

Auranet CAP Solution 1

CAP Indoor Wi-Fi Solution for Small-Sized and Single-Subnet Networks

Albert.Hao

2017-1-24

Contents

Background	2
Application Scenarios	2
Why TP-Link?.....	2
Solution	2
A. Solution Overview and Network Topology Description	3
B. Wired Network Deployment and Configuration Guide	3
1. Wired Network Deployment and Configuration Guide 1: Gateway Selection	3
2. Network Deployment and Configuration Guide 2: Power Supply Selection	4
C. Wireless Network Deployment and Configuration Guide	5
1. Wireless Network Deployment and Configuration Guide 1: Solution Selection	5
2. Wireless Network Deployment and Configuration Guide 2: CAP Product Selection.....	5
3. Wireless Network Deployment and Configuration Guide 3: CAP Product Deployment	5
1) CAP Product Installation	5
2) CAP Product Cabling.....	5
3) Wireless Network Settings	6
4) Wireless Network Optimization.....	6
4. Wireless Network Deployment and Configuration Guide 4: Improve Wi-Fi Access Experience	7

Background

Visitors to bars, cafés, restaurants and shops, and to offices and conference rooms, increasingly expect to receive free Wi-Fi as part of the experience. For small-scale public locations with a high-density of end users such as these, Wi-Fi infrastructure should be built that can handle concurrent access from a large number of devices, whilst also maintaining a stable network when receiving a large number of connection requests. Routers and access points designed for home use are unable to meet such demands.

TP-Link's Auranet CAP Series products provide secure, stable and cost-effective indoor solutions engineered to meet the networking needs of today's businesses. With 20 years of networking experience behind us, TP-Link has an outstanding track record as a commercial wireless network solutions provider, owing to our dedicated technical support team and trusted partners.

Application Scenarios

The solutions provided here apply to the following customers and application scenarios:

1. Bars, cafes, restaurants, shops, conference rooms, offices and other small indoor settings with a client number of 20-100.
2. Users requiring fast, stable wireless internet service.

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 for your business
5. Outstanding technical support team with both pre-sales and post-sales support
6. Free and dependable global hotline support and warranty service available 24/7

Solution

This document will demonstrate a Wi-Fi networking solution for small-sized and single-subnet networks based on CAP products. The TP-Link CAP solution contains the following parts:

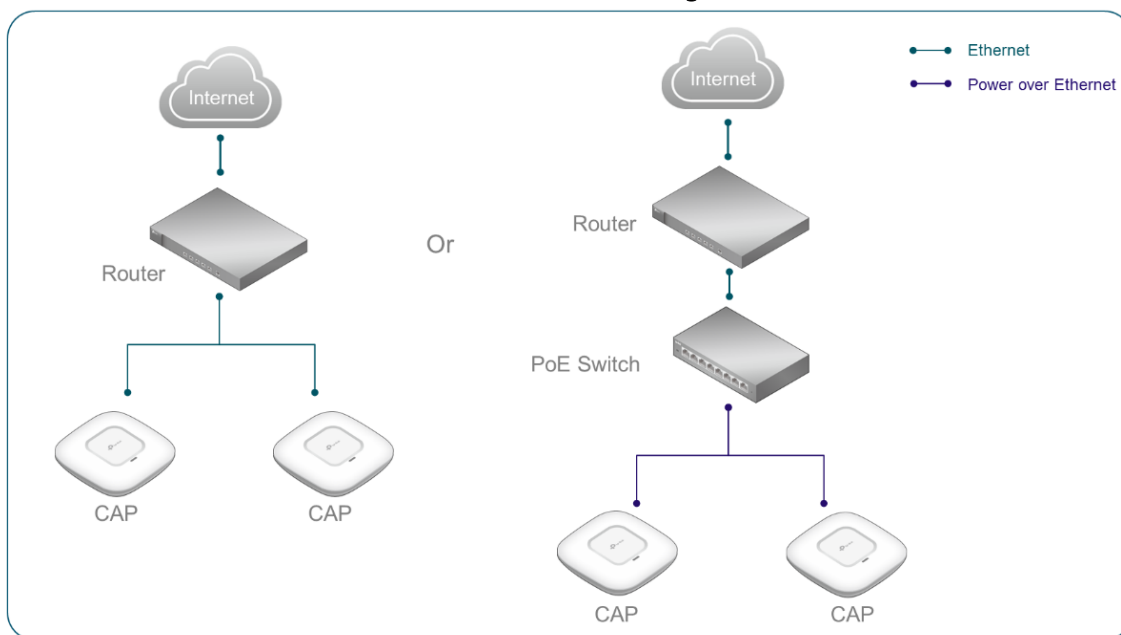
A: Solution Overview and Network Topology Description.

B. Wired Network Deployment and Configuration Guide.

C. Wireless Network Deployment and Configuration Guide

A. Solution Overview and Network Topology Description

Solution: CAP Indoor Wi-Fi Solution for a Small-Sized and Single-Subnet Network



As shown above:

- 1) CAP products are used to extend the wireless network based on the existing wired network.
- 2) When CAPs work in FAT mode (Standalone mode), each CAP can be managed and configured separately through the web interface.
- 3) A power adapter or POE switch can be used for power supply according to the size of the network.

