



# **Wireless Dual Band Ceiling Access Point i21**

## **User Guide**

## Copyright Statement

© 2018 Shenzhen Tenda Technology Co., Ltd. All rights reserved.

**Tenda** is a registered trademark legally held by Shenzhen Tenda Technology Co., Ltd. Other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders. Copyright of the whole product as integration, including its accessories and software, belongs to Shenzhen Tenda Technology Co., Ltd. No part of this publication can be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form or by any means without the prior written permission of Shenzhen Tenda Technology Co., Ltd.

## Disclaimer

Pictures, images and product specifications herein are for references only. To improve internal design, operational function, and/or reliability, Tenda reserves the right to make changes to the products without obligation to notify any person or organization of such revisions or changes. Tenda does not assume any liability that may occur due to the use or application of the product described herein. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information and recommendations in this document

do not constitute a warranty of any kind, express or implied.

## Preface



Thank you for choosing Tenda! Please read this user guide before you start with i21.

## Conventions

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 <b>User Name</b> to Tom.
Variable	Italic	Format: XX:XX:XX:XX:XX:XX
UI control	Bold	On the <b>Policy</b> page, click the <b>OK</b> button.
Message	“ ”	The “Success” message appears.

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

Symbol	Meaning
 <b>NOTE</b>	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.
 <b>TIP</b>	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
AC	Access Point Controller
SSID	Service Set Identifier
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
ISP	Internet Service Provider
AES	Advanced Encryption Standard
VLAN	Virtual Local Area Network

Acronym or Abbreviation	Full Spelling
TKIP	Temporal Key Integrity Protocol
PoE	Power Over Ethernet
WEP	Wired Equivalent Privacy

## Additional Information

For more information, search this product model on our website at <http://www.tendacn.com>.

## 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	 Email support@tenda.cn
	Canada: 1-888-998-8966	
	Hong Kong: 00852-81931998	
 Website	<a href="http://www.tendacn.com">http://www.tendacn.com</a>	 Skype tendasz

# Contents

1 Getting to Know Your Device .....	1
1.1 Overview .....	1
1.2 Appearance .....	1
1.2.1 LED Indicator .....	1
1.2.2 Button and Port .....	2
1.2.3 Label .....	2
2 Application Scenarios .....	4
2.1 Small Scale WiFi Network Deployment .....	4
2.1.1 Deploying the AP with a Tenda Router with the AP Controller Capacity .....	4
2.1.2 Deploying the AP with a Router without the AP Controller Capacity .....	5
2.2 Large Scale WiFi Network Deployment .....	6
3 Login .....	7
3.1 Logging in to the Web UI of the AP .....	7
3.2 Logging out of the Web UI of the AP .....	9
3.3 Web UI Layout .....	9
3.4 Common Buttons on the Web UI .....	10
4 Quick Setup .....	11
4.1 Overview .....	11
4.2 Configuring AP Mode .....	13
4.3 Configuring APClient Mode .....	14
5 Status .....	17
5.1 System Status .....	17
5.2 Wireless Status .....	19
5.3 Traffic Statistics .....	20
5.4 Client List .....	21
6 Network Settings .....	22
6.1 LAN Setup .....	22
6.1.1 IP Address Obtaining Mode – Static IP .....	23
6.1.2 IP Address Obtaining Mode – Dynamic IP .....	24

6.2 DHCP Server .....	25
6.2.1 Overview .....	25
6.2.2 Configuring the DHCP Server .....	25
6.2.3 DHCP Client List .....	28
7 Wireless Settings .....	29
7.1 Basic Settings .....	29
7.1.1 Overview .....	29
7.1.2 Changing the SSID Setup .....	31
7.1.3 Examples of Configuring SSID Setup .....	37
7.2 Radio Settings .....	57
7.2.1 Overview .....	57
7.2.2 Changing the Radio Settings .....	57
7.3 Radio Optimizing .....	60
7.3.1 Overview .....	60
7.3.2 Optimizing Radio .....	61
7.4 Frequency Analysis .....	64
7.4.1 Overview .....	64
7.4.2 Checking the Usage of Channels .....	64
7.4.3 Checking the Wireless Networks Nearby .....	65
7.5 WMM Setup .....	66
7.5.1 Overview .....	66
7.5.2 Changing the WMM Settings .....	67
7.6 Access Control .....	69
7.6.1 Overview .....	69
7.6.2 Configuring Access Control .....	69
7.6.3 Example of Configuring Access Control .....	70
7.7 Advanced .....	72
7.7.1 Overview .....	72
7.7.2 Changing the Advanced Settings .....	72
7.8 QVLAN Settings .....	74
7.8.1 Overview .....	74
7.8.2 Configuring the QVLAN Function .....	74

7.8.3 Example of Configuring QVLAN Settings .....	75
8 SNMP .....	78
8.1 Overview .....	78
8.1.1 SNMP Management Framework .....	78
8.1.2 Basic SNMP Operations .....	78
8.1.3 SNMP Protocol Version .....	79
8.1.4 MIB Introduction .....	79
8.2 Configuring the SNMP Function .....	80
8.3 Example of Configuring the SNMP Function .....	81
Networking Requirement .....	81
Configuration Procedure .....	81
Verification .....	82
9 Tools .....	83
9.1 Firmware Upgrade .....	83
9.2 Time & Day .....	84
9.2.1 System Time .....	84
9.2.2 Login Timeout .....	86
9.3 Logs .....	87
9.3.1 View Logs .....	87
9.3.2 Log Setup .....	88
9.4 Configuration .....	91
9.4.1 Backup & Restore .....	91
9.4.2 Restoring the Factory Settings .....	91
9.5 User Name & Password .....	93
9.6 Diagnostics .....	94
9.7 Device Reboot .....	96
9.7.1 Manual Reboot .....	96
9.7.2 Automatic Reboot .....	96
9.8 LED .....	98
9.9 Uplink Detection .....	99
9.9.1 Overview .....	99
9.9.2 Configuring Uplink Detection .....	99

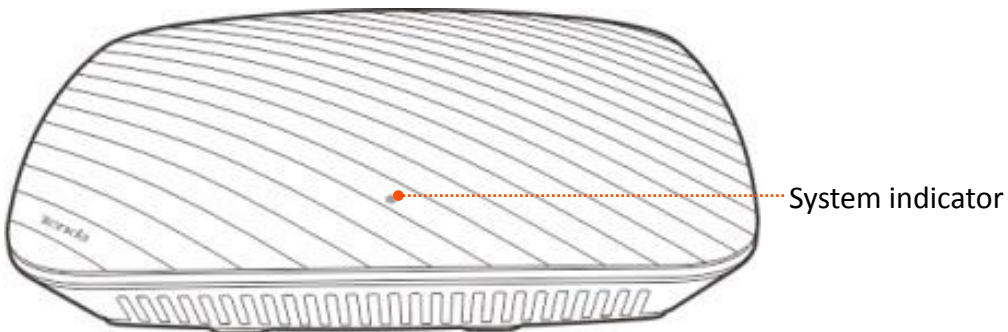
# 1 Getting to Know Your Device

## 1.1 Overview

Tenda i21 is a dual band wireless access point designed for crowded places such as offices, bars and cafes. Featuring the dual-band (2.4 GHz/5 GHz) capacity and equipped with the MIMO and OFDM technologies, it offers a combined data rate of up to 1167 Mbps. You can use the built-in power adjustment mode to adjust the transmit power as needed. Compliant with IEEE 802.3af standard, i21 allows you to apply long-distance power supply via PoE without changing your original power network. All of this makes i21 an ideal choice for WiFi coverage.

## 1.2 Appearance

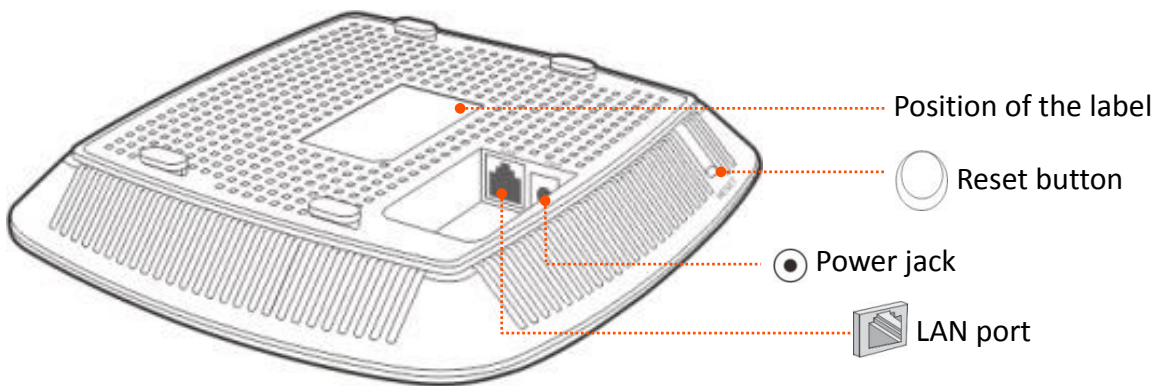
### 1.2.1 LED Indicator



LED Indicator	Status	Description
System indicator	Solid on	The system is booting or faulty.
	Blinking	The system is running properly.
	Off	The system is powered off or the LED indicator is turned off.



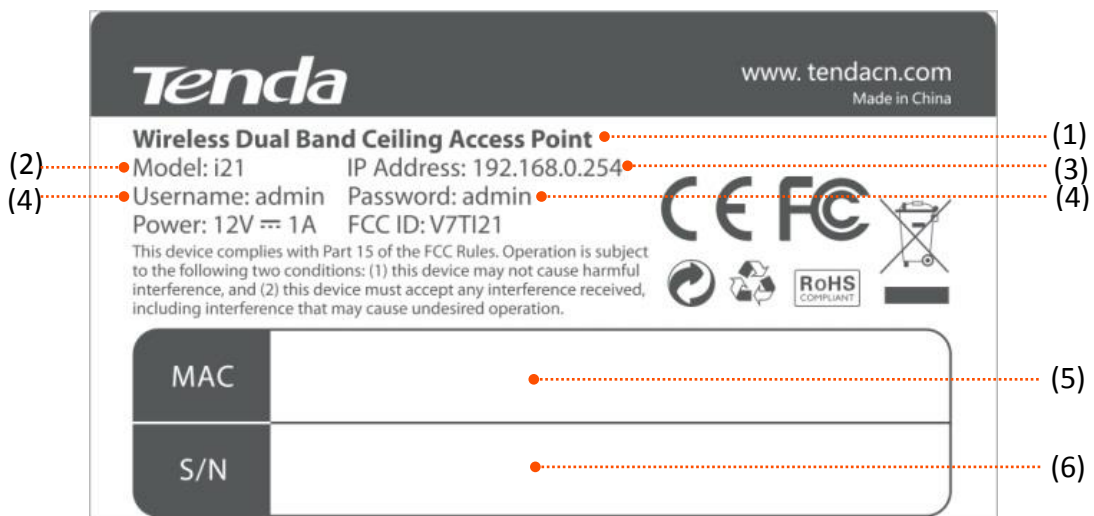
## 1.2.2 Button and Port



Button & Port	Connection Description
LAN port	<p>10/100 Mbps auto negotiation port</p> <ul style="list-style-type: none"> <li>If the AP is powered using a DC adapter, connect this port to a switch.</li> <li>If the AP is powered through PoE, connect this port to an IEEE 802.3af/at PoE switch.</li> </ul> <p>The AP allows a maximum PoE power supply distance of 100 meters.</p>
Power jack	<p>The power jack is used to connect to a DC adapter for supplying power to the AP.</p> <p>Input: 12 V 1 A</p>
Reset button	<p>After the AP is powered on, you can hold down this button for 8 seconds to restore the factory settings.</p>

## 1.2.3 Label

The label is located on the rear panel of the AP. For details of the label, see the following figure.



- (1):** Name of the AP.
- (2):** Model of the AP.
- (3):** Default IP address of the AP. You can use this IP address to log in to the web UI of the AP.
- (4):** Default user name and password of the web UI of the AP.
- (5):** MAC address of the AP. The default primary SSID of the AP is Tenda\_XXXXXX, where XXXXXX indicates the last 6 characters of this MAC address.
- (6):** Serial number of the AP. If the AP is faulty, you need to provide this serial number when sending the AP for repair.

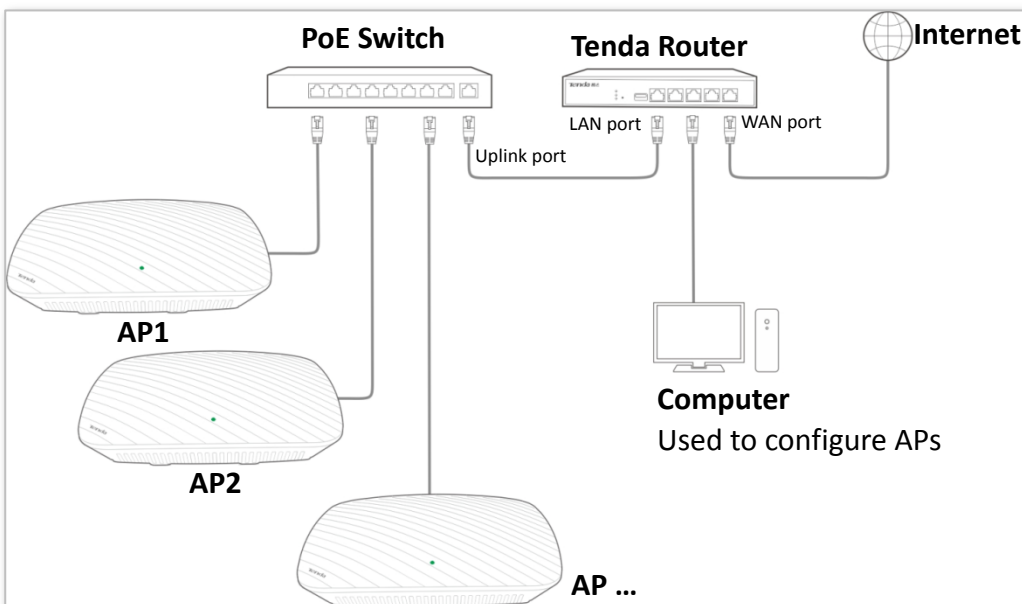
# 2 Application Scenarios

## 2.1 Small Scale WiFi Network Deployment

If you need to deploy a small scale WiFi network, you are recommended to use a wired router, a PoE switch, and several APs.

