

TP-LINK®
The Reliable Choice
Installation Guide

Outdoor CPE
CPE210 / CPE220 / CPE510 / CPE520

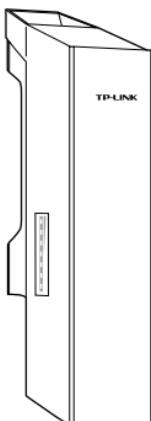
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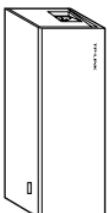
Overview

TP-LINK's Pharos series outdoor CPEs are dedicated to outdoor wireless network solutions. This guide is applicable to products including CPE210, CPE220, CPE510 and CPE520.

• Package Contents



Pharos CPE



Passive PoE Adapter



Power Cord



Pole Mounting Straps



Installation Guide

• LED Explanation



AP/AP Router mode:

All four LEDs remain solid.

Client/Bridge/Repeater/AP Client Router mode:

That the more LEDs lit will indicate better wireless signal strength.

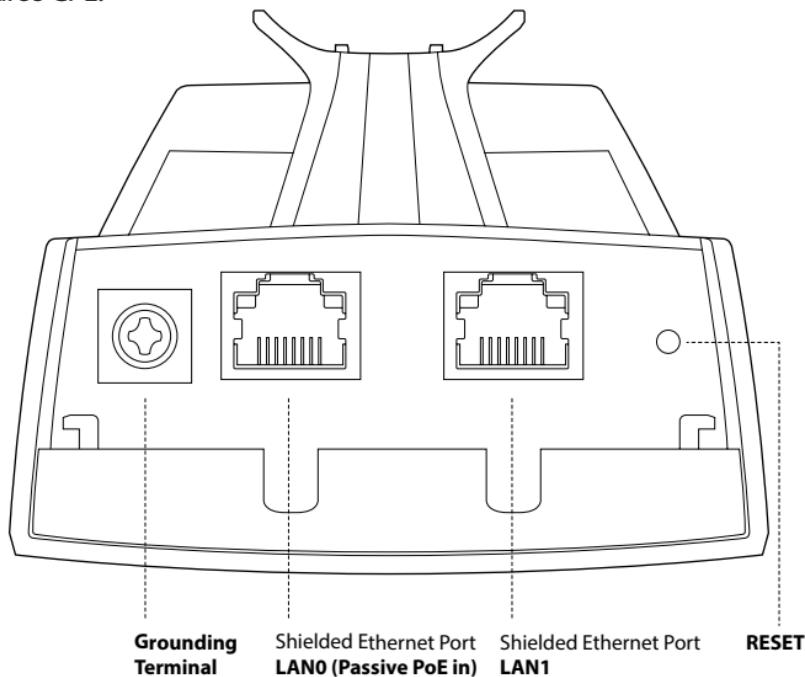
On: A device is connected to this port, but there is no activity.

Flashing: A device is connected to this port, and is active.

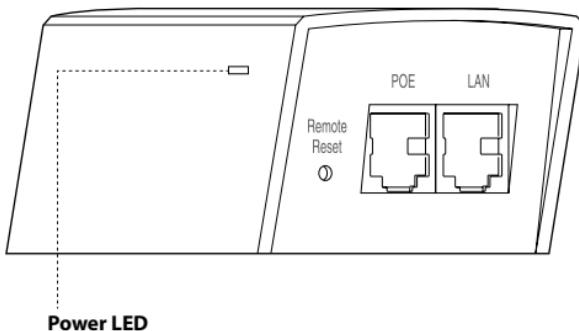
On: The CPE is powered on.

• Panel Layout

Pharos CPE:



Passive PoE Adapter:



Power LED

The Power LED indicates the status of the electric current:
green (0~0.8A), red (0.8A~1A).

