Outdoor Point to Point CPE

User Guide

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Preface

Thank you for choosing Tenda! Please read this user guide before you start.

Conventions

This user guide applies to the following CPEs. O4 is used for illustrations here unless otherwise specified. The contained images and UI screenshots are subject to the actual products.

Product Model	Description
O1	500m Outdoor Point to Point CPE
O2	2Km Outdoor Point to Point CPE
O3	2.4G Long Range Outdoor Access Point
O4	5Km Outdoor Point to Point CPE
O9	5GHz 11ac 23dBi Gigabit Outdoor CPE
OS3	5GHz 11ac 867Mbps 12dBi Outdoor CPE

The typographical elements that may be found in this document are defined as follows.

Item	Presentation	Example
Cascading menus	>	**System** > **Live Users**
Parameter and value	Bold	Set **User Name** to **Tom**.
Variable	Italic	Format: *XX*:*XX*:*XX*:*XX*:*XX*:*XX*
UI control	Bold	On the **Policy** page, click the **OK** button.
Message	“ ”	The “Success” message appears.

The symbols that may be found in this document are defined as follows.

Symbol	Meaning
NOTE	This format is used to highlight information of importance or special interest. Ignoring this type of note may result in ineffective configurations, loss of data or damage to device.
TIP	This format is used to highlight a procedure that will save time or resources.

Acronyms and Abbreviations

Acronym or Abbreviation	Full Spelling
AP	Access Point
ARP	Address Resolution Protocol
AES	Advanced Encryption Standard
CPE	Customer Premises Equipment
CCQ	Client Connection Quality
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DDNS	Dynamic Domain Name Server
GMT	Greenwich Mean Time
IP	Internet Protocol
ICMP	Internet Control Message Protocol
LAN	Local Area Network
MAC	Media Access Control
PoE	Power over Ethernet
P2MP	Point-to-MultiPoint
PVID	Port-based VLAN ID
RADIUS	Remote Authentication Dial In User Service
SSID	Service Set Identifier
TCP	Transmission Control Protocol
TKIP	Temporal Key Integrity Protocol
UDP	User Datagram Protocol
VLAN	Virtual Local Area Network
WAN	Wide Area Network
WEP	Wired Equivalent Privacy
WLAN	Wireless Local Area Networks
WMM	Wi-Fi multi-media

Acronym or Abbreviation	Full Spelling
WPA-PSK	WPA-Preshared Key
WPA	Wi-Fi Protected Access

Getting more documents

If you want to get more documents of the device, visit www.tendacn.com and search for the corresponding product model. The related documents are listed as below:

Document	Description
Quick Installation Guide	It introduces how to set up the device quickly for internet access, the descriptions of LED indicators, ports, and buttons, FAQ, statement information, and so on.
User Guide	It introduces how to set up more functions of the device for more requirements, including all functions on the web UI of the device.
Data Sheet	It introduces the basic information of the device, including product overview, selling points, and specifications.

Technical Support

If you need more help, contact us by any of the following means. We will be glad to assist you as soon as possible.

Hotline

Global: (86) 755-27657180

Toll Free: Mon - Fri 9 am - 6 pm (China Time Zone)

United States: 1-800-570-5892

Toll Free: Daily 24 hours

Hong Kong: 00852-81931998

Toll Free: Mon - Fri 9 am - 6 pm (China Time Zone)

Email

support@tenda.com.cn

Contents

1 Application scenario

1.1 ISP hotspot connection-WISP mode

An apartment needs to bridge an ISP hotspot for internet access.

1.1.1 Solution

Tenda CPE can meet this demand.

O4 is used as an example to illustrate the installation procedures. Procedures for other CPEs are similar.

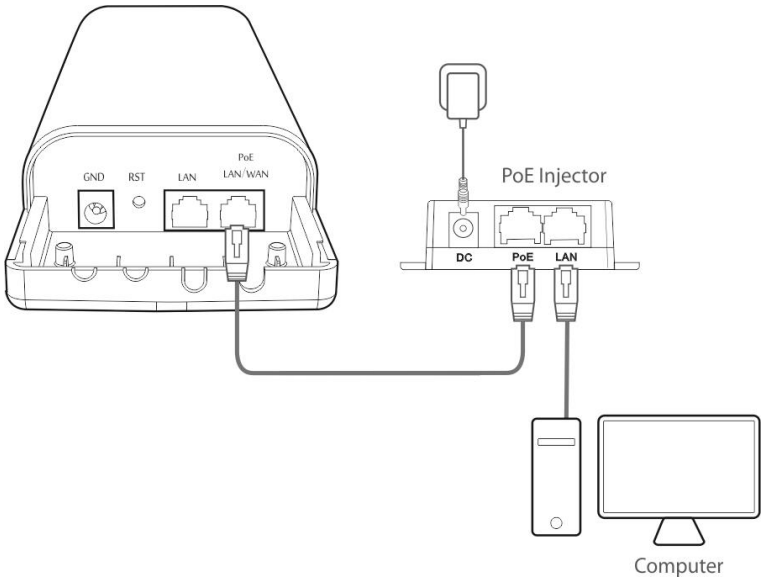
TIP

To establish the network quickly, you are recommended to set up the CPEs before installing them.

1.1.2 Set up the CPE

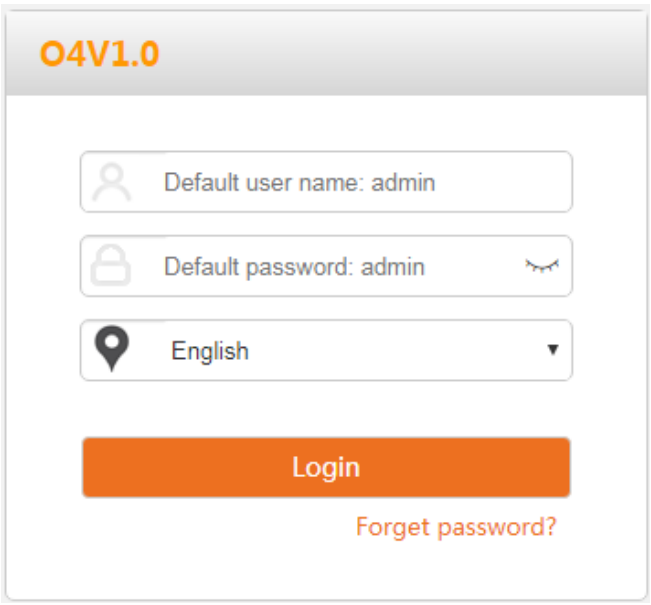
Step 1 Connect the computer to the CPE.

1. Uncover the housing of the CPE.
2. Use an Ethernet cable to connect the **PoE/LAN/WAN** port of the device to the **PoE** port of the PoE injector.
3. Use the included power adapter to connect the PoE injector to a power socket. The **LAN/WAN** LED indicator of the CEP lights up.
4. Use an Ethernet cable to connect your computer to the **LAN** port of the PoE injector.

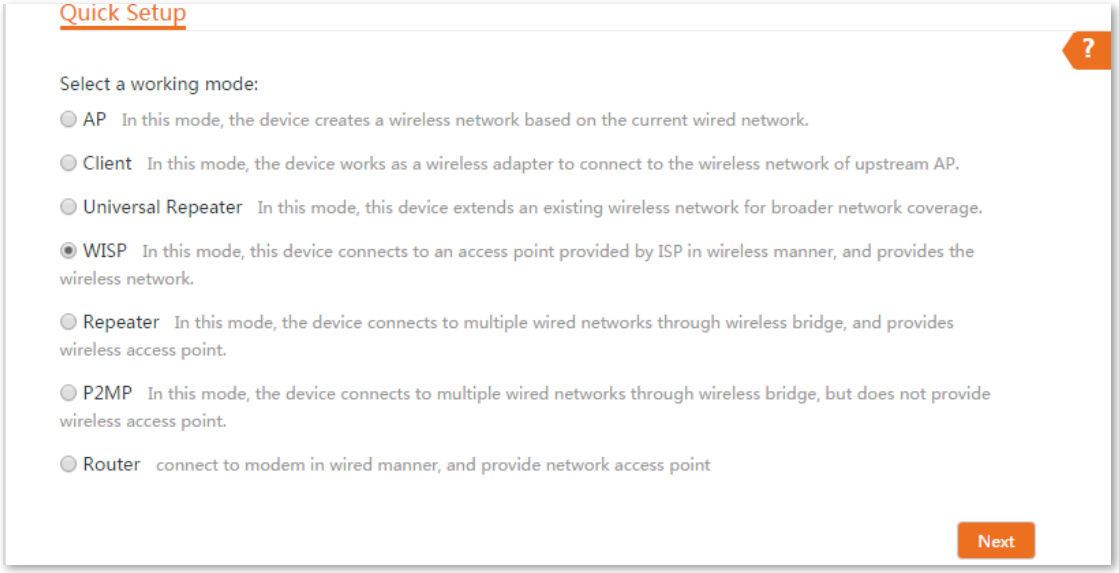


Step 2 Set the CPE to **WISP** mode.

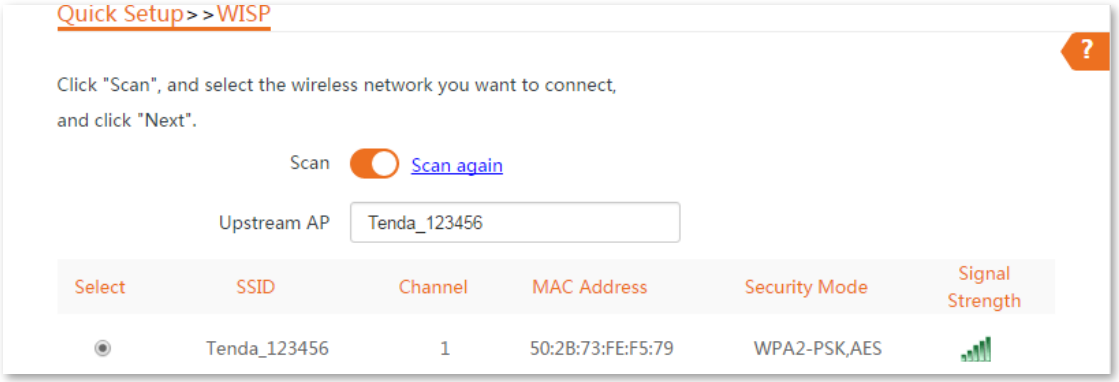
1. Start a web browser on your computer, and visit **192.168.2.1**. Enter your user name and password (default: **admin/admin**), and click **Login**.



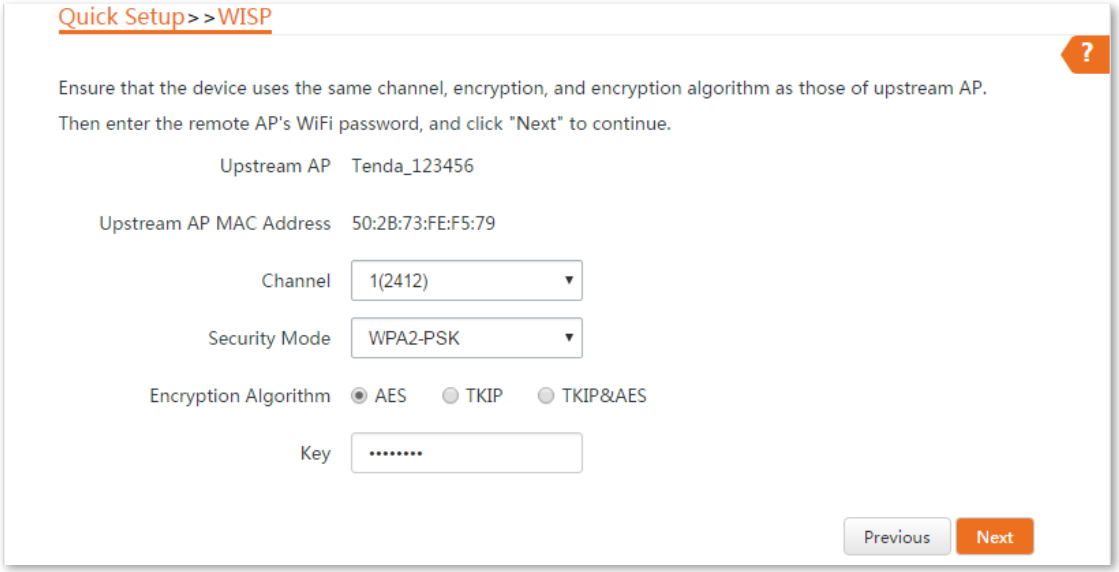
2. Select **WISP**, and click **Next**.



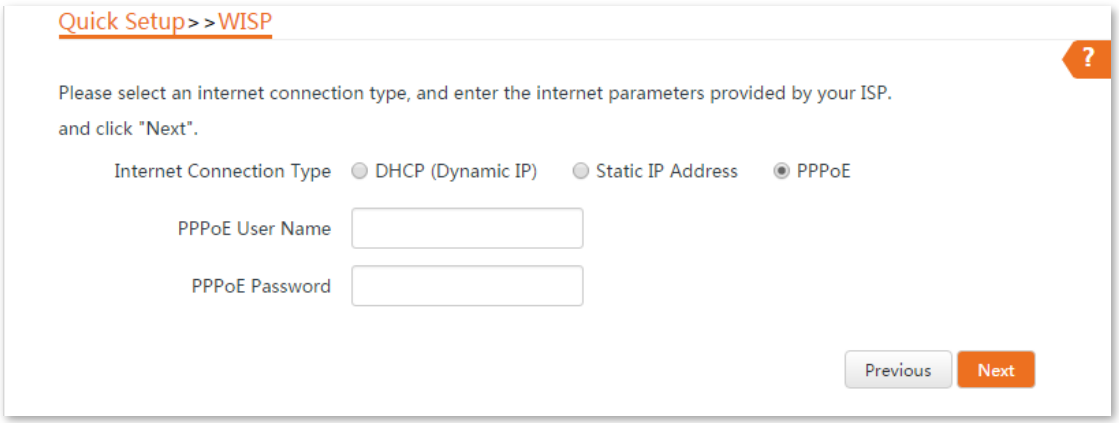
3. Select the SSID of your ISP (Internet Service Provider) hotspot, which is **Tenda_123456** in this example, and click **Next**.



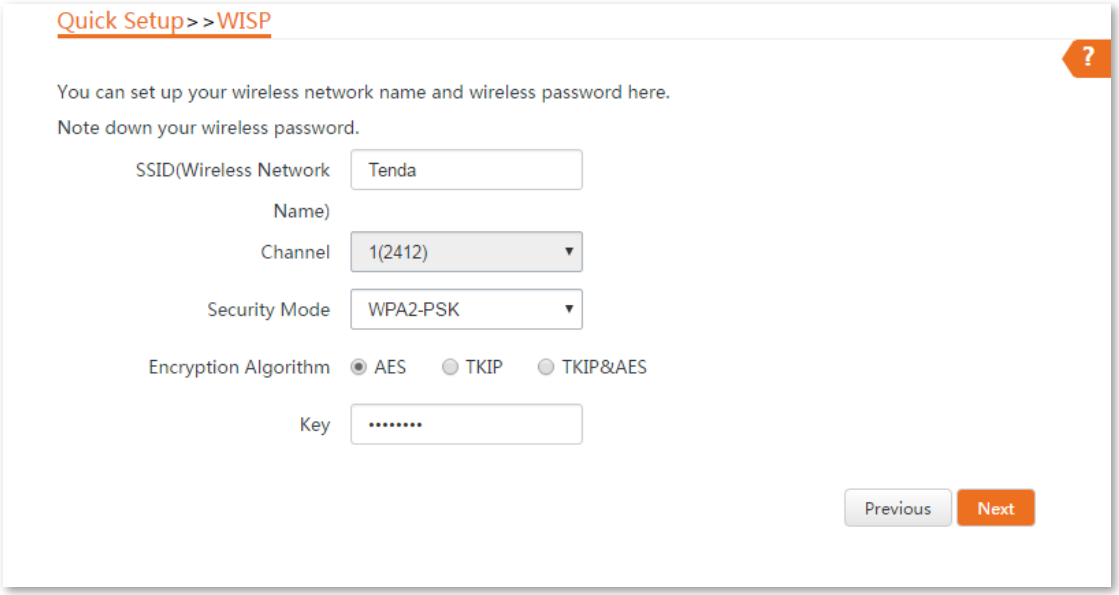
4. Enter the WiFi password of your ISP hotspot in the **Key** text box, and click **Next**.



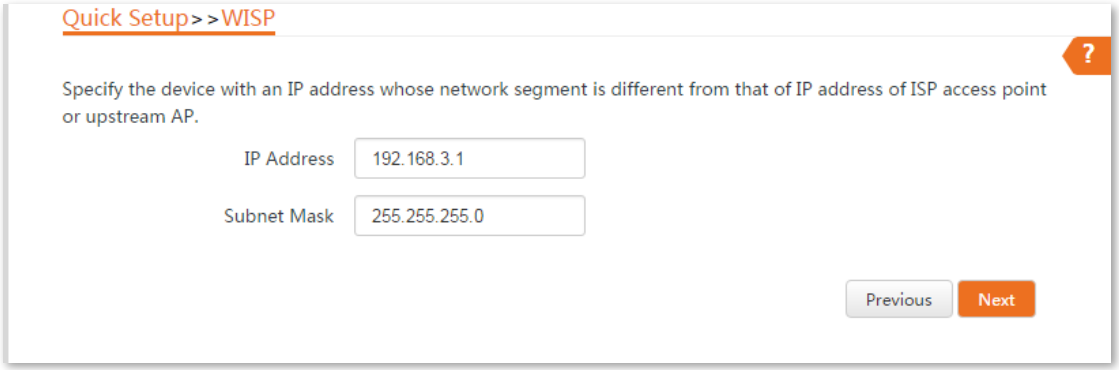
5. Select the Internet Connection Type of your ISP hotspot, which is **PPPoE** in this example. Enter the PPPoE user name and password provided by your ISP, and click **Next**.



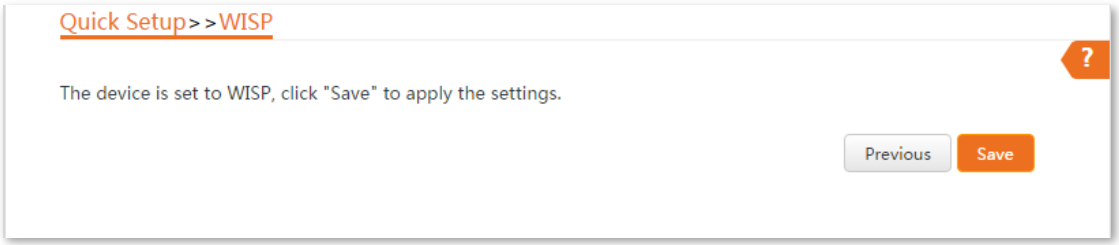
6. Customize the SSID and key, and click **Next**.



7. Set an IP address belonging to different network segment as that of your ISP hotspot. For example, if the IP address of your ISP hotspot is 192.168.2.1, you can set this device's IP address to 192.168.*X*.1 (*X* ranges from 0 to 254 excluding 2). Then click **Next**.



8. Click **Save**, and wait until the device reboots to activate the settings.



----End

When LED1, LED2, and LED3 indicators of the device are blinking, the device is connected to your ISP hotspot successfully.

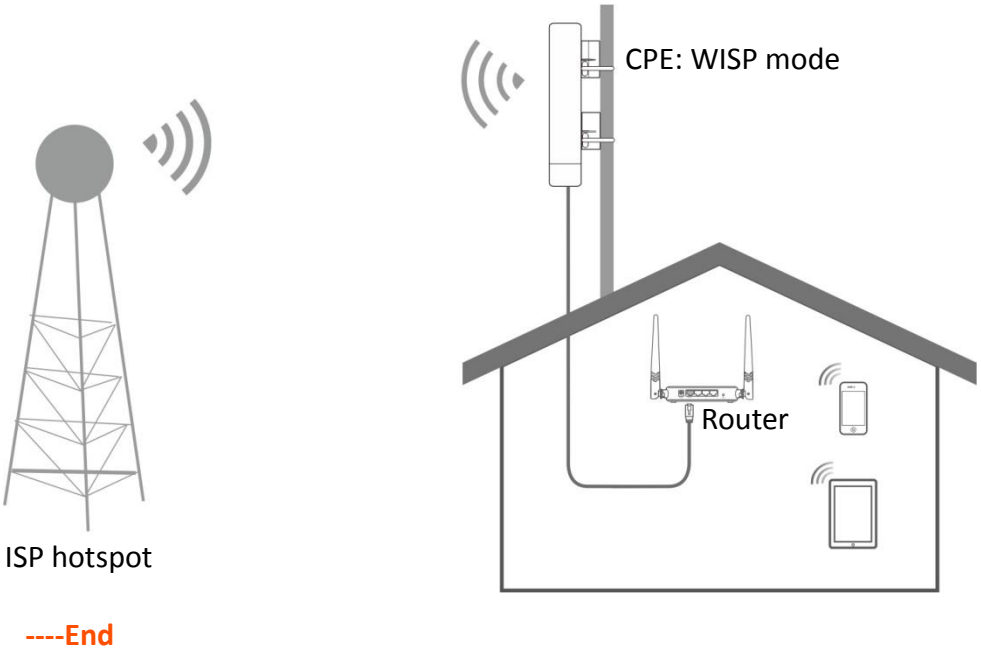
1.1.3 Instal the CPE

Step 1 Place the device at an elevated position in the open air.

Step 2 Uncover the housings of the device, and connect the **PoE/LAN/WAN** port of the device to the WAN port of your wireless router. The **LAN/WAN** LED indicator lights up.

Step 3 Adjust the device's direction or location on the selected pole until the LED1, LED2 and LED3 of the device light up.

Step 4 Use the plastic straps to attach the device to the pole.



----End

1.2 CCTV surveillance

To ensure the safety of employees and property, a video surveillance system needs to be installed in a building site.

1.2.1 Solution

Tenda CPE can meet this demand.

O4 is used as an example to illustrate the installation procedures. Procedures for other CPEs are similar.

1.2.2 Set up the CPEs

TIP

At least two CPEs are required for bridging.

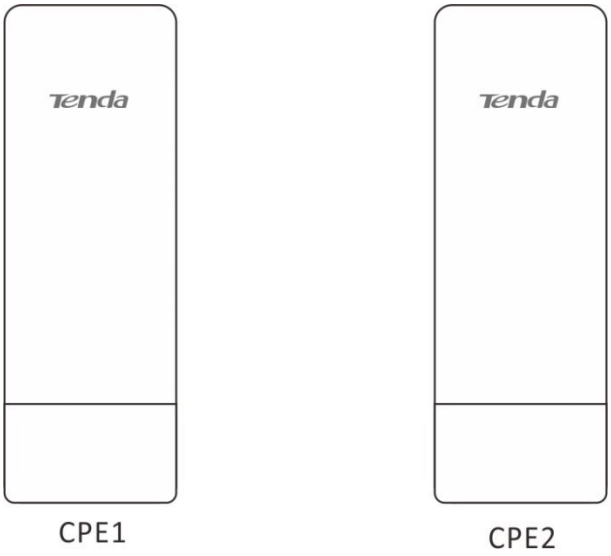
Option 1: Automatic bridging (recommended)

NOTE

- Automatic Bridging is only applicable when the CPEs are in factory settings.
- When performing peer-to-peer bridging, ensure that only two CPEs are powered on nearby. Otherwise, the peer-to-peer bridging may fail.
- For peer-to-multiple peers bridging, perform peer-to-peer bridging first, and then power on the rest CPEs within 30 minutes.
- A CPE can bridge to 15 CPEs at most.

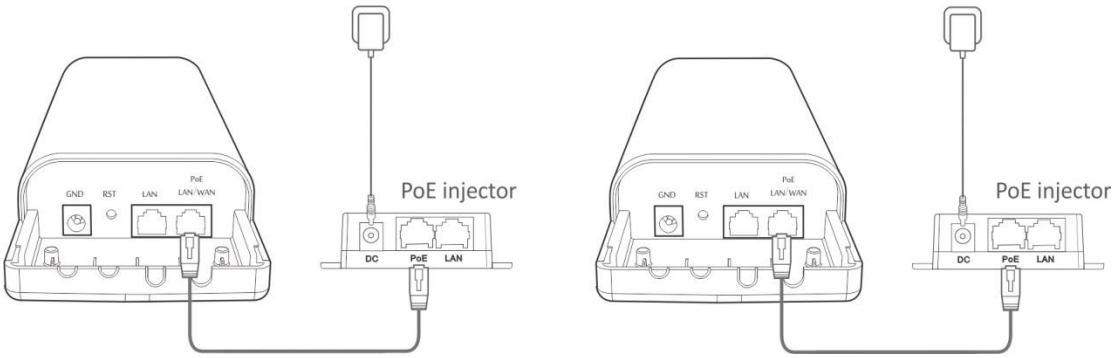
Scenario 1: Peer-to-peer bridging

Step 1 Place the two CPEs next to each other, see the following figure.

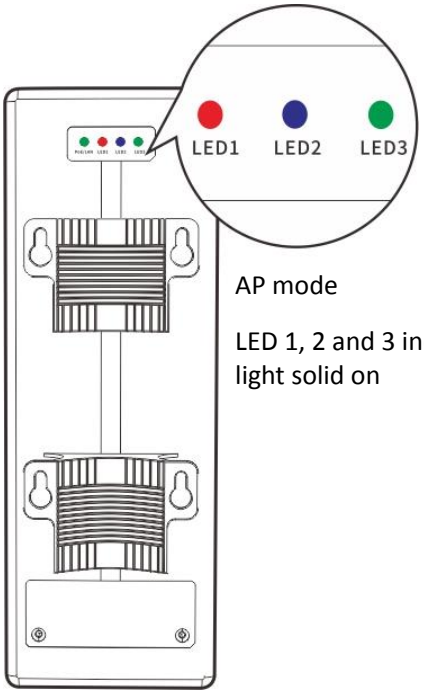


Step 2 Remove the housing of each CPE, and use the included PoE injectors to power them on.

Wait until the **LAN/WAN** LED indicators of the CPEs light up.

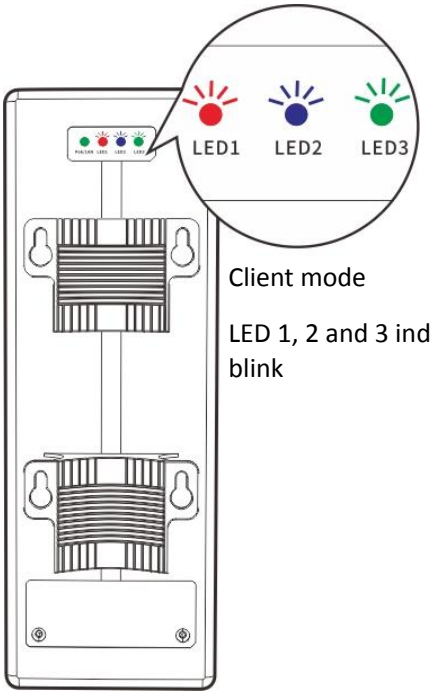


Step 3 Wait for the two CPEs to negotiate and connect to each other automatically. The following LED indicator status indicates successful connection of the two CPEs.



AP mode

LED 1, 2 and 3 indicators light solid on



Client mode

LED 1, 2 and 3 indicators blink

NOTE

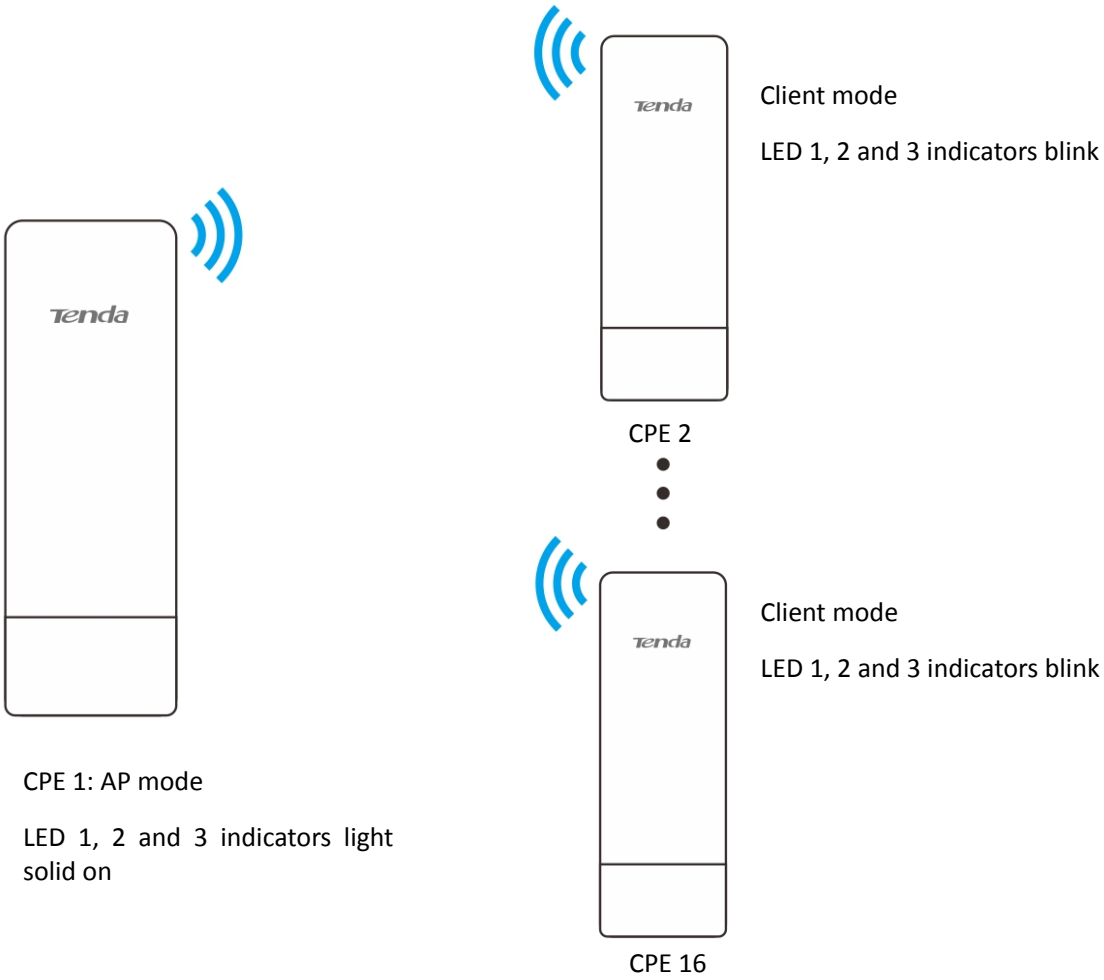
- If the bridging succeeds, the DHCP servers of the two CPEs are disabled, and the IP address of the CPE working in Client mode changes to 192.168.2.2.
- Refer to your actual product for the supported PoE power supply distance.
- If the peer-to-peer automatic bridging fails, reset the two CPEs to factory settings, and try again. Reset method: When the CPEs are working properly, hold down the reset button for about 8 seconds, and then release it. When all LED indicators light up, the CPE is restored to factory settings successfully.

----End

Scenario 2: Peer-to-multiple peers bridging

Step 1 Refer to **Peer-to-peer bridging** to make any two CPEs bridge to each other.

Step 2 Within 30 minutes after the peer-to-peer bridging succeeds, place the rest CPEs which are in factory settings near the CPE with the LED1, LED2, and LED3 indicators solid on and power them on. Wait about 1 minute. When the LED1, LED2, and LED3 indicators of these new-added CPEs keep blinking, the peer-to-multiple peers bridging succeeds.

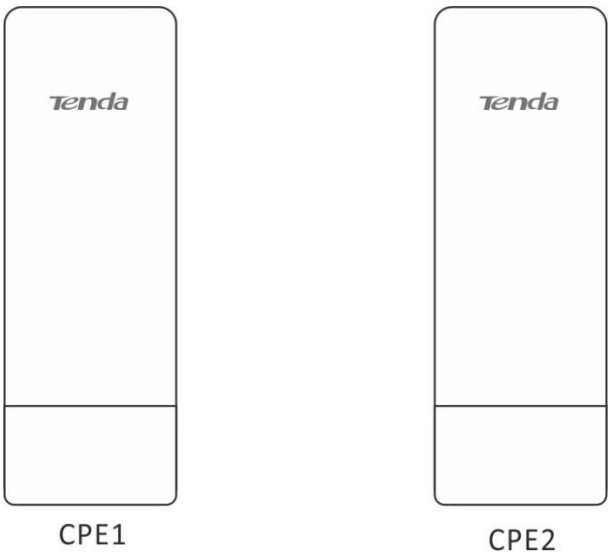


TIP

- If the LED1, LED2 and LED3 indicators of a new-added CPE turn off after it is powered on for 1 minute, the bridging fails. Reset the CPE to factory settings, and wait until its LED1, LED2 and LED3 indicators keep blinking.
- When using O2 to perform peer-to-multiple peers bridging, after the peer-to-peer bridging succeeds, place the rest CPEs which are in factory settings near the CPE with the LED1, LED2, and LED3 indicators solid on and power them on **in 3 minutes**.
- If the bridging still fails, try manual bridging. Refer to **Client mode** for details

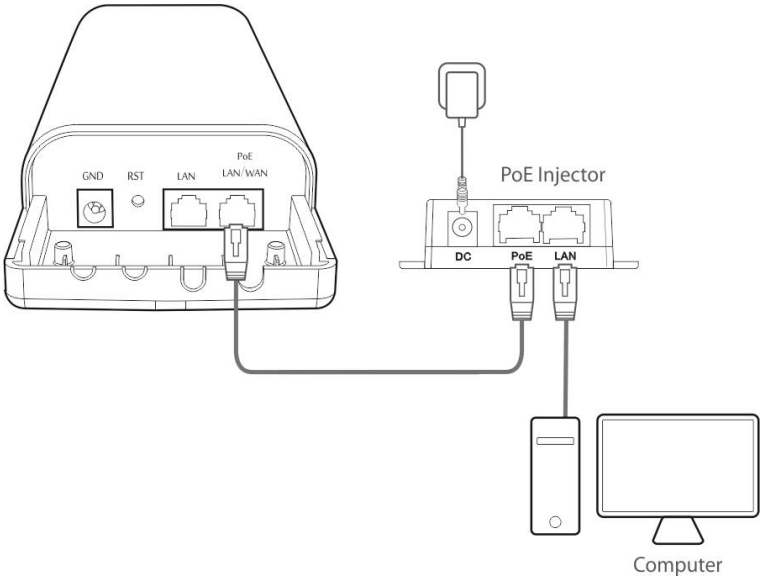
Option 2 Manual bridging

Step 1 Place the two CPEs next to each other.



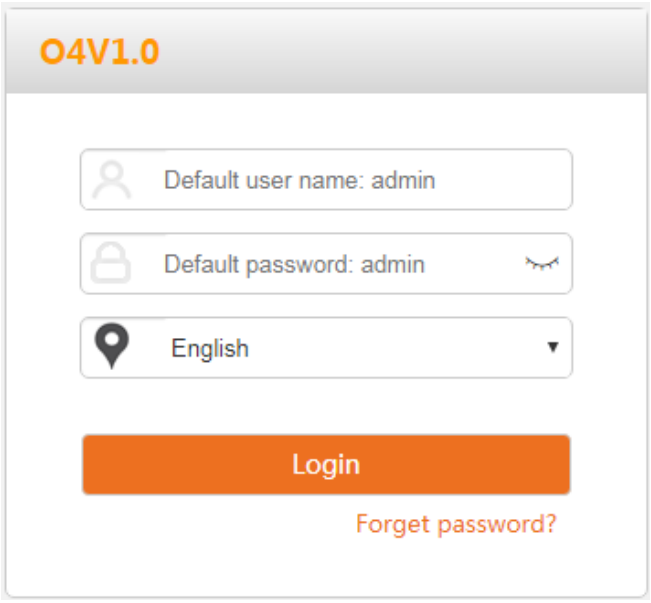
Step 2 Connect the computer to **CPE1**.

1. Uncover the housing of **CPE1**.
2. Use an Ethernet cable to connect the **PoE LAN/WAN** port of **CPE1** to the PoE port of the PoE injector.
3. Use the included power adapter to connect the PoE injector to a power socket. The **LAN/WAN** LED indicator of the **CPE1** lights up.
4. Use an Ethernet cable to connect your computer to the **LAN** port of the PoE injector.

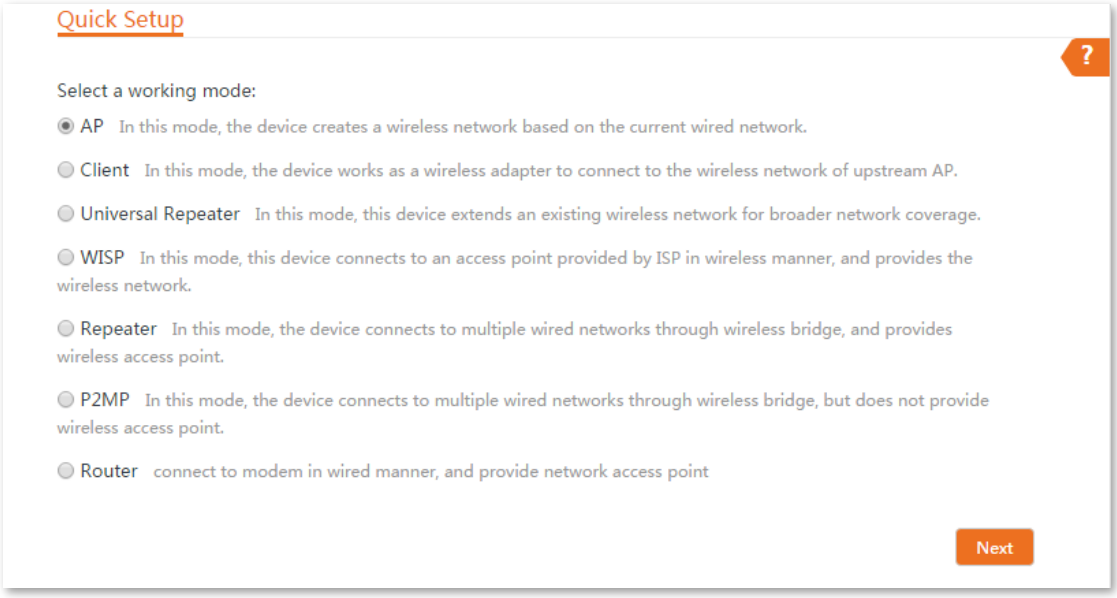


Step 3 Set **CPE1** to **AP Mode**.

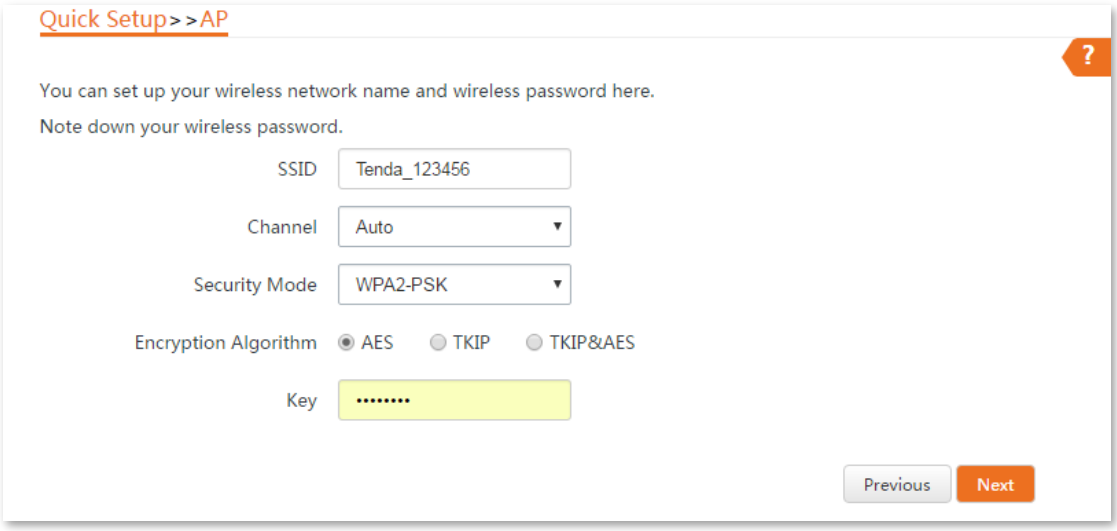
1. Start a web browser on the computer, and visit **192.168.2.1**. Enter your user name and password (default: **admin**/**admin**), and click **Login**.



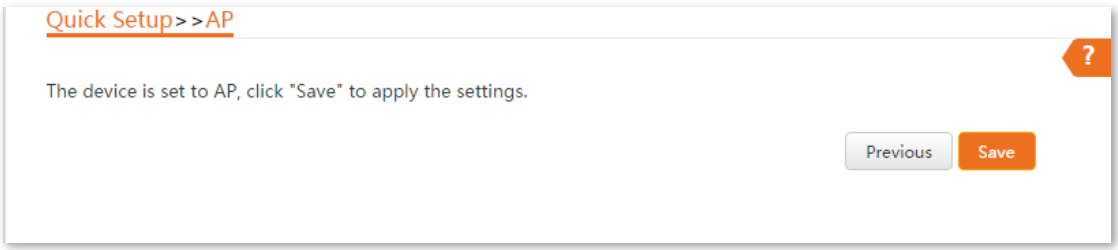
2. Select **AP**, and click **Next**.



3. Set an **SSID**, which is **Tenda_123456** in this example, **Security Mode**, which is **WPA2-PSK** in this example, and **Key**, and click **Next**.



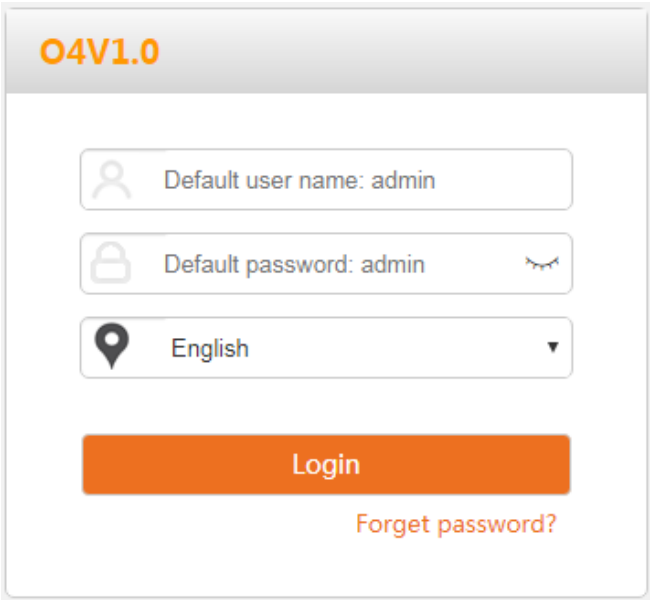
4. Click **Save**, and wait until the CPE reboots automatically to activate the settings.



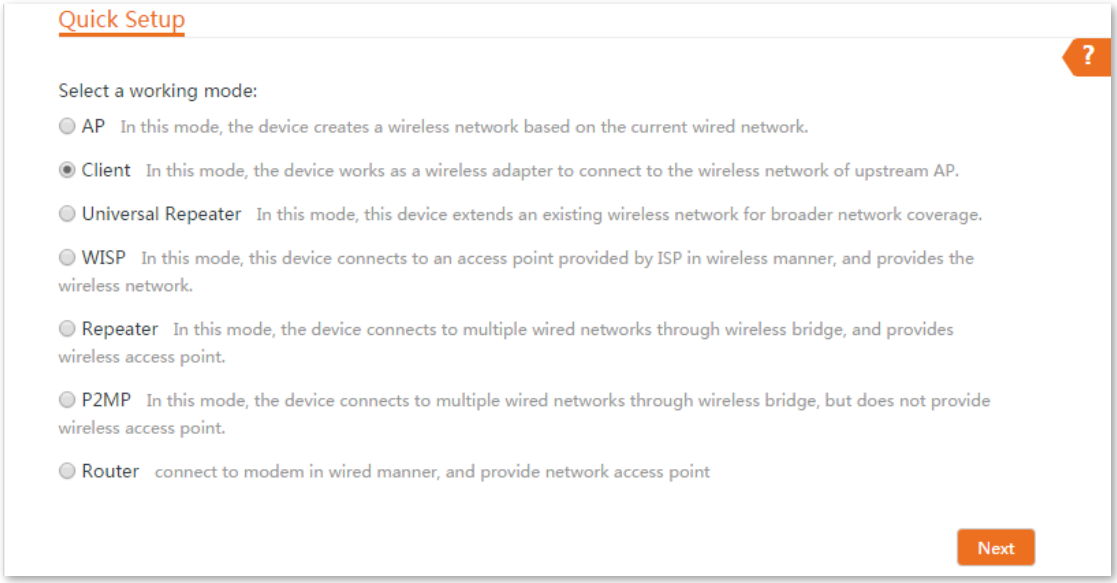
Step 4 Set **CPE2** to **Client Mode**.

1. Perform the procedure in **Step 2** Connect the computer to **CPE1** to connect the computer to **CPE2**.

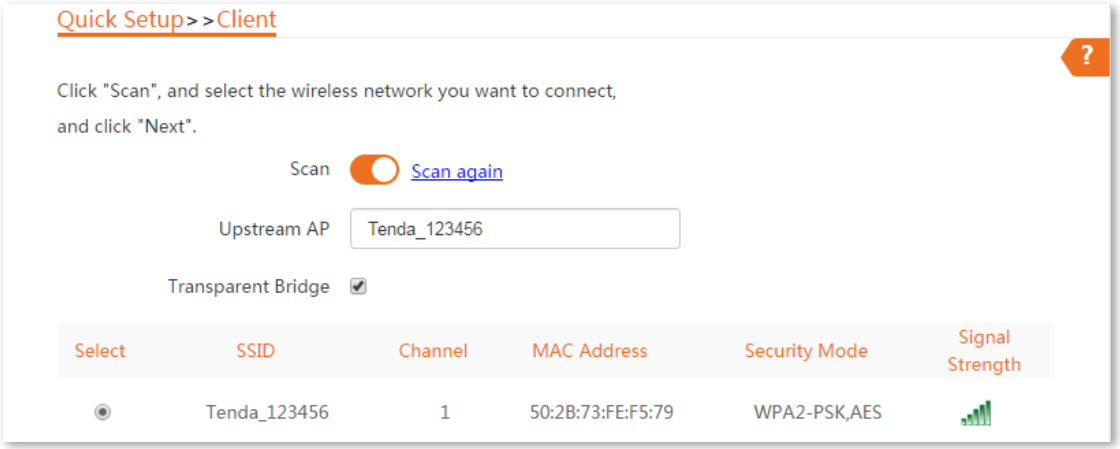
2. Start a web browser on your computer, and visit **192.168.2.1**. Enter the login user name and password (default: **admin**/**admin**), and click **Login**.



3. Select **Client**, and click **Next**.



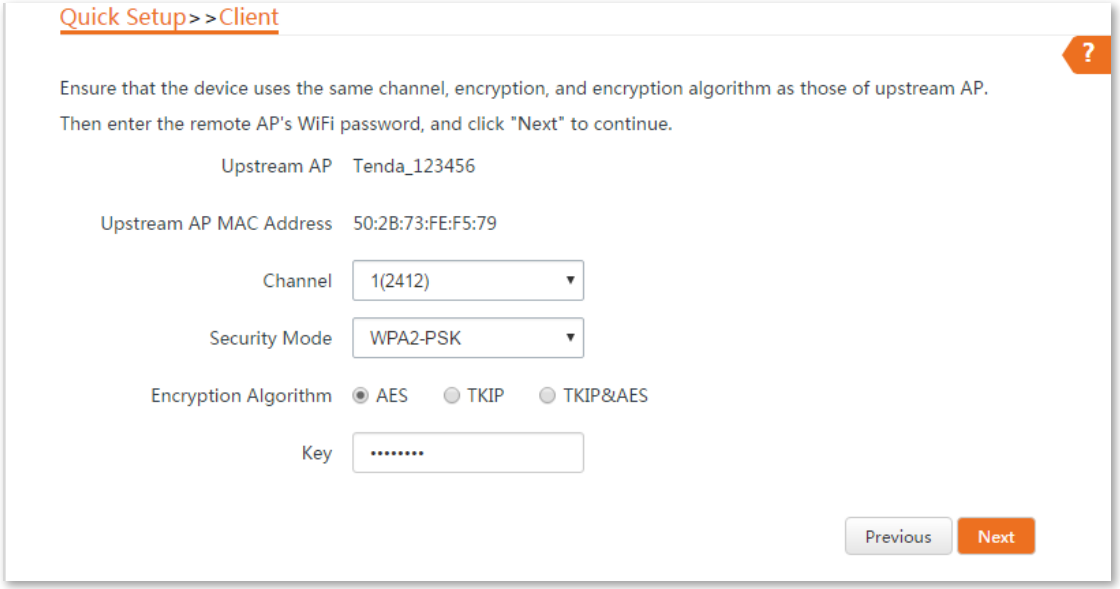
4. Select the SSID of **CPE1** you set, which is **Tenda_123456** in this example, and click **Next**.



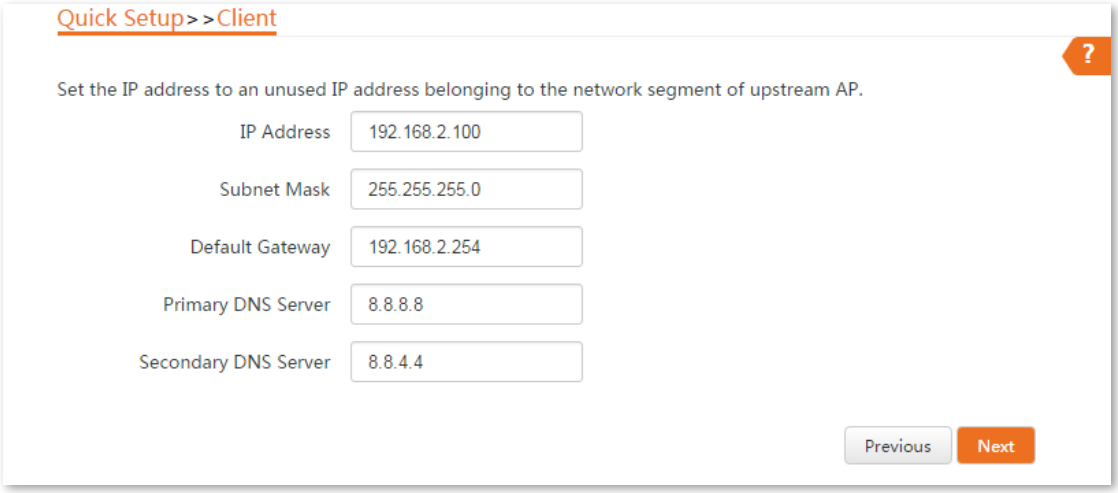
TIP

If there is no wireless network is scanned, choose **Wireless** > **Basic**, and ensure that the wireless function is enabled. Then try again.

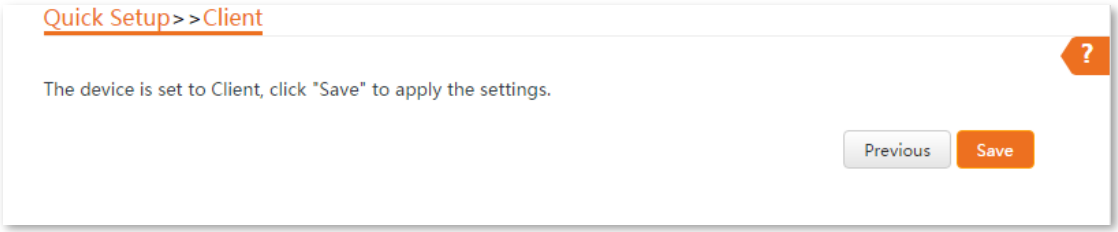
5. Enter the WiFi password you set for **CPE1** in the **Key** text box, and click **Next**.



6. Set the **IP address** to an unused IP address belonging to the same network segment as that of **CPE1**. For example, if the IP address of CPE1 is 192.168.2.1, you can set this CPE's IP address to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



7. Click **Save**, and wait until the CPE reboots to activate the settings.



----End

When LED1, LED2, and LED3 of CPE1 are solid on, and LED1, LED2, and LED3 of CPE2 are blinking, the bridging succeeds.

If you want to perform peer-to-multiple peers bridging, refer to **Step 4** to bridge them to the WiFi network of the CPE with the LED1, LED2 and LED3 indicators solid on.

TIP

You can check the SSID and key of the CPE1 or CPE2 by choosing **Wireless** > **Basic** after logging in to the web UI.

1.2.3 Instal the CPEs

The CPE (transmitter in AP mode) with LED1, LED2 and LED3 solid on should be connected to the switch connecting to a network video recorder (NVR). See **Figure 1** below.

The CPE (receiver in Client mode) with LED1, LED2 and LED3 blinking should be connected to the switch connecting to a monitoring IP camera. See **Figure 2** below.

Detailed procedures are as follows:

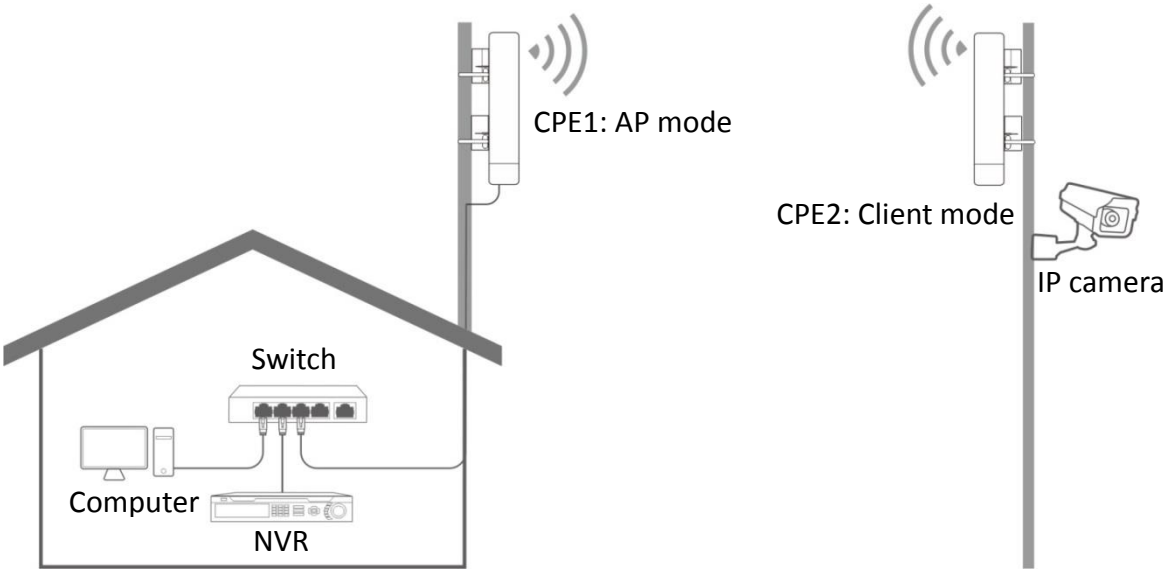
Step 1 Place the transmitter in the open air at the point where the NVR is located. Place the

receiver in the open air at the point where the IP camera is located.

Step 2 Uncover the housings of the two CPEs, and connect the **PoE/LAN/WAN** ports of the CPEs to PoE injectors respectively. The **LAN/WAN** LED indicators light up.

Step 3 Adjust the two CPEs' direction or location until the LED1, LED2 and LED3 of the two CPEs light up.

Step 4 Use the plastic straps to attach the two CPEs to the poles respectively.



Check the LED1, LED2 and LED3 indicators of the CPEs to confirm whether the positions are proper. The more LED indicators light up, and the better the connection quality is. The LED indicator descriptions of the CPEs below are for reference.

LED Indicator	Status	Description
LED1, LED2, LED3 (Received signal strength LED indicators)	Solid on/Blinking	There is device connected to the CPE. • Solid on: The CPE may work in AP, Repeater, P2MP or Router mode. • Blinking: The CPE may work in Client, Universal Repeater or WISP mode. Each LED indicator corresponds to a received signal strength value. When the received signal strength of the CPE reaches the RSSI threshold, the corresponding LED indicator lights up. You can judge the connection quality based on the statuses of the LED indicators. By default, the minimum signal strength of LED1, LED2 and LED3 are -90 dBm, -80 dBm and -70 dBm. You can change them on the **Wireless** > **Advanced** page of the web UI of the CPE.
	Off	No device is connected to the CPE, or the received signal strength is less than the RSSI threshold (default: -90 dBm).

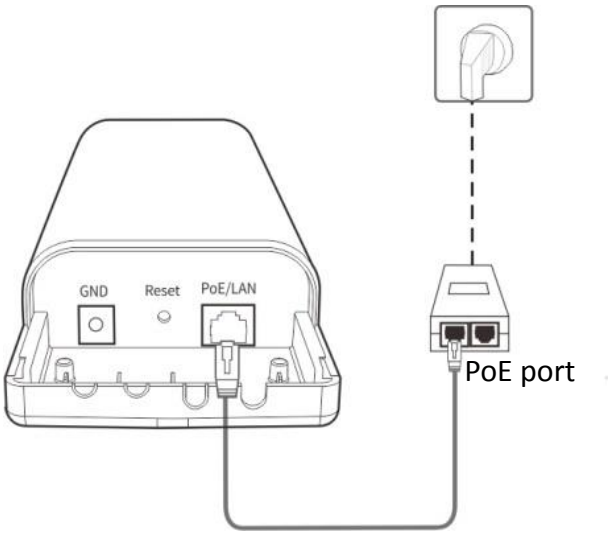
2 Login

2.1 Login

When you log in to the web UI at the first time or after the CPE is reset to factory settings, follow the steps below:

Step 1 Connect the computer to the device.

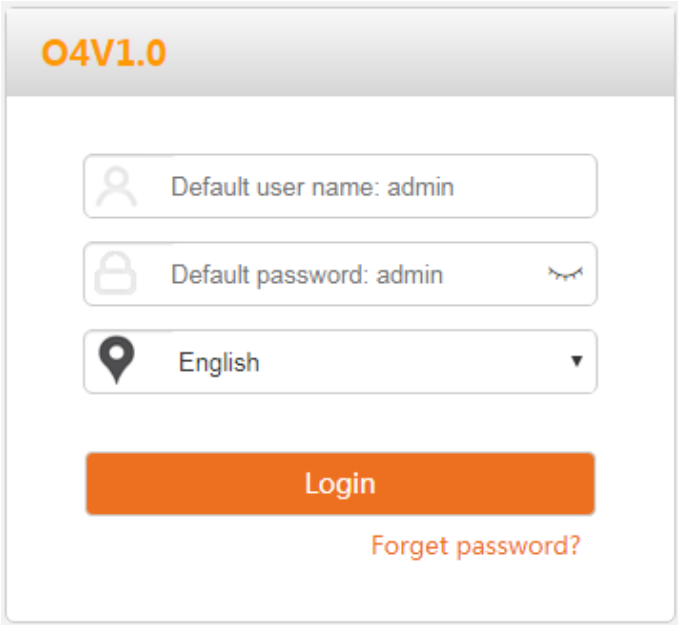
1. Uncover the housing of the device.
2. Use an Ethernet cable to connect the **PoE/LAN** port of the CPE to the **PoE** port of the included PoE adapter.
3. Use the included power adapter to connect the PoE adapter to a power source. The **LAN/WAN** LED indicator of the device lights up.
4. Use an Ethernet cable to connect your computer to the **LAN** port of the PoE adapter.



Step 2 Start a web browser on your computer, and visit **192.168.2.1**. Enter your user name and password (default: **admin**), and click **Login**.

TIP

For the security of your network, you can change the login user name and password by choosing **Tools** > **Account**.



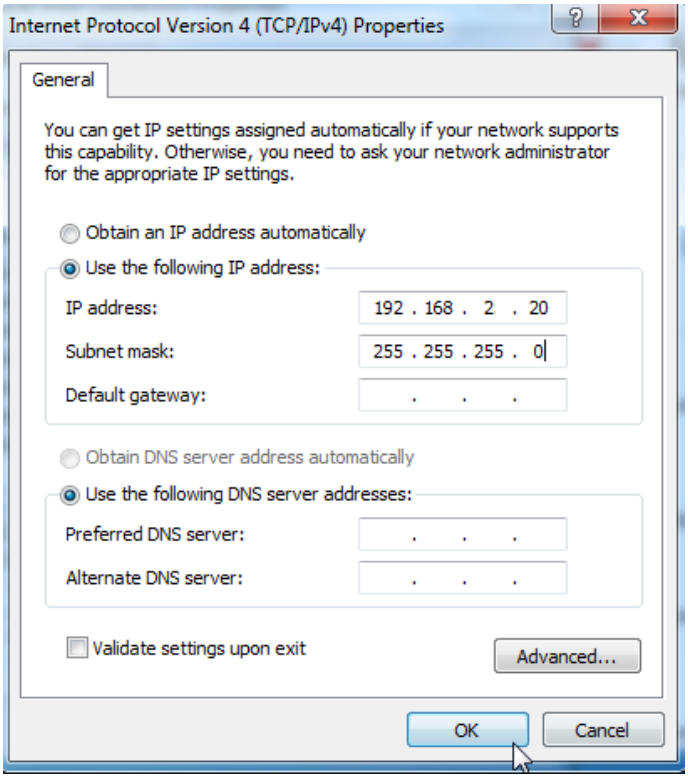
----End

If you want to log in to the web UI after the CPE is set to AP mode, Client mode, Universal Repeater mode, Repeater mode or P2MP mode, follow the steps below:

Step 1 Connect the computer to the CPE or the switch connected to the CPE.

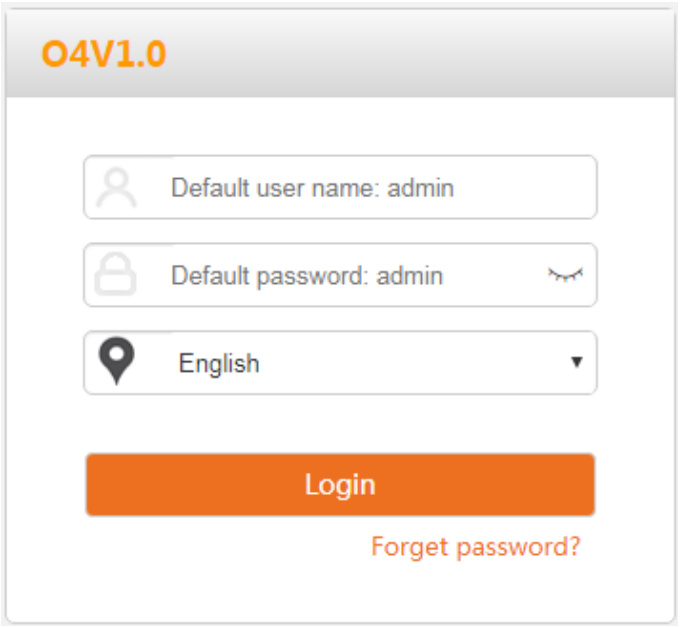
Step 2 Set the IP address of the computer to an unused one belonging to the same network segment of the IP address of the CPE.

For example, if the IP address of the CPE is 192.168.2.1, you can set the IP address of the computer to 192.168.2.*X* (*X* is an unused digit ranging from 2 to 254), and subnet mask to 255.255.255.0.



Step 3 Start a web browser on your computer, and visit the IP address of the CPE.

Step 4 Enter the login user name and password you set (default: **admin**), and click **Login**.



----End

TIP

- Refer to How to assign a fixed IP address to your computer in **Appendix** for details of step 2 above.
- If the CPE is set to **AP**, **Client**, or **Universal Repeater** mode, check its IP address in the client list of the upstream device.
- If the CPE is set to **Repeater** or **P2MP** mode, use the IP address you changed when you set it to these modes to log in to the web UI. If you do not change it, try 192.168.2.1.

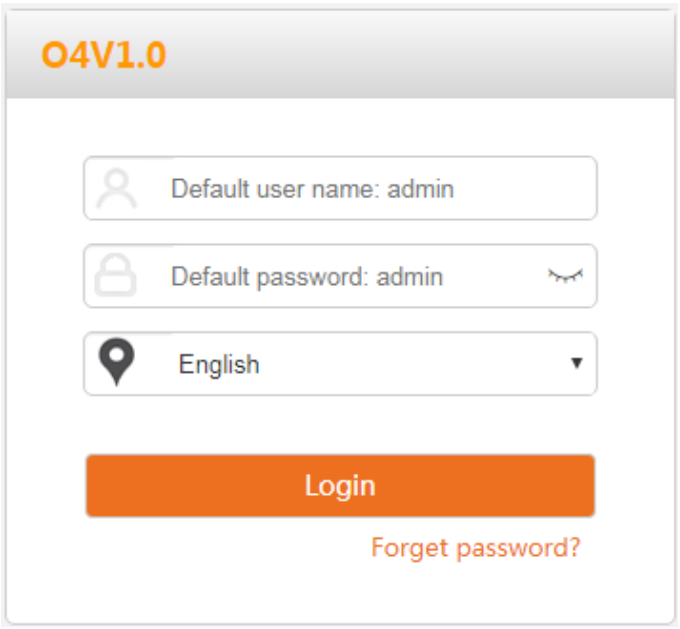
If you want to log in to the web UI after the CPE is set to WISP or Router mode, follow the steps below:

Step 1 Connect the computer to the CPE or the switch connected to the CPE.

Step 2 Check the gateway IP address of the computer, and we assume that it is 192.168.0.1 in this example.

Step 3 Start a web browser on your computer, and visit **192.168.0.1**.

Step 4 Enter the login user name and password, and click **Login**.

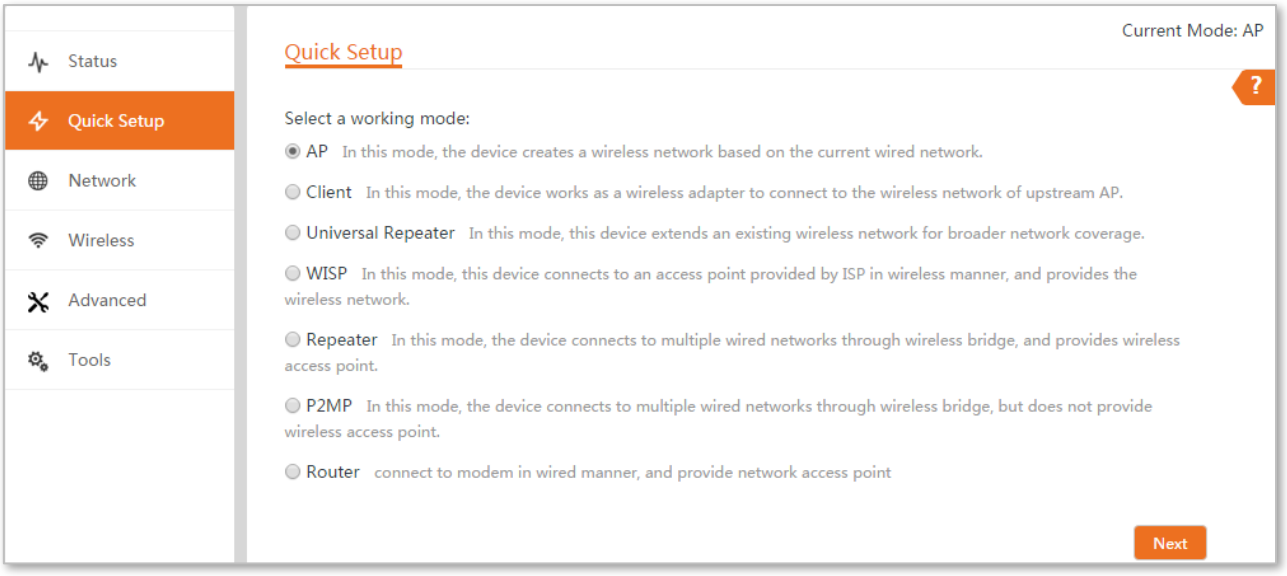


----End

TIP

Refer to How to check the gateway IP address of a computer in Appendix to get the gateway IP address of your computer.

After successful login, the following page appears.



2.2 Logout

The CPE logs you out when you:

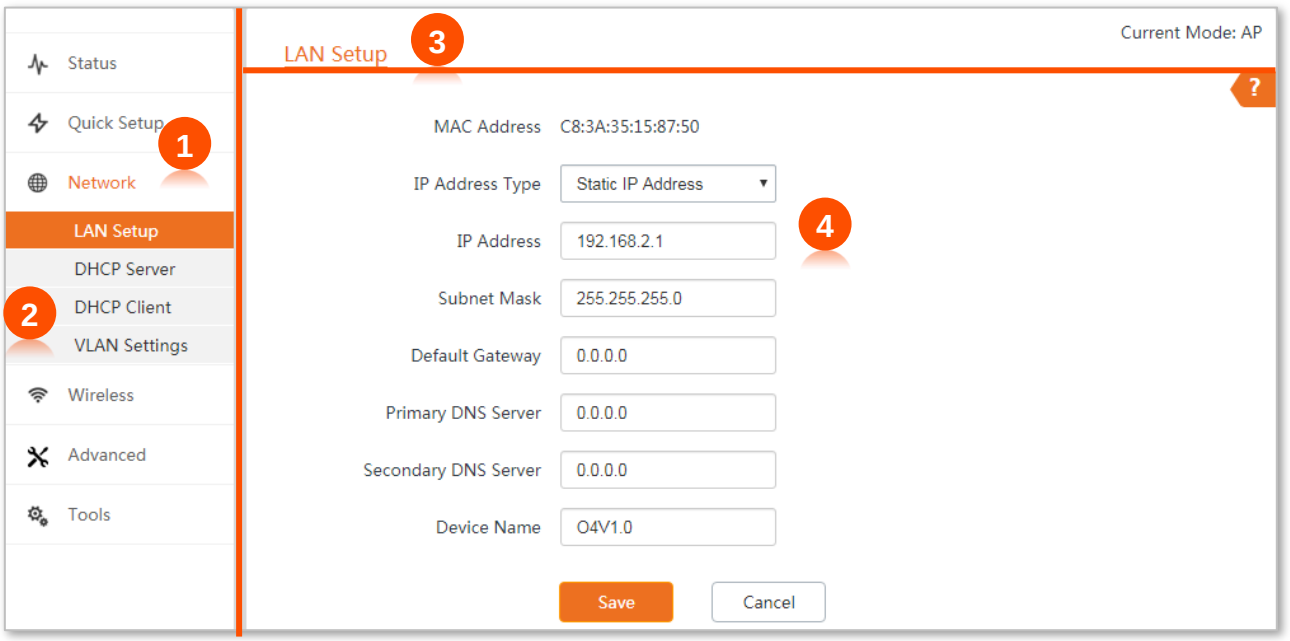
- Click the **Logout** button on the upper-right corner of the web UI.
- Close the web browser.

Perform no operation within the login timeout interval (default: 5 minutes). You can change the login timeout interval on the **Advanced** > **Network Service** page.

3 Web UI

3.1 Web UI layout

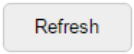
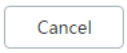
The web UI of the device is composed of 4 parts, including the level-1 navigation tree, level-2 navigation tree, tab page area, and configuration area. See the following figure.



No.	Name	Description
1	Level-1 navigation tree	The navigation bars and tab pages display the function menu of the device. When you select a function in navigation bar, the configuration of the function appears in the configuration area.
2	Level-2 navigation tree	
3	Tab page area	
4	Configuration area	It enables you to view and modify configuration.

3.2 Common buttons

The following table describes the common buttons available on the web UI.

Common Buttons	Description
	It is used to update the content of the current page.
	It is used to save the configuration on the current page and enable the configuration to take effect.
	It is used to go back to the original configuration without saving the configuration on the current page.
	It is used to view help information corresponding to the settings on the current page.

4 Quick setup

This module enables you to quickly configure the device or change the working mode of the CPE to deploy your wireless network.

The CPE supports the following working modes:

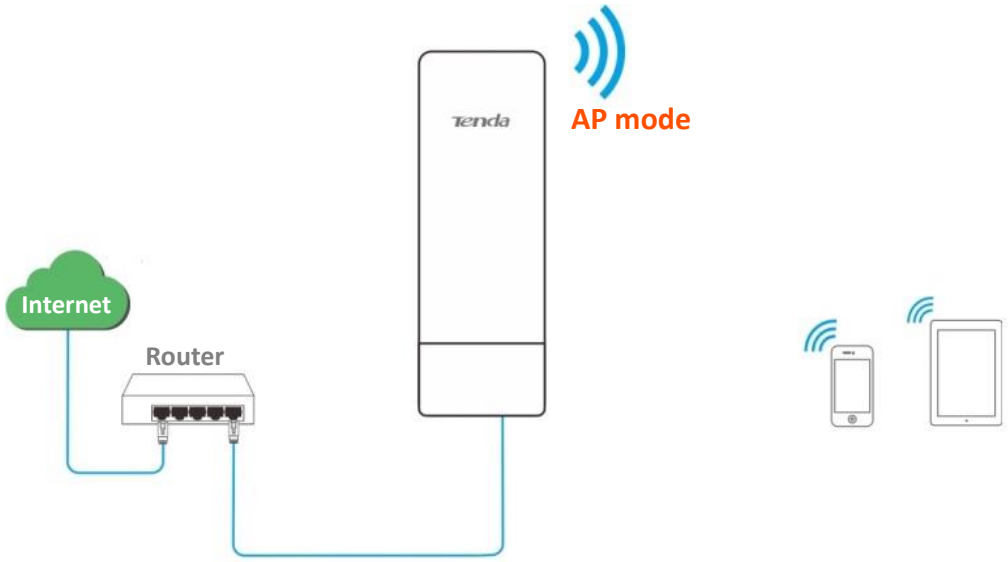
- AP: In this mode, the device creates a wireless network based on the current wired network.
- Client: In this mode, the device works as a wireless adapter to connect to the wireless network of upstream AP.
- Universal Repeater: In this mode, this device extends an existing wireless network for broader network coverage.
- WISP: In this mode, this device connects to a hotspot provided by ISP in wireless manner, and provides the wireless network.
- Repeater: In this mode, the device connects to multiple wired networks through wireless bridge, and provides wireless access point.
- P2MP: In this mode, the device connects to multiple wired networks through wireless bridge, but does not provide wireless access point.
- Router: In this mode, the device connects to a modem in wired manner, and provides a wireless network.

4.1 AP mode

In AP mode, this device connects to a wired network, and provides a wireless network for wireless clients.