### 2.1.1 Deploying the AP with a Tenda Router with the AP Controller Capacity

#### Networking topology



- Connect the LAN port of the AP to the PoE port of the switch.
- Connect the uplink port of the switch to a LAN port of the router.
- Connect the computer used to configure APs to a LAN port of the router.

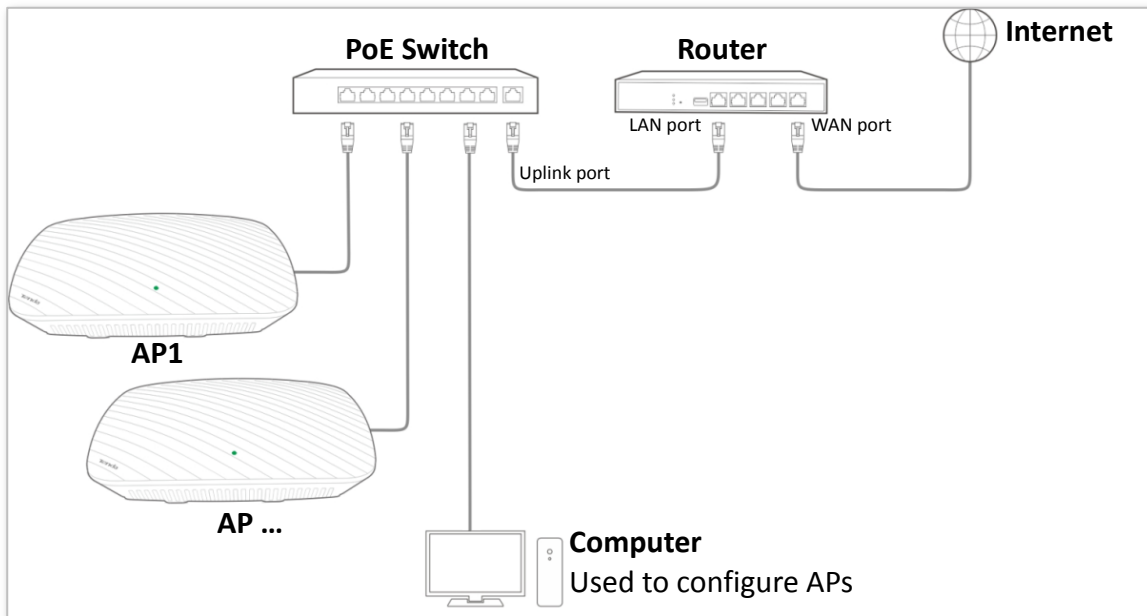
#### Setting up the AP

Log in to the web UI of the router, and set up the APs in batch. Refer to the user guide of the router for details.

## 2.1.2 Deploying the AP with a Router without the AP Controller Capacity

If you deploy the AP with a router without the AP controller capacity, refer to the following networking topology.

### Networking topology



- Connect the uplink port of the switch to a LAN port of the router.
- Connect the computer used to configure APs to the switch.
- Connect an AP to the switch first. Then perform the same procedures to connect and configure the other APs.

### Setting up the AP

Log in to the web UI of the first AP, and configure it. Then configure the other APs one by one.

Refer to [Chapter 3](#) and the follows in this user guide for details.



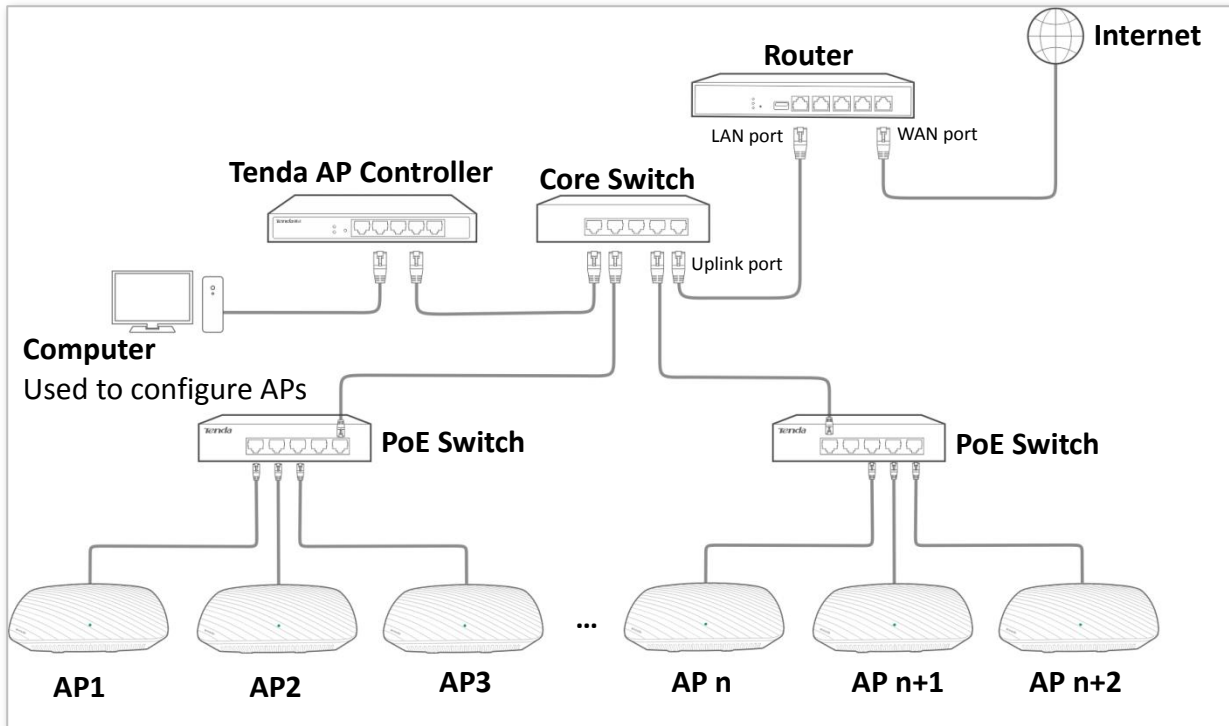
TIP

If multiple APs are needed to setup, change their IP addresses to different ones to avoid IP conflict.

## 2.2 Large Scale WiFi Network Deployment

If you need to deploy a large scale WiFi network in hotels, enterprises, or stations, you are recommended to use a wired router, a PoE switch, a Tenda AP controller, and several APs.

### Networking topology



- Connect the computer used to configure APs to the Tenda AP controller.
- Connect the LAN port of the AP to the PoE port of the switch.

### Setting up the AP

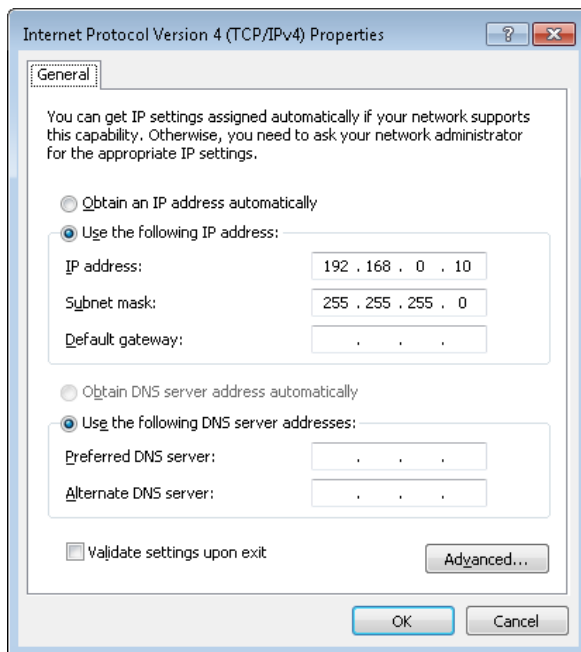
Log in to the web UI of the Tenda AP controller, and set up the APs in batch. Refer to the user guide of the Tenda AP controller for details.

# 3 Login

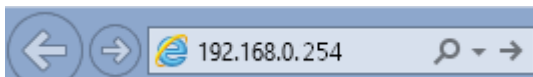
## 3.1 Logging in to the Web UI of the AP

**Step 1** Connect the computer to the AP or the switch connected to the AP.

**Step 2** Set **IP address** of your local area connection to **192.168.0.X** (X: 2 - 253) and **Subnet mask** to **255.255.255.0**.



**Step 3** Access **192.168.0.254** using a web browser.



**Step 4** Enter **admin** as the user name and password and click **Login**.

**i21V1.0**

[Forget your password?](#)



**TIP**

If this page is not displayed, refer to [Q1](#) in Appendix A "FAQ".

**--End**

You can now start configuring the AP.

- Status
- System Status**
- Wireless Status
- Traffic Statistics
- Client List
- Quick Setup
- Network
- Wireless
- SNMP
- Tools

Administrator:admin

### System Status

<b>System Status</b>		<input type="button" value="Help"/>
Device Name	i21V1.0	
System Time	2018-08-10 17:20:05	
Up Time	2Day 07h 58m 13s	
Number of Wireless Clients	1	
Firmware Version	V1.0.0.8(1418)	
Hardware Version	V1.0	
<b>LAN Status</b>		
MAC Address	50:2B:73:09:94:50	
IP Address	192.168.0.153	
Subnet Mask	255.255.255.0	
Primary DNS Server	192.168.0.252	
Secondary DNS Server		

## 3.2 Logging out of the Web UI of the AP

After you log in to the web UI of the AP, the system logs you out if you perform no operation on the web UI within the [Login Timeout](#) interval. (The default interval is 5 minutes and can be changed.)

When you close the web browser, the system logs you out as well.

When you are logged out, the system does not save the current configuration. Therefore, you are recommended to save the current configuration before logging out.



TIP

If you close the web browser tab page used to log in to the web UI of the AP instead of the web browser, you are not logged out.

## 3.3 Web UI Layout

The web UI of the CPE 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.



TIP

The functions and parameters dimmed on the web UI indicates that they are not supported by the AP or cannot be changed in the current configuration.

The screenshot displays the web UI interface for an AP. It is divided into four numbered regions:

- 1**: Level-1 navigation tree on the top left, showing 'Status'.
- 2**: Level-2 navigation tree on the left side, showing 'System Status', 'Wireless Status', 'Traffic Statistics', 'Client List', 'Quick Setup', 'Network', 'Wireless', 'SNMP', and 'Tools'.
- 3**: Tab page area at the top, showing 'System Status'.
- 4**: Configuration area on the right, displaying system and LAN status details.

The configuration area shows the following details:

System Status	
Device Name	i21V1.0
System Time	2018-08-10 17:20:05
Up Time	2Day 07h 58m 13s
Number of Wireless Clients	1
Firmware Version	V1.0.0.8(1418)
Hardware Version	V1.0


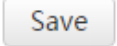

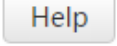
LAN Status	
MAC Address	50:2B:73:09:94:50
IP Address	192.168.0.153
Subnet Mask	255.255.255.0
Primary DNS Server	192.168.0.252
Secondary DNS Server	



No.	Name	Description
1	Level-1 navigation tree	The navigation bars display the function menu of the AP. 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.

## 3.4 Common Buttons on the Web UI

Description of common buttons:

Button	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 change the current configuration on the current page back to the original configuration.
	It is used to view help information corresponding to the settings on the current page.

# 4 Quick Setup

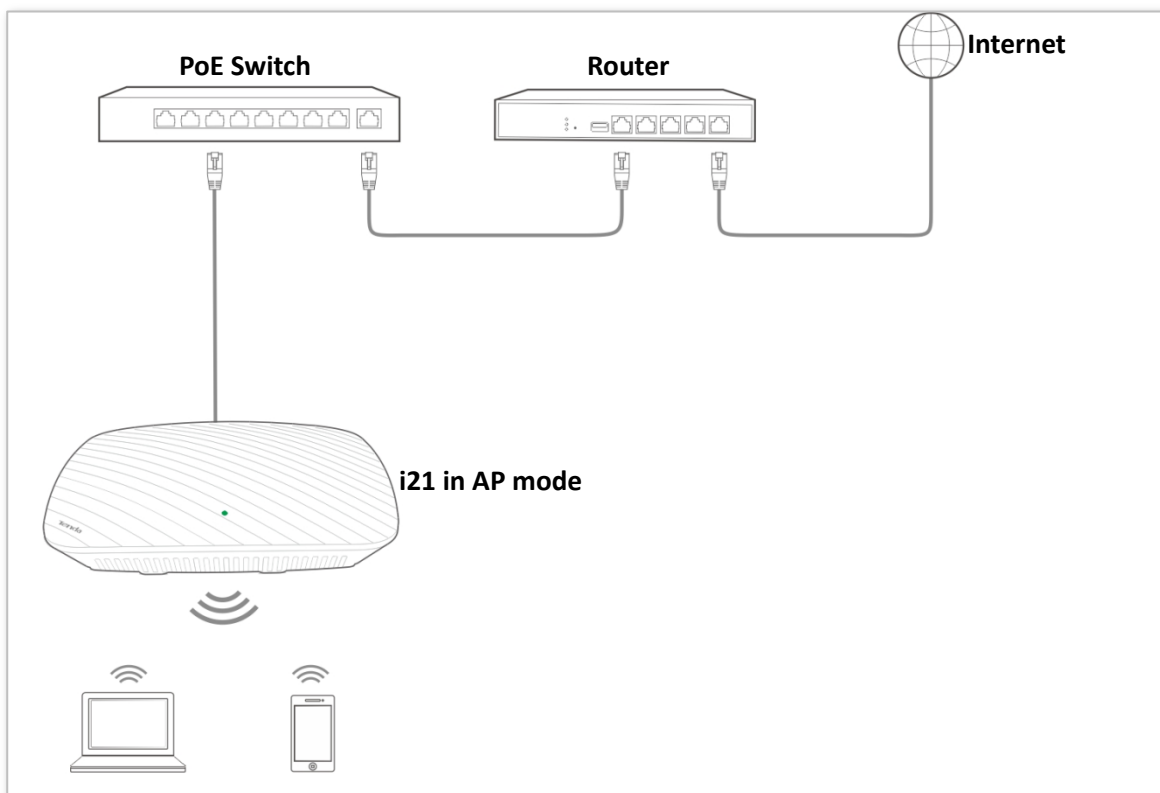
## 4.1 Overview

This module enables you to quickly configure the AP so that wireless devices such as smart phones and pads can access the internet through the wireless network of the AP.

This AP can work in [AP](#) or [APClient](#) mode.