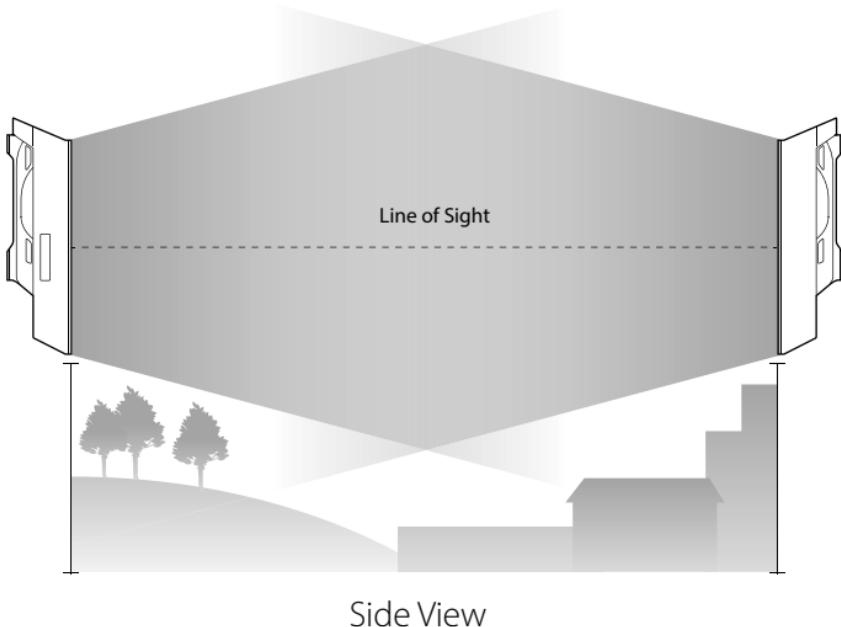
Hardware Connection

1. Site Consideration

• Mounting Height

Ensure a clear line of sight between the wireless devices for an optimum performance. An elevated location is recommended as obstacles like trees, buildings and large steel structures will weaken the wireless signal.

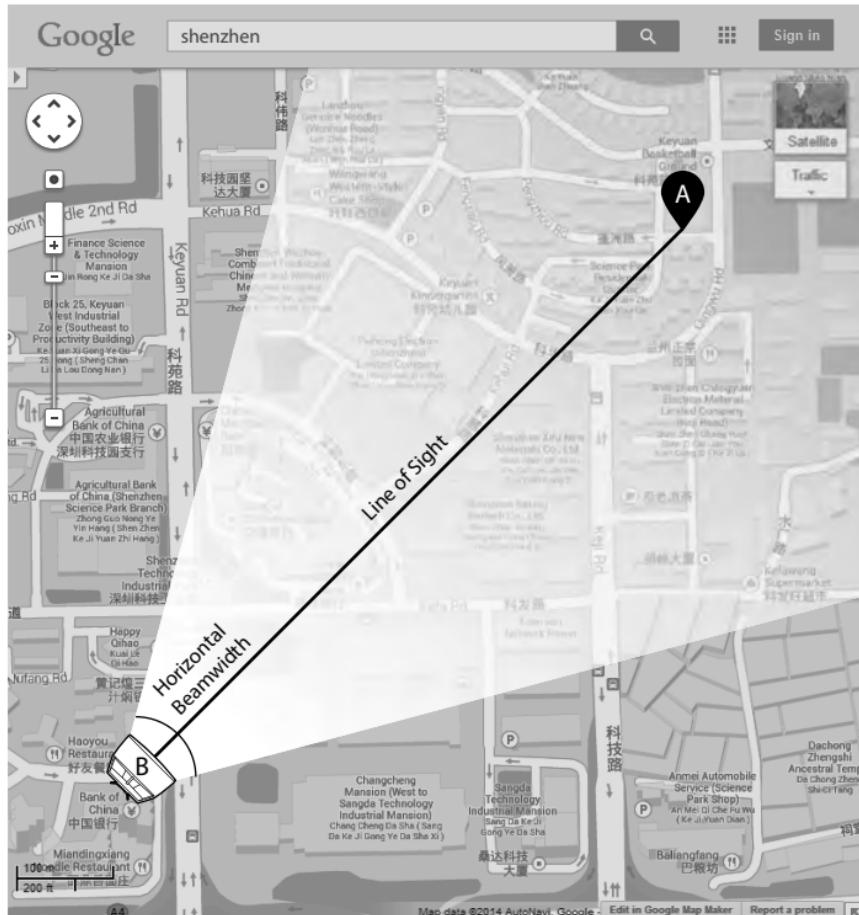
See 'Q2' in 'FAQ' for details about how to calculate the minimum mounting height of the devices.