You can deploy an appropriate number of CAPs for your indoor wireless network by considering the area where wireless coverage is needed and the number of clients during peak usage. The recommended number of wireless clients for each CAP is 25. (For dual-band CAPs the number is 50, or 25 for each band.) A single CAP has a range of 15 meters. For guidelines on the number of CAPs needed in an ideal environment, you can refer to the test report in Part C of this document, entitled "Wireless Network Deployment and Configuration Guide 3: CAP Product Deployment". However, please note the actual number of required CAPs will depend on the environment they are deployed in, since wireless signal is affected by obstacles, RF interference and other factors.

B. Wired Network Deployment and Configuration Guide

1. Wired Network Deployment and Configuration Guide 1: Gateway Selection

There are no special requirements for the gateway router, but you need to consider the performance of the router, such as the number of concurrent connections and NAT throughput, in order to provide stable internet access to multiple wireless clients. TP-Link offers various SMB routers. In this solution, we recommend using the following TP-Link SafeStream Routers as the gateway device:

Model	TL-ER6020	TL-ER604W	TL-R480T+	TL-R470T+
Concurrent Connections	30000	10000	30000	10000

Recommended number of Connected Devices	150	50	150	50
NAT Throughput	180Mbps	160Mbps	80Mbps	80Mbps
Maximum WAN ports	2	2	4	4

To learn more about our [SafeStream VPN Routers](#) and [SafeStream Load Balance Routers](#), please visit our official website.

2. Network Deployment and Configuration Guide 2: Power Supply Selection

You can determine the number of CAPs required for your indoor wireless network based on the expected number of clients during peak times and on the area of the building. With a small number of CAPs (less than 3), a power adapter may be a suitable choice to supply power. Otherwise, it is recommended to use a PoE switch.

PoE (Power over Ethernet) allows a single cable to transfer both network data and electrical power. Using PoE switches can simplify network deployment and save costs since there's no need to install additional power cabling. TP-Link provides different levels of PoE switches with a variety of port numbers, which can meet the requirements of PoE power supply and network access in various scenarios. In this solution, we recommend using the following PoE switches:

Model	TL-SF1008P	TL-SG1008P	TL-SG1008PE	TL-SG108PE
PoE Standard	802.3af	802.3af	802.3at	802.3af
Power Budget	57W	55W	124W	55W
Single PoE port maximum power	15.4W	15.4W	30W	15.4W
PoE ports	Port 1-4	Port 1-4	Port 1-8	Port 1-4

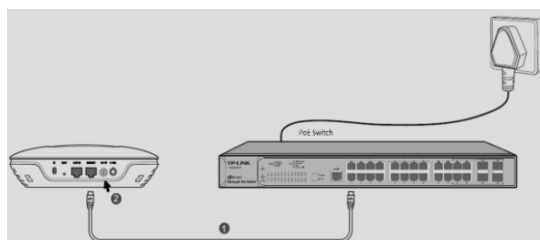
In addition, different TP-Link CAP products support different PoE standards. PoE technologies adopted on the TP-Link Auranet series CAP are listed in the following table:

Model	CAP1750	CAP300
PoE Standard	802.3at	802.3af

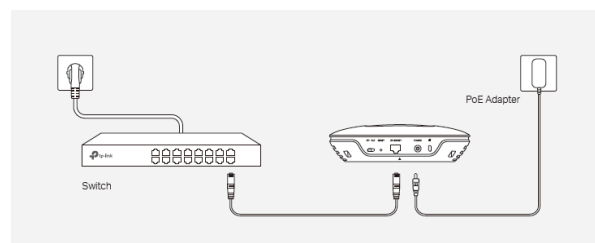
Find out more about [TP-Link PoE switches](#) on our official website.

Why is the 802.3af standard PoE switch not available for the 802.3at standard CAP?

The maximum output power per PoE port in IEEE 802.3af is 15.40W. A more recently developed standard, IEEE 802.3at, offers up to 30W on each port. Although 802.3at PSE (power source equipment) is backward-compatible with 802.3af PD (powered device), an IEEE 802.3af PoE switch cannot provide power to the 802.3at standard CAPs such as CAP1750. However, an 802.3at standard PoE switch is able to power 802.3af CAPs such as CAP300.



Standard PoE Power Supply



External power adapter power supply

C. Wireless Network Deployment and Configuration Guide

1. Wireless Network Deployment and Configuration Guide 1: Solution Selection

Here we discuss TP-Link CAP (FAT Mode) Wi-Fi solutions. These solutions use CAP products to build and expand wireless networks using the existing wired network. The main benefits are:

- 1) Set up is simple and convenient, without any need to change the existing wired network.
- 2) When CAPs work in FAT Mode, they can be managed directly through the web interface without the need for an additional controller device.
- 3) CAP products can provide a high-speed and stable commercial Wi-Fi service.

2. Wireless Network Deployment and Configuration Guide 2: CAP Product Selection

TP-Link provides different levels of 11n/11ac CAP products to meet different requirements. See the table below for details.