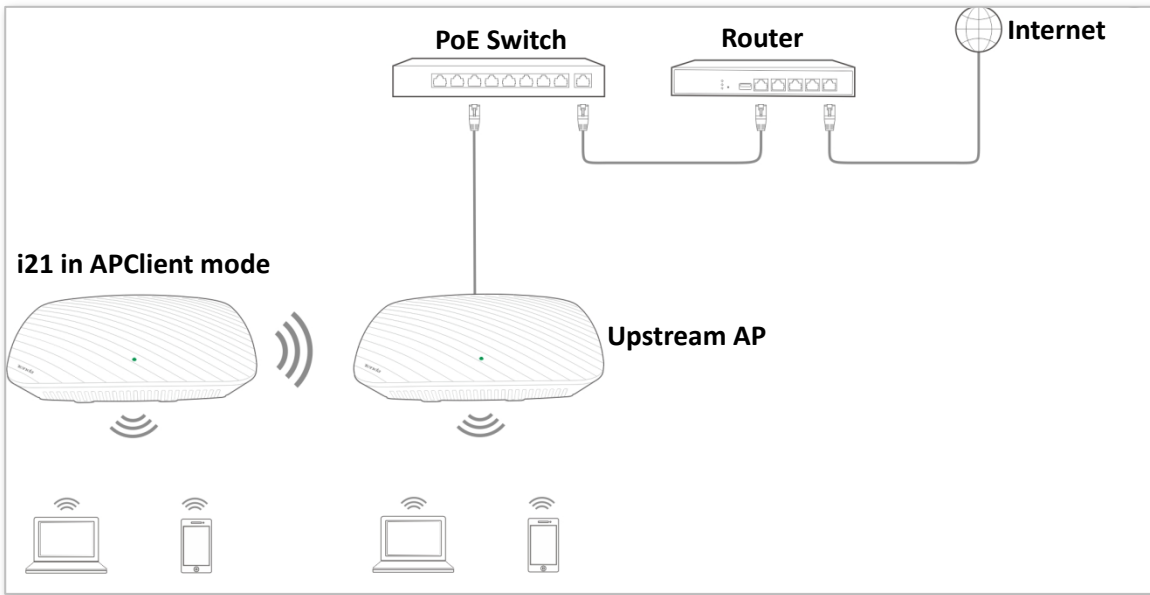
### ■ AP Mode

By default, the AP works in this mode. In this mode, the AP connects to the internet using an Ethernet cable and converts wired signals into wireless signals to provide wireless network coverage. See the following topology.



■ **APClient Mode**

In this mode, the AP is wirelessly bridged to an upstream device (such as a wireless router or AP) to extend the wireless network coverage of the upstream device. See the following topology.



## 4.2 Configuring AP Mode

The Mixed WPA/WPA2-PSK security mode and AES encryption algorithm are used as an example to describe the configuration procedure. If you need to use another security mode, refer to Section [7.1 Basic Settings](#).

### Configuration procedure:

- Step 1** Select a radio band.
- Step 2** Set **Mode** to **AP Mode**.
- Step 3** (Optional) Set **SSID** to a wireless network name.
- Step 4** Set **Security Mode** to **Mixed WPA/WPA2-PSK**, **Cipher Type** to **AES**, and **Security Key** to the password of the wireless network.
- Step 5** Click **Save**.
- Step 6** Select the other radio band, and set the related parameters as needed.
- Step 7** Click **Save**.

The screenshot shows a 'Quick Setup' window with the following configuration:

- WiFi Radio: 2.4GHz
- Mode:  AP Mode,  APClient Mode
- SSID: Tenda\_888888
- Security Mode: Mixed WPA/WPA2-PSK
- Cipher Type:  AES,  TKIP,  TKIP&AES
- Security Key: .....

Buttons: Save, Restore, Help

--End

### Parameter description

Parameter	Description
WiFi Radio	It specifies the radio band of the wireless network. The AP supports 2.4 GHz and 5 GHz wireless networks.
Mode	It specifies the working mode of the AP, including AP Mode and APClient Mode.
SSID	It specifies the primary SSID (wireless network name) of the wireless network at the corresponding radio band.
Security Mode	It specifies the security mode of the wireless network, including: None, WEP, WPA-PSK, WPA2-PSK, Mixed WPA/WPA2-PSK, WPA, and WPA2. Clicking the hyperlink navigates you to the elaborated description of the corresponding security mode.

After the configuration, you can select the SSID on your wireless devices such as smart phones and enter your wireless network password to connect to the wireless network of the AP and access the internet through the AP.

## 4.3 Configuring APClient Mode

Configuration procedure:



- Before configuration, ensure that the upstream AP is connected to the internet successfully.
- If you want to bridge the wireless networks at both 2.4 GHz and 5 GHz bands, ensure that the two networks belong to a same upstream AP.

Assume that the upstream AP has the basic information described in the following table.

IP Address	SSID	Security Mode	Security Key (Wireless Network Password)
192.168.0.254	Tenda_1	Mixed WPA/WPA2-PSK	87654321

- Step 1** Log in to the web UI of this AP, and change its IP address to an unused IP address belonging to the same network segment as that of the upstream AP, such as 192.168.0.253. For details, refer to Section [6.1 LAN Setup](#).
- Step 2** Use the new IP address to log in to the web UI of this AP, and choose **Quick Setup**.
- Step 3** Select the radio band of the wireless network to be bridged.
- Step 4** Set the **Mode** to **APClient Mode**.
- Step 5** Click **Enable Scan**.
- Step 6** Select the SSID of the upstream AP from the detected SSIDs, which is **Tenda\_1** in this example.



If the AP detects no wireless network, choose **Wireless > SSID Setup** to enable the wireless function, and then try again.

- Step 7** After you select an SSID, the SSID, Security Mode, Cipher Type, and Upstream AP Channel are populated automatically. You just need to enter the password of the wireless network of the upstream AP in the **Security Key** box. Set **Security Key** to the wireless network password of the upstream AP, which is **87654321** in this example.
- Step 8** Click **Save**.

**Quick Setup**

WIFI Radio: 2.4GHz Save

Mode:  AP Mode  APClient Mode Restore


SSID: Tenda\_1 Help

Security Mode: Mixed WPA/WPA2-PSK

Cipher Type:  AES  TKIP  TKIP&AES

Security Key: .....

Upstream AP Channel: 6 Disable Scan

Select	SSID	MAC Address	Network Mode	Channel Bandwidth	Channel	Extension Channel	Security	Signal Strength
<input checked="" type="radio"/>	Tenda_1	50:2b:7b:ff:30:79	bgn	40MHz	6	upper	wpa&wpa2/aes&t...	-56dBm 

**Step 9** If you want to bridge the wireless network at the other band, select the radio band, and perform step 4 to 8.

**--End**

### Parameter description

Parameter	Description
WIFI Radio	It specifies the radio band of the wireless network to be bridged. The AP supports 2.4 GHz and 5 GHz wireless networks.
Mode	It specifies the working mode of the AP, including AP Mode and APClient Mode.
SSID	It specifies the SSID (wireless network name) of the upstream AP to be bridged. It is populated automatically when you select the SSID of the upstream AP.
Security Mode	It specifies the security mode of the wireless network to be bridged. The AP can bridge to a wireless network using None, WEP (Open or shared), WPA-PSK, WPA2-PSK, or Mixed WPA/WPA2-PSK security mode. Clicking the hyperlink navigates you to the elaborated description of the corresponding security mode.
Authentication Type	It specifies the WEP authentication type of the wireless network to be bridged. It needs to be manually entered.
Default Key	It specifies the WEP default key (wireless password) of the wireless network to be bridged. It needs to be manually entered.
WEP Key 1 to 4	It specifies the WEP key of the wireless network to be bridged. It needs to be manually entered.
Cipher Type	It specifies the WPA cipher type of the wireless network to be bridged. It is populated automatically when you select the SSID of the upstream AP.
Security Key	It specifies the wireless password of the wireless network to be bridged. It needs to

Parameter	Description
	be manually entered.
Upstream AP Channel	It specifies the wireless channel used by the upstream AP. It is populated automatically when you select the SSID of the upstream AP.

After the settings take effect, use your smart phone to search the SSID of the upstream AP, and enter the password for internet access, which are **Tenda\_1** and **87654321** in this example.

# 5 Status

## 5.1 System Status

To view the system status and LAN status of the AP, choose **Status > System Status**.

### System Status

[Help](#)

System Status	
Device Name	i21V1.0
System Time	2018-08-14 14:46:45
Up Time	00h 00m 27s
Number of Wireless Clients	0
Firmware Version	V1.0.0.8(1418)
Hardware Version	V1.0
<b>LAN Status</b>	
MAC Address	50:2B:73:09:94:50
IP Address	192.168.0.254
Subnet Mask	255.255.255.0
Primary DNS Server	8.8.8.8
Secondary DNS Server	8.8.4.4

### Parameter description

Parameter	Description
Device Name	It specifies the name of the AP. A unique Device Name helps quickly identify the AP. You can change the Device Name on the <b>Network &gt; LAN Setup</b> page.
System Time	It specifies the current system time of the AP.
Up Time	It specifies the time that has elapsed since the AP was started last time.
Number of Wireless Clients	It specifies the number of wireless clients currently connected to the AP.
Firmware Version	It specifies the firmware version number of the AP.
Hardware Version	It specifies the hardware version number of the AP.
MAC Address	It specifies the physical address of the LAN port of the AP. If you connect the AP to other devices using Ethernet cables, the AP uses this MAC address to communicate



Parameter	Description
	with those devices.
IP Address	It specifies the IP address of the AP. The web UI of the AP is accessible at this IP address. You can change the IP address on the <b>Network &gt; LAN Setup</b> page.
Subnet Mask	It specifies the subnet mask of the IP address of the AP.
Primary DNS Server	It specifies the primary DNS server of the AP.
Secondary DNS Server	It specifies the secondary DNS server of the AP.

## 5.2 Wireless Status

To view the radio status and SSID status of the wireless network at 2.4 GHz, choose **Status > Wireless Status**. Click **5GHz Wireless Status** tap to view the related information of 5 GHz wireless network.

2.4GHz Wireless Status		5GHz Wireless Status		
<b>Radio Status</b>				<a href="#">Help</a>
Radio (On/Off)	On			
Network Mode	11b/g/n mixed			
Channel	9			
<b>SSID Status</b>				
SSID	MAC Address	Working Status	Security Mode	
Tenda_099450	50:2B:73:09:94:51	Enabled	None	
Tenda_099451	50:2B:73:09:94:52	Disabled	None	
Tenda_099452	50:2B:73:09:94:53	Disabled	None	
Tenda_099453	50:2B:73:09:94:54	Disabled	None	
Tenda_099454	50:2B:73:09:94:55	Disabled	None	
Tenda_099455	50:2B:73:09:94:56	Disabled	None	
Tenda_099456	50:2B:73:09:94:57	Disabled	None	
Tenda_099457	50:2B:73:09:94:58	Disabled	None	

### Parameter description

Parameter	Description	
Radio Status	Radio(On/Off)	It specifies whether the wireless function of the AP is enabled.
	Network Mode	It specifies the current network mode of the AP.
	Channel	It specifies the current working channel of the AP.
SSID Status	SSID	It specifies the names of all the wireless networks of the AP.
	MAC Address	It specifies the physical addresses corresponding to the SSIDs of the AP.
	Working Status	It specifies whether the wireless networks corresponding to the SSIDs of the AP are enabled.
	Security Mode	It specifies the security modes of the wireless networks corresponding to the SSIDs of the AP.

## 5.3 Traffic Statistics

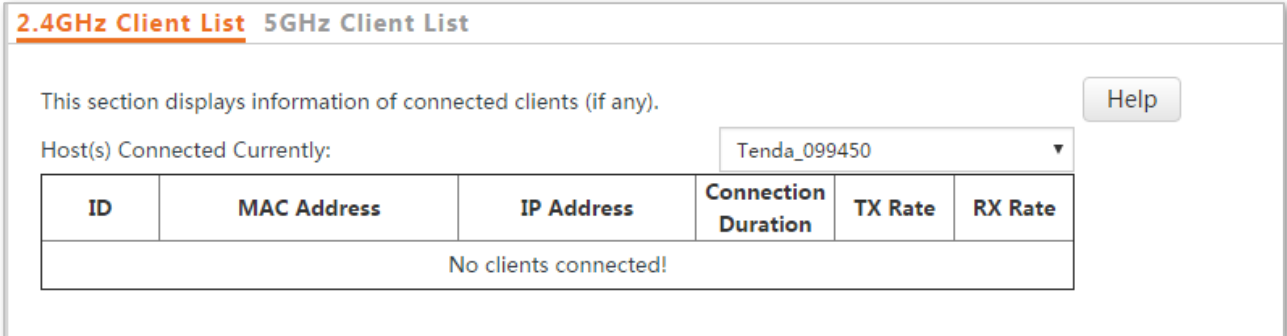
To view the total transmitted traffic, total received traffic, total number of transmitted packets, and total number of received packets corresponding to each SSID of the AP, choose **Status > Traffic Statistics**. Click **5GHz Traffic Statistics** tap to view the related information of 5 GHz wireless network.

<u>2.4GHz Traffic Statistics</u> 5GHz Traffic Statistics					
SSID	Total RX Traffic (MB)	Total RX Packets (Num)	Total TX Traffic (MB)	Total TX Packets (Num)	Help
Tenda_099450	0.99MB	4293	0.00MB	31	Refresh
Tenda_099451	0.00MB	0	0.00MB	0	
Tenda_099452	0.00MB	0	0.00MB	0	
Tenda_099453	0.00MB	0	0.00MB	0	
Tenda_099454	0.00MB	0	0.00MB	0	
Tenda_099455	0.00MB	0	0.00MB	0	
Tenda_099456	0.00MB	0	0.00MB	0	
Tenda_099457	0.00MB	0	0.00MB	0	

You can click **Refresh** to view the latest traffic statistics.

## 5.4 Client List

To view the MAC address, IP address, connection uptime, transmit speed, and receive speed of each wireless client connected to the AP, choose **Status > Client List**. Click **5GHz Client List** tap to view the related information of 5 GHz wireless network.



The screenshot shows a web interface for viewing connected clients. At the top, there are two tabs: "2.4GHz Client List" (highlighted in orange) and "5GHz Client List". Below the tabs, a message states: "This section displays information of connected clients (if any)." To the right of this message is a "Help" button. Below the message, there is a label "Host(s) Connected Currently:" followed by a drop-down menu currently showing "Tenda\_099450". Below this is a table with the following structure:

ID	MAC Address	IP Address	Connection Duration	TX Rate	RX Rate
No clients connected!					

You can select an SSID from the drop-down list box in the upper-right corner to view information about the wireless clients connected to the AP using the SSID.