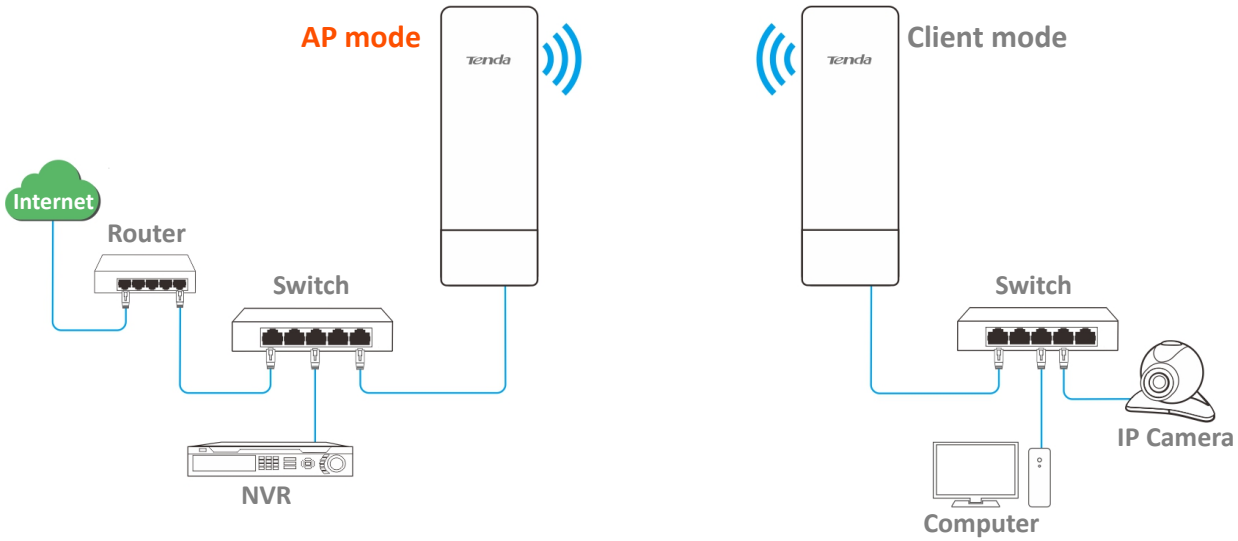
Application scenario 1

The CPE can be used to transform a wired network to a wireless one for your wireless devices to access the internet. The network topology is shown as below:



Application scenario 2

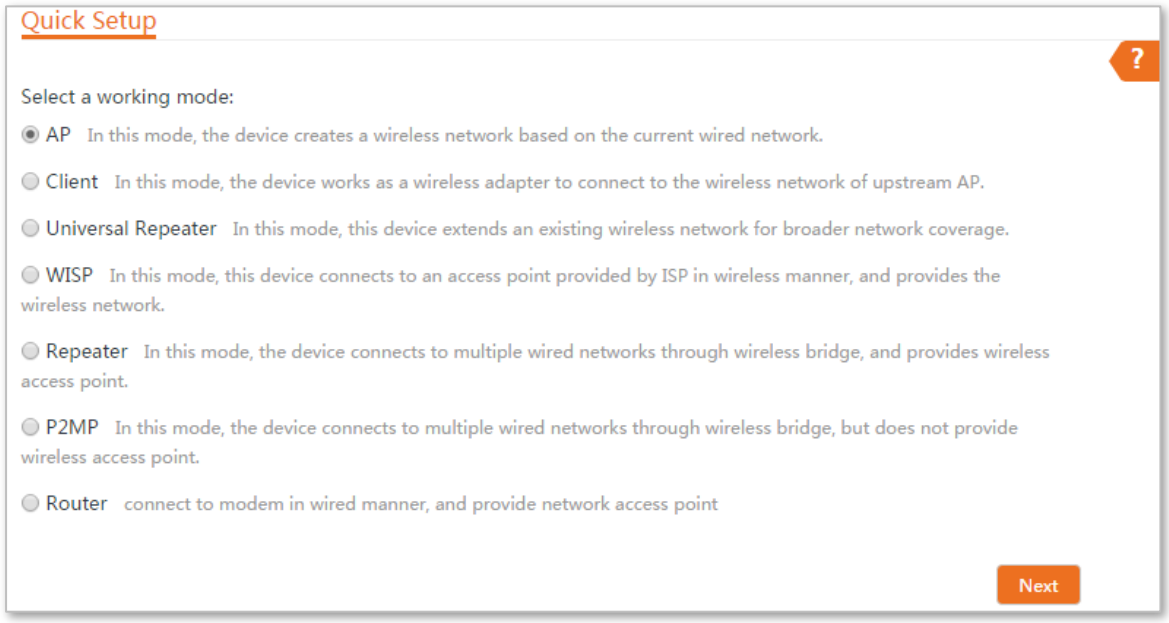
The CPE in AP mode usually works with another CPE in client mode to establish a CCTV surveillance network. Set one CPE to AP mode and connect it to the NVR, and the other to Client mode, and connect it to an IP camera. The network topology is shown as below:



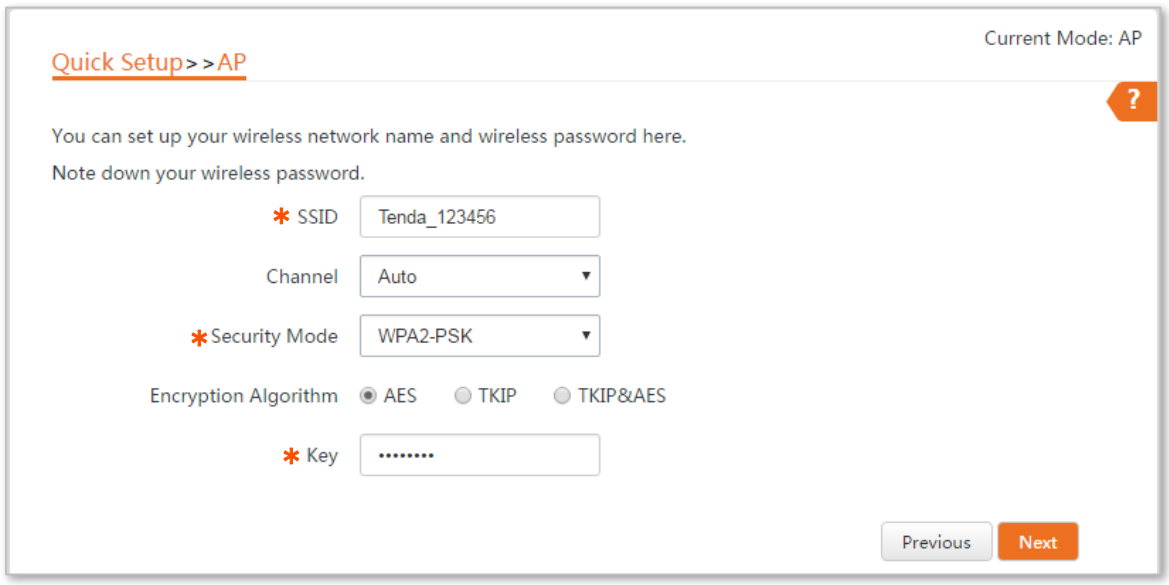
Configuration procedures:

Step 1 Log in to the web UI of the CPE and choose **Quick Setup** to enter the configuration page.

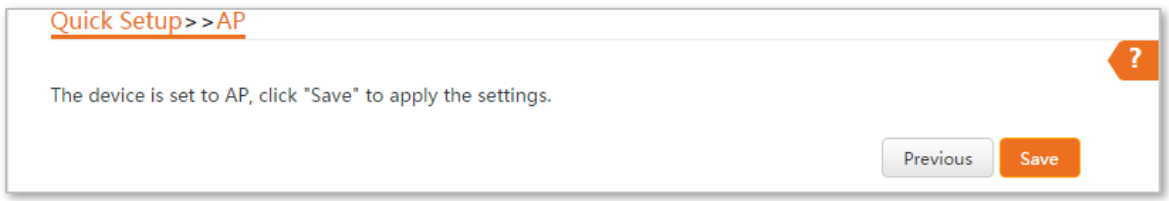
Step 2 Select **AP** mode and click **Next**.



Step 3 Set an SSID, which is **Tenda_123456** in this example, **Security Mode**, which is WPA2-PSK in this example, and **Key**, and click **Next**.



Step 4 Click **Save**, and wait until the device reboots automatically to activate the settings.



----End

Parameters description

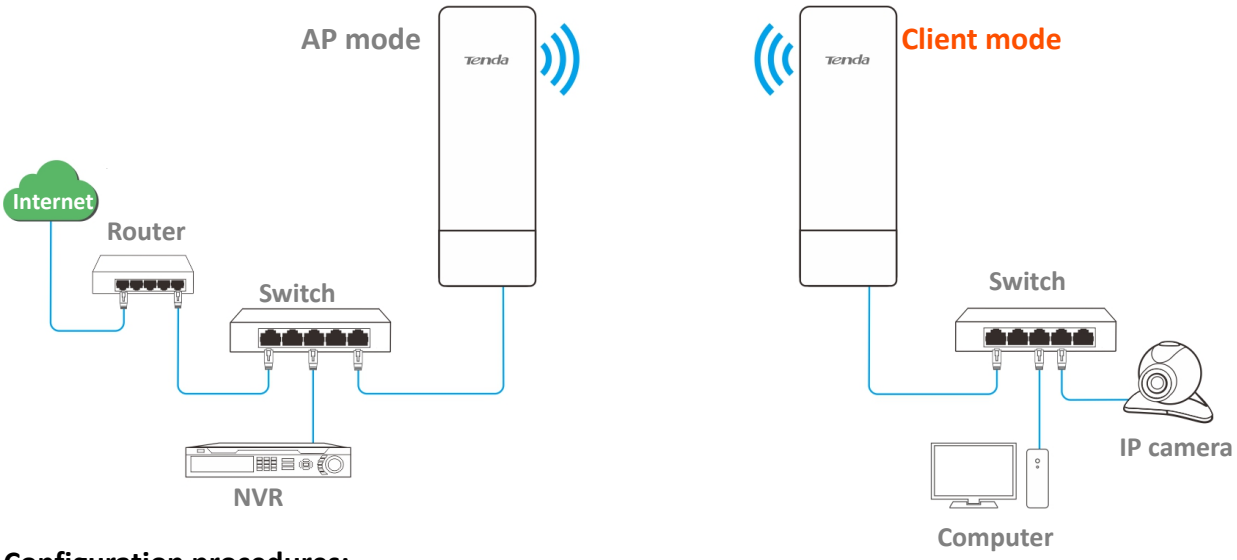
Name	Description
Working modes	It specifies the working mode of this device. **AP** mode: In this mode, the device creates a wireless network based on the current wired network.
SSID	It specifies the wireless network name of this device.
Channel	It specifies the operating channel of this device. Select a less used channel in the ambient environment to reduce interference. **Auto**: It indicates that the device automatically adjusts its operating channel according to the ambient environment.
Security Mode	It specifies the security mode of the wireless network, including: None, WPA-PSK, WPA2-PSK, and Mixed WPA/WPA2-PSK. Clicking the hyperlink navigates you to the elaborated description of the corresponding security mode.
Encryption Algorithm	It specifies the encryption method of the wireless network. • **AES**: It indicates the Advanced Encryption Standard. • **TKIP**: It indicates the Temporal Key Integrity Protocol. If TKIP is used, the maximum wireless throughput of the device is limited to 54 Mbps. • **TKIP&AES**: It indicates that both TKIP and AES encryption algorithms are supported. Wireless clients can connect to the wireless network corresponding to the selected SSID using TKIP or AES.
Key	It specifies the WiFi password of the wireless network.

4.2 Client mode

In Client mode, this device serves as a wireless adapter, and connects to a wireless network of upstream AP. The CPE is unable to be connected by wireless devices in this mode.

Application scenario

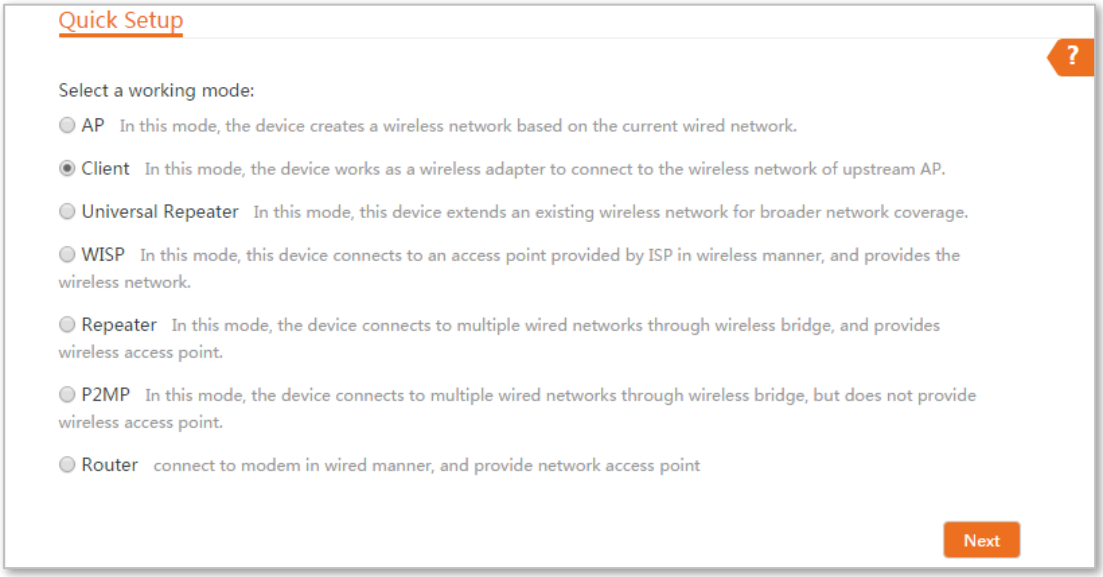
The CPE in AP mode usually works with another CPE in client mode to establish a CCTV surveillance network, and use the CPE to connect to IP cameras. The network topology is shown as below:



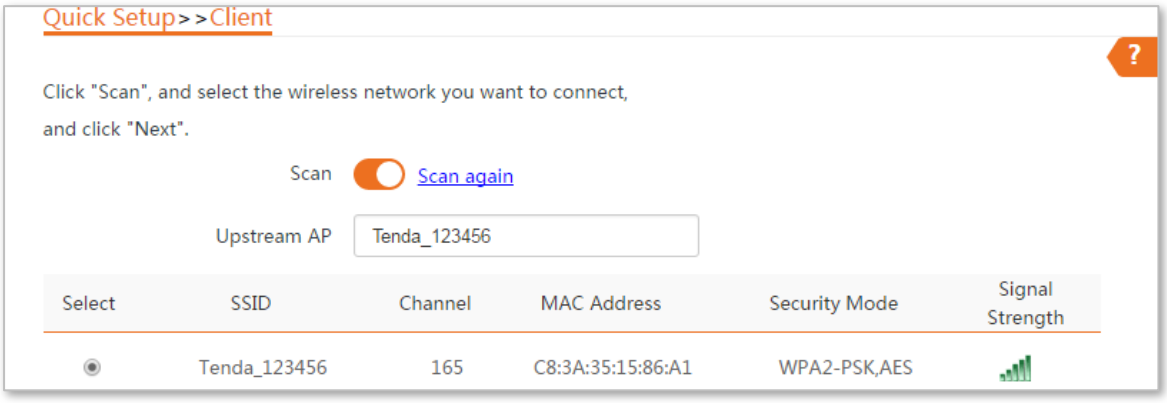
Configuration procedures:

Step 1 Log in to the web UI of CPE and choose **Quick Setup** to enter the configuration page.

Step 2 Select **Client**, and click **Next**.



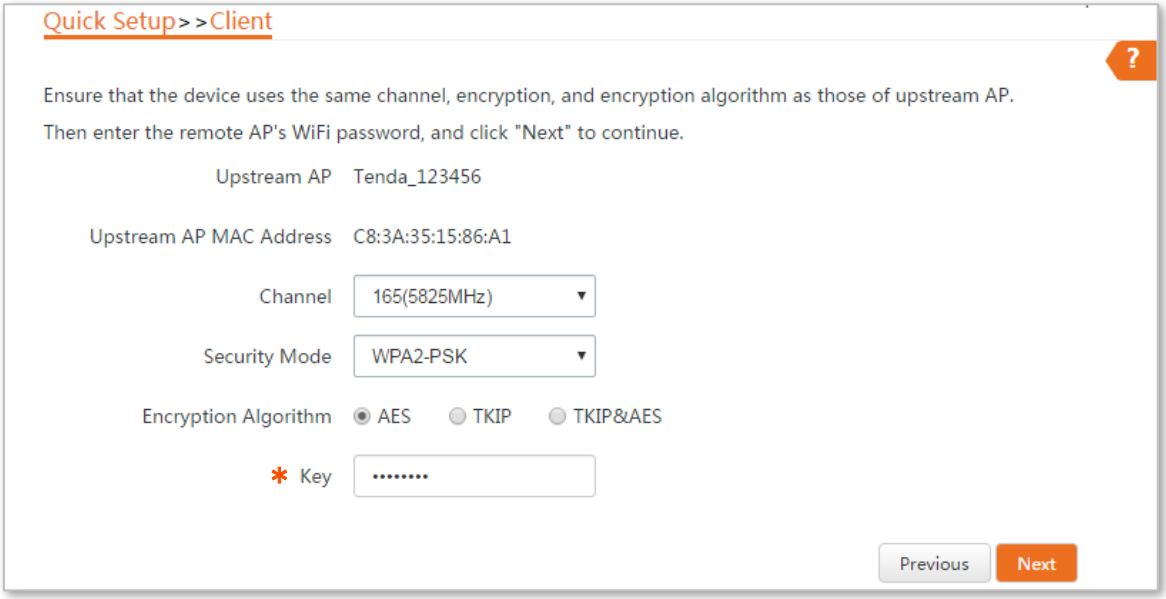
Step 3 Select the SSID of the peer device, which is **Tenda_123456** in this example, and click **Next** at the bottom of the page.



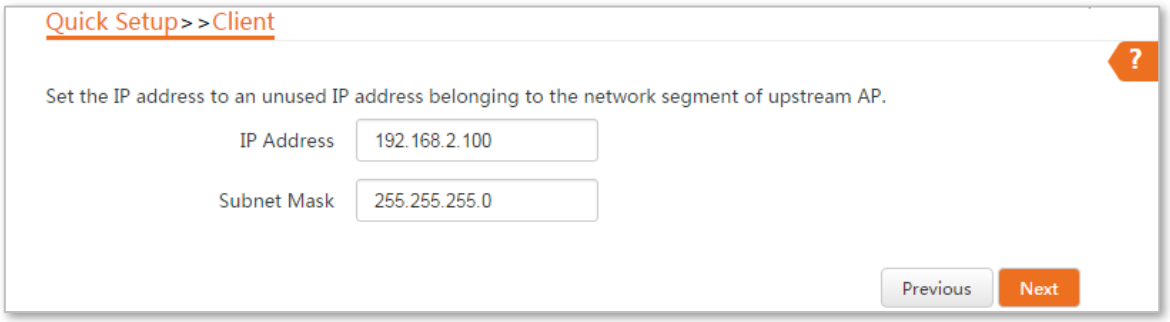
TIP

- If you cannot find any SSID from the list, choose **Wireless** > **Basic** and enable the wireless function. Then try again.
- If you cannot find the SSID of the CPE in AP mode from the list, adjust the direction of CPE in client mode, and move it close to the CPE in AP mode.

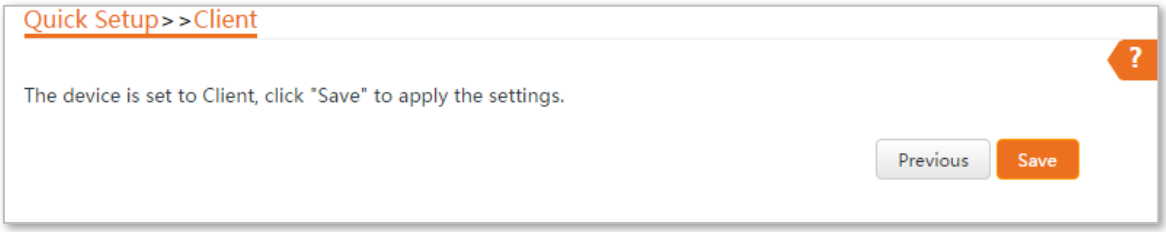
Step 4 Enter the WiFi password for the selected WiFi network **Tenda_123456** in the **Key** text box, and click **Next**.



Step 5 Set the IP address to an unused IP address belonging to the same network segment as that of the peer device. For example, if the IP address of the peer device is 192.168.2.1, you can set the IP address of the device to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



Step 6 Click **Save**, and wait until the device reboots to activate the settings.



----End

When LED1, LED2, and LED3 of the peer device are solid on, and LED1, LED2, and LED3 of the CPE are blinking, the bridging succeeds.

Parameters description

Name	Description
Working modes	It specifies the working mode of this device. **Client mode**: In this mode, the device works as a wireless adapter to connect to the wireless network of upstream AP, and does not provide wireless network.
Upstream AP	It specifies the wireless network name (SSID) of the upstream AP.
Channel	It specifies the operating channel of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge.
Security Mode	It specifies the security mode of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge. If the WiFi network to be bridged has a WiFi password, you need to enter the password manually.

4.3 Example of AP mode and client mode

Network requirement

You want to use two CPEs to establish a CCTV surveillance network.

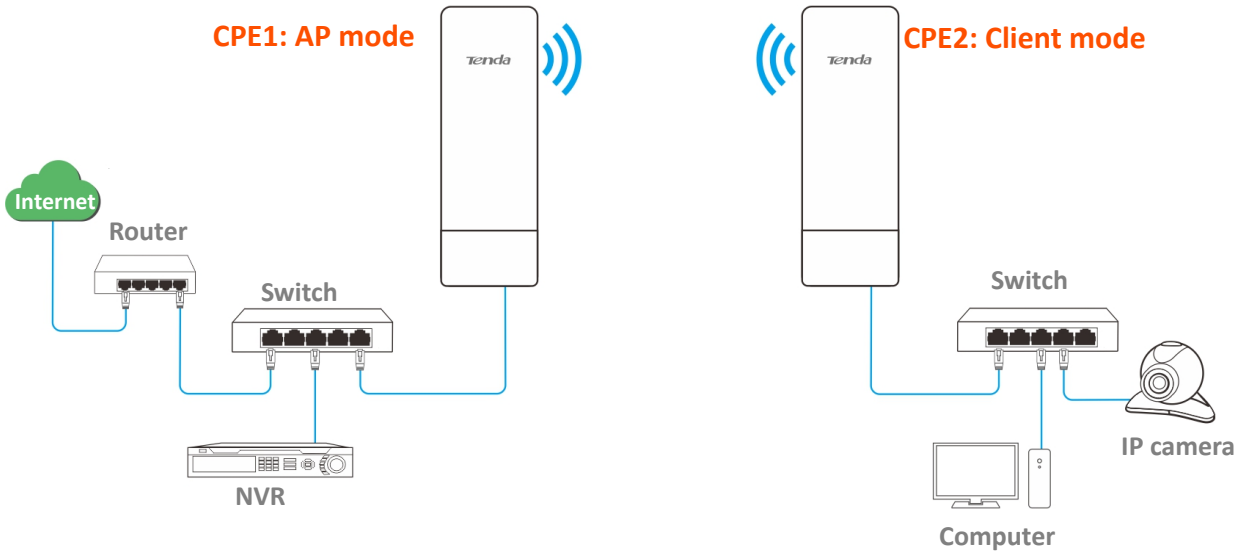
TIP

A CPE can support several IP cameras. The maximum number of IP cameras can be calculated with the following formula:
Number of IP cameras=Transmitted/received rate of the CPE / Data rate of IP camera

Solution

- Set CPE1 to the AP mode, and connect it to the NVR.
- Set CPE2 to the Client mode, and connect it to IP cameras.

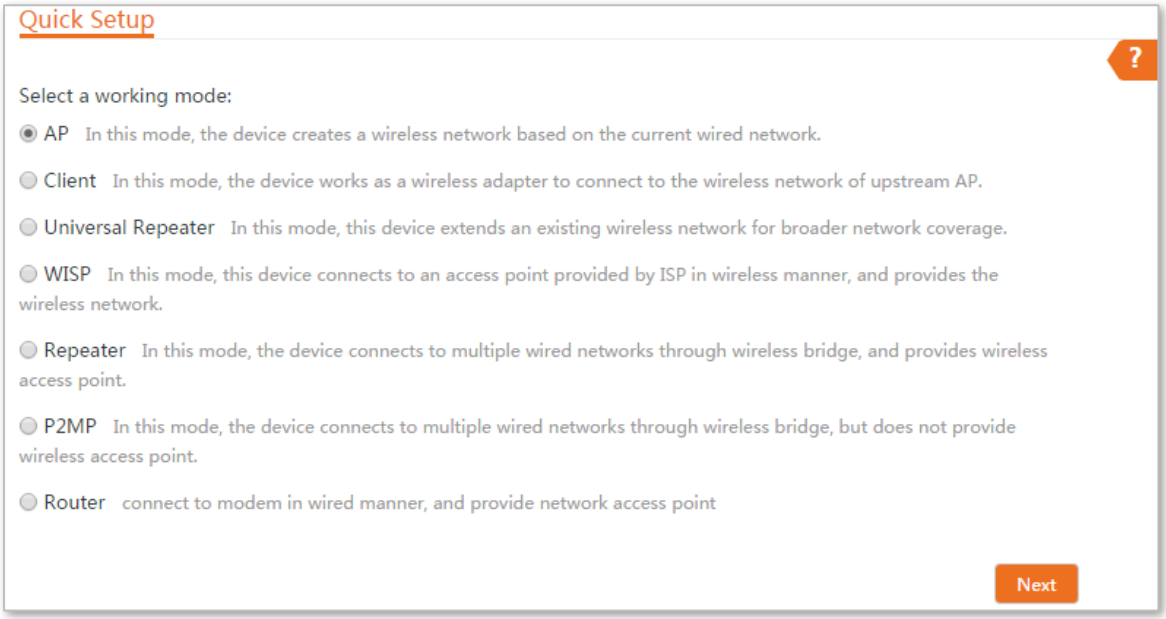
Network topology



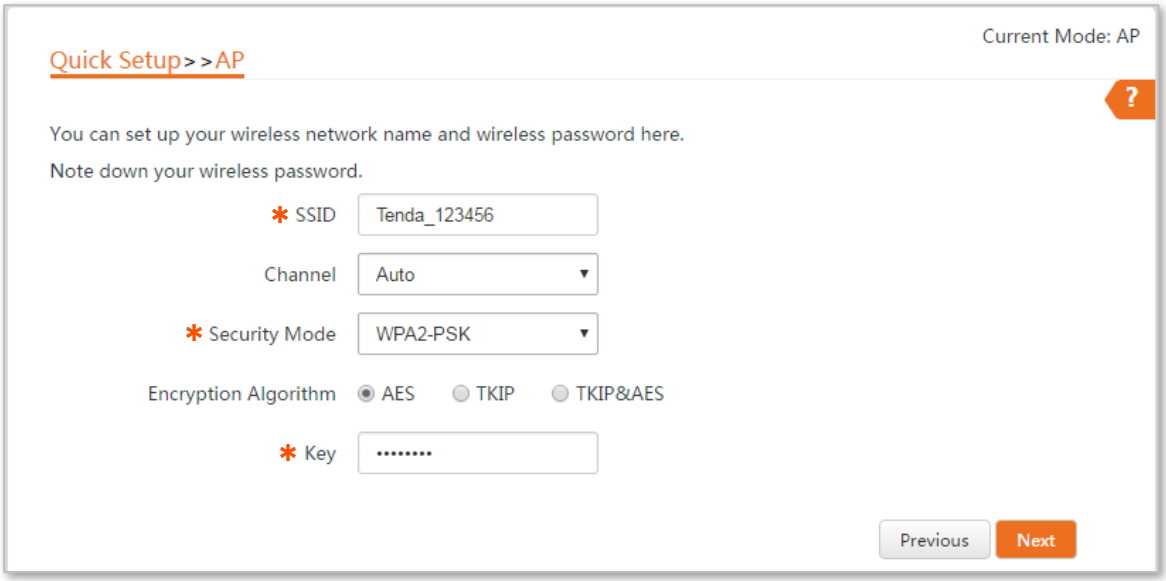
Configuration procedures

Step 1 Set **CPE1** to **AP** mode.

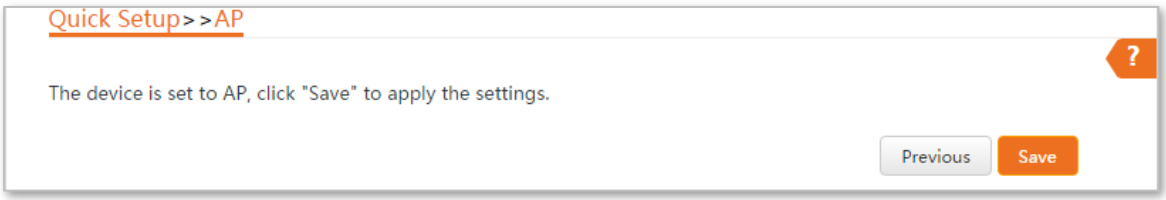
1. Log in to the web UI of CPE1, and choose **Quick Setup** to enter the configuration page.
2. Select **AP** mode and click **Next**.



3. Set an SSID, which is **Tenda_123456** in this example, select a **Security Mode** (WPA2-PSK is recommended) and customize a **Key**, and click **Next**.

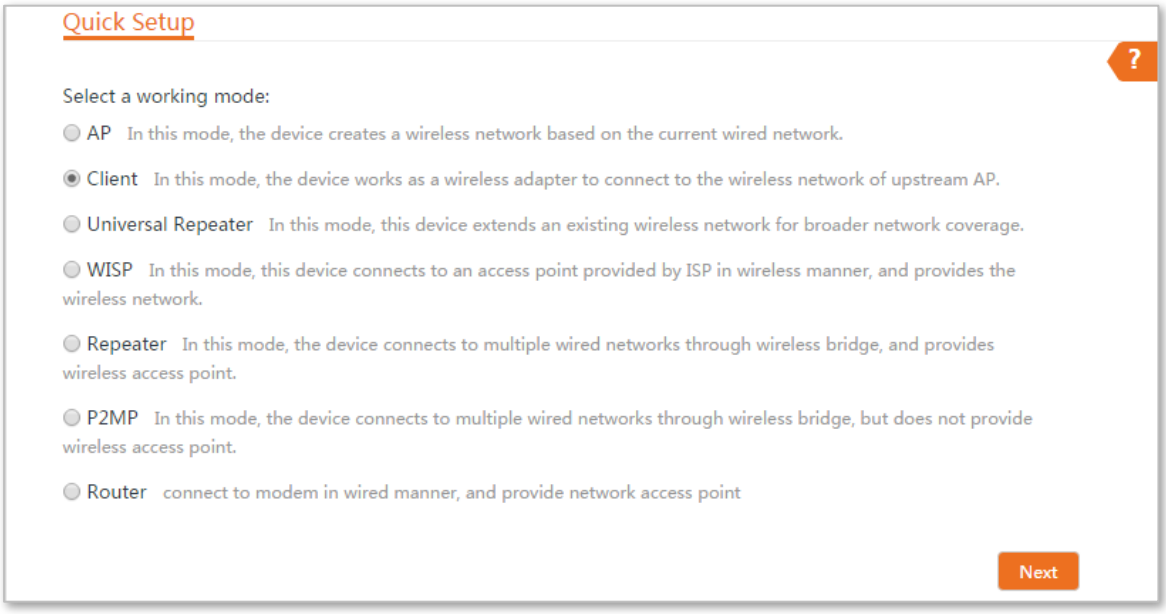


4. Click **Save**, and wait until the device reboots automatically to activate the settings.

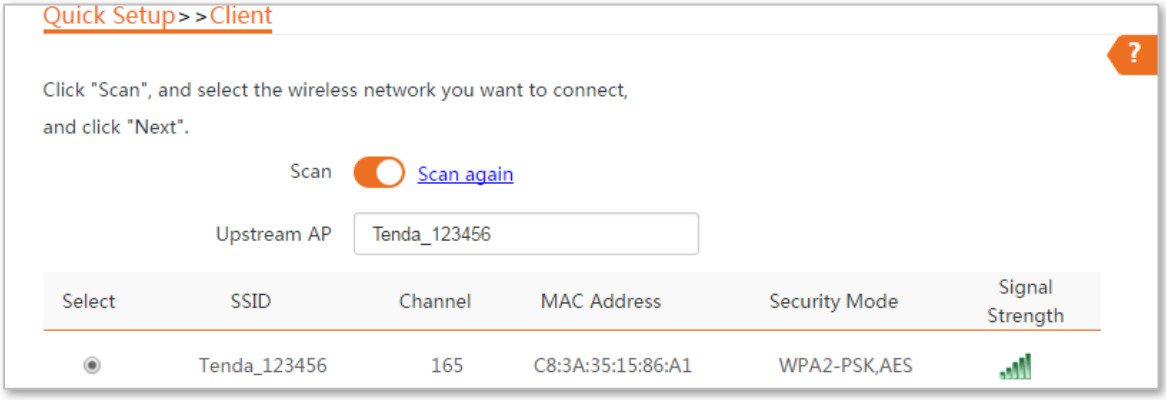


Step 2 Set **CPE2** to **Client** mode.

1. Log in to the web UI of CPE2 and choose **Quick Setup** to enter the configuration page.
2. Select **Client**, and click **Next**.



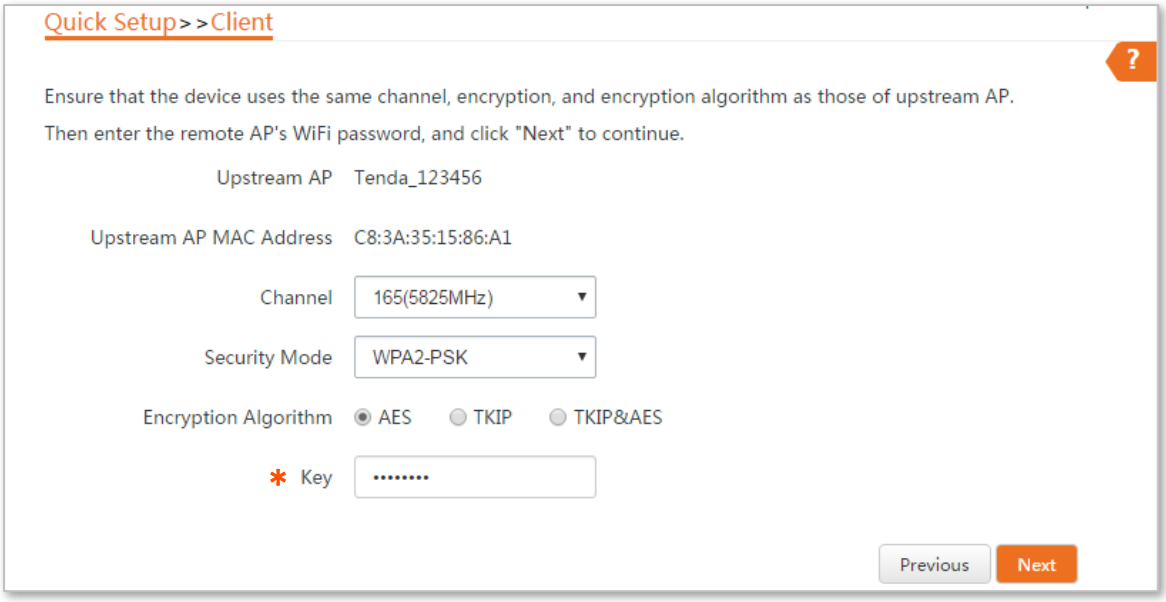
3. Select the SSID of the CPE1, which is **Tenda_123456** in this example, and click **Next** at the bottom of the page.



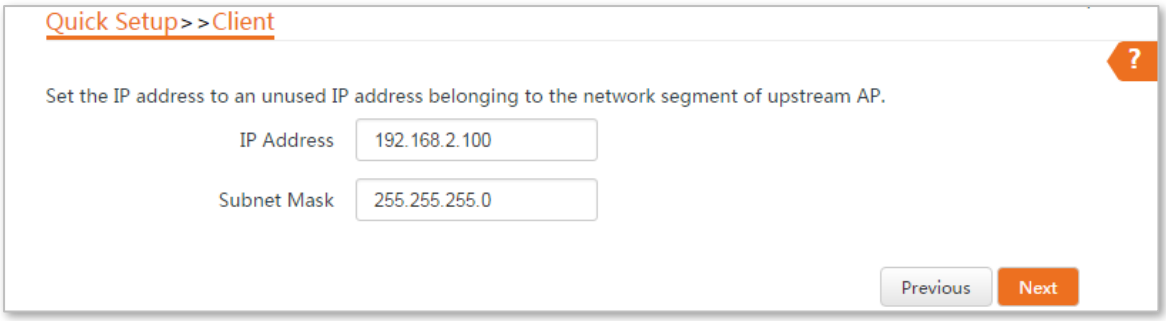
TIP

- If you cannot find any SSID from the list, choose **Wireless** > **Basic** and enable the wireless function. Then try again.
- If you cannot find the SSID of CPE1 from the list, adjust the direction of CPE2, and move it close to the CPE1.

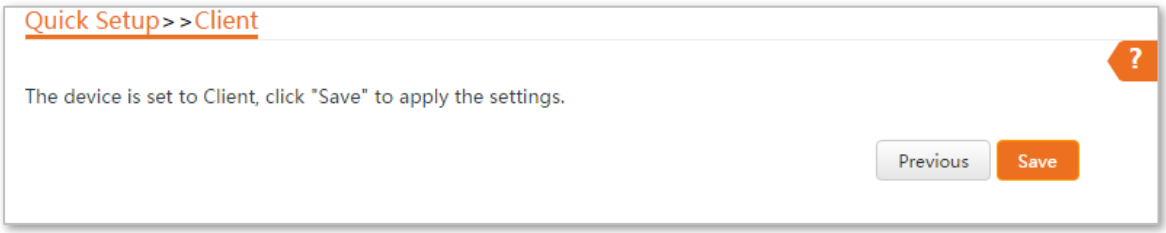
4. Enter the WiFi password you set on CPE1 in the **Key** text box, and click **Next**.



5. Set the IP address to an unused IP address belonging to the same network segment as that of CPE1. For example, if the IP address of CPE1 is 192.168.2.1, you can set the IP address of the device to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



6. Click **Save**, and wait until the device reboots to activate the settings.



----End

When LED1, LED2, and LED3 of CPE1 are solid on, and LED1, LED2, and LED3 of CPE2 are blinking, the bridging succeeds.

TIP

You can check the SSID and key of CPE2 by choosing **Wireless** > **Basic** after logging in to the web UI.

Verification

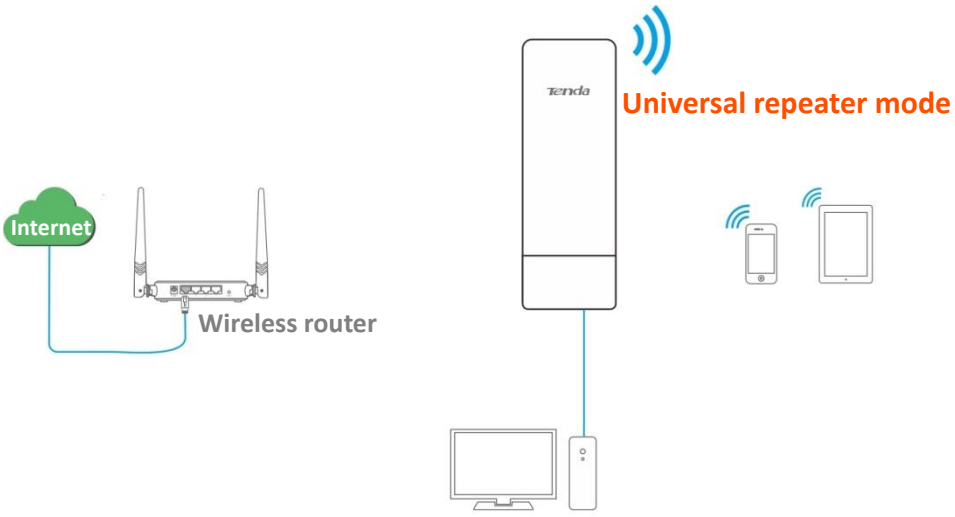
Surveillance videos can be seen on the computer in the side of CPE1.

4.4 Universal repeater mode

In Universal Repeater mode, this device expands your WiFi network for broader network coverage. Advantage of Universal Repeater compared with Repeater mode: This mode does not require that the upstream AP supports WDS function.

Application scenario

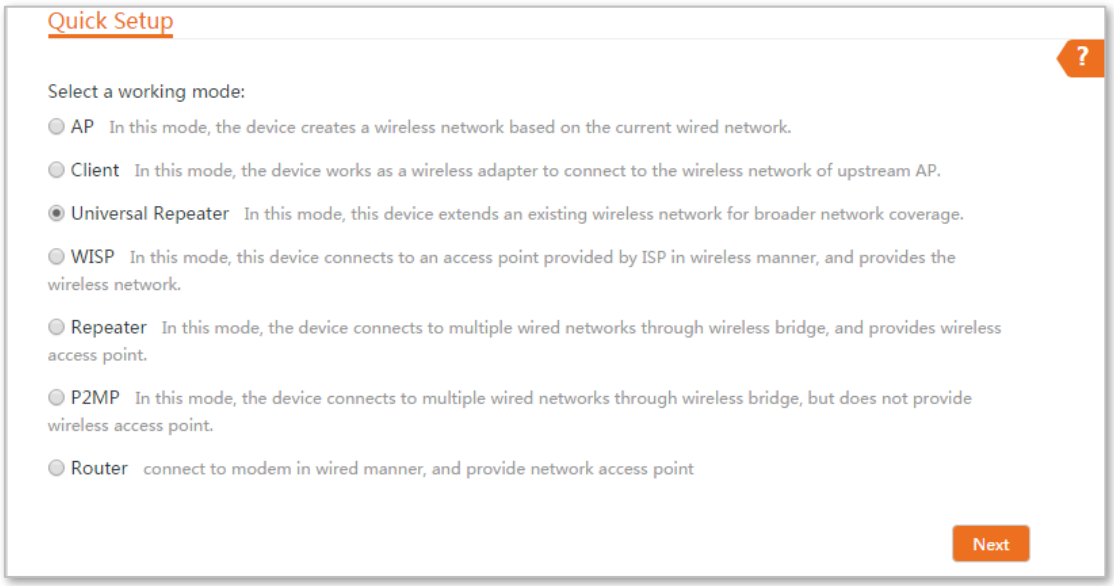
The CPE is used to extend your existing wireless network. The network topology is shown as below:



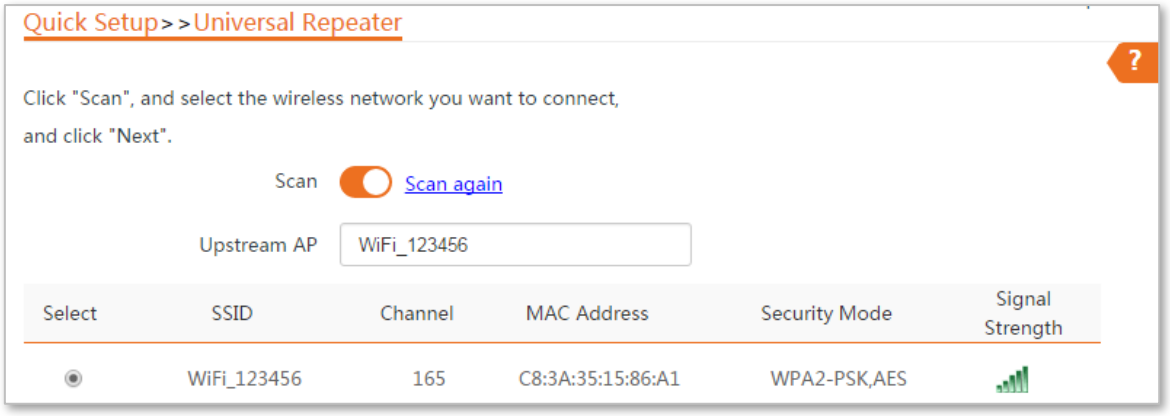
Configuration procedures:

Step 1 Log in to the web UI of the CPE and choose **Quick Setup** to enter the configuration page.

Step 2 Select **Universal Repeater**, and click **Next**.



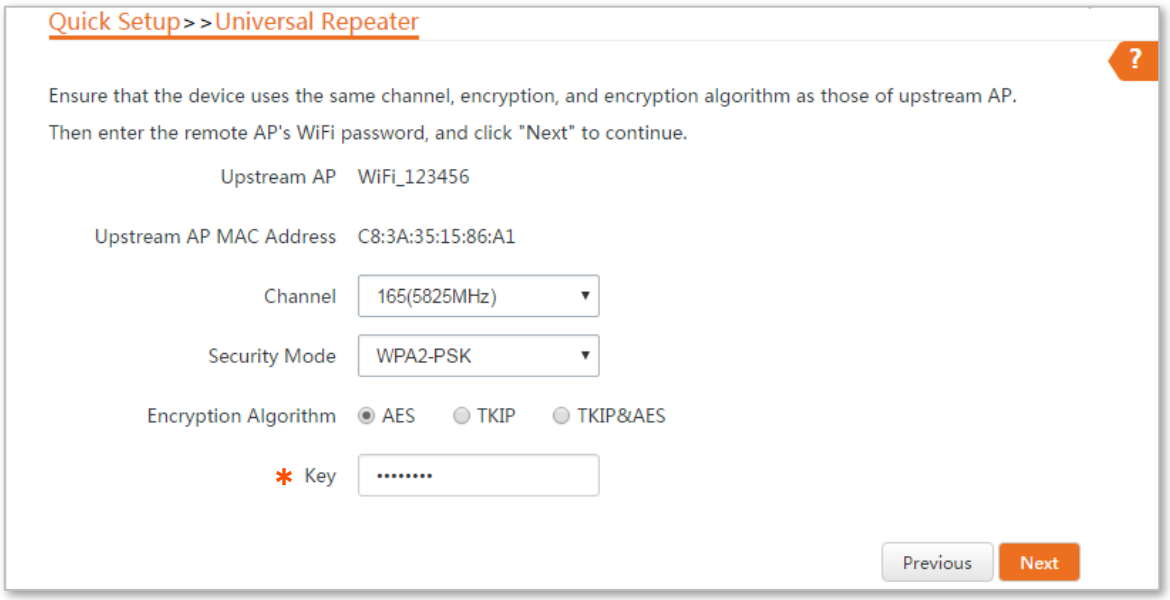
Step 3 Select the SSID of the router and click **Next** at the bottom of the page.



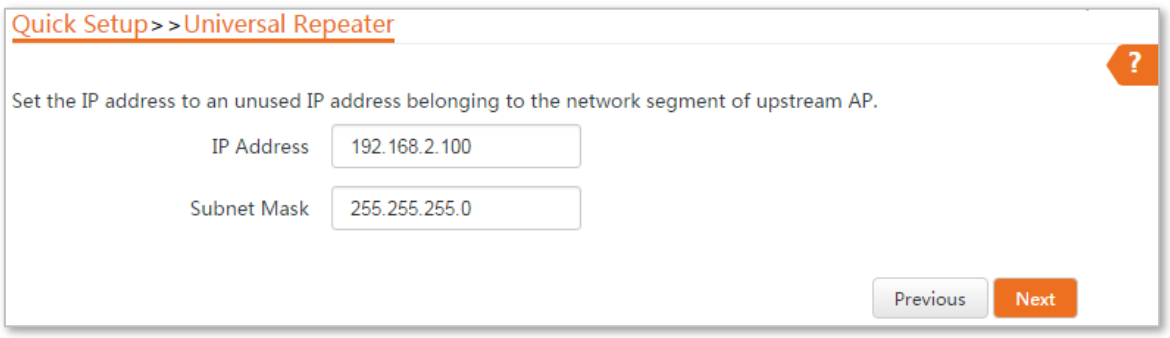
TIP

If you cannot find the SSID of the router from the list, ensure that the WiFi network of the router is enabled. Only the WiFi networks at the same band as that of the CPE will be displayed in the list.

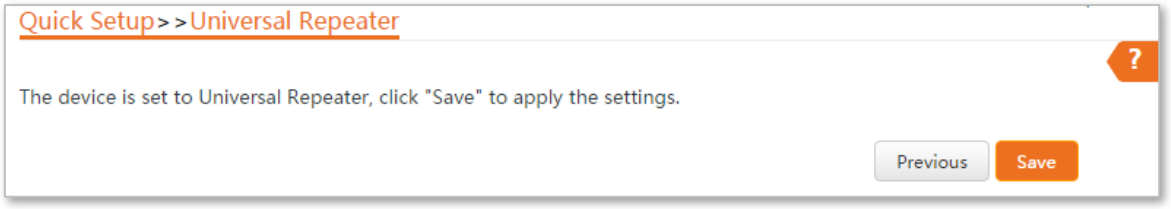
Step 4 Enter the WiFi password of the router in the **Key** text box, and click **Next**.



Step 5 Set the IP address to an unused IP address belonging to the same network segment as that of the router. For example, if the IP address of the router is 192.168.2.1, you can set this device's IP address to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



Step 6 Click **Save**, and wait until the device reboots to activate the settings.



----End

When the LED1, LED2, and LED3 are blinking, the bridging succeeds. The WiFi name and password of the device are the same as those of the wireless router.

To access the internet with:

- Wireless devices: Connect the wireless devices, such as a smart phone, to the WiFi network of the CPE using the SSID and key of the wireless router.
- Wired devices: Connect the wired devices, such as a computer, to the LAN port of the power adapter whose PoE port is connected to the CPE, or the switch connected to the LAN port of the power adapter.

Parameters description

Name	Description
Working modes	It specifies the working mode of this device. **Universal Repeater mode**: In this mode, the device expands your WiFi network for broader network coverage. Advantage of Universal Repeater compared with Repeater mode: This mode does not require that the upstream AP supports WDS function.
Upstream AP	It specifies the wireless network name (SSID) of the upstream AP.
Channel	It specifies the operating channel of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge.
Security Mode	It specifies the security mode of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge. If the WiFi network to be bridged has a WiFi password, you need to enter the password manually.

4.5 Example of universal repeater mode

Network requirement

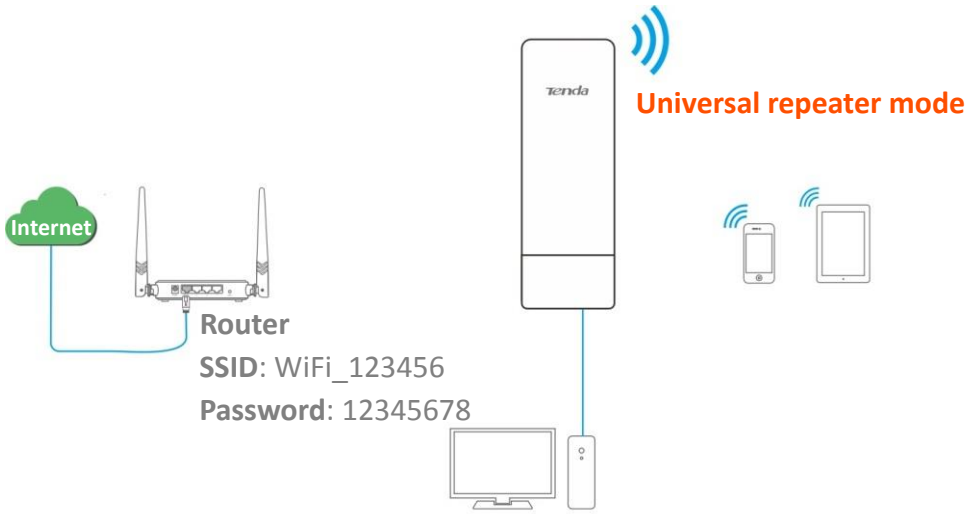
You already had a wireless router in your office, but in your conference room, the wireless signal is weak. Now you want to have a larger WiFi network coverage through your conference room.

Solution

Set the CPE to **Universal Repeater** mode to extend the WiFi network of the router.
Assume that the SSID and password of the router are shown as follows:

- **SSID**: WiFi_123456
- **Password**: 12345678

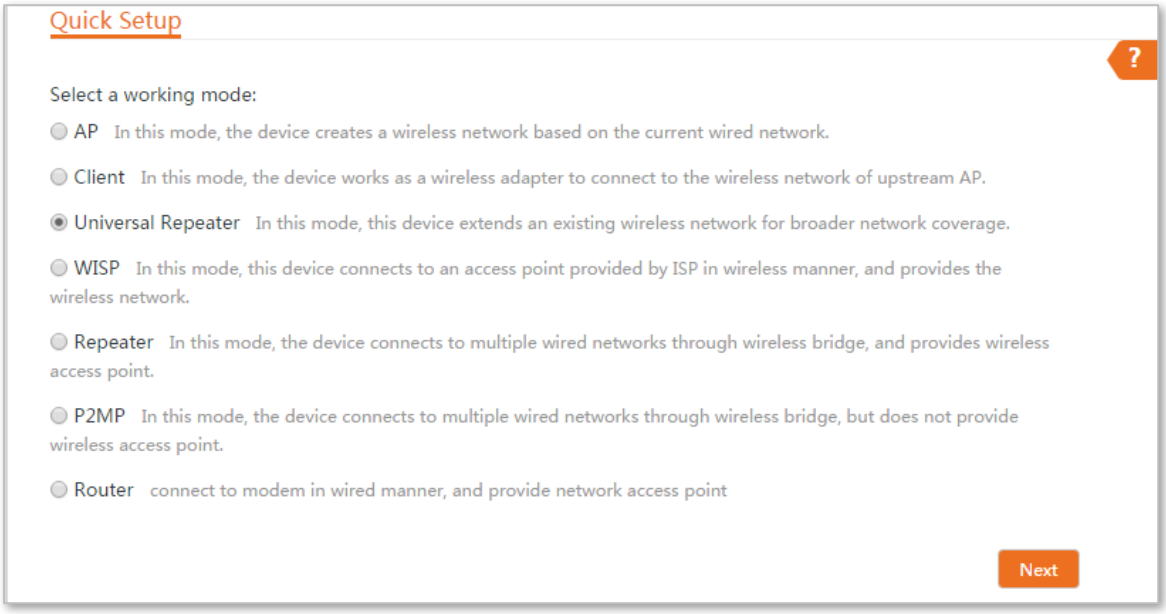
Network topology



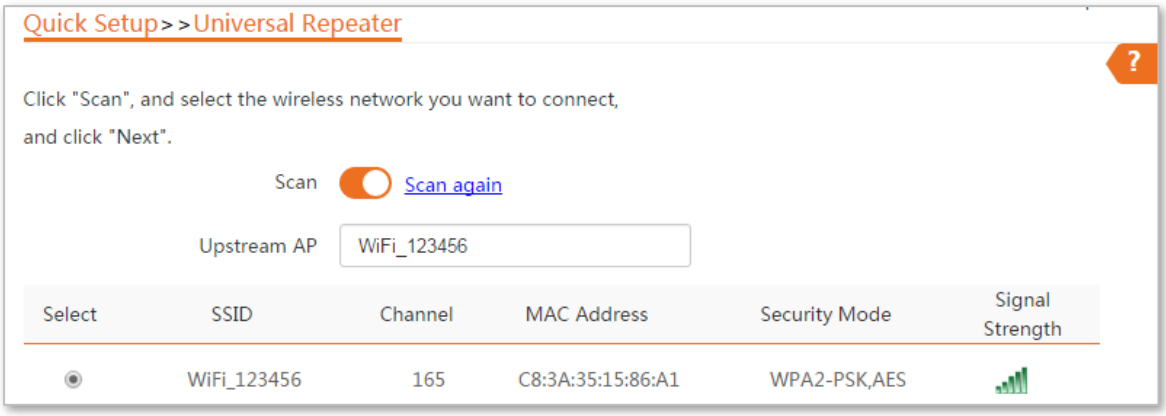
Configuration procedures

Step 1 Log in to the web UI of the CPE and choose **Quick Setup** to enter the configuration page.

Step 2 Select **Universal Repeater**, and click **Next**.



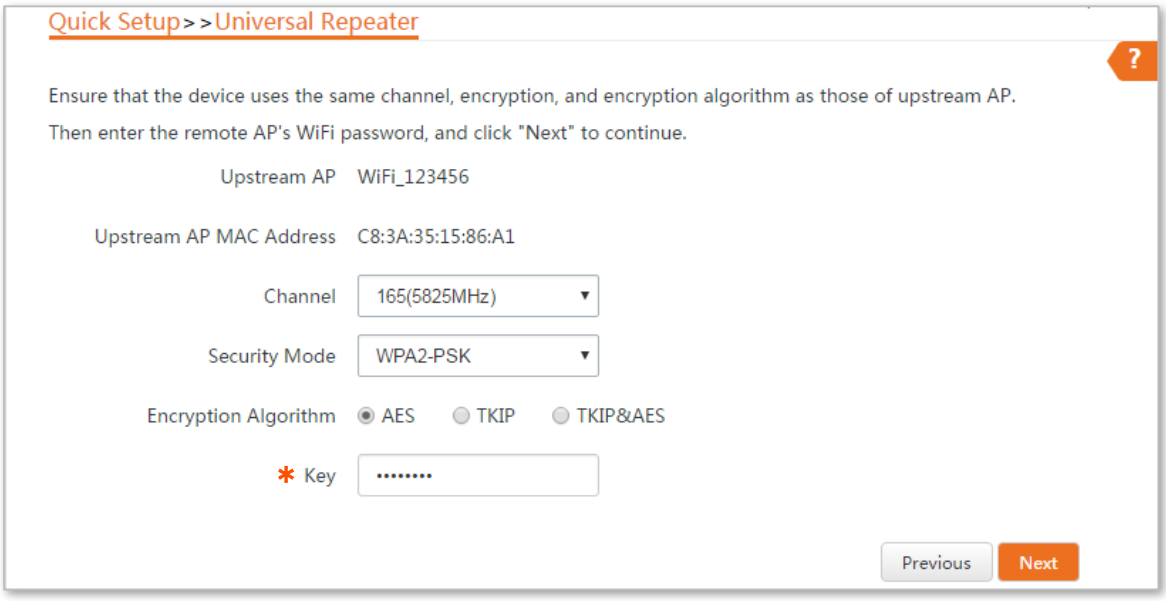
Step 3 Select the SSID of the router, which is **WiFi_123456** in this example, and click **Next** at the bottom of the page.



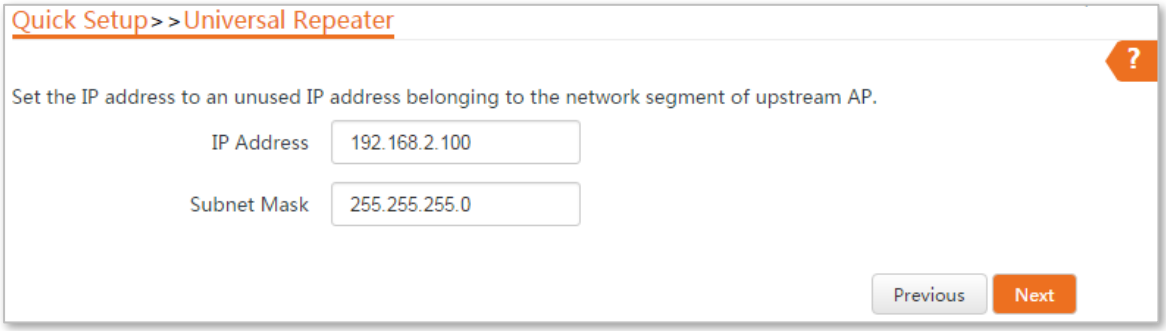
TIP

If you cannot find the SSID of the router from the list, ensure that the WiFi network of the router is enabled. Only the WiFi networks at the same band as that of the CPE will be displayed in the list.

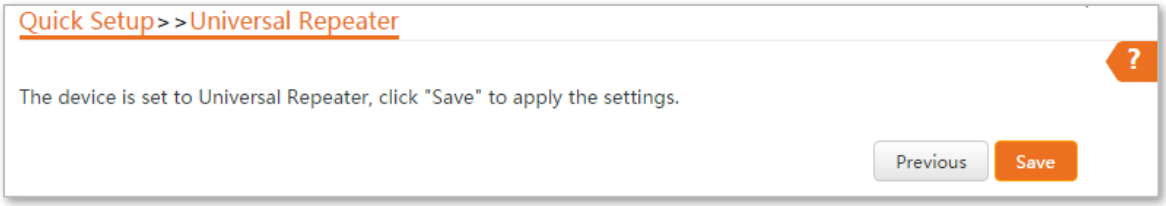
Step 4 Enter the **12345678** in the **Key** text box, and click **Next**.



Step 5 Set the IP address to an unused IP address belonging to the same network segment as that of the router. For example, if the IP address of the router is 192.168.2.1, you can set this device's IP address to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



Step 6 Click **Save**, and wait until the device reboots to activate the settings.



----End

Verification

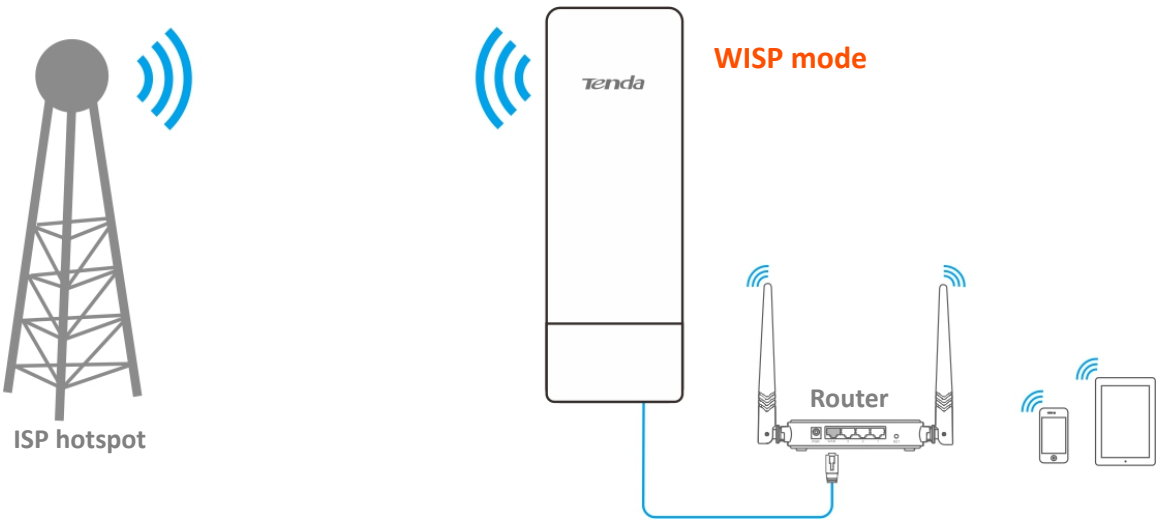
You can search strong wireless signal in the conference room.

4.6 WISP mode

In WISP mode, this device connects to a hotspot provided by ISP (Internet Service Provider) in wireless manner, and allows the wired and wireless devices to connect to the internet.

Application scenario

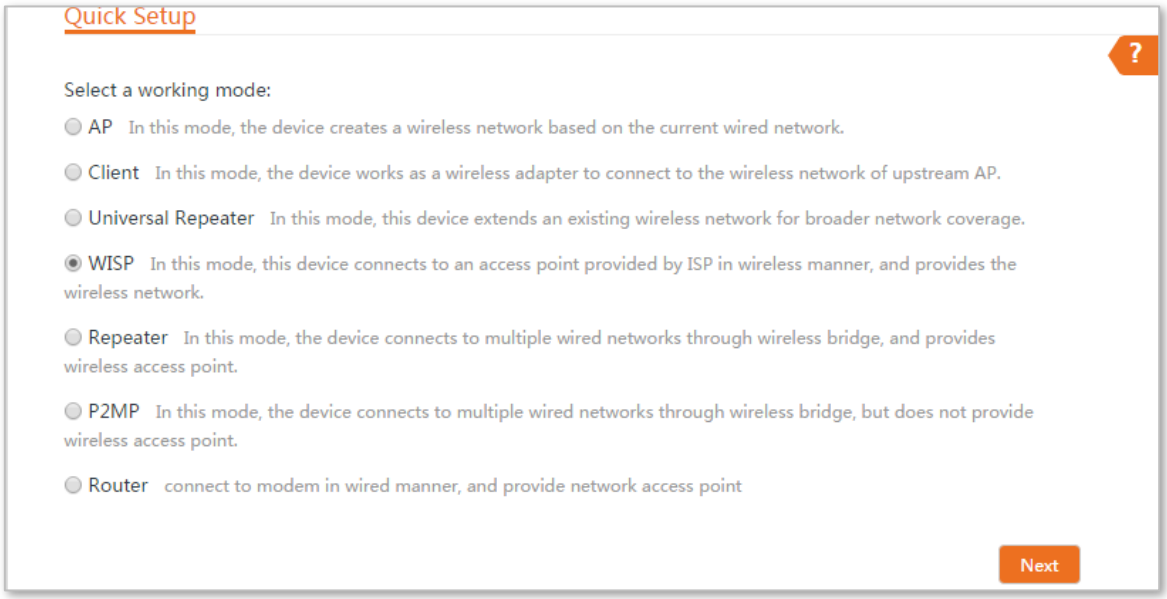
The CPE is used to extend the ISP hotspot to your home. The network topology is shown as below:



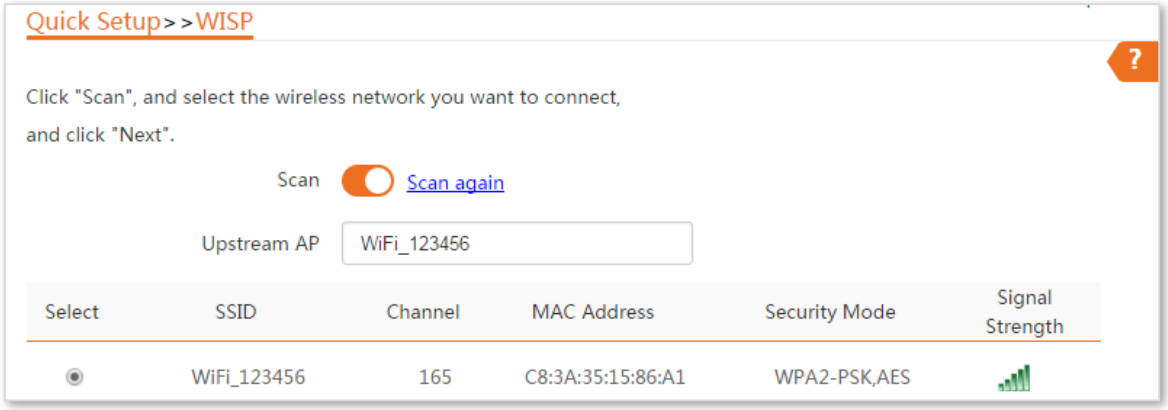
Configuration procedures:

Step 1 Log in to the web UI of this CPE and choose **Quick Setup** to enter the configuration page.

Step 2 Select **WISP**, and click **Next**.



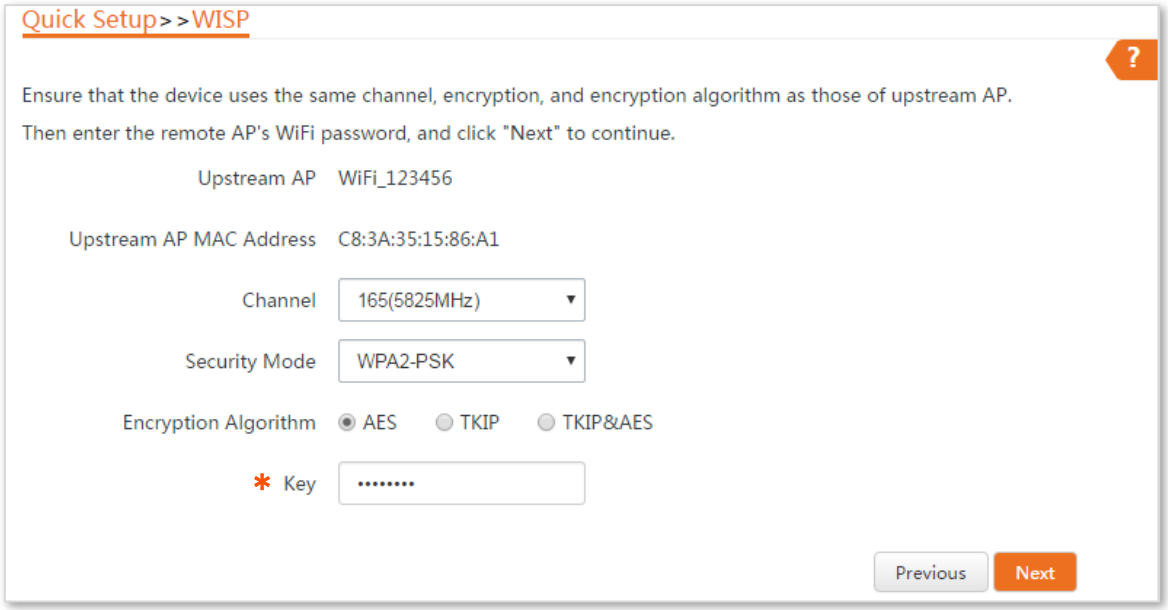
Step 3 Select the SSID of your ISP hotspot, which is **WiFi 123456** in this example, and click **Next** at the bottom of the page.



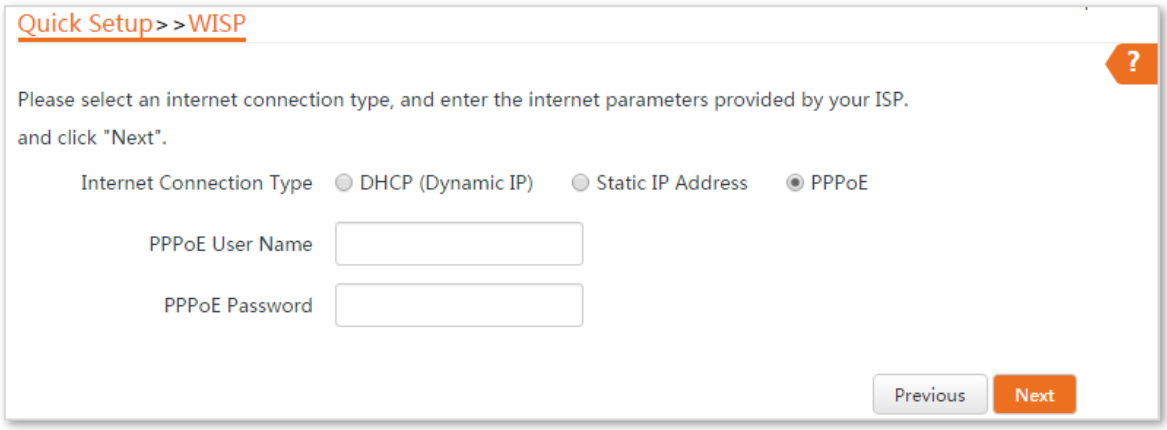
TIP

If you cannot find the SSID of the router from the list, ensure that the WiFi network of the router is enabled. Only the WiFi networks at the same band as that of the CPE will be displayed in the list.

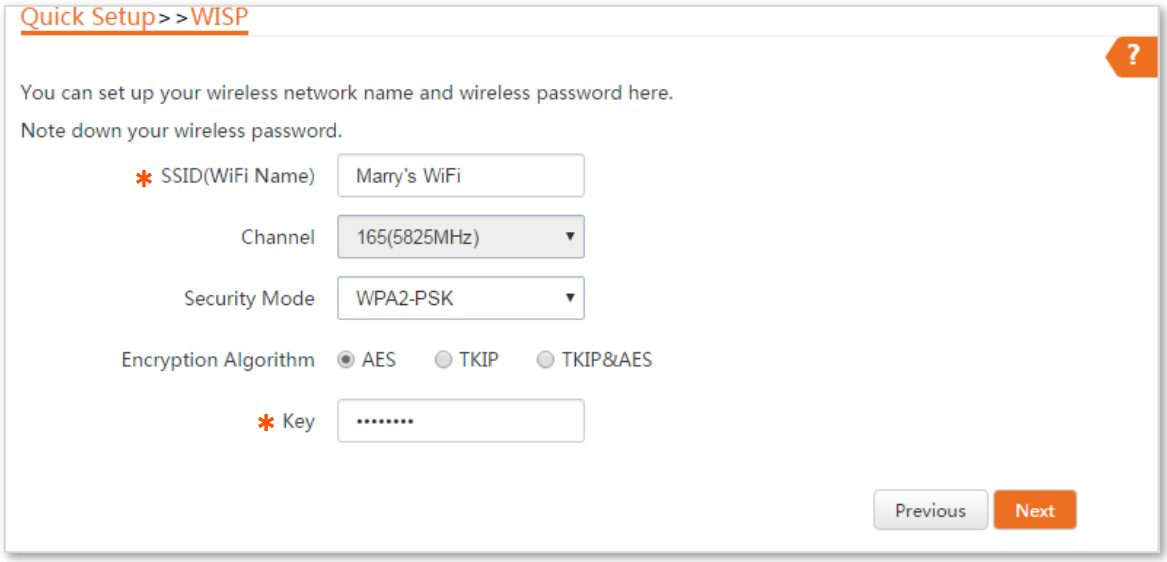
Step 4 Enter the WiFi password of your ISP hotspot in the **Key** text box, and click **Next**.



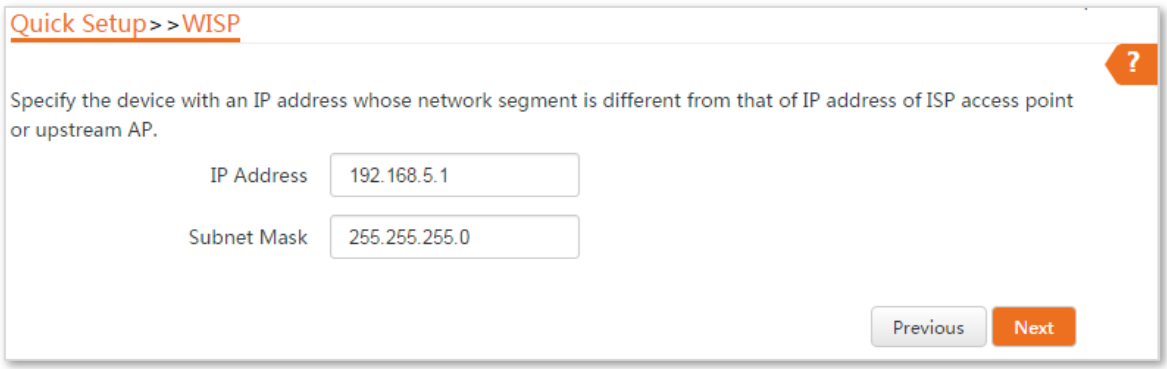
Step 5 Select the **Internet Connection Type** of your ISP hotspot, which is **PPPoE** in this example. Enter the PPPoE user name and password provided by your ISP, and click **Next**.



