

Omada EAP Solution 5

EAP Outdoor Wi-Fi Solution for Hotspot Applications

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Background

Smartphones have become integral to our daily lives. This has driven an increased demand for Wi-Fi in all types of public spaces. Currently, Wi-Fi hotspots are widespread in indoor settings. Outdoors, however, the potential for access points remains largely untapped. TP-Link's Omada EAP products represent a versatile solution, able to deliver reliable, fast wireless access to users both indoors and out.

Application Scenarios

- Schools, squares, beaches and other outdoor public places that require Wi-Fi coverage.
- Outdoor businesses, such as amusement parks, sports centers, zoos and more.

Why TP-Link?

1. 20 years of experience delivering quality products at an affordable price
2. Over 1000 global professional and reliable partners
3. Effective, economical and reliable wireless solutions
4. Diverse range of products available to suit your business
5. Outstanding technical support team with both pre-sales and post-sales support
6. Free and professional global hotline support and warranty service available 24/7

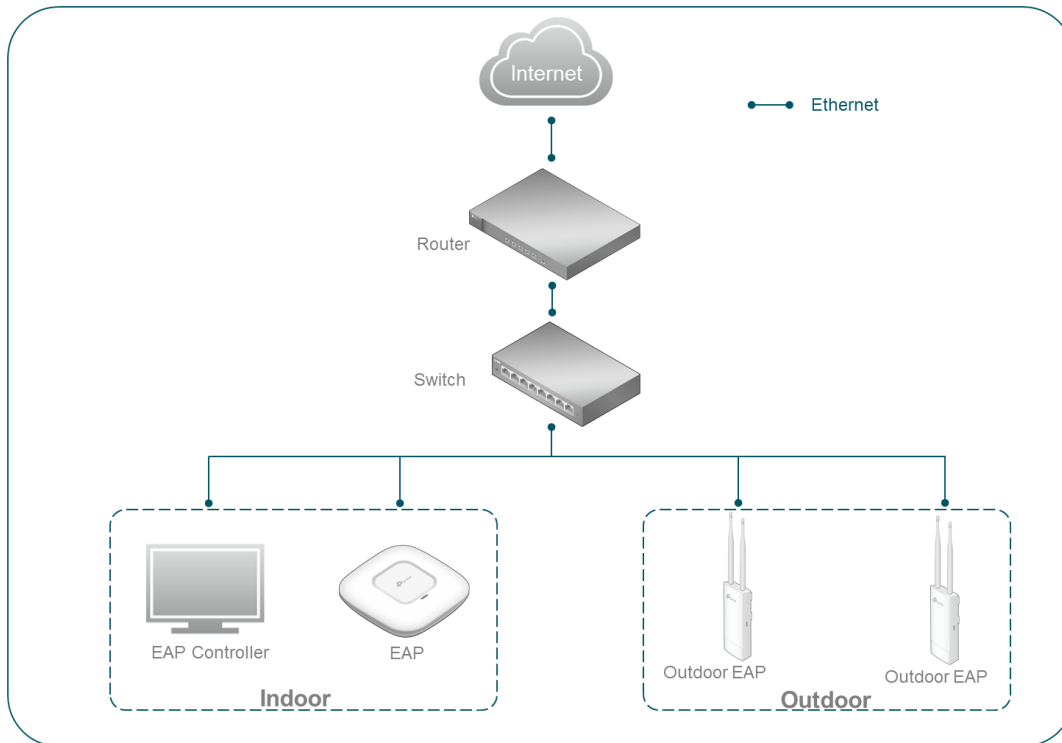
Solution

This document will introduce the EAP Outdoor Wi-Fi Hotspot Solution, which consists of the following three parts:

- A. Solution Overview and Topology Description**
- B. Network Deployment and Configuration Guide**
- C. Advanced Functions.**

A. Solution Overview and Network Topology Description

Networking Solution — EAP Outdoor Wi-Fi Hotspot Solution



As shown above:

1. EAP110 Outdoor access points are used to provide outdoor Wi-Fi coverage and linked to the indoor parts of the network via a switch.
2. An EAP Controller allows centralized maintenance and management of both indoor and outdoor networks.