# 6 Network Settings

## 6.1 LAN Setup

To view or configure the MAC address, device name, IP address obtaining mode, and other related information of the LAN port of the AP, choose **Network > LAN Setup**.

**LAN Setup**

MAC Address: 50:2B:73:09:94:50

Address Mode: Static IP

IP Address: 192.168.0.254 (For example: 192.168.1.1)

Subnet Mask: 255.255.255.0 (For example: 255.255.255.0)

Gateway: 192.168.0.1

Primary DNS Server: 8.8.8.8

Secondary DNS Server (Optional): 8.8.4.4


Device Name: i21V1.0

Ethernet Mode:  Auto-negotiation  10M half-duplex

Buttons: Save, Restore, Help

### Parameter description

Parameter	Description
MAC Address	It specifies the MAC address of the LAN port of the AP. The default primary SSID of the AP is Tenda_XXXXXX, where XXXXXX indicates the last 6 characters of this MAC address.
Address Mode	It specifies the IP address obtaining mode of the AP. The default option is <b>Static IP</b> . <ul style="list-style-type: none"><li>• <b>Static IP</b>: It indicates that the IP address, subnet mask, gateway, and DNS server information of the AP is set manually.</li><li>• <b>Dynamic IP</b>: It indicates that the IP address, subnet mask, gateway, and DNS server information of the AP is obtained from a DHCP server in your LAN.</li></ul> If <b>Address Mode</b> is set to <b>Dynamic IP</b> , you can log in to the web UI of the AP only with the IP address assigned to the AP by the DHCP server. The IP address is specified on the client list of the DHCP server.
IP Address	It specifies the IP address of the AP if <b>Address Mode</b> is set to <b>Static IP</b> . The default IP address is 192.168.0.254 and you can change it as required.

Parameter	Description
	 <p>This IP address also functions as the management IP address of the AP. You can use this IP address to log in to the web UI of the AP to manage the AP.</p>
Subnet Mask	It specifies the subnet mask of the IP address of the AP if <b>Address Mode</b> is set to <b>Static IP</b> . The default subnet mask is 255.255.255.0 and you can change it as required.
Gateway	It specifies the gateway of the AP if <b>Address Mode</b> is set to <b>Static IP</b> . The default gateway IP address is 192.168.0.1 and you can change it as required.
Primary DNS Server	It specifies the primary DNS server of the AP if <b>Address Mode</b> is set to <b>Static IP</b> . The default IP address of the primary DNS server is 8.8.8.8 and you can change it as required.
Secondary DNS Server (optional)	It specifies the secondary DNS server of the AP if <b>Address Mode</b> is set to <b>Static IP</b> . This IP address is optional.
Device Name	<p>It specifies the device name of the AP. The default device name is in the format of <i>Model + Hardware version number</i>.</p> <p>You are recommended to change the device name so that you can quickly locate the AP when managing the AP remotely.</p>
Ethernet Mode	<p>It specifies the Ethernet mode of LAN of this AP.</p> <p><b>Auto-negotiation:</b> This mode features a high transmission rate but short transmission distance. Generally, this mode is recommended.</p> <p><b>10M half-duplex:</b> This mode features a long transmission distance but relatively low transmission rate (10 Mbps).</p> <p>This mode is recommended only if the Ethernet cable that connects the LAN port of the AP to a peer device exceeds 100 meters. In this case, the connected LAN port of the peer device must work in auto-negotiation mode. Otherwise, the LAN port of the AP may not be able to properly transmit or receive data.</p>



If you change the IP address of the LAN port, change the IP address of your management computer as well so that the two IP addresses belong to the same network segment. Then, use the new IP address of the LAN port to log in to the web UI of the AP.

### 6.1.1 IP Address Obtaining Mode – Static IP

This mode enables you to set the IP address, subnet mask, gateway IP address, primary DNS server, and secondary DNS server of the AP. It is applicable to a scenario with only one or a few APs.

## Configuration procedure:



Assume that the AP IP address is 192.168.1.254, and the default gateway IP address and DNS server IP address are 192.168.1.1.

- Step 1** Set **Address Mode** to **Static IP**.
- Step 2** Set **IP Address**.
- Step 3** Set **Subnet Mask** to the subnet mask of the IP address. Generally the subnet mask is 255.255.255.0.
- Step 4** Set **Gateway** to the IP address of the gateway of the AP.
- Step 5** Set **Primary DNS Server** to the IP address of the primary DNS server of the AP. If another DNS server is available, set **Secondary DNS Server** to the IP address of the additional DNS server.
- Step 6** Click **Save**.

The screenshot shows the 'LAN Setup' configuration page. The fields are as follows:

MAC Address	50:2B:73:09:94:50	
Address Mode	Static IP	
IP Address	192.168.1.254	For example: 192.168.1.1
Subnet Mask	255.255.255.0	For example: 255.255.255.0
Gateway	192.168.1.1	
Primary DNS Server	8.8.8.8	
Secondary DNS Server (Optional)	8.8.4.4	
Device Name	i21V1.0	
Ethernet Mode	<input checked="" type="radio"/> Auto-negotiation <input type="radio"/> 10M half-duplex	

Buttons: Save, Restore, Help

--End

## 6.1.2 IP Address Obtaining Mode – Dynamic IP

This mode enables the AP to automatically obtain an IP address, subnet mask, gateway IP address, primary DNS server IP address, and secondary DNS server IP address from a DHCP server in the network. If a large number of APs are deployed, you can adopt this mode to prevent IP address conflicts and effectively reduce your workload.

### Configuration procedure:

- Step 1** Set **Address Mode** to **Dynamic IP**.
- Step 2** Click **Save**.

**LAN Setup**

MAC Address	50:2B:73:09:94:50	Save
Address Mode	Dynamic IP	Restore
Device Name	i21V1.0	Help
Ethernet Mode	<input checked="" type="radio"/> Auto-negotiation <input type="radio"/> 10M half-duplex	

--End

## 6.2 DHCP Server

### 6.2.1 Overview

The AP provides a DHCP server function to assign IP addresses to clients on the LAN. By default, the DHCP server function is disabled.



If the new and original IP addresses of the LAN port belong to different network segment, the system changes the IP address pool of the DHCP server function of the AP so that the IP address pool and the new IP address of the LAN port belong to the same network segment.

### 6.2.2 Configuring the DHCP Server

**Configuration procedure:**

- Step 1** Select the **Enable** check box of **DHCP Server**.
- Step 2** Set **Start IP** to the start IP address of the IP address pool, which contains the IP addresses that can be assigned by the DHCP server to clients.
- Step 3** Set **End IP** to the end IP address of the IP address pool.
- Step 4** Set **Lease Time** to the time when an IP address is available to a client. The default option **1 day** is recommended.
- Step 5** Set **Subnet Mask** to the subnet mask of the IP addresses. The default value **255.255.255.0** is recommended.
- Step 6** Set **Gateway** to the gateway IP address to be assigned by the DHCP server to clients.
- Step 7** Set **Primary DNS Server** to the IP address of the primary DNS server assigned by the DHCP server to clients. If another DNS server IP address is available, set **Secondary DNS Server** to that IP address.
- Step 8** Click **Save**.





**DHCP Server** DHCP Client List

DHCP Server	<input checked="" type="checkbox"/> Enable	Save
Start IP	<input type="text" value="192.168.0.100"/>	Restore
End IP	<input type="text" value="192.168.0.200"/>	Help
Lease Time	<input type="text" value="1 day"/>	
Subnet Mask	<input type="text" value="255.255.255.0"/>	
Gateway	<input type="text" value="192.168.0.1"/>	
Primary DNS Server	<input type="text" value="8.8.8.8"/>	
Secondary DNS Server (Optional)	<input type="text" value="8.8.4.4"/>	

--End

## Parameter description

Parameter	Description
DHCP Server	It specifies whether to enable the DHCP server function. To enable it, select the check box. To disable it, deselect the check box. By default, it is disabled.
Start IP	It specifies the first IP address that can be assigned by the DHCP server to a client. The default value is <b>192.168.0.100</b> .
End IP	It specifies the last IP address that can be assigned by the DHCP server to a client. The default value is <b>192.168.0.200</b> .
Lease Time	It specifies the validity period of an IP address assigned by the DHCP server to a client. The default value is <b>1 day</b> .
Subnet Mask	It specifies the subnet mask assigned by the DHCP server to clients. The default value is <b>255.255.255.0</b> .
Gateway	<p>It specifies the gateway IP address assigned by the DHCP server to clients. The default value is <b>192.168.0.254</b>.</p> <p> <b>NOTE</b></p> <p>When a client accesses a server or host located outside the network segment where the client resides, the data from and to the client must be forwarded by the gateway. Generally, the IP address of the gateway is the LAN IP address of the router in your LAN.</p>
Primary DNS Server	<p>It specifies the primary DNS server IP address assigned by the DHCP server to clients. The default value is <b>8.8.8.8</b>.</p> <p> <b>NOTE</b></p> <p>To enable clients to access web pages using domain names, set this parameter to a correct DNS server IP address or DNS proxy IP address.</p>
Secondary DNS Server (optional)	It specifies the secondary DNS server IP address assigned by the DHCP server to clients. This IP address is optional.



If another DHCP server is available in your LAN, ensure that the IP address pool of the AP does not overlap the IP address pool of that DHCP server. Otherwise, IP address conflict may occur.

### 6.2.3 DHCP Client List

If the AP functions as a DHCP server, you can view the DHCP client list to understand the details about the clients that obtain IP addresses from the DHCP server. The details include host names, IP addresses, MAC addresses, and lease times.

To view information about the clients that obtain IP addresses from the DHCP server function of the AP, choose **Network > DHCP Server** and click the **DHCP Client List** tab.

DHCP Server **DHCP Client List**

Once DHCP is enabled, client list will be refreshed automatically every five seconds.

ID	Host Name	IP Address	MAC Address	Lease Time
No clients connected!				

You can click **Refresh** to view the latest client information.

# 7 Wireless Settings

## 7.1 Basic Settings

This module enables you to set SSID-related parameters of wireless networks at both 2.4 GHz and 5 GHz of your AP.

### 7.1.1 Overview

#### ■ Broadcast SSID

When the AP broadcasts an SSID, nearby wireless clients can detect the SSID. When this parameter is set to **Disable**, the AP does not broadcast the SSID and nearby wireless clients cannot detect the SSID. In this case, you need to enter the SSID 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.

It is worth noting that after **Broadcast SSID** is set to **Disable**, a hacker can still connect to the corresponding wireless network if he/she manages to obtain the SSID by other means.

#### ■ AP Isolation

This parameter implements a function similar to the VLAN function for wired networks. It isolates the wireless clients connected to the same wireless network corresponding to an SSID, so that the wireless clients can access only the wired network connected to the AP. Applying this function to hotspot setup at public places such as hotels and airports helps increase network security.

#### ■ WMF

The number of wireless clients keeps increasing currently, but wired and wireless bandwidth resources are limited. Therefore, the multicast technology, which enables single-point data transmission and multi-point data reception, has been widely used in networks to effectively reduce bandwidth requirements and prevent network congestion.

Nevertheless, if a large number of clients are connected to a wireless interface of a wireless network and multicast data is intended for only one of the clients, the data is still sent to all the clients, which unnecessarily increases wireless resource usage and may lead to wireless channel congestion. In addition, multicast stream forwarding over an IEEE 802.11 network is not secure.

The WMF function of the AP converts multicast traffic into unicast traffic and forwards the traffic to the multicast traffic destination in the wireless network. This helps save wireless resources, ensure reliable transmission, and reduce delays.

## ■ Maximum 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 APs.

## ■ 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 AP 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 any wireless client can connect to the wireless network. 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 throughput of only 54 Mbps. Therefore, this security mode is not recommended.

### – WPA-PSK, WPA2-PSK, and 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 AP 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 AP, the key may be disclosed unexpectedly. This makes the security modes not suitable for scenarios where high security is required.

### – WPA and WPA2

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 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.

### 7.1.2 Changing the SSID Setup

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

2.4 GHz wireless network setup is used for illustration here. The configuration procedure for 5 GHz wireless network is similar.

**Step 1** Choose **Wireless** > SSID Setup.

**Step 2** Select the SSID from the SSID drop-down list box.

**Step 3** Change the parameters as required. Generally, you only need to change the **Enable**, **SSID**, and **Security Mode** settings.

**Step 4** Click **Save**.

The screenshot shows the '2.4GHz SSID' configuration page. At the top, there are tabs for '2.4GHz SSID' and '5GHz SSID'. The main configuration area includes the following settings:


- \*SSID:** Tenda\_099450 (dropdown menu)
- \*enable:**
- Broadcast SSID:** Enable (dropdown menu)
- AP Isolation:**  Disable  Enable
- WMF:**  Disable  Enable
- Probe Broadcast Packets Control:**  Disable  Enable
- Maximum Clients:** 48 (text input, Range:1~128)
- \*SSID:** Tenda\_099450 (text input)
- Chinese SSID Encode:** UTF-8 (dropdown menu)
- \*Security Mode:** None (dropdown menu)

On the right side, there are three buttons: 'Save', 'Restore', and 'Help'.