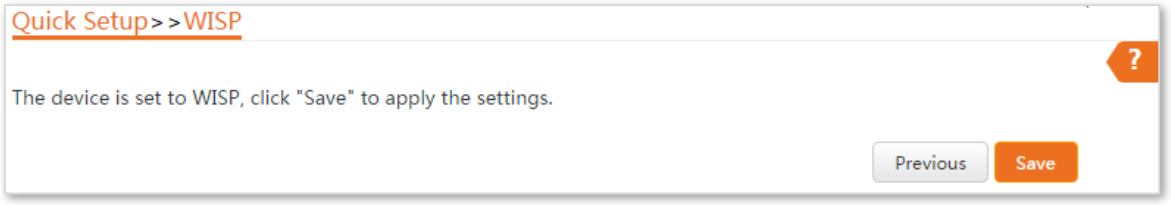
Step 6 Customize the SSID and key, and click **Next**.



Step 7 Set an IP address belonging to a different network segment as that of your ISP hotspot. For example, if the IP address of your ISP hotspot is 192.168.2.1, you can set this device's IP address to 192.168.*X*.1 (*X* ranges from 0 to 254 excluding 2) which is also the login IP address of the CPE. Then click **Next**.



Step 8 Click **Save**, and wait until the device reboots to activate the settings.



----End

When LED1, LED2, and LED3 of the CPE are blinking, the device is connected to your ISP hotspot successfully.
To access the internet with:

- Wireless devices: Connect the wireless devices, such as a smart phone, to the WiFi network of the wireless router which is connected to the CPE.
- Wired devices: Connect the wired devices, such as a computer, to the LAN ports of the wireless router which is connected to the CPE.

Parameters description

Name	Description
Working modes	It specifies the working mode of this device. **WISP mode**: In this mode, the device connects to an access point provided by ISP in wireless manner.
Upstream AP	It specifies the wireless network name (SSID) of the upstream AP.
Channel	It specifies the operating channel of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge.
Security Mode	It specifies the security mode of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge. If the WiFi network to be bridged has a WiFi password, you need to enter the password manually.
Internet Connection Type	• **DHCP (Dynamic IP)**: The device obtains an IP address and other parameters form the DHCP server of upstream device for internet access. • **Static IP Address**: The device access the internet by setting the IP address, subnet mask, default gateway and DNS server IP addresses manually. • **PPPoE**: The device access the internet using the PPPoE user name and password provided by the ISP.

4.7 Example of WISP mode

Network requirement

You live in countryside, and it is not convenient for you to connect the nearest ISP CPE using Ethernet cables. So you want to extend the ISP hotspot to your home in wireless manner.

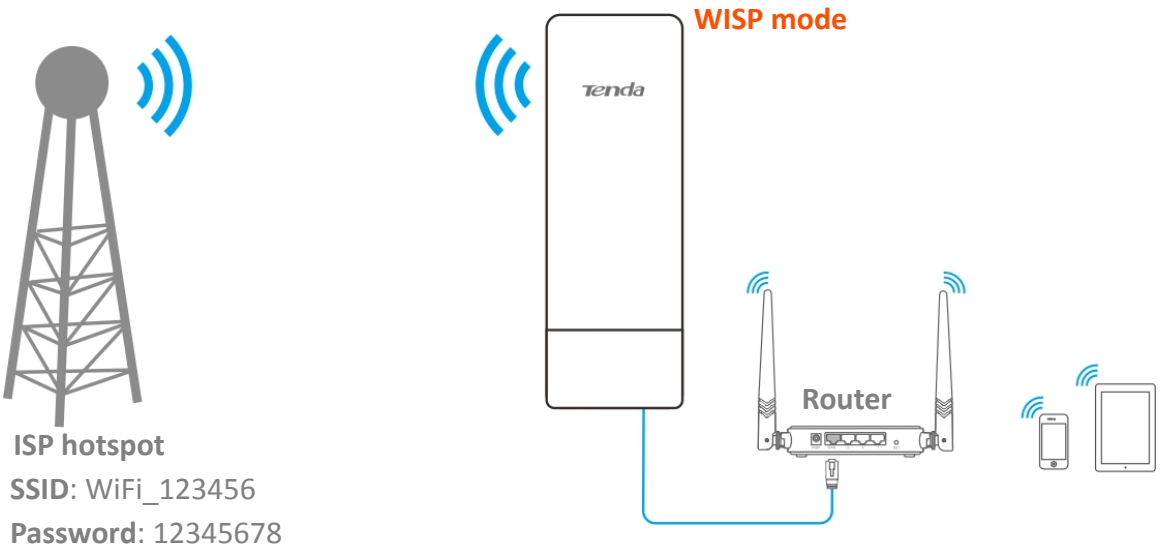
Solution

Set the CPE to WISP mode, and bridge it to the ISP hotspot.

Assume that the SSID and password of the ISP hotspot are:

- SSID: WiFi_123456
- Password: 12345678
- Internet Connection Type: PPPoE
  User name: admin
  Password: admin

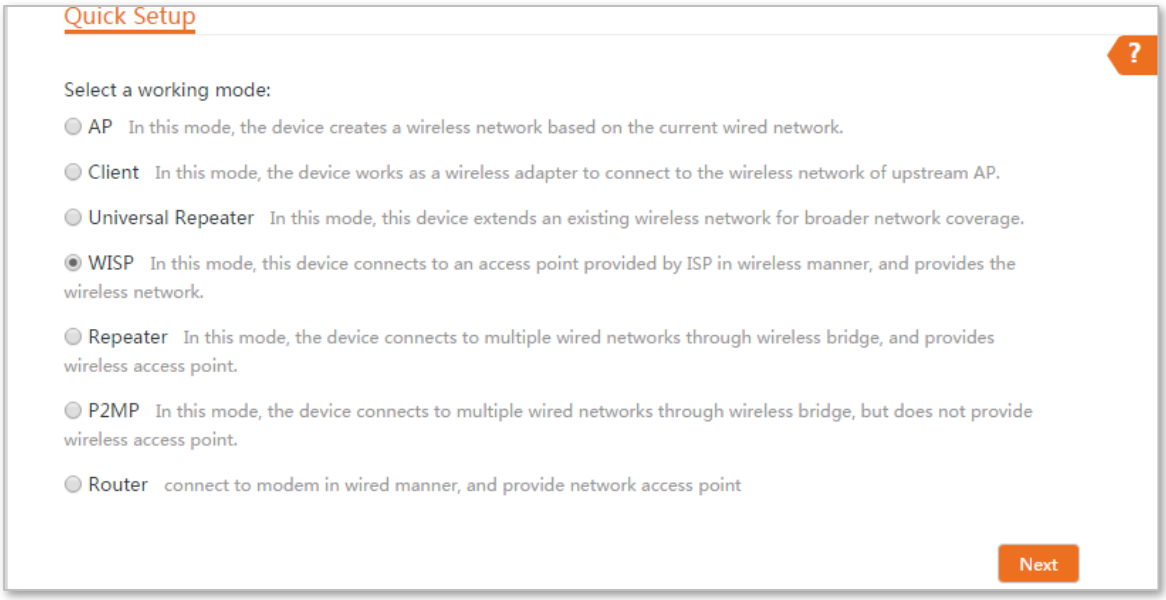
Network topology



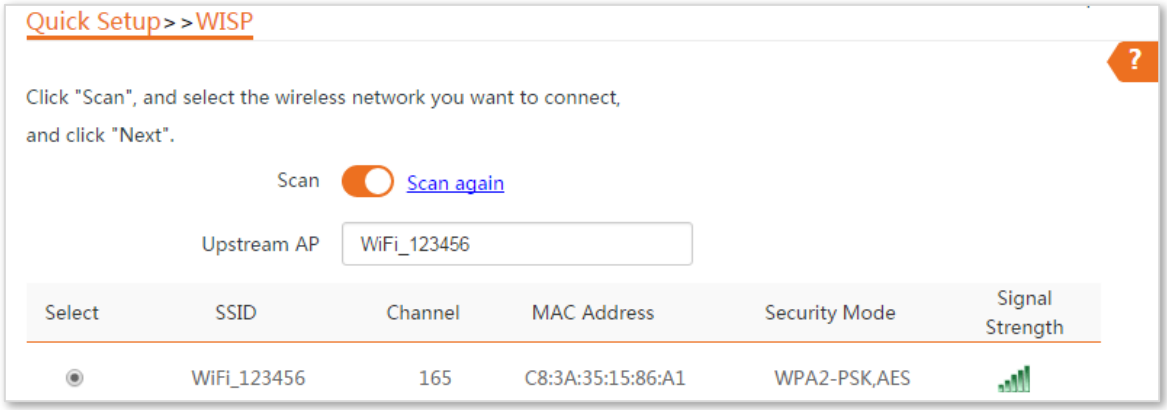
Configuration procedures

Step 1 Log in to the web UI of this CPE and choose **Quick Setup** to enter the configuration page.

Step 2 Select **WISP**, and click **Next**.



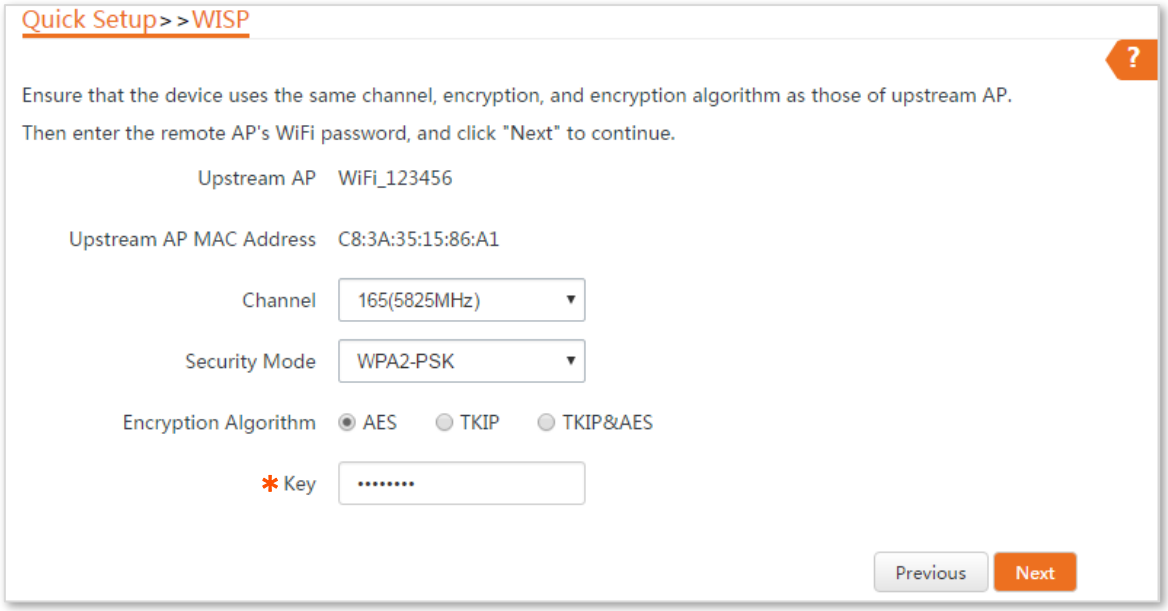
Step 3 Select the SSID of your ISP (Internet Service Provider) hotspot, which is **WiFi_123456** in this example, and click **Next** at the bottom of the page.



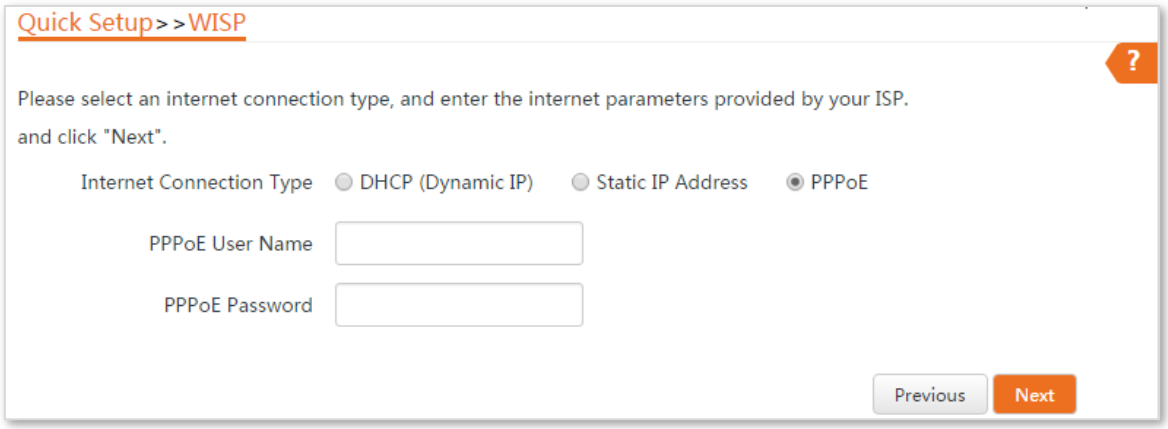
TIP

If you cannot find the SSID of the router from the list, ensure that the WiFi network of the router is enabled. Only the WiFi networks at the same band as that of the CPE will be displayed in the list.

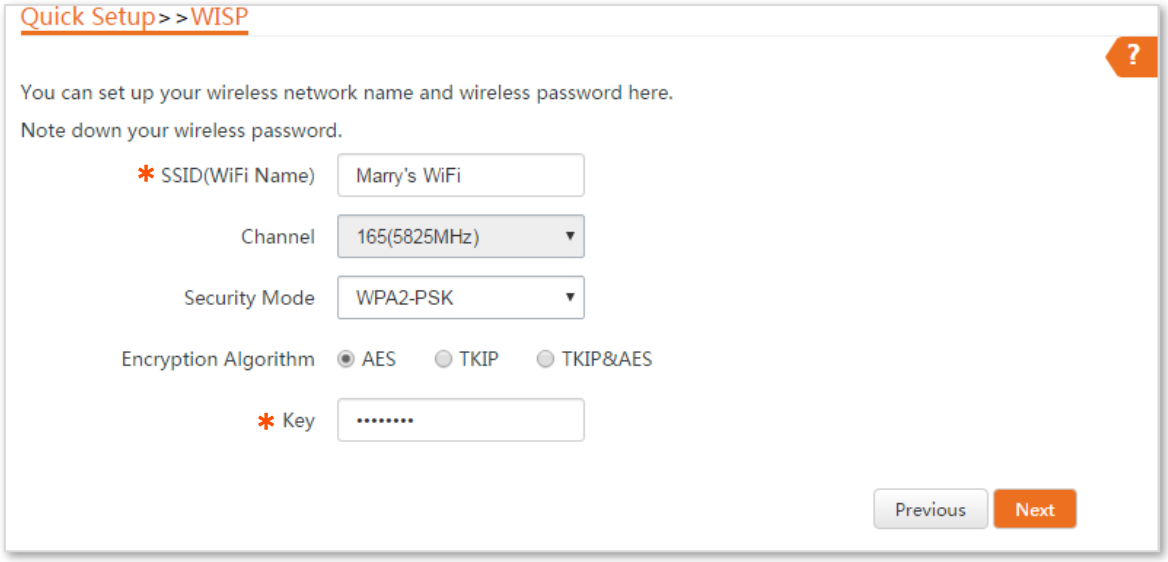
Step 4 Enter the WiFi password of your ISP hotspot in the **Key** text box, and click **Next**.



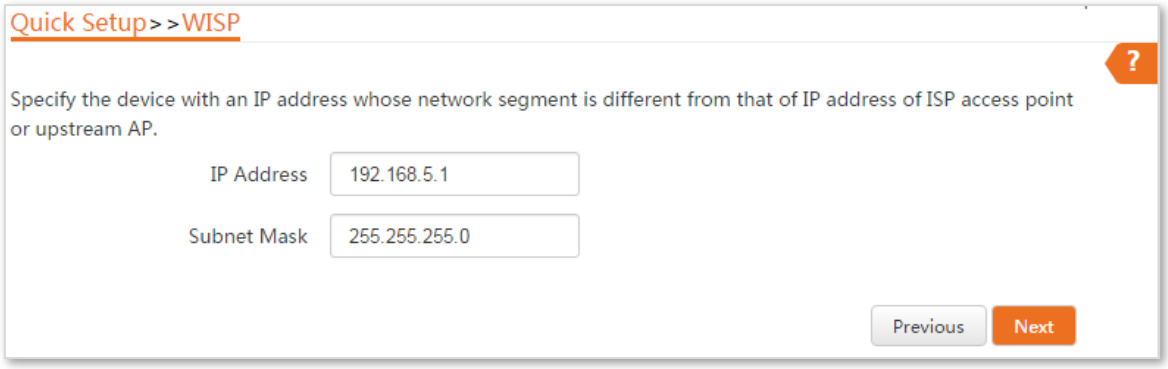
Step 5 Select the **Internet Connection Type** of your ISP hotspot, which is **PPPoE** in this example. Enter the PPPoE user name and password provided by your ISP, and click **Next**.



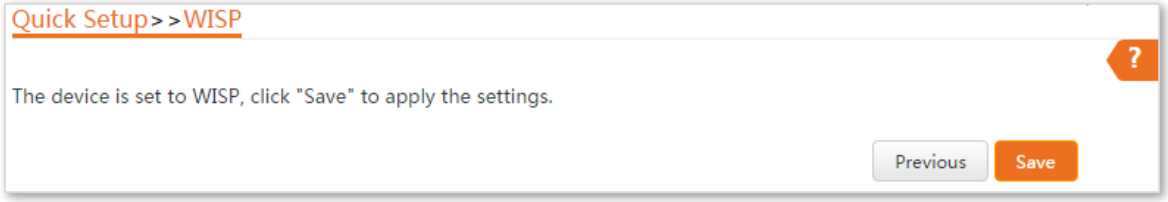
Step 6 Customize the SSID and key, and click **Next**.



Step 7 Set an IP address belonging to a different network segment as that of your ISP hotspot. For example, if the IP address of your ISP hotspot is 192.168.2.1, you can set this device's IP address to 192.168.*X*.1 (*X* ranges from 0 to 254 excluding 2) which is also the login IP address of the CPE. Then click **Next**.



Step 8 Click **Save**, and wait until the device reboots to activate the settings.



----End

When LED1, LED2, and LED3 of the CPE are blinking, the device is connected to your ISP hotspot successfully.

Verification

Your wired and wireless devices can connect to the CPE for internet access.

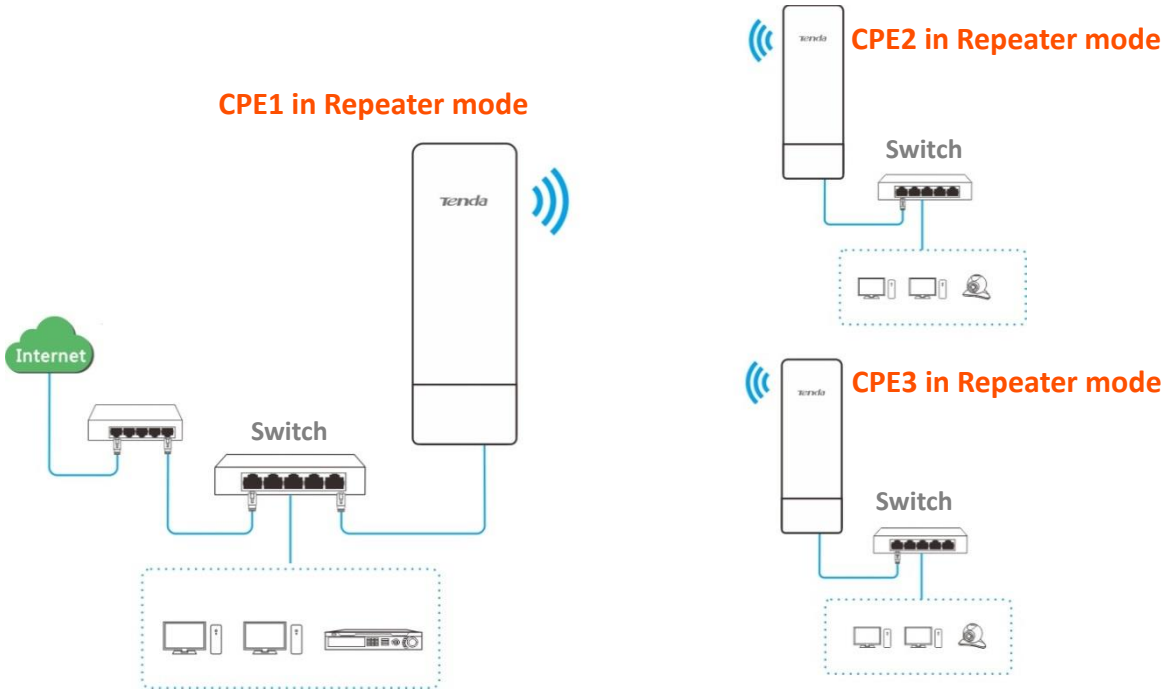
4.8 Repeater mode

In Repeater mode, this device connects 2 or more (this device supports 4 at most) wired networks with a wireless link, and can be connected with both wired and wireless clients. To use this function, the peer AP is required to support WDS function. Repeater mode is used to achieve communication between multiple offices of an enterprise in a city.

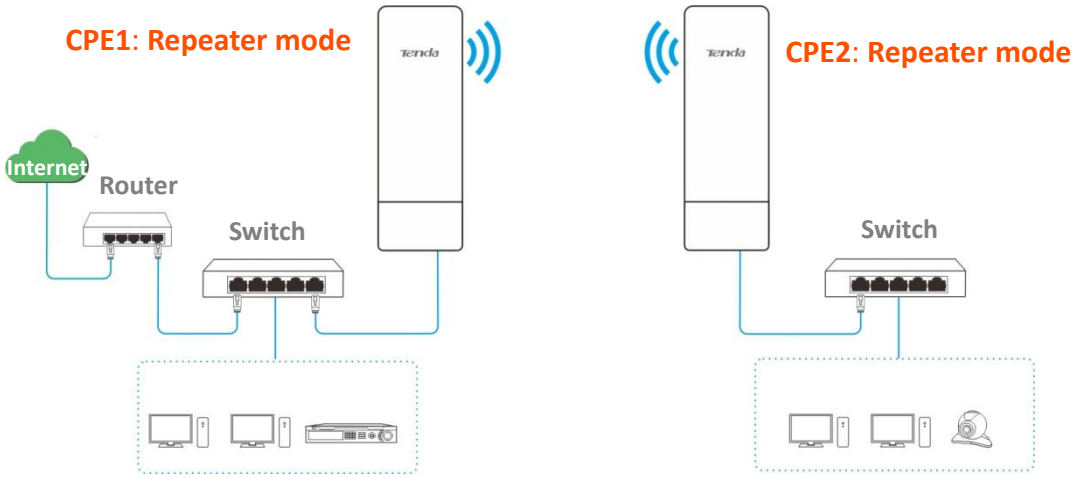
The CPE in Repeater mode can works with the CPE in Repeater or P2MP mode. It supports one to four bridging at most.

Application scenario

You want to combine multiple wired networks into one in wireless manner. The network topology is shown as below:



Configuration procedures of peer to peer briding



Assume that the related parameters are as follows:

CPE1

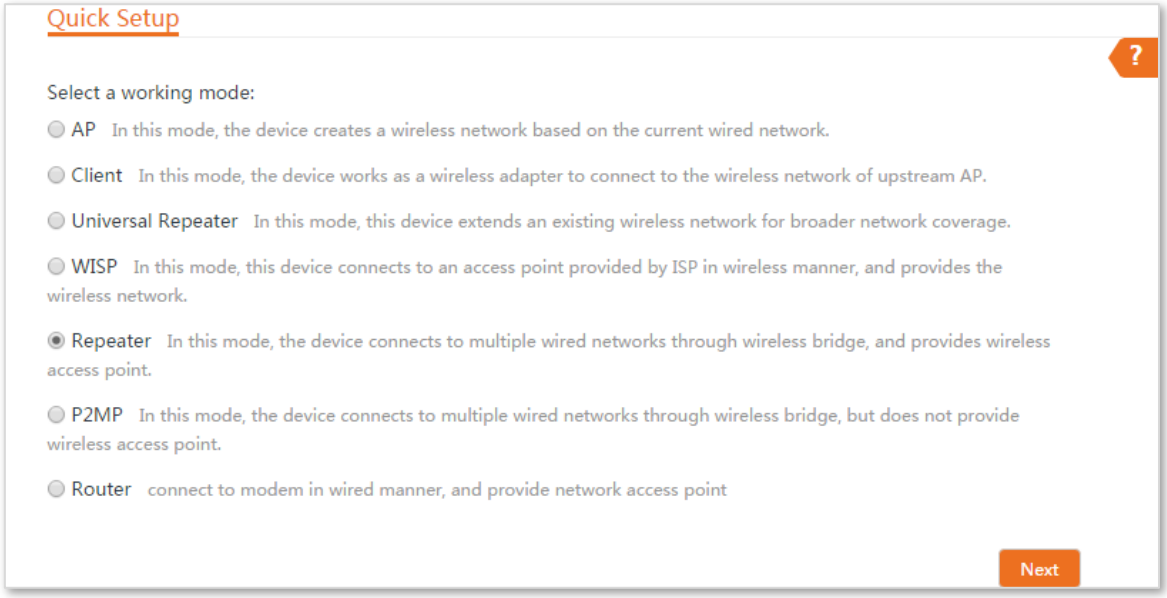
- **SSID**: Tenda_123456
- **Channel**: 165
- **Security mode**: WEP
- **Authentication type**: Shared
- **Default key**: Key 1, 12345

CPE2

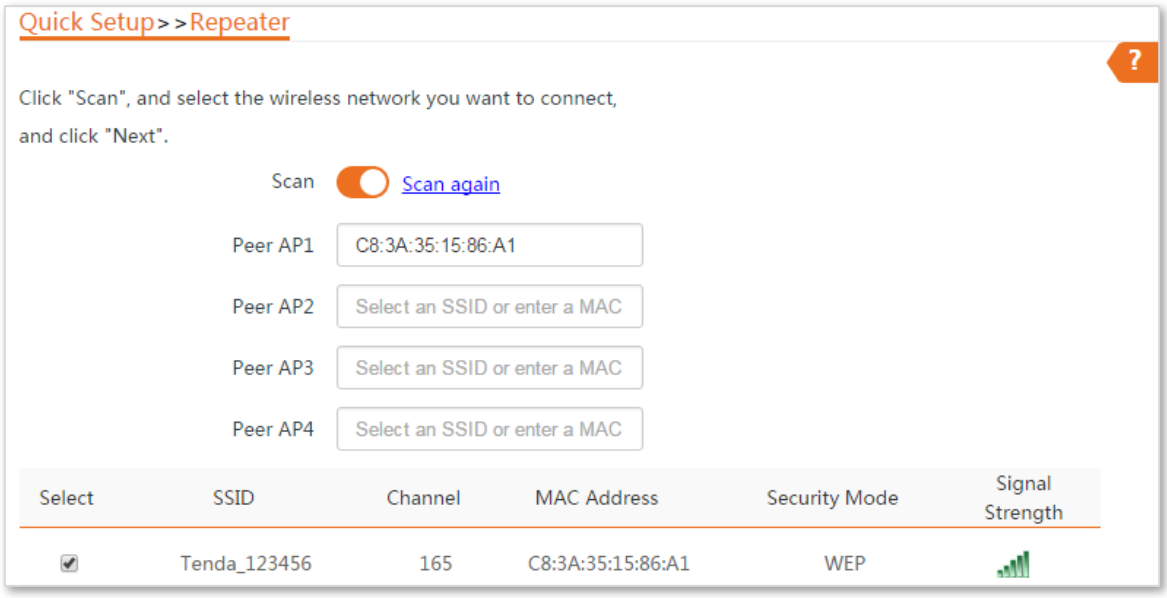
- **SSID**: Tenda_654321
- **WLAN MAC Address**: C8:3A:35:15:86:B2

Step 1 Set the CPE2 to the **Repeater** mode.

1. Start a web browser on the computer connected to CPE2.
2. Log in to the web UI of CPE2, and choose **Quick Setup** to enter the configuration page.



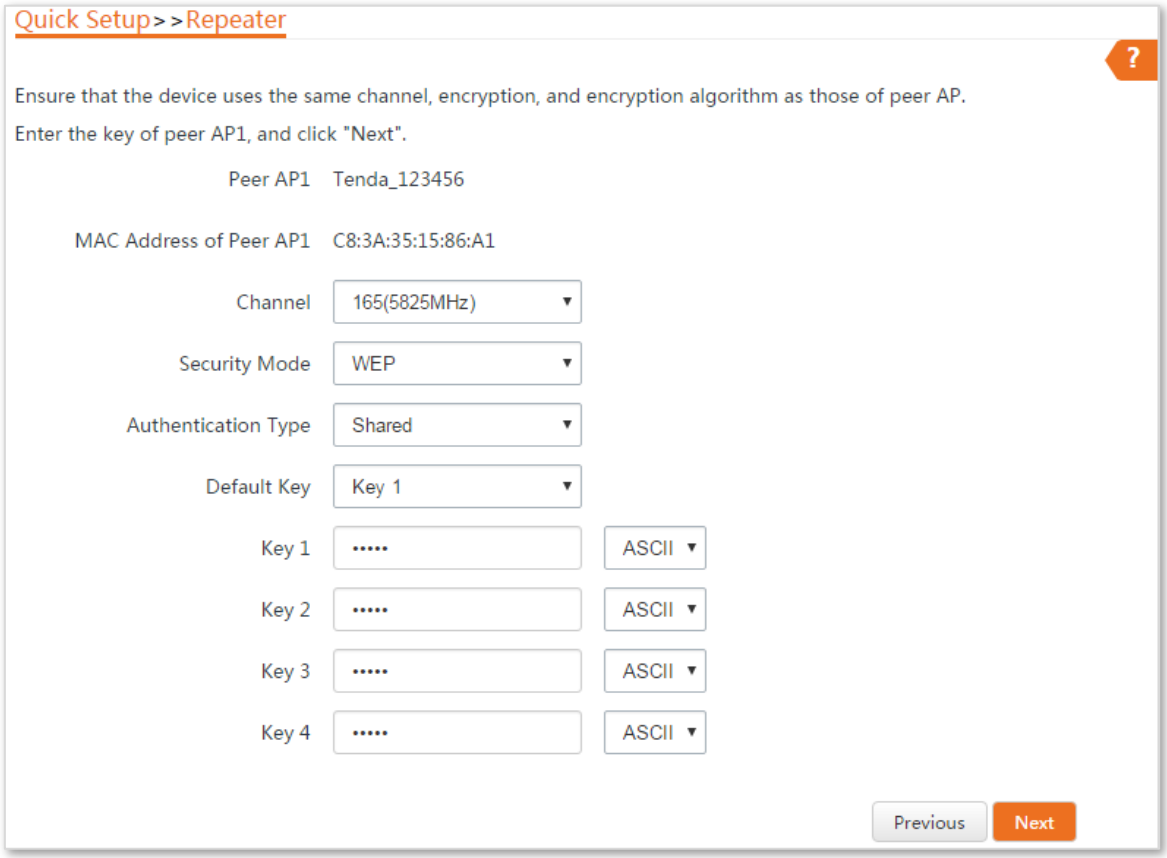
3. Select the SSID of CPE1 from the list, which is **Tenda_123456** in this example, and click **Next** at the bottom of the page.



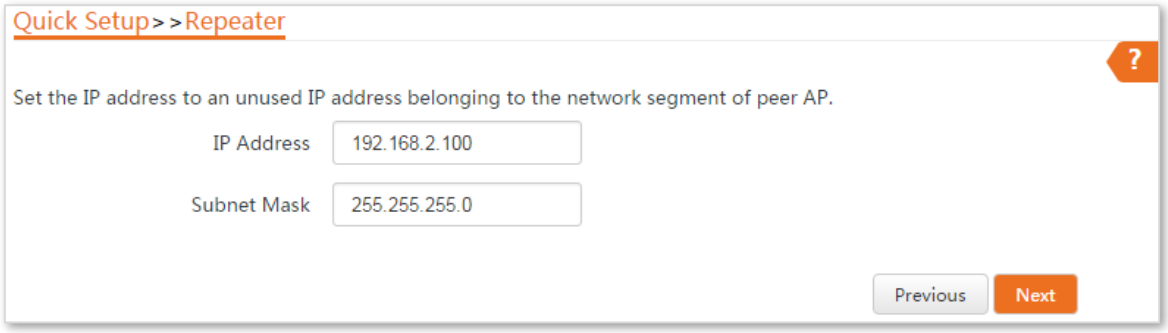
TIP

Only the WiFi networks whose security modes are set to none or WEP can be displayed on the list.

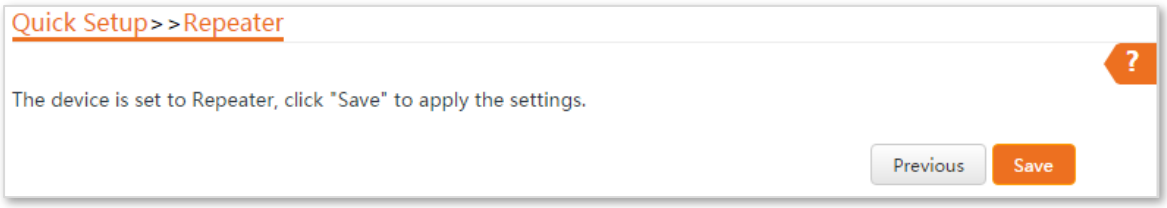
4. Set the **Authentication Type** and **Default Key** to the same as those of CPE1, enter the key 1, and click **Next**.



5. Set the IP address to an unused IP address belonging to the same network segment as that of CPE1. For example, if the IP address of CPE1 is 192.168.2.1, you can set this device's IP address to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



6. Click **Save**, and wait until the device reboots to activate the settings.



Step 2 Perform the procedure in Step 1 above to set the CPE1 to **Repeater** mode. The differences are list below:

- Select the SSID of CPE2, which is **Tenda_654321** in this example.
- Do not need to change the IP address of CPE1.

TIP

If there are multiple wireless networks with the same SSID, select the one with the WLAN MAC address of the CPE2, which is **C8:3A:35:15:86:B2** in this example.

----End

To check whether the bridging is successful:

Method 1: When the LED1, LED2, and LED3 indicators of CPE1 and CPE2 are solid on, the bridging succeeds.

Method 2:

Step 1 Start a web browser on the computer which is connected to CPE1 and visit its IP address.

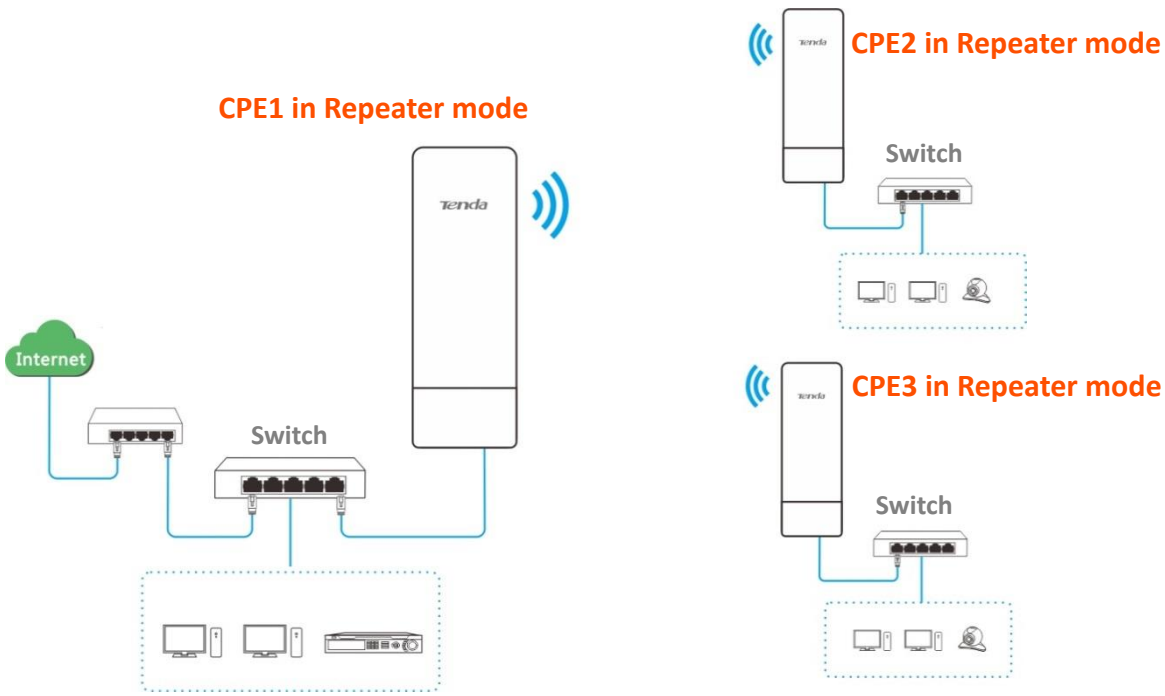
Step 2 Choose **Advanced** > **Diagnose**, select **Ping** from the **Diagnose** drop-down list menu, enter the IP address of CPE2 and click **Start**.

The bridging is successful when the ping succeeds.

Parameters description

Name	Description
Working modes	It specifies the working mode of this device. **Repeater** mode: In this mode, the device can connect 2 or more (this device supports 4 at most) wired networks with a wireless link, and can be connected with both wired and wireless clients. To use the Repeater function of this device, the peer AP is required to support WDS function, and use the same radio band as that of this device.
Peer AP	It specifies the wireless network name (SSID) of the peer AP.
Channel	It specifies the operating channel of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge.
Security Mode	It specifies the security mode of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge. TIP The Repeater mode only supports WEP and None security modes.

Configuration procedures of peer to multiple peers briding



Assume that the related parameters are shown as follows:

CPE1:

- **IP Address**: 192.168.2.1
- **SSID**: Tenda_123456
- **Channel**: 165
- **Security mode**: None

CPE2:

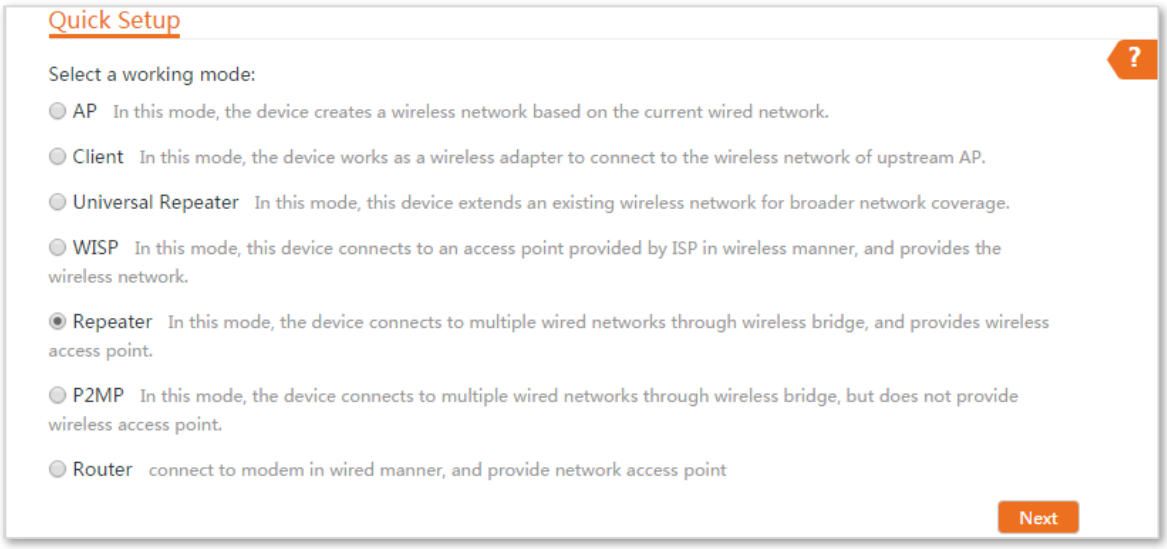
- **SSID: Tenda_1**
- **WLAN MAC address:** C8:3A:35:15:86:8C

CPE3:

- **SSID: Tenda_2**
- **WLAN MAC address:** C8:3A:35:01:8C:C9

Step 1 Set the CPE2 to the **Repeater** mode.

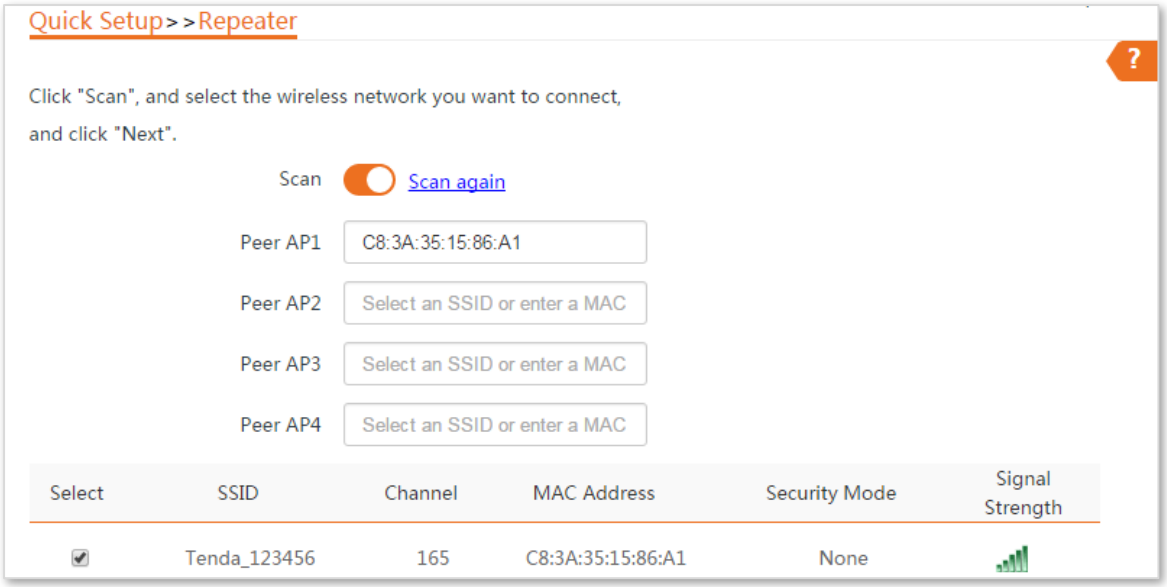
1. Log in to the web UI of CPE2, and choose **Quick Setup**, and select **Repeater**.



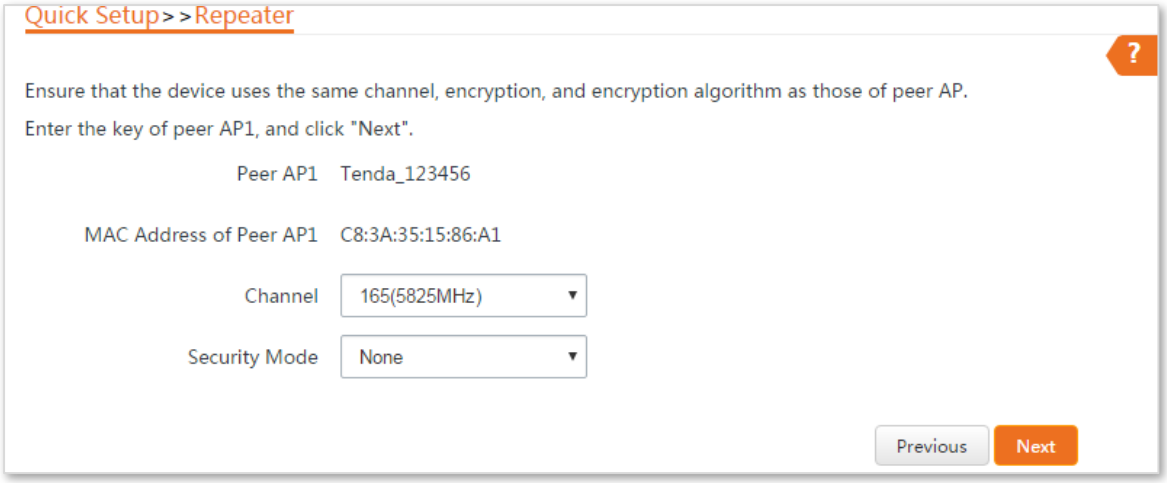
2. Select the SSID of CPE1 from the list, which is **Tenda_123456** in this example, and click **Next** at the bottom of the page.

TIP

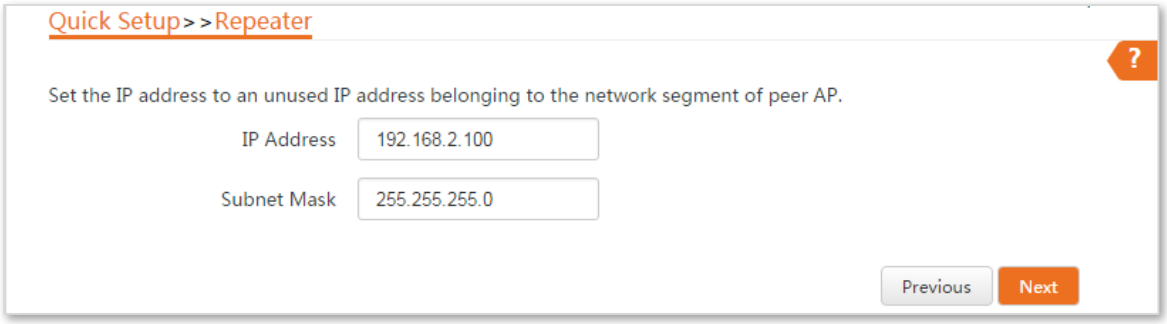
If you cannot scan the SSID of CPE1 from the list, choose **Wireless** > **Basic** and enable the wireless function. Then try again.



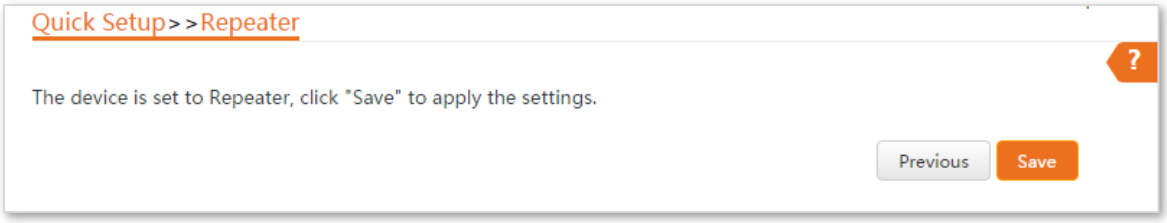
3. Click **Next** directly on the following page.



4. Set the IP address to an unused IP address belonging to the same network segment as that of CPE1. For example, if the IP address of the CPE1 is **192.168.2.1**, you can set this device's IP address to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



5. Click **Save**, and wait until the device reboots to activate the settings.



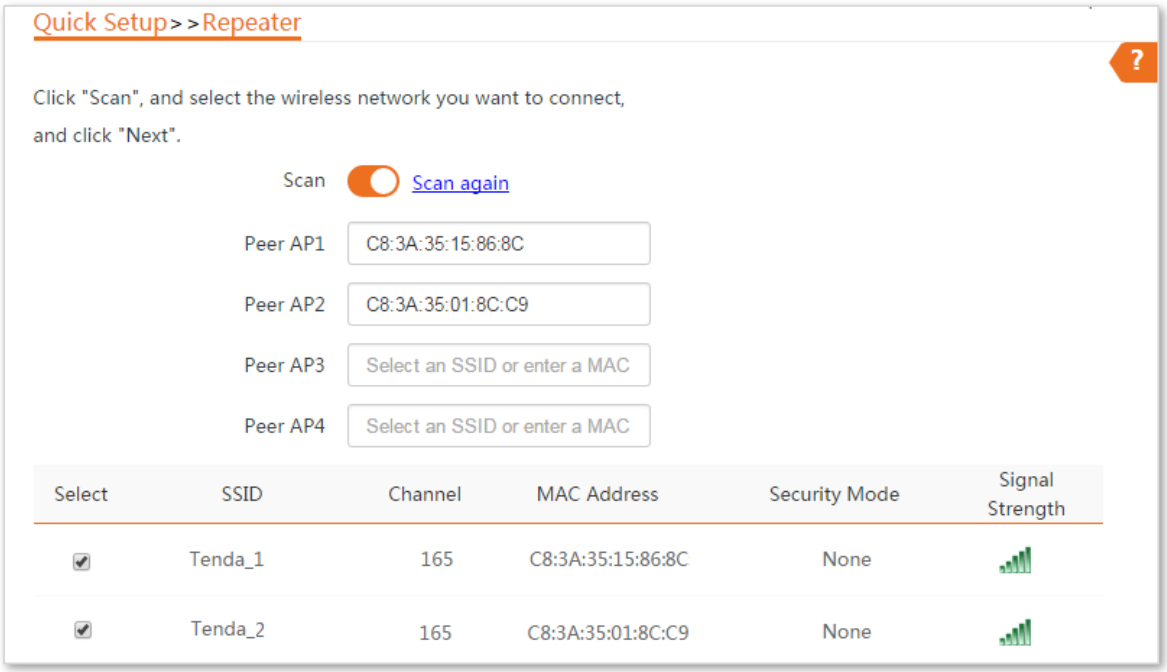
Step 2 Perform **Step 1** above to set CPE3 to **Repeater** mode, and bridge to CPE1.

Step 3 Set CPE1 to **Repeater** mode and bridge to CPE2 and CPE3.

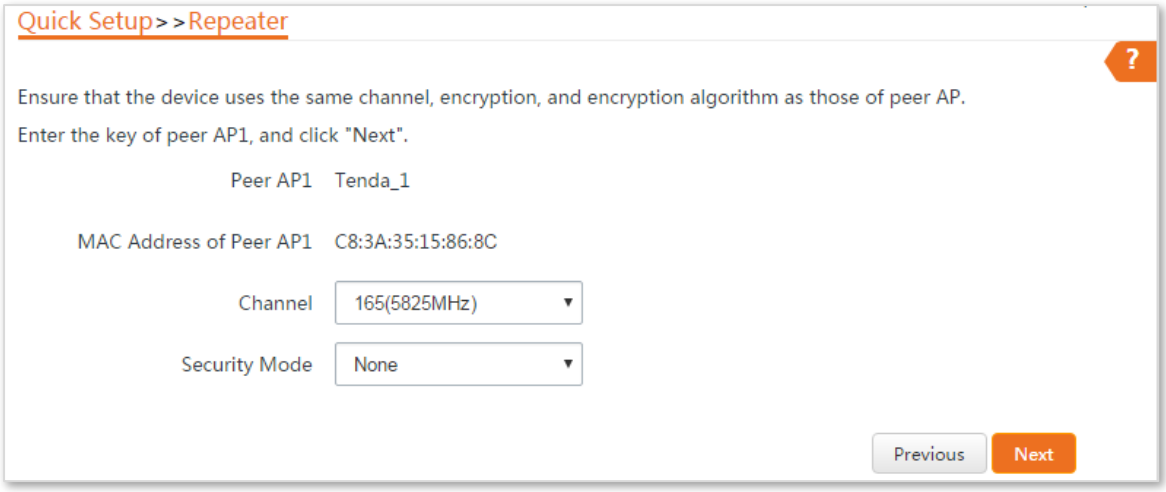
1. Start a web browser on the computer connected to CPE1, and visit **192.168.2.1**.
2. Choose **Quick Setup** to enter the configuration page.
3. Select **Repeater** mode, and click **Next**.
4. Select SSIDs of CPE2 and CPE3, and click **Next** at the bottom of the page.

TIP

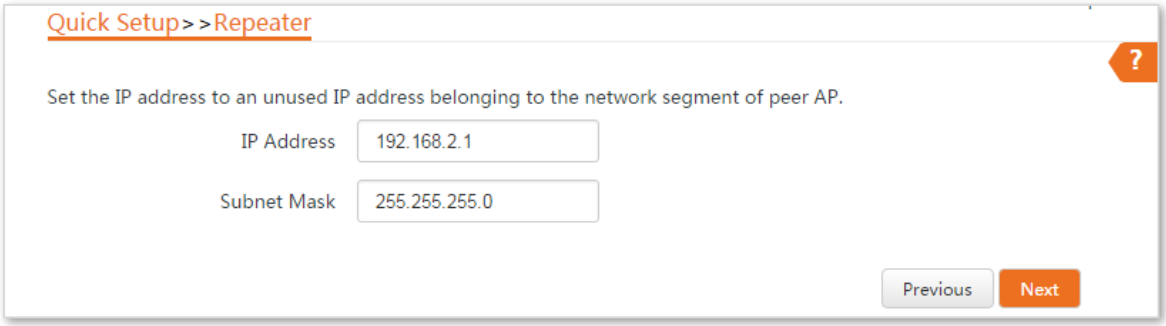
If there are multiple wireless networks with the same SSID, select the ones with the WLAN MAC addresses of the CPE2 and CPE3, which are **C8:3A:35:15:86:8C** and **C8:3A:35:01:8C:C9** in this example.



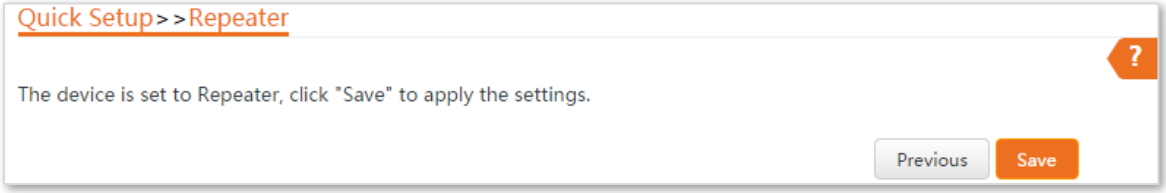
5. Click **Next** on the following page.



6. Click **Next**.



7. Click **Save**, and wait until the device reboots to activate the settings.



----End

To check whether the bridging is successful:

Method 1: When the LED1, LED2, and LED3 indicators of CPE1, CPE2 and CPE3 are solid on, the bridging succeeds.

Method 2:

Step 1 Start a web browser on the computer which is connected to CPE1 and visit its IP address.

Step 2 Choose **Advanced** > **Diagnose**, select **Ping** from the **Diagnose** drop-down list menu, enter the IP address of CPE2 and CPE3 respectively, and click **Start**.

The bridging is successful when the ping succeeds.

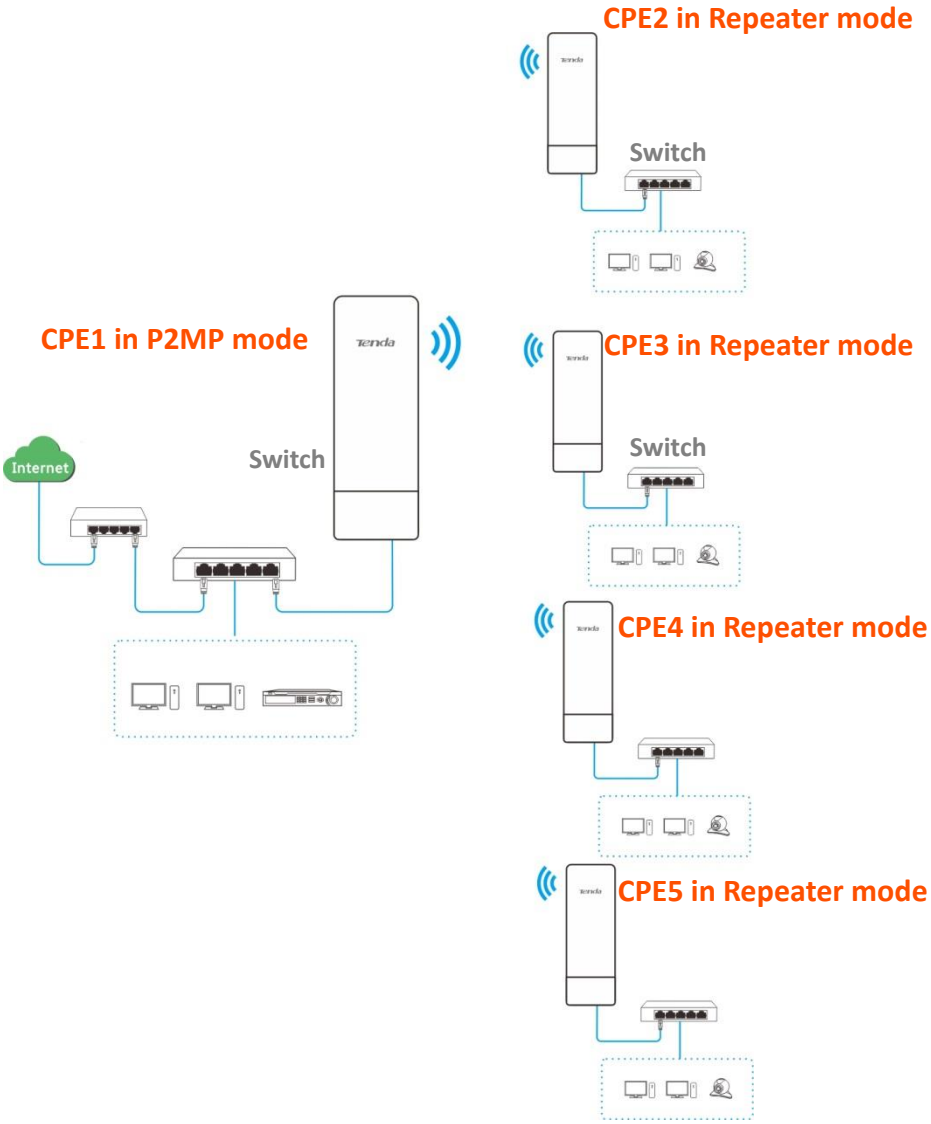
4.9 P2MP mode

In **P2MP** mode, this device connects 2 or more (this device supports 4 at most) wired networks with a wireless link, but cannot be connected to wireless clients.

The configuration procedure of P2MP mode is similar with Repeater mode. In the following example, the CPE works in P2MP mode, and bridges to four CPEs work in Repeater mode.

Application scenario

The CPE is used to combine two local networks into one in wireless manner. The network topology is shown as below:



Assume that the related parameters are shown as follows:

CPE1:

- **IP Address**: 192.168.2.1
- **SSID**: Tenda_1
- **Channel**: 165
- **Security Mode**: None

CPE2 to CPE5:

CPE	SSID	WLAN MAC address
CPE2	Tenda_2	C8:3A:35:01:8C:C9
CPE3	Tenda_3	C8:3A:35:35:BA:01
CPE4	Tenda_4	C8:3A:35:FD:8D:A1
CPE5	Tenda_5	C8:3A:35:09:93:51

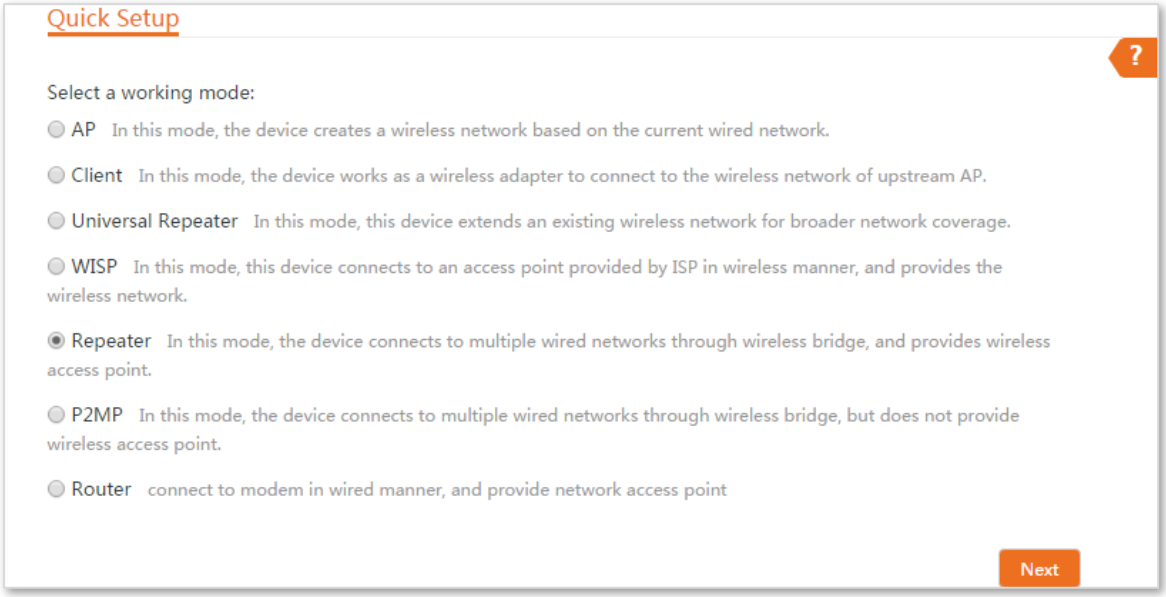
Configuration procedures

TIP

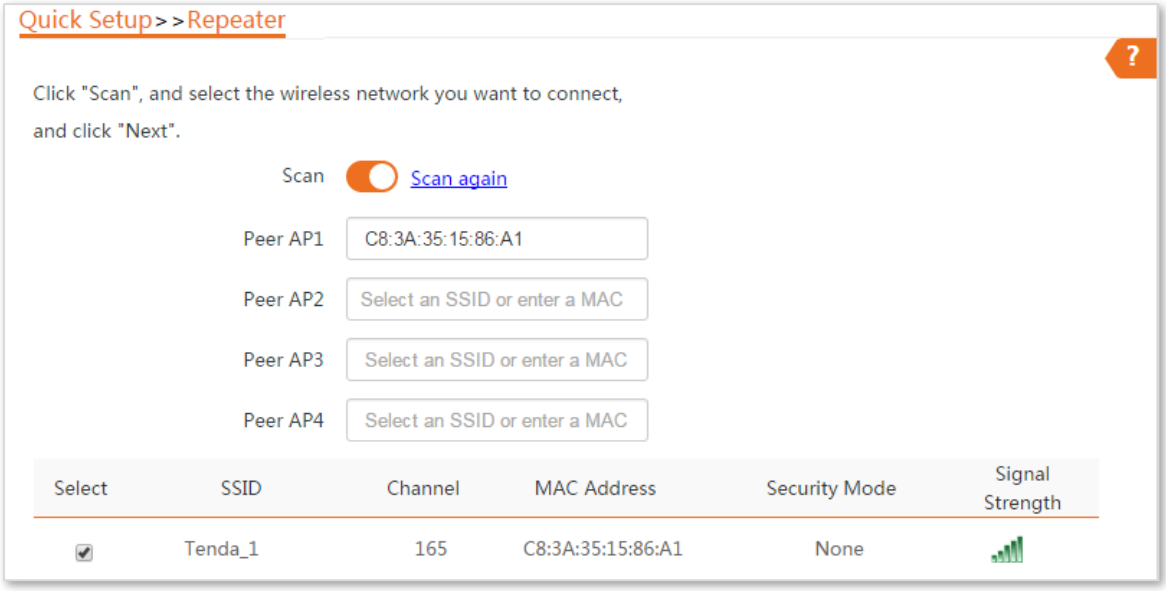
When setting the Base Station to P2MP mode, ensure that the Base Station and all CPEs operate in the same channel.

Step 1 Set CPE2 to **Repeater** mode and bridge to the CPE1.

1. Log in to the web UI of CPE2, choose **Quick Setup**, select **Repeater** mode, and click **Next**.



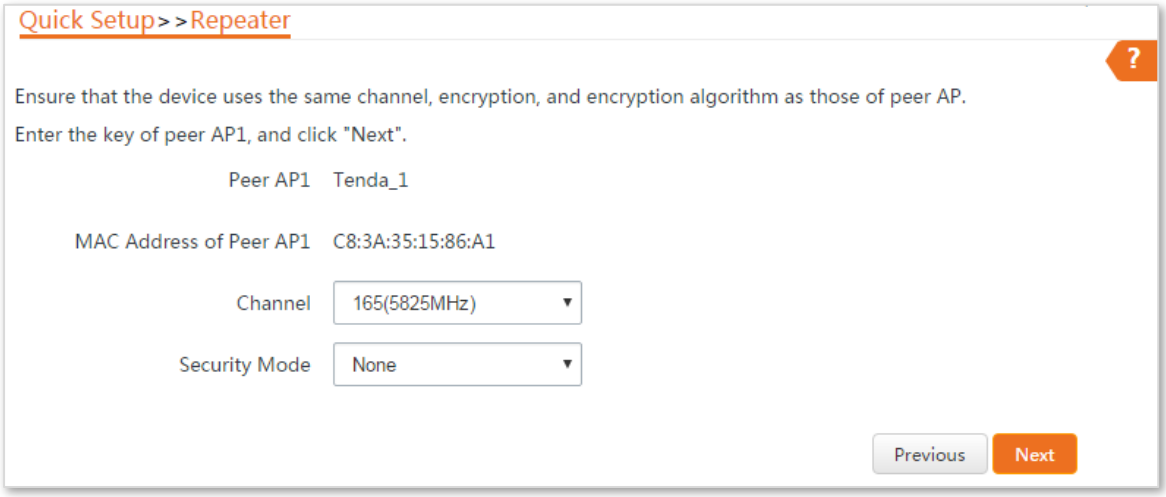
2. Select the SSID of CPE1, which is **Tenda_1** in this example, and click **Next** at the bottom of the page.



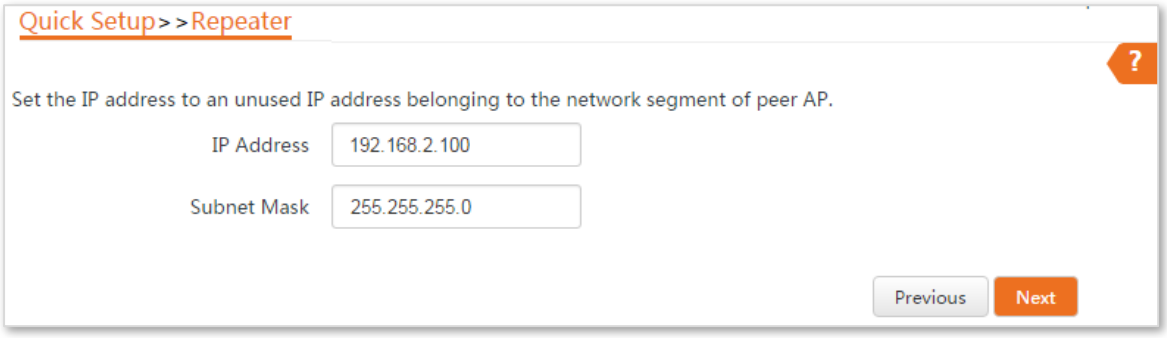
TIP

- If you cannot find any SSID from the list, choose **Wireless** > **Basic** and enable the wireless function. Then try again.
- If you cannot find the SSID of CPE1 from the list, adjust the direction of the CPE2, and move it close to the CPE1.
- The repeater mode only supports **None** and **WEP** security modes.

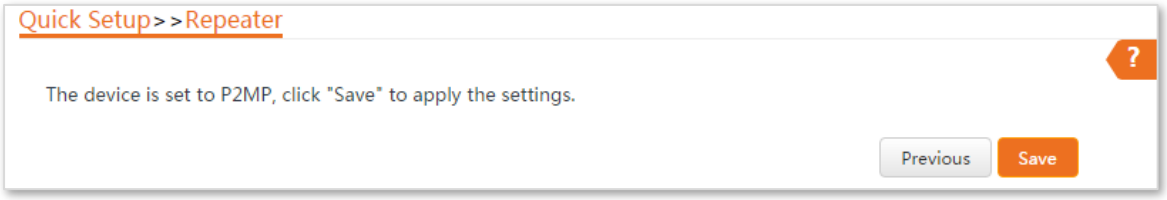
3. Click **Next** on the following page.



4. Set the IP address to an unused IP address belonging to the same network segment as that of CPE1. For example, if the IP address of CPE1 is **192.168.2.1**, you can set the IP address of the device to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



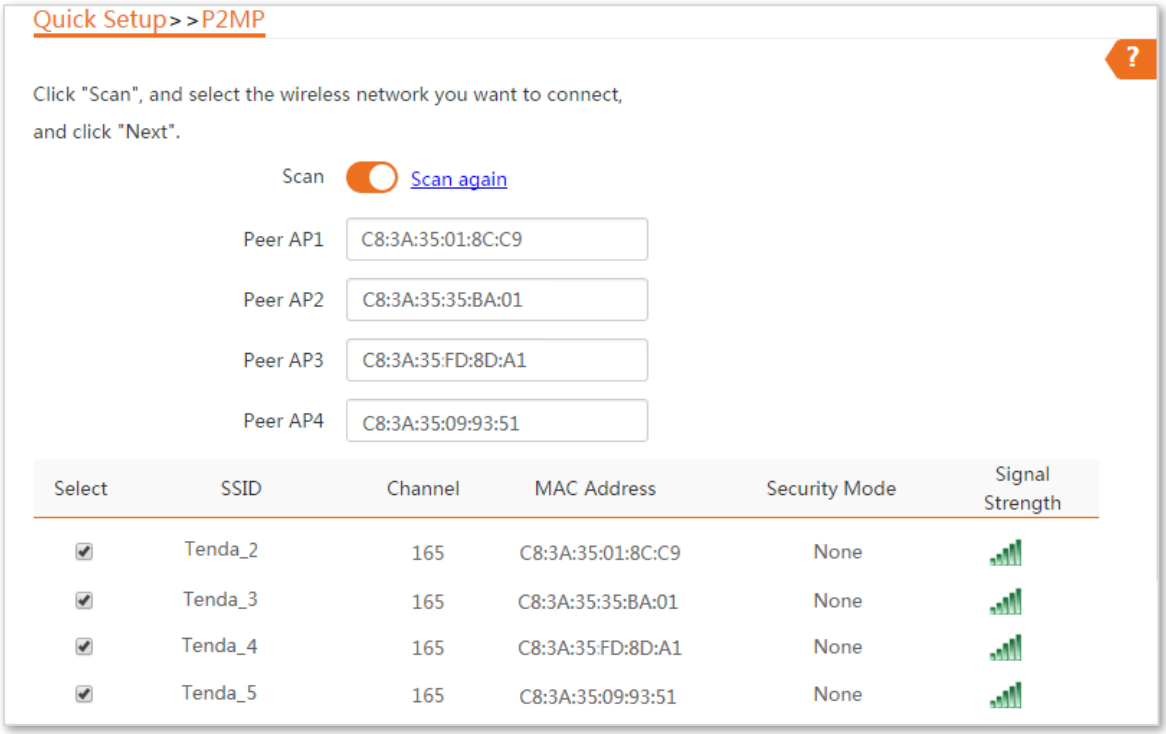
5. Click **Save**, and wait until the device reboots to activate the settings.



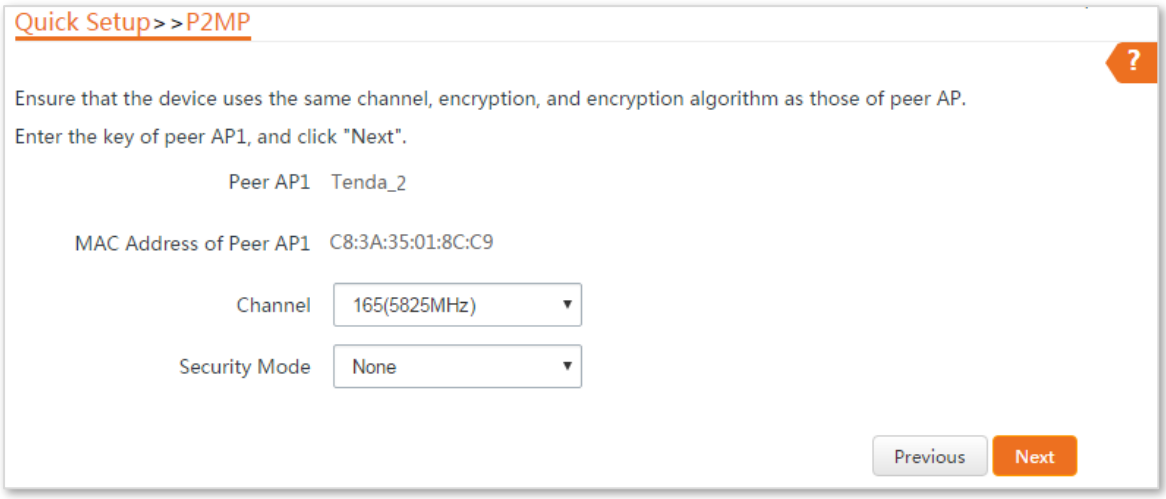
Step 2 Perform Step 1 to set the CPE3, CPE4 and CPE5 to Repeater mode, and bridge to the CPE1.

Step 3 Set CPE1 to **P2MP** mode and bridge to CPE2, CPE3, CPE4 and CPE5.

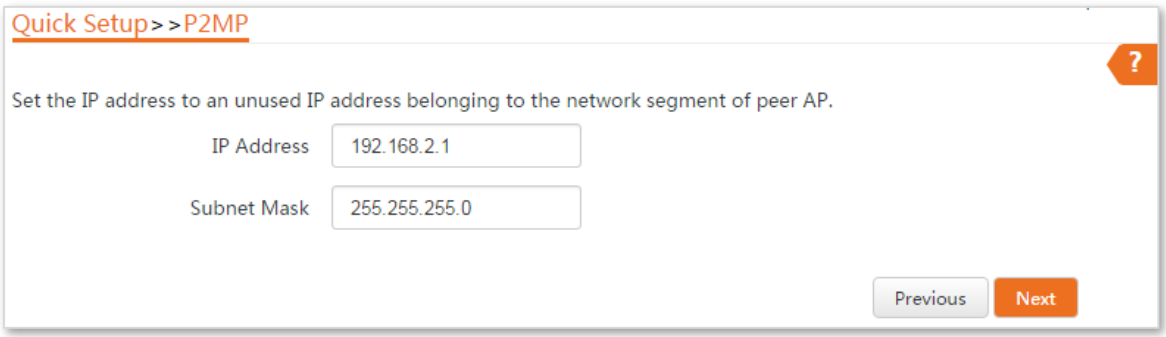
1. Start a web browser on the computer connected to the CPE1, and visit **192.168.2.1**.
2. Choose **Quick Setup** to enter the configuration page.
3. Select **P2MP** mode, and click **Next**.
4. Select the SSID of CPE2, CPE3, CPE4 and CPE5, which are **Tenda_2**, **Tenda_3**, **Tenda_4** and **Tenda_5** in this example, and click **Next**.



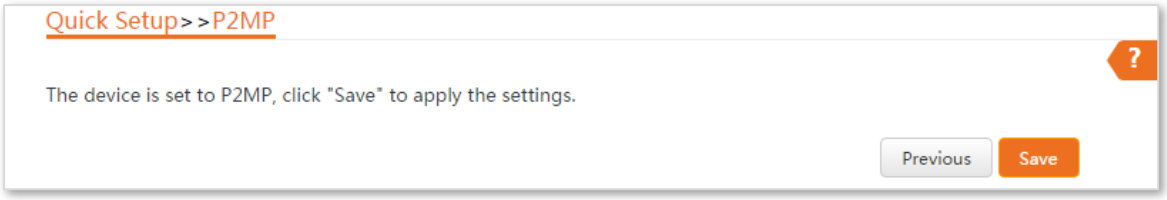
5. Click **Next** on the following page.