B. Network Deployment and Configuration Guide

1. Network Deployment and Configuration Guide 1: Solution Selection

The EAP Outdoor Wireless Hotspot Solution has the following advantages:

- 1) Able to handle a large quantity of connected clients and provide a wide range of wireless coverage at an affordable price.
- 2) Various advanced functions are supported, such as Portal Authentication, Management VLAN and more.
- 3) Centralized maintenance and management together with indoor network via the EAP Controller.

2. Network Deployment and Configuration Guide 2: Product Selection

TP-Link offers a range of EAP Outdoor products to meet the needs of different customer scenarios. The detailed specifications are as follows:

Model	EAP110-Outdoor	
Wireless Speed	2.4GHz 300Mbps	
LAN Interface	10/100Mbps Ethernet Port * 1	
Antenna	5dBi	
Transmission Power	27dBm(US Version)	
Recommended Client Number	35	
Advance	Rate Limit	√

Function	Load Balance	√
	Captive Portal	√
	Hotspot Authentication	√(Voucher)
	Access Control	√
	Multi-SSID	√(Up to 8)
	Reboot Schedule	√
	Wireless Schedule	√
	Remote Reset	√

3. Network Deployment and Configuration Guide 3: Information Collection

- **Maps**

Clear site maps can display the position of all wireless access points. Customers usually provide their own maps. You can also use Google Maps or shooting in the field to obtain topographic maps.

- **Number, distribution and bandwidth requirements of clients**

You could divide the site into the main areas where wireless client activity takes place, then evaluate the peak number of clients and the bandwidth requirements in each zone based on the site maps. The bandwidth requirements of different services are listed in the following table:

Type	Bandwidth Requirement
Web browse	160~400kbps
IM (such as Skype, Line, WhatsApp)	32~64 kbps
SNS (Eg: Facebook, Instagram)	200 kbps
VoIP	256 kbps
Game	200 kbps
HD video	512 kbps

For instance, the barbecue area in the park can accommodate 300 people, and the peak concurrency volume reaches 60% at lunch time. Since the main internet use is social software applications, you can estimate the bandwidth requirements of each client in the barbecue area as being

$$\begin{aligned}
 \text{BW} &= 300 * 60\% * 200\text{kbps} \\
 &= 36\text{Mbps}.
 \end{aligned}$$

- **Obstacles**

For outdoor wireless deployment, obstacles should be taken into consideration. For instance, a hill may block the area behind it from receiving wireless signal. You need mark out the position of such obstacles when planning the network deployment and take it into consideration.

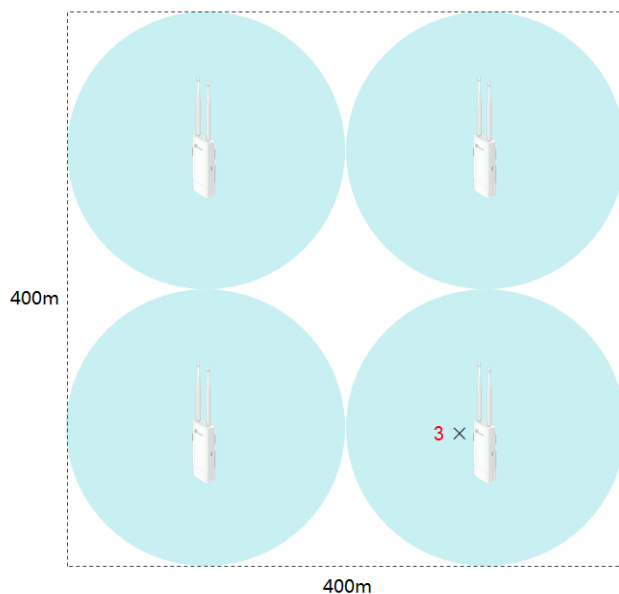
4. Network Deployment and Configuration Guide 4: Quantity and Installation Location

- **Quantity of EAPs**

The quantity of access points depends on the size of each activity area and the number of clients. The distance of the clients from the access point should be less than 100m to ensure a good communication quality. Since the transmission power of wireless devices such as mobile phones is much less than for

the access points, it is recommended that you use a single EAP Outdoor to cover an area with a radius of 100m or less. Since there is a limit to the number of connected clients on a single EAP Outdoor, if the client density of a certain area is large, you need to increase the number of EAP Outdoor products to balance the load.