• Orientation

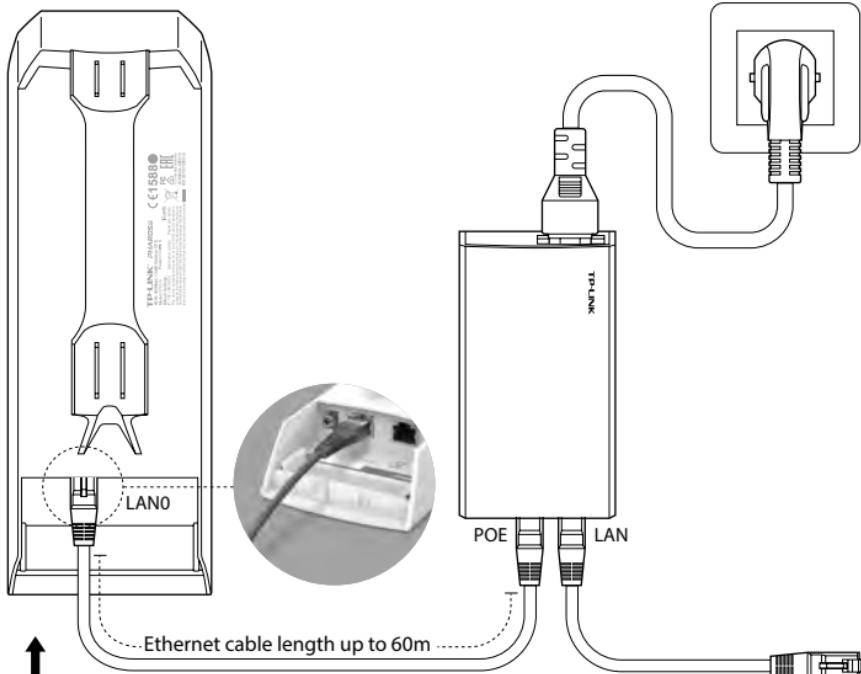
Install the CPE devices with the front facing the intended signal receiving devices. You can orient the devices with the assistance of Google Maps, GPS and some landmarks according to the horizontal beamwidth listed below.

Models	CPE210	CPE220	CPE510	CPE520
Horizontal Beamwidth	70°	45°	45°	50°



2. Connection and Installation

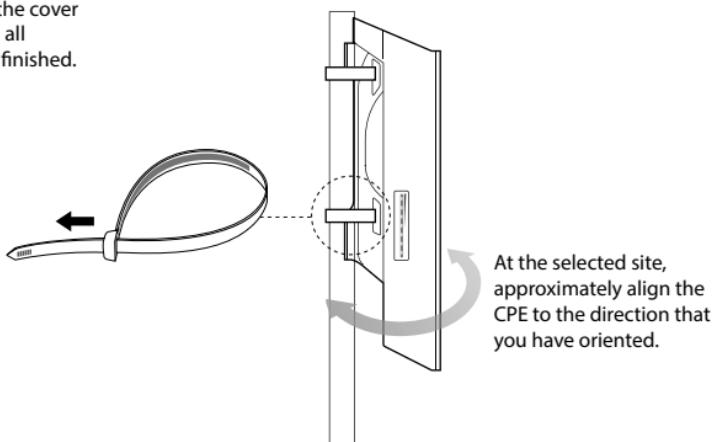
Please connect and install the device as shown in the figure below.



Slide to replace the cover of the CPE when all connections are finished.

You should prepare an adequate Ethernet cable to connect the CPE and the passive PoE adapter. Shielded CAT5e (or above) cable with ground wire is recommended (refer to the next section).

Connect to a computer, router or switch. (Depending on your intended usage and/or network topology.)