6. Click **Next** on the following page.



7. Click **Save**, and wait until the device reboots to activate the settings.



----End

To check whether the bridging is successful:

Method 1: When the LED1, LED2, and LED3 indicators of the CPEs are solid on, the bridging succeeds.

Method 2:

Step 1 Start a web browser on the computer which is connected to the CPE1 and visit its IP address.

Step 2 Choose **Advanced** > **Diagnose**, select **Ping** from the **Diagnose** drop-down list menu, enter the IP addresses of the CPE2, CPE3, CPE4 and CPE5 respectively and click **Start**.

The bridging is successful when the ping succeeds.

Parameters description

Name	Description
Working modes	It specifies the working mode of this device. **P2MP** mode: In this mode, the device can connect 2 or more (this device supports 4 at most) wired networks with a wireless link, but cannot be connected with wireless clients. P2MP mode is used to achieve communication between multiple offices of an enterprise in a city.
Peer AP	It specifies the wireless network name (SSID) of the peer AP.
Channel	It specifies the operating channel of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge.
Security Mode	It specifies the security mode of the WiFi network to be bridged. It will be automatically populated when you select an SSID to bridge. TIP The P2MP mode only supports WEP and None security modes.

4.10 Example of repeater mode and P2MP mode

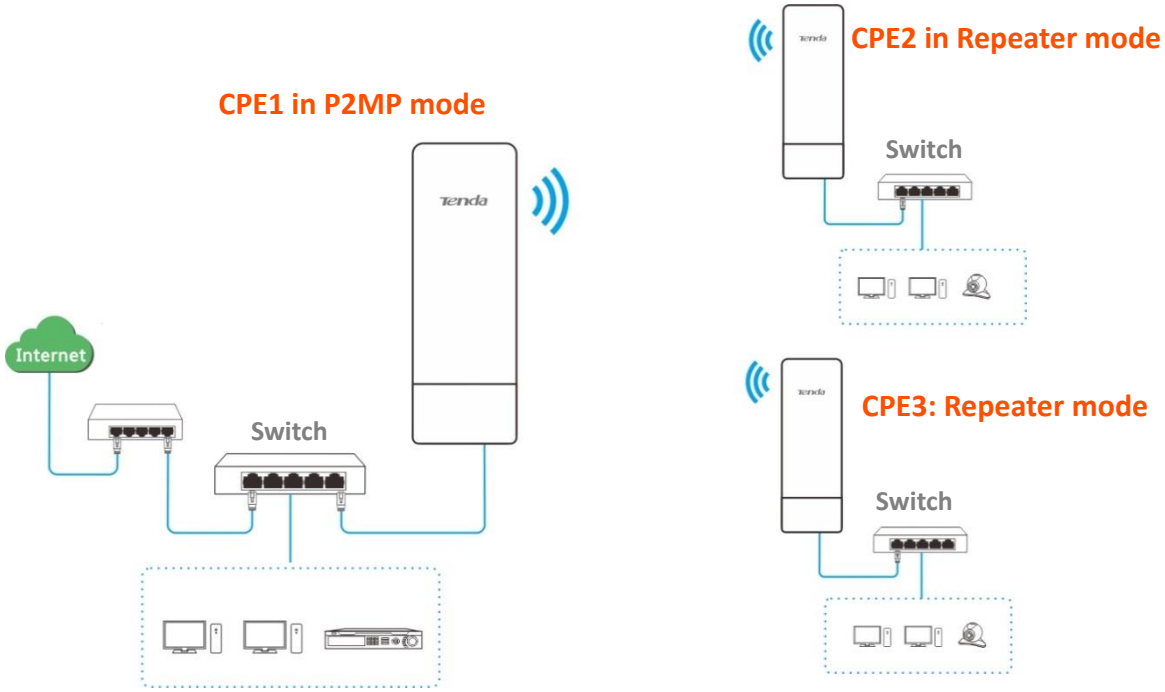
Network requirement

You have three offices in an estate which are not far away from each other, and only one office has internet service. Now you want to combine the networks in three offices into one, and provide wireless networks to wireless devices in the offices without internet service.

Solution

Set CPE1 to P2MP mode, and set CPE2 and CPE3 to Repeater mode.

Network topology



Configuration procedures

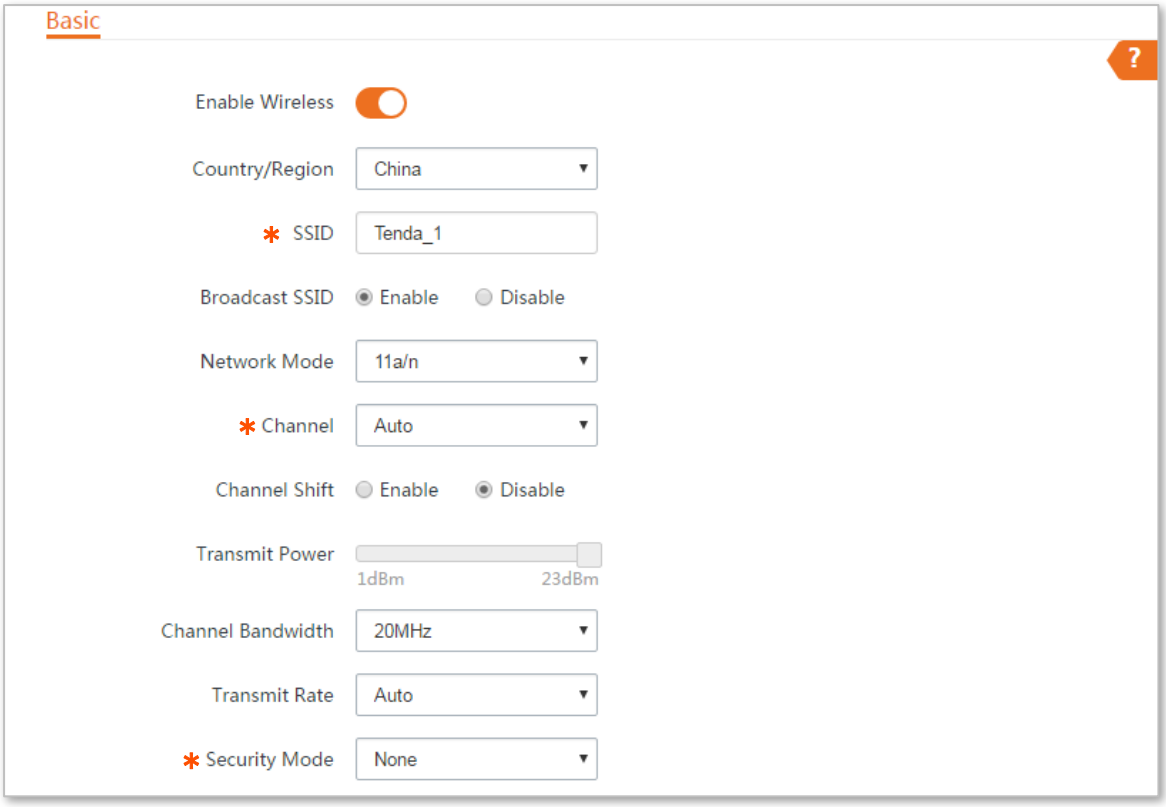
Assume that the wireless parameters of CPE1 are shown as follows:

- **IP Address**: 192.168.2.1
- **SSID**: Tenda_123456
- **Channel**: 165
- **Security mode**: None

Step 1 Configure the wireless settings of CPE2.

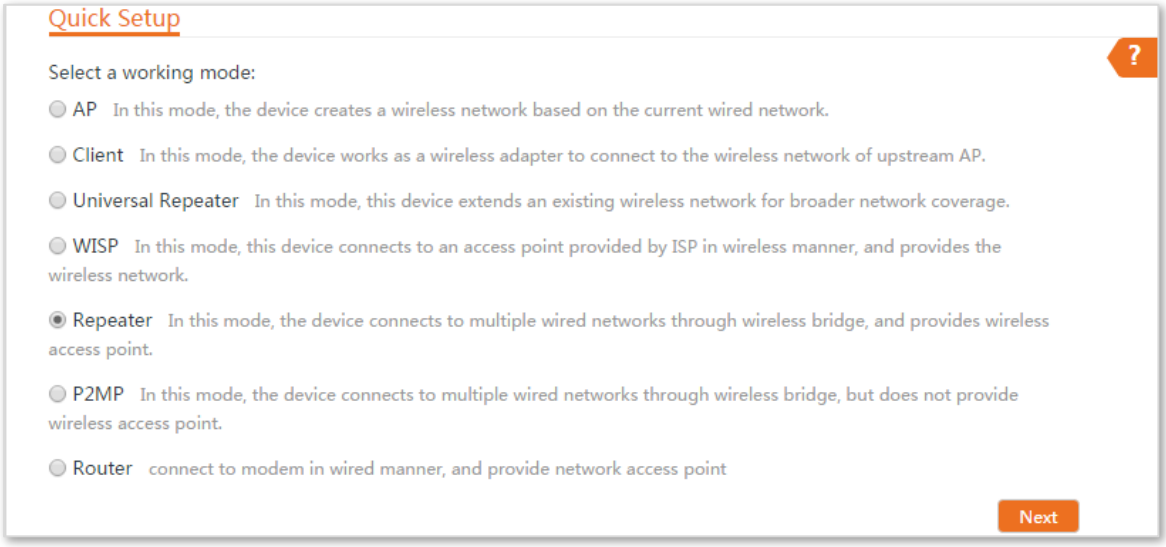
1. Log in to the web UI of CPE2, and choose **Wireless > Basic** to enter the configuration page.
2. Change the SSID, which is **Tenda_1** in this example.
3. Set the **Channel** to the same as that of CPE1, which is **165** in this example.
4. Set the **Security Mode** to the same as that of CPE1, which is **None** in this example.

5. Click **Save** to apply the settings.



Step 2 Set CPE2 to the **Repeater** mode.

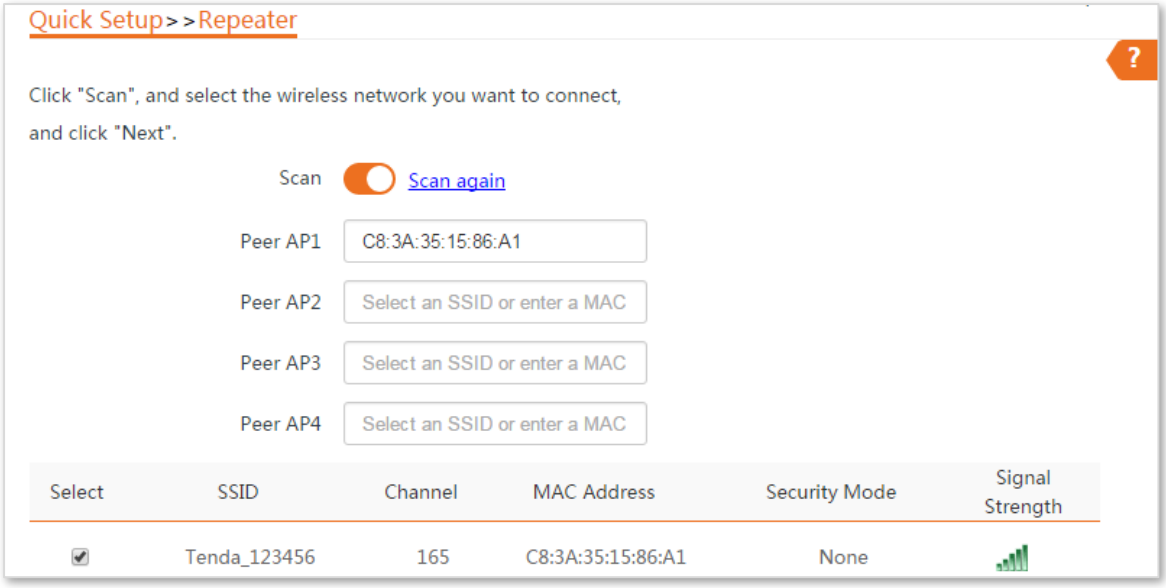
1. Choose **Quick Setup**, and select **Repeater**.



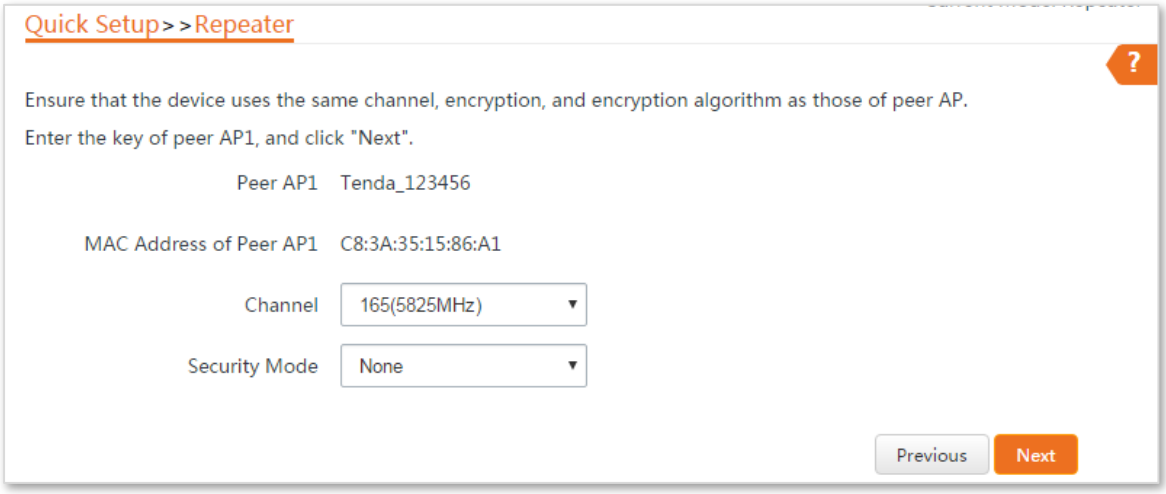
2. Select the SSID of CPE1 from the list, which is **Tenda_123456** in this example, and click **Next** on the bottom of the page.

TIP

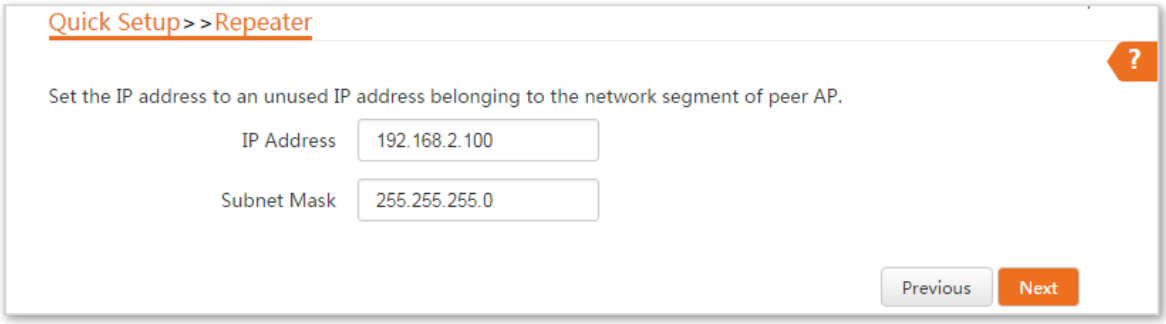
- If you cannot find any SSID from the list, choose **Wireless** > **Basic** and enable the wireless function. Then try again.
- If you cannot find the SSID of CPE1 from the list, adjust the direction of CPE2, and move it close to the CPE1.



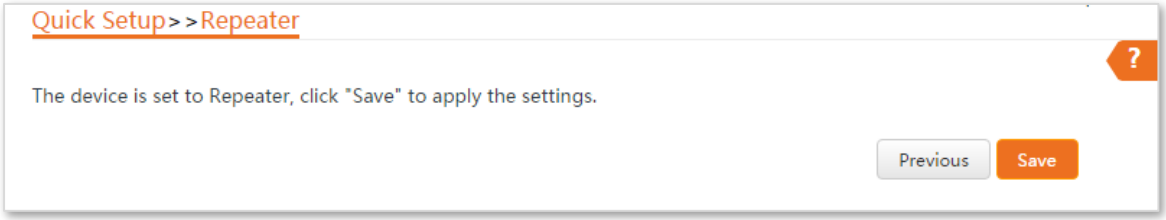
3. Click **Next** directly on the following page.



4. Set the IP address to an unused IP address belonging to the same network segment as that of CPE1. For example, if the IP address of the CPE1 is **192.168.2.1**, you can set this device's IP address to 192.168.2.*X* (*X* ranges from 2 to 254). Then click **Next**.



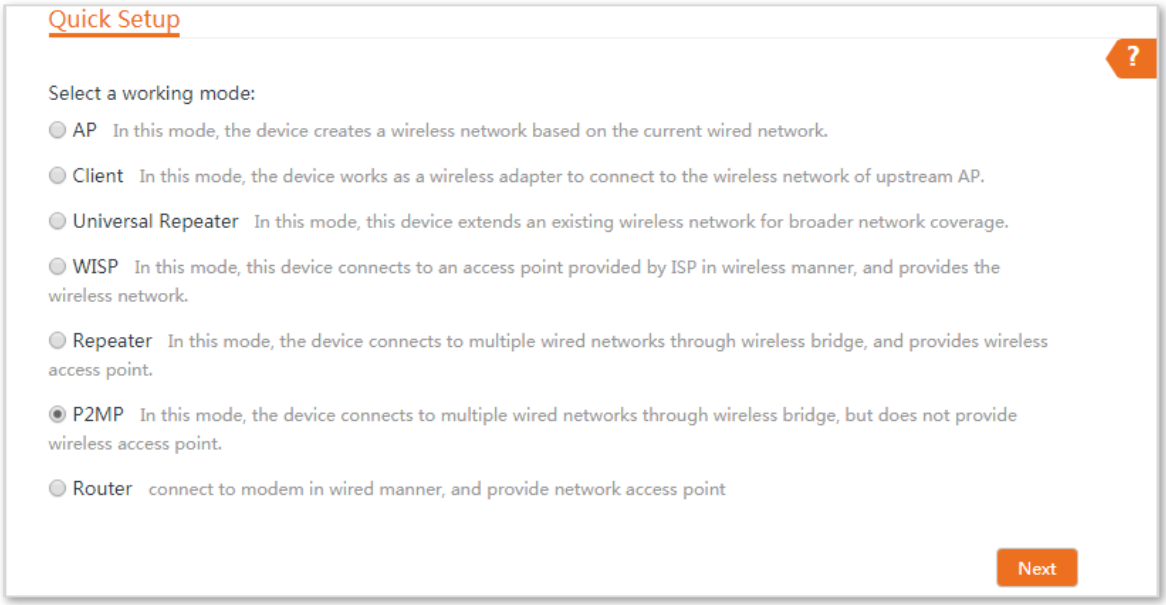
5. Click **Save**, and wait until the device reboots to activate the settings.



Step 3 Perform Step 1 and Step 2 above to change the wireless settings of **CPE3**, whose SSID is **Tenda_2** in this example, set it to **Repeater** mode, and bridge to CPE1.

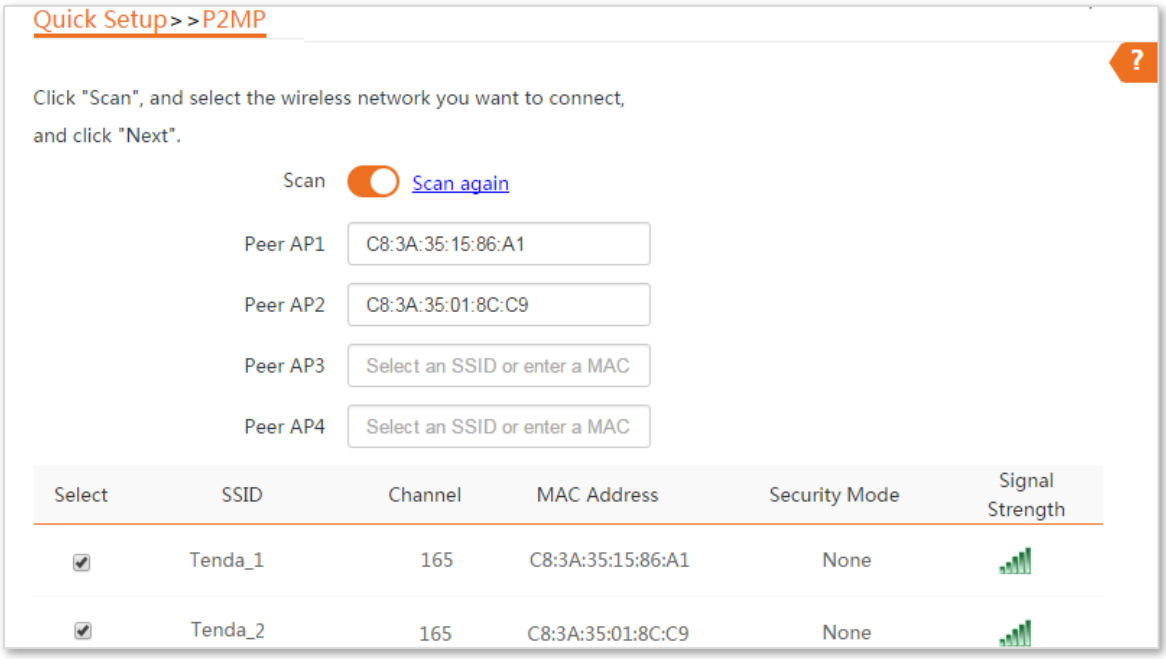
Step 4 Set CPE1 to **P2MP** mode and bridge to CPE2 and CPE3.

1. Log in to the web UI of CPE1, and choose **Quick Setup** to enter the configuration page.
2. Select **P2MP** mode, and click **Next**.

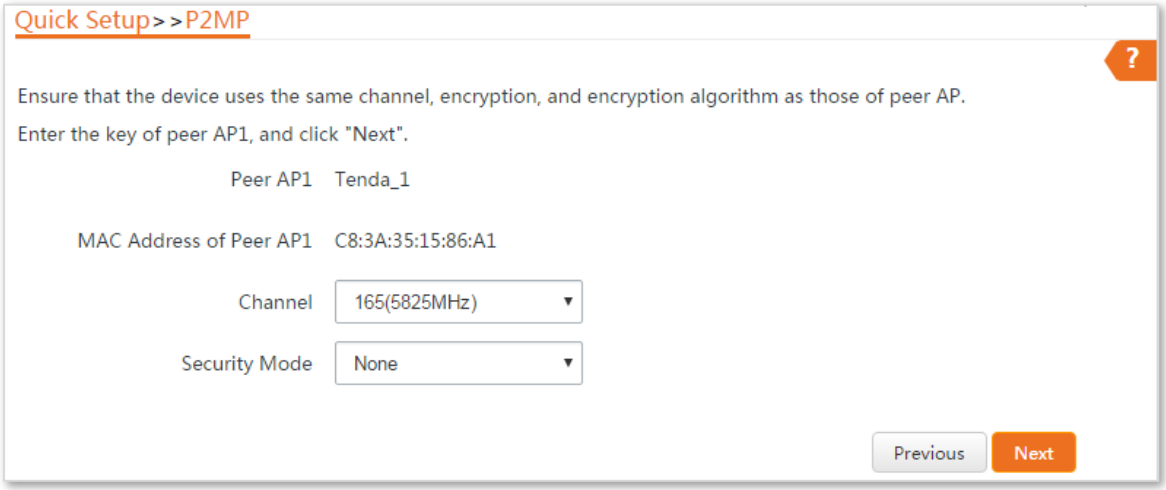


3. Select SSIDs of CPE2 and CPE3, and click **Next**.

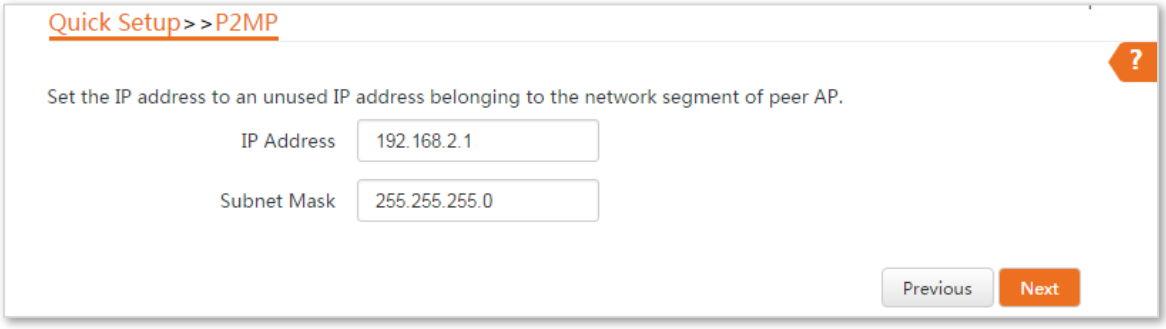
4. Click **Next** at the bottom of the following page.



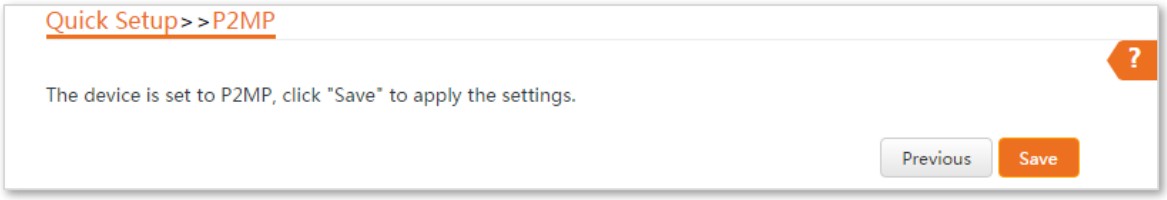
5. Click **Next** on the following page.



6. Click **Next**.



7. Click **Save**, and wait until the device reboots to activate the settings.



----End

Verification

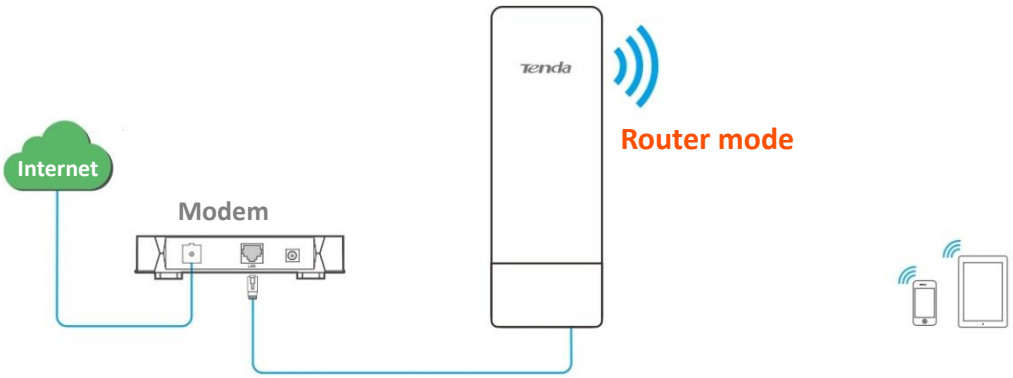
Wired or wireless devices connected to CPE2 and CPE3 can access the internet.

4.11 Router mode

In Router mode, this device serves as a router to provide a wireless network.

Application scenario

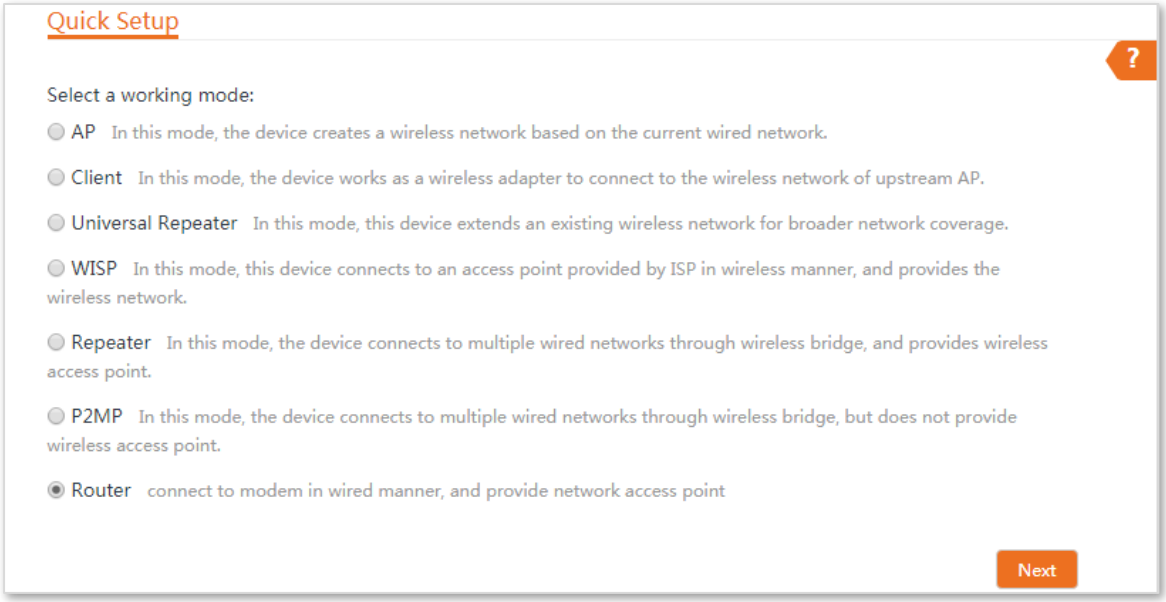
The CPE is used to provide a wireless network and assign IP addresses to your wireless devices. The network topology is shown as below:



Configuration procedures:

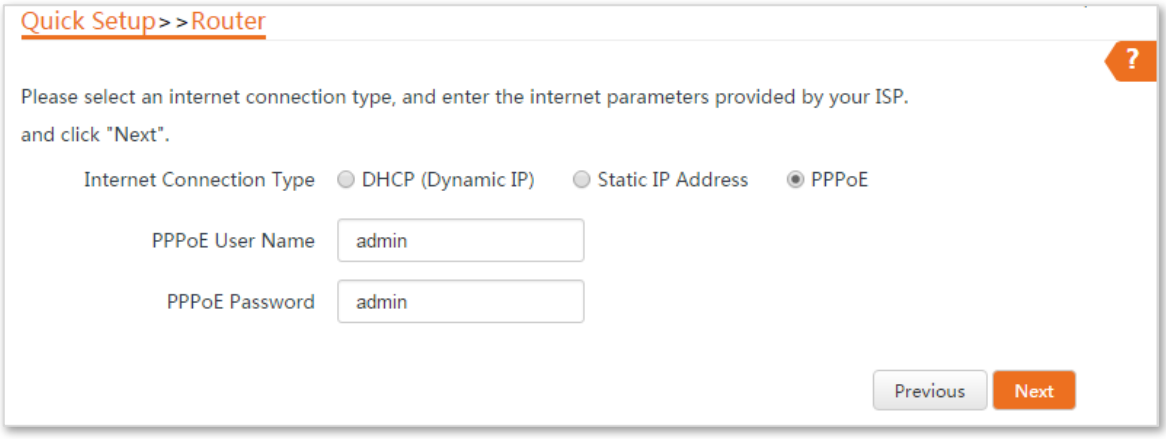
Step 1 Log in to the web UI of the CPE, and choose **Quick Setup** to enter the configuration page.

Step 2 Select **Router** mode, and click **Next**.



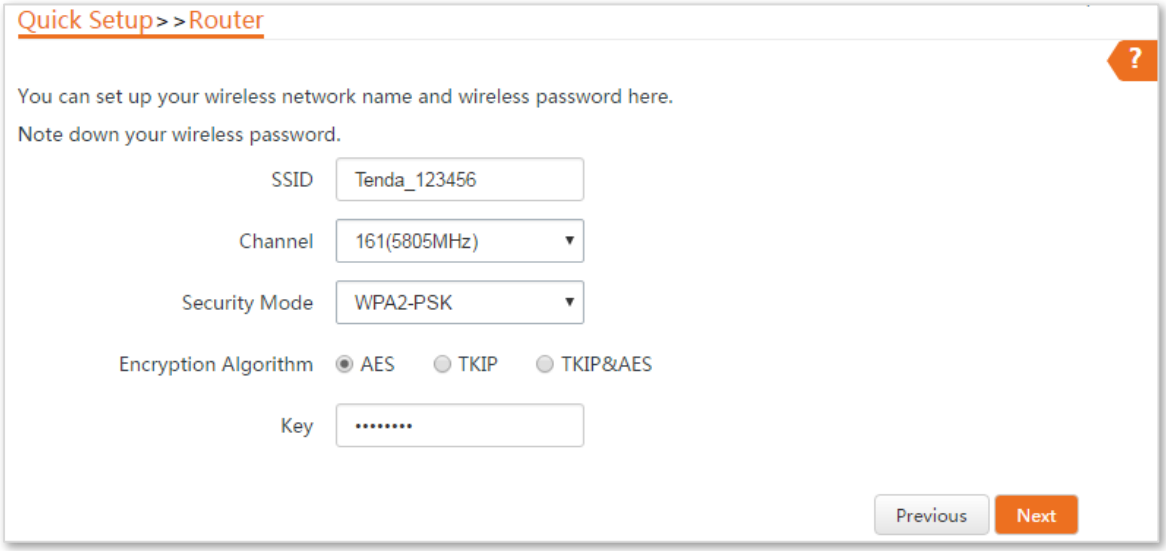
Step 3 Select your internet connection type, and set the related parameters. Take **PPPoE** as an example here.

1. Select **PPPoE**.
2. Enter the **PPPoE User Name** and **Password** provided by your internet service provider, which are both **admin** in this example.
3. Click **Next**.

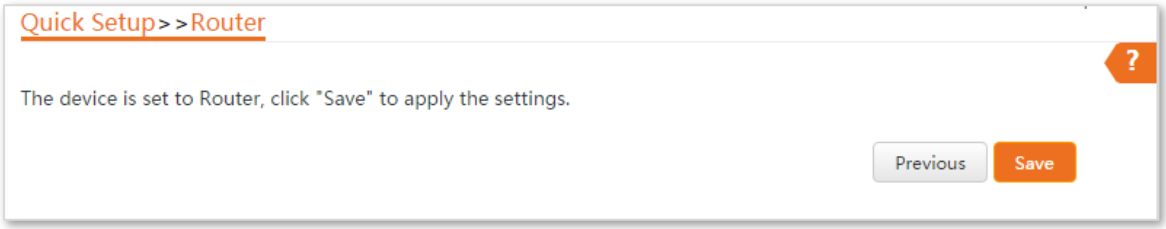


Step 4 Set wireless parameters of the CPE.

1. Customize a SSID, which is **Tenda_123456** in this example.
2. Select a security mode, which is **WPA2-PSK** in this example.
3. Set a **Key** for the wireless network, and click **Next**.



Step 5 Click **Save**, and wait until the device reboots to activate the settings.



----End

Parameters description

Name	Description
Working modes	It specifies the working mode of this device. **Router mode**: In this mode, the PoE/LAN port works as the WAN port and is used to connect to a modem for internet access.
Internet Connection Type	The device in Router mode supports three internet connection types: • **DHCP (Dynamic IP)**: The device obtains the IP address and other parameters from the DHCP server of upstream device for internet access. • **Static IP Address**: The device accesses the internet using the IP address, subnet mask, default gateway and DNS server IP addresses provided by your ISP. • **PPPoE**: The device accesses the internet using the PPPoE user name and password provided by the ISP.
SSID	It specifies the wireless network name of the device.
Channel	It specifies the channel that the WiFi network operates.
Security Mode	It specifies the security mode of the WiFi network of the device. It includes None, WPA-PSK, WPA2-PSK, and Mixed WPA/WPA2-PSK. Clicking the hyperlink navigates you to the elaborated description of the corresponding security mode.

4.12 Example of router mode

Network requirement

You already had a modem. Now you need a router to share your network.

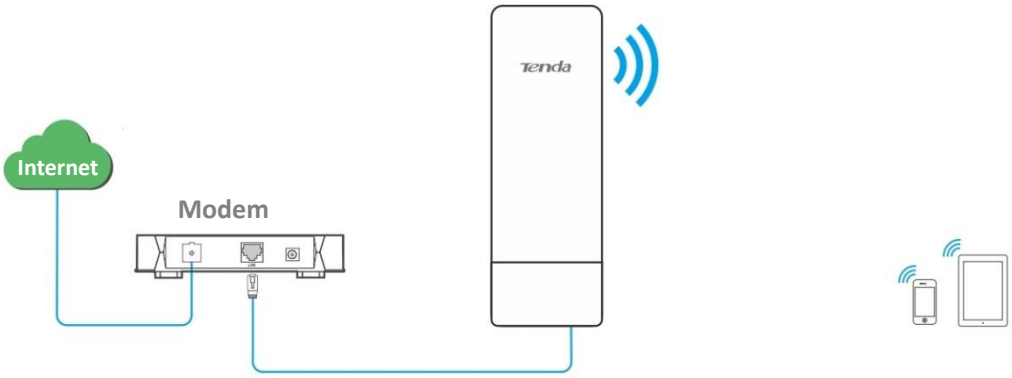
Solution

Set the CPE to Router mode.

Assume that:

- Your internet connection type: **PPPoE**
- User name: **admin**
- Password: **admin**

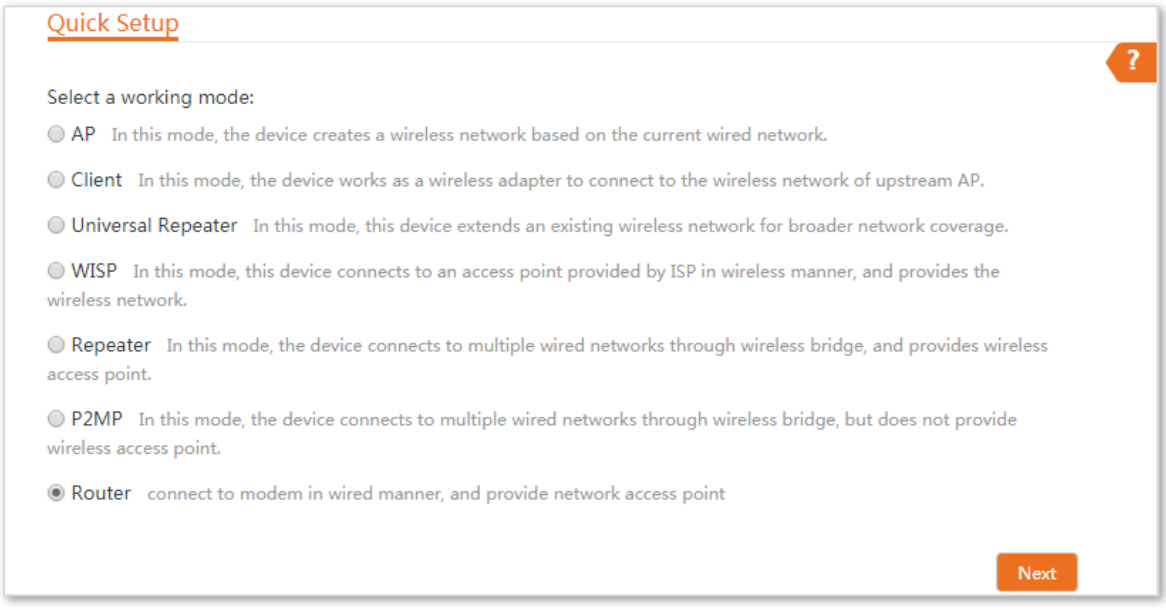
Network topology



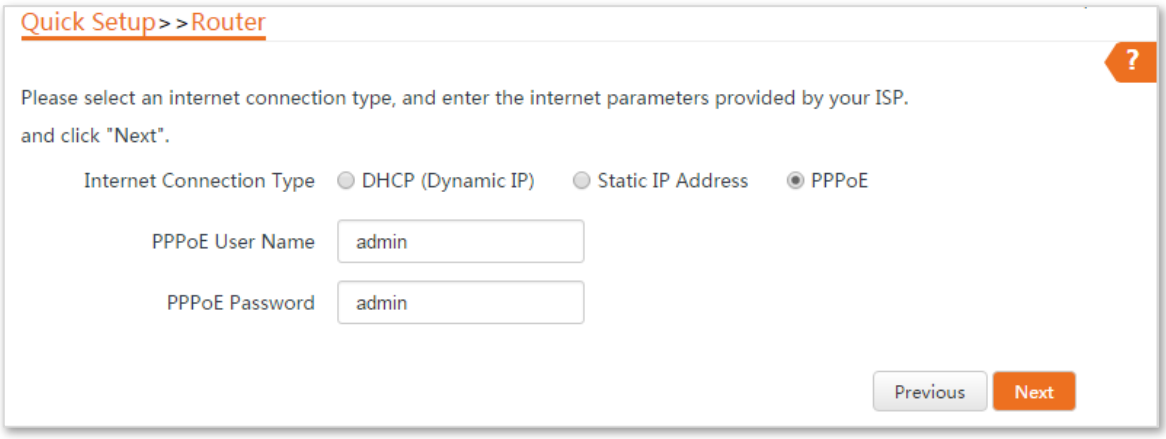
Configuration procedures

Step 1 Log in to the web UI of the CPE, and choose **Quick Setup** to enter the configuration page.

Step 2 Select **Router** mode, and click **Next**.

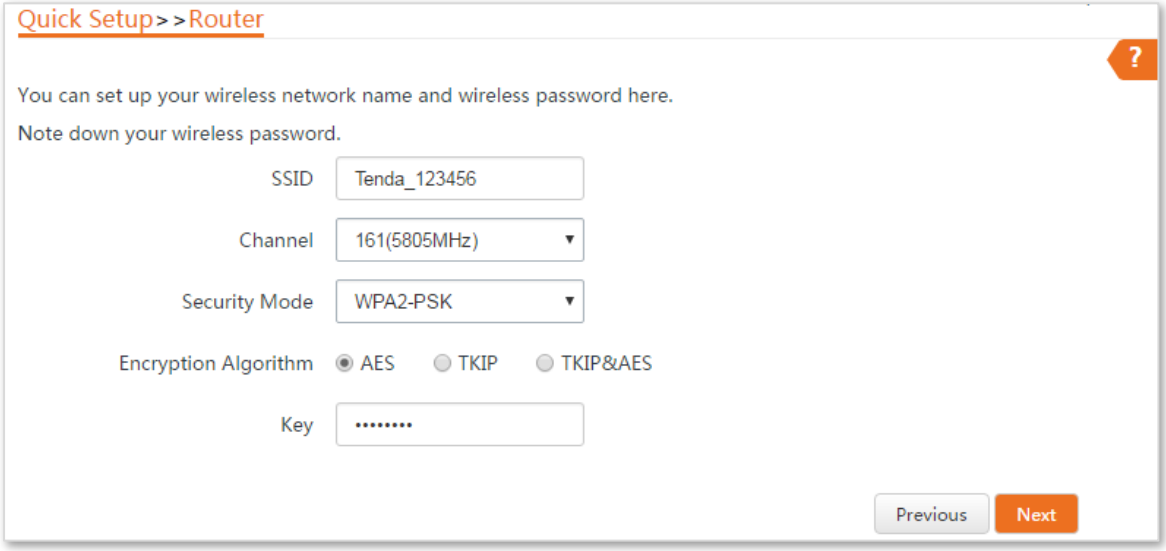


Step 3 Select **PPPoE**, enter **admin** in both **PPPoE User Name** and **PPPoE Password** boxes, and click **Next**.

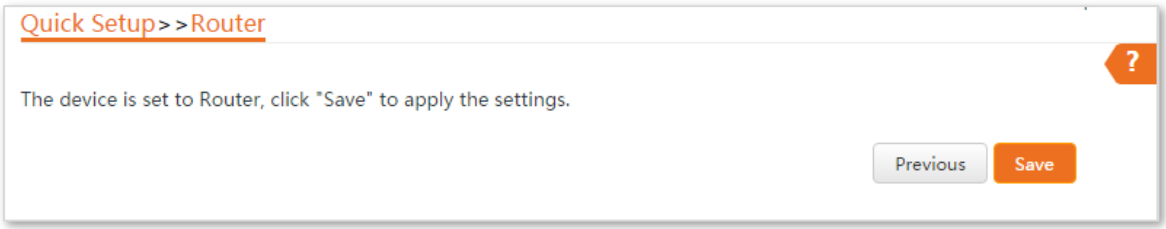


Step 4 Set wireless parameters of the CPE.

1. Customize a SSID, which is **Tenda_123456** in this example.
2. Select a security mode, which is **WPA2-PSK** in this example.
3. Set a **Key** for the wireless network, and click **Next**.



Step 5 Click **Save**, and wait until the device reboots to activate the settings.



----End

Verification

Wireless devices connected to the wireless network of the CPE can access the internet.

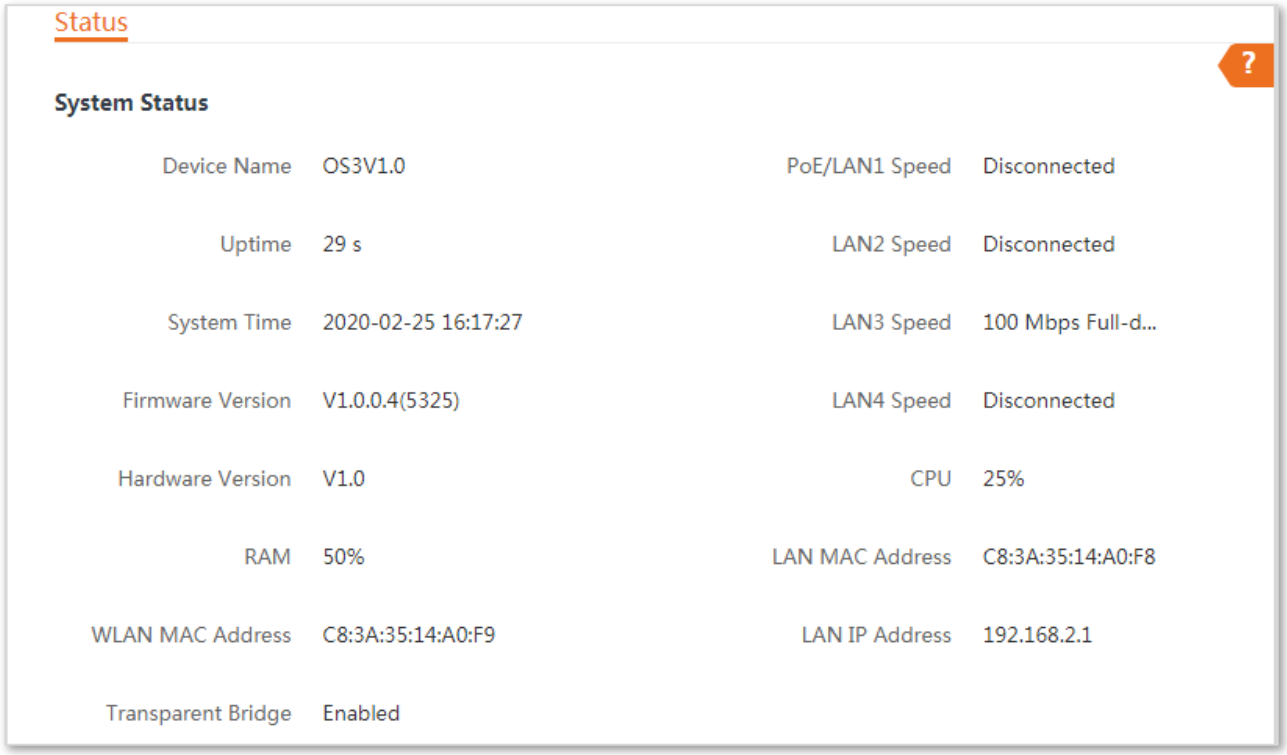
5 Status

This module allows you to view the information of system and wireless network, including three parts: system status, wireless status, and statistics.

5.1 System status

Log in to the web UI of the device, and choose **Status**. You can view the system status here.

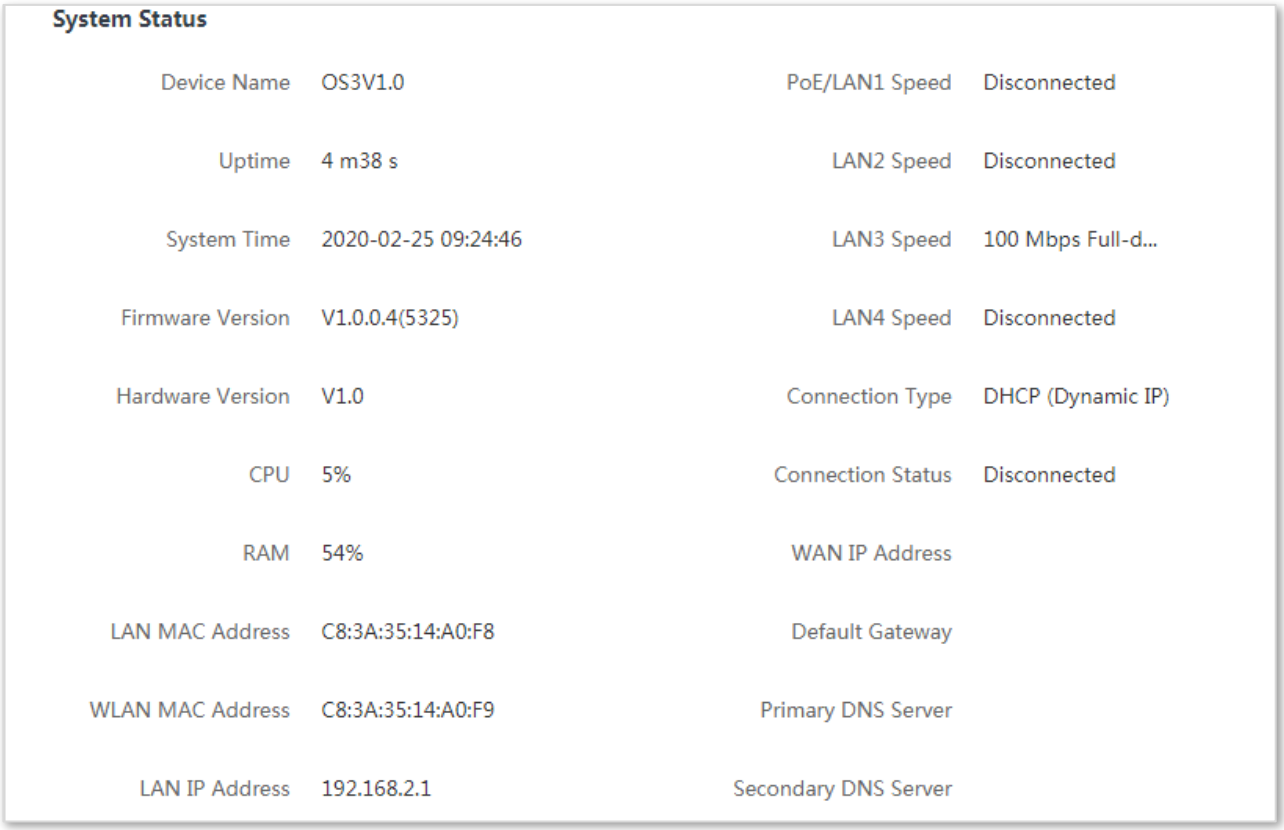
If this device is set to **AP** mode, **Client** mode, **Universal Repeater** mode, **Repeater** mode or **P2MP** mode, the system status is shown as follows. If the CPE has multiple Ethernet ports, this page displays the current connection rate of each LAN port. OS3 is used for illustration.



If the device is set to **WISP** or **Router** mode, the system status is shown as follows:

TIP

When the CPE works in Router mode, the PoE port is changed to WAN port from LAN port.



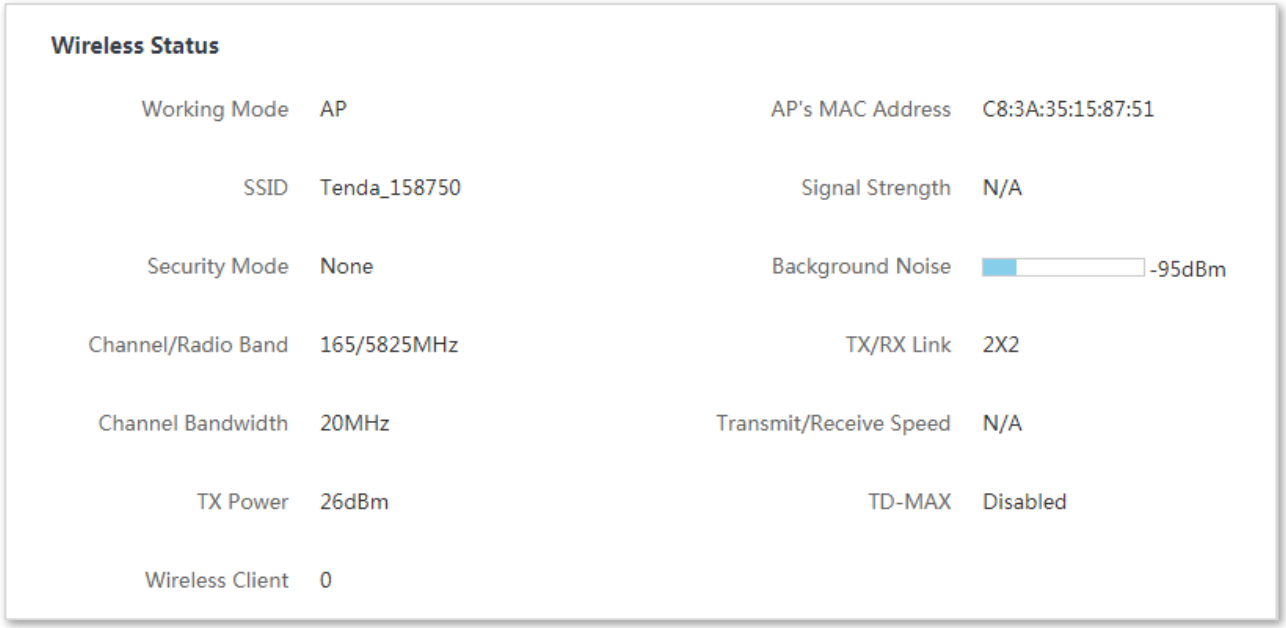
Parameters description

Name	Description
Device Name	It specifies the name of this device. Different device names help you manage multiple devices on LAN easily. You can change the name of this device on the **Network** > **LAN Setup** page when the device works in AP, Client, Universal Repeater, Repeater, and P2MP modes. When the device works in WISP or Router mode, it displays the model of the device, and cannot be changed.
Uptime	It specifies the time that has elapsed since the device was started last time.
System Time	It specifies the current system time of this device.
Firmware Version	It specifies the system software version number of this device.
Hardware Version	It specifies the hardware version of this device.
CPU	Central Processing Unit. It specifies the CPU usage of this device.
RAM	Random Access Memory. It specifies the memory usage of this device.
LAN MAC Address	It specifies the MAC address of LAN port of this device.
WLAN MAC Address	It specifies the MAC address of the wireless network of this device.
LAN Speed	It specifies the PoE/LAN port speed and duplex mode of this device.
LAN IP Address	It specifies the IP address (also named management IP address) of this device. By

Name	Description
	default, it is 192.168.2.1. You can access the web UI of this device using this IP address.
Transparent Bridge	It displays the status of transparent bridge.
Connection Type	It specifies the internet connection type of this device in **WISP** or **Router** mode. • DHCP (Dynamic IP): The CPE obtains IP address from the upstream DHCP server for internet access. • Static IP Address: The CPE uses a fixed IP address, subnet mask, default gateway, and DNS server info for internet access. • PPPoE: The CPE uses a user name and password for internet access.
Connection Status	It specifies the connection status of WAN port of this device in **WISP** or **Router** mode.
WAN IP Address	It specifies the IP address of WAN port of this device in **WISP** or **Router** mode.
Default Gateway	It specifies the default gateway address of this device in **WISP** or **Router** mode.
Primary DNS Server	It specifies the IP address of primary DNS server of this device in **WISP** or **Router** mode.
Secondary DNS Server	It specifies the IP address of secondary DNS server of this device in **WISP** or **Router** mode.

5.2 Wireless status

Log in to the web UI of the device, and choose **Status**. You can view wireless status here, including working mode, SSID, security mode, and so on.



Parameters description

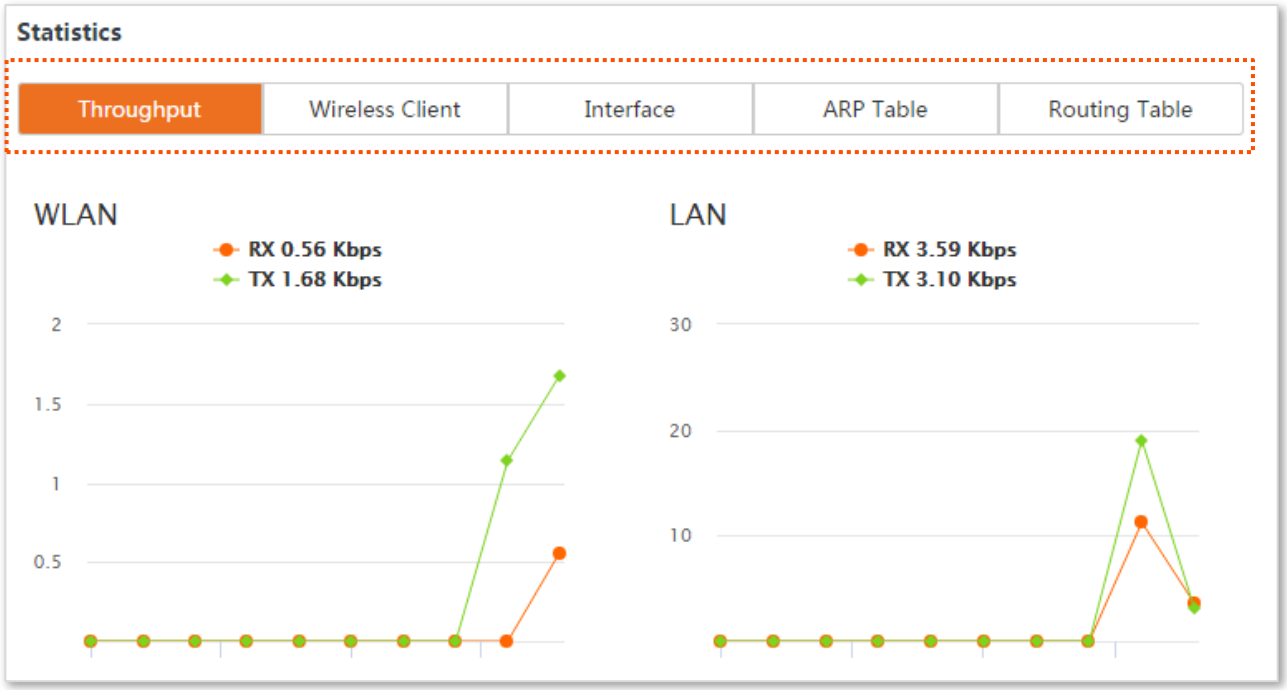
Name	Description
Working Mode	It specifies the working mode the device operates.
SSID	It specifies the wireless network name of this device.
Security Mode	It specifies the security mode of the wireless network of this device.
Channel/Radio Band	It specifies the channel and radio band used by this device to transmit radio signals.
Channel Bandwidth	It specifies the channel bandwidth of this device.
TX Power	It specifies the transmitted power of this device.
Wireless Client	It specifies the number of wireless clients connected to this device.
AP's MAC Address	It displays the MAC address of the upstream device. • In AP, Router, Repeater, or P2MP mode, it displays the WLAN MAC address of the CPE. • In Client, Universal Repeater or WISP mode, or when the bridging succeeds, it displays the WLAN MAC address of the upstream AP. When the bridging fails, it displays N/A.
Signal Strength	It displays the wireless signal strength of peer device. • In AP or Router mode, it displays the signal strength of the first device connected

Name	Description
	to the wireless network of the device. • In Client, Universal Repeater, WISP, Repeater or P2MP mode, it displays the received signal strength from peer AP.
Background Noise	It specifies the strength of radio interference signals in the ambient environment that interfere with the channel of this device. Larger absolute value indicates less interference. For example, -95 dBm indicates less interference than that of -75 dBm.
TX/RX Link	It specifies the number of spatial streams of wireless data the device is transmitting or receiving. The more links indicates the more traffic.
Transmit/Receive Speed	It specifies the wireless transmitting/receiving rate. • In AP or Router mode: it displays the transmitting/receiving rate of the first device connected to the wireless network of this device. • In Client, Universal Repeater, WISP, Repeater, or P2MP mode: it displays transmitting/receiving rate of this device.
TD-MAX	It specifies the status of the TD-MAX function.

5.3 Statistics

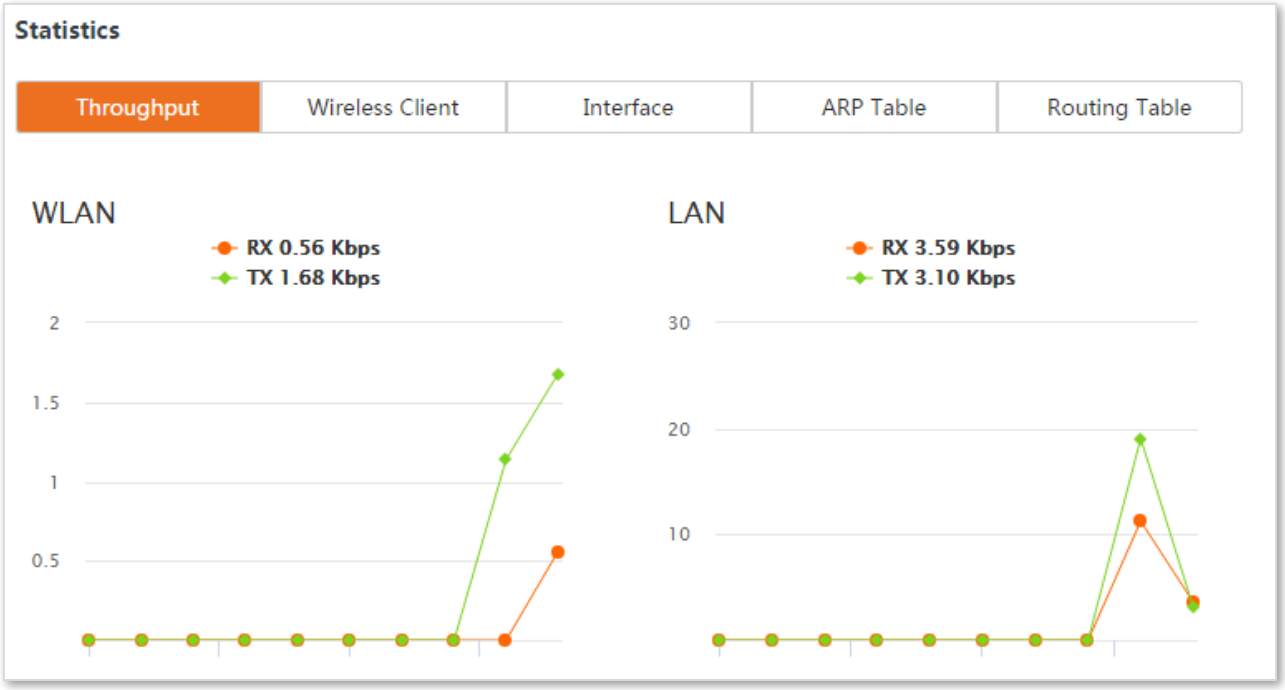
On the **Status** page, you can learn statistics information about throughput, wireless client, interface, ARP table and routing table.

To access the page, log in to the web UI of the device and choose **Status**.



5.3.1 Throughput

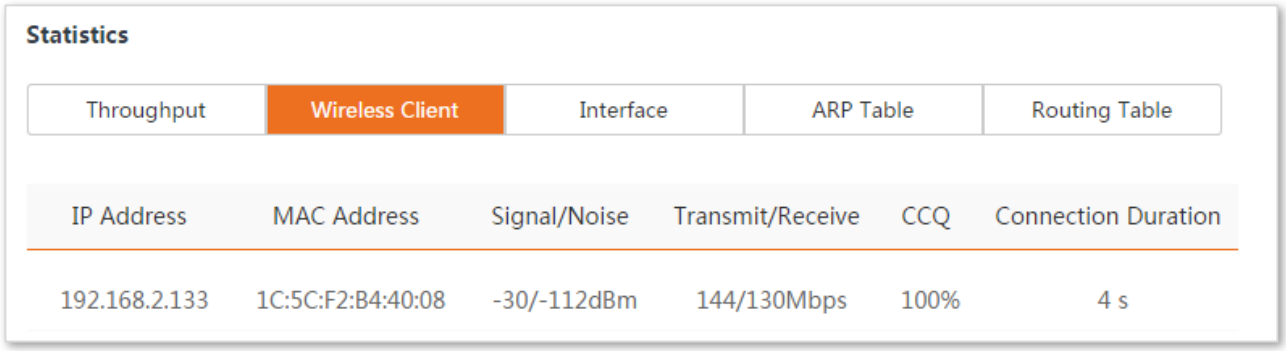
The line charts visually show the real-time transmitting and receiving traffic of WLAN and LAN ports of the device.



5.3.2 Wireless client/Upstream AP

This module differs depending on the working mode of the device.

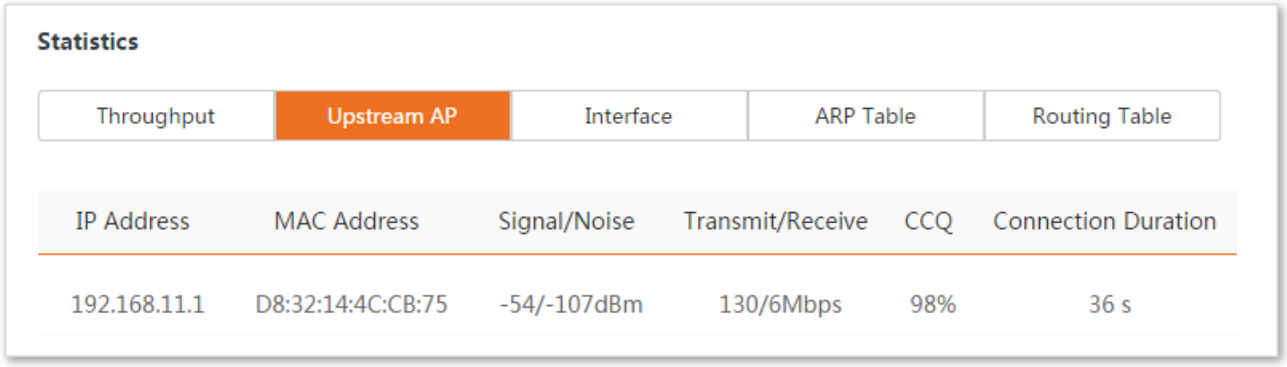
- In **AP** or **Router** mode, it displays information of connected wireless clients.
- In **Client**, **Universal Repeater**, **WISP**, **P2MP** or **Repeater** mode, it displays information of upstream AP.



Parameters description

Name	Description
IP Address	It specifies the IP address of the corresponding wireless client.
MAC Address	It specifies the MAC address of the corresponding wireless client.
Signal/Noise	It specifies the WiFi signal strength and electromagnet interference signal strength of the corresponding wireless client.
Transmit/Receive	It specifies the transmitting and receiving rate of the corresponding client.
CCQ	It specifies the connection quality of the corresponding client. A higher percentage indicates a better connection quality.
Connection Duration	It specifies the time that has elapsed since the wireless client is connected to the wireless network of the device.

This function is available only when the device works in Client, Universal Repeater, or WISP mode.

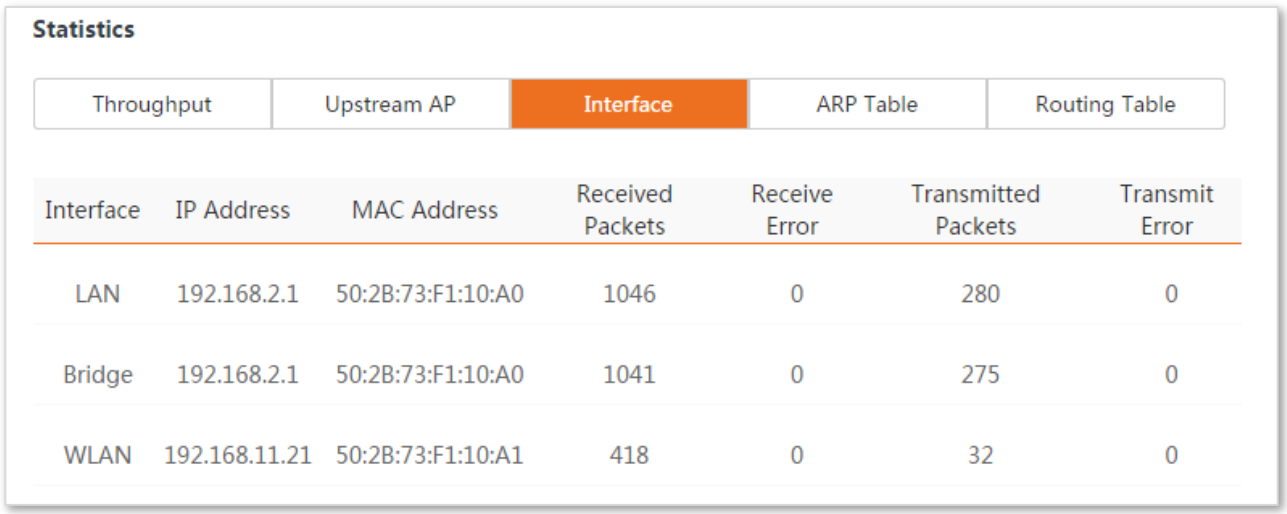


Parameters description

Name	Description
IP Address	It specifies the IP address of the upstream device.
MAC Address	It specifies the MAC address of the upstream device.
Signal/Noise	• **Signal**: It specifies the WiFi signal strength of the corresponding upstream AP. • **Noise**: It specifies the ambitus interference signal and electromagnetic interference strength.
Transmit/Receive	It specifies the transmitting and receiving rate of the upstream device.
CCQ	It specifies the connection quality of the upstream device. A higher percentage indicates a better connection quality.
Connection Duration	It specifies the time that has elapsed since this device bridges to the upstream device.

5.3.3 Interface

It displays the IP address, MAC address and traffic information of the interfaces of the device.

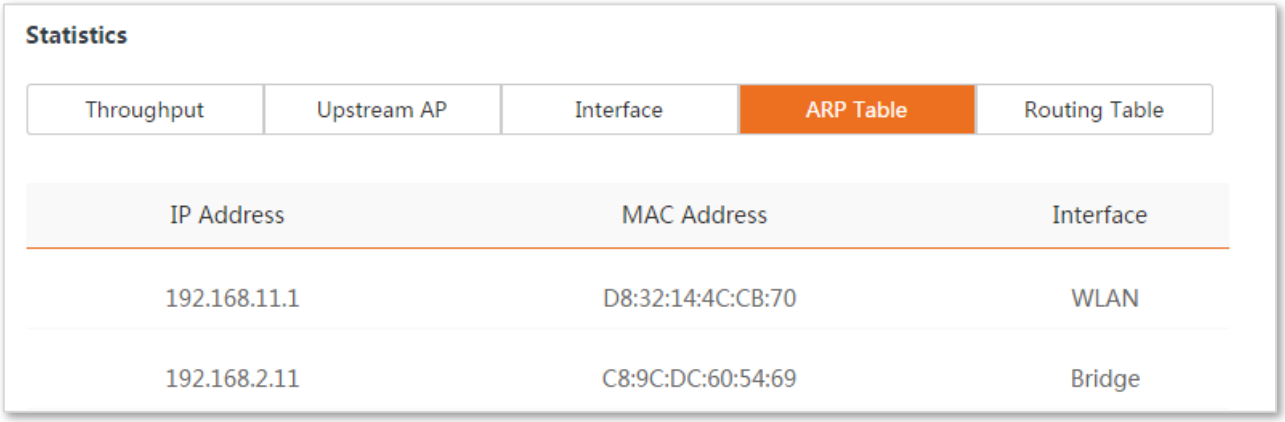


Parameters description

Name	Description
Interface	It displays the wired interface, bridge interface, and WLAN interface of the device.
IP Address	It displays the IP addresses of wired interface, bridge interface, and WLAN interface.
MAC Address	It displays the MAC addresses of wired interface, bridge interface, and WLAN interface.
Received Packets	It displays the received and transmitted packets of the interface.
Transmitted Packets	
Receive Error	It displays the received and transmitted error packets of the interface.
Transmit Error	

5.3.4 ARP table

ARP (Address Resolution Protocol) is a network layer protocol used to convert an IP address into a physical address. The ARP table displays the IP address and its corresponding MAC address the device visits, and the interface the packets pass through.



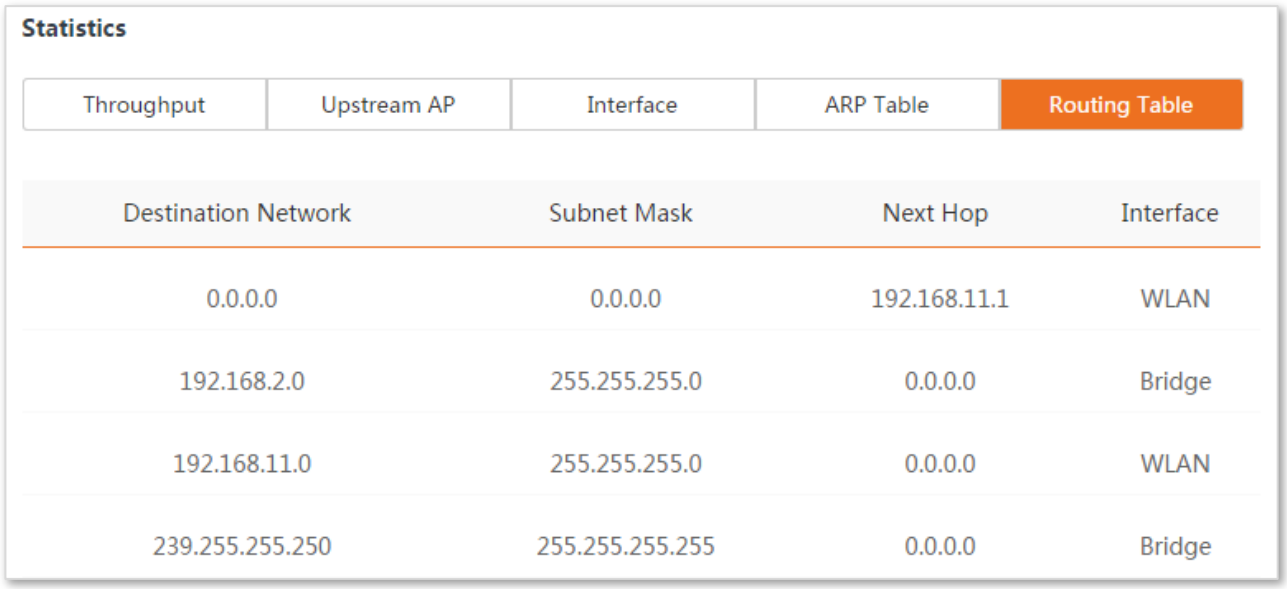
Parameters description

Name	Description
IP Address	It specifies the IP address of the host in the APR table.
MAC Address	It specifies the MAC address corresponding to the IP address.
Interface	It specifies the interface used to communicate with the host, including LAN, WLAN and bridge interfaces.