For instance, below is a plan view of a 400*400m playground. The number of clients in the lower right area reaches 50 at peak times, so three EAP Outdoor are required in this area to share the load.



- **Installation Location**

You can mark all locations where the access points will be installed on the maps. If no street lights or other suitable locations are present, special mounting brackets can be used to install the EAPs. Taking power supply into account, the installation location should be no more than 60m from the power supply.

5. Network Deployment and Configuration Guide 5: Field Deployment

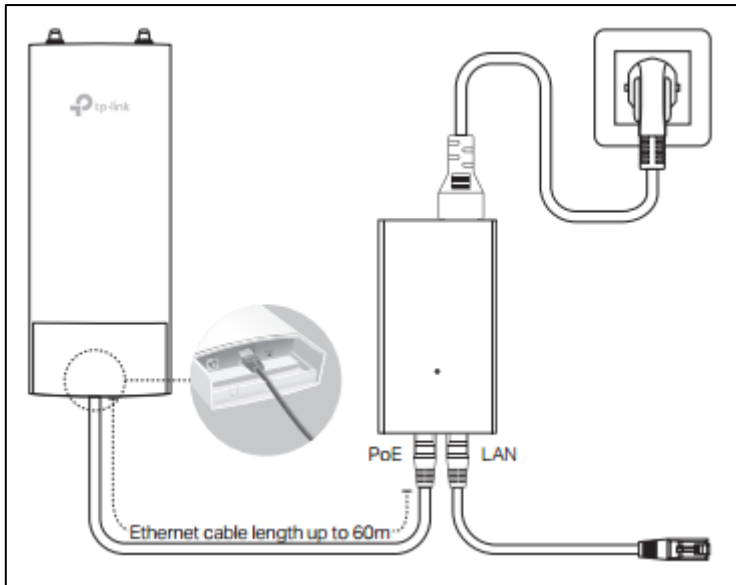
- **AP Installation.**

EAP110-Outdoor supports two types of installation: wall-mounted and pole-mounted. You can install them according to your environment. For more details, please refer to page 7 and 8 of the [Installation Guide](#).

Note: An outdoor environment is usually more open than an indoor one, and the vertical lobe width of omnidirectional antenna is narrow. Therefore, it is generally best to install the EAPs at a height of no more than 3m so as to ensure better wireless signal quality.

- **Power Supply and Lightning Protection**

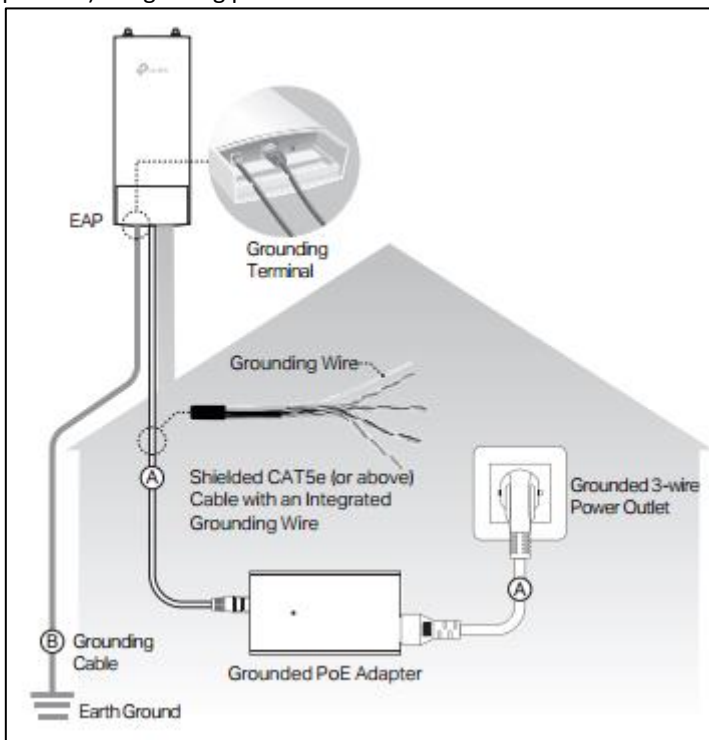
EAP110-Outdoor supports 24V/0.6A Passive PoE power supply. An Ethernet cable can supply power up to a distance of 60m. Therefore, you can easily power the devices with an indoor source.