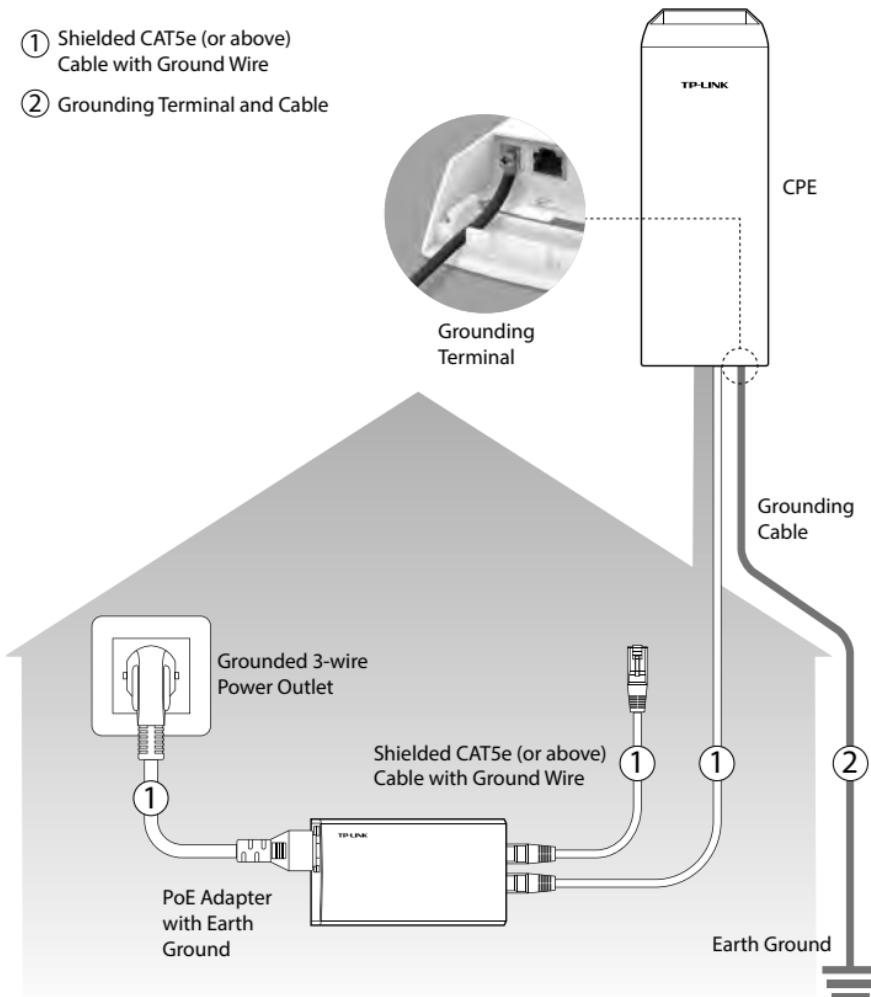


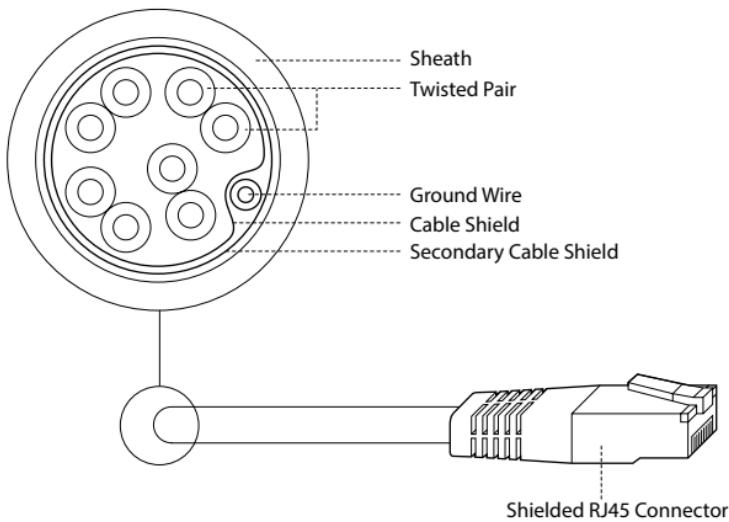
3. Lightning & ESD Protection

Proper grounding is extremely important for outdoor devices. By using shielded CAT5e (or above) cable with ground wire for the connection and the provided PoE adapter (method ①), you can effectively eliminate ESD attacks. If you use the general CAT5e cable for the connection, then it is necessary to connect the grounding terminal of the CPE to earth ground through grounding cable (method ②).

Two Methods:

- ① Shielded CAT5e (or above) Cable with Ground Wire
- ② Grounding Terminal and Cable





Shielded CAT5e (or above) Cable with Ground Wire

Software Configuration

This chapter introduces the login to the PharOS Web Interface and the software configurations to implement three typical applications, including point-to-point and hotspot.

1. Logging into the PharOS

1. Before accessing the PharOS Web Interface, you need to assign a static IP address 192.168.0.x (2≤x≤253) to your computer. We use 192.168.0.10 as an example in the figure below.



2. Open your web browser, type 'http://192.168.0.254' in the address field and press 'Enter'. It is recommended to use the latest version of Google Chrome, Safari or Firefox.



3. The 'Login' page will appear, set the parameters as below.
 - Username: admin.
 - Password: admin.
 - Select 'I agree to these terms of use'.
 - Click 'Login'.