5.3.5 Routing table

It specifies the destination networks that the device can access.

To access the page, log in to the web UI of the device, and choose **Status**, then **Routing Table** in **Statistics** part.



Parameters description

Name	Description
Destination Network	It specifies the IP address of the destination network.
Subnet Mask	It specifies the subnet mask of the destination network.
Next Hop	It specifies the IP address of entrance of the next hop route when the packets egress from the interface of the device.
Interface	It specifies the interface that the packets egress.

6 Network

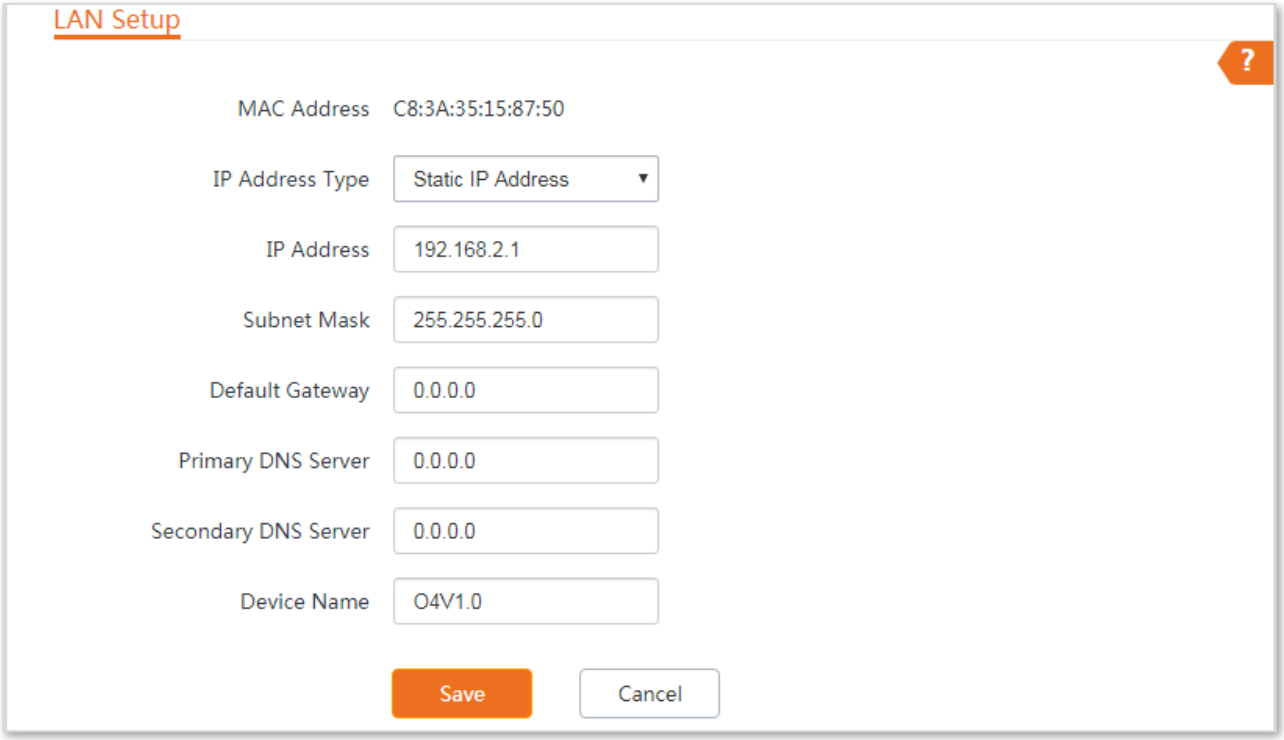
6.1 LAN setup

6.1.1 Overview

On the **LAN Setup** page, you can view the MAC address of the LAN port, configure the device name, and type of obtaining an IP address and related parameters.

To access the page, choose **Network** > **LAN Setup**.

In **AP**, **Client**, **Universal Repeater**, **Repeater**, and **P2MP** modes, the page displays:

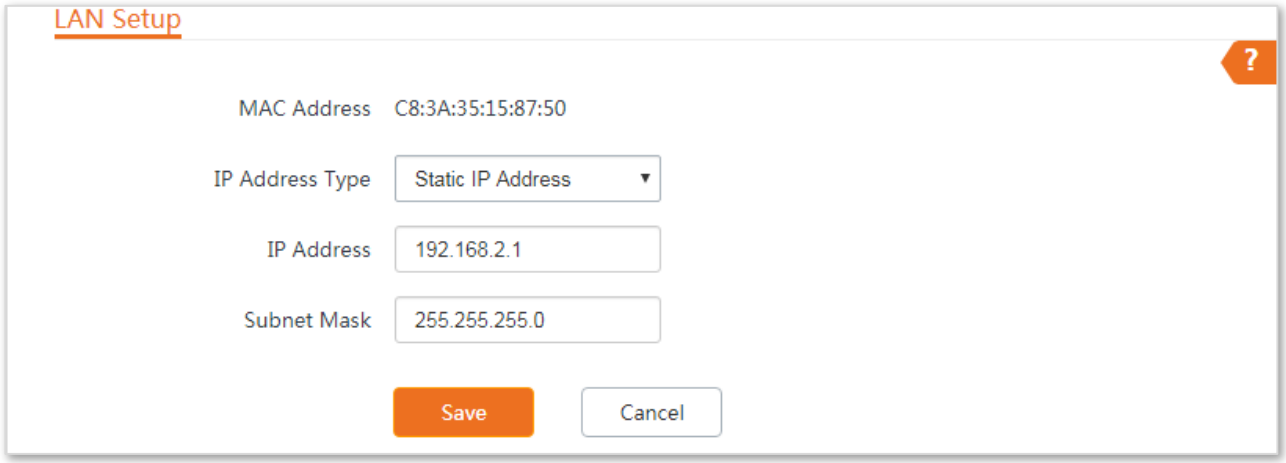


Parameters description

Name	Description
MAC Address	It specifies the MAC address of LAN port.
IP Address Type	It specifies the type of obtaining an IP address. The default is **Static IP Address**. • **Static IP Address**: Specify the IP address, subnet mask, default gateway, and DNS server IP addresses manually. • **DHCP (Dynamic IP Address)**: The device obtains an IP address, subnet mask,

Name	Description
	default gateway and DNS server IP address from the DHCP server in the network. TIP If the **IP Address Type** is set to **DHCP (Dynamic IP Address)**, you need to check the device's IP address on the clients list of the DHCP server in the network, and use this IP address to log in.
IP Address	It specifies the LAN IP address of the device.
Subnet Mask	It specifies the subnet mask of the device. The default is **255.255.255.0**.
Default Gateway	It specifies the default gateway of the device. You can set it to the IP address of the egress router to enable the device to access the internet.
Primary DNS Server	It specifies the primary DNS server IP address of the device. If the egress router has the DNS agency function, it can be set to the LAN IP address the egress router. Otherwise, specify a DNS server IP address manually.
Secondary DNS Server	It specifies the secondary DNS server IP address of the device. If there are two DNS server IP addresses, enter one in this box.
Device Name	It specifies the name of the device. The default name indicates the product model and version. You are recommended to change the name to indicate the location of the device, so that you can easily identify the device when there are multiple devices in the network.

When the CPE is in **WISP** and **Router** modes, the page is displayed as below:



Parameters description

Name	Description
MAC Address	It specifies the MAC address of LAN port.
IP Address Type	It specifies the type of obtaining an IP address. The default is **Static IP Address**. • **Static IP Address**: Specify the IP address and subnet mask manually. • **DHCP (Dynamic IP Address)**: The device obtains an IP address and subnet mask from the upstream DHCP server in the network. TIP If the IP Address Type is set to DHCP (Dynamic IP Address), you need to check the device's IP address on the clients list of the DHCP server of the upstream device, and use this IP address to log in.
IP Address	It specifies the LAN IP address of the device.
Subnet Mask	It specifies the subnet mask corresponding to the LAN IP address of the device. The default is **255.255.255.0**.

6.1.2 Set the LAN IP address manually

In this mode, you must manually set the IP address, subnet mask, gateway IP address, and DNS server IP addresses of the device. Therefore, this mode is recommended if you need to deploy only a few CEPs.

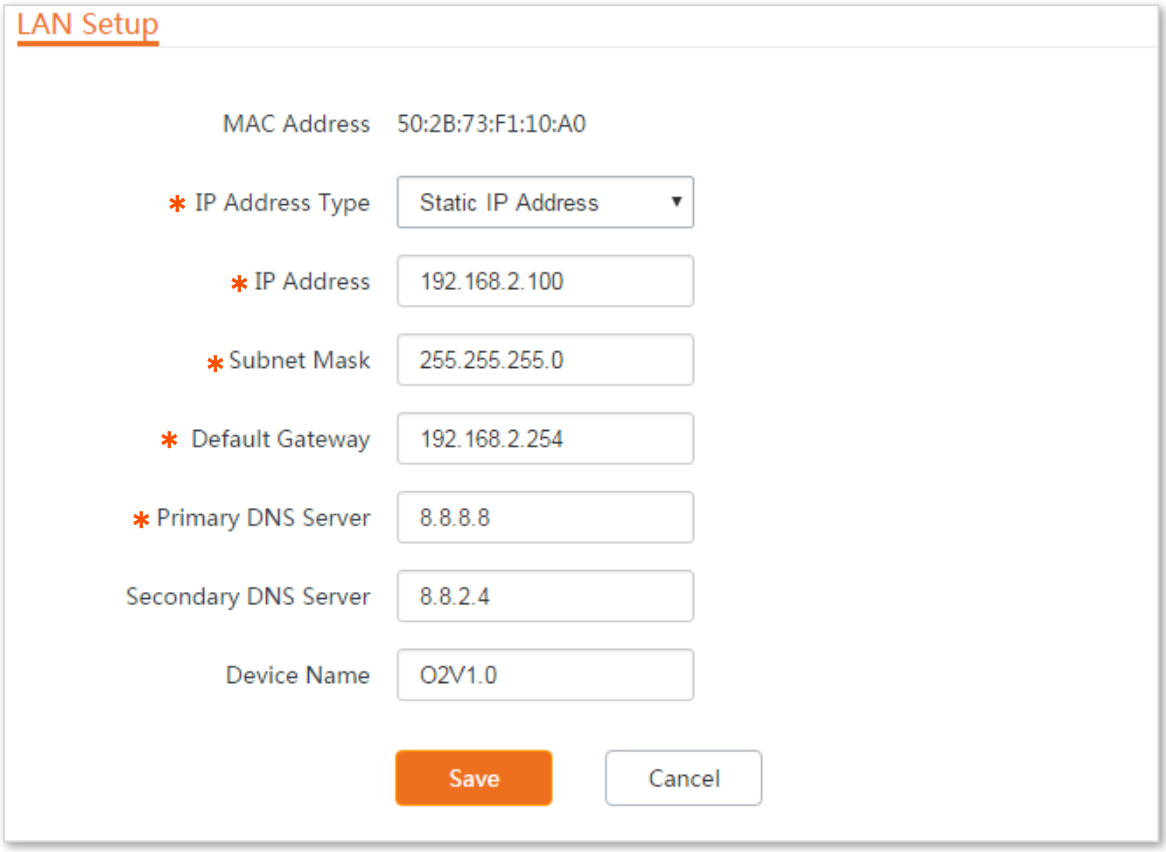
Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Network** > **LAN Setup** to enter the configuration page.

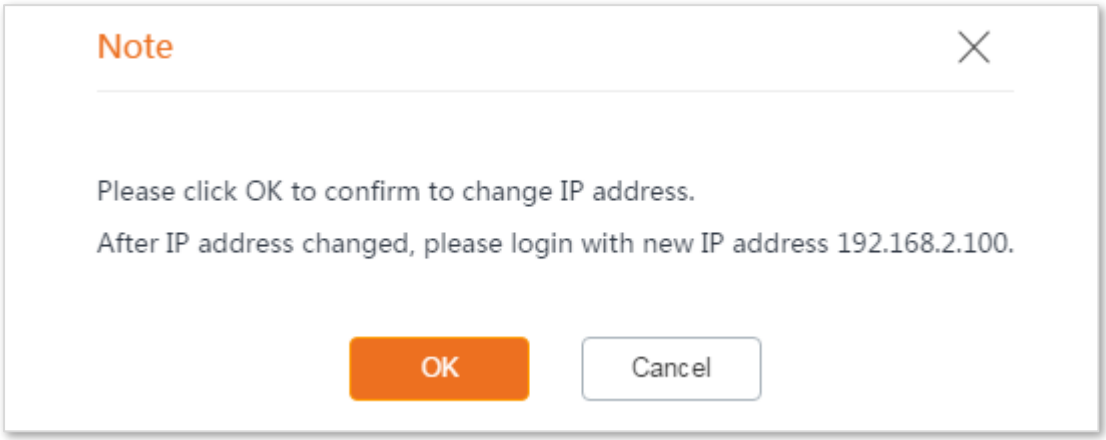
Step 2 Set **IP Address Type** to **Static IP Address**.

Step 3 Set **IP Address**, **Subnet Mask**, **Default Gateway**, and **Primary DNS Server**. If another DNS server is available, set **Secondary DNS Server** to the IP address of the additional DNS server.

Step 4 Click **Save**.



Step 5 Click **OK** on the pop-up window.



----End

6.1.3 Log in to the web UI after changing the LAN IP address

After the configuration, if the new and original IP addresses belong to the same network segment, you can log in to the web UI of the device by accessing the new IP address.

Otherwise, assign your computer an IP address that belongs to the same network segment as the new IP address of the device before login with the new IP address. Refer to How to assign a fixed IP address to your computer in Appendix for details.

6.1.4 Set the device to obtaining an LAN IP address automatically

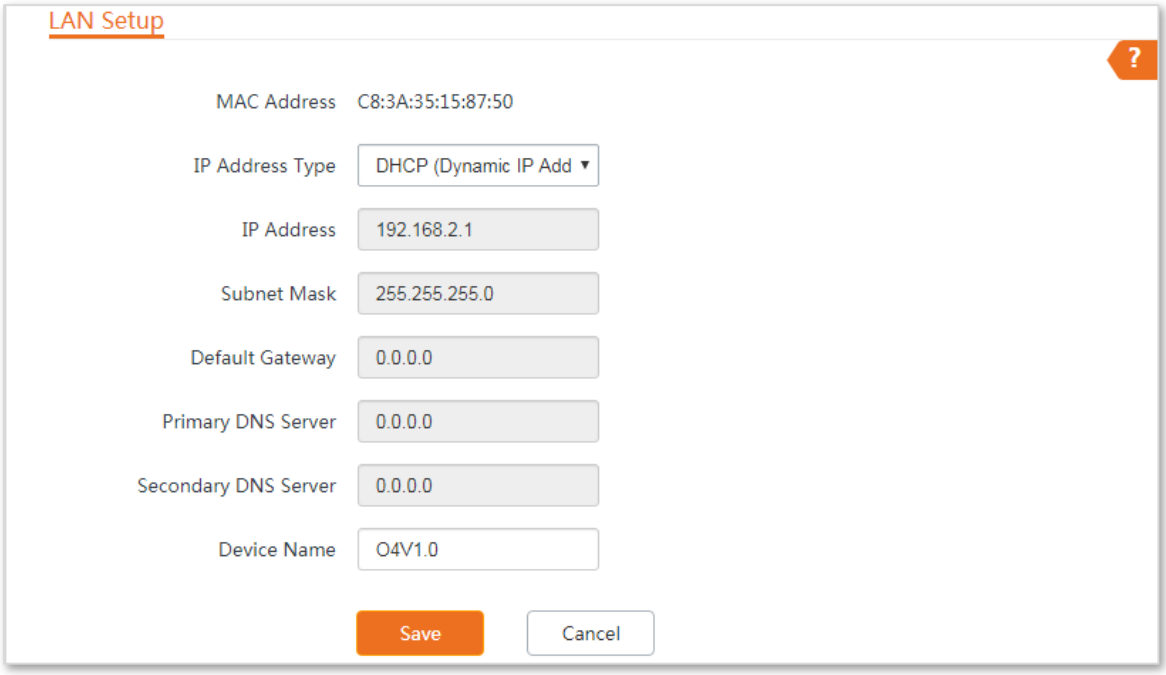
This mode enables the device to automatically obtain an IP address, a subnet mask, a gateway IP address, DNS server IP addresses assigned by the DHCP server of the upstream device. If a large number of devices are deployed, you can adopt this mode to prevent IP address conflicts and effectively reduce your workload.

Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Network** > **LAN Setup** to enter the configuration page.

Step 2 Set **IP Address Type** to **DHCP (Dynamic IP Address)**.

Step 3 Click **Save**.



----End

After completing the configuration, if you want to re-log in to the web UI of the device, check the new IP address on the web UI of the upstream device which assigns the IP address to this device. Ensure that the IP address of the management computer and the IP address of the device belong to the same network segment, and access the IP address of the device. Refer to steps in the How to assign a fixed IP address to your computer part to assign an IP address to the computer manually.

6.2 MAC clone

This function is available only when the device works in **WISP** or **Router** mode.

6.2.1 Overview

If the CPE cannot access the internet after configuring internet settings, your ISP may have bound your internet service account with the MAC address of your computer that was used to verify the internet connectivity after you subscribed to the internet service. Therefore, only this computer can access the internet with the account.

In this case, you need to clone the MAC address of this computer to the WAN port of the CPE for internet access.

6.2.2 Clone a MAC address

Select one of the following methods to clone the MAC address according to your networking scenario.

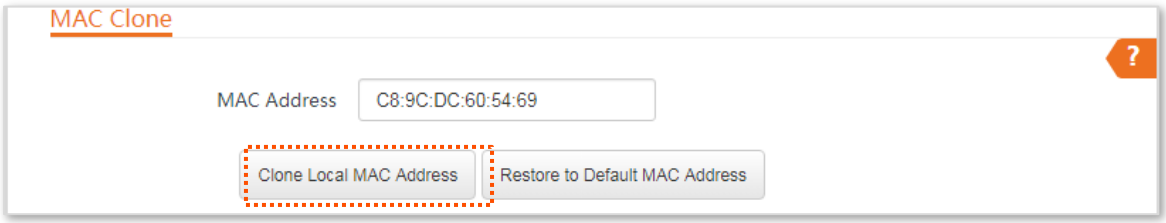
Use the computer with the MAC address bound to your internet service for setup

Step 1 Connect the computer to the device.

Step 2 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Network** > **MAC Clone** to enter the configuration page.

Step 3 Click **Clone Local MAC Address**.

Step 4 Click **Save**.



----End

Use a device without the MAC address bound your internet service for setup

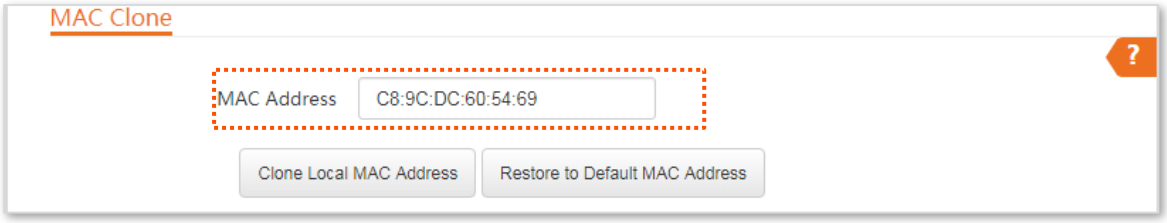
If you do NOT use the computer that can access the internet after it connects to the modem directly to configure the CPE, but you know the MAC address of this computer, perform the following steps:

Step 1 Connect a device (such as a smart phone or tablet) to the device.

Step 2 Start a web browser the device, visit **192.168.2.1** and choose **Network** > **MAC Clone** to enter the configuration page.

Step 3 Enter the MAC address of the computer that can access the internet in the **MAC Address** box.

Step 4 Click **Save**.



----End

TIP

If you want to restore the MAC address to factory settings, choose **Network** > **MAC Clone**, click **Restore to Default MAC Address**, and click **Save**.

6.3 DHCP server

6.3.1 Overview

The device provides a DHCP server function to assign IP addresses to clients in the LAN. By default, the DHCP server function is enabled.

TIP

If you change the LAN IP address of the CPE and the new and original IP addresses belong to different network segments, the system changes the IP address pool of the DHCP server of the device, so that the IP address pool and the new IP address of the LAN port belong to the same network segment.

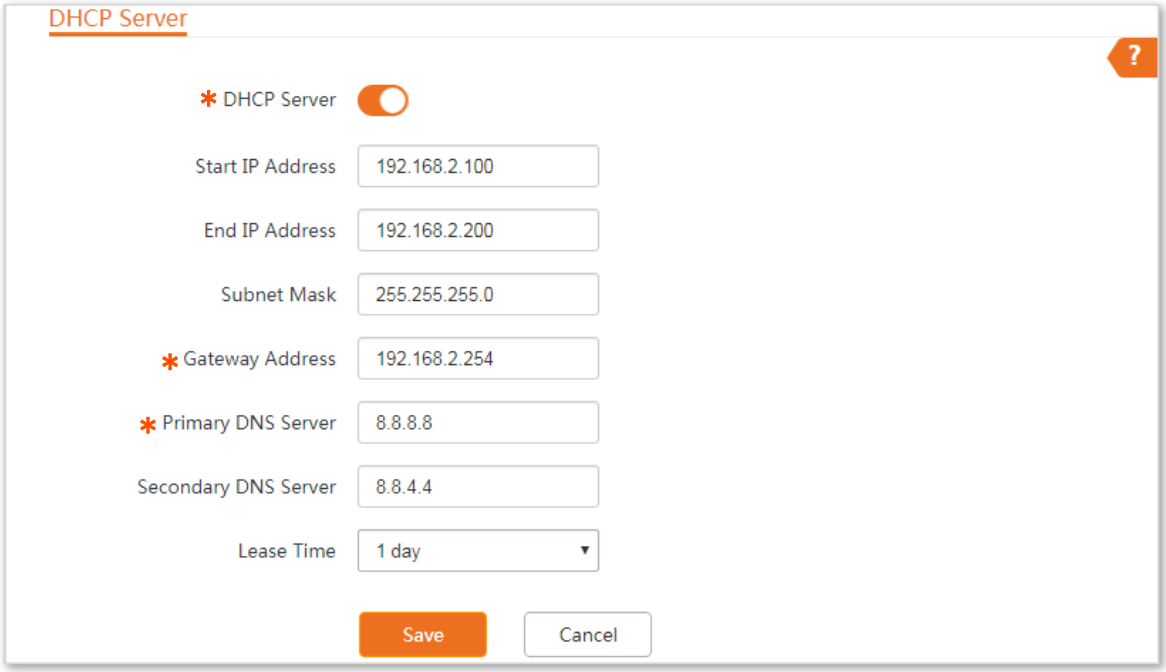
6.3.2 Configure the DHCP server

Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Network** > **DHCP Server** to enter the configuration page.

Step 2 Enable the **DHCP server**.

Step 3 Set the parameters. Generally, you need to set only **Gateway Address** and **Primary DNS Server**.

Step 4 Click **Save**.



----End

TIP

If another DHCP server is available on your LAN, ensure that the IP address pool of the device does not overlap with the IP address pool of that DHCP server. Otherwise, IP address conflicts may occur.

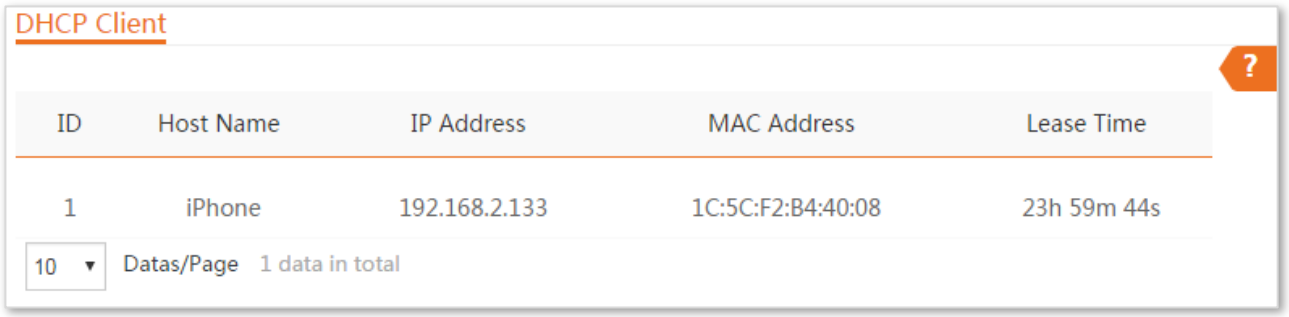
Parameters description

Name	Description
DHCP Server	It specifies whether to enable the DHCP server function of the device. By default, it is enabled.
Start IP Address	It specifies the start IP address of the IP address pool of the DHCP server. The default value is **192.168.2.100**.
End IP Address	It specifies the end IP address of the IP address pool of the DHCP server. The default value is **192.168.2.200**.  The start and end IP addresses must belong to the same network segment as the IP address of the LAN port of the device.
Subnet Mask	It specifies the subnet mask assigned by the DHCP server to clients. The default value is **255.255.255.0**.
Gateway Address	It specifies the default IP address gateway assigned by the DHCP server to clients. Generally, it is the IP address of the LAN port of a router on the LAN. The default value is **192.168.2.254**.  A client can access a server or host not in the local network segment only through a gateway.
Primary DNS Server	It specifies the primary DNS server IP address assigned by the DHCP server to clients. The default value is **8.8.8.8**.  To enable clients to access the internet, set this parameter to a correct DNS server IP address or DNS proxy IP address.
Secondary DNS Server	It specifies the secondary DNS server IP address assigned by the DHCP server to clients. This parameter is optional.
Lease Time	It specifies the validity period of an IP address assigned by the DHCP server to a client. When half of the lease time has elapsed, the client sends a DHCP request to the DHCP server to renew the lease time. If the request succeeds, the lease time is extended according to the request. Otherwise, the client sends the request again when 7/8 of the lease time has elapsed. If the request succeeds, the lease time is extended according to the request. Otherwise, the client must request an IP address from the DHCP server after the lease time expires. It is recommended that you retain the default value.

6.4 DHCP client

With the DHCP server enabled, you can view details about the clients that obtain IP addresses from the DHCP server, including host names, IP addresses, MAC addresses, and lease time.

To access the page, choose **Network** > **DHCP Client**.



6.5 VLAN settings

6.5.1 Overview

The device supports the IEEE 802.1Q VLAN function, so that it can be used in networks with QVLAN. By default, the function is disabled.

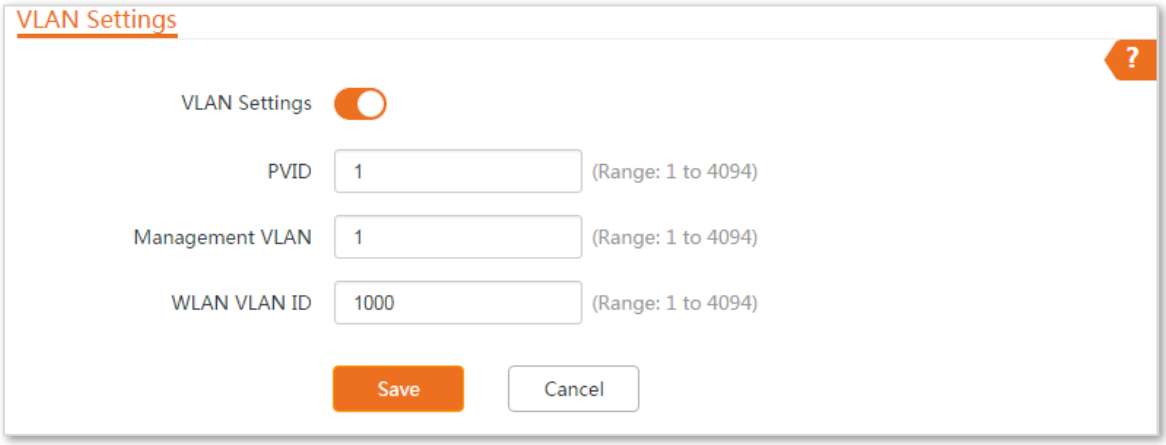
6.5.2 Set up VLAN

Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Network** > **VLAN Settings** to enter the configuration page.

Step 2 Enable the function.

Step 3 Set the parameters as needed.

Step 4 Click **Save**.



----End

Parameters description

Name	Description
VLAN Settings	It specifies whether to enable the VLAN function of this device. By default, it is disabled. After the VLAN function is enabled, the PoE/LAN port is used as a trunk port.
PVID	It specifies the ID of the default native VLAN ID of the trunk port. The default ID is **1**. After the VLAN function is enabled, the PoE/LAN port is used as a trunk port.
Management VLAN	It specifies the ID of the management VLAN of this device. The default ID is **1**. After changing the management VLAN, you can manage this device only after connecting your computer to the new management VLAN.
WLAN VLAN ID	It allows you to set a VLAN ID for the wireless network of this device. By default, it is set to **1000**. After the VLAN function is enabled, the WLAN interface functions as an access port, whose PVID is the same as VLAN ID.

After the IEEE 802.1Q VLAN settings take effect, packet with tag will be forwarded to the ports of the corresponding VLAN according to the VID of the packet, and packet without tag will be forwards to the ports of the corresponding VLAN according to the PVID of the port.

The following form shows the details about how different link type ports address received packets:

<table>
<tr><th rowspan="2">Type of the Port</th><th colspan="2">Type of Received Packets</th><th rowspan="2">Transmitted Packets</th></tr>
<tr><th>Packet with Tag</th><th>Packet without Tag</th></tr>
<tr><td>Access</td><td rowspan="2">Forward the data to the ports of the corresponding VLAN based on the VID in the tag.</td><td rowspan="2">Forward the data to the ports of the corresponding VLAN based on the PVID of ports</td><td>Strip the tag in the packet and then forward it</td></tr>
<tr><td>Trunk</td><td>VID ＝ PVID of the port, strip the tag in the packet and then forward it
VID ≠ PVID of the port, retain the tag in the packet and then forward it</td></tr>
</table>

6.5.3 Example of configuring VLAN settings

Networking requirement

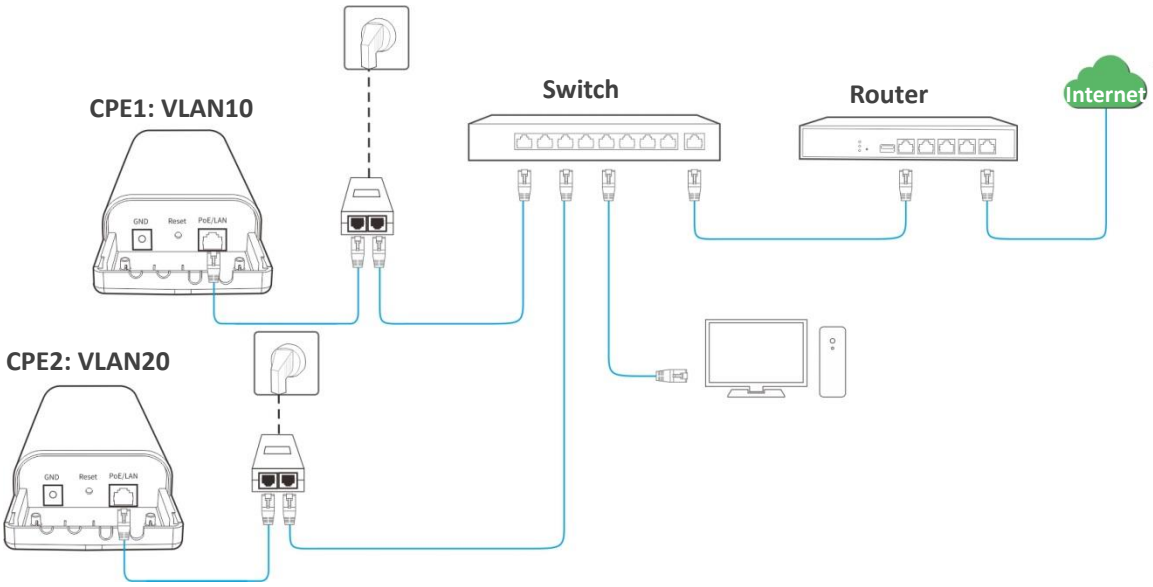
You use CPEs to set up CCTV surveillance networks. CPE1 and CPE2 are used to connect to IP cameras in different places and cannot communicate with each other.

You can assign CPE1 and CPE2 to different VLANs.

Assume that:

- CPE1 is assigned to VLAN10, and CPE2 is assigned to VLAN20.
- The router in the network supports IEEE 802.1Q VLAN and enables two DHCP servers which belong to VLAN10 and VLAN 20 respectively.

Network Topology



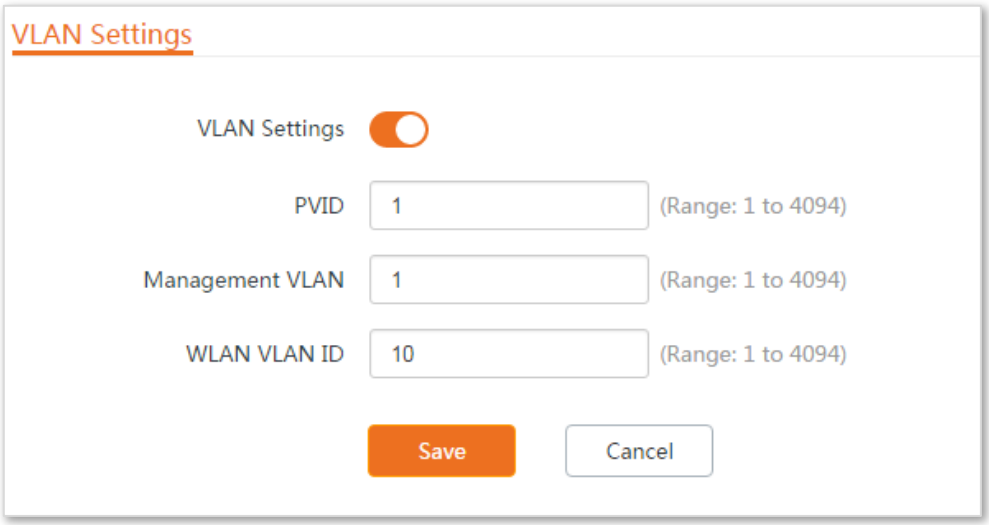
The connections of the switch:

- The router is connected to the uplink port
- CPE1 is connected to port 1
- CPE2 is connected to port 2

Configuration procedures

Step 1 Set up CPE1.

1. Log in to the web UI of CPE1, and choose **Network** > **VLAN Settings**.
2. Enable the function.
3. Set **Management VLAN** to **1**.
4. Set **WLAN VLAN ID** to **10**.
5. Click **Save**.



6. Click **OK** on the pop-up window, and wait until the CPE1 completes reboot.

Step 2 Set the **WLAN VLAN ID** of Base Station 2 to **20** according to the steps in **Step 1**.

Step 3 Set up the switch as shown in the following table.

The following table shows the configuration on the switch:

Ports of the Switch	VLAN ID (Allow the packets belonging to the following VLANs to access)	Type of Port	PVID
Uplink port (Connected to a router)	1,10,20	Trunk	1
Port 1 (Connected to CPE1)	1,10	Trunk	1
Port 2 (Connected to CPE2)	1,20	Trunk	1

Keep the default settings for the parameters which are not mentioned here. Refer to the user guide of the switch for details.

The following form shows the configuration on the router:

Enables two DHCP servers on the router, and assign them to VLAN10 and VLAN20 respectively.

Port of the router is connected to	VLAN ID (Allow the packets belonging to the following VLANs to access)	Type of Port	PVID
The switch	10, 20	Trunk	1

Refer to the user guide of the router for details.

----End

Verification

If the router enables two DHCP servers which belong to VLAN10 and VLAN20 respectively, the IP camera connected to the CPE1 obtains an IP address and related parameters from the DHCP server belonging to VLAN10, and the IP camera connected to CPE2 obtains these parameters from the DHCP sever belonging to VLAN20.

7 Wireless

7.1 Basic

This module enables you to set basic wireless settings of the device, including SSID-related parameters, network mode, channel, transmit power and so on.

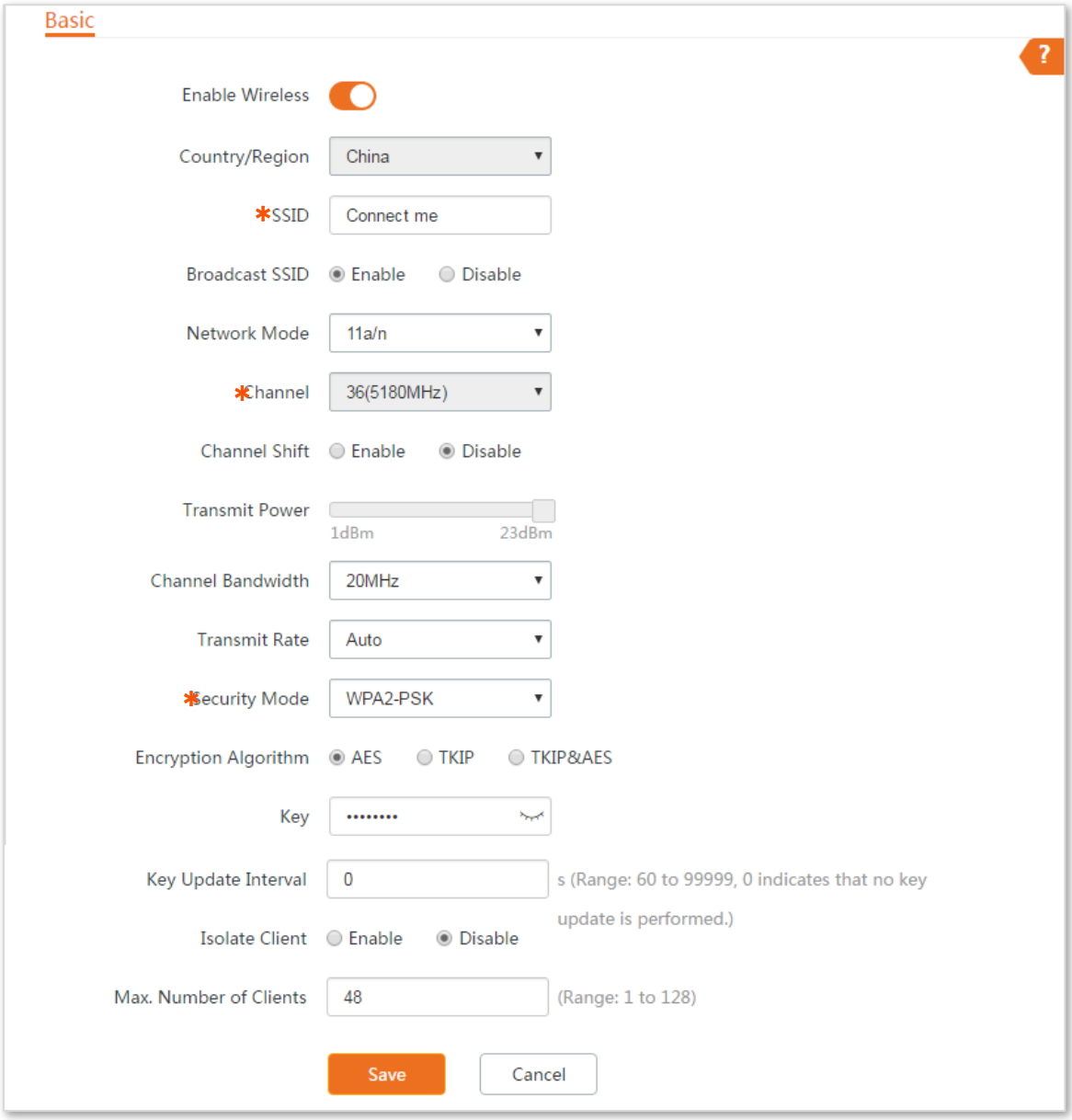
7.1.1 Change the basic settings

To change the basic settings of an SSID, perform the following procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Wireless** > **Basic**.

Step 2 Change the parameters as required. Generally, you only need to enable the wireless function, and change **SSID**, **Channel** and **Security Mode** settings.

Step 3 Click **Save**.



----End

Parameters description

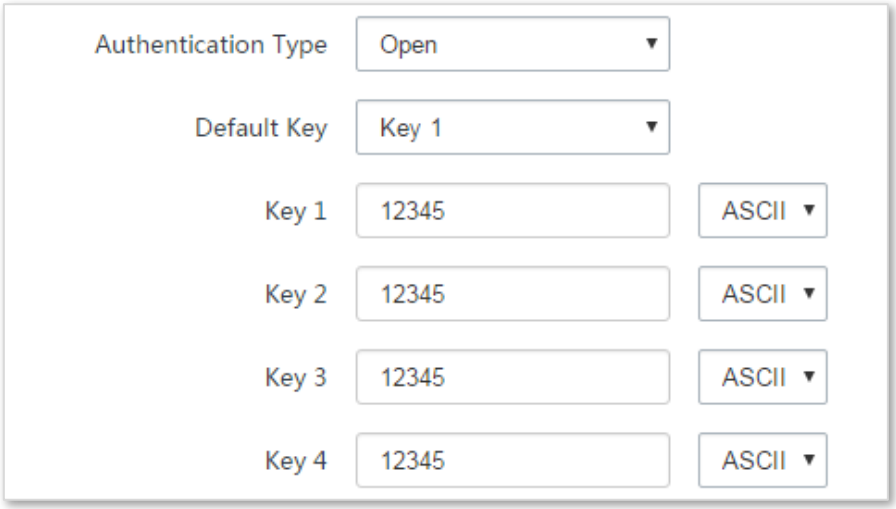
Name	Description
Enable Wireless	It specifies whether to enable the wireless function. By default, it is enabled.
Country/Region	It specifies country or region where this device is located. You can select the country or region to ensure that this device complies with the channel regulations of the country or region.
SSID	It specifies the wireless network name.
Broadcast SSID	It specifies whether to broadcast the SSID. When the device broadcasts an SSID, wireless clients can detect the SSID. When this parameter is set to **Disable**, the device does not broadcast the SSID and nearby wireless clients cannot detect the SSID. In this case, you need to enter the SSID

Name	Description
	manually on your wireless client if you want to connect to the wireless network corresponding to the SSID. This to some extent enhances the security of the wireless network.
Network Mode	It specifies the wireless network mode of this device. The available options include 11a, 11n, and 11 a/n. • **11a**: It indicates that clients compliant with the 802.11a protocol can connect to the device. • **11n**: It indicates that clients working at 5 GHz and compliant with 802.11n can connect to the device. • **11 a/n**: It indicates that all clients working at 5 GHz and compliant with the 802.11a or 802.11n protocol can connect to the device.
Channel	It specifies channel in which this device operates. **Auto** indicates that this device automatically changes to a channel rarely used in the ambient environment to prevent interference.
Channel Shift	It specifies the shift of the channel center frequency. With this function enabled, the channel center frequency shifts 5 MHz based on the frequency defined by the IEEE 802.11 standard, so that the device can exchange data on less interference channels.
Transmit Power	It specifies the transmit power of this device. Higher number indicates wider WiFi coverage. Setting a proper transmit power helps improve the performance and security of the wireless network.
Channel Bandwidth	It specifies the bandwidth of the operating channel of a wireless network. The channel bandwidth varies from different network modes. Please select it based on your actual operating environment. When setting to **Auto**, the device can switch its channel bandwidth among 10MHz, 20 MHz, 30MHz and 40 MHz based on the ambient environment.
Transmit Rate	It specifies wireless transmission rate of the device. Auto is recommended. The maximum negotiation rate varies from different channel bandwidths and network modes. Refer to the web UI of the device for details.
Security Mode	A wireless network uses radio, which is open to the public, as its data transmission medium. If the wireless network is not protected by necessary measures, any client can connect to the network to use the resources of the network or access unprotected data over the network. To ensure communication security, transmission links of wireless networks must be encrypted for protection. The device supports various security modes for network encryption, including None, WEP, WPA-PSK, WPA2-PSK, Mixed WPA/WPA2-PSK, WPA, and WPA2. • **None**: It indicates that the WiFi network allows any wireless client to connect to it. This option is not recommended because it affects network security. • **WEP**: It uses a static key to encrypt all exchanged data, and ensures that a wireless LAN has the same level of security as a wired LAN. Data encrypted based on WEP can be easily cracked. In addition, WEP supports a maximum wireless network

Name	Description
	throughput of only 54 Mbps. Therefore, this security mode is not recommended. • **WPA-PSK/WPA2-PSK/Mixed WPA/WPA2-PSK**: They belong to pre-shared key or personal key modes, where Mixed WPA/WPA2-PSK supports both WPA-PSK and WPA2-PSK. WPA-PSK, WPA2-PSK, and Mixed WPA/WPA2-PSK adopt a pre-shared key for authentication, while the CPE generates another key for data encryption. This prevents the vulnerability caused by static WEP keys, and makes the three security modes suitable for ensuring security of home wireless networks. Nevertheless, because the initial pre-shared key for authentication is manually set and all clients use the same key to connect to the same CPE, the key may be disclosed unexpectedly. This makes the security modes not suitable for scenarios where high security is required. To address the key management weakness of WPA-PSK and WPA2-PSK, the WiFi Alliance puts forward WPA and WPA2, which use 802.1x to authenticate clients and generate data encryption–oriented root keys. WPA and WPA2 use the root keys to replace the pre-shared keys that set manually, but adopt the same encryption process as WPA-PSK and WPA2-PSK. • **WPA/WPA2**: WPA and WPA2 uses 802.1x to authenticate clients and the login information of a client is managed by the client. This effectively reduces the probability of information leakage. In addition, each time a client connects to an AP that adopts the WPA or WPA2 security mode, the RADIUS server generates a data encryption key and assigns it to the client. This makes it difficult for attackers to obtain the key. These features of WPA and WPA2 help significantly increase network security, making WPA and WPA2 the preferred security modes of wireless networks that require high security.
Encryption Algorithm	It specifies the encryption algorithm corresponding to the selected security mode. If Security Mode is set to WPA-PSK, this parameter has the AES and TKIP values. If Security Mode is set to WPA2-PSK or Mixed WPA/WPA2-PSK, this parameter has the AES, TKIP, and TKIP&AES values. • **AES**: It indicates the Advanced Encryption Standard. • **TKIP**: It indicates the Temporal Key Integrity Protocol. If TKIP is used, the maximum wireless throughput of the CPE is limited to 54 Mbps. • **TKIP&AES**: It indicates that both TKIP and AES encryption algorithms are supported. Wireless clients can connect to the wireless network corresponding to the selected SSID using TKIP or AES.
Key	It specifies a pre-shared WPA key. It consists of 8 to 63 ASCII characters or 8 to 64 hexadecimal characters.
Key Update Interval	It specifies interval at which a WPA key is updated. A shorter interval leads to higher security. The value **0** indicates that no key update is performed.
Isolate Client	• Enable: Clients connected to this SSID cannot communicate with each other, which improves the wireless network security. • Disable: Clients connected to this SSID can communicate with each other. The

Name	Description
	default is Disbale.
Max. Number of Clients	This parameter specifies the maximum number of clients that can connect to the wireless network corresponding to an SSID. If the number is reached, the wireless network rejects new connection requests from clients. This limit helps balance load among devices.

WEP

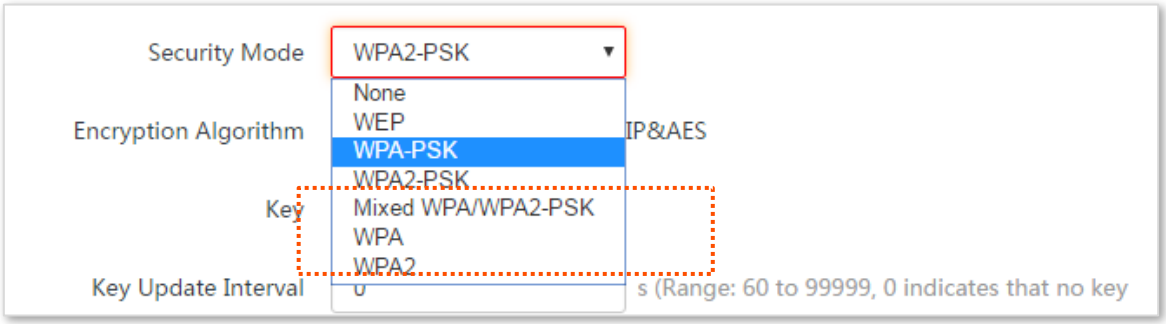


Parameters description

Name	Description
Authentication Type	It specifies the authentication type for the WEP security mode. The options include **Open** and **Shared**. The options share the same encryption process. • **Open**: It specifies that authentication is not required and data exchanged is encrypted using WEP. In this case, a wireless client can connect to the wireless network corresponding to the selected SSID without being authenticated, and the data exchanged between the client and the network is encrypted in WEP security mode. • **Shared**: It specifies that a shared key is used for authentication and data exchanged is encrypted using WEP. In this case, a wireless client must use a preset WEP key to connect to the wireless network corresponding to the selected SSID. The wireless client can be connected to the wireless network only if they use the same WEP key.
Default Key	It specifies the WEP key for the **Open** or **Shared** encryption type. For example, if Default Key is set to Security Key 2, a wireless client can connect to the wireless network corresponding to the selected SSID only with the password specified by Security Key 2.
Key 1/2/3/4	Enter WEP key. You can enter four keys, but only the key specified in the Default Key takes effect.

Name	Description
ASCII	It indicates that a key selected for the **Open** or **Shared** authentication type contains ASCII characters. 5 or 13 ASCII characters are allowed in the key.
Hex	It indicates that a key selected for the **Open** or **Shared** authentication type contains hexadecimal characters. 10 or 26 hexadecimal characters (range: 0-9, a-f, and A-F) are allowed in the key.

WPA-PSK, WPA2-PSK, and Mixed WPA/WPA2-PSK

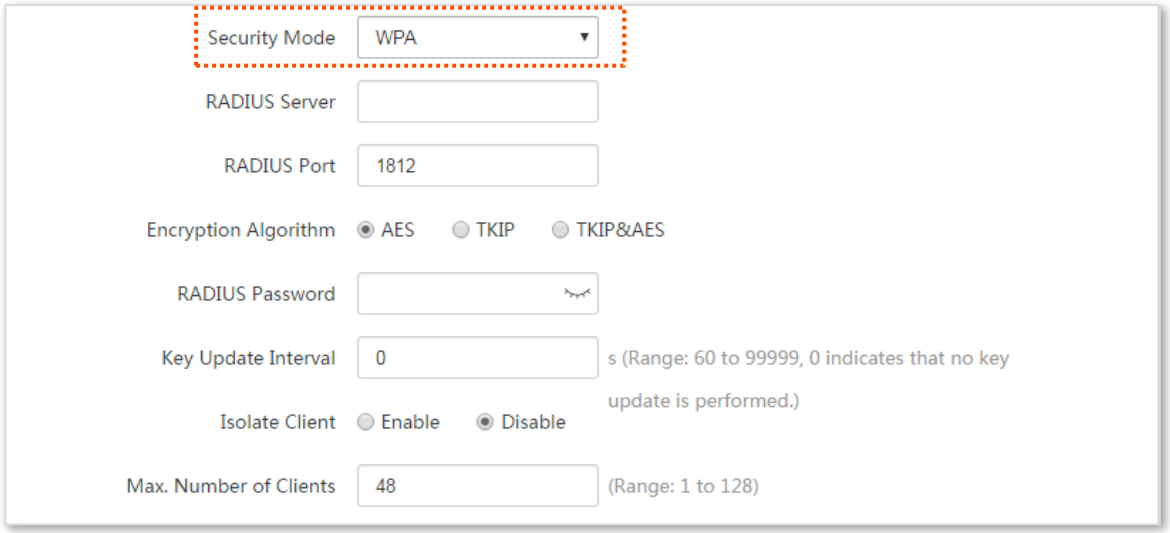


Parameters description

Name	Description
Security Mode	It indicates the personal or pre-shared key security mode, including WPA-PSK, WPA2-PSK, and Mixed WPA/WPA2-PSK. • **WPA-PSK**: It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA-PSK. • **WPA2-PSK**: It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA2-PSK. • **Mixed WPA/WPA2-PSK**: It indicates that wireless clients can connect to the wireless network corresponding to the selected SSID using either WPA-PSK or WPA2-PSK.
Encryption Algorithm	It specifies the encryption algorithm corresponding to the selected security mode. If Security Mode is set to WPA-PSK, this parameter has the AES and TKIP values. If Security Mode is set to WPA2-PSK or Mixed WPA/WPA2-PSK, this parameter has the AES, TKIP, and TKIP&AES values. • **AES**: It indicates the Advanced Encryption Standard. • **TKIP**: It indicates the Temporal Key Integrity Protocol. If TKIP is used, the maximum wireless throughput of the AP is limited to 54 Mbps. • **TKIP&AES**: It indicates that both TKIP and AES encryption algorithms are supported. Wireless clients can connect to the wireless network corresponding to the selected SSID using TKIP or AES.

Name	Description
Key	It specifies a pre-shared WPA key. A WPA key can contain 8 to 63 ASCII characters or 8 to 64 hexadecimal characters.
Key Update Interval	It specifies the automatic update interval of a WPA key for data encryption. A shorter interval results in higher data security. The value 0 indicates that a WAP key is not updated.

WPA and WPA2



Parameters description

Name	Description
Security Mode	The **WPA** and **WPA2** options are available for network protection with a RADIUS server. • **WPA**: It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA. • **WPA**: It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA.
RADIUS Server	It specifies the IP address of the RADIUS server for client authentication.
RADIUS Port	It specifies the port number of the RADIUS server for client authentication.
RADIUS Password	It specifies the shared password of the RADIUS server.
Encryption Algorithm	It specifies the encryption algorithm corresponding to the selected security mode. The available options include **AES**, **TKIP**, and **TKIP&AES**. • **AES**: It indicates the Advanced Encryption Standard. • **TKIP**: It indicates the Temporal Key Integrity Protocol. • **TKIP&AES**: It indicates that both TKIP and AES encryption algorithms are

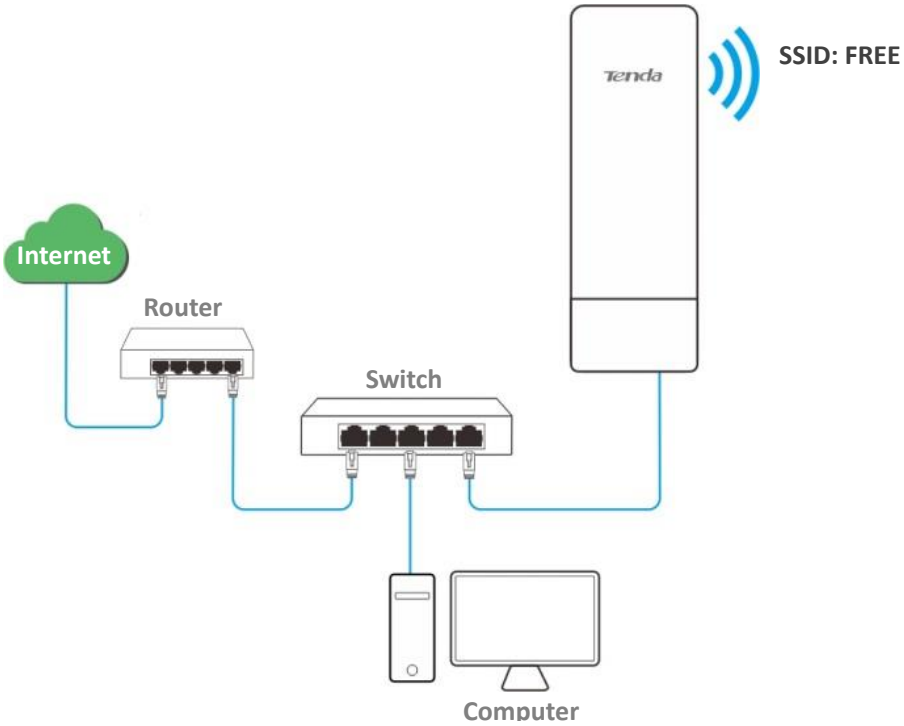
Name	Description
	supported. Wireless clients can connect to the wireless network corresponding to the selected SSID using TKIP or AES.
Key Update Interval	It specifies the automatic update interval of a WPA key for data encryption. A shorter interval results in higher data security. The value 0 indicates that a WAP key is not updated.

7.1.2 Set up a non-encrypted wireless network

Networking requirement

A residential community uses the CPE to deploy its network for video surveillance. It requires that the SSID is FREE and there is no WiFi password.

Network topology



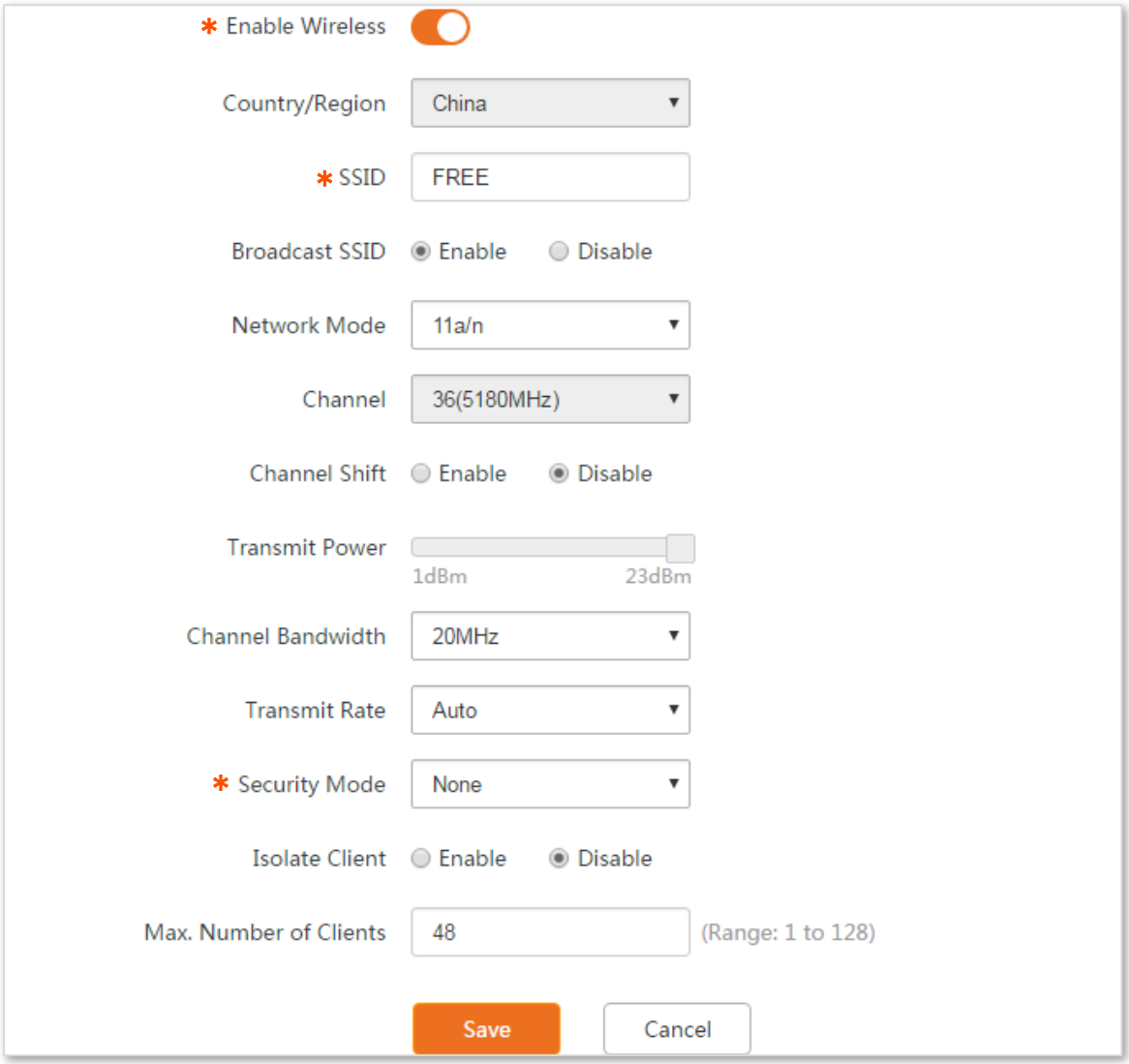
Configuration procedures

Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Wireless** > **Basic**.

Step 2 Change the value of the **SSID** text box to **FREE**.

Step 3 Set **Security Mode** to **None**.

Step 4 Click **Save**.



----End

Verification

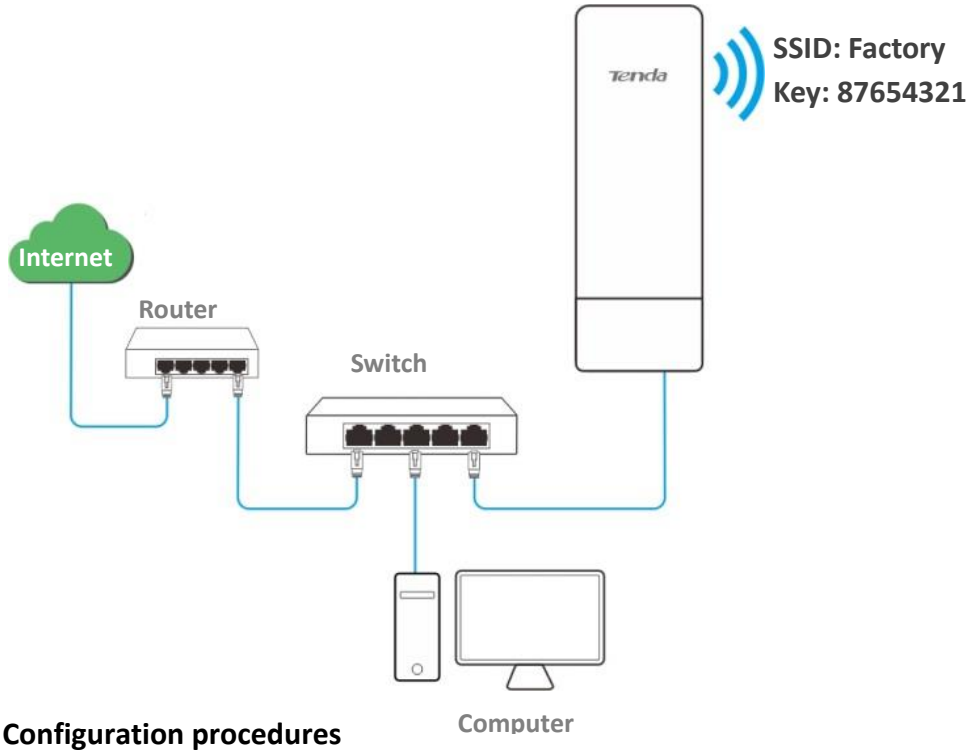
Wireless devices can connect to the wireless network whose SSID is FREE without a password.

7.1.3 Set up a wireless network encrypted using WPA2-PSK

Networking requirement

A factory uses CPEs to set up to set up a wireless network. It requires that the wireless network has a certain level of security. In this case, WPA2-PSK mode is recommended. See the following figure.

Network topology



Configuration procedures

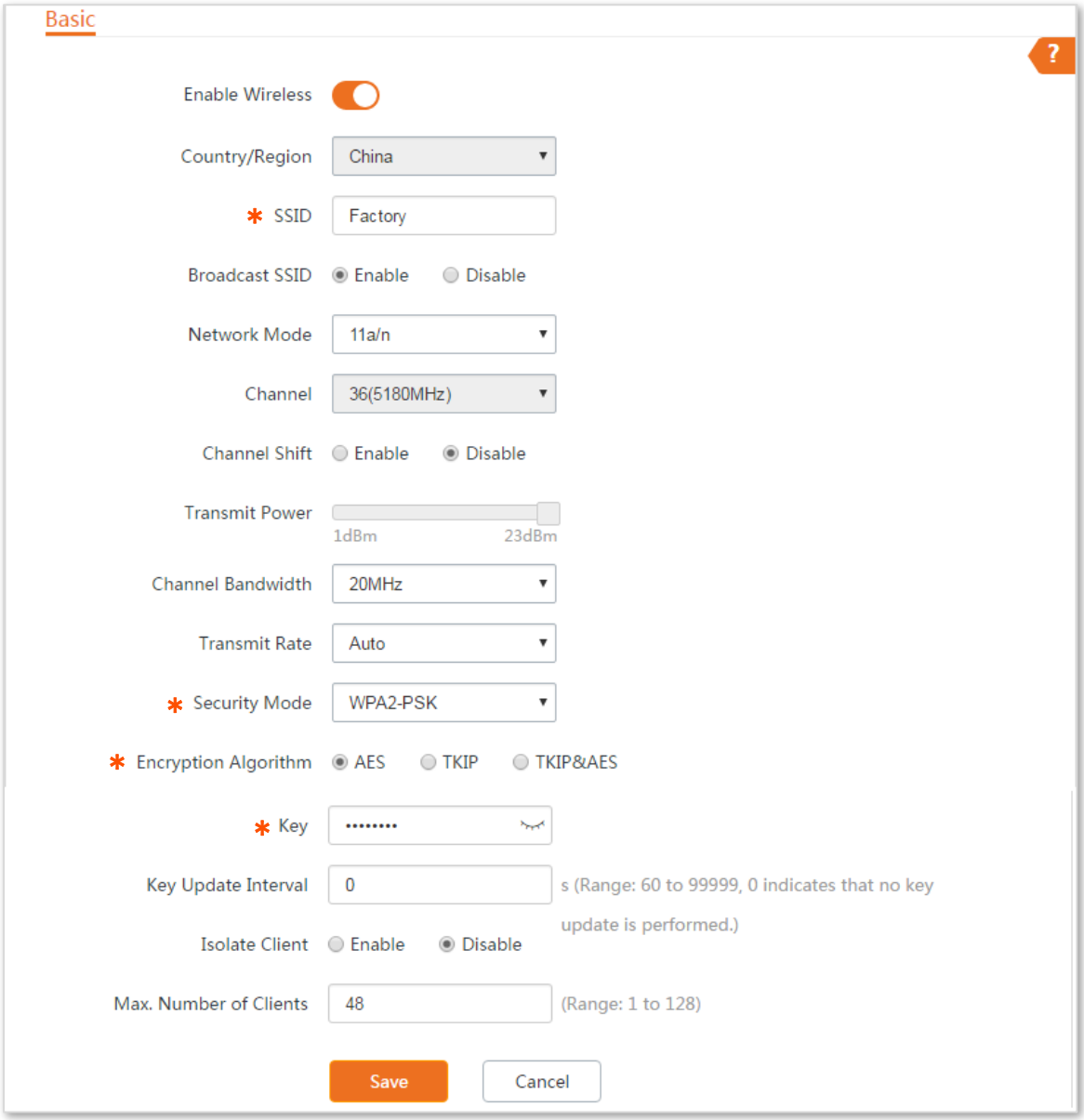
Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Wireless** > **Basic**.

Step 2 Change the value of the SSID text box to **Factory**.

Step 3 Set **Security Mode** to **WPA2-PSK** and **Encryption Algorithm** to **AES**.

Step 4 Set **Key** to **87654321**.

Step 5 Click **Save**.



----End

Verification

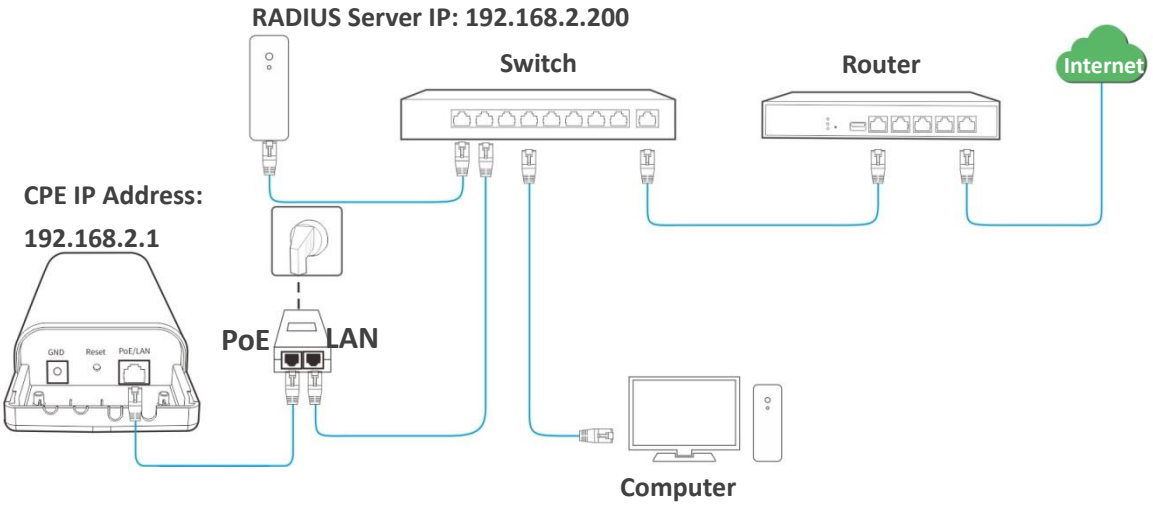
Wireless devices can connect to the wireless network named **Factory** with the password **87654321**.

7.1.4 Set up a wireless network encrypted using WPA or WPA2

Networking requirement

A highly secured wireless network is required and a RADIUS server is available. In this case, WPA or WPA2 mode is recommended. See the following figure.

Network topology



Configuration procedures

To configure the CPE:

Assume that:

The IP address of the RADIUS server is **192.168.2.200**, the Key is **12345678**, and the port number for authentication is **1812**.

The SSID of the CPE is hot_spot, security mode is WPA2, and the encryption algorithm is AES.

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Wireless** > **Basic**.

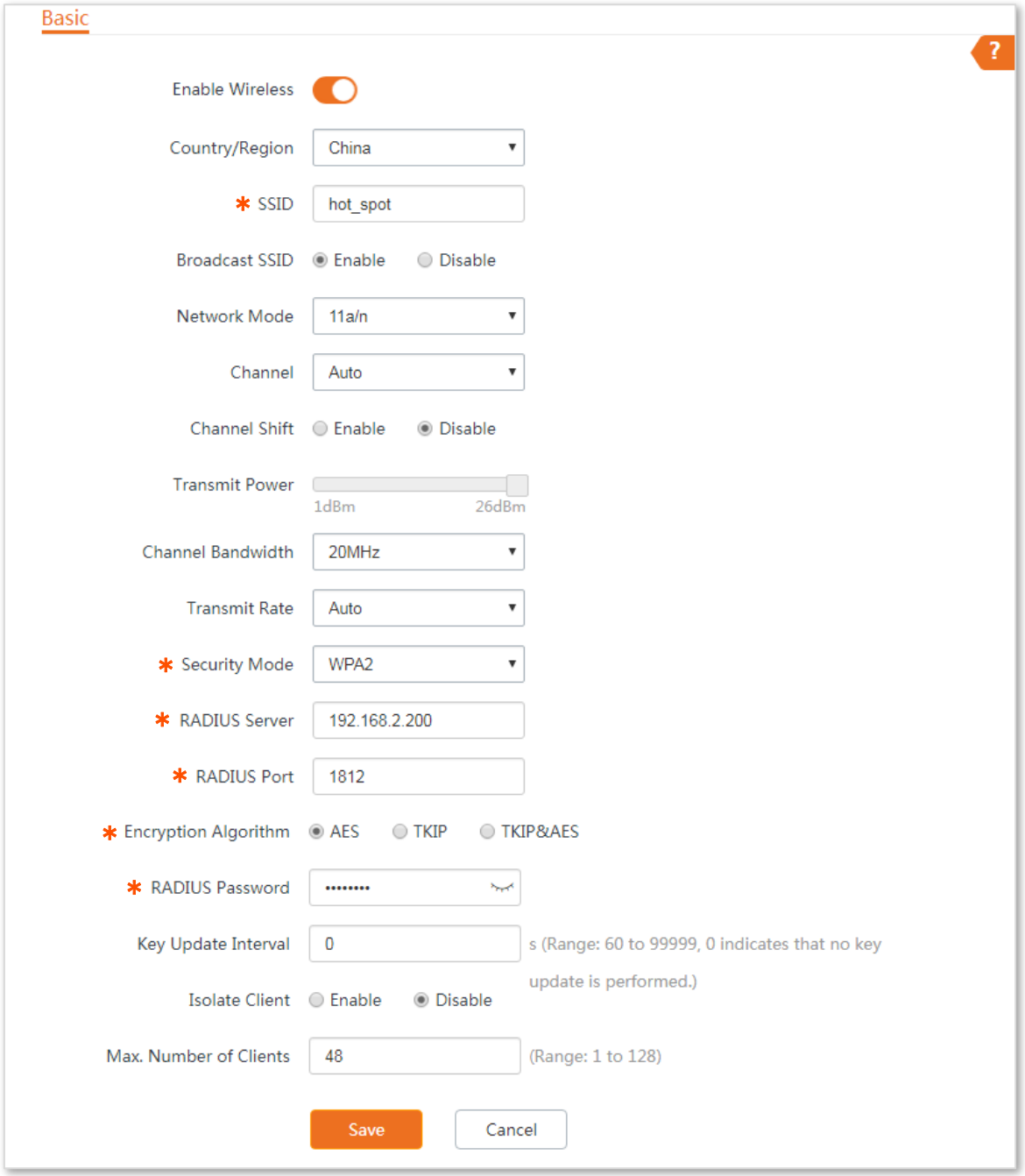
Step 2 Change the value of the SSID text box to **hot_spot**.

Step 3 Set **Security Mode** to **WPA2**.

Step 4 Set **RADIUS Server**, **RADIUS Port**, and **RADIUS Password** to **192.168.0.200**, **1812**, and **12345678** respectively.

Step 5 Set **Encryption Algorithm** to **AES**.

Step 6 Click **Save**.