Model	CAP1750	CAP300
Wireless Throughput	2.4GHz:450Mbps 5GHz:1300Mbps	2.4GHz: 300Mbps
Internal Antennas	2.4GHz:3*4dBi 5GHz:3*4dBi	2.4GHz: 2*3dBi
Airtime Fairness	×	×
Band Steering	√	×
Load Balance	√	√

Why choose 5GHz CAP products?

- 1) The 2.4GHz band only has three available non-overlapping channels for transmission: 1, 6, and 11. The 5GHz band can provide a much larger number of channels. Please note that due to different local regulations, available 5GHz channels differ between countries and regions. For example, in the United States twenty-two 5GHz channels are supported, while in Europe nineteen 5GHz channels are supported.
- 2) The 5GHz channel is much cleaner, with less interference. The 2.4GHz wireless band uses the same channel signals as other devices such as Bluetooth and microwave ovens, so it is more likely to experience interference in a noisy environment. Compatibility with 5GHz band Wi-Fi is becoming widespread, with greater and greater numbers of devices now supporting it. Furthermore, it allows dual-band CAP products to handle larger numbers of simultaneous connections.

3. Wireless Network Deployment and Configuration Guide 3: CAP Product Deployment

1) CAP Product Installation

TP-Link CAP products can be ceiling-mounted, wall-mounted and ceiling-rail mounted. Installation methods are simple and fast. The installation procedure is the same for CAP300 and CAP1750. Please refer to the [CAP300 Installation Guide](#) for detailed instructions.

2) CAP Product Cabling

To ensure normal communication and power transmission, we recommend that you use Ethernet cables that are CAT 5E or above, with a maximum length of 100 meters. If you have a large network, then we recommend that you use a standard PoE switch if you have one. If you do not have a PoE switch, then

external power adapters can also be used for power supply.

For every CAP product, you will need to decide on the number of CAPs and where to install them based on your indoor environment. You should consider the following factors:

- **Carpet Area:** In theory, the wireless coverage of a CAP can reach up to 500 square meters. However, the actual coverage may be less than that value, due to the effects of signal interference and obstacles.
- **Number of Connections and Internet Behaviors:** A single band (2.4GHz or 5GHz) of a CAP has a recommended number of connected devices of 30, and the connected capacity of the 5GHz band is slightly more than that of the 2.4GHz band. A series of tests carried out with a selection of CAP products produced the following results when users streamed 720P HD videos:

	2.4 GHz		5 GHz
	CAP1750	CAP300	CAP1750
Smooth Play*	26	25	38
Occasional Error**	30	30	42

* Smooth Play indicates the maximum number of connected devices when all clients are able to smoothly stream 720P HD videos.

** Occasional Error indicates the maximum number of connected devices when clients experience occasional buffering or pausing when streaming 720P HD videos.

- **Obstacles:** Obstacles cause varying degrees of wireless signal attenuation. To ensure complete coverage, try to install the CAPs in the center of an open room, which reduces the interference between the CAPs and their surroundings. It is recommended to test the signal reception in the corner of the room.

3) Wireless Network Settings

After following the steps to build the wireless network, you will notice the default wireless SSID of the CAP wireless network is in the form TP-Link_2.4GHz_XXXXXX or TP-Link_5GHz_XXXXXX (XXXXXX is the last six hexadecimal bytes of the MAC address. No password is set by default). If you need to modify the SSID, encryption or other settings, please log in to the CAP web management page to change the settings. For step-by-step instructions, please see the [CAP User Guide](#)

4) Wireless Network Optimization

After completing the above configuration steps, you can now connect to the wireless network via CAP and configure the network to your business needs, such as setting up wireless authentication, VOIP, etc. To provide a more stable and smooth wireless network, we recommend configuring the following features:

- **Load Balance** aims to even out the number of clients connected to each access point and removes clients with a poor quality connection. This optimizes the network and ensures a smoother browsing experience for users. If you want to know how Load Balance works and how to enable it on TP-Link CAP products, please see [FAQ1336](#).
- **Band Steering** is only supported on the 2.4GHz/5GHz dual-band CAP1750 product. This feature guarantees that dual-band clients will prioritize access to the relatively cleaner and faster 5GHz network, providing users with a better internet experience. If you want to know more about how Band Steering works and how to enable Band Steering on TP-Link CAP products, please see [FAQ-1337](#).

4. Wireless Network Deployment and Configuration Guide 4: Improve Wi-Fi Access Experience

TP-Link Auranet CAP products not only meet the basic needs of internet access, but also provide a wealth of other software features and value-added services, such as Captive Portal, Rate Limit, Access Control and more.

- 1) AP Isolation is able to provide users with a safe internet environment. By setting up AP Isolation, clients under the same SSID of the same AP can be isolated from each other. This reduces broadcast traffic and enhances security because clients are completely isolated from each other.

- 2) Just like AP Isolation, SSID Isolation also keeps users safe. By setting up SSID Isolation, clients under different SSIDs of the same AP can be isolated from each other so as to reduce broadcast traffic and enhance security because the clients connected to the same SSID can communicate while the clients under different SSIDs cannot.