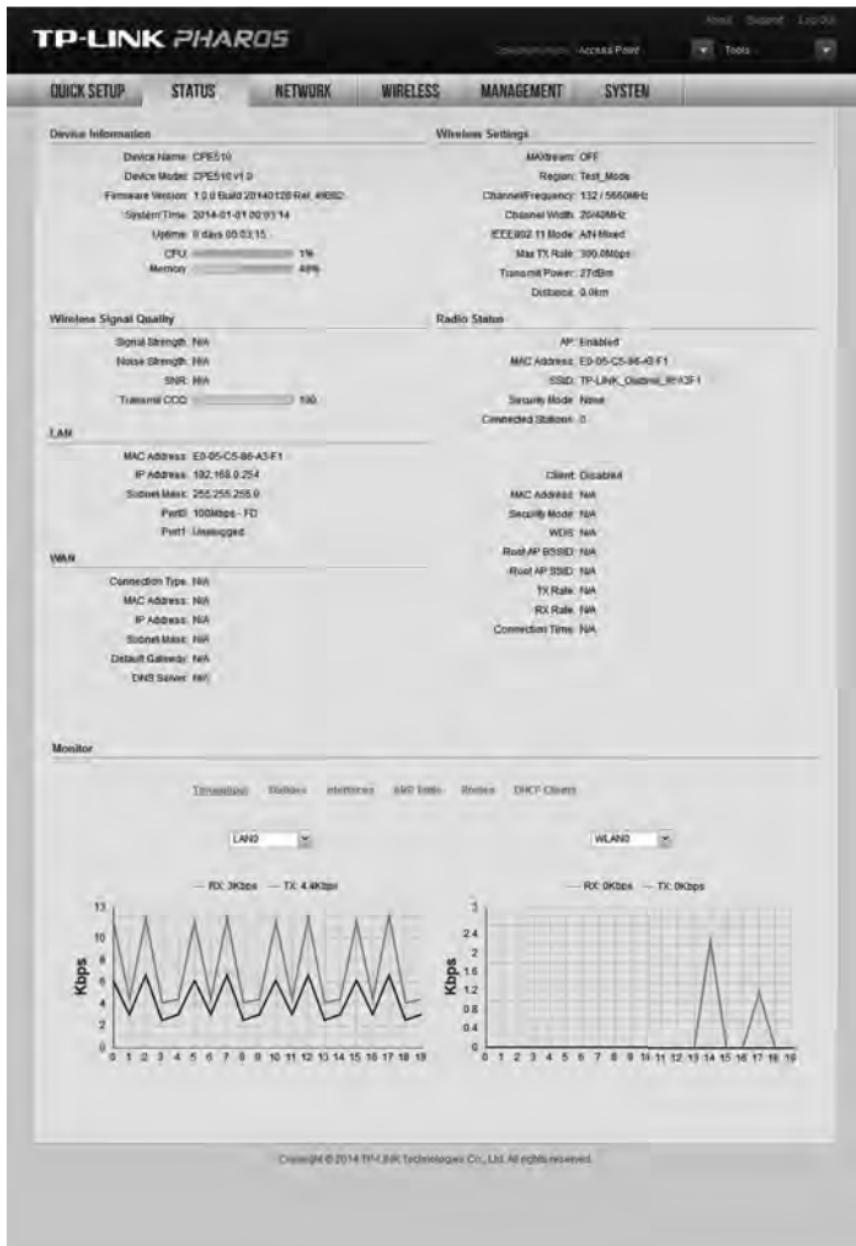


4. At the first login, change the 'Password' for safety.



For subsequent logins, you only need to enter the username and password that you have set to log in.

5. Then you will log in to the PharOS Web Interface and see the Status page as shown in the figure below.

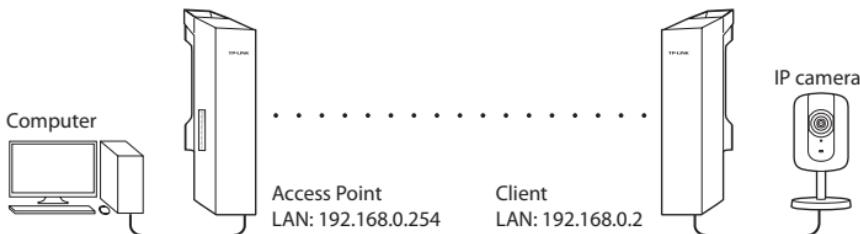


2. Configuration for Typical Applications

This section introduces the configurations for the point-to-point, and hotspot applications. Refer to the section corresponding to your networking needs.

- **Point-to-Point**

Point-to-Point application is used to build a transparent bridge between two locations which are far from each other. The figure shown below is an example for this application.



Refer to the following steps to configure the CPEs.

Configure the Access Point

1. Log in to PharOS
2. Go to the Quick Setup page
3. Operation Mode
 - Select 'Access Point'.
 - Click 'Next'.
4. LAN Settings: Click 'Next'.
5. Wireless AP Settings
 - SSID: customize the name for the network as you like.
 - Security: select 'WPA-PSK/WPA2-PSK'.
 - PSK Password: create the password for the network as you like.
 - Distance Setting: enter the distance between the Access Point and the Client. It is recommended to round the number up to the nearest integer.
 - Select the MAXtream option if the Access Point and the Client both are Pharos outdoor CPEs. (Refer to 'Q4' in 'FAQ' for details about MAXtream)
 - Click 'Next'.
6. Finish: Click 'Finish'.