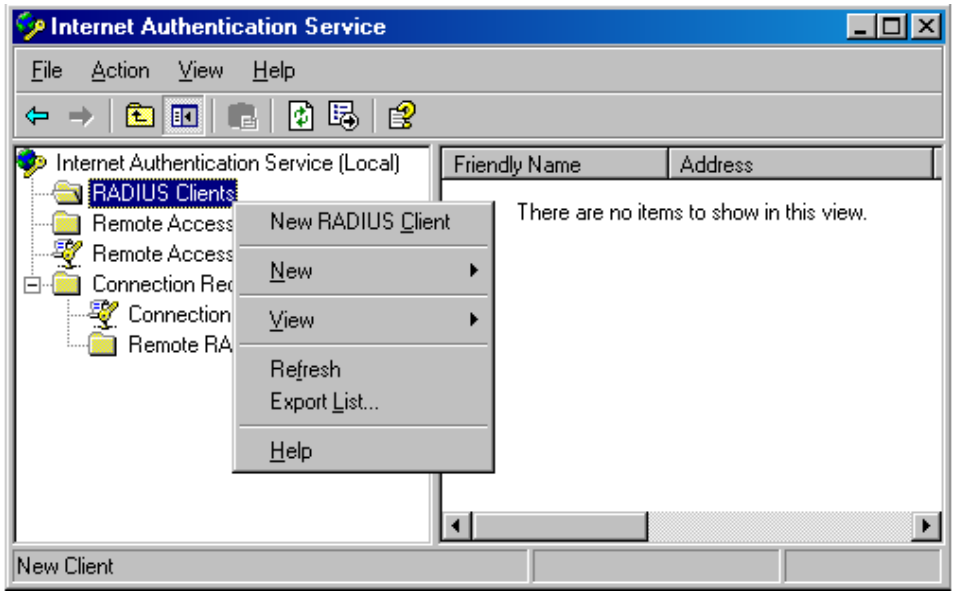
To configure the RADIUS server:

TIP

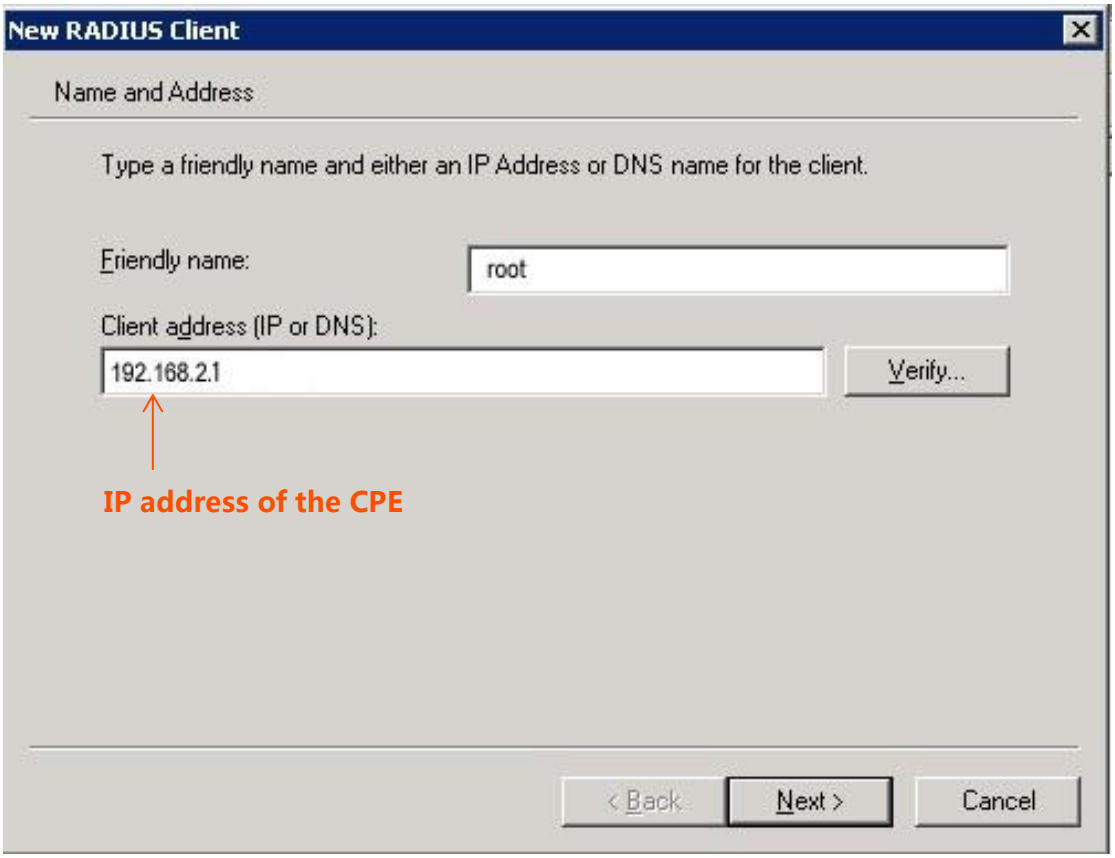
Windows 2003 is used as an example to describe how to configure the RADIUS server.

Step 1 Configure a RADIUS client.

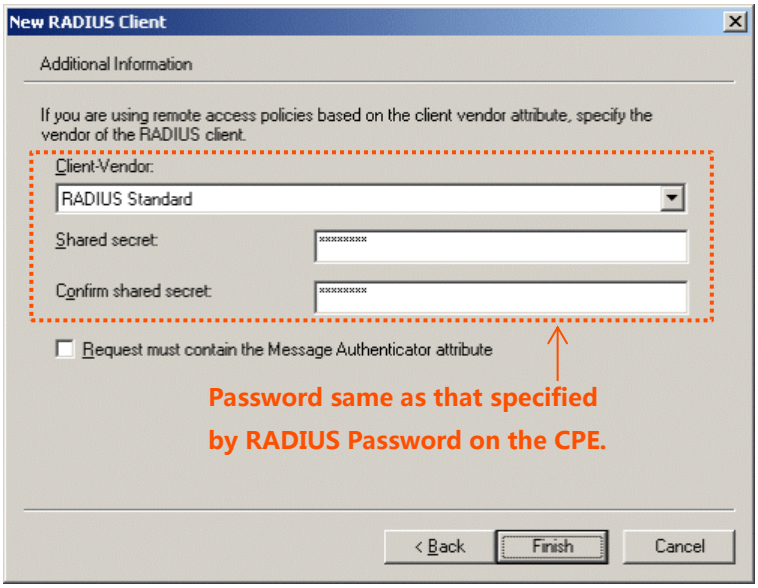
1. In the **Computer Management** dialog box, double-click **Internet Authentication Service**, right-click **RADIUS Clients**, and choose **New RADIUS Client**.



2. Enter a RADIUS client name (which can be the name of the CPE) and the IP address of the CPE, and click **Next**.

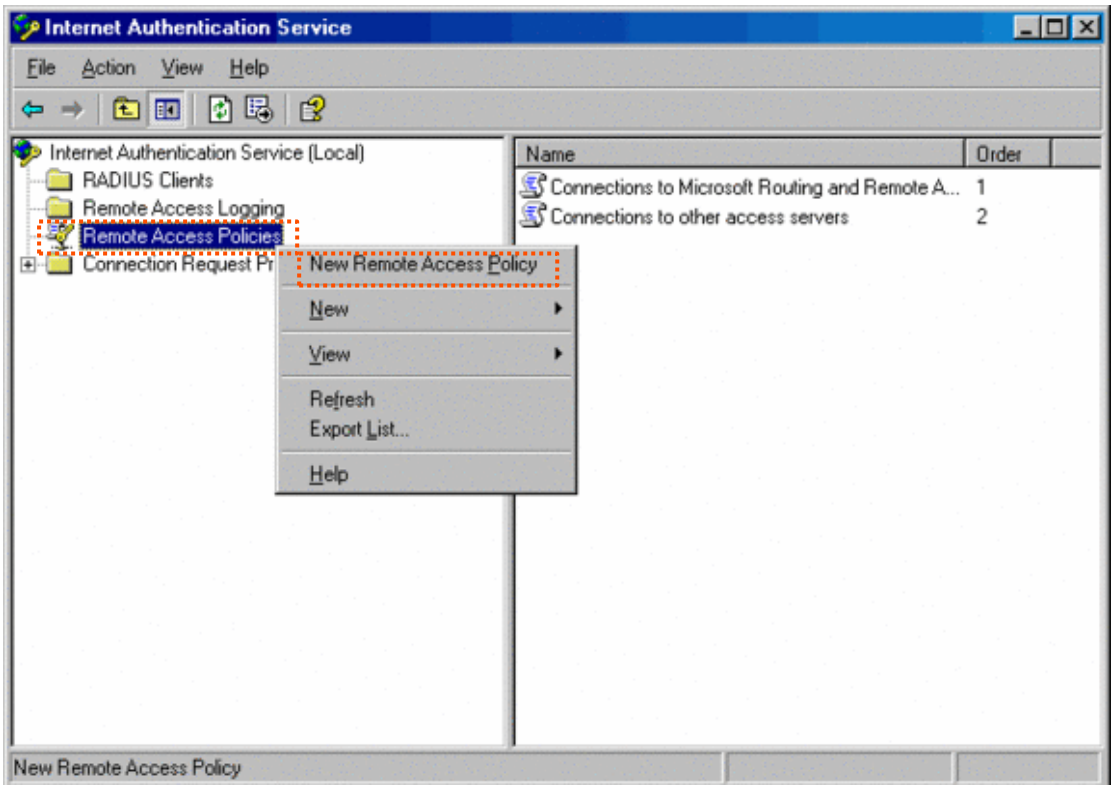


3. Enter **12345678** in the **Shared secret** and **Confirm shared secret** text boxes, and click **Finish**.

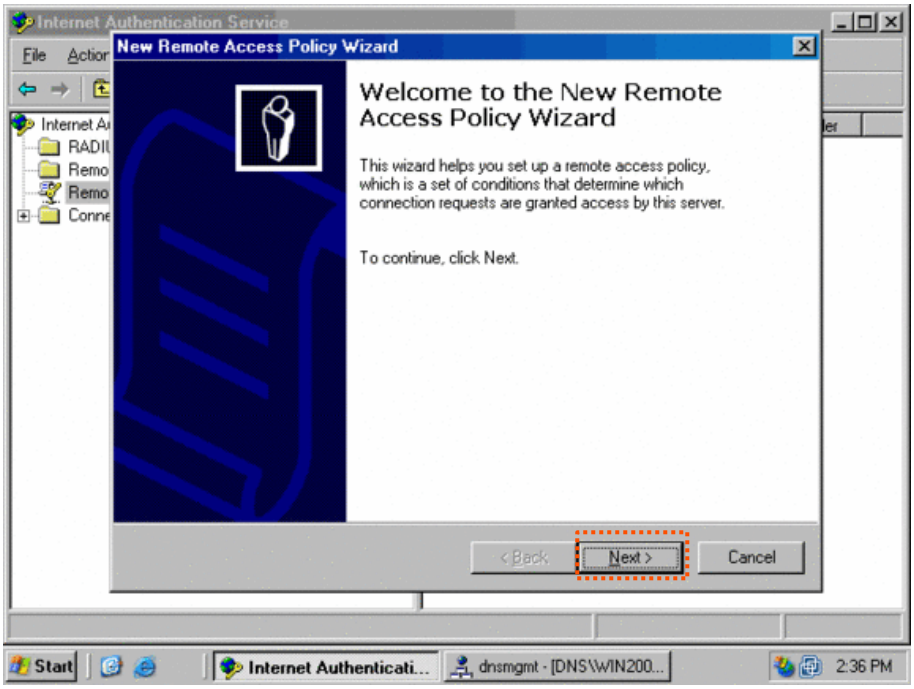


Step 2 Configure a remote access policy.

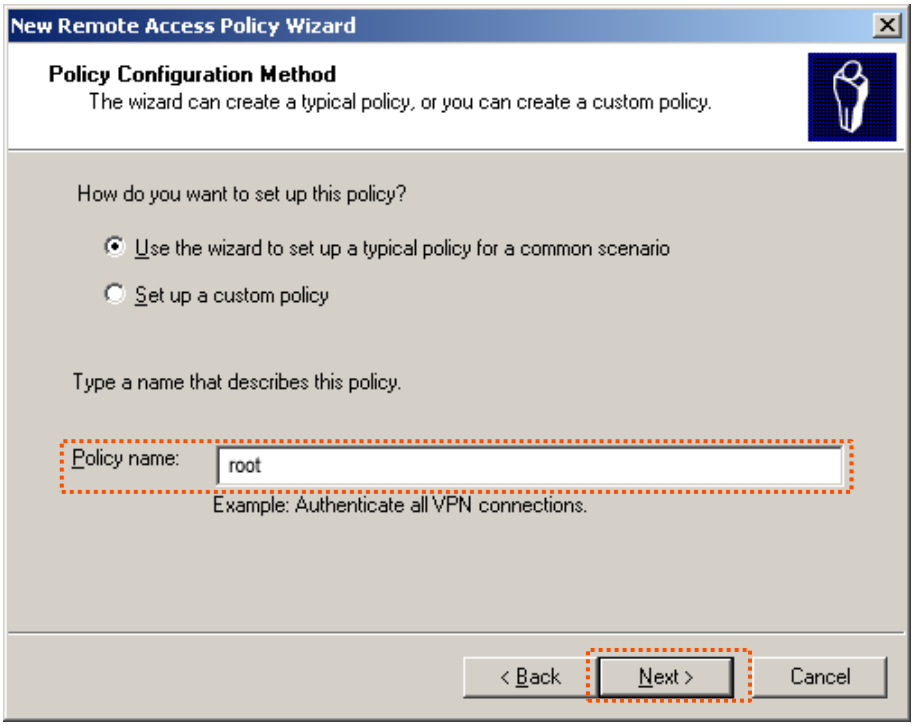
1. Right-click **Remote Access Policies** and choose **New Remote Access Policy**.



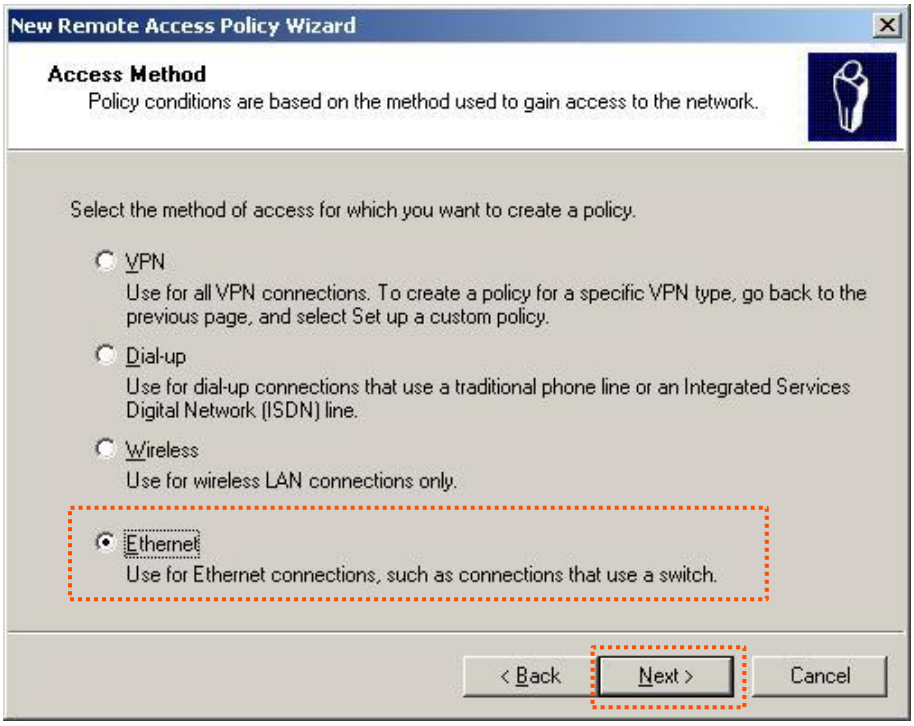
2. In the **New Remote Access Policy Wizard** dialog box that appears, click **Next**.



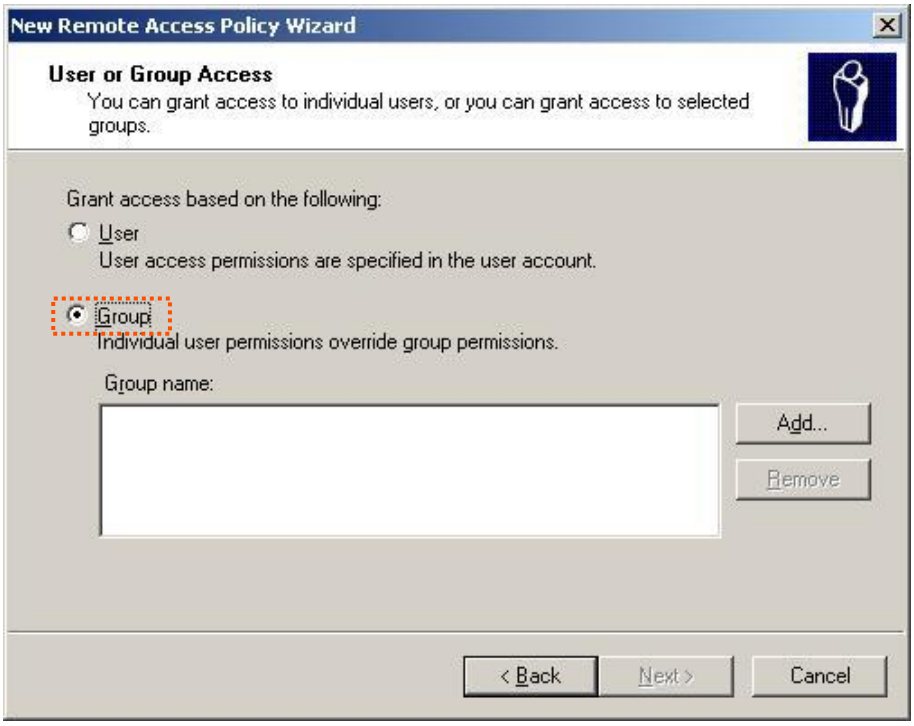
3. Enter a policy name and click **Next**.



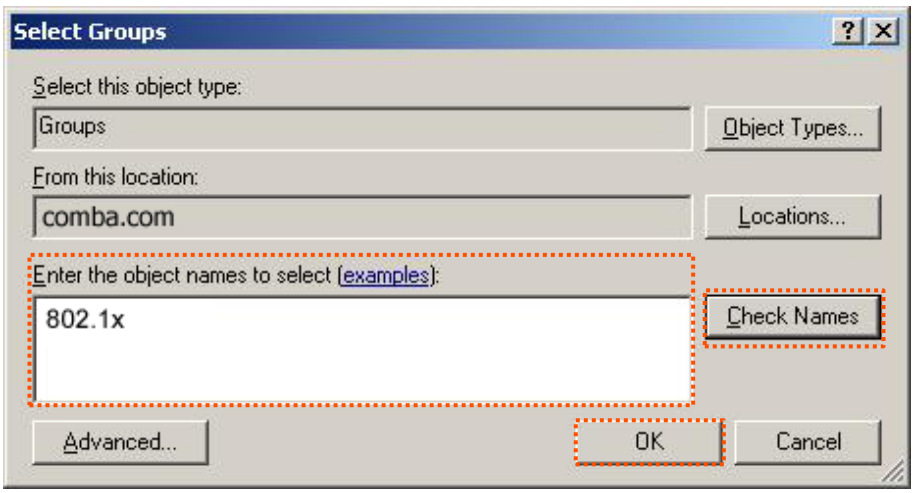
4. Select **Ethernet** and click **Next**.



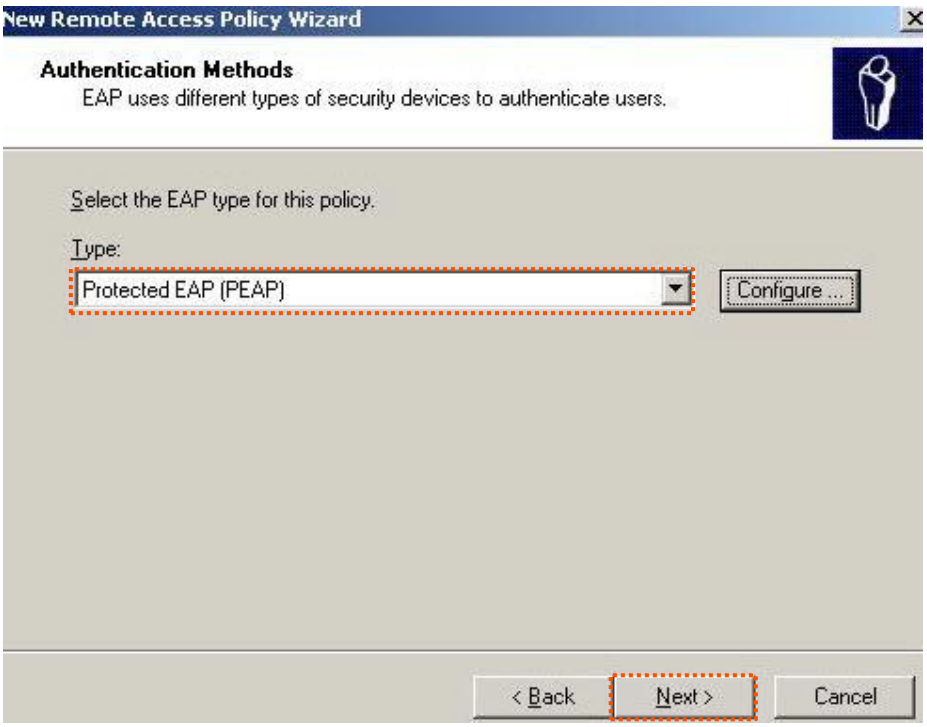
5. Select **Group** and click **Add**.



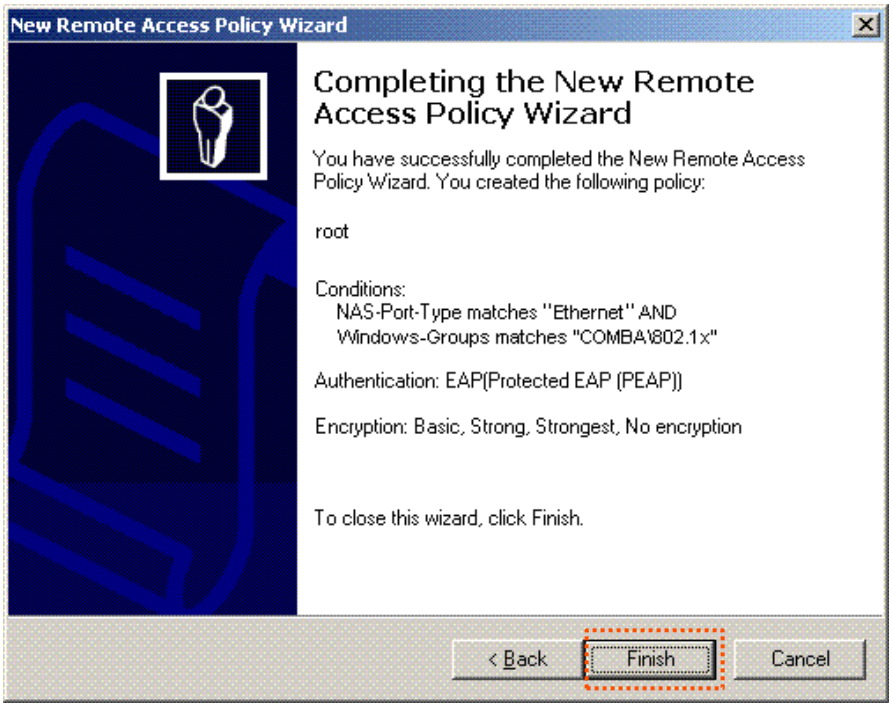
6. Enter **802.1x** in the **Enter the object names to select** text box, click **Check Names**, and click **OK**.



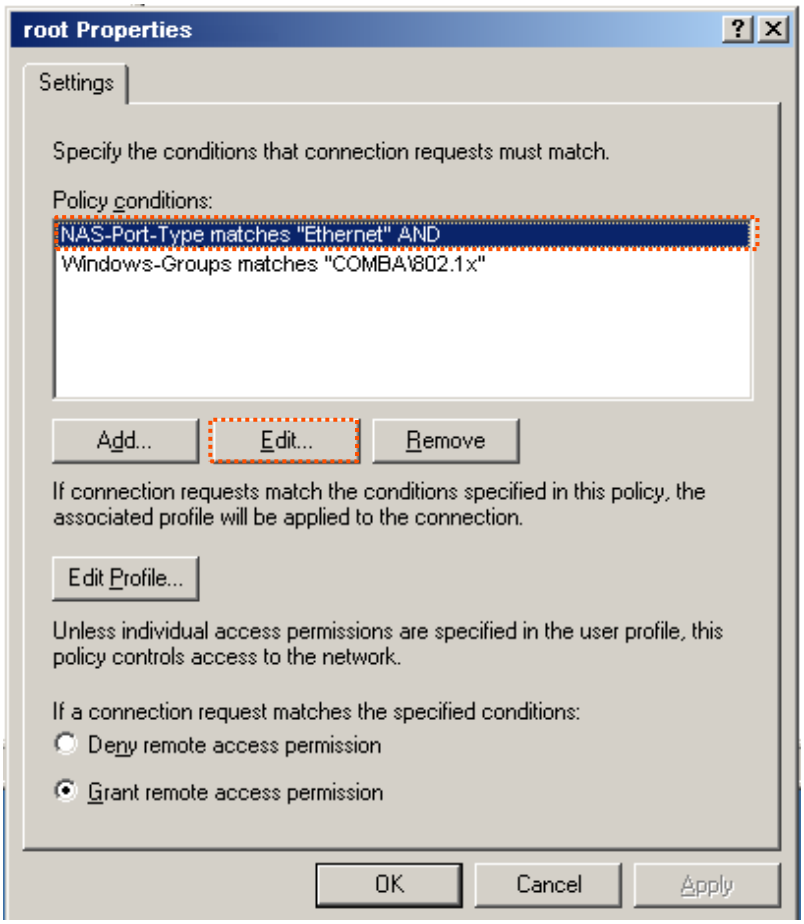
7. Select **Protected EAP (PEAP)** and click **Next**.



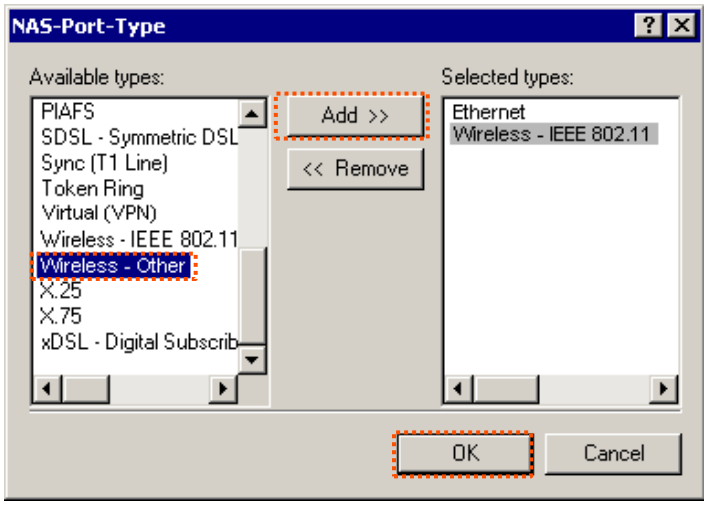
8. Click **Finish**. The remote access policy is created.



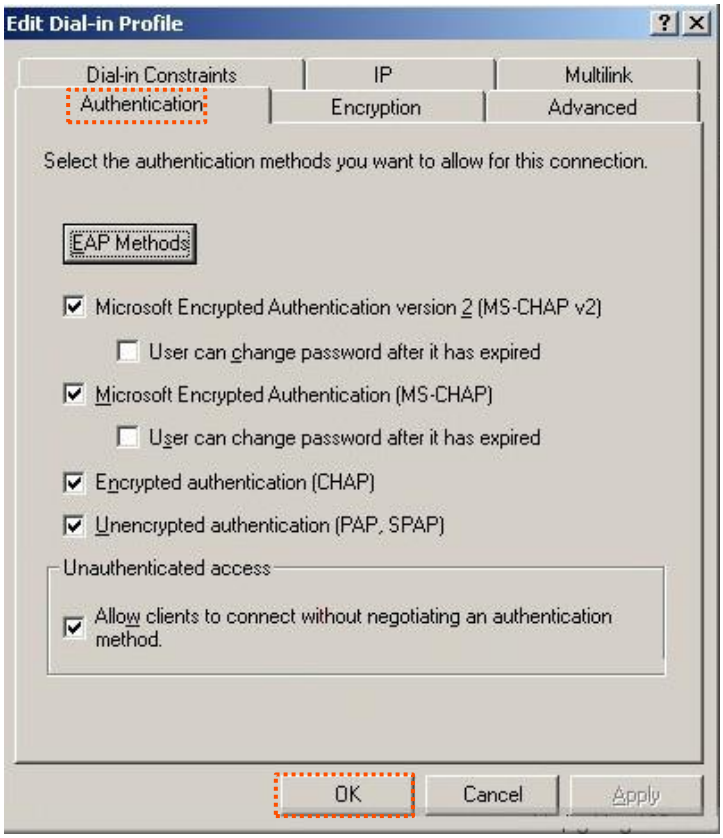
9. Right-click **root** and choose **Properties**. Select **Grant remote access permission**, select **NAS-Port-Type matches "Ethernet" AND**, and click **Edit**.



10. Select **Wireless – Other**, click **Add**, and click **OK**.



11. Click **Edit Profile**, click the **Authentication** tab, configure settings as shown in the following figure, and click **OK**.



12. When a message appears, click **No**.

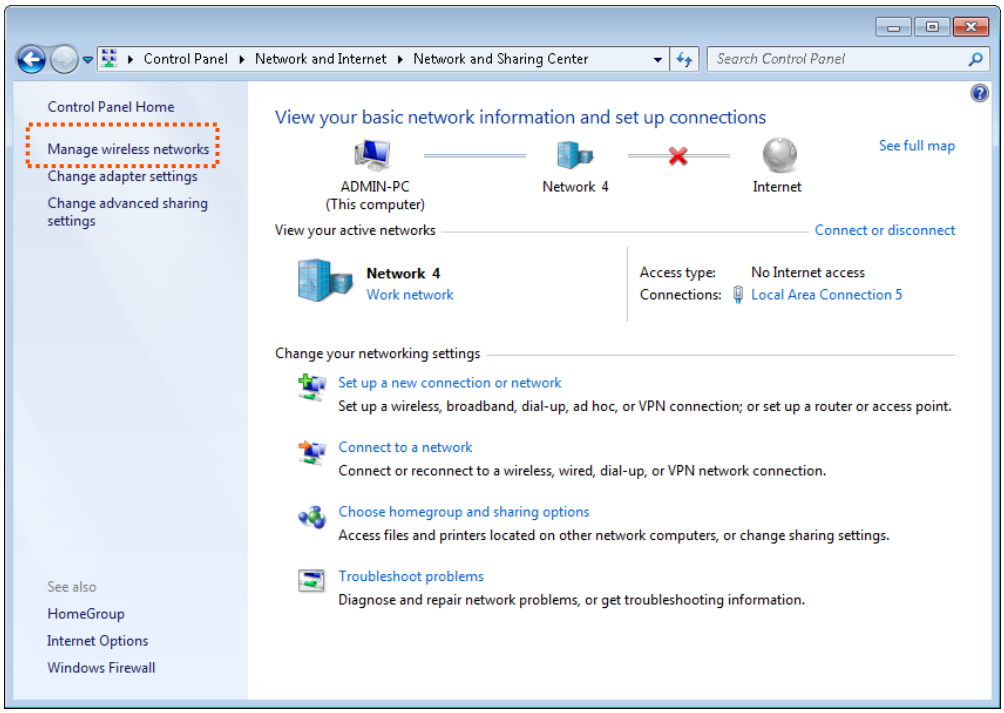
Step 3 Configure user information. Create a user and add the user to group **802.1x**.

To configure your wireless device:

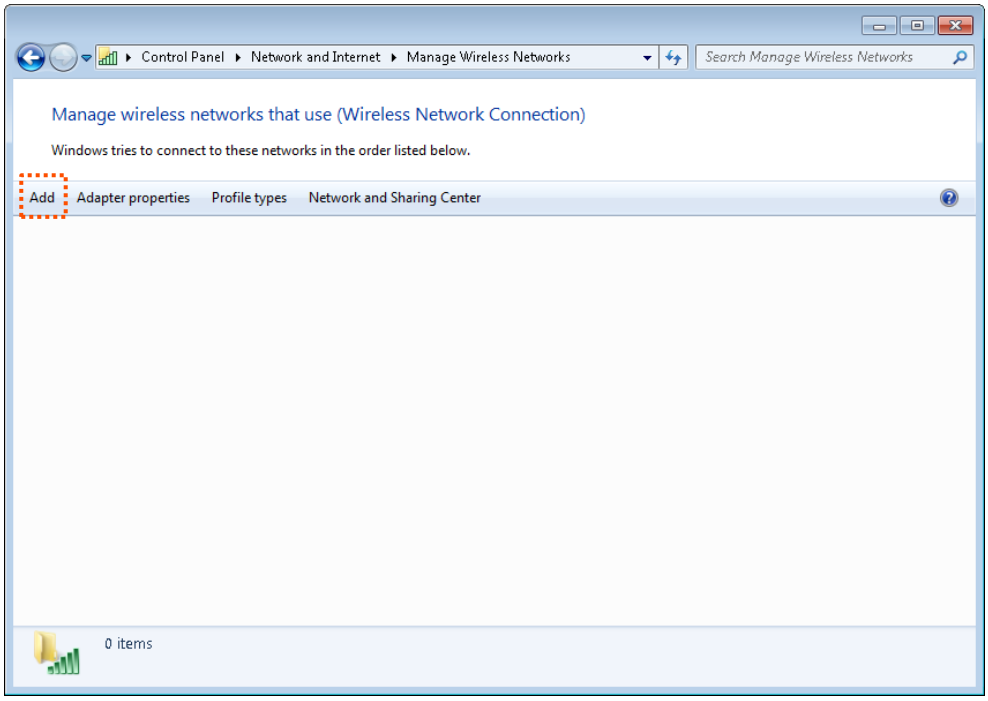
TIP

Windows 7 is taken as an example to describe the procedures.

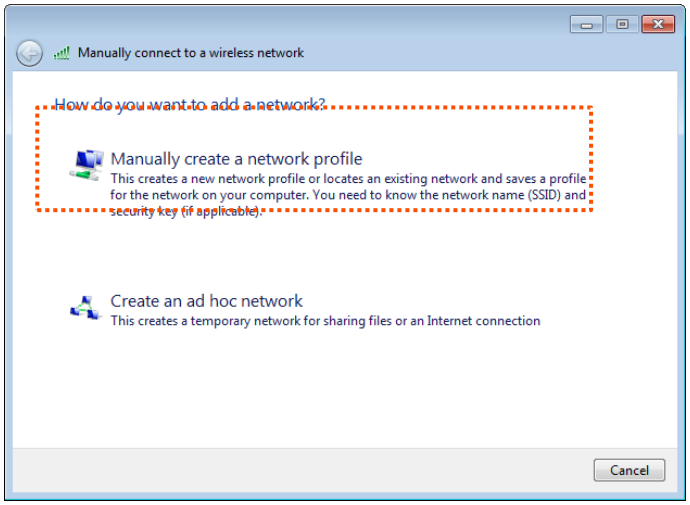
Step 1 Choose **Start** > **Control Panel**, click **Network and Internet**, click **Network and Sharing Center**, and click **Manage wireless networks**.



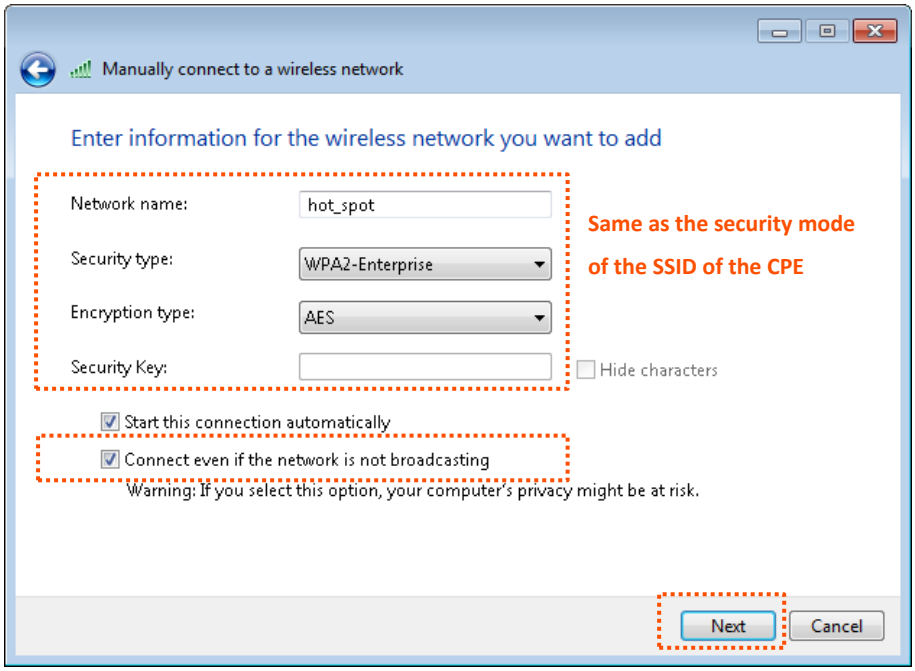
Step 2 Click **Add**.



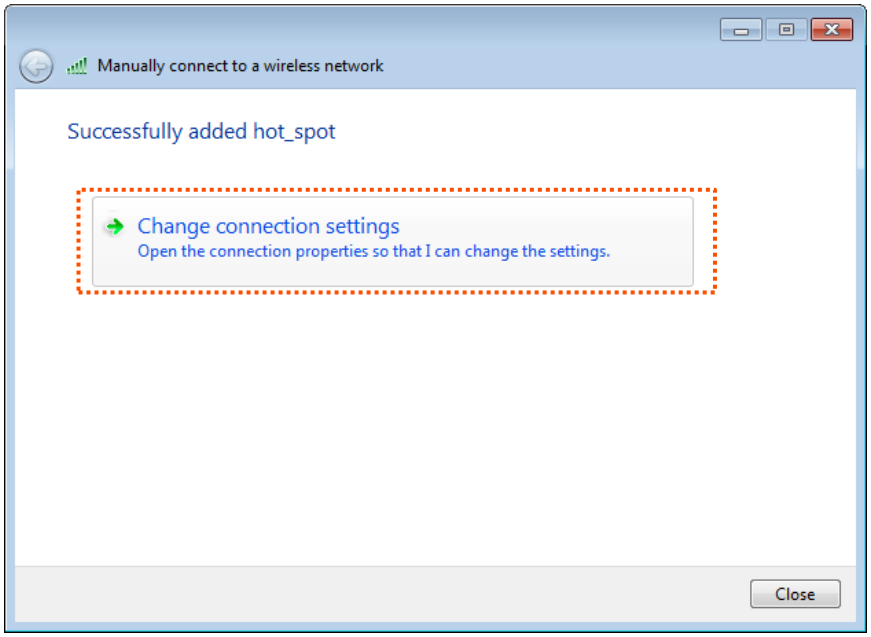
Step 3 Click **Manually create a network profile**.



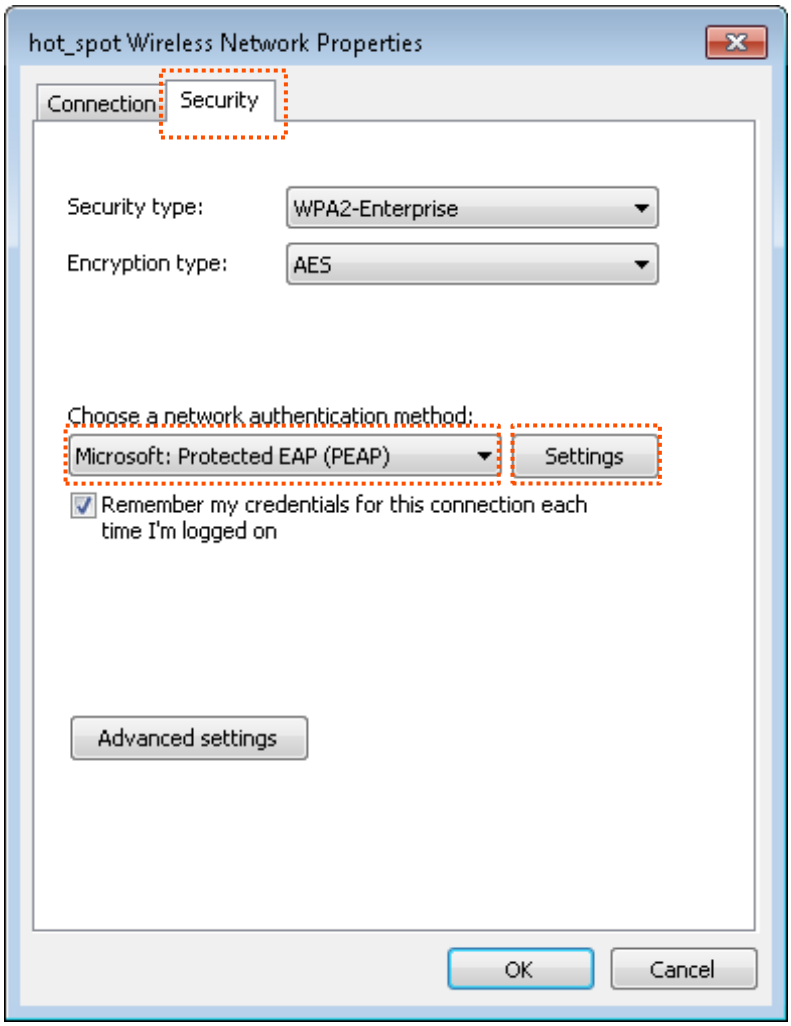
Step 4 Enter wireless network information, select **Connect even if the network is not broadcasting**, and click **Next**.



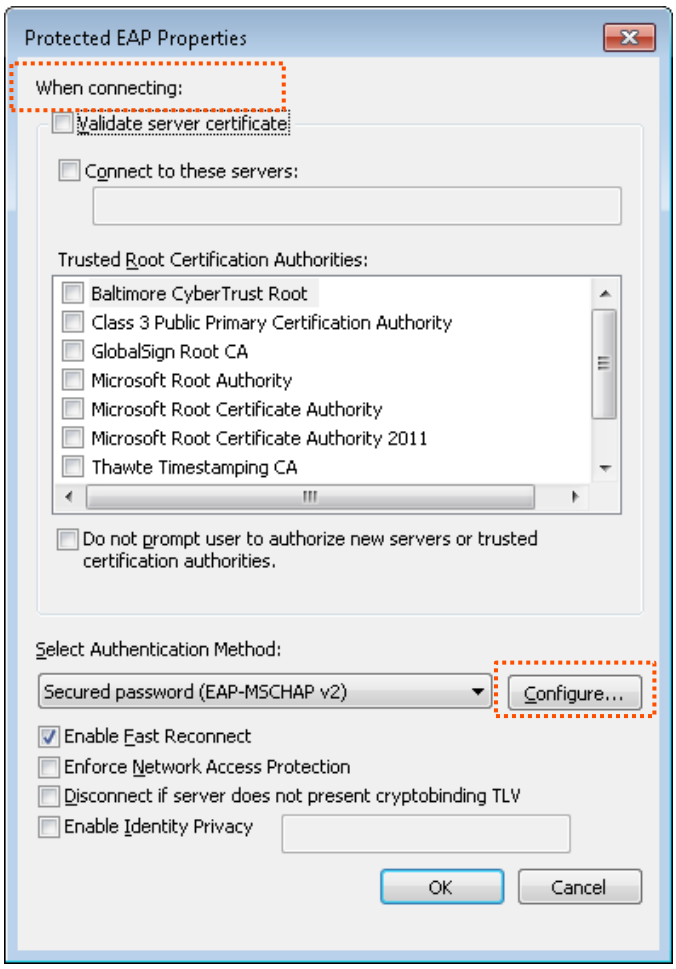
Step 5 Click **Change connection settings**.



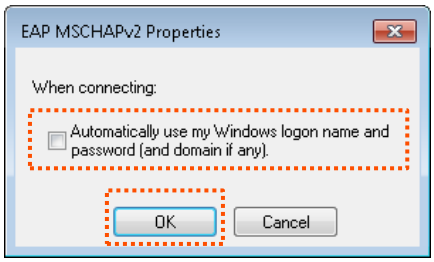
Step 6 Click the **Security** tab, select **Microsoft: Protected EAP (PEAP)**, and click **Settings**.



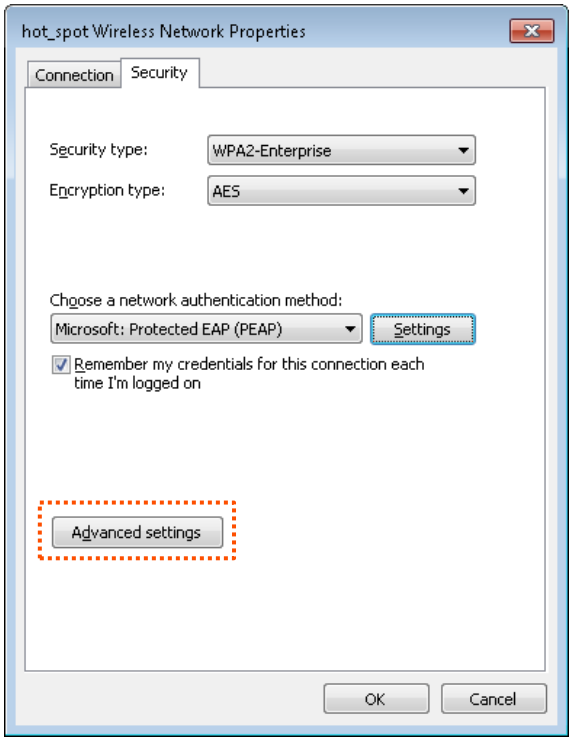
Step 7 Deselect **Validate server certificate** and click **Configure**.



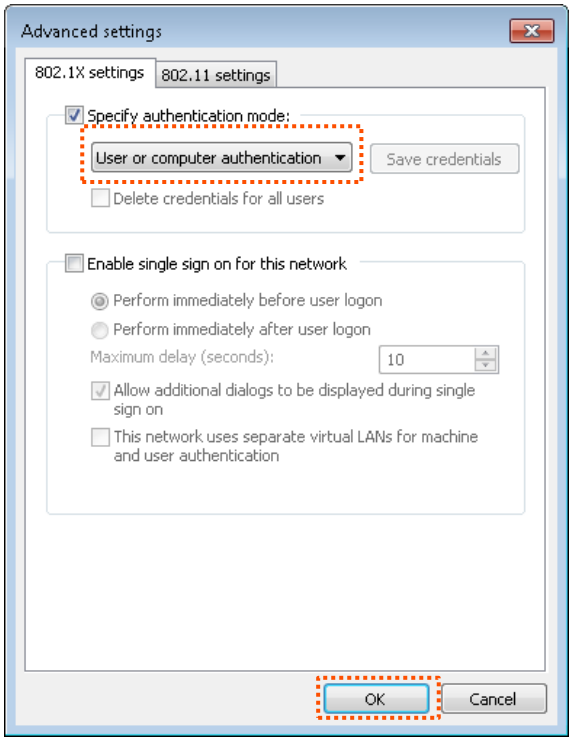
Step 8 Deselect **Automatically use my Windows logon name and password (and domain if any)** and click **OK**.



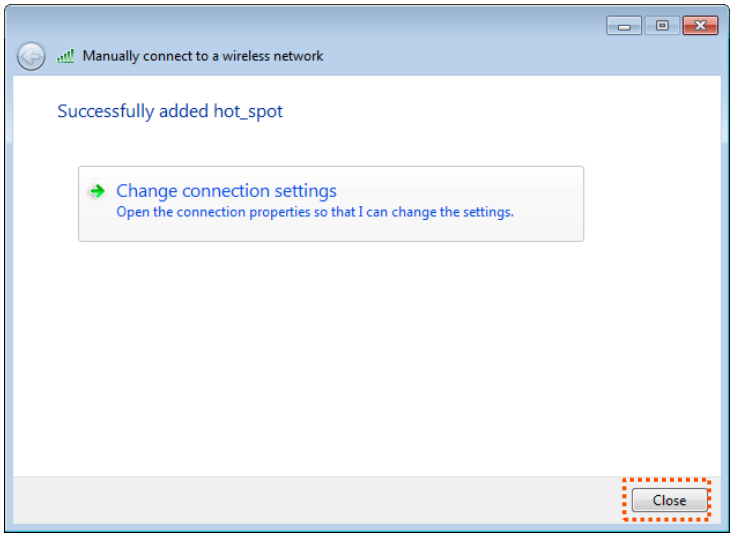
Step 9 Click **Advanced settings**.

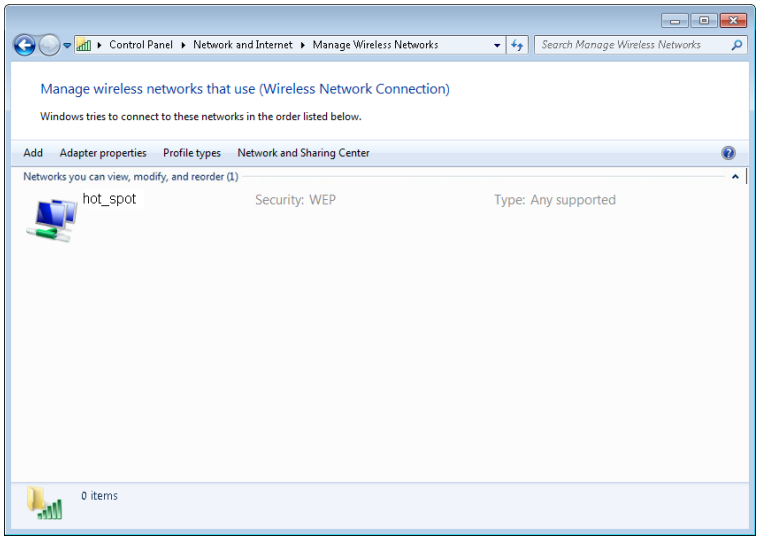


Step 10 Select **User or computer authentication** and click **OK**.

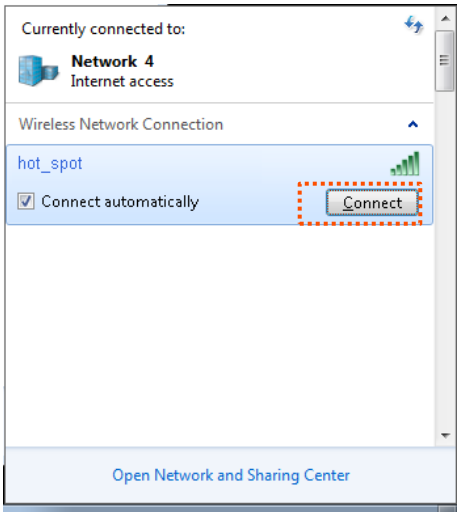


Step 11 Click **Close**.

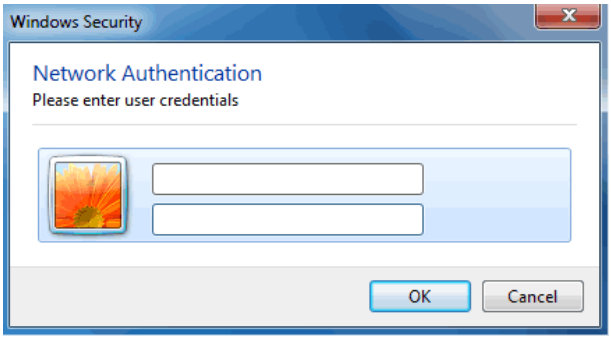




Step 12 Click the network icon in the lower-right corner of the desktop and choose the wireless network of the CPE such as **hot_spot** in this example.



Step 13 In the Windows Security dialog box that appears, enter the user name and password set on the RADIUS server and click **OK**.



----End

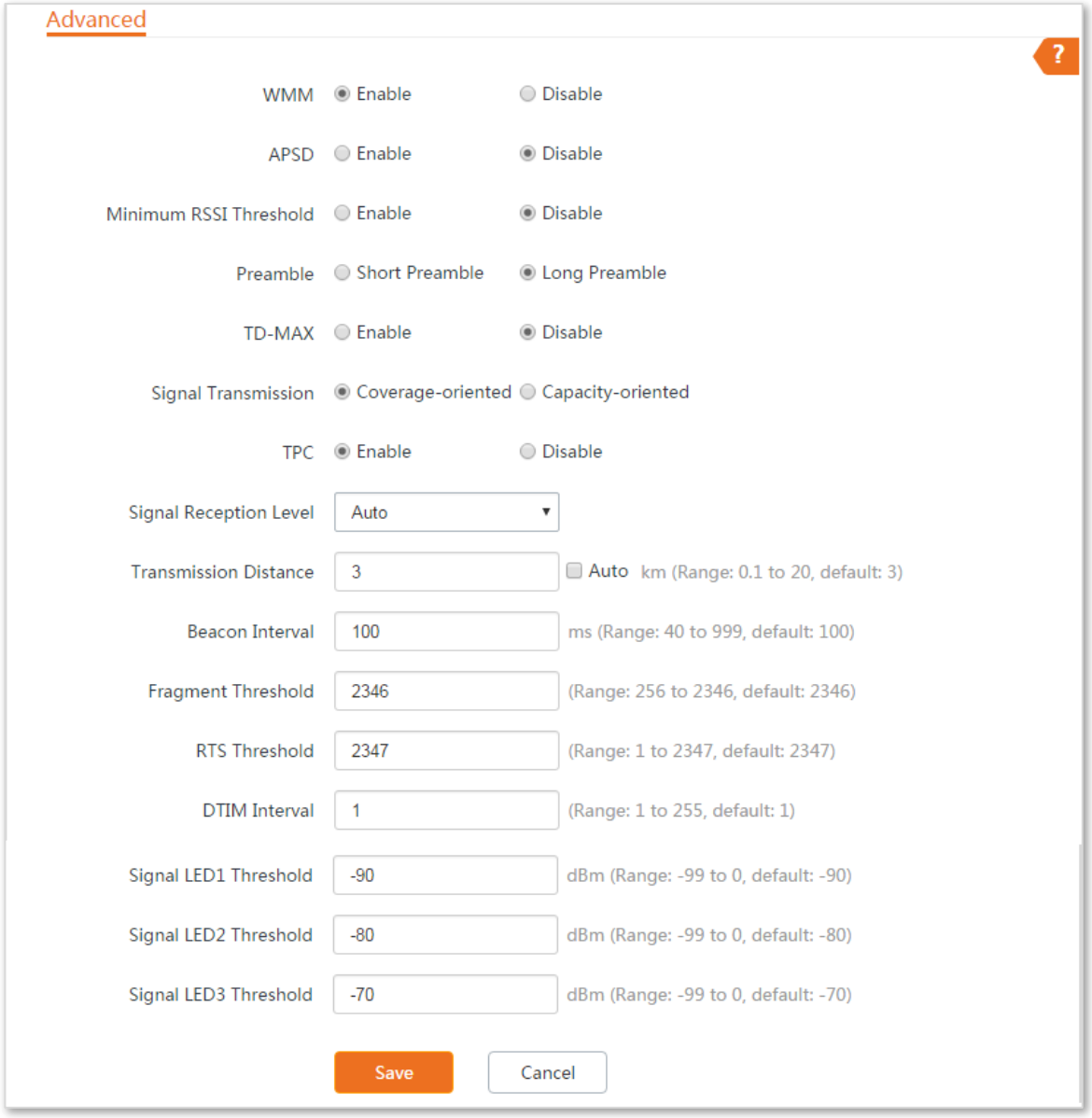
Verification

Wireless devices can connect to the wireless network **hot_spot**.

7.2 Advanced

This module enables you to adjust the wireless performance. You are recommended to configure it under the guide of a professional.

Choose **Wireless** > **Advanced** to enter the page.



Parameters description

Name	Description
WMM	WMM (Wi-Fi Multi-media) is a wireless QoS protocol making packets with higher priorities are transmitted earlier. This ensures better QoS of voice and video applications over wireless networks. You are recommended to configure the advanced setting instructed by professional.
APSD	It specifies whether to enable the Automatic Power Save Delivery (APSD) mode. APSD is a WMM power saving protocol created by Wi-Fi Alliance. Enabling APSD helps reduce power consumption. By default, this mode is disabled.
Minimum RSSI Threshold	It specifies the minimum strength of received signals acceptable to this device. If the strength of the signals transmitted by a wireless device is weaker than this threshold, the wireless device cannot connect to this device. If there are multiple devices in a network, setting a proper value helps wireless devices connect to WiFi network with better WiFi signal.
Preamble	It specifies a group of bits located at the beginning of a packet to enable a receiver of the packet to perform synchronization and prepare for receiving data. By default, the Long Preamble option is selected for compatibility with old network adapters installed on wireless clients. To achieve better synchronization performance of networks, you can select the Short Preamble option.
TD-MAX	TD-MAX is Tenda's proprietary Time Division Multiple Access (TDMA) polling technology. It allows multiple clients to share the same channel for accessing to a network. With the TD-MAX enabled, the CPE assigns time slots to each client, and transmits data according to the assigned time slots, achieving Point-to-MultiPoint (P2MP) connections. After the TD-MAX is enabled, the CPE: • Avoids the “hidden node” problem, which occurs when a node is visible from a wireless AP, but not from other nodes communicating with the originating AP. • Reduces latency. • Improves throughput and anti-interference performance. Improves overall performance in Point-to-MultiPoint (PtMP) installations, and increases the maximum possible number of users that can associate with an AP that uses TD-MAX. NOTE If TD-MAX is enabled, the device operates in TD-MAX mode and only accepts connections from TD-MAX devices. And you cannot connect standard Wi-Fi devices, such as laptops, tablets, or smart phones, to the CPE.
Signal Transmission	It specifies the wall penetrating capability of the device. • **Coverage-oriented**: With less interference nearby, this mode enables the device to cover wider area. • **Capacity-oriented**: With strong interference nearby, this mode improves the device’s anti-interference capability.

Name	Description
TPC	The Transmit Power Control (TPC) function decreases the TX power of this device automatically to improve the negotiation rate when the two devices are too close By default, when the received signal strength is greater than -25 dBm, the device decreases its TX power. The received signal strength can be checked on the **Status** > **Wireless Status** page.
Signal Reception Level	It is used to adjust the signal reception level. A higher level leads to better signal reception capability, but lower throughput. Adjust the level based on your actual situation.
Transmission Distance	It specifies the wireless transmission distance of this device. You can set it based on the actual installation distance.
Beacon Interval	It specifies the interval at which this device sends Beacon frames. Beacon frames are sent at the interval to announce the existence of a wireless network. Generally, a smaller interval allows wireless clients to connect to this device sooner, while a larger interval allows the wireless network to transmit data quicker.
Fragment Threshold	It specifies the threshold of a fragment. The unit is byte. Fragmenting is a process that divides a frame into several fragments, which are transmitted and acknowledged separately. If the size of a frame exceeds this threshold, the frame is fragmented. In case of a high error rate, you can reduce the threshold to enable this device to resend only the fragments that have not been sent successfully, so as to increase the frame throughput. In an environment with little interference, you can increase the threshold to reduce the number of frames, so as to increase the frame throughput.
RTS Threshold	It specifies the frame length threshold for triggering the RTS/CTS mechanism. If a frame exceeds this threshold, the RTS/CTS mechanism is triggered to reduce conflicts. The unit is byte. Set the RTS threshold based on the actual situation. An excessively small value increases the RTS frame transmission frequency and bandwidth requirement. A higher RTS frame transmission frequency enables a wireless network to recover from conflicts quicker. For a wireless network with high user density, you can reduce this threshold for reducing conflicts. The RTS mechanism requires some network bandwidth. Therefore, it is triggered only when frames exceed this threshold.
DTIM Interval	It specifies the countdown before this device transmits broadcast and multicast frames in its cache. The unit is Beacon interval. For example, if DTIM Interval is set to 1, this device transmits all cached frames at one Beacon interval.
Signal LED1/2/3 Threshold	The device uses three signal LED indicators to indicate the received signal strength in an intuitive way, and allows you to customize the threshold for triggering each signal LED indicator to light up. The default threshold for LED1, LED2, and LED3 are **-90**, **-80**, and **-70** respectively.

7.3 Access control

7.3.1 Overview

The Access control function enables you to allow or disallow the wireless devices to access the wireless network based on their MAC addresses. The device supports the following MAC address filter rules:

- **Disallow**: It indicates that only the wireless devices with the specified MAC addresses cannot access the wireless networks of the device.
- **Allow**: It indicates that only the wireless devices with the specified MAC addresses can access the wireless networks of the device.

7.3.2 Configure access control

Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Wireless** > **Access Control**.

Step 2 Enable the **Access Control** function.

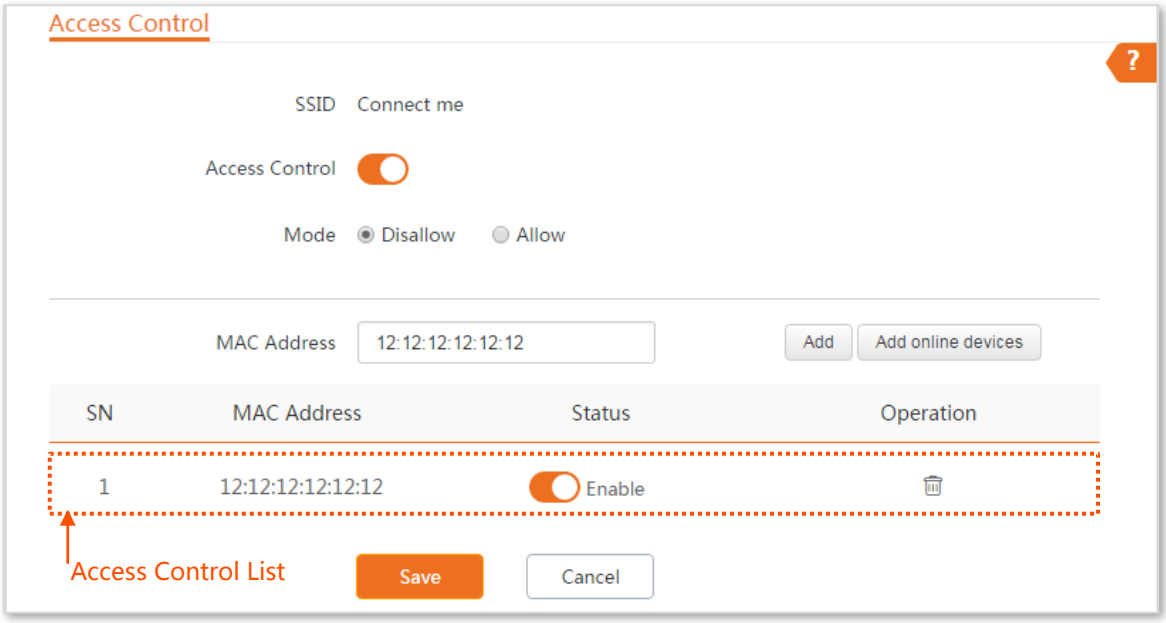
Step 3 Select a MAC address filter mode, **Disallow** or **Allow**.

Step 4 Enter the MAC addresses and click **Add**.

TIP

If the wireless devices to be controlled are connected to the CPE, click **Add online devices** to add them to the access control list quickly.

Step 5 Click **Save**.



----End

Parameters description

Name	Description
SSID	It specifies the SSID of this device. With the rule enabled, clients connected to the network with this SSID will be controlled by the rule.
Access Control	It specifies whether to enable the Access Control function.
Mode	It specifies the mode for filtering MAC addresses. • **Allow**: It indicates that only the wireless clients on the access control list can connect to the WiFi network of the device. • **Disallow**: It indicates that only the wireless clients on the access control list cannot connect to the WiFi network of the device.

7.3.3 Example of configuring access control

Networking requirement

A wireless network whose SSID is **Connect me** has been set up in a residential community. Only the community members are allowed to connect to the wireless network.

The Access Control function of the CPE is recommended. Assume that the users have three wireless devices whose MAC addresses are C8:3A:35:00:00:01, C8:3A:35:00:00:02, and C8:3A:35:00:00:03.

Configuration procedures

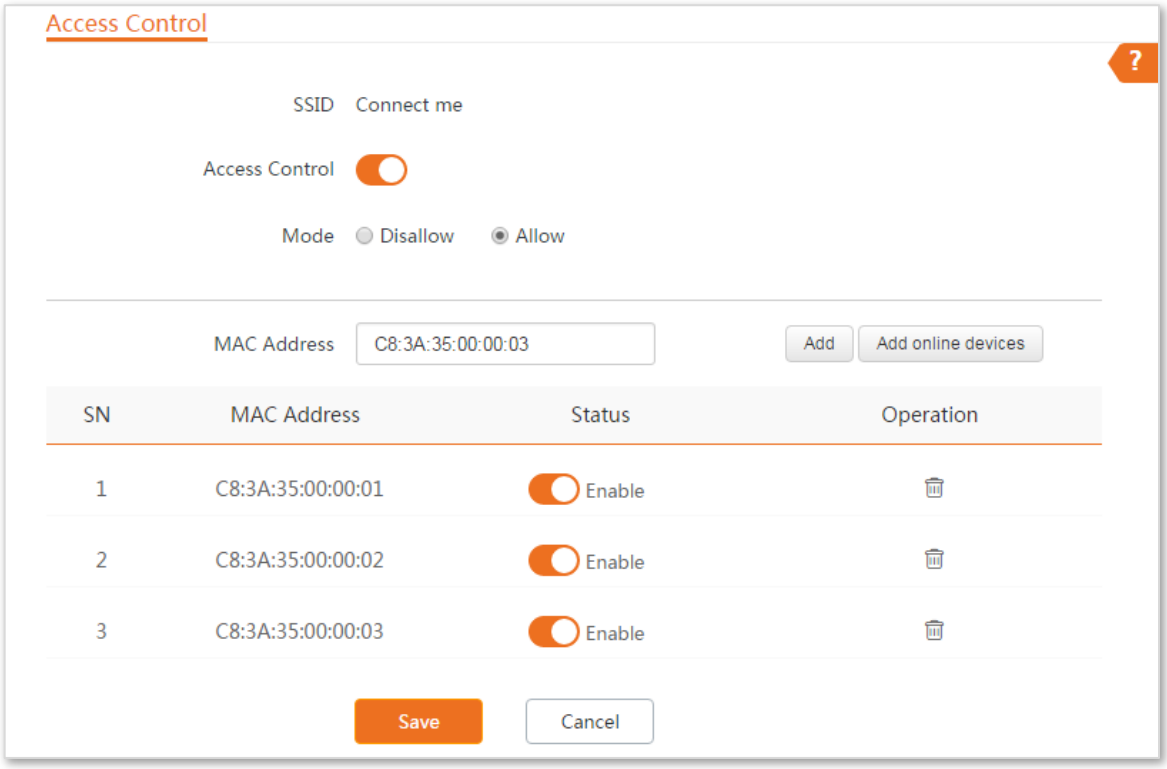
Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Wireless** > **Access Control**, and enable the **Access Control** function.

Step 2 Set the **Mode** to **Allow**.

Step 3 Enter the MAC address, which is **C8:3A:35:00:00:01** is this example, and click **Add**.

Step 4 Perform **Step 3** to add the other two MAC addresses.

Step 5 Click **Save**.



----End

Verification

Only above-mentioned wireless devices can connect to the WiFi network of the device.

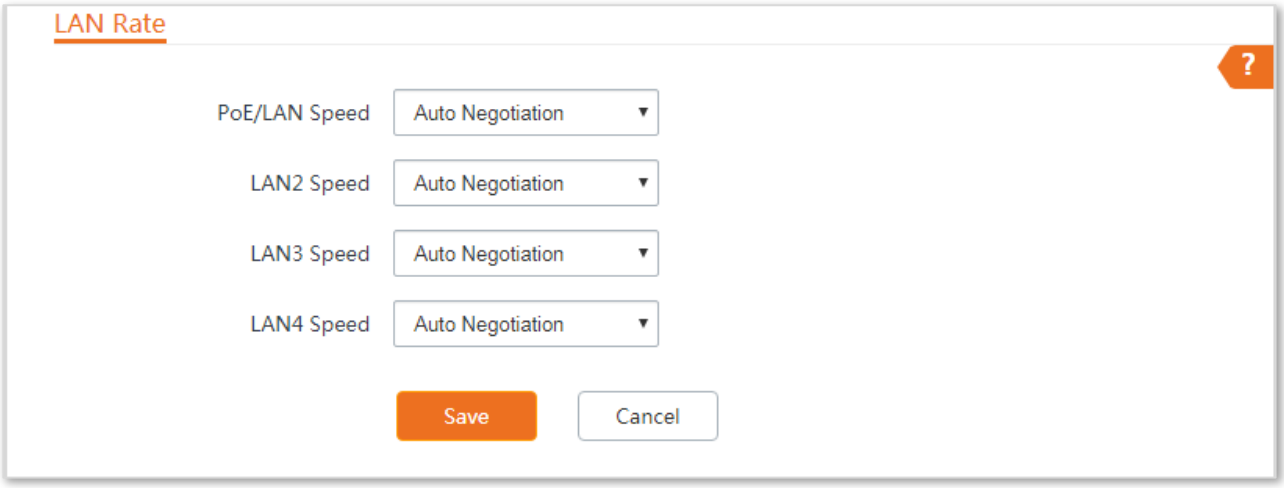
8 Advanced

8.1 LAN rate

This module enables you to change LAN speed and duplex mode settings. If the transmission distance between the ports of the CPE and peer device is too long, you can reduce the port speed of the CPE and peer device to increase the driving distance.

When you change the settings, ensure that the LAN speed and duplex mode of the port of the device is the same as that of peer device. By default, the LAN speed settings of the LAN port is **Auto Negotiation**. OS3 is used for illustration.

To access the page, choose **Advanced** > **LAN Rate**.



Parameters description

Name	Description
Auto Negotiation	The speed and duplex mode of the port is determined by the negotiation between the port and peer port.
100Mbps Full-Duplex	The port is under 100 Mbps, and can transmit and receive packets at the same time.
100Mbps Half-Duplex	The port is under 100 Mbps, and can only transmit or receive packets at the same time.
10Mbps Full-Duplex	The port is under 10 Mbps, and can transmit and receive packets at the same time.
10Mbps Half-Duplex	The port is under 10 Mbps, and can only transmit or receive packets at the same time.

TIP

- If you specify the speed and duplex mode for the port manually, ensure that the speed and duplex mode for peer port are the same with this port, or is set to auto negotiation.
- The low speed mode can improve the transmission distance of the port. If you want to extend the PoE power supply distance, you can change the speed mode to a low speed mode, such as 10 Mbps full duplex. And ensure that the speed mode for peer port is also 10 Mbps full duplex or auto negotiation.

8.2 Diagnose

8.2.1 Overview

You can use the diagnosis tools for troubleshooting. The device supports the following tools:

- **Site Survey**: used to check nearby wireless signals.
- **Ping**: used to check the network connectivity.
- **Traceroute**: used to check the network routes.
- **Speed Test**: used to check the connection speed between two devices in a same network.
- **Spectrum Analysis**: used to check the nearby wireless noise of each channel, then select a frequency band with less wireless noise for the CPE.

8.2.2 Site Survey

Site survey gives you an insight into the information of nearby wireless signals. According to the diagnosis result, you can select a less interference channel (used by few devices) for the WiFi network of the device to improve the transmission efficiency.

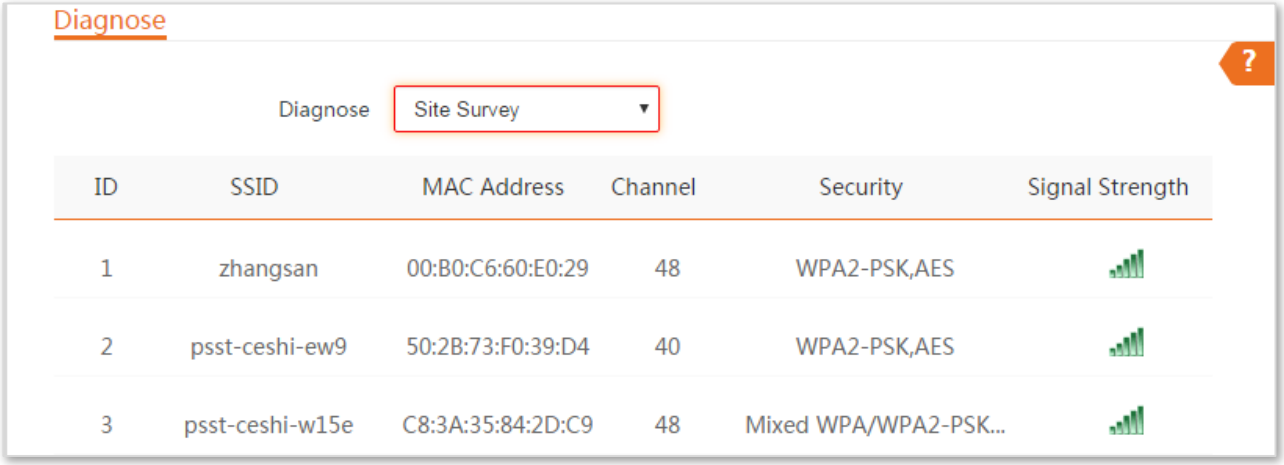
Configuration procedure

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Diagnose**.

Step 2 Select **Site Survey** in the **Diagnose** drop-down list menu.

----End

The diagnosis result will be displayed in a few seconds in the list below the **Diagnose** box. See the following figure:



8.2.3 Ping

You can use ping to detect the connectivity and quality of network connection.

Assume that you want to know whether the device can access **Bing**.

Configuration procedures:

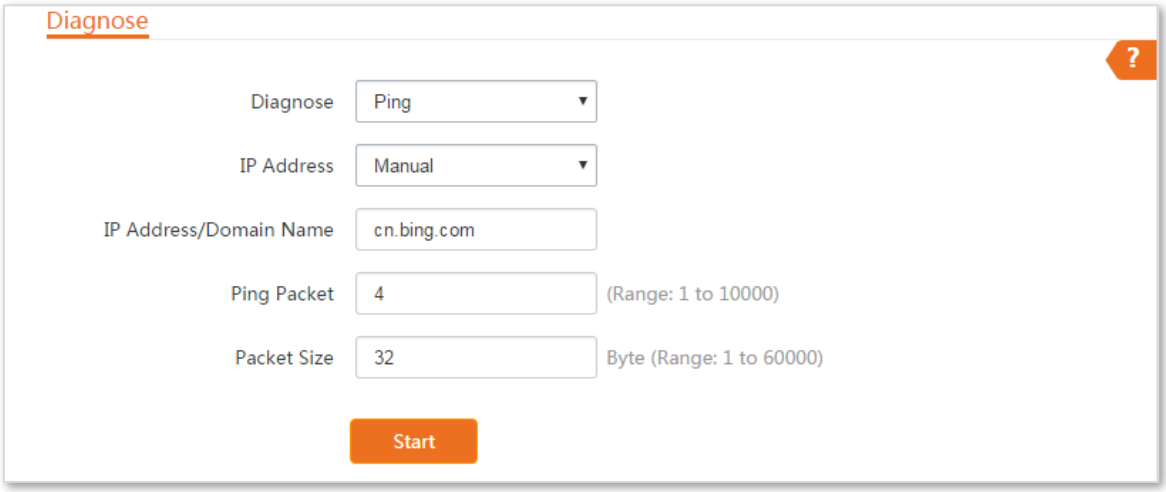
Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Diagnose**.