Note: Passive PoE is different from Standard PoE. You cannot supply power to EAP Outdoor products with PoE switches. For detailed information about PoE power supply, please refer to [FAQ-906](#).

If your project requires lightning protection, you can:

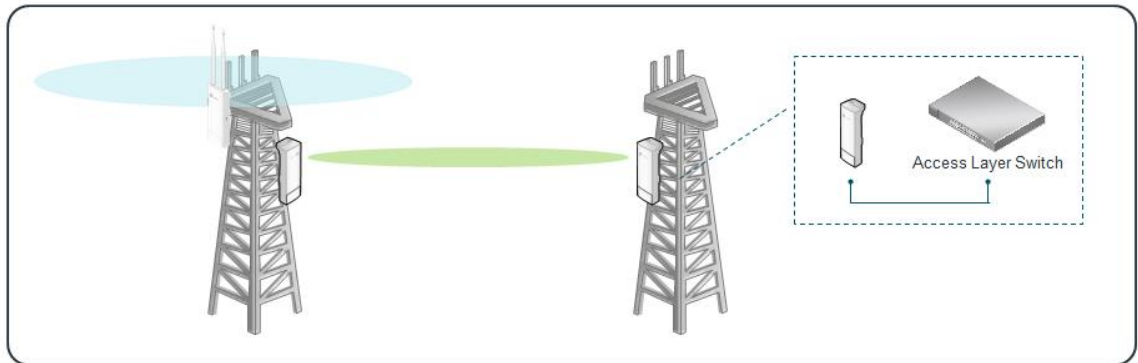
- 1) Connect ground electrode to the grounding terminal.
- 2) Use Cat5e (or above) shielded twisted pair cables to work with the PoE Adapter (included with product) as lightning protection.



- **Backhaul**

For the wired connection, you need to directly connect the EAP110 Outdoor with the access layer (wired network) switch. In order to prevent the cable lines from being damaged by others, you may need to deploy a steel pipe around them.

It is also possible to use the wireless method as backhaul instead. You can deploy a P2P link between the access layer (wired network) switch and the EAPs.



6. Network Deployment and Configuration Guide 6: Network Configuration and Optimization

- **EAP Discovery and Management.**

If the EAP110-Outdoor and EAP Controller are in the same subnet, you simply need to log in to the EAP Controller management interface and then adopt the EAPs to be managed. (The EAP Controller automatically discovers EAPs in the same network subnet.) For more details, you can refer to the [EAP Controller User Guide](#).