--End

#### Parameter description

Parameter	Description
SSID	<p>It specifies the SSID to be configured.</p> <p><b>2.4 GHz:</b> The AP allows 8 SSIDs. The default SSID is the primary SSID of the AP, which is Tenda_XXXXXX, where XXXXXX indicates the last 6 characters in the MAC address specified on the label on the external surface of the AP.</p> <p><b>5 GHz:</b> The AP allows 4 SSIDs. The default SSID is the primary SSID of the AP, which is Tenda_XXXXXX_5G, where XXXXXX indicates the last 6 characters in the MAC address specified on the label on the external surface of the AP.</p>
Enable	<p>It specifies whether to enable the selected SSID.</p> <p>By default, the primary SSID is enabled and the other SSIDs are disabled. You can</p>

Parameter	Description
	enable them as required.
Probe Broadcast Packets Control	<p>Wireless devices keep broadcasting Probe Request frames, which includes SSID information, to scan the wireless network nearby. After receiving this kind of frames, an AP determines whether a wireless client can connect to its wireless network based on this frame, and respond to the wireless device with Probe Response frames, which contains all parameters of Beacon frame. This consumes a lot of wireless resources.</p> <p>With this function enabled, this AP does not respond to wireless devices when receiving Probe Request frames without SSID information. In this way, it efficiently reduces the consumption of wireless resources.</p>
Broadcast SSID	<p>It specifies whether to broadcast the selected SSID.</p> <ul style="list-style-type: none"> <li>• <b>Enable:</b> It indicates that the AP broadcasts the SSID and the SSID can be detected by clients.</li> <li>• <b>Disable:</b> It indicates that the AP does not broadcast the SSID and the SSID cannot be detected by clients. If a user wants to connect to the wireless network corresponding to this SSID, the user must enter the SSID manually.</li> </ul> <p> <b>NOTE</b></p> <p>This AP can automatically hide its SSID. When the number of clients connected to the AP with an SSID of the AP reaches the <a href="#">Maximum Clients</a>, the AP stops broadcasting the SSID.</p>
AP isolation	<p>It specifies whether to isolate the wireless clients connected to the AP with the selected SSID.</p> <ul style="list-style-type: none"> <li>• <b>Enable:</b> It indicates that the wireless clients connected to the AP with the selected SSID cannot communicate with each other. This improves wireless network security.</li> <li>• <b>Disable:</b> It indicates that the wireless clients connected to the AP with the selected SSID can communicate with each other.</li> </ul>
WMF	<p>It specifies whether to forward multicast packets through unicast tunnels. Generally, multicast packets are usually transmitted at the lowest rate, such as 1 Mbps, leading to poor transmission efficiency. WMF leverages the high auto-negotiated rate, reliable feedback mechanism, and other advantages of unicast packets to address multicast problems such as video playback stalls caused by packet loss and long delays over a wireless network.</p>
Maximum Clients	<p>It specifies the maximum number of wireless clients that can connect to the AP with the selected SSID.</p> <p>After this upper limit is reached, the AP rejects new connection requests from clients.</p>
SSID	<p>It enables you to change the selected SSID. Chinese characters are allowed in an SSID.</p>
Chinese SSID Encode	<p>It specifies the encoding format of Chinese characters in an SSID. The default value is <b>UTF8</b>.</p> <p>If 2 or more SSIDs of the AP are enabled, you are recommended to set this parameter to <b>UTF-8</b> for some SSIDs and to <b>GB2312</b> for the other SSIDs, so that any wireless client can identify one or both SSIDs that contain Chinese characters.</p>

Parameter	Description
Security Mode	<p>It specifies the encryption type of the selected SSID. <b>None</b> indicates that any wireless client can connect to the AP using the selected SSID. This option is not recommended because it affects network security.</p> <p>The AP supports the WEP, WPA-PSK, WPA2-PSK, Mixed WPA/WPA2-PSK, WPA, and WPA2 security modes, which are elaborated in the following section.</p>

---

■ **None**

It allows any wireless client to connect to a wireless network. This option is not recommended because it affects network security.



■ WEP

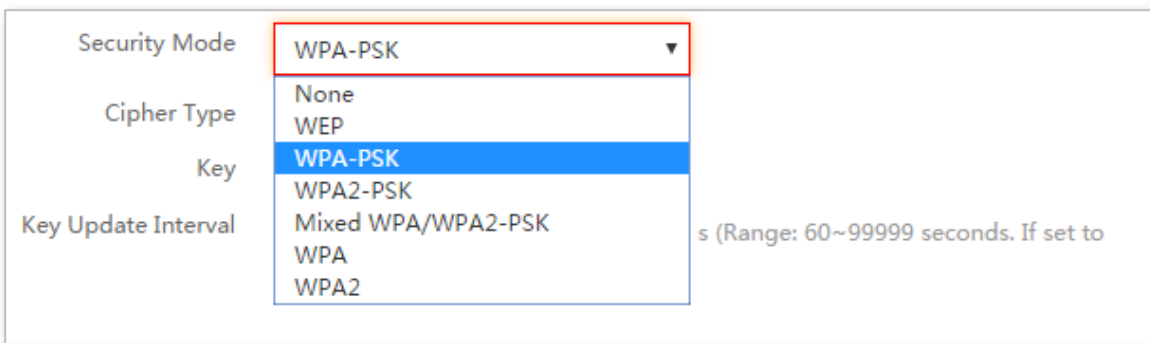
Security Mode	WEP ▼	
Encryption Type	Open ▼	
Default Key	Open	
	Shared	
	802.1x	
WEP Key 1	.....	ASCII ▼
WEP Key 2	.....	ASCII ▼
WEP Key 3	.....	ASCII ▼
WEP Key 4	.....	ASCII ▼

**Parameter description**

Parameter	Description
Encryption Type	<p>It specifies the encryption type for the WEP security mode of the AP. The options include <b>Open</b>, <b>Shared</b>, and <b>802.1x</b>.</p> <p>The options share the same encryption process.</p> <ul style="list-style-type: none"> <li>• <b>Open</b> <p>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.</p> </li> <li>• <b>Shared</b> <p>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.</p> </li> <li>• <b>802.1x</b> <p>It specifies that 802.1x authentication is required and data exchanged is encrypted using WEP. In this case, ports are enabled for user authentication when valid clients connect to the wireless network corresponding to the selected SSID, and disabled when invalid users connect to the wireless network.</p> </li> </ul>
Default Key	<p>It specifies the default WEP key for the Open and Shared encryption types.</p> <p>For example, if <b>Default Key</b> is set to <b>Security Key 2</b>, a wireless client can connect to the wireless network corresponding to the selected SSID only with the password specified by <b>Security Key 2</b>.</p>
ASCII	<p>It indicates that a key selected for the Open or Shared authentication type contains hexadecimal characters.</p> <p>5 or 13 ASCII characters are allowed in the key.</p>

Parameter	Description
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.
RADIUS Server	These parameters are dedicated to the 802.1x authentication type. It specifies the IP address/port number/shared key of the RADIUS server for authentication.
RADIUS Port	
RADIUS Password	

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



### Parameter description

Parameter	Description
Security Mode	It indicates the personal or pre-shared key security mode, including WPA-PSK, WPA2-PSK, and Mixed WPA/WPA2-PSK. <ul style="list-style-type: none"> <li>• <b>WPA-PSK:</b> It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA-PSK.</li> <li>• <b>WPA2-PSK:</b> It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA2-PSK.</li> <li>• <b>Mixed WPA/WPA2-PSK:</b> It indicates that wireless clients can connect to the wireless network corresponding to the selected SSID using either WPA-PSK or WPA2-PSK.</li> </ul>
Cipher Type	It specifies the encryption algorithm corresponding to the selected security mode. If <b>Security Mode</b> is set to <b>WPA-PSK</b> , this parameter has the <b>AES</b> and <b>TKIP</b> values. If <b>Security Mode</b> is set to <b>WPA2-PSK</b> or <b>Mixed WPA/WPA2-PSK</b> , this parameter has the <b>AES</b> , <b>TKIP</b> , and <b>TKIP&amp;AES</b> values. <ul style="list-style-type: none"> <li>• <b>AES:</b> It indicates the Advanced Encryption Standard.</li> <li>• <b>TKIP:</b> It indicates the Temporal Key Integrity Protocol. If <b>TKIP</b> is used, the maximum wireless throughput of the AP is limited to 54 Mbps.</li> <li>• <b>TKIP&amp;AES:</b> 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.</li> </ul>

Parameter	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 <b>0</b> indicates that a WAP key is not updated.

## ■ WPA and WPA2

The screenshot shows a configuration window with the following fields:

- Security Mode:** A dropdown menu is open, showing options: None, WEP, WPA-PSK, WPA2-PSK, Mixed WPA/WPA2-PSK, WPA (selected), and WPA2.
- RADIUS Server:** A text input field.
- RADIUS Port:** A text input field with a note: "(Range: 1025~65535, default: 1812)".
- RADIUS Password:** A text input field.
- Cipher Type:** Radio buttons for AES (selected), TKIP, and TKIP&AES.
- Key Update Interval:** A text input field with the value "0" and a note: "s (Range: 60~99999 seconds. If set to 0, key will not be updated.)".

## Parameter description

Parameter	Description
Security Mode	The <b>WPA</b> and <b>WPA2</b> options are available for network protection with a RADIUS server. <ul style="list-style-type: none"> <li>• <b>WPA:</b> It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA.</li> <li>• <b>WPA:</b> It indicates that the wireless network corresponding to the selected SSID is encrypted using WPA.</li> </ul>
RADIUS Server IP	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.
Cipher Type	It specifies the encryption algorithm corresponding to the selected security mode. The available options include <b>AES</b> , <b>TKIP</b> , and <b>TKIP&amp;AES</b> . <ul style="list-style-type: none"> <li>• <b>AES:</b> It indicates the Advanced Encryption Standard.</li> <li>• <b>TKIP:</b> It indicates the Temporal Key Integrity Protocol.</li> <li>• <b>TKIP&amp;AES:</b> 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.</li> </ul>
Key Update Interval	It specifies the automatic update interval of a WPA key for data encryption. A shorter interval results in higher data security.

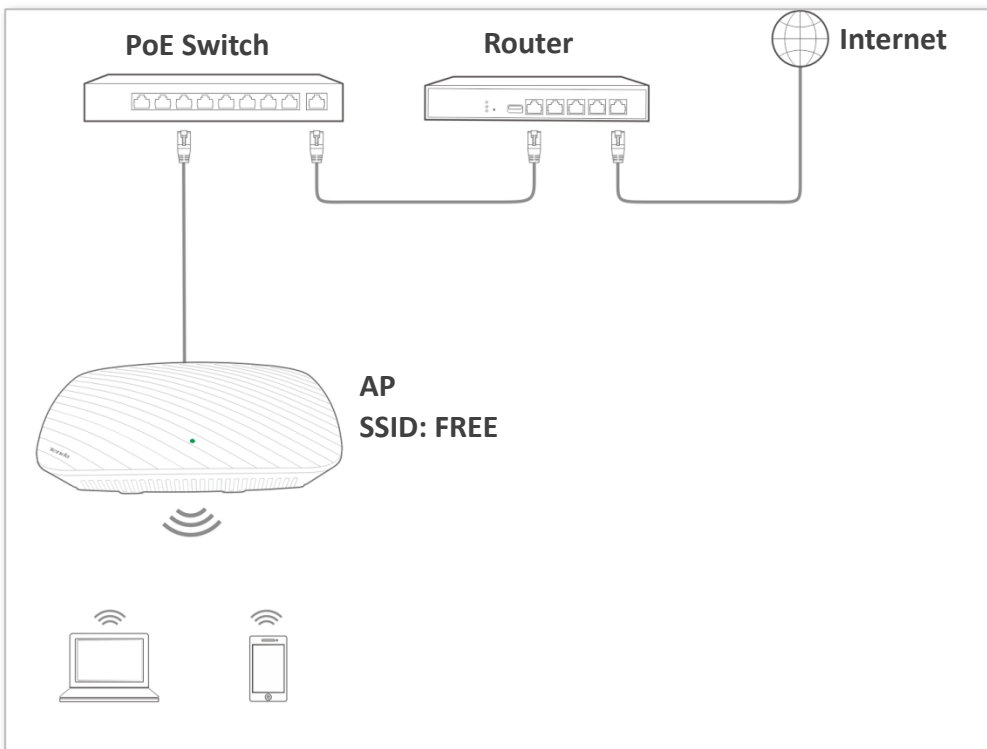
Parameter	Description
	The value <b>0</b> indicates that a WAP key is not updated.

### 7.1.3 Examples of Configuring SSID Setup

#### Setting up a Non-encrypted Wireless Network

##### Networking requirement

In a hotel lounge, guests can connect to the wireless network without a password and access the internet through the wireless network.



##### Configuration procedure:

Assume that the second SSID of the AP, the WPA2-PSK security mode, and AES encryption algorithm are used.

2.4 GHz wireless network setup is used for illustration here. The configuration procedure for 5 GHz wireless network is similar.

- Step 1** Choose **Wireless > SSID Setup**.
- Step 2** Select the second SSID from the SSID drop-down list box.
- Step 3** Select the **Enable** check box.
- Step 4** Change the value of the SSID text box to **FREE**.
- Step 5** Set **Security Mode** to **None**.
- Step 6** Click **Save**.

*SSID	FREE	▼	Save
*enable	<input checked="" type="checkbox"/>		Restore
Broadcast SSID	Enable	▼	Help
AP Isolation	<input checked="" type="radio"/> Disable	<input type="radio"/> Enable	
WMF	<input type="radio"/> Disable	<input checked="" type="radio"/> Enable	
Probe Broadcast Packets Control	<input checked="" type="radio"/> Disable	<input type="radio"/> Enable	
Maximum Clients	48	(Range:1~128)	
*SSID	FREE		
Chinese SSID Encode	UTF-8	▼	
*Security Mode	None	▼	

**--End**

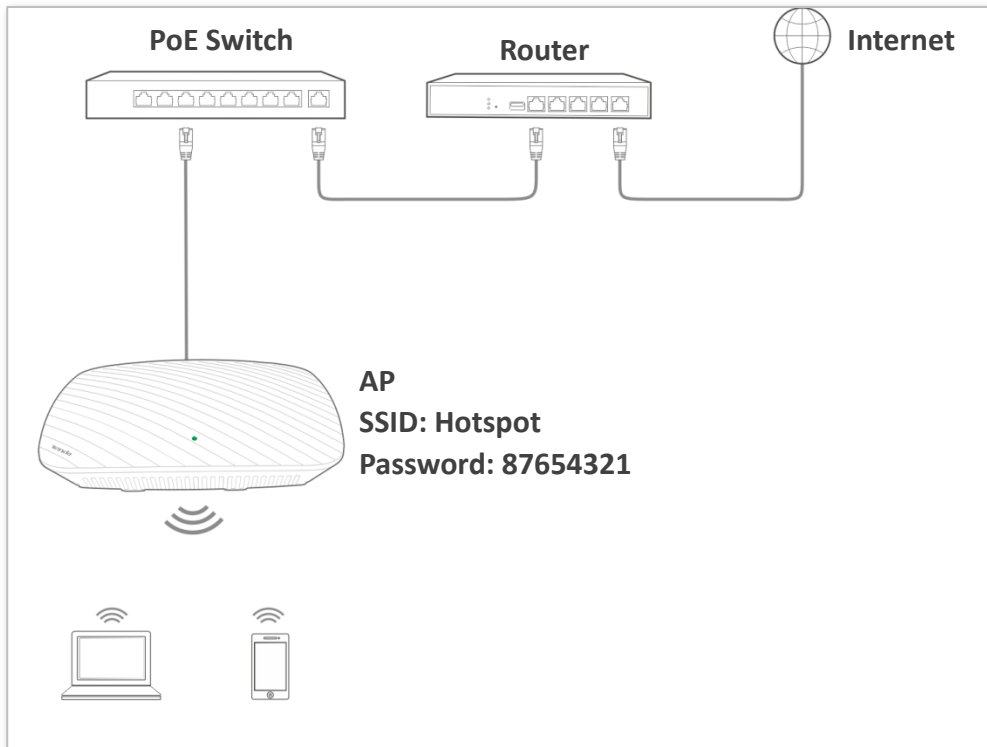
### Verification

Verify that wireless devices can connect to the FREE wireless network without a password.