Step 2 Select **Ping** in the **Diagnose** drop-down list menu.

Step 3 Set **IP Address** to **Manual**.

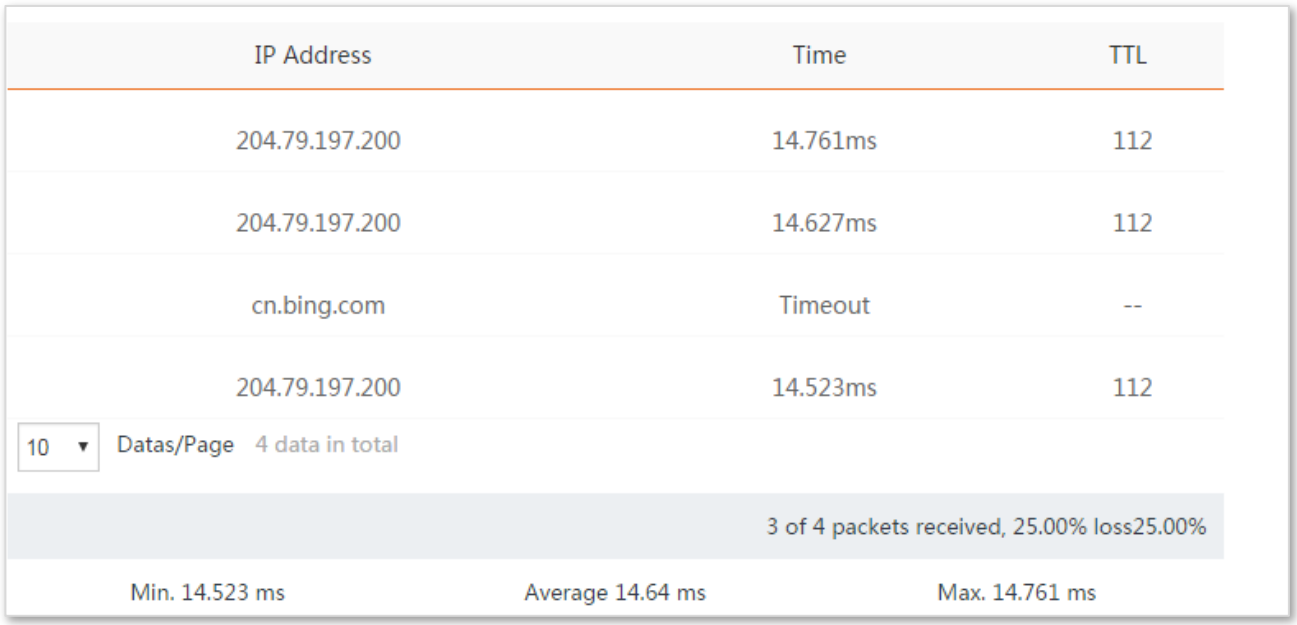
Step 4 Enter the target IP address or a domain name, which is **cn.bing.com** in this example.

Step 5 Click **Start**.



----End

The diagnosis result will be displayed in a few seconds in the list below **Start** button. See the following figure:



8.2.4 Traceroute

You can use the Traceroute tool to detect the routes that the packets pass by from the device to destination host.

Assume that you want to detect the routes that the packets pass by from the device to **cn.bing.com**.

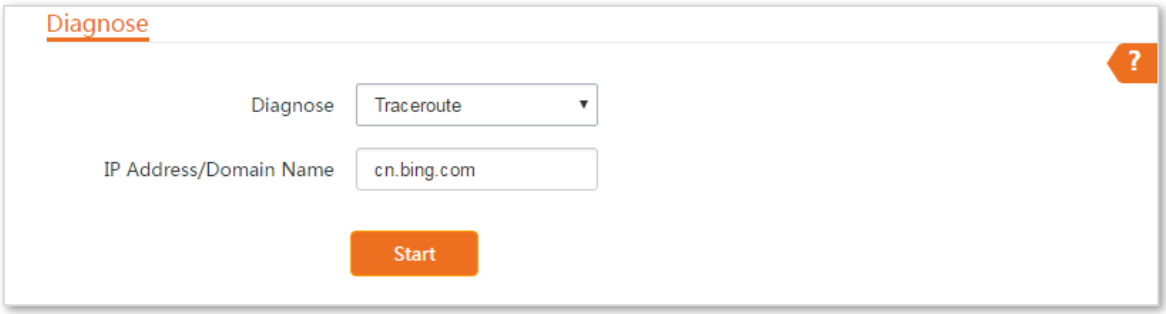
Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Advanced** > **Diagnose**.

Step 2 Select **Traceroute** in the **Diagnose** drop-down list menu.

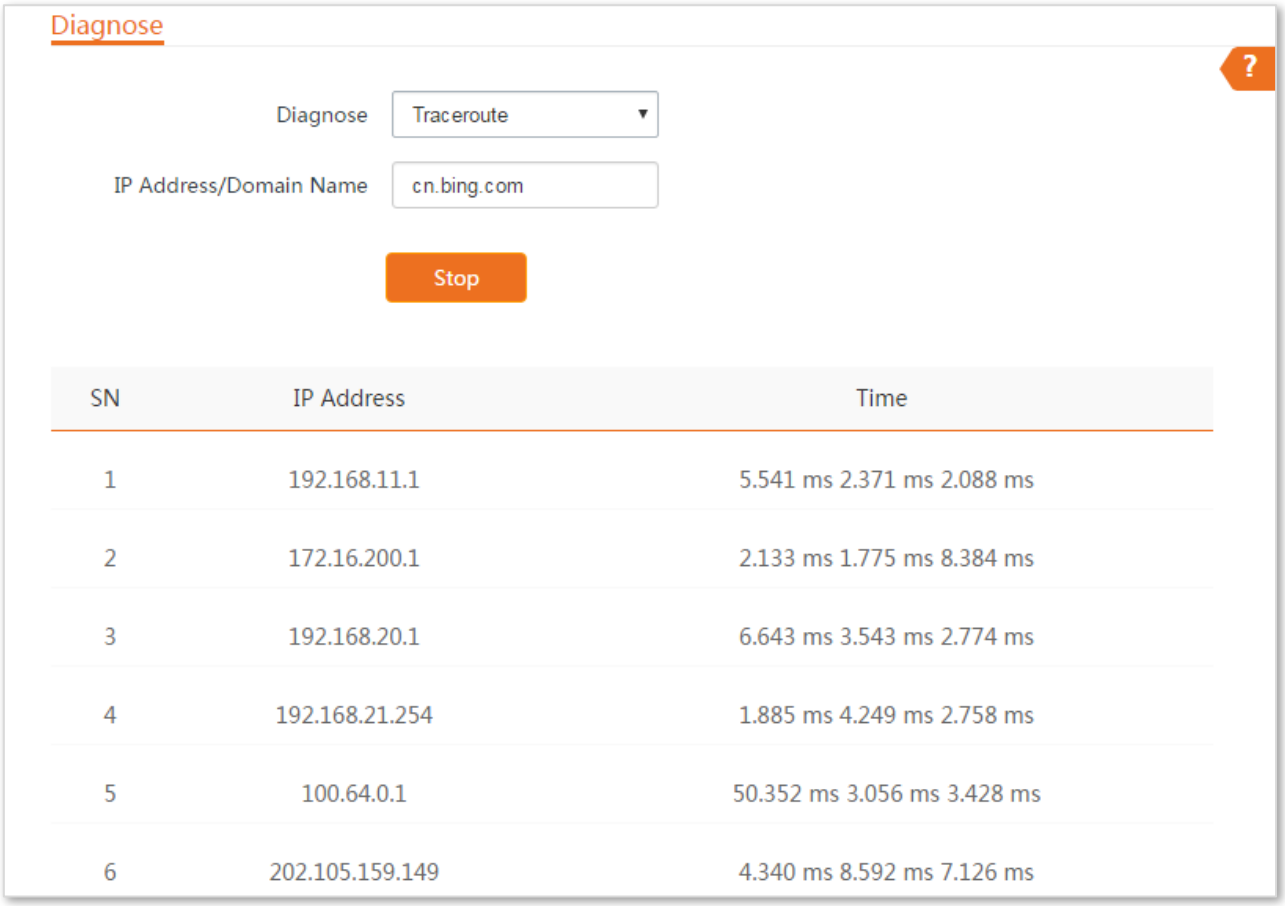
Step 3 Enter the target IP address or a domain name, which is **cn.bing.com** in this example.

Step 4 Click **Start**.



----End

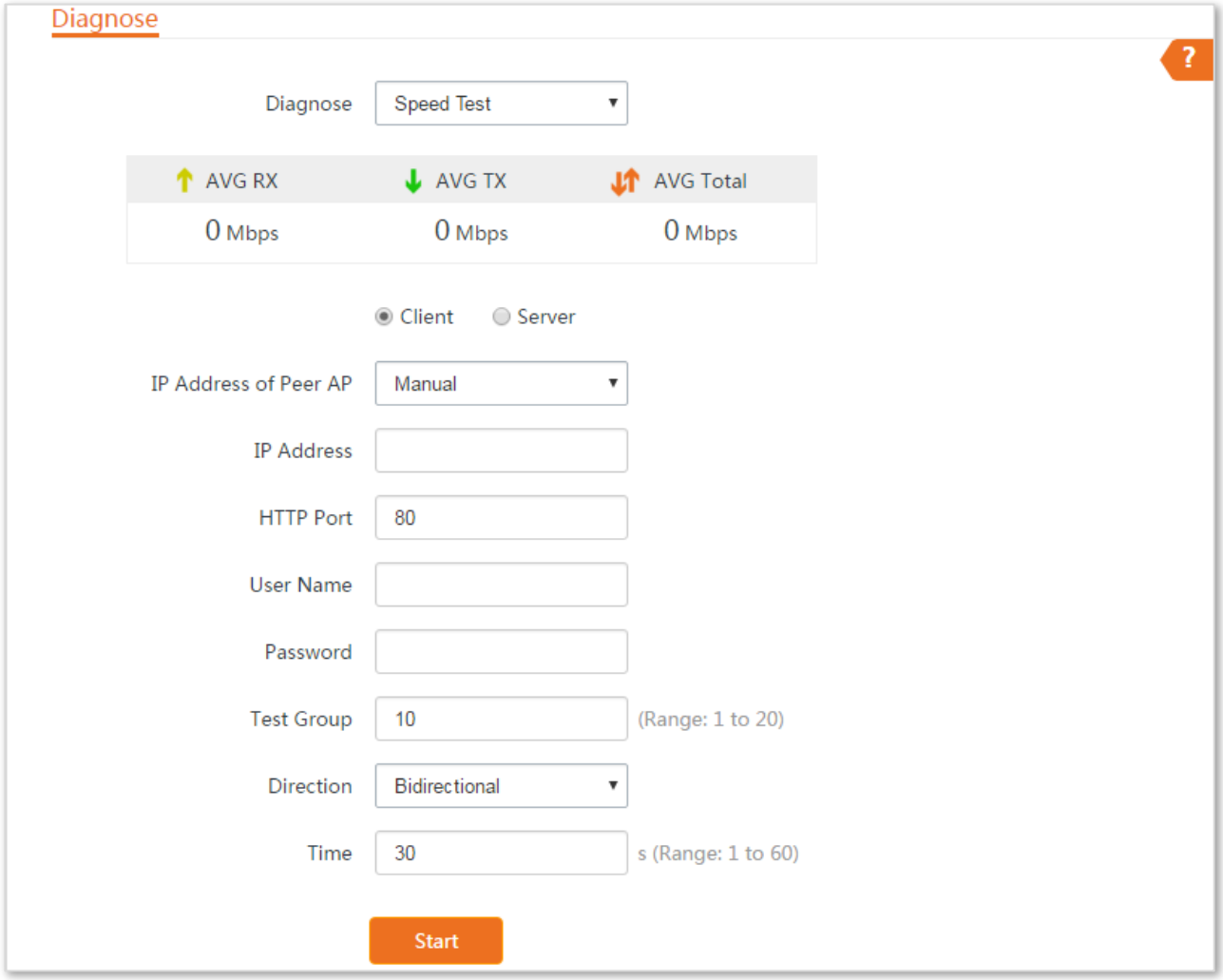
The diagnosis result will be displayed in a few seconds in the list below **Start** button. See the following figure:



8.2.5 Speed test

You can use the **Speed Test** to test the throughput between two Tenda CPEs or a CPE and an outdoor CPE in the same network. The test requires that both sides support the **Speed Test** function.

Choose **Advanced** > **Diagnose**, and select **Speed Test** from the **Diagnose** drop-down list menu to enter the page.



Parameters description

Name	Description
IP Address of Peer AP	It specifies the LAN IP address of peer CPE. You can enter it manually or select an IP address from the drop-down list if there are devices connected to the CPE.
IP Address	If the **IP Address of Peer AP** is set to **Manual**, you need to enter the LAN IP address of peer CPE in the box manually.
HTTP Port	It specifies the HTTP service port number of peer device, which is used to establish speed test connection based on TCP/IP. Default: **80**. You are recommended to keep the default value.
User Name	It specifies the login user name and password of peer device.
Password	
Test Group	It specifies the number of test connection launched.
Direction	It specifies the test speed direction. • **RX** (Receive): only test the speed that the peer device transmits data to this

Name	Description
	device. • **TX** (Transmit): only test the speed that this device transmits data to peer device. • **Bidirectional**: test both transmit and receive speed between the two CPEs
Time	It specifies the duration of speed test.
AVG RX	It displays the average received rate.
AVG TX	It displays the average transmitted rate.
AVG Total	It displays the average total rate.

Example of configuring the speed test

Assume that a CPE working in AP mode and an outdoor CPE working in client mode have bridged successfully. Then test the wireless speed between them.

The procedure can be performed both on the web UI of the CPE and that of the CPE. The CPE is used for illustration.

Assume that the IP address of peer CPE is **192.168.2.100**, and the login user name and password of peer CPE are both **admin**.

Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Diagnose**.

Step 2 Set **Diagnose** to **Speed Test**.

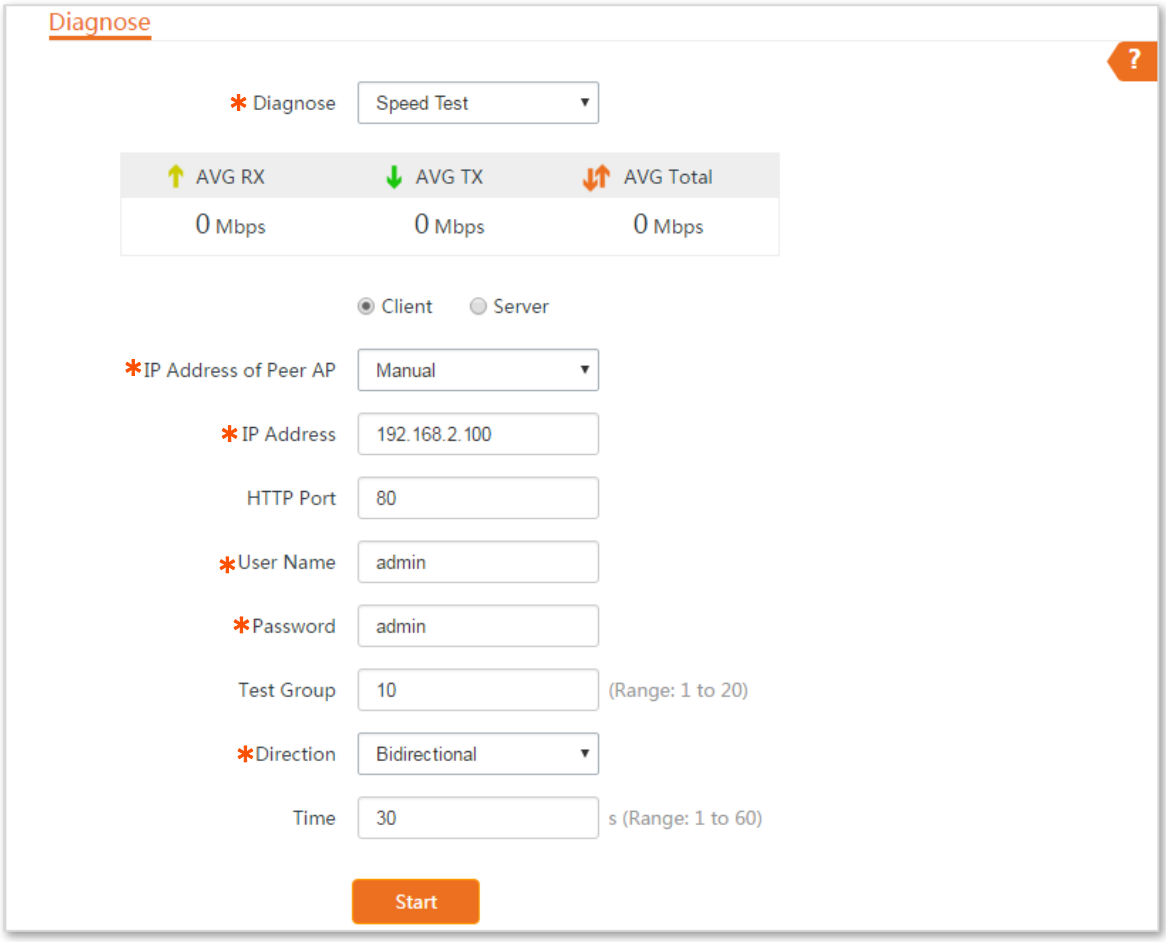
Step 3 Set **IP Address of Peer AP** to **Manual**.

Step 4 Enter the IP address of CPE1 to the **IP Address** box, which is **192.168.2.100** in this example.

Step 5 Enter the login user name and password of the web UI of CPE1 in the **User name** and **Password** boxes, which are both **admin** in this example.

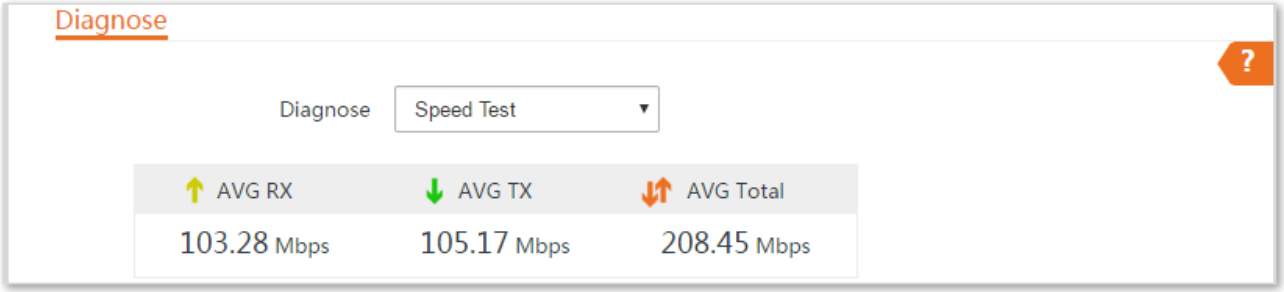
Step 6 Set **Direction** to **Bidirectional**.

Step 7 Click **Start**.



----End

The test result will be displayed in a few seconds in the list below the **Diagnose** box. See the following figure:



8.2.6 Spectrum Analysis

You can use the Spectrum Analysis to check the wireless noise of each channel, then select a frequency band with less wireless noise for the CPE based on the diagnose result.

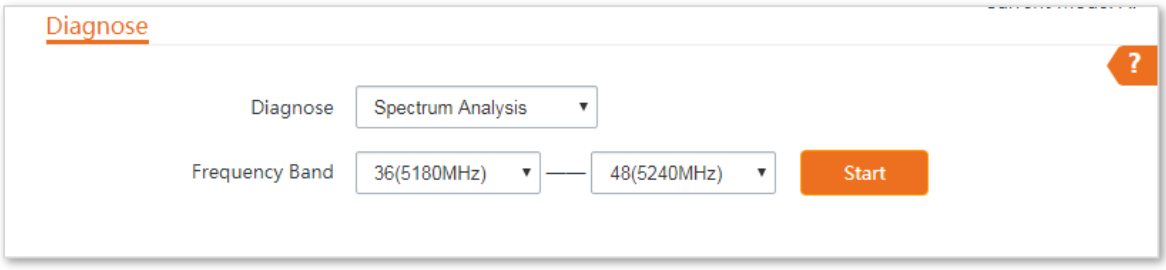
Configuration procedure:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Diagnose** to enter the page.

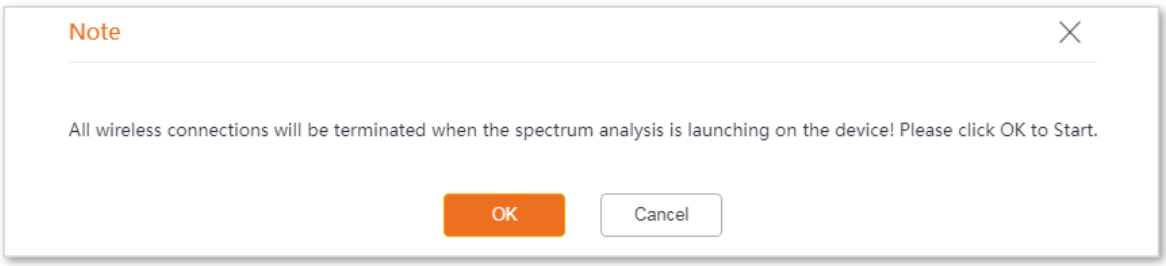
Step 2 Select **Spectrum Analysis** from the **Diagnose** drop-down list menu.

Step 3 Select the frequency band range you want to test from the drop-down list.

Step 4 Click **Start**.

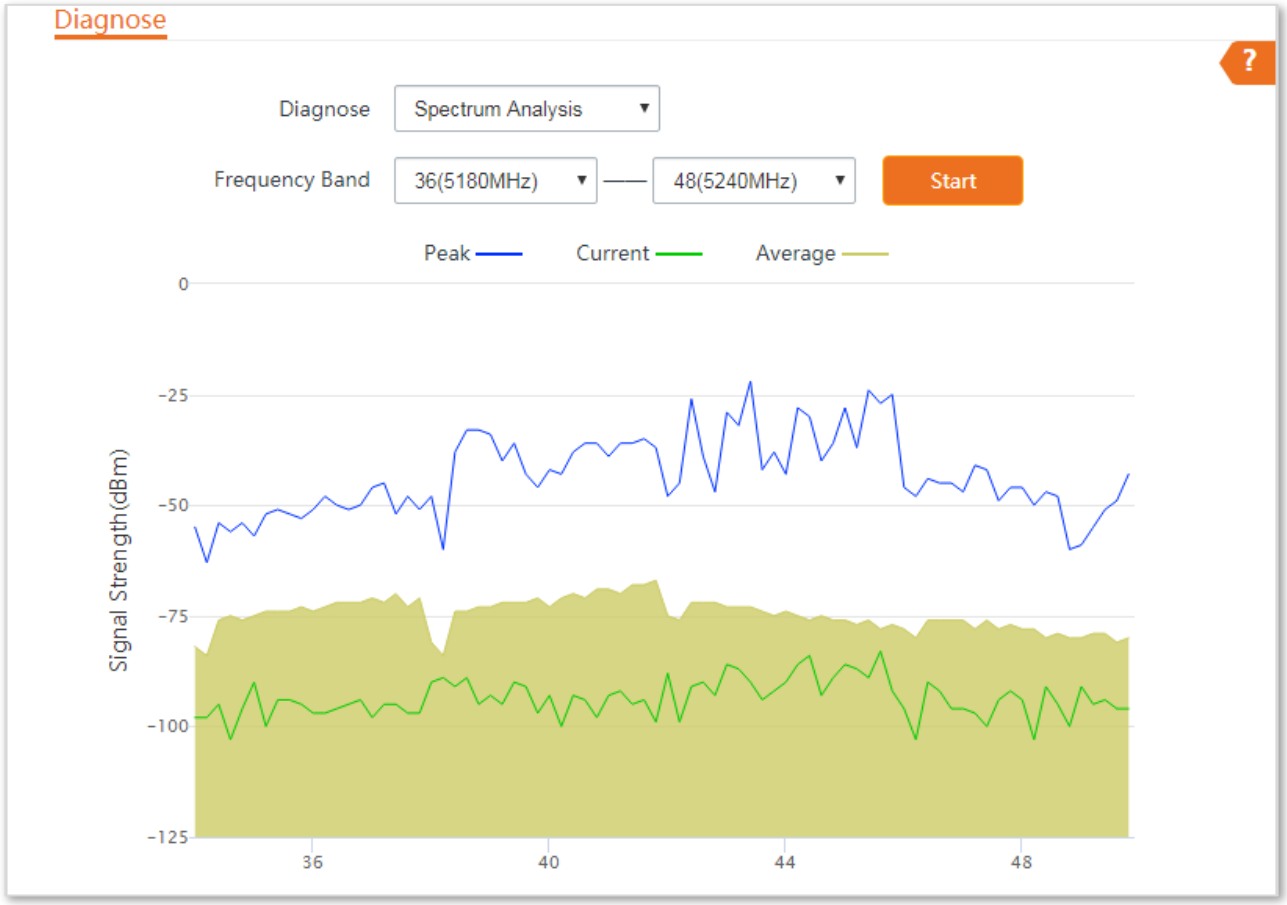


Step 5 Confirm the message on the pop-up window, and click **OK**.



----End

The diagnosis result will be displayed in a few seconds. See the following figure.



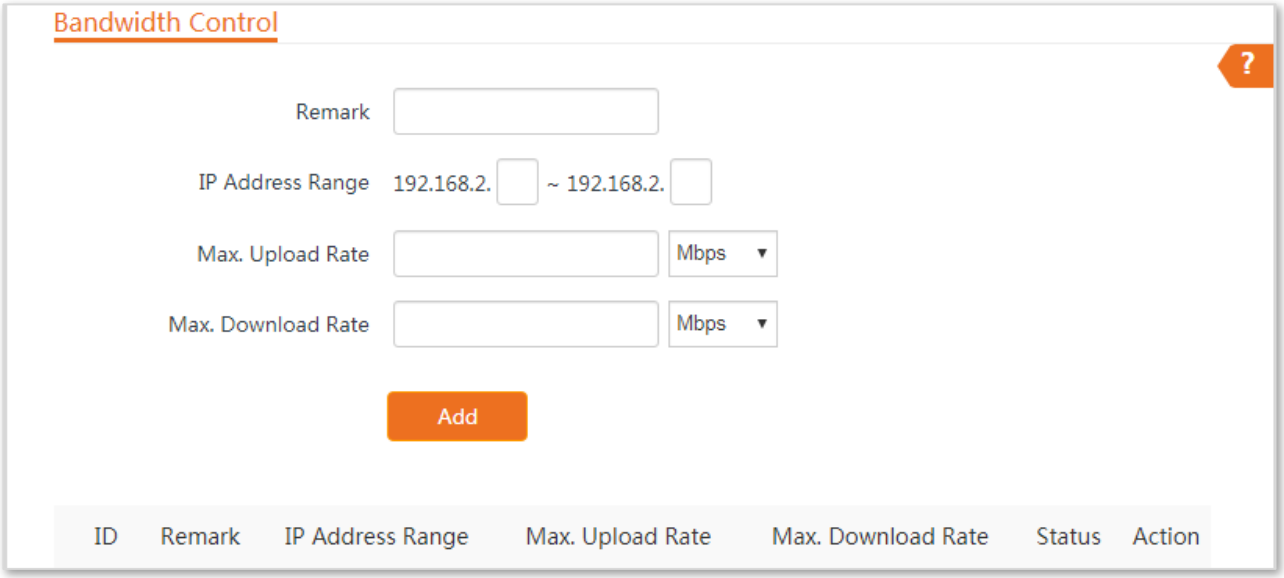
8.3 Bandwidth control

8.3.1 Overview

The **Bandwidth Control** function is only available in **WISP** or **Router** mode.

If multiple clients access the internet through the CPE, bandwidth control is recommended, so that high-speed file download by a client does not reduce the internet access speed of the other clients.

To access the page, choose **Advanced** > **Bandwidth Control**.

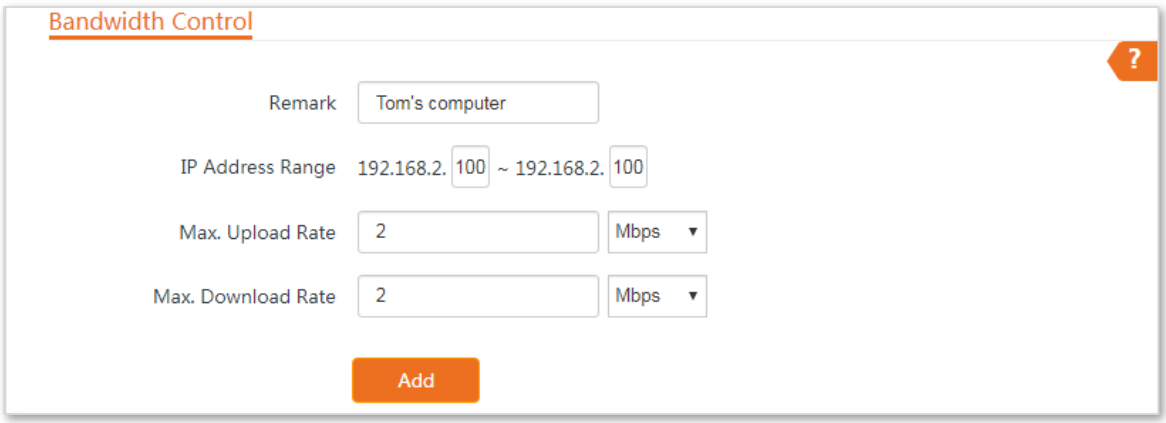


Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** >**Bandwidth Control**.

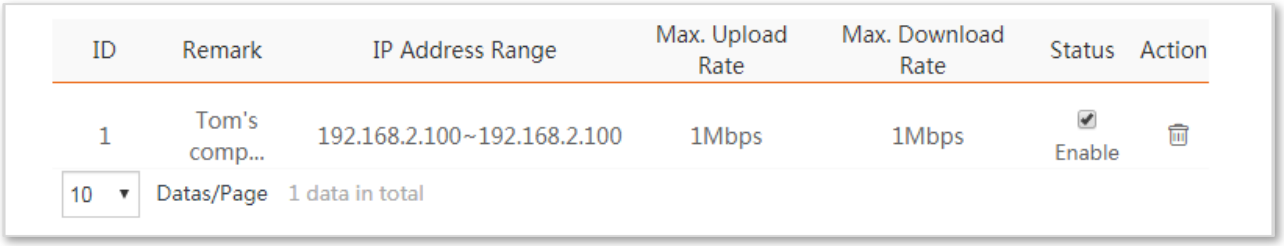
Step 2 Set related parameters.

Step 3 Click **Add**.



----End

The added rule displays in the bandwidth control list. The parameters on the picture below are used for examples.



Parameters description

Name	Description
Remark	It specifies the additional information of the bandwidth control rule. This field is required. For convenient management, you'd better specify different remarks for different rules.
IP Address Range	It specifies the IP address or IP address range of devices that this rule applies to. If you want to control only one device, enter the same IP address in the two boxes. If you want to control multiple devices, enter an IP address range including start IP address and end IP address. The end IP address should be greater than the start IP address.
Max. Upload Rate	It specifies the maximum upload/download rate of the device whose IP address is within the IP Address Range.
Max. Download Rate	
Status	It specifies the current status of the rule. You can enable or disable it as required.
Action	Click to delete the rule.

8.3.2 Example of configuring bandwidth control

Networking requirement

The CPE is used to bridge to the ISP hotspot for internet access in a house in the countryside, and the device is set to WISP mode. To ensure that every device can access the internet smoothly, you want to specify a maximum upload/download for each device.

Assume that: The maximum upload rate of each device connected to the WiFi network of the device is **5 Mbps**, and download rate is **10 Mbps**. And the IP address range of the devices connected to the WiFi network is **192.168.2.100** to **192.168.2.200**.

Configuration procedures

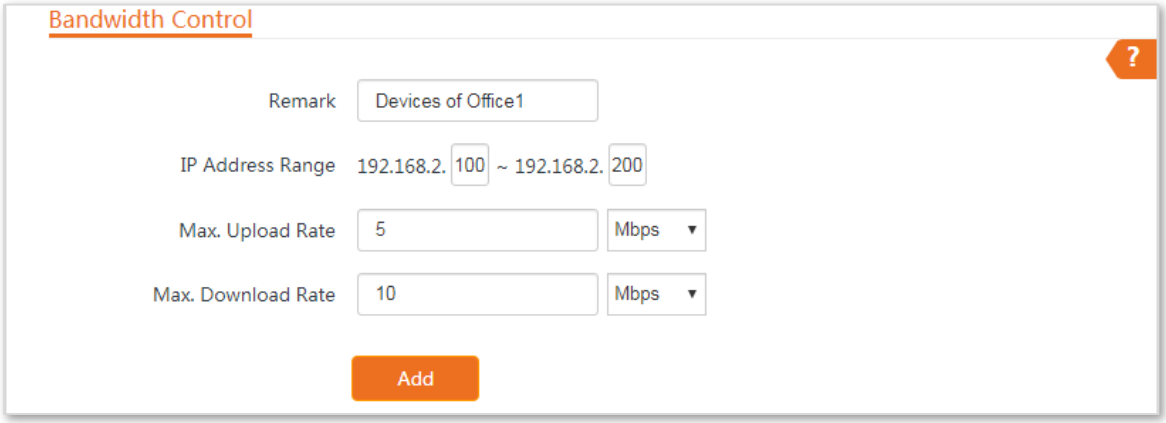
Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Advanced** > **Bandwidth Control**.

Step 2 Enter a remark, such as **Devices of Office1**.

Step 3 Specify an IP address range, which are **100** and **200** in this example.

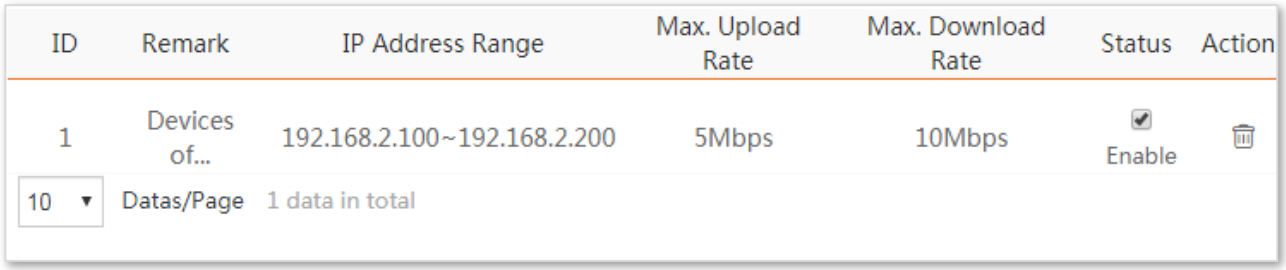
Step 4 Specify the maximum upload rate and download rate respectively, which are **5** and **10** in this example.

Step 5 Click **Add**.



----End

If the rule is added successfully, it is displayed in the list below the **Add** button. See the following figure:



Verification

For a device whose IP address is within the range of 192.168.2.100 to 192.168.2.200, its maximum upload rate is 5 Mbps and its maximum download rate is 10 Mbps.

8.4 Port forwarding

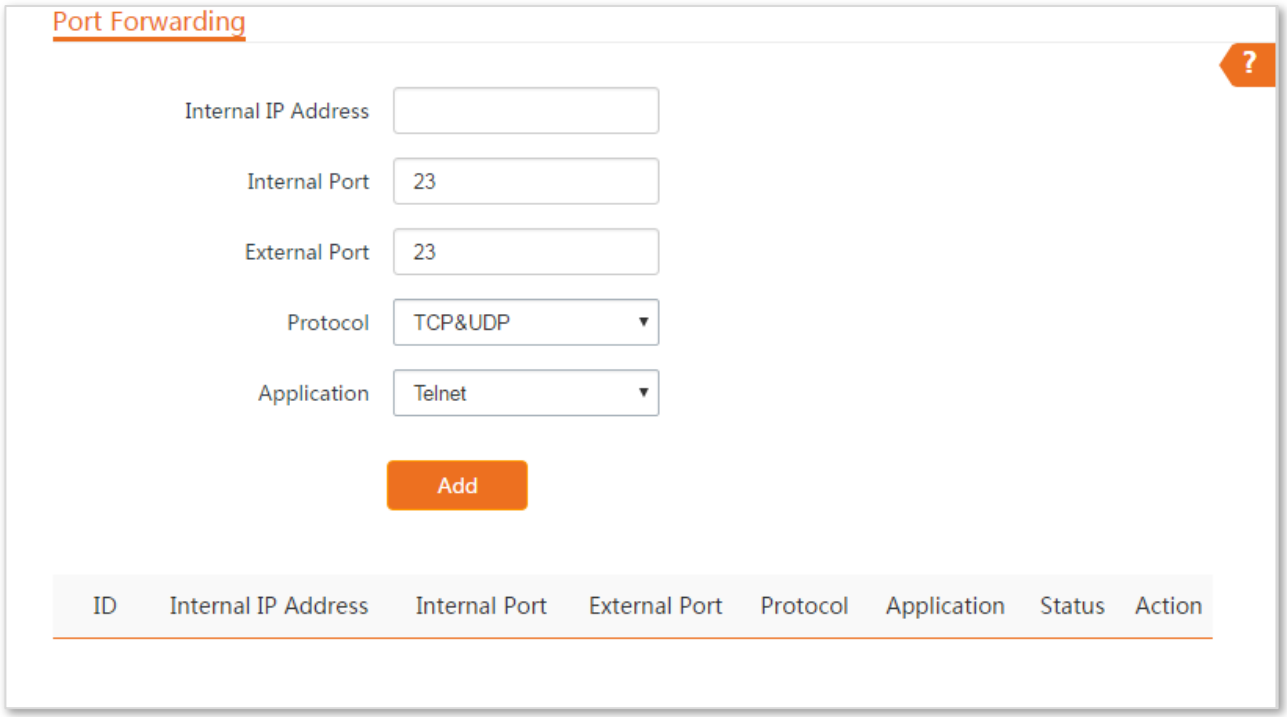
This function is available only when the device works in **WISP** or **Router** mode.

8.4.1 Overview

If computers are connected to the CPE to form a LAN and access the internet through the CPE, internet users cannot access the hosts on the LAN. Therefore, the servers, such as web servers, email servers, and FTP servers, on the LAN are inaccessible to internet users.

To enable internet users to access a LAN server, enable the port forwarding function of the CPE, and map one service port to the IP address of the LAN server. This enables the CPE to forward the requests arriving at the port from the internet to the LAN server, and avoid the attacks from the WAN.

Choose **Advanced** > **Port Forwarding** to enter the page.



8.4.2 Configure port forwarding

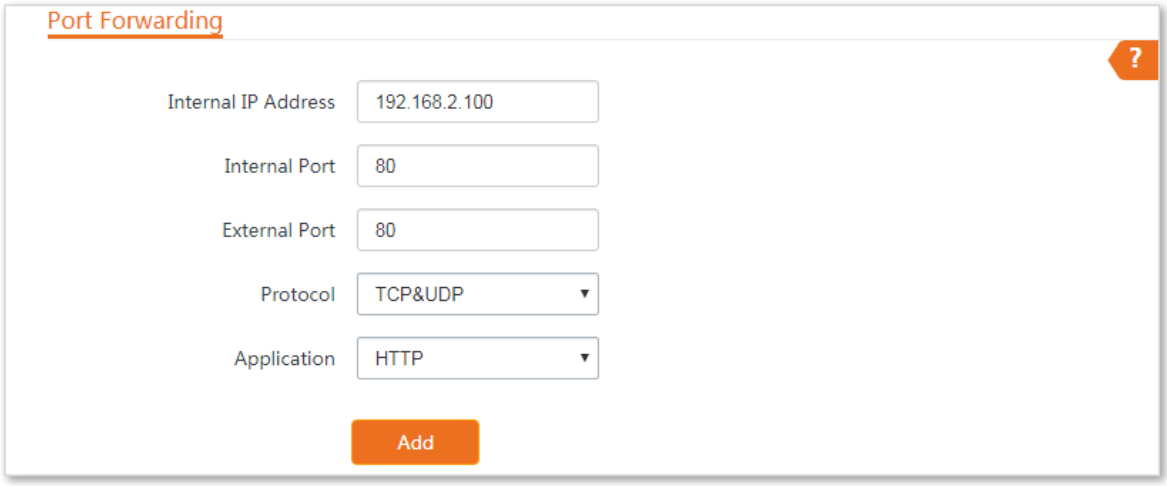
Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Advanced** > **Port Forwarding**.

Step 2 Enter an IP address in LAN.

Step 3 Select an **Application**, and the internal and external ports will be automatically populated.

Step 4 Select a protocol of the selected applications.

Step 5 Click **Add**.



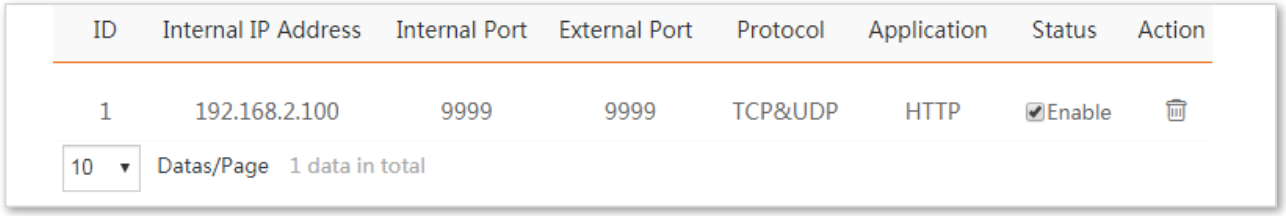
----End

TIP

If internet users still cannot visit servers in LAN after the configuration, try the following solutions:

- Ensure that the WAN IP address of the device is a public IP address, and the internal port you entered is correct.
- Security software, antivirus software, and the built-in OS firewall of the computer that establishes a server may cause port forwarding function failures. Disable them and try again.

The added rule displays in the port forwarding list. The parameters on the picture below are used for examples.



After the port forwarding rule takes effect, to access the LAN server:

Enter **Protocol name**://**WAN port IP address**:**External port** in the address bar of a web browser on a computer over the internet.

Parameters description

Name	Description
Internal IP Address	It specifies the IP address of the host that establishes a server in LAN.
Internal Port	It specifies the service port of the server in LAN. After you select an **Application**, this option will be auto populated. You can also customize it.

Name	Description
External Port	It specifies the ports which are enabled for WAN users to visit the corresponding servers in LAN. After you select an **Application**, this option will be auto populated. You can also customize it.
Protocol	It specifies the protocol type of the selected applications. Select TCP&UDP when you are not sure.
Application	It specifies the application services established in LAN. The device provides some common services. After you select an application, the internal and external ports will be populated.
Action	Click  to delete the rule.

8.4.3 Example of configuring port forwarding

Networking requirement

The device is used to bridge to the ISP hotspot for internet access in a house in the countryside, and the device is set to WISP mode.

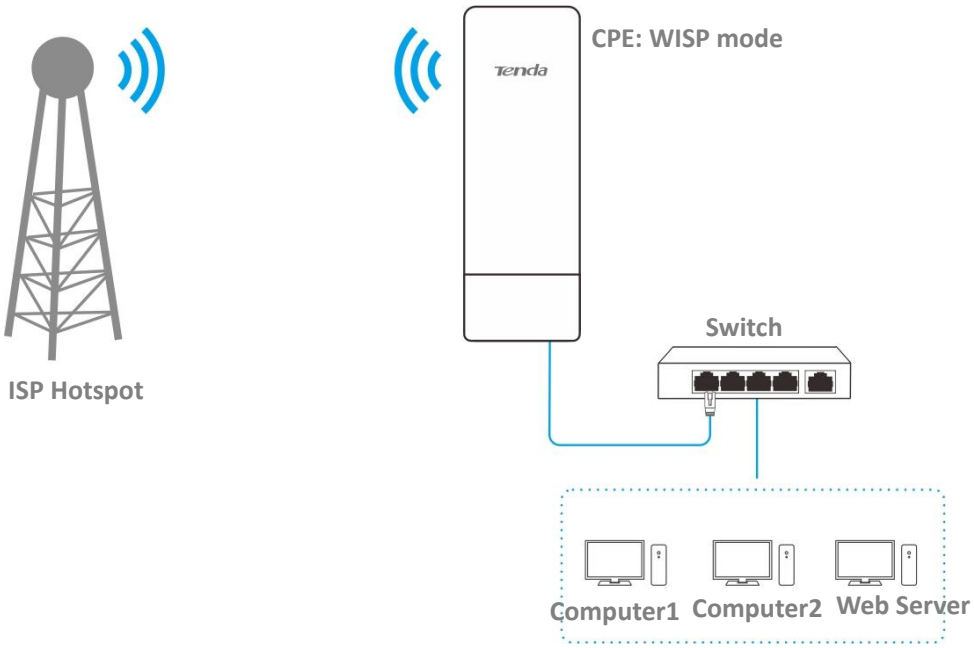
Requirement: Family members who are not at home can visit the resources on the web server in LAN over the internet.

You are recommended to use port forwarding function to solve the problem.

Assume that:

- IP Address of the web server: 192.168.2.100
- Service port (internal port) of the web server in LAN: 80
- External port that this device enables for internet devices: 80
- WAN IP Address of the device: 202.105.11.22

Network topology



Configuration procedures

Prerequisite: manually set a static IP address and related parameters for the web server to avoid the service disconnection caused by the dynamic IP address.

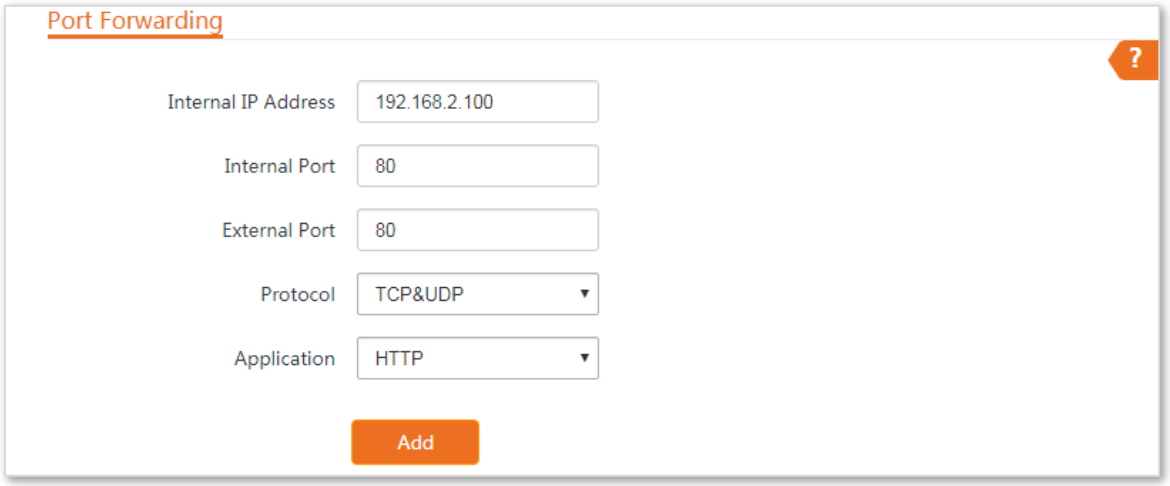
Step 1 Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Advanced** > **Port Forwarding**.

Step 2 Enter the IP address of the web server in the **Internal IP Address** box, which is **192.168.2.100** in this example.

Step 3 Select **HTTP** from the drop-down list of **Application**, and the **Internal Port** and **External Port** boxes will be automatically populated.

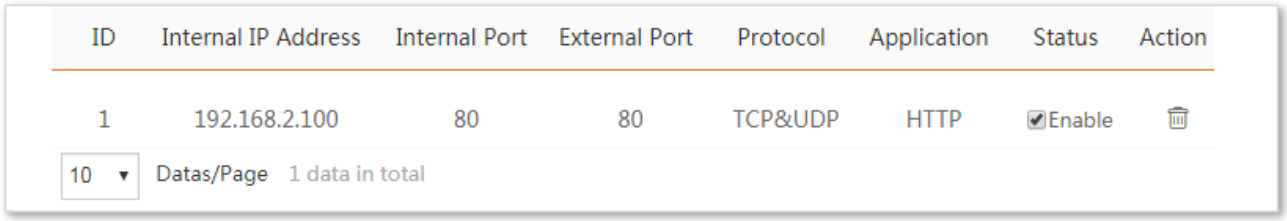
Step 4 Select **TCP&UDP** from the drop-down list of **Protocol**.

Step 5 Click **Add**.



----End

If the rule is added successfully, it is displayed in the list below the **Add** button. See the following figure:



Verification

Enter **Protocol name**://**WAN port IP address**:**External port** in the address bar of a web browser on a computer over the internet to access the resources on the web server. In this example, enter **http://202.105.11.22:80**.

TIP

If internet users still cannot visit the web server in LAN after the configuration, try the following solutions:

- Ensure that the WAN IP address of the device is a public IP address, and the internal port you entered is correct.
- Security software, antivirus software, and the built-in OS firewall of the computer may cause port forwarding function failures. Disable them and try again.
- Manually set an IP address and related parameters for the web server to avoid the service disconnection caused by the dynamic IP address.

8.5 MAC filter

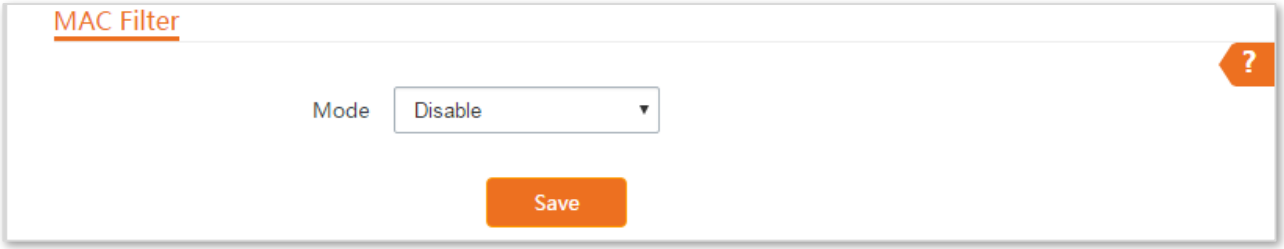
This function is available only when the device works in **WISP** or **Router** mode.

8.5.1 Overview

The MAC Filter function enables you to allow or disallow the devices, such as computers, laptops, tablets, and smart phones, to access the internet via the device based on their MAC addresses.

Choose **Advanced** > **MAC Filter** to enter the page.

The function is disabled by default.



8.5.2 Configure MAC filter

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **MAC Filter**.

Step 2 Select a MAC filter mode, **Disallow** or **Allow**.

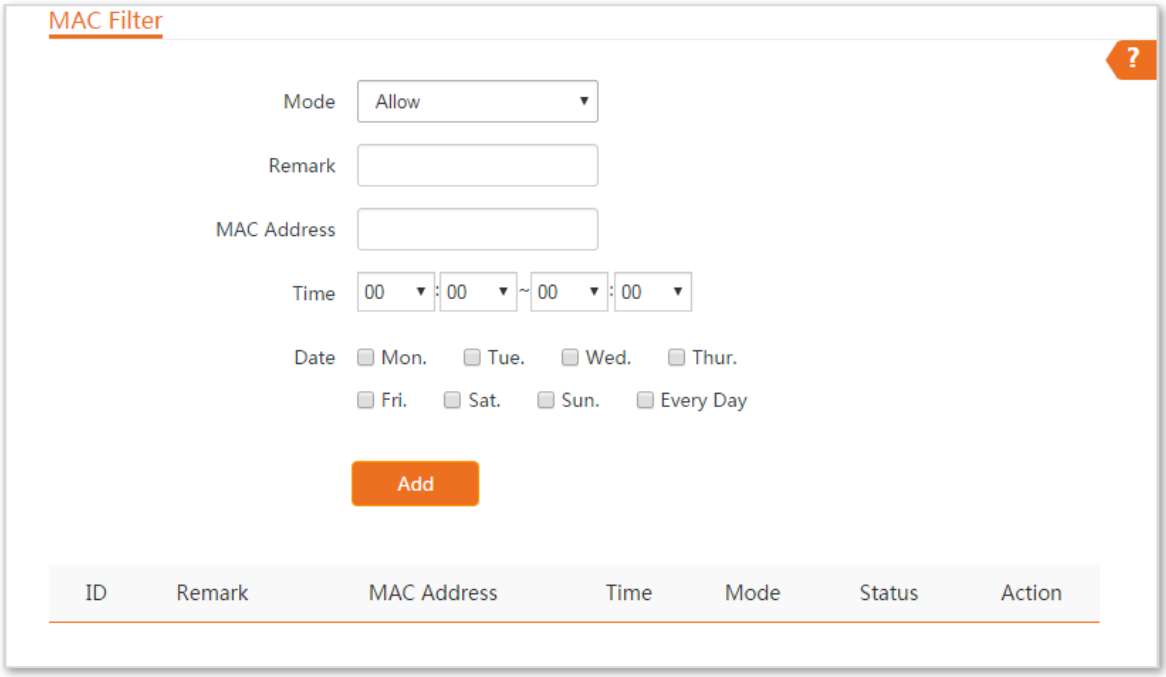
Step 3 Optional. Enter a **Remark** for the rule, such as somebody's device.

Step 4 Enter the **MAC Address** of the client to which this rule applies.

Step 5 Specify a period at which the rule takes effect.

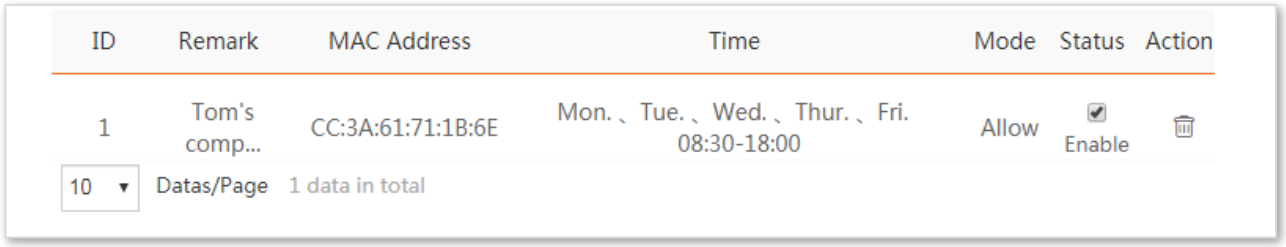
Step 6 Tick the dates on which the rule takes effect.

Step 7 Click **Add**.



----End

The added rule displays in the MAC filter list. The parameters on the picture below are used for examples.



Parameters description

Name	Description
Mode	It specifies the mode of MAC filter rule. • **Disable**: Disable the MAC Filter function. • **Allow**: Allow the devices with the MAC addresses in the list to access the internet via this device, and disallow the other devices to access the internet via this device. • **Disallow**: Disallow the devices with the MAC addresses in the list to access the internet via this device, and allow the other devices to access the internet via this device.
Remark	It specifies the additional information of the rule.
MAC Address	It specifies the MAC address of the device to which the rule applies.
Time	It specifies the period at which the rule takes effect.

Name	Description
Date	It specifies the dates on which the rule takes effect.
Status	It specifies the status of the rule.
Action	Click  to delete the rule.

8.5.3 Example of configuring MAC filter

Network topology

The device is used to bridge to the ISP hotspot for internet access in a house in the countryside, and the device is set to WISP mode.

Requirements: Only allow the parents' devices to access the internet during 9:00 to 17:00, Monday to Friday.

You are recommended to use the MAC Filter function to solve the problem.

Assume that: The MAC addresses of the parents' devices are **CC:3A:61:71:1B:6E** and **CC:3A:61:75:1F:3E**.

Configuration procedures

Step 1 Log in to the web UI of the device which is working in WISP mode, and choose **Advanced** > **MAC Filter**.

Step 2 Select a mode, which is **Allow** in this example.

Step 3 Enter a remark in the **Remark** box, which is **Dad's smartphone** in this example.

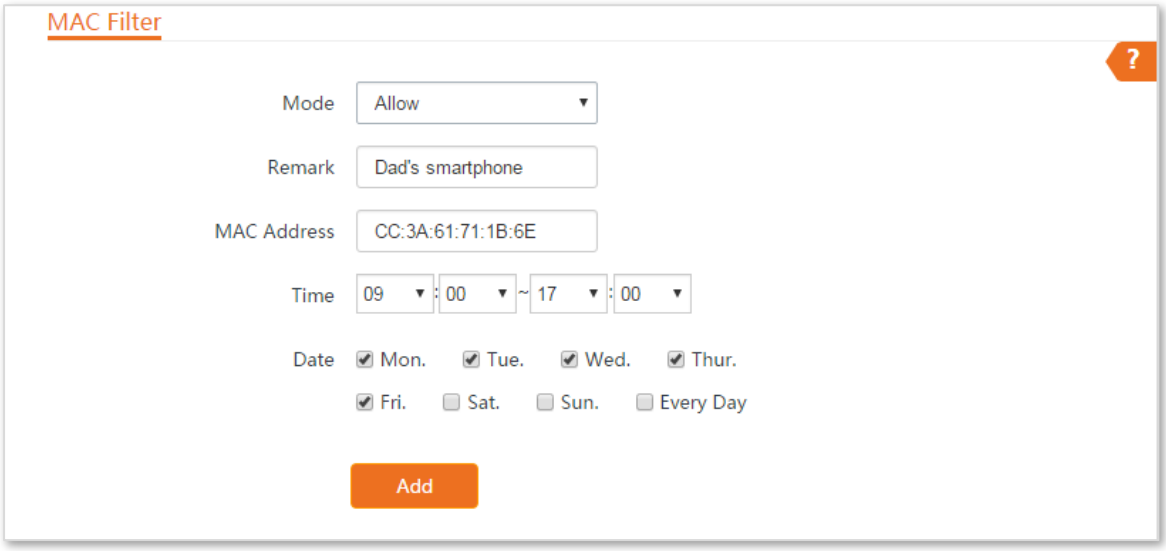
Step 4 Enter the MAC address of the device, which is **CC:3A:61:71:1B:6E** in this example.

Step 5 Specify a period, which is **9:00** to **17:00** in this example.

Step 6 Tick the dates, which are **Monday to Friday** in this example.

Step 7 Click **Add**.

Step 8 Perform **Step2** to **Step7** to add the rule with the other MAC address.



----End

If the rule is added successfully, it is displayed in the list below the **Add** button. See the following figure:

ID	Remark	MAC Address	Time	Mode	Status	Action
1	Dad's smar...	CC:3A:61:71:1B:6E	Mon.、Tue.、Wed.、Thur.、Fri. 09:00-17:00	Allow	Enable	
2	Mum's lapt...	CC:3A:61:75:1F:3E	Mon.、Tue.、Wed.、Thur.、Fri. 09:00-17:00	Allow	Enable	

10 Datas/Page 2 data in total

Verification

Only the devices with the MAC addresses of CC:3A:61:71:1B:6E and CC:3A:61:75:1F:3E can access the internet at 9:00 to 17:00 from Monday to Friday. All of other devices cannot access the internet during this period.

8.6 Network service

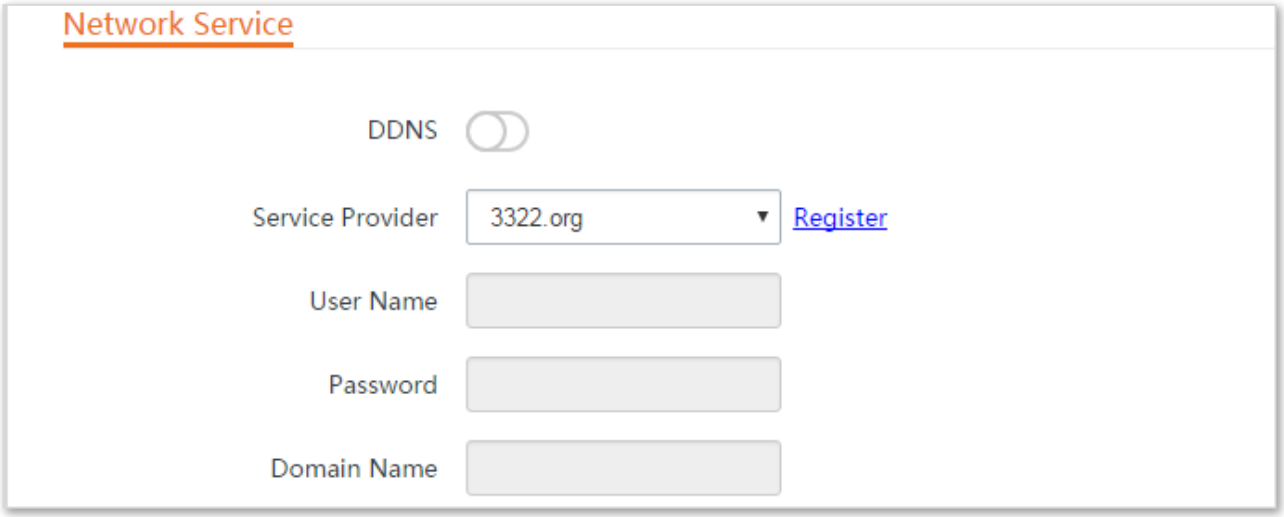
8.6.1 DDNS

The **DDNS** function is only available in **WISP** or **Router** mode.

DDNS, dynamic domain name server, enables the dynamic DNS client on the device to deliver the current WAN IP address to the DNS server. Then the server maps the WAN IP address to a domain name for dynamic domain name resolution.

This function often works with the port forwarding, DMZ host, and remote web management functions. Then users can visit an address with a domain name instead of a dynamic WAN IP address, which makes the visit easier.

To access the page, choose **Advanced** > **Network Service**.



Configuration procedures:

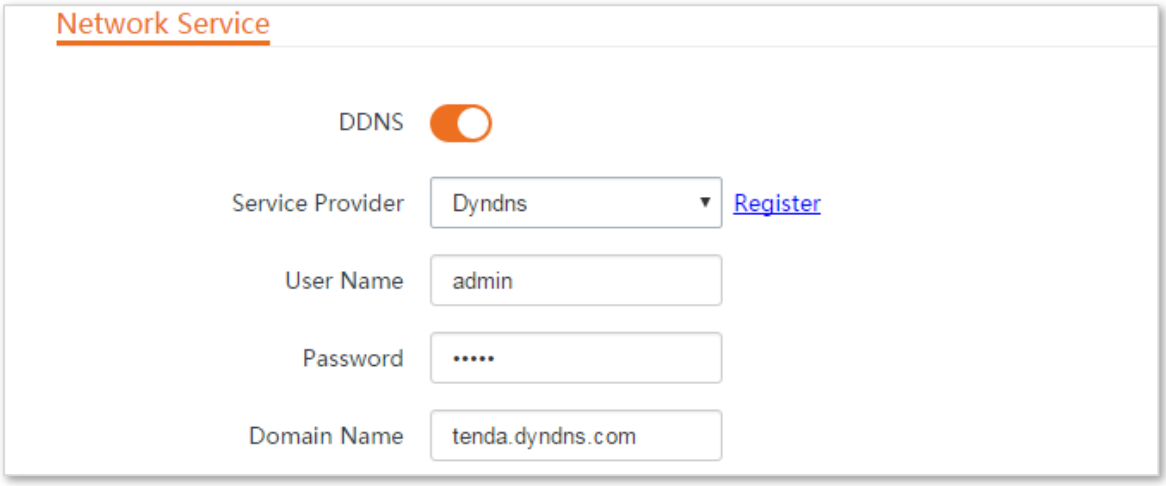
Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Enable the **DDNS** function.

Step 3 Select a dynamic DNS provider from the drop-down list.

Step 4 Enter the user name, password, and domain name you registered with DDNS service provider.

Step 5 Click **Save** on the bottom of this page.



----End

Parameters description

Name	Description
DDNS	It Specifies whether to enable the DDNS function.
Service Provider	It specifies Dynamic Domain Name Service provider. The device supports Dyndns, No-ip.com, and 3322.org.
User Name	It specifies the user name used to log in to the dynamic DNS service, as well as the login user name and password you registered on the website of the service provider.
Password	
Domain Name	It specifies the domain name information obtained from the dynamic DNS server. You need to enter the domain name which you registered on the website manually.

Example of configuring DDNS

Networking requirement

The device is used to bridge to the ISP hotspot for internet access in a house in the countryside, and the device is set to WISP mode. The WAN IP address of the device is dynamic.

Requirement: The administrator on business can visit the resources on web server in LAN. You are recommended to use the DDNS and port forwarding functions to solve the problem.

Assume that:

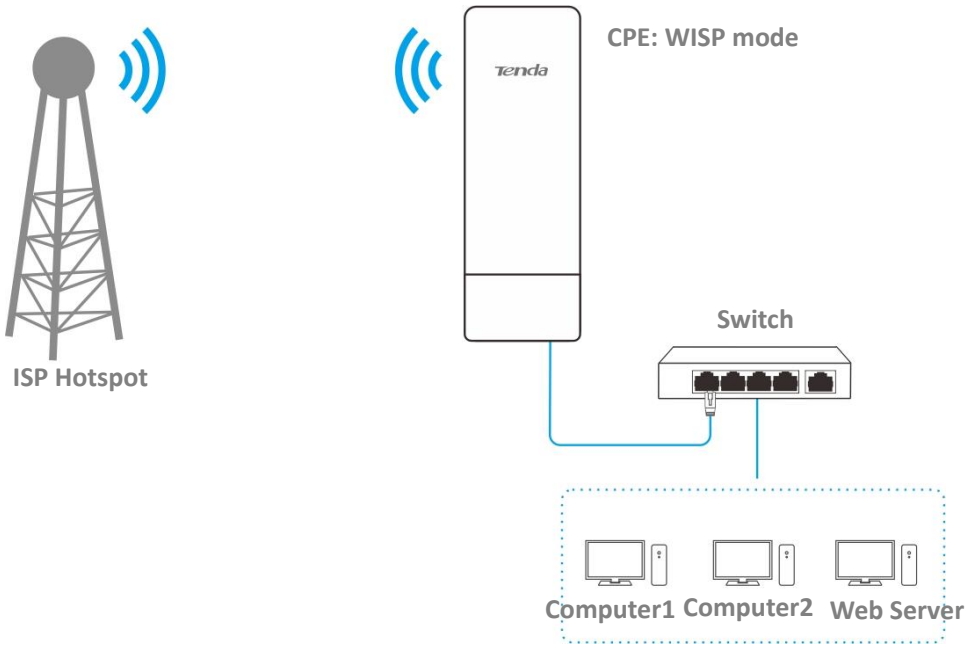
The information of the web server in LAN is shown as follows:

- **IP Address**: 192.168.2.100
- **Service Port of the Web Server**: 80

The registered domain name information is shown as follows:

- **Service Provider**: Dyndns
- **User Name**: tenda
- **Password**: tenda
- **Domain Name**: tenda.dyndns.com

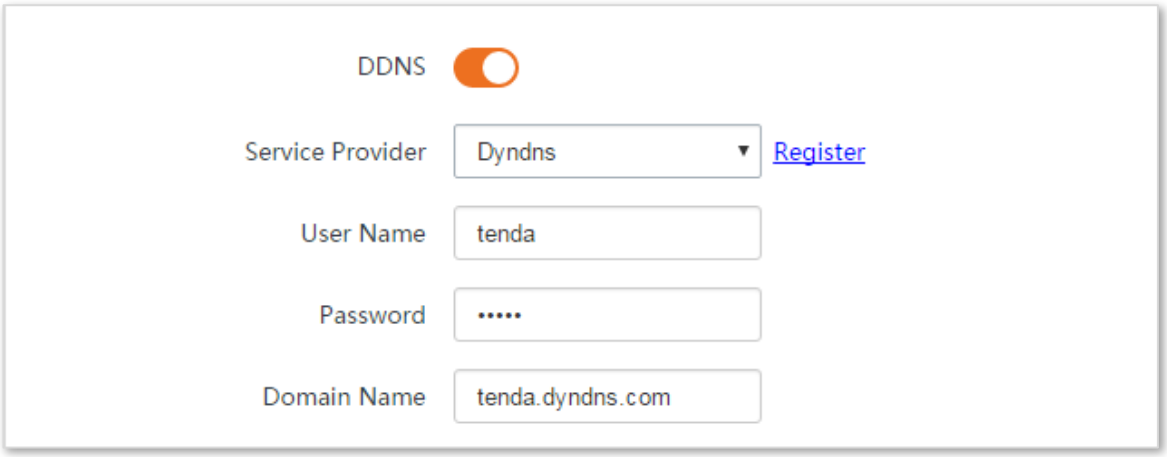
Network topology



Configuration procedures

Step 1 Set up the DDNS function.

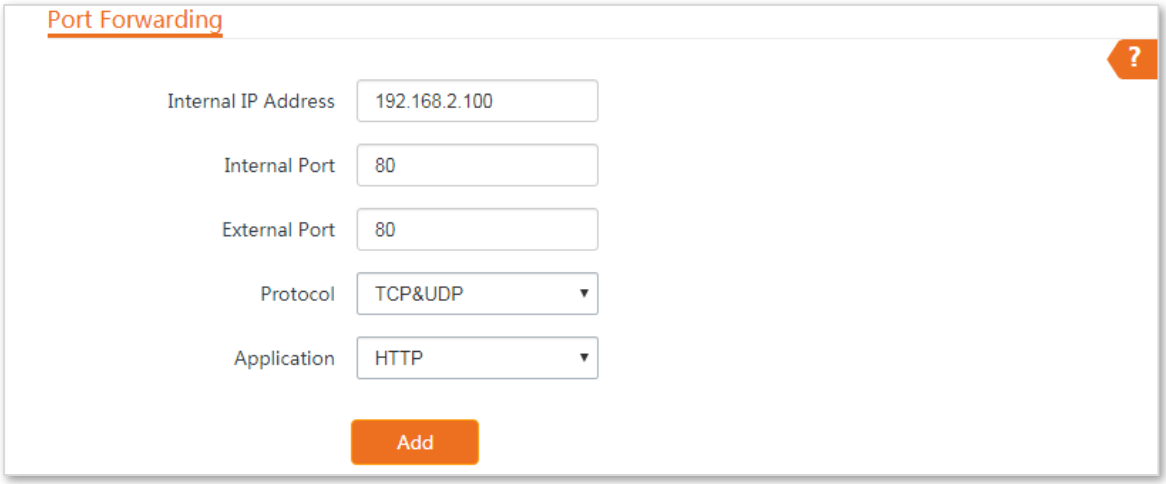
1. Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Advanced** > **Network Service**.
2. Enable the **DDNS** function.
3. Select a service provider, which is **Dyndns** in this example.
4. Enter the user name and password you registered with DDNS service provider, which are **tenda** and **tenda** in this example.
5. Enter the domain name you registered, which is **tenda.dyndns.com**.
6. Click **Save** on the bottom of this page.



Step 2 Set up the port forwarding function.

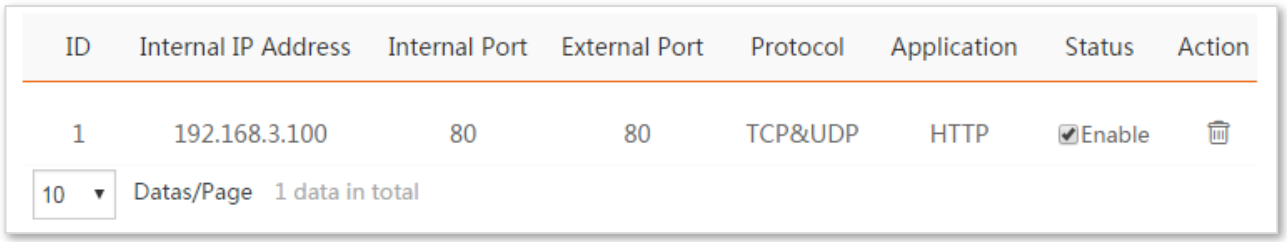
Prerequisite: manually set static an IP address and related parameters for the web server to avoid the service disconnection caused by the dynamic IP address.

1. Start a web browser on the computer connected to the CPE, visit 192.168.2.1 and choose **Advanced** > **Port Forwarding**.
2. Enter the IP address of the web server, which is **192.168.2.100** in this example.
3. Select an application, which is **HTTP** in this example, and the Internal Port and External Port will be populated automatically.
4. Select the protocol of the service. **TCP&UDP** is recommended if you are not sure.
5. Click **Add**.



----End

If the rule is added successfully, it is displayed in the list below the **Add** button. See the following figure:



Verification

Enter **Protocol name://WAN port domain name:External port** in the address bar of a web browser on a computer over the internet to access the resources on the web server. In this example, enter **http://tenda.dyndns.com:80**.

TIP

If internet users still cannot visit the web server in LAN after the configuration, try the following solutions:

- Ensure that the WAN IP address of the device is a public IP address, and the internal port you entered is correct.
- Security software, antivirus software, and the built-in OS firewall of the computer may cause port forwarding function failures. Disable them and try again.
- Manually set an IP address and related parameters for the web server to avoid the service disconnection caused by the dynamic IP address.

8.6.2 Remote web management

The **Remote Web Management** function is only available in **WISP** or **Router** mode.
Generally, only the clients connected to the CPE can access its web UI.
The remote web management function enables you to access the web UI of the CPE on WAN if it is required.

Configuration procedures:

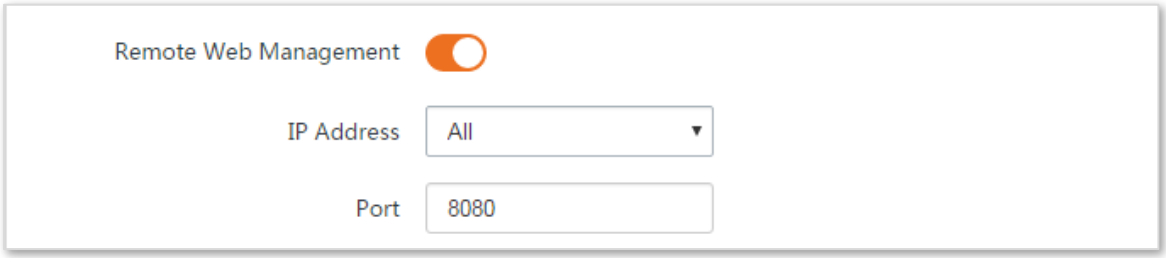
Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Set the **Remote Web Management** to .

Step 3 Select **Manual** from the **IP Address** drop-down list, enter the IP address of a device which is allowed to access the web UI of the device remotely, or select **All** to allow any device on WAN to access.

Step 4 Optional. Enter a port number.

Step 5 Click **Save** on the bottom of this page.



----End

Parameters description

Name	Description
Remote Web Management	It specifies whether to enable the remote web management function.
IP Address	It specifies the IP address of a device which is allowed to access the web UI of the device. **All**: It indicates that any computer in WAN can manage this device remotely. For security, this option is not recommended. **Manual**: It indicates that only the device with specified IP address can manage this device remotely. If this device belongs to a LAN, the gateway address (a public IP address) of the device should be entered.
Port	It specifies the port number used for remote management of device. Default: **8080**. You can change it if necessary. Ports 1 to 1024 have been used by well-known services. To avoid port conflicts, you can set the port number to one between 1025 and 65535. Then you can access the device from WAN by visiting an address in the form of **http://WAN IP address:port number**. If the DDNS function is enabled on the device, you can access the device by visiting an address in the form of **http://Domain name of WAN port:port number**.