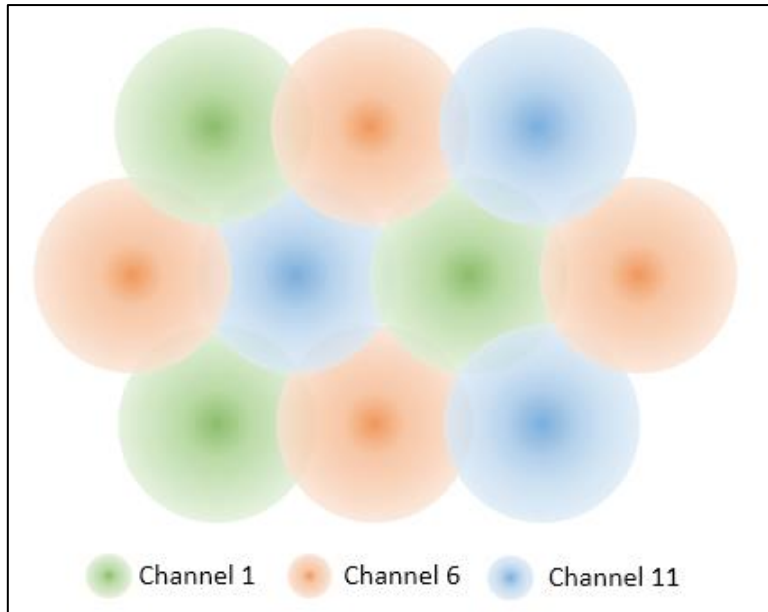
If the EAP110-Outdoor and EAP Controller are in different subnets, the EAPs must be informed of the EAP Controller's IP address. You can achieve this by installing the EAP Discover Utility in the same subnet as the EAP Controller. Run it and fill in EAP Controller's host IP address (the IP address of the PC/server where you installed the EAP Controller). For details of how to complete the configuration, refer to [FAQ-1361](#).

Note: EAP Discover is currently available for Windows and MAC OS.

After the EAP Controller discovers your EAPs, you can close the EAP Discover. However, if the EAP Controller's host IP address is changed, or any EAP Outdoors have been forgotten by the EAP Controller or reset manually, you need to rerun the EAP Discover so the EAP Controller can discover the EAPs again.

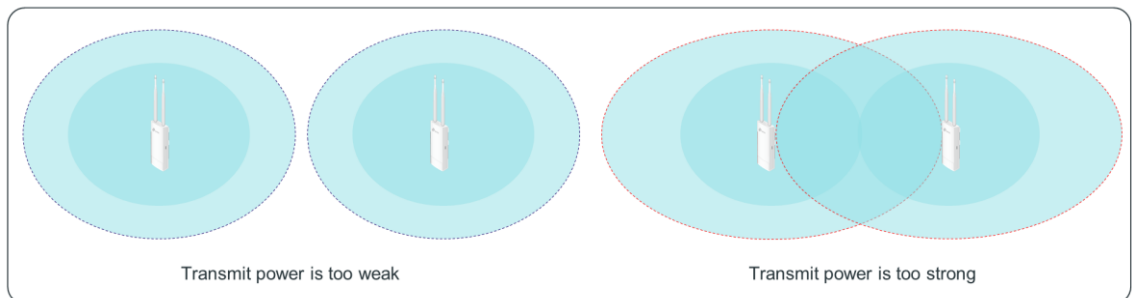
- **Channel Optimization**

No matter whether you select the 2.4GHz or 5GHz band when deploying your wireless network, it is important to ensure that wireless signals of adjacent EAPs do not interfere with each other. To achieve this, we can manually assign and fix channels for each access point. The following figure shows a possible channel assignment layout based on the three non-overlapping 2.4GHz wireless channels (1, 6 and 11).



- **Transmission Power Adjustment**

Generally, the higher the transmission power is, the larger the area that the wireless signal can cover. In places with a high density of clients, however, access points tend to be placed very close together, which may result in their wireless signals interfering. High transmission power is another factor that can result in interference between adjacent access points. Analyzing transmission power requires professional wireless signal analysis tools such as inSSIDer. However, when two access points are close together and there is no obstacle between them, it is recommended to reduce the transmission power. If there are many obstacles and access points are spread far apart from one another, the transmission power may be increased.



- **Load Balance**

Load Balance attempts to distribute wireless clients evenly between access points. Clients with a weak wireless signal can also be removed from the network, creating a smoother connection for users. To learn more about how Load Balance works, and how to configure it, please refer to the EAP Controller's User Guide (Page 61).