Antenna Alignment

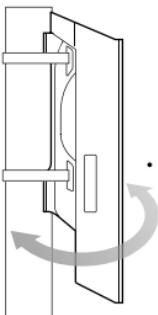
In order to get the best performance, you can precisely align the direction of the CPE with the assistance of 'Wireless Signal Quality' on 'STATUS' page of the PharOS Web Interface.

Device Name:	CPE510
Device Model:	CPE510 v1.0
Firmware Version:	1.0.0 Build 20140325 Rel. 62329
System Time:	2014-01-01 00:02:28
Uptime:	0 days 00:02:30
CPU:	1%
Memory:	49%
MAXstream:	OFF
Region:	Argentina
Channel Frequency:	157 / 5785MHz
Channel Width:	20/40MHz
IEEE802.11 Mode:	AN Mixed
Max TX Rate:	300.0Mbps
Transmit Power:	27dBm
Distance:	27.0km

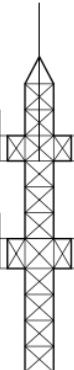
Signal Strength:	-95dBm
Noise Strength:	-110dBm
SNR:	24dB
Transmit CQI:	100

AP:	Enabled
MAC Address:	E8-DE-27-21-04-FE
SSID:	TP-LINK_Dlink00_2104FE
Security Mode:	None
Connected Stations:	0

Adjust the direction of the CPE until the device reaches the highest SNR.



WISP



Specifications

HARDWARE FEATURES				
Dimensions	CPE520/CPE220: 275.83*79*60.3mm CPE510/CPE210: 224.34*79*60.3mm			
Interface	LAN0: 10/100Mbps Ethernet Port(PoE IN) LAN1: 10/100Mbps Ethernet Port GND: Grounding Terminal for Lightning Protection RESET: Button to restore the device to Factory Default			
Power Supply	24V Passive PoE Adapter Included			
ESD Protection ¹	15kV			
Lightning Protection ¹	Up to 6kV			
Operating Temperature	-30°C ~ 70°C (-22F ~158F)			
Operating Humidity	10% ~ 90%			
Certification	CE, FCC, RoHS, IPX5			
WIRELESS FEATURES				
Models	CPE210	CPE220	CPE510	CPE520
Antenna Gain	9dBi	12dBi	13dBi	16dBi
Horizontal Beamwidth/ Elevation Beamwidth ²	70° / 45	45° / 30°	45° / 30°	50° / 20°
Operating Frequency ³	2.4- 2.4835GHz	2.4- 2.4835GHz	CE:5.5-5.725GHz FCC:5.15-5.25GHz; 5.745-5.85GHz	CE:5.5-5.725GHz FCC:5.15-5.25GHz; 5.745-5.85GHz
802.11 Standards	11b/g/n	11b/g/n	11a/n	11a/n

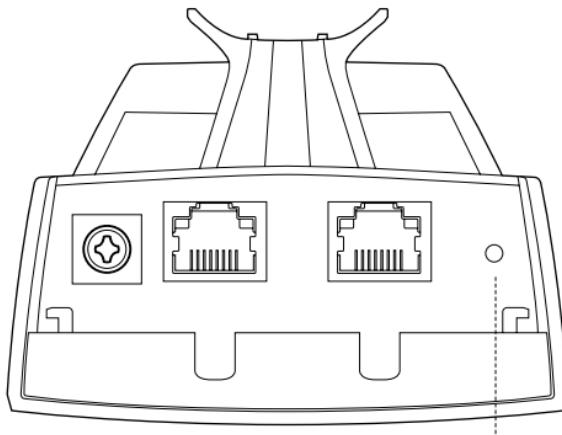
This is fixed point-to-point device not point-to-multipoint device.

FAQ (Frequently Asked Questions)

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

With the CPE powered on, press and hold the 'RESET' button of the CPE or the 'Remote Reset' button of the passive PoE adapter for about 8 seconds until the Wireless Signal Strength LEDs flash.