Example of configuring remote web management

The device is used to bridge to the ISP hotspot for internet access in a house in the countryside, and the device is set to WISP mode.

Networking requirement

The host needs to troubleshoot the network when he is on business. So he needs to access the device's web UI on WAN.

You are recommended to use the remote web management function to solve the problem.

Assume that:

- The WAN IP address of the device is **202.105.106.55**
- The IP address of the computer which is allowed to access the device on WAN is **202.105.88.77**
- Port number is **8080**

Configuration procedures

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

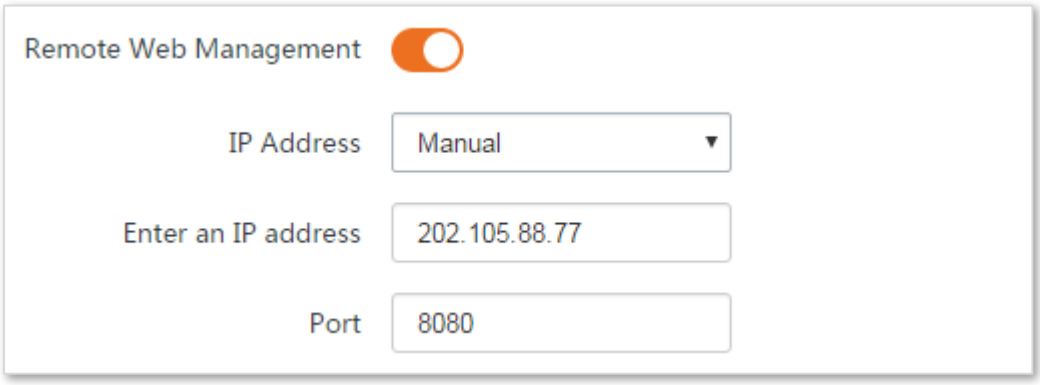
Step 2 Enable the **Remote Web Management** function.

Step 3 Set **IP Address** to **Manual**.

Step 4 Enter the IP address of the computer which is allowed to access the device on WAN, which is **202.105.88.77** in this example.

Step 5 Enter the port number, which is **8080** in this example.

Step 6 Click **Save** in the bottom of this page.



----End

Verification

The host can use his computer to log in to the web UI of the device by access **http://202.105.106.55:8080**.

8.6.3 Reboot schedule

Overview

This function enables the device to automatically reboot as scheduled. You can use this function to prevent wireless performance degradation or network instability due to long-time running.

Configuration procedures

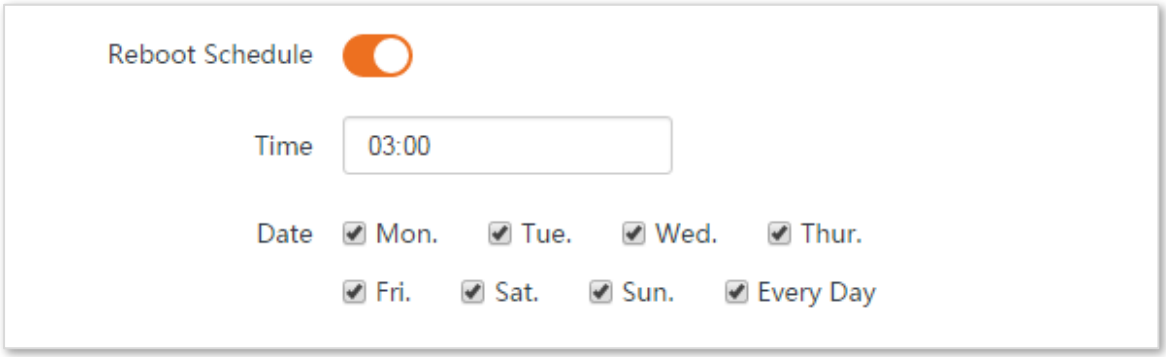
Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Enable the **Reboot Schedule** function.

Step 3 Specify a time at which the device reboots.

Step 4 Specify the dates on which the device reboots.

Step 5 Click **Save** on the bottom of this page.

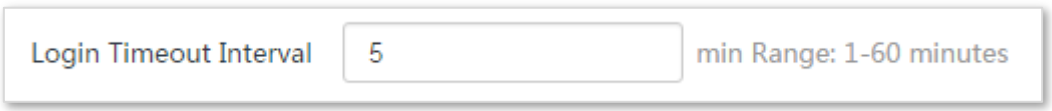


----End

8.6.4 Login timeout interval

If you log in to the web UI of the device and perform no operation within the login timeout interval, the device logs you out for network security. The default login timeout interval is 5 minutes.

Choose **Advanced** > **Network Service** to enter the page.



8.6.5 SNMP agent

Overview

The Simple Network Management Protocol (SNMP) is the most widely used network management protocol in TCP/IP networks. SNMP enables you to remotely manage all your network devices compliant with this protocol, such as monitoring the network status, changing network device settings, and receive network event alarms.

SNMP allows automatic management of devices from various vendors regardless of physical differences among the devices.

SNMP Management Framework

The SNMP management framework consists of SNMP manager, SNMP agent, and Management Information Base (MIB).

- SNMP manager: It is a system that controls and monitors network nodes using the SNMP protocol. The SNMP manager most widely used in network environments is Network Management System (NMS). An NMS can be a dedicated network management server, or an application that implements management functions in a network device.

- SNMP agent: It is a software module in a managed device. The module is used to manage data about the device and report the management data to an SNMP manager.

- MIB: It is a collection of managed objects. It defines a series of attributes of managed objects, including names, access permissions, and data types of objects. Each SNMP agent has its MIB. An SNMP manager can read and/or write objects in the MIB based on the permissions assigned to the SNMP manager.

An SNMP manager manages SNMP agents in an SNMP network. The SNMP manager exchanges management information with the SNMP agents using the SNMP protocol.

Basic SNMP Operations

The device allows the following basic SNMP operations:

- Get: An SNMP manager performs this operation to query the SNMP agent of the device for values of one or more objects.

- Set: An SNMP manager performs this operation to set values of one or more objects in the MIB of the SNMP agent of the device.

SNMP Protocol Version

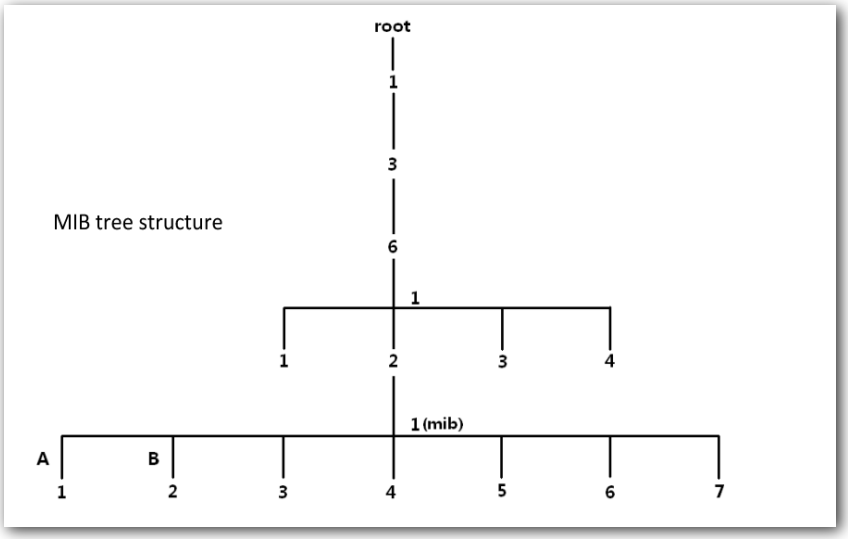
The device is compatible with SNMP V1 and SNMP V2C and adopts the community authentication mechanism. Community name is used to define the relationship between an SNMP agent and an SNMP manager. If the community name contained in an SNMP packet is rejected by a device, the packet is discarded. A community name functions as a password to control SNMP agent access

attempts of SNMP managers.

SNMP V2C is compatible with SNMP V1 and provides more functions than SNMP V1. Compared with SNMP V1, SNMP V2C supports more operations (GetBulk and InformRequest) and data types (such as Counter64), and provides more error codes for better distinguishing errors.

MIB Introduction

An MIB adopts a tree structure. The nodes of the tree indicate managed objects. A path consisting of digits and starting from the root can be used to uniquely identify a node. This path is calling an object identifier (OID).The following figure shows the structure of an MIB. In the figure, the OID of A is 1.3.6.1.2.1.1, whereas the OID of B is 1.3.6.1.2.1.2.



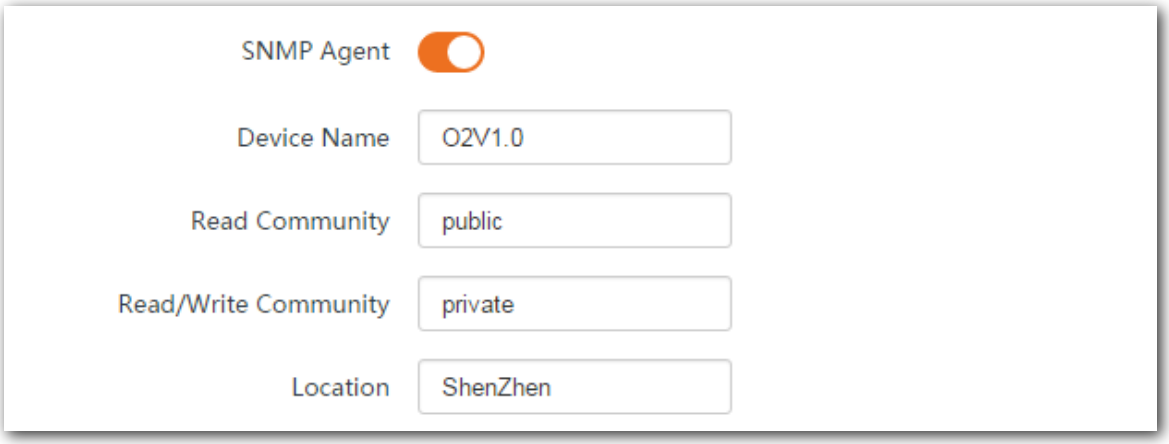
Configure the SNMP agent function

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Enable the **SNMP Agent** function.

Step 3 Set the related SNMP parameters.

Step 4 Click **Save** on the bottom of this page.



----End

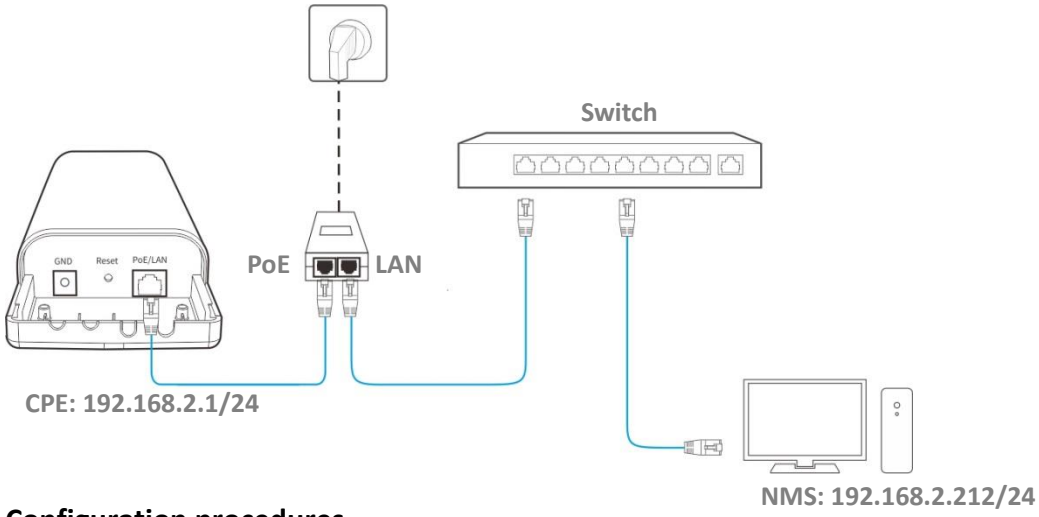
Parameters description

Name	Description
SNMP Agent	It specifies whether to enable the SNMP agent function of the CPE. By default, it is disabled. An SNMP manager and the SNMP agent can communicate with each other only if their SNMP versions are the same. Currently, the SNMP agent function of the device supports SNMP V1 and SNMP V2C.
Device Name	It specifies the device name of the device. The default device name is the model and version number of the device. For example, the default name of this device is O2V1.0 TIP It is recommended that you change the device name so that you can easily identify the device when managing it using SNMP.
Read Community	It specifies the read password shared between SNMP managers and this SNMP agent. The default password is public. The SNMP agent function of the device allows an SNMP manager to use the password to read variables in the MIB of the device.
Read/Write Community	It specifies the read/write password shared between SNMP managers and this SNMP agent. The default password is private. The SNMP agent function of the device allows an SNMP manager to use the password to read/write variables in the MIB of the device.
Location	It specifies the location where the device is used. You can change the location as required.

Example of configuring the SNMP function

Networking requirement

- The device connects to an NMS over an LAN. This network address of the device is 192.168.2.1/24 and the network IP address of the NMS is 192.168.2.212/24.
- The NMS use SNMP V1 or SNMP V2C to monitor and manage the device.



Configuration procedures

Step 1 Set up the device.

Assume that **Read Community** is **Jack**, and **Read/Write Community** is **Jack123**.

1. Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.
2. Enable the **SNMP Agent** function.
3. Set the **Read Community**, which is **Jack** in this example.
4. Set **Read/Write Community**, which is **Jack123** in this example.
5. Click **Save** on the bottom of this page.

Step 2 Set up the NMS.

On an NMS that uses SNMP V1 or SNMP V2C, set the read community to **Jack** and read/write community to **Jack123**. For details about how to configure the NMS, refer to the configuration guide for the NMS.

----End

Verification

After the configuration, the NMS can connect to the SNMP agent of the device and can query and set some parameters on the SNMP agent through the MIB.

8.6.6 Ping watch dog

With this function enabled, the device periodically pings target IP address to check the network connectivity and identify whether the device malfunctions. If it malfunctions, the device will reboot automatically to ensure the network performance.

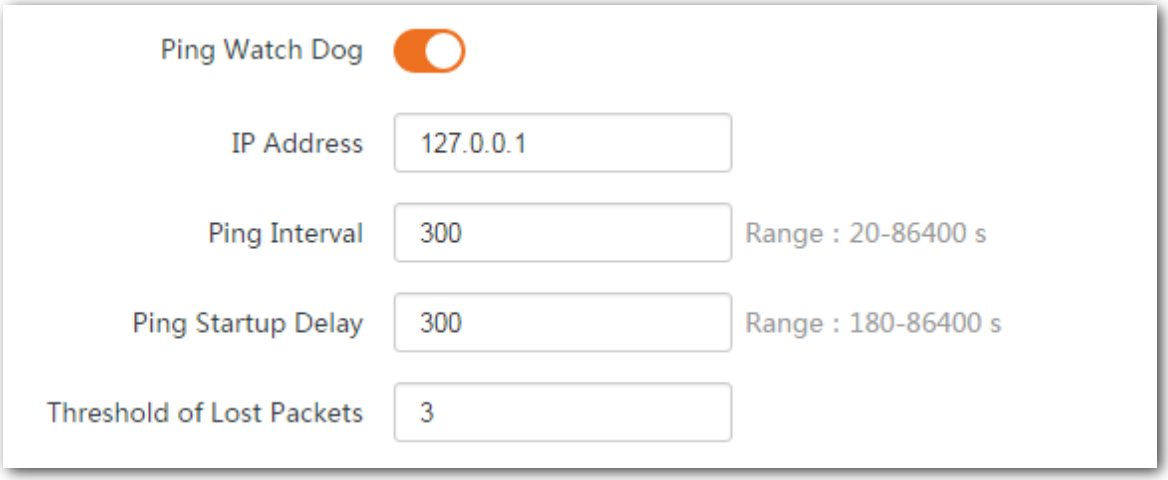
Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Enable the **Ping Watch Dog** function.

Step 3 Set the related parameters.

Step 4 Click **Save** on the bottom of this page.



----End

Parameters description

Name	Description
Ping Watch Dog	It specifies whether to enable the Ping Watch Dog function.
IP Address	It specifies the target IP address that the device pings.
Ping Interval	It specifies the interval at which the device transmits packets to ping the target IP address.
Ping Startup Delay	It specifies the delay time for the device to enable the **Ping Watch Dog** function after the device startup completes. Default: 300 s. Setting a proper Ping Startup Delay time can stop the **Ping Watch Dog** function from being triggered during the startup of the CPE. Such triggering leads to failure of

Name	Description
	accessing the web UI to modify the settings, causing the CPE to start up continuously. The short Ping Startup Delay leaves insufficient time for the user to access the web UI and modify the settings, causing the CPE to start up continuously.
Threshold of Lost Packets	It specifies the threshold of lost packet that triggers reboot. Range: 1 to 65535, default: 3. For example, if 5 is set, the device will reboot automatically when it does not receive response after sending 5 Ping packets to target IP address/domain name.

8.6.7 DMZ host

The **DMZ** function is only available in **WISP** or **Router** mode.

A DMZ host on a LAN can communicate with the internet without limit. You can set a computer that require higher internet connection throughput, such as a computer used for video conferencing or online gaming, as a DMZ host for better user experience.

NOTE

- A computer set to DMZ host is not protected by the firewall of the device.
- A hacker may leverage the DMZ host to attack your LAN. Therefore, enable the DMZ function only when necessary.

Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Enable the **DMZ Host** function.

Step 3 Enter the IP address of the device to be set to DMZ host.

Step 4 Click **Save** on the bottom of this page.

----End

TIP

Security software, antivirus software, and the built-in OS firewall of the host may cause the function failures. Disable them and try again if the function fails.

Example of configuring DMZ host

The device is used in a company to deploy its network, and it is set to WISP mode.

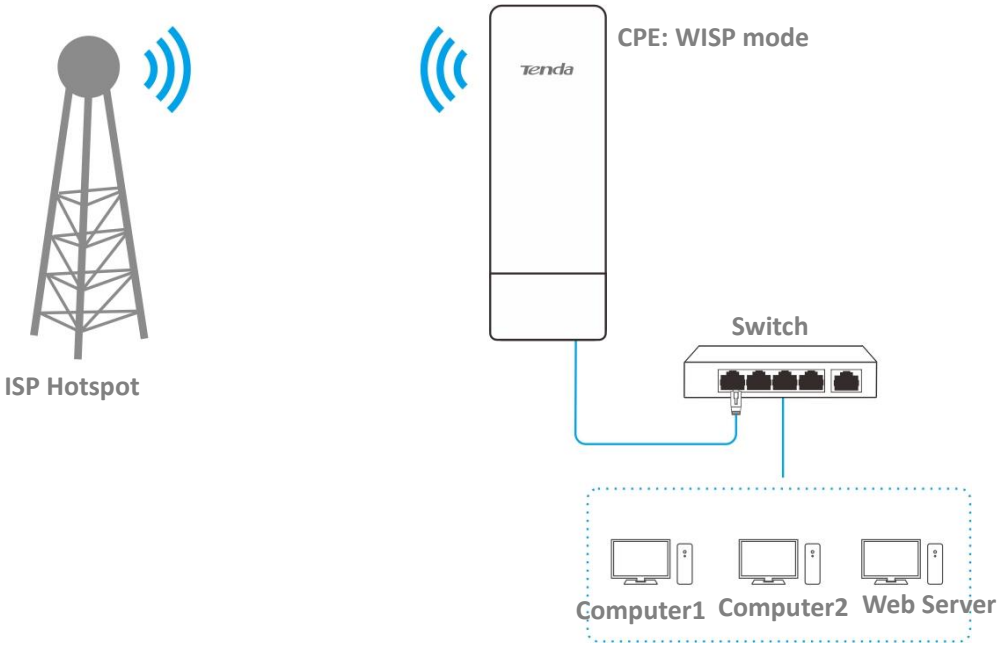
Networking requirement

The administrator on business can visit the resources on web server in LAN.
You can use DMZ Host function to solve the problem.

Assume that:

- The WAN IP address of the device is **202.105.106.55**.
- The information of the internal web server is shown as follows:
- **IP Address**: 192.168.2.100

Network topology



Configuration procedures:

Prerequisite: Manually set static an IP address and related parameters for the web server to avoid the service disconnection caused by the dynamic IP address.

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Advanced** > **Network Service**.

Step 2 Enable the **DMZ Host** function.

Step 3 Enter the IP address of the computer to be set to DMZ host, which is **192.168.2.100** in this example.

Step 4 Click **Save** on the bottom of this page.

----End

Verification

Enter **Protocol name**://**WAN port IP address** in the address bar of a web browser on a computer over the internet to access the resources on the web server. In this example, enter **http://202.105.106.55**.

If the DDNS function is enabled, you can visit an address in the form of **Protocol name**://**domain name**.

TIP

If internet users still cannot visit the web server in LAN after the configuration, try the following solutions:

- Ensure that the WAN IP address of the device is a public IP address.
- Security software, antivirus software, and the built-in OS firewall of the computer may cause the function failures. Disable them and try again.
- Manually set an IP address and related parameters for the web server to avoid the service disconnection caused by the dynamic IP address.

8.6.8 Telnet service

With this function enabled, the device can be managed via Telnet. Generally this function is used to maintain the device by technical professional.

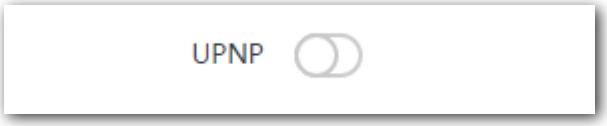
To access the page, choose **Advanced** > **Network Service**. By default, the function is enabled.

8.6.9 UPnP

Universal Plug and Play (UPnP) is a set of networking protocols that makes automatic port forwarding possible. It can identify devices and enable ports for certain applications, such as Thunder. To use this function, it requires that the operating system support UPnP, or application software supporting UPnP is installed.

To access the page, choose **Advanced** > **Network Service**. By default, the function is disabled.

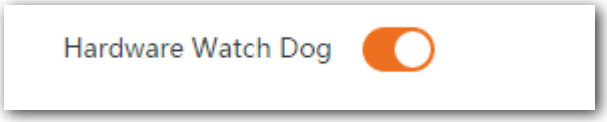
You can enable it as required.



8.6.10 Hardware watch dog

This function uses an embedded watchdog timer to detect the operation condition of the device's main program regularly. During normal operation, the device regularly resets the watchdog timer to prevent it from elapsing, or "timing out". If the device fails to reset the watchdog timer, due to a hardware fault or program error, the timer will elapse and generate a timeout signal. The timeout signal is used to reboot the device to make it recover from malfunctions.

Choose **Advanced** > **Network Service** to enter the page. By default, the function is enabled.



8.6.11 STP

Spanning Tree Protocol (STP) is a network protocol standardized by IEEE 802.1D. It helps establish a loop-free logical topology for Ethernet network, and allows a network design to include backup links to provide fault tolerance if an active link fails. The STP-enabled device creates a spanning tree within a network of connected layer-2 bridges, and disables those links that are not part of the spanning tree, leaving a single active path between any two network nodes. So that it prevents packets from continued proliferation and endless loop in a loop network to avoid reducing the capability of processing packets caused by receiving duplicate packets.

Choose **Advanced** > **Network Service** to enter the page. By default, the function is disabled.

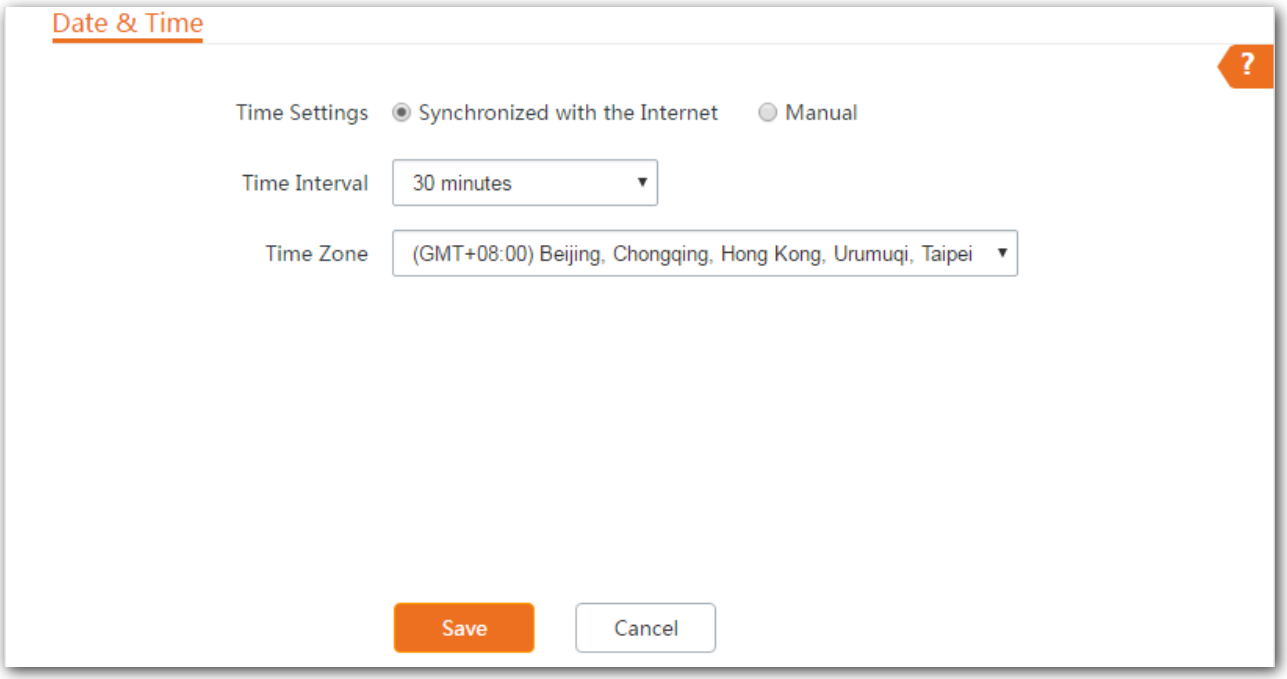
9 Tools

9.1 Date & time

This module enables you to set the system time of the device.

Ensure that the system time of the device is correct, so that logs can be recorded correctly and the reboot schedule can be executed correctly.

Choose **Tools** > **Date & Time** to enter the page.



The device allows you to set the system time by synchronizing the time with the internet or manually setting the time. By default, it is configured to synchronize the system time with the internet.

9.1.1 Synchronized with the Internet

The device automatically synchronizes its system time with a time server of the internet. This enables the device to automatically correct its system time after being connected to the internet.

For details about how to connect the CPE to the internet, refer to the configuration procedure of corresponding mode in Quick Setup.

Configuration procedures:

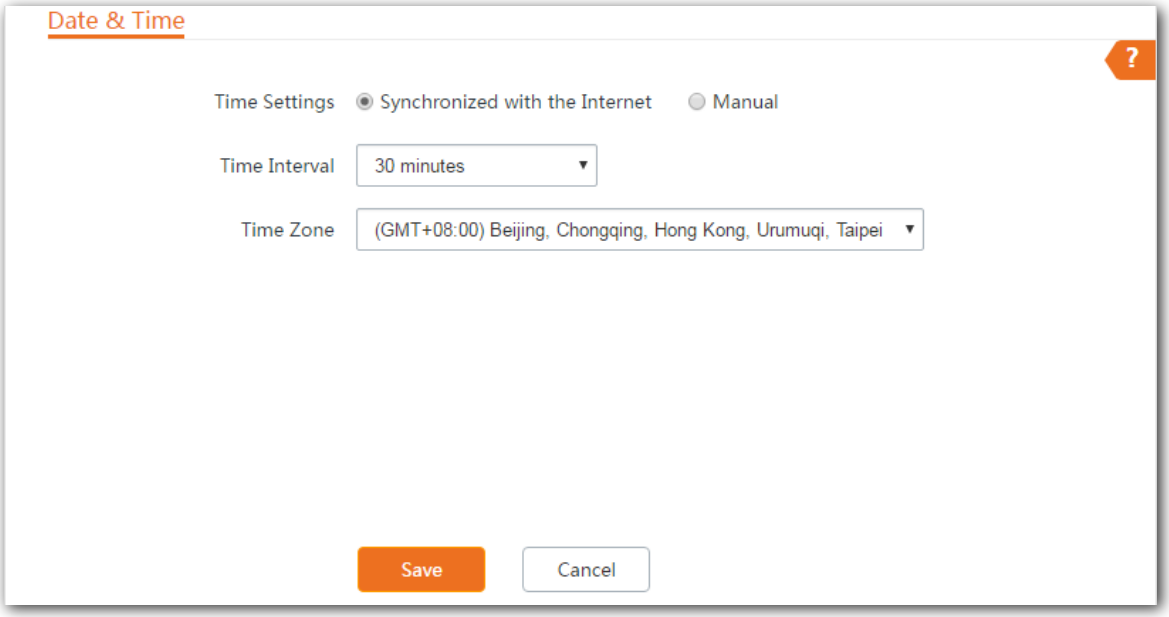
Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Date & Time**.

Step 2 Set **Time settings** to **Synchronized with the Internet**.

Step 3 Specify a time interval. The default value **30 minutes** is recommended.

Step 4 Set **Time Zone** to your time zone.

Step 5 Click **Save**.



----End

9.1.2 Manual

You can manually set the system time of the device. If you choose this option, you need to set the system time each time after the device reboots.

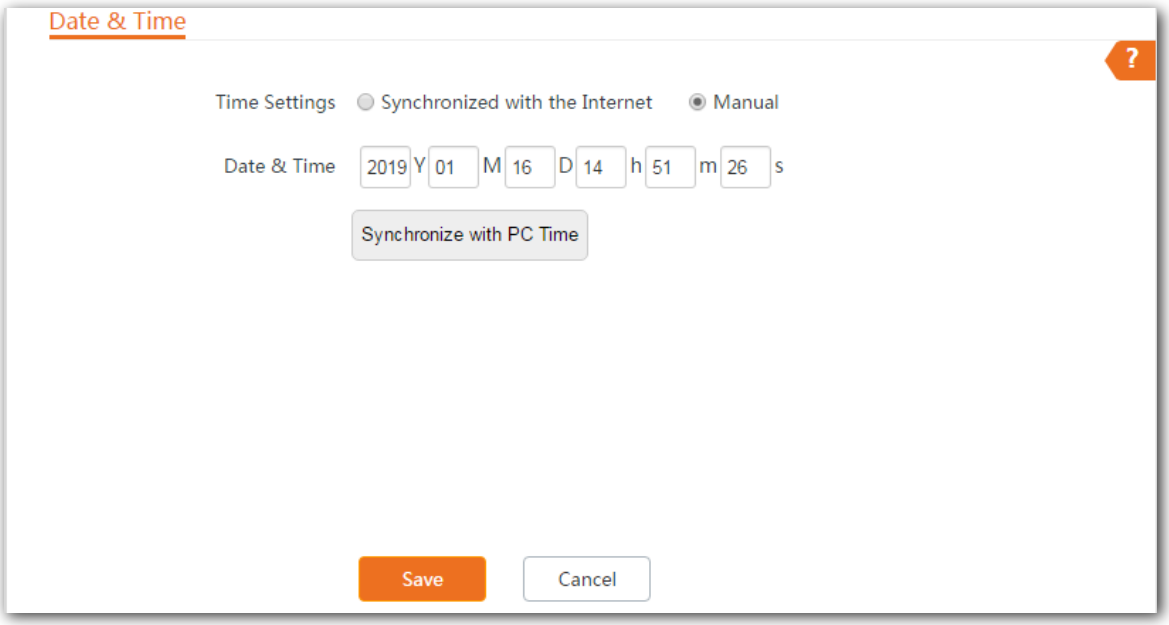
Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Date & Time**.

Step 2 Set the **Time Settings** to **Manual**.

Step 3 Enter a correct date and time, or click **Synchronize with PC Time** to synchronize the system time of the device with the system time (ensure that it is correct) of the computer being used to manage the device.

Step 4 Click **Save**.



----End

9.2 Maintenance

9.2.1 Reboot device

If a setting does not take effect or the device works improperly, you can try rebooting the device to resolve the problem.

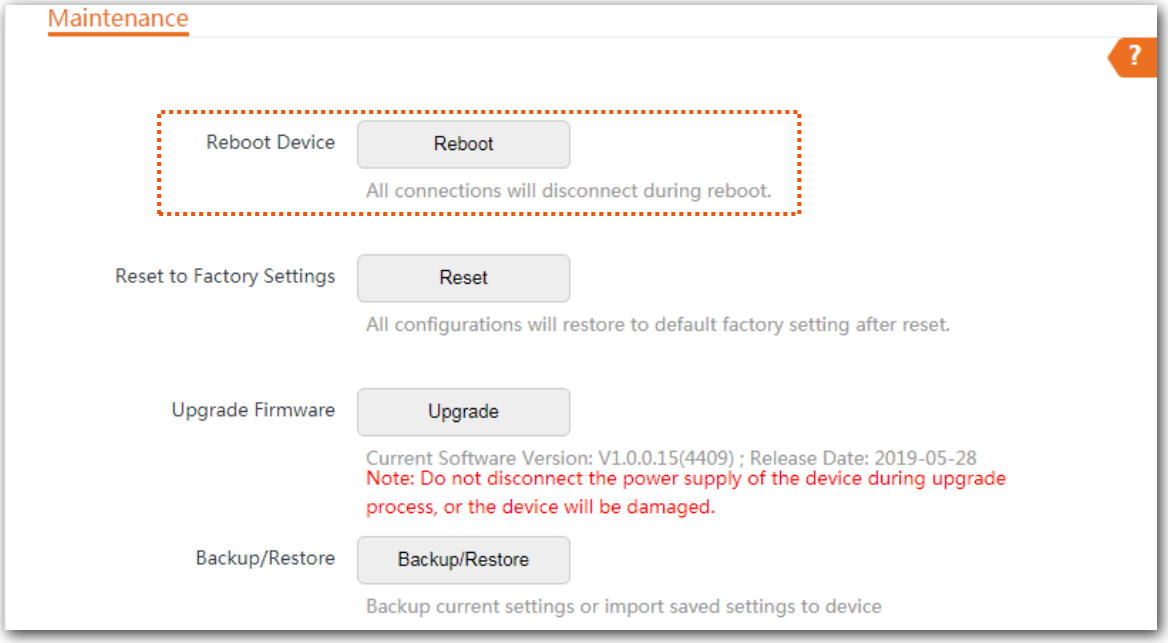
TIP

When the device reboots, the current connections will be disconnected. Perform this operation when the device is NOT busy.

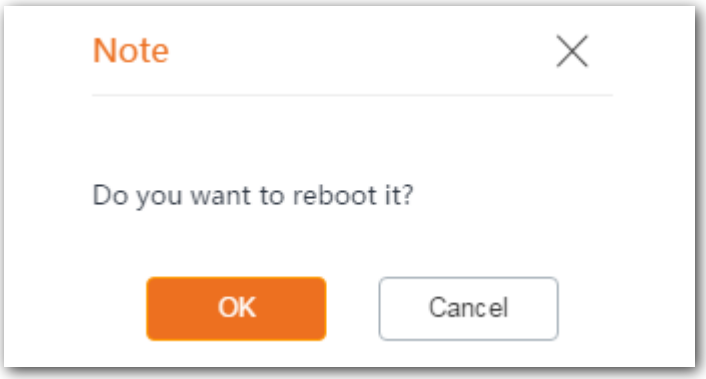
Configuration procedures:

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Maintenance**.

Step 2 Click **Reboot**.



Step 3 Click **OK** on the pop-up window.



----End

A progress bar is displayed on the page. Wait for it to elapse.

9.2.2 Reset to factory settings

If you cannot locate a fault of the device or forget the login password of the web UI, you can reset the device to restore its factory settings and then configure it again.

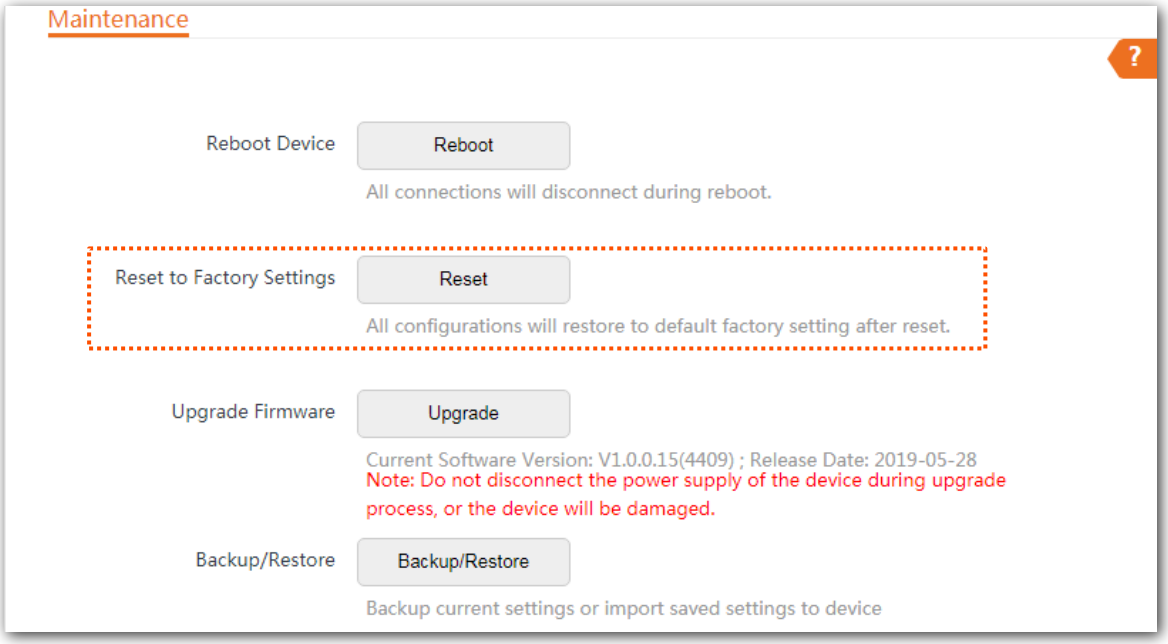
NOTE

- When the factory settings are restored, the configuration of the device is cleared.
- To prevent device damages, do not power off the device during resetting.
- When the factory settings are restored, the login IP address is 192.168.2.1, and both login user name and password are **admin**.

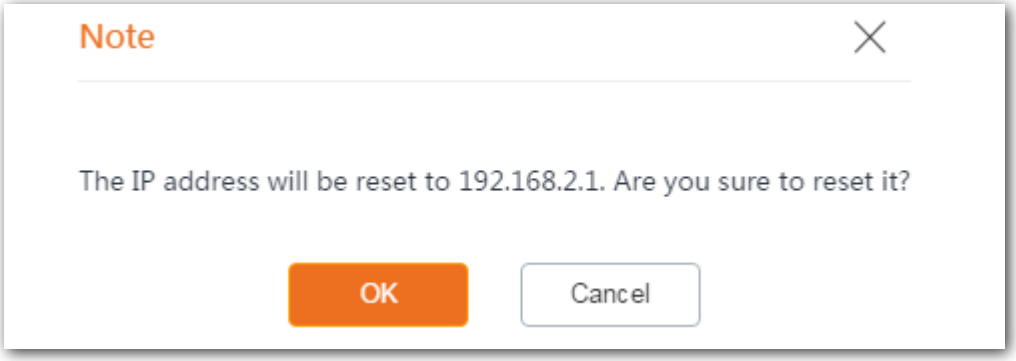
Option 1: Reset the CPE using the web UI

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Maintenance**.

Step 2 Click **Reset**.



Step 3 Click **OK** on the pop-up window.



----End

A progress bar is displayed on the page. Wait for it to elapse.

Option 2: Reset the CPE using the Reset button

When the **Power** LED indicator lights solid on, hold down the **Reset** button for about 8 seconds, then release it. When all the LED indicators light up and then turn off, the CPE is restored to factory settings.

9.2.3 Upgrade firmware

This function upgrades the firmware of the device for more functions and higher stability.

NOTE

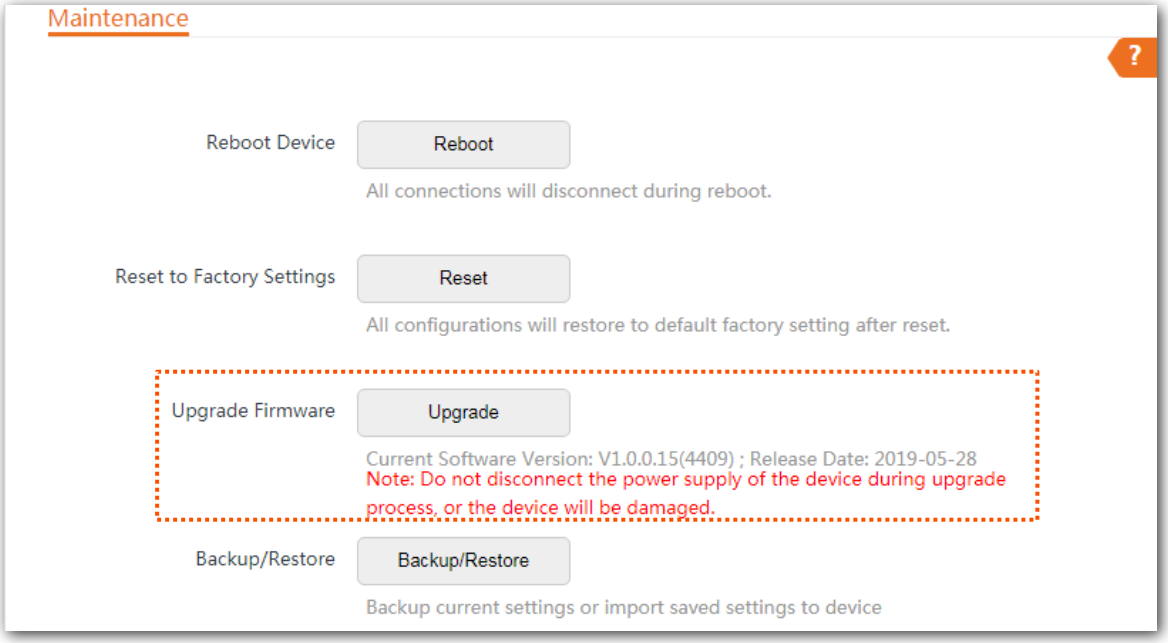
To prevent damaging the device, verify that the new firmware version is applicable to the device before upgrading the firmware and keep the power supply of the device connected during an upgrade.

Configuration procedures:

Step 1 Download the package of a later firmware version for the device from www.tendacn.com to your local computer, and decompress the package.

Step 2 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Maintenance**.

Step 3 Click **Upgrade**.



Step 4 Select the correct upgrade file from your local computer.

----End

Wait for the progress bar completes. Then log in to the web UI of the device. On the Status page, check if the current Firmware Version is consistent with the firmware version you selected for upgrade.

TIP

After the device is upgraded, you are recommended to restore the factory settings of the device and configure it again to get the best experience.

9.2.4 Backup/restore

The **Backup/Restore** function enables you to export the current configuration of the device to a local computer, and import the configuration file you export before.

You are recommended to back up the new configuration, so that you can restore it after upgrading or resetting the device, or import the configuration to other devices of the same product model.

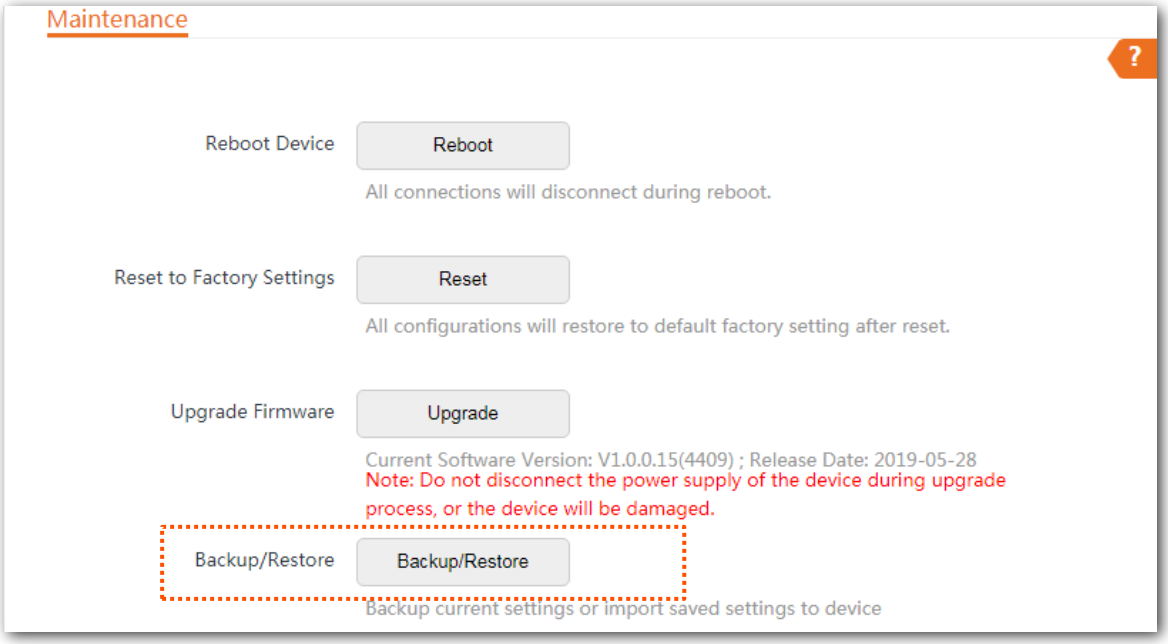
NOTE

If you need to apply same or similar configurations to many devices, you can configure one of the devices, back up the configuration of the device, and use the backup to restore the configuration on the other devices. This improves configuration efficiency.

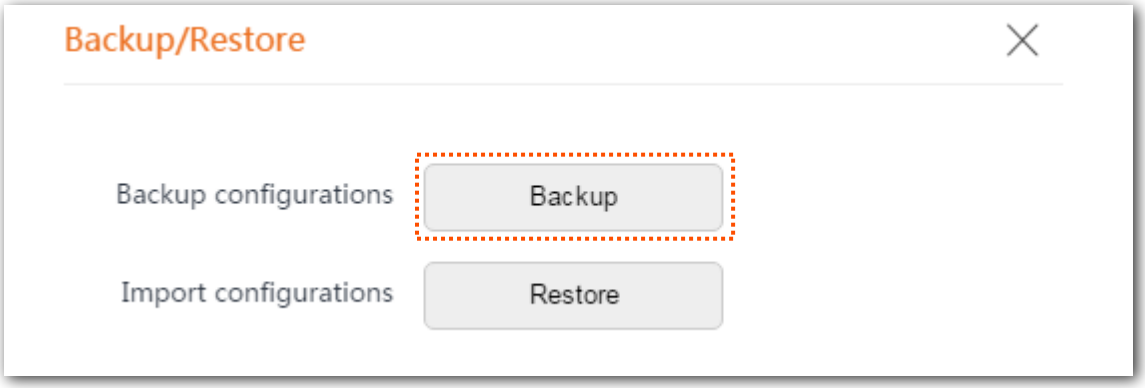
Export the configuration

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Maintenance**.

Step 2 Click **Backup/Restore**.



Step 3 Then click **Backup** on the pop-up window.



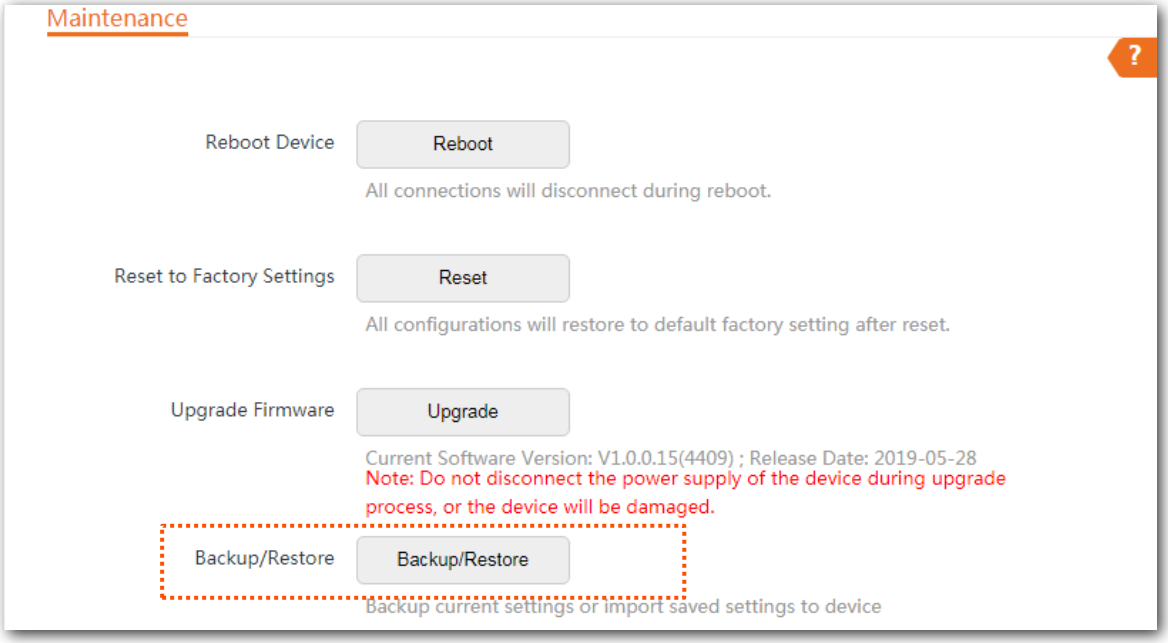
----End

A file named **APCfm.cfg** is downloaded to your local computer.

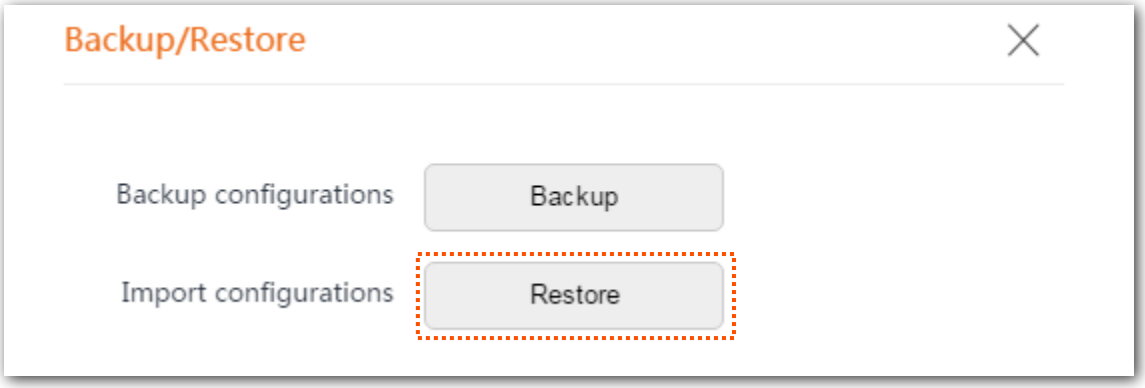
Import the configuration

Step 1 Start a web browser on the computer connected to the CPE, visit **192.168.2.1** and choose **Tools** > **Maintenance**.

Step 2 Click **Backup/Restore**.

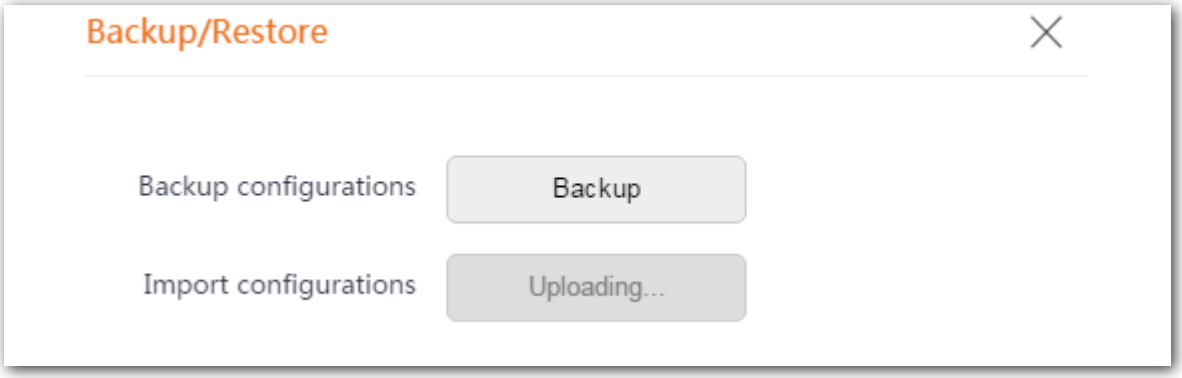


Step 3 Click **Restore** on the pop-up window.



Step 4 Select and upload the file you back up before.

----End



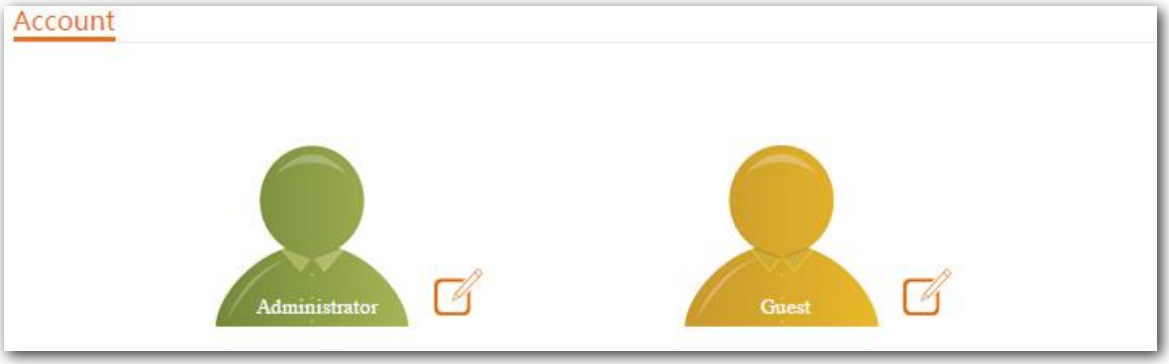
Wait for the progress bar completes. Then the device is restored the settings successfully.

9.3 Account

On this page, you can change the login account information of the device to prevent unauthorized login. By default, the device has one administrator account and one guest account. With the administrator account, you can modify and view the settings of the device while with the guest account, you can only view the settings.

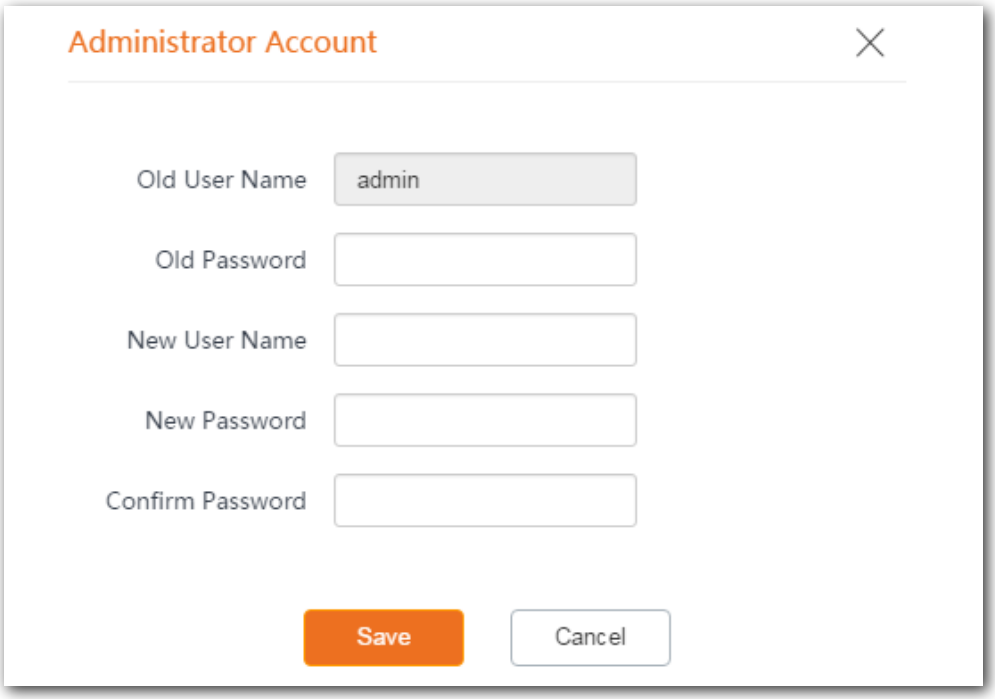
To access the page, choose **Tools** > **Account**.

Click  to change the account information.



9.3.1 Administrator

You can modify and view the settings with the administrator account. Both the default user name and password of the administrator account are **admin**.

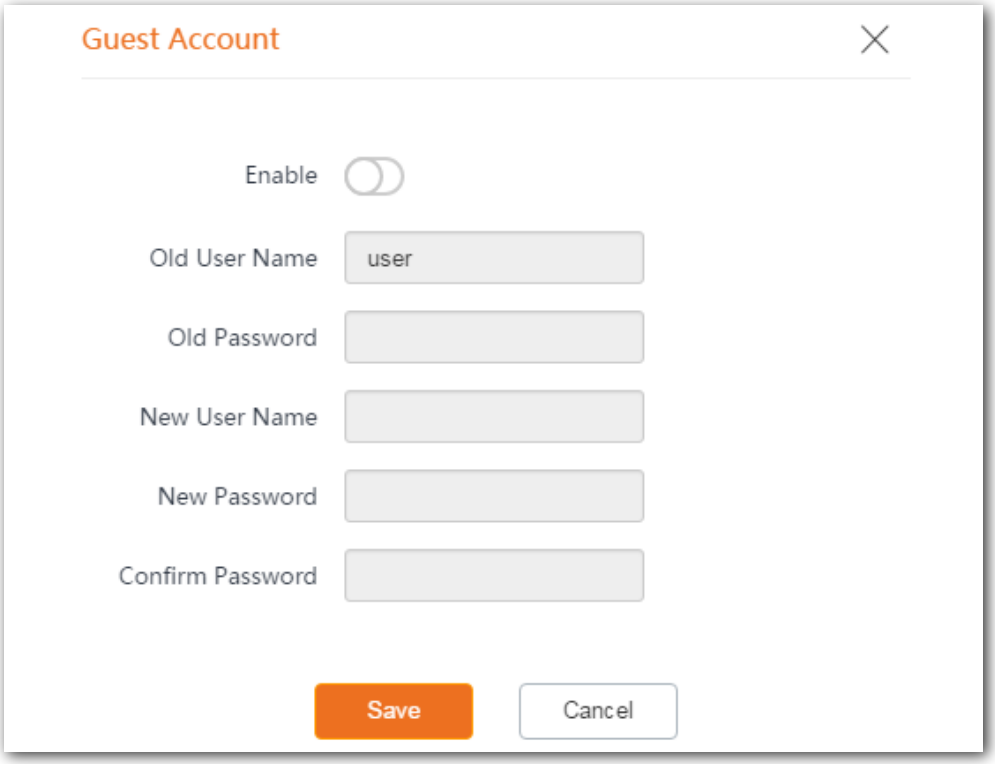


Parameters description

Name	Description
Old User Name	It specifies the user name of the current login account. By default, the device has one administrator account and one guest account. Administrator user name/password: admin/admin (all lowercase) Guest user name/password: user/user (all lowercase)
Old Password	It specifies the current login password.
New User Name	Specify a new login user name.
New Password	Specify a new login password.
Confirm Password	Enter the new login password again.

9.3.2 Guest

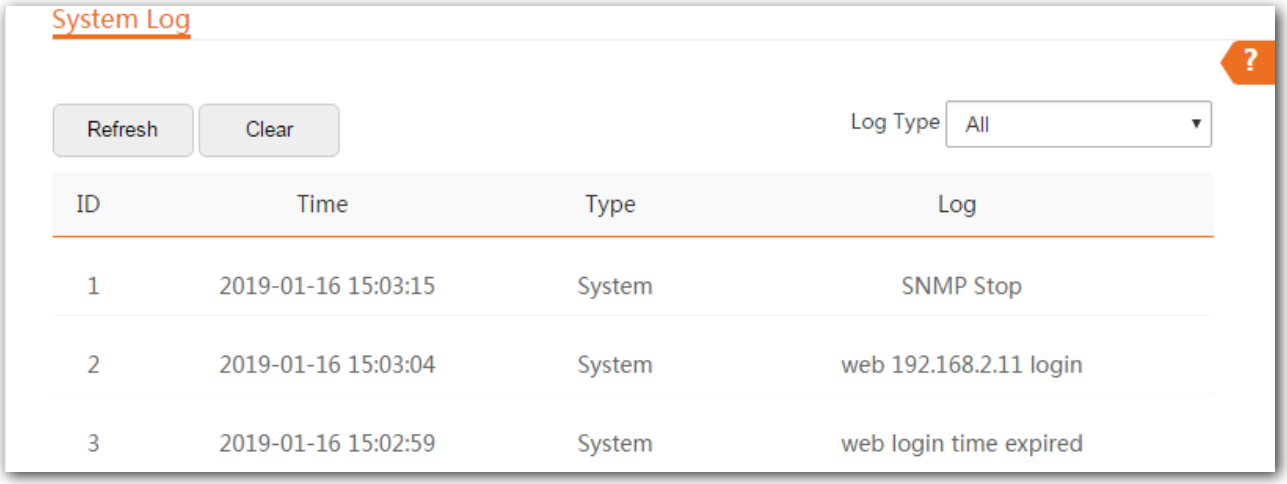
This account only allows you to view the settings. By default, this account is disabled. Both the default user name and password are **user**.



9.4 System log

To access the page, choose **Tools** > **System Log**. The maximum of 300 items can be saved. After the total log items exceed the maximum number, the previous logs will be cleared.

The logs of the device record various events that occur and the operations that users perform after the device starts. In case of a system fault, you can refer to the logs during troubleshooting.



To ensure that the logs are recorded correctly, verify the system time of the device. You can correct the system time of the device by choosing **Tools** > **Date & Time**.

To view the latest logs of the device, click **Refresh**. To clear the existing logs, click **Clear**.

NOTE

- When the device reboots, the previous logs are lost.
- The device reboots when one of the following situations occurs: the device is powered on after a power failure, the VLAN function is configured, the firmware is upgraded, the configuration of the device is backed up or restored or the factory settings are restored.

Appendix

A.1 Default parameters

The default parameters are shown in the following table:

Parameters			Default settings
Login	Login IP Address		192.168.2.1
	Administrator	User name	admin
		Password	admin
	Guest		Disable
Quick Setup	Working Mode		AP mode
LAN Setup	IP Address Type		Static IP address
	IP Address		192.168.2.1
	Subnet Mask		255.255.255.0
DHCP Server	DHCP Server		Enable
	Start IP Address		192.168.2.100
	End IP Address		192.168.2.200
	Subnet Mask		255.255.255.0
	Gateway Address		192.168.2.254
	Primary DNS Server		8.8.8.8
	Lease Time		1 day
VLAN Settings	VLAN Settings		Disable
	PVID		1
	Management VLAN		1
	WLAN		1000
Wireless	Wireless Network		Enable
	SSID		Tenda_*XXXXXX*, and *XXXXXX* is the last six characters of the LAN MAC address of the device

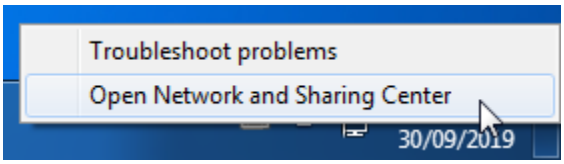
Parameters		Default settings
	Security Mode	None
	Transparent Bridge	Enable
	TD-MAX	Disable
	TPC	Enable
	Signal LED1 Threshold	-90 dBm
	Signal LED2 Threshold	-80 dBm
	Signal LED3 Threshold	-70 dBm
Network Service	Login Timeout Interval	5 min
	Ping Watch Dog	Disable
	Telnet Service	Enable
	UPnP	Disable
	Hardware Watch Dog	Enable
	STP	Disable
Tools	Date & Time	Synchronized with the Internet

A.2 How to assign a fixed IP address to your computer

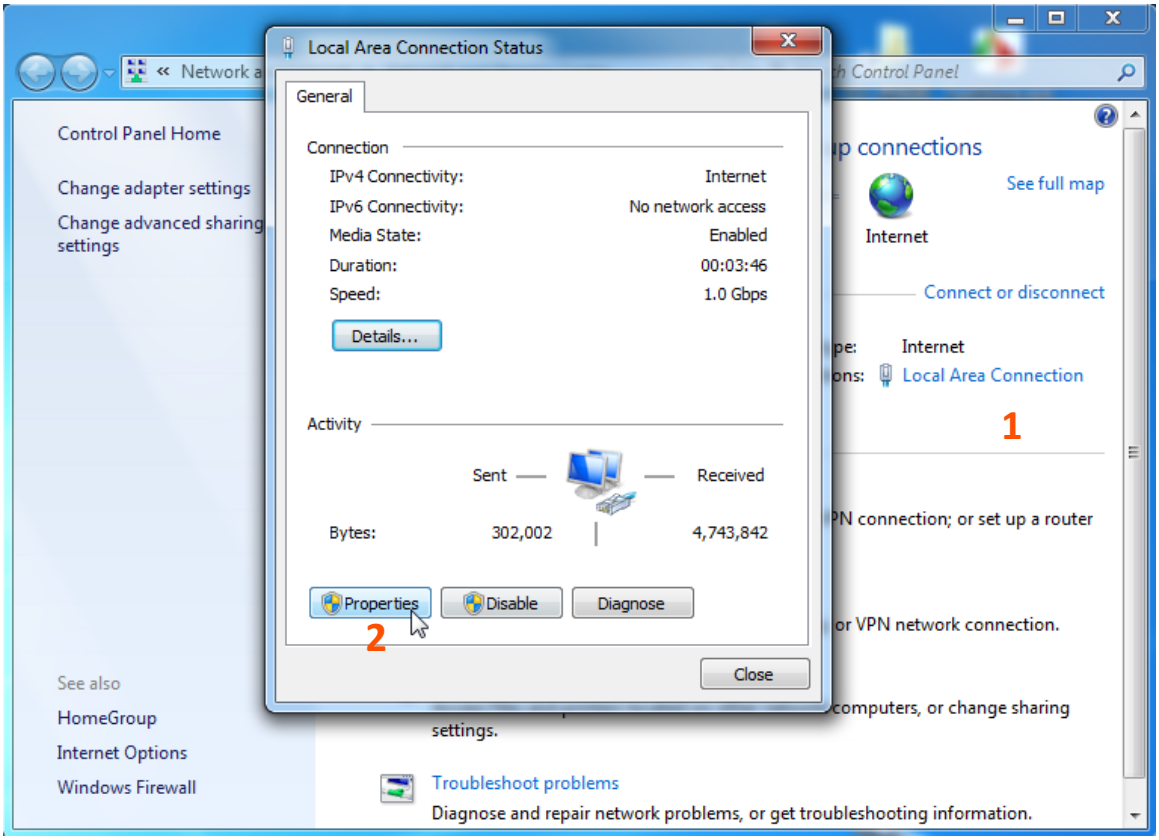
OS example: Windows 7

Step 5 Right-click the  icon on the bottom-right corner of the desktop.

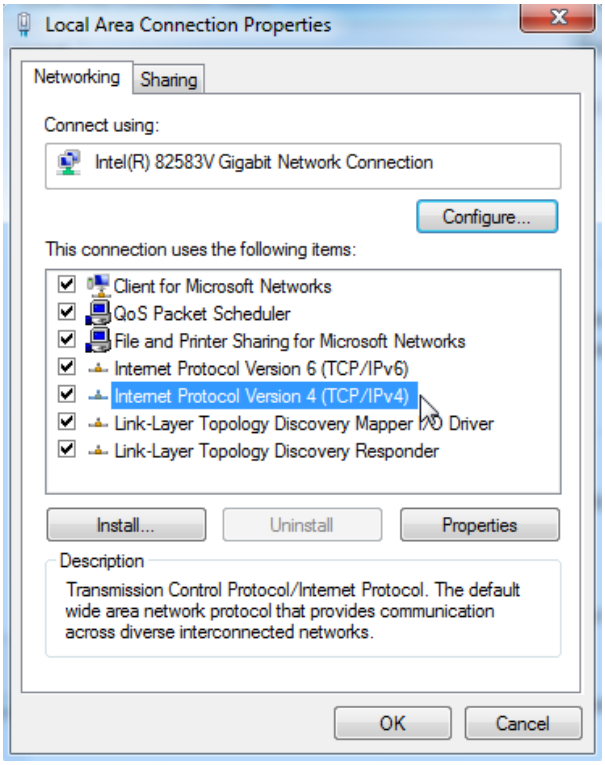
Step 6 Click **Open Network and Sharing Center**.



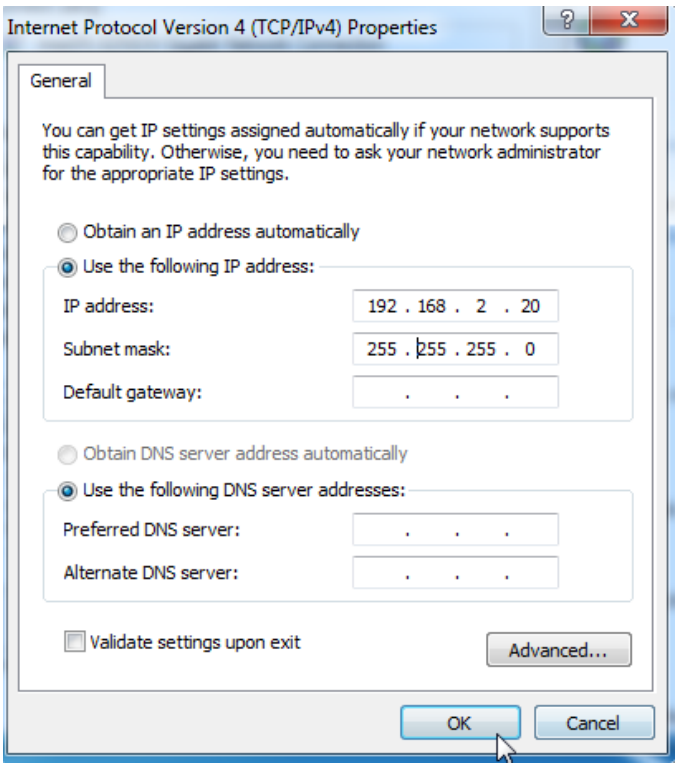
Step 7 Click **Local Area Connection**, then click **Properties**.



Step 8 Double-click **Internet Protocol Version 4 (TCP/IPv4)**.



Step 9 Select **Use the following IP address**, set the **IP address** to **192.168.2.*X*** (*X* ranges from 2 to 253), the **Subnet mask** to **255.255.255.0**, and click **OK**.



6. Click **OK** on the **Local Area Connection Properties** window, and close the other windows.

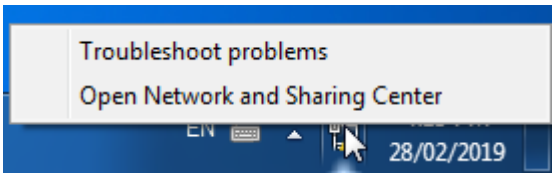
----End

A.3 How to check the gateway IP address of a computer

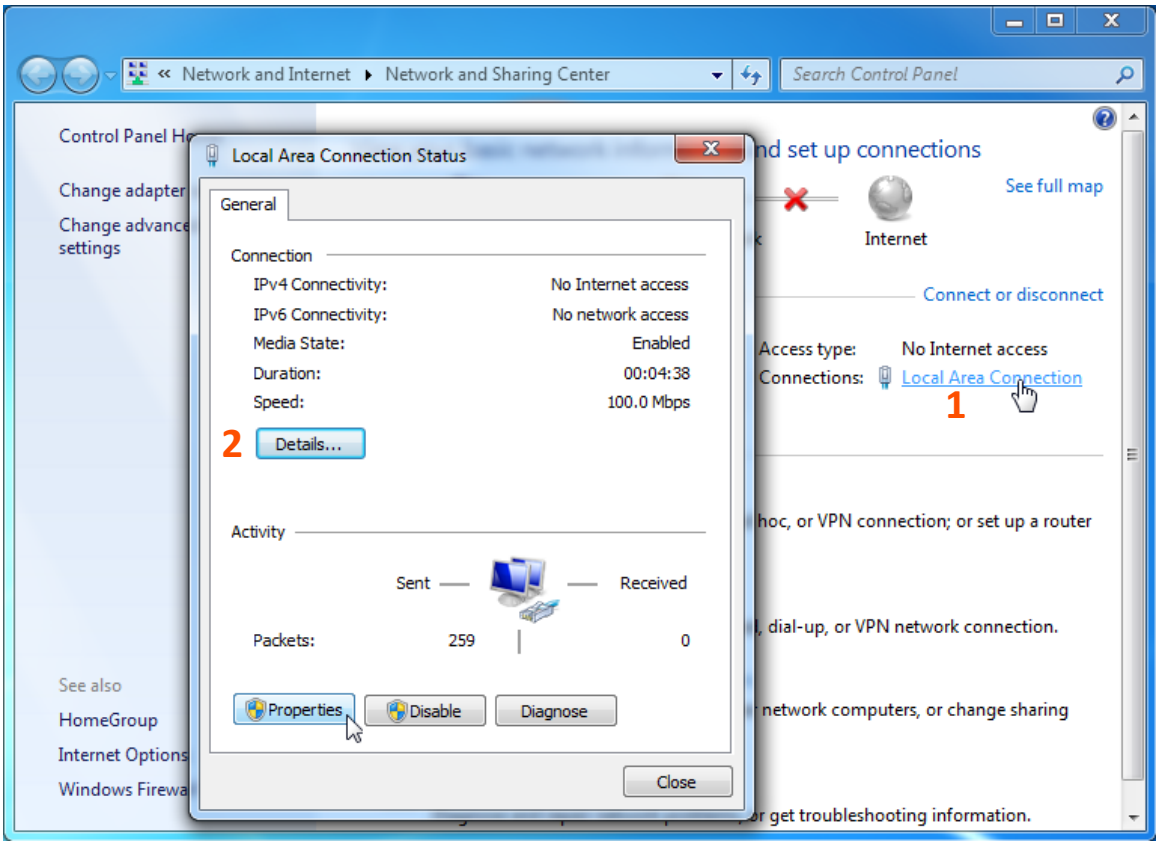
OS example: Windows 7

Step 10 Right-click the  icon on the bottom-right corner of the desktop.

Step 11 Click **Open Network and Sharing Center**.



Step 12 Click **Local Area Connection**, then click **Details…**



Then you can check the default gateway address on the following page.