## Setting up a Wireless Network Encrypted Using WPA/WPA2-PSK

### Network requirement

A company wireless network with a certain level of security must be set up through a simple procedure. In this case, WPA/WPA2 pre-shared key mode is recommended.



### Configuration procedure:

Assume that the second SSID of the AP, the WPA2-PSK security mode, and AES encryption algorithm are used.

2.4 GHz wireless network setup is used for illustration here. The configuration procedure for 5 GHz wireless network is similar.

- Step 1** Choose **Wireless > SSID Setup**.
- Step 2** Select the second SSID from the SSID drop-down list box.
- Step 3** Select the **Enable** check box.
- Step 4** Change the value of the **SSID** text box to **Hotspot**.
- Step 5** Set **Security Mode** to **WPA2-PSK** and **Cipher Type** to **AES**.
- Step 6** Set **Key** to **87654321**.
- Step 7** Click **Save**.

**2.4GHz SSID** 5GHz SSID

\*SSID Hotspot

\*Enable

Broadcast SSID Enable

AP Isolation  Disable  Enable

WMF  Disable  Enable

Probe Broadcast Packets  Disable  Enable

Control

Maximum Clients 48 (Range:1~128)

\*SSID Hotspot

Chinese SSID Encode UTF-8

\*Security Mode WPA2-PSK

\*Cipher Type  AES  TKIP  TKIP&AES

\*Key .....

Key Update Interval 0 s (Range: 60~99999 seconds. If set to 0, key will not be updated.)

Save

Restore

Help

--End

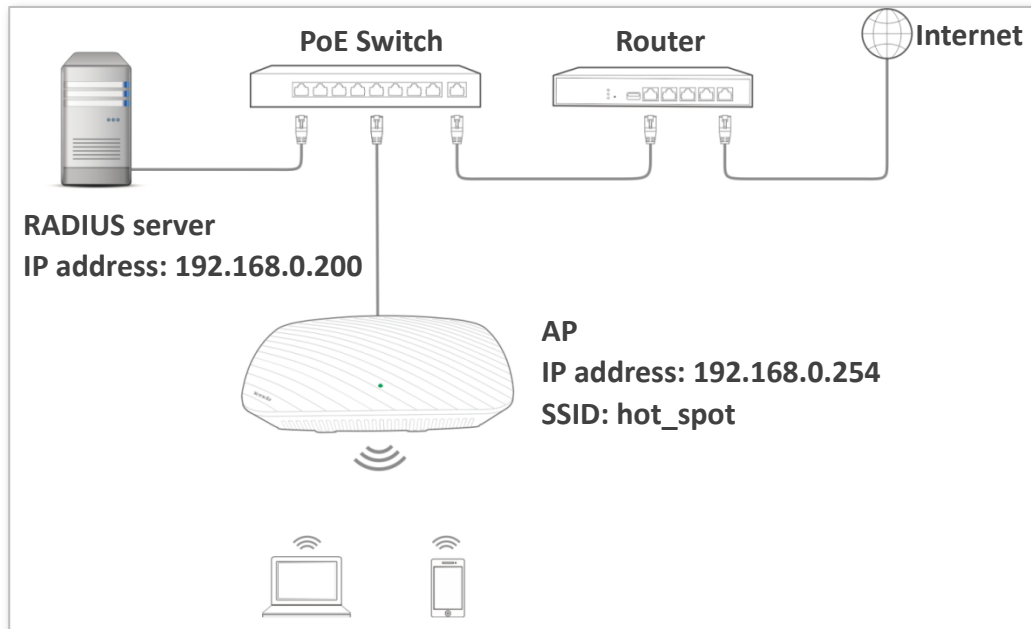
### Verification

Verify that wireless devices can connect to the Hotspot wireless network with the password 87654321.

## Setting up a Wireless Network Encrypted Using WPA or WPA2

### Network requirement

A highly secure wireless network is required and a RADIUS server is available. In this case, WPA or WPA2 pre-shared key mode is recommended.



### Configuration procedure:

#### ■ Configuring the AP

Assume that the IP address of the RADIUS server is 192.168.0.200, the RADIUS password is 12345678, and the port number for authentication is 1812.

Assume that the second SSID of the AP is used.

2.4 GHz wireless network setup is used for illustration here. The configuration procedure for 5 GHz wireless network is similar.

- Step 1** Choose **Wireless > SSID Setup**.
- Step 2** Select the second SSID from the SSID drop-down list box.
- Step 3** Select the **Enable** check box.
- Step 4** Change the value of the **SSID** text box to **hot\_spot**.
- Step 5** Set **Security Mode** to **WPA2**.
- Step 6** Set **RADIUS Server**, **RADIUS Port**, and **RADIUS Password** to **192.168.0.200**, **1812**, and **12345678** respectively.
- Step 7** Set **Cipher Type** to **AES**.
- Step 8** Click **Save**.



**2.4GHz SSID** **5GHz SSID**

\* SSID: hot\_spot

\* Enable:

Broadcast SSID: Enable

AP Isolation:  Disable  Enable

WMF:  Disable  Enable

Probe Broadcast Packets Control:  Disable  Enable

Maximum Clients: 48 (Range:1~128)

\* SSID: hot\_spot

Chinese SSID Encode: UTF-8

\* Security Mode: WPA2

\* RADIUS Server: 192.168.0.200

\* RADIUS Port: 1812 (Range: 1025~65535,default: 1812)

\* RADIUS Password: .....

\* Cipher Type:  AES  TKIP  TKIP&AES

Save Restore Help

--End

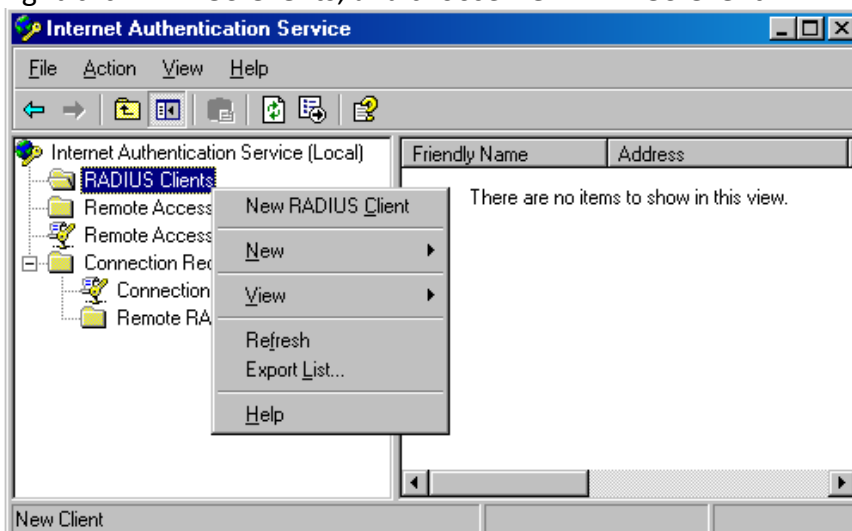
■ **Configuring the RADIUS server**



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

**Step 1** Configure a RADIUS client.

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



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

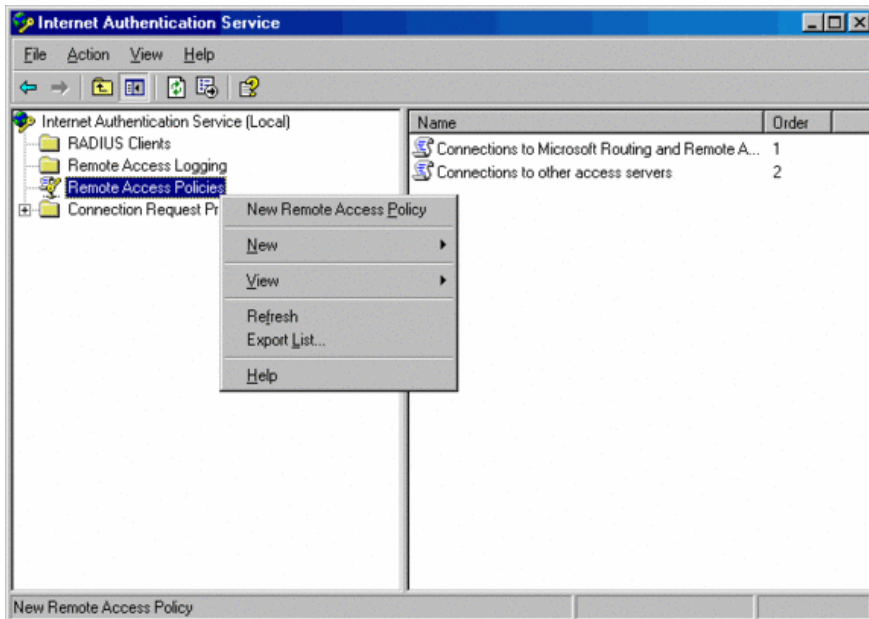
The screenshot shows the 'New RADIUS Client' dialog box with the 'Name and Address' tab selected. The 'Friendly name' field contains 'root' and the 'Client address (IP or DNS)' field contains '192.168.0.254'. An orange arrow points from the text 'IP address of your AP' below to the IP address field. At the bottom, there are buttons for '< Back', 'Next >', and 'Cancel'.

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

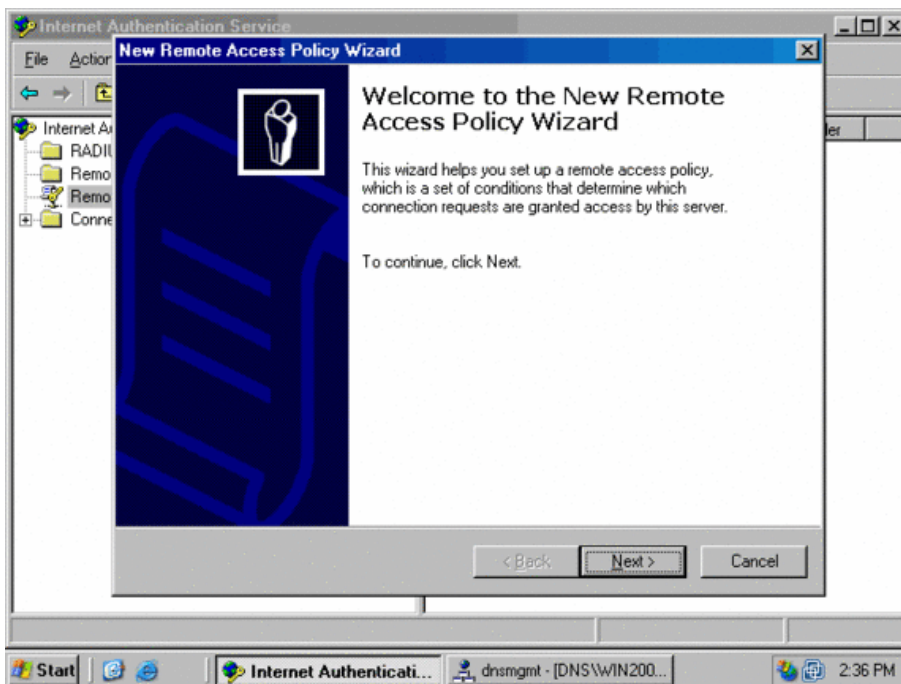
The screenshot shows the 'New RADIUS Client' dialog box with the 'Additional Information' tab selected. The 'Client-Vendor' dropdown is set to 'RADIUS Standard'. The 'Shared secret' and 'Confirm shared secret' fields are both filled with 'XXXXXXXX'. A red dashed box highlights these two fields, and an orange arrow points from the text 'Password same as that specified by RADIUS Password on the AP' below to the 'Shared secret' field. At the bottom, there are buttons for '< Back', 'Finish', and 'Cancel'.

**Step 2** Configure a remote access policy.

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



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



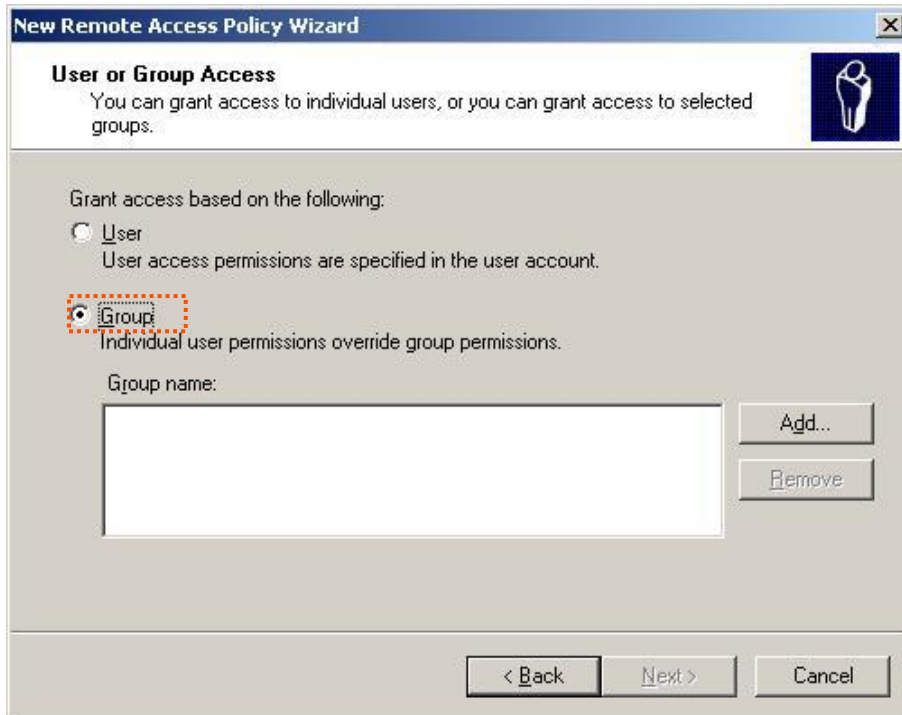
Enter a policy name and click **Next**.