- **Bandwidth Testing and Optimization**

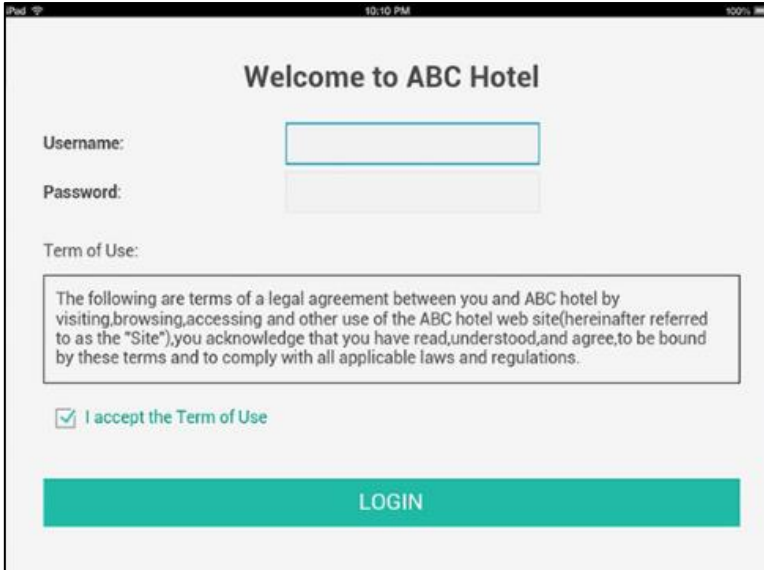
Bandwidth testing the wireless performance can be achieved by simulating multiple clients surfing the internet simultaneously and streaming video, browsing the webpages, making VoIP calls and more. If the bandwidth cannot satisfy the requirements of the clients, the access point may be overloaded or the

channel capacity is insufficient. This shortage of bandwidth can be solved by increasing the number of access points and by allocating clients by staggering the working channel of each base station.

C. Advanced Functions

1. Advanced Function 1: Enable Captive Portal to Provide Flexible User Authentication

EAP110-Outdoor supports a variety of authentication types to create a secure wireless network while promoting your business. For instance, if you enable the External Portal Server authentication type, you could set up your Portal Server design and customize the authentication page by adding your company's logo. For details about Portal types and configuration please refer to [FAQ-896](#).



The screenshot shows a mobile device screen displaying a captive portal for 'ABC Hotel'. The page has a light gray background and a teal 'LOGIN' button at the bottom. The title 'Welcome to ABC Hotel' is centered at the top. Below the title are two input fields: 'Username:' and 'Password:'. Underneath these is a 'Term of Use:' section with a text box containing the following text: 'The following are terms of a legal agreement between you and ABC hotel by visiting,browsing,accessing and other use of the ABC hotel web site(hereinafter referred to as the "Site"),you acknowledge that you have read,understood,and agree,to be bound by these terms and to comply with all applicable laws and regulations.' Below the text box is a checked checkbox with the text 'I accept the Term of Use'.

2. Advanced Function 2: Enable Multi-SSID to Isolate Guest Network and Host Network

For better security and network management, it is recommended to enable the Multi-SSID function of your outdoor wireless hotspots, so that guests and internal staff will connect to different SSIDs. You can then isolate these networks by setting up VLANs on switches. For details on how to configure Multi-SSID, please refer to [FAQ-755](#).

3. Advanced Function 3: Enable Rate Limit to Ensure User Experience

Rate Limit works by limiting P2P download speeds and other bandwidth intensive applications to ensure that all users have a good internet experience. With the Rate Limit function enabled, we can set up the maximum allowed upload and download rate for each client. This avoids situations where individual clients are taking up a large proportion of the bandwidth and slowing down the internet connection of other users. For how to configure Rate Limit, please refer to [FAQ-914](#).

4. Advanced Function 4: Enable Management VLAN to Ensure Network Security

In order to improve the stability and security of the wireless network, administrators can choose to limit access and management of the EAP Controller to hosts (PC/server with the EAP Controller installed) within a single VLAN. To do this, you should enable the Management VLAN function. For details of how to configure Management VLAN, please refer to page 53 of the [EAP Controller User Guide](#).