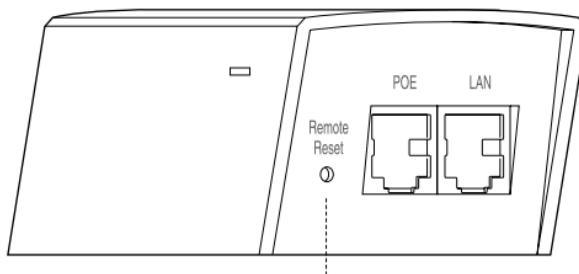
Method 1:



RESET Button

Press & hold for about 8 seconds

Method 2:

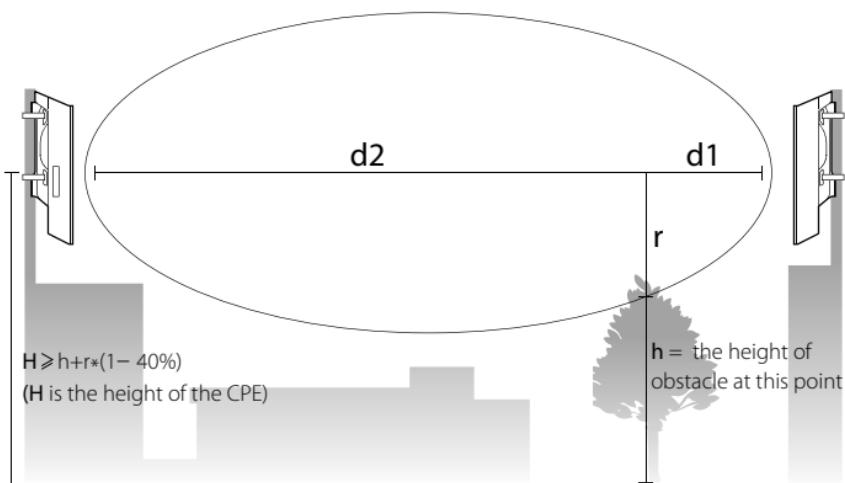


Remote Reset Button

Press & hold for about 8 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 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:

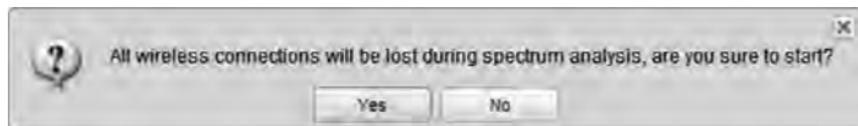
http://en.wikipedia.org/wiki/Fresnel_zone

Q3. How can I use Spectrum Analysis to find the appropriate channel for the devices?

1. Log in to PharOS, on the 'WIRELESS' page, you can find the 'Spectrum Analysis' button as shown in the figure below. Click the button.

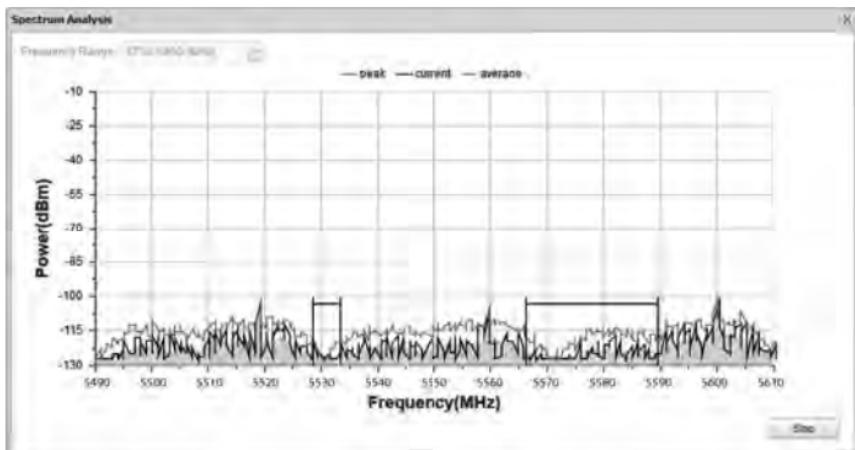


2. The following window will pop up. Click 'Yes' and you will then get into the 'Spectrum Analysis' page.



3. Select the 'Frequency Range' and click the 'Start' button, the PharOS will begin to analyze the power of the frequency. Watch the curves for a period of time, and then click 'Stop'. Mark the relatively low and continuous part of the 'average' curve, and note the corresponding frequency range.

Here we take the figure below as an example.



4. Close the Spectrum Analysis Window, and then you will get back to the 'WIRELESS' page. For the Channel/Frequency option, it is recommended to select a value whose frequency is within the noted frequency range.

So, in this example, the recommended Channel/Frequency is 116/5580MHz.

Q4. 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 & improves channel efficiency.
- Lower latency, higher throughput, larger network capacity & more stability.

To enable the MAXtream function among the AP and stations, you only need to select the MAXtream option on the 'WIRELESS' page of the PharOS Web Interface of the AP, shown as the figure below. Then the stations will automatically adjust their connections to the AP.



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.

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.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 26cm between the radiator & your body.

CE Mark Warning

€1588

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.

IC STATEMENT

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.