The screenshot shows the 'New Remote Access Policy Wizard' dialog box. The title bar reads 'New Remote Access Policy Wizard'. The main heading is 'Policy Configuration Method' with a sub-heading 'The wizard can create a typical policy, or you can create a custom policy.' Below this, the question 'How do you want to set up this policy?' is followed by two radio button options: 'Use the wizard to set up a typical policy for a common scenario' (which is selected) and 'Set up a custom policy'. A text prompt asks to 'Type a name that describes this policy.' Below this is a text input field labeled 'Policy name:' containing the text 'root'. An example text below the field reads 'Example: Authenticate all VPN connections.' At the bottom, there are three buttons: '< Back', 'Next >' (which is highlighted with a red dashed box), and 'Cancel'.

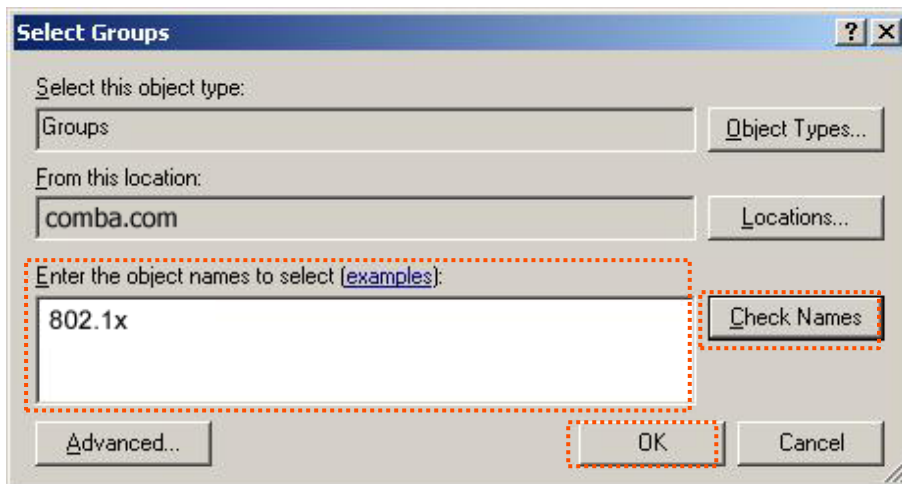
Select **Ethernet** and click **Next**.

The screenshot shows the 'New Remote Access Policy Wizard' dialog box. The title bar reads 'New Remote Access Policy Wizard'. The main heading is 'Access Method' with a sub-heading 'Policy conditions are based on the method used to gain access to the network.' Below this, the question 'Select the method of access for which you want to create a policy.' is followed by four radio button options: 'VPN' (with a sub-description: 'Use for all VPN connections. To create a policy for a specific VPN type, go back to the previous page, and select Set up a custom policy.'), 'Dial-up' (with a sub-description: 'Use for dial-up connections that use a traditional phone line or an Integrated Services Digital Network (ISDN) line.'), 'Wireless' (with a sub-description: 'Use for wireless LAN connections only.'), and 'Ethernet' (which is selected and highlighted with a red dashed box, with a sub-description: 'Use for Ethernet connections, such as connections that use a switch.'). At the bottom, there are three buttons: '< Back', 'Next >' (which is highlighted with a red dashed box), and 'Cancel'.

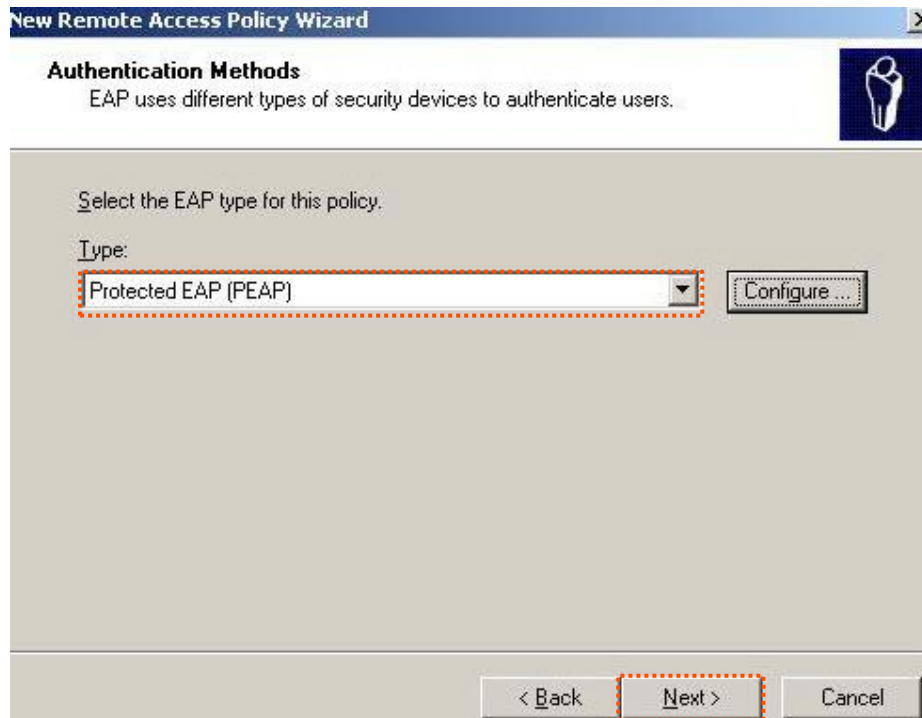
Select **Group** and click **Add**.



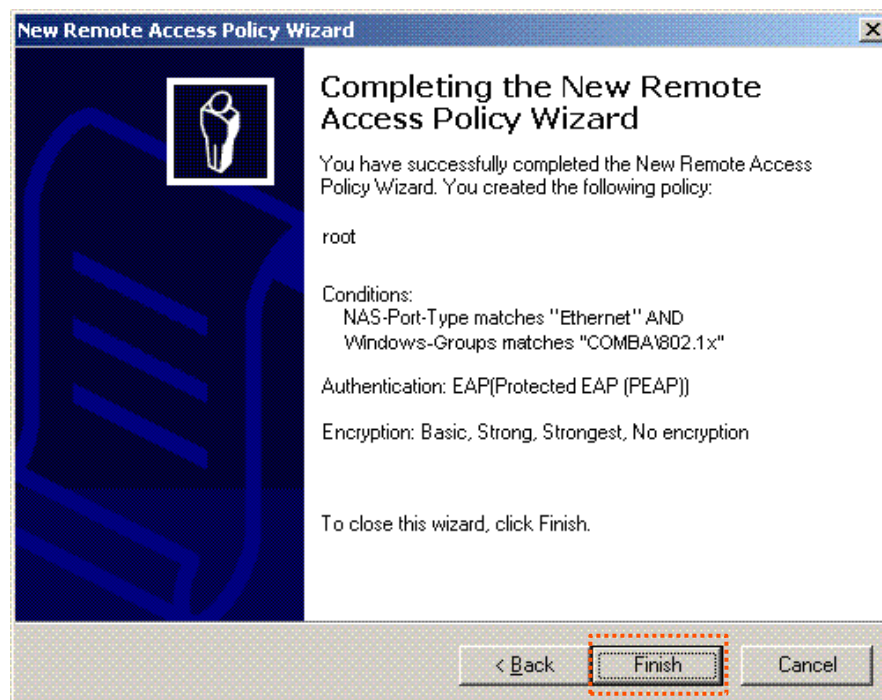
Enter **802.1x** in the **Enter the object names to select** text box, click **Check Names**, and click **OK**.



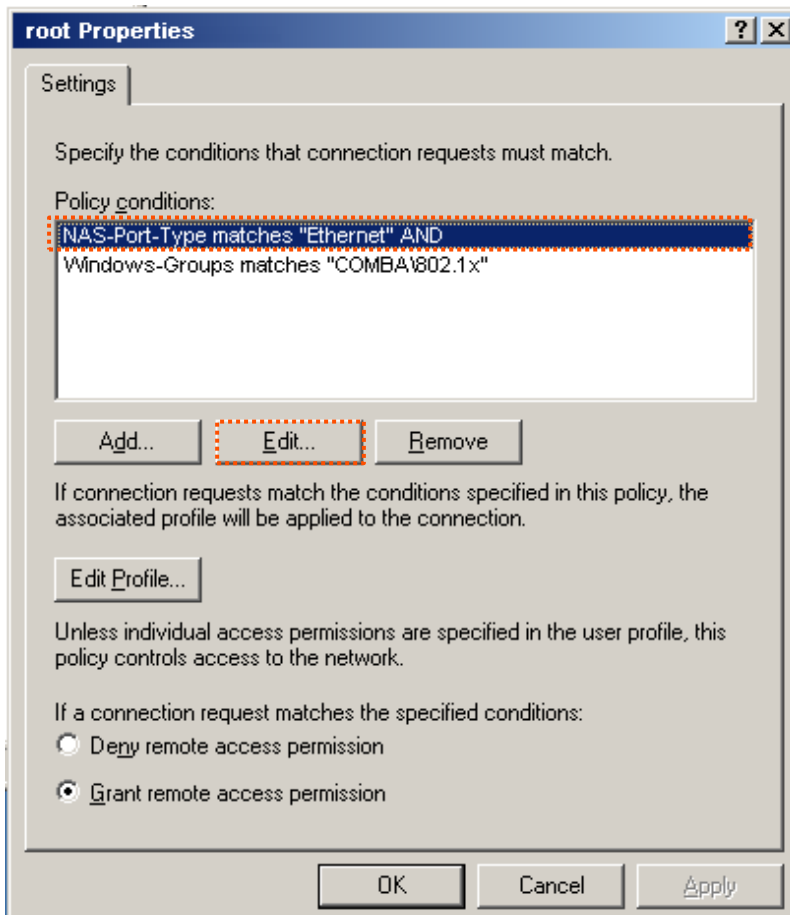
Select **Protected EAP (PEAP)** and click **Next**.



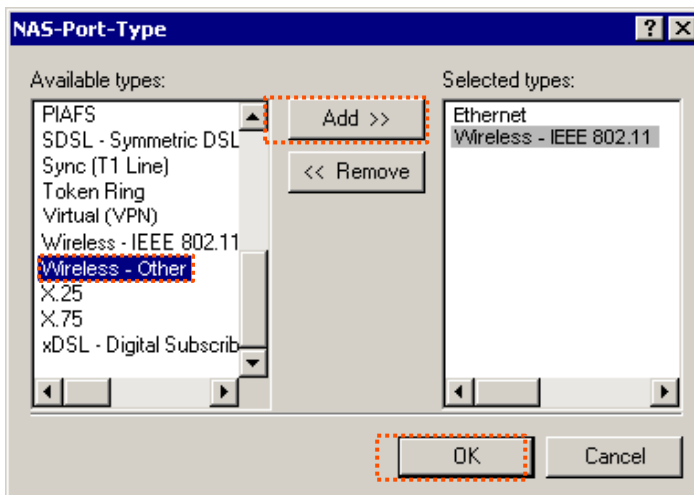
Click **Finish**. The remote access policy is created.



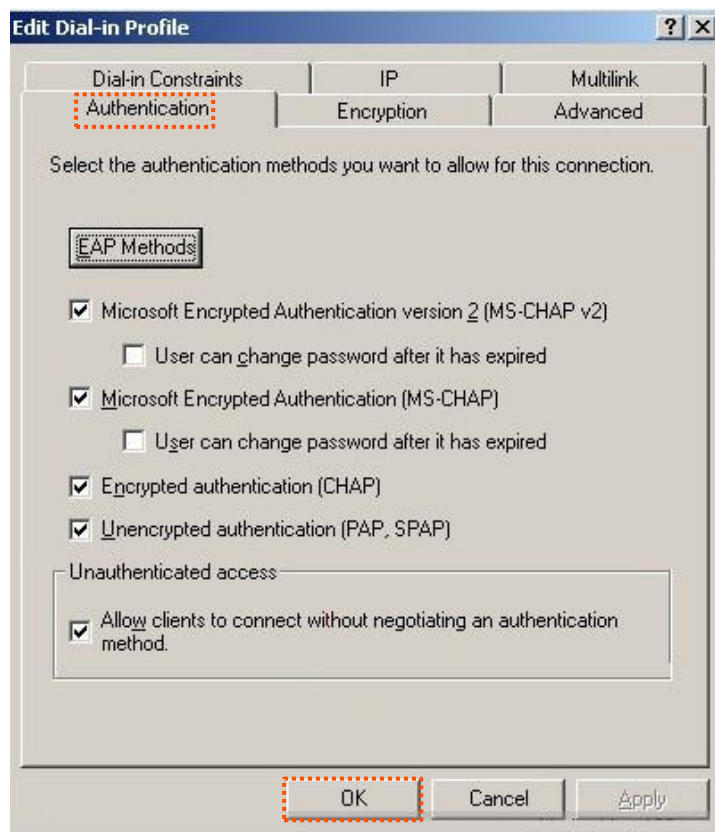
Right-click **root** and choose **Properties**. Select **Grant remote access permission**, select **NAS-Port-Type matches "Ethernet" AND**, and click **Edit**.



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



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



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

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

**--End**

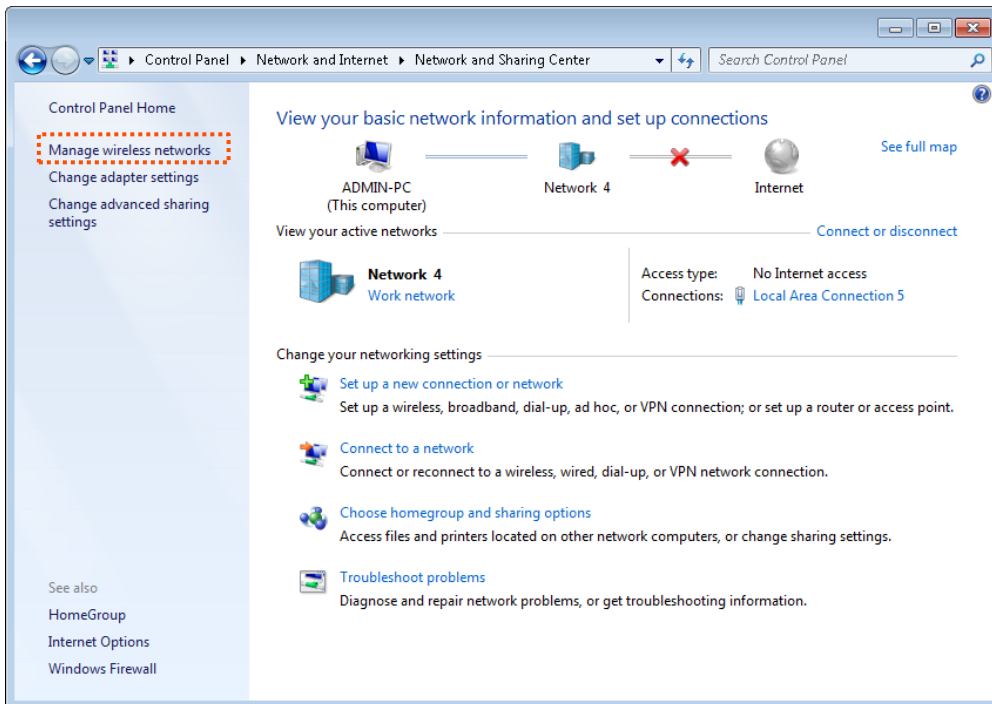


## ■ Configure your wireless device

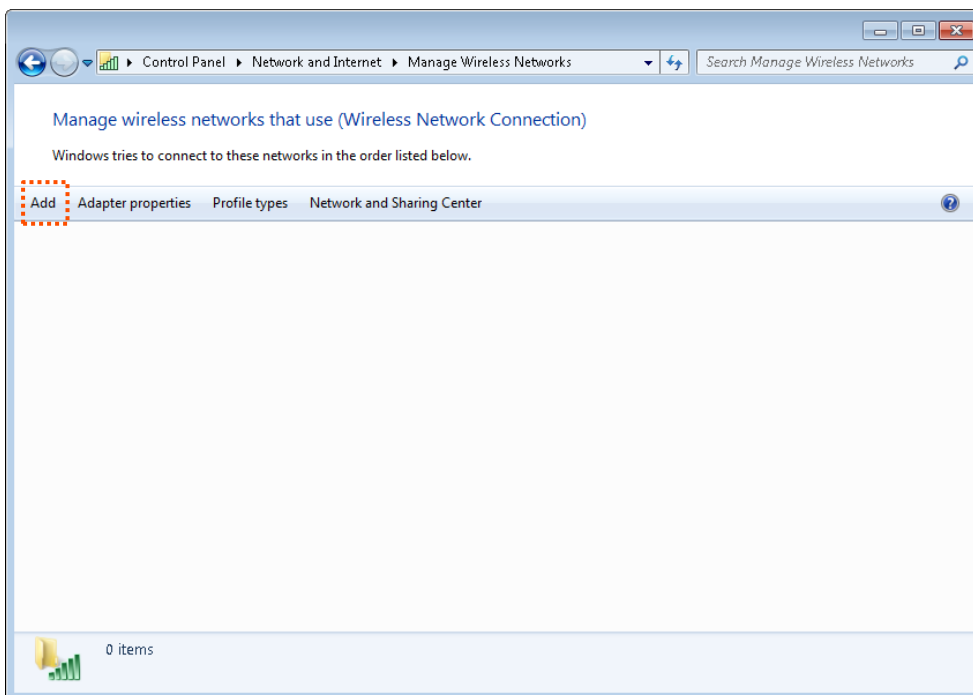


Windows 7 is taken as an example to describe the procedure.

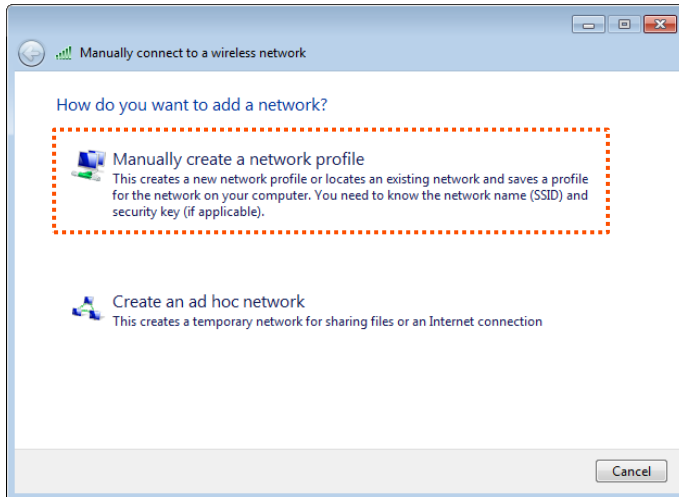
**Step 1** Choose **Start > Control Panel**, and click **Network and Internet > Network and Sharing Center > Manage wireless networks**.



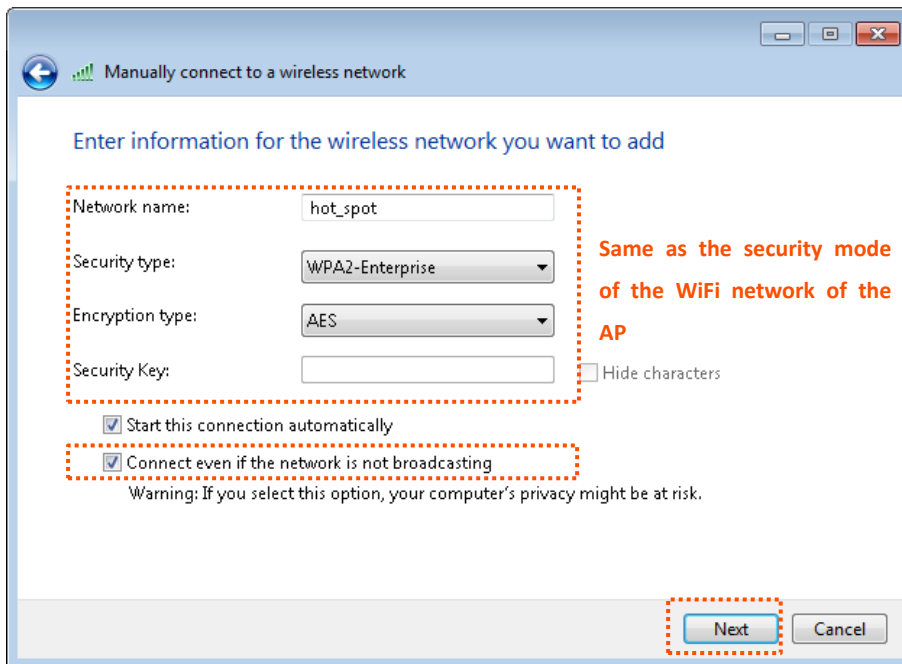
**Step 2** Click **Add**.



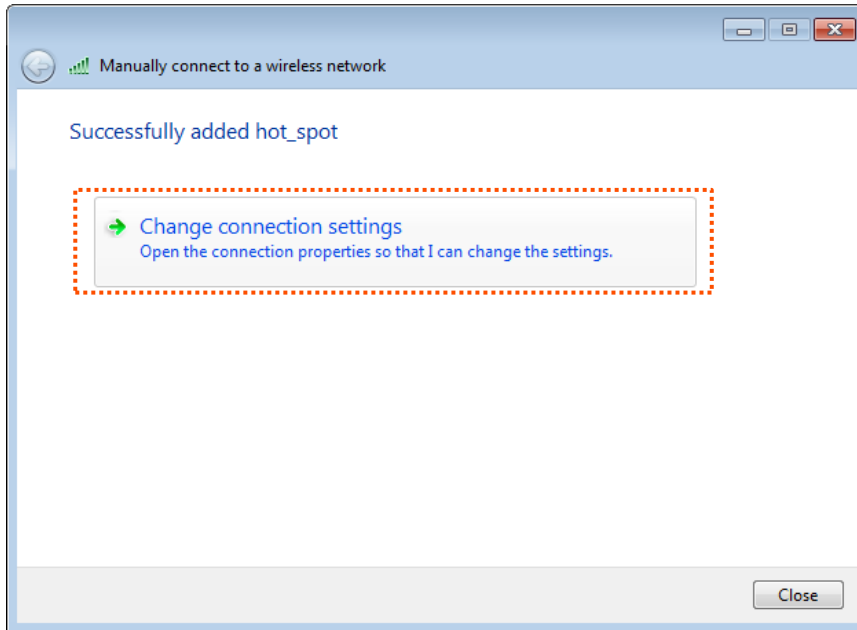
**Step 3** Click **Manually create a network profile**.



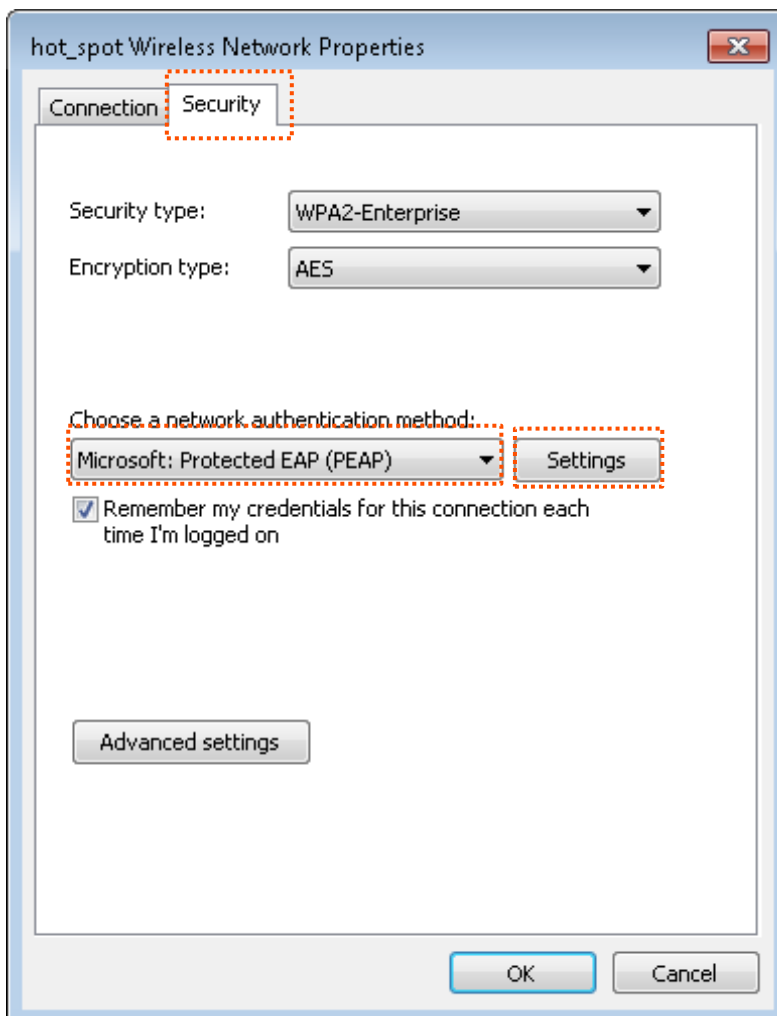
**Step 4** Enter wireless network information, select **Connect even if the network is not broadcasting**, and click **Next**.



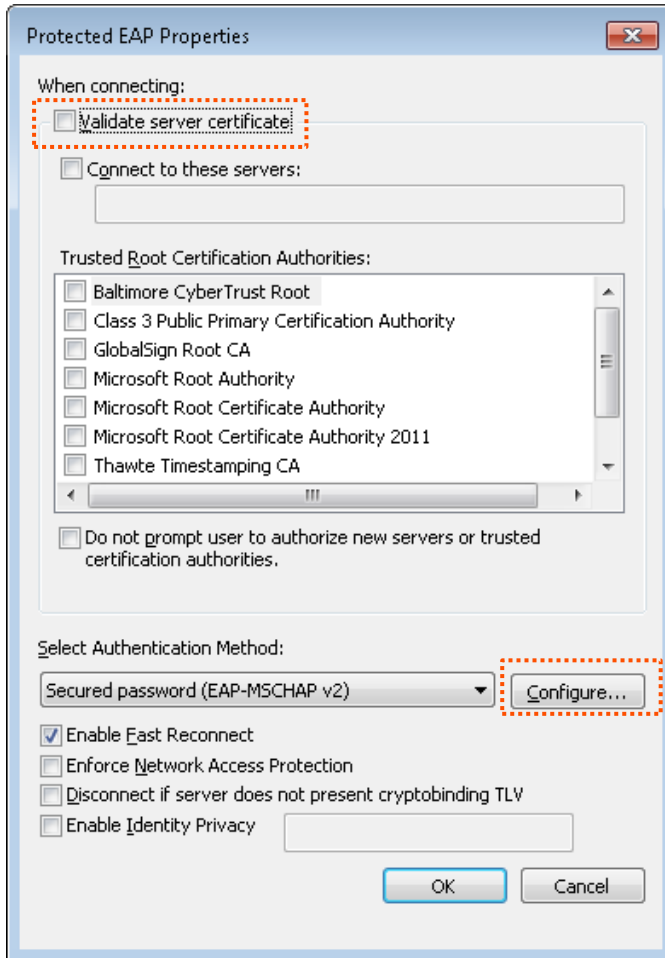
**Step 5** Click **Change connection settings**.



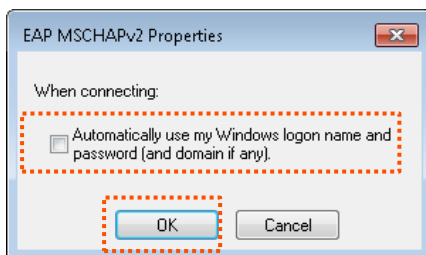
**Step 6** Click the **Security** tab, select **Microsoft: Protected EAP (PEAP)**, and click **Settings**.



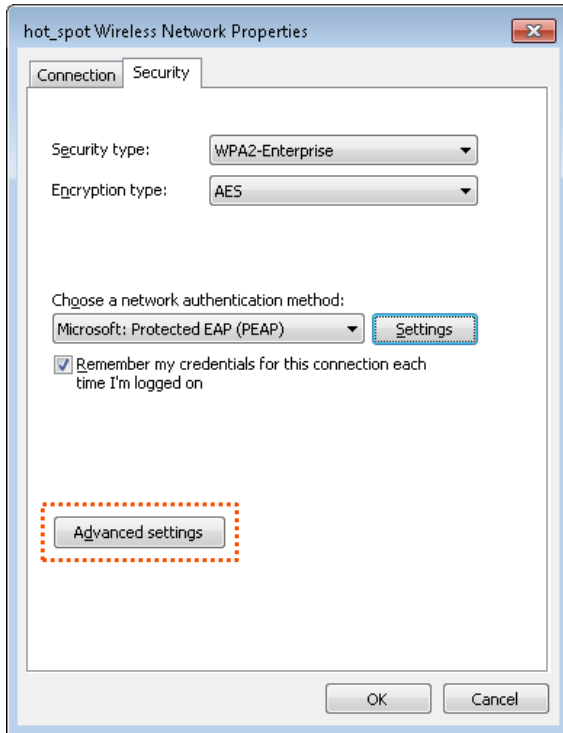
**Step 7** Deselect **Validate server certificate** and click **Configure**.