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



Safety Information

- When product has power button, the power button is one of the way to shut off the product; When there is no power button, the only way to completely shut off power is to disconnect the product or the power adapter from the power source.
- Don't disassemble the product, or make repairs yourself. You run the risk of electric shock and voiding the limited warranty. If you need service, please contact us.
- Avoid water and wet locations.

NCC Notice & BSMI Notice

注意！

依據 低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性或功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通行；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信規定作業之無線電信。低功率射頻電機需忍受合法通信或工業、科學以及醫療用電波輻射性電機設備之干擾。

減少電磁波影響，請妥適使用。



於 5.25GHz 至 5.35GHz 區域內操作之無線設備的警告聲明
工作頻率 5.250~5.350GHz 該頻段限於室內使用。

安全諮詢及注意事項

請使用原裝電源供應器或只能按照本產品注明的電源類型使用本產品。

- 清潔本產品之前請先拔掉電源線。請勿使用液體、噴霧清潔劑或濕布進行清潔。
- 注意防潮，請勿將水或其他液體潑灑到本產品上。
- 插槽與開口供通風使用，以確保本產品的操作可靠並防止過熱，請勿堵塞或覆蓋開口。
- 請勿將本產品置放於靠近熱源的地方。除非有正常的通風，否則不可放在密閉位置中。
- 請不要私自打開機殼，不要嘗試自行維修本產品，請由授權的專業人士進行此項工作。

此為甲類資訊技術設備，于居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

This product can be used in the following countries:

AT / BG / BY / CA / CZ / DE / DK / EE / ES / FI / FR / GB / GR / HU / IE / IT
LT / LV / MT / NL / NO / PL / PT / RO / RU / SE / SK / TR / UA / US

Industry Canada statement:

This device complies with RSS-247 of the Industry Canada 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.

Ce dispositif est conforme à la norme CNR-247 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Caution :

- (i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- (ii) the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate; and
- (iii) Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Avertissement:

- (i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
- (ii) le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée pour l'exploitation point à point et l'exploitation non point à point, selon le cas;
- (iii) De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Professional installation instruction

1. Installation personal

This product is designed for specific application and needs to be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting.

2. Installation location

The product shall be installed at a location where the radiating antenna can be kept 26cm from nearby person in normal operation condition to meet regulatory RF exposure requirement.

3. External antenna

Use only the antennas which have been approved by the applicant. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC/IC limit and is prohibited.

4. Installation procedure

Please refer to user's manual for the detail.

5. Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.

Instructions d'installation professionnelle

1. Installation

Ce produit est destine a un usage specifique et doit etre installe par un personnel qualifie maitrisant les radiofrequences et les regles s'y rapportant. L'installation et les reglages ne doivent pas etre modifies par l'utilisateur final.

2. Emplacement d'installation

En usage normal, afin de respecter les exigences reglementaires concernant l'exposition aux radiofrequences, ce produit doit etre installe de facon a respecter une distance de 40 cm entre l'antenne emettrice et les personnes.

3. Antenn externe.

Utiliser uniiquement les antennes approuvees par le fabricant. L'utilisation d'autres antennes peut conduire a un niveau de rayonnement essentiel ou non essentiel depassant les niveaux limites definis par FCC/IC, ce qui est interdit.

4. Procedure d'installation

Consulter le manuel d'utilisation.

5. Avertissement

Choisir avec soin la position d'installation et s'assurer que la puissance de sortie ne depasse pas les limites en vigueur. La violation de cette regle peut conduire a de serieuses penalites federales.



DECLARATION OF CONFORMITY

No. of this DoC: TE7CPE510

Company: **TP-LINK TECHNOLOGIES CO., LTD.**

We declare under our own responsibility for the following equipment:

Product Description: **5GHz 300Mbps 13dBi Outdoor CPE**

Model No.: **CPE510**

Trademark: **TP-LINK**

The above products satisfy all the technical regulations applicable to the product within the scope of Council Directives:

Directives 1999/5/EC, 2004/108/EC

The above product is in conformity with the following standards or other normative documents:

EN 300 328 V1.8.1: 2012-06

EN 301 893 V1.7.1:2012-06

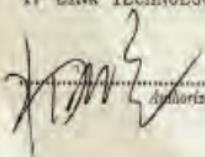
EN 301 489-1 V1.9.2:2011 & EN 301 489-17 V2.2.1:2012

EN60950-1:2006+A11:2009+A1:2010+A12:2011

Person is responsible for marking this declaration:

For and on behalf of

TP-LINK TECHNOLOGIES CO.,LTD.



.....
Authorized Signature(s)

Yang Hongliang
Product Manager of International Business

Date of Issue: 2014-06-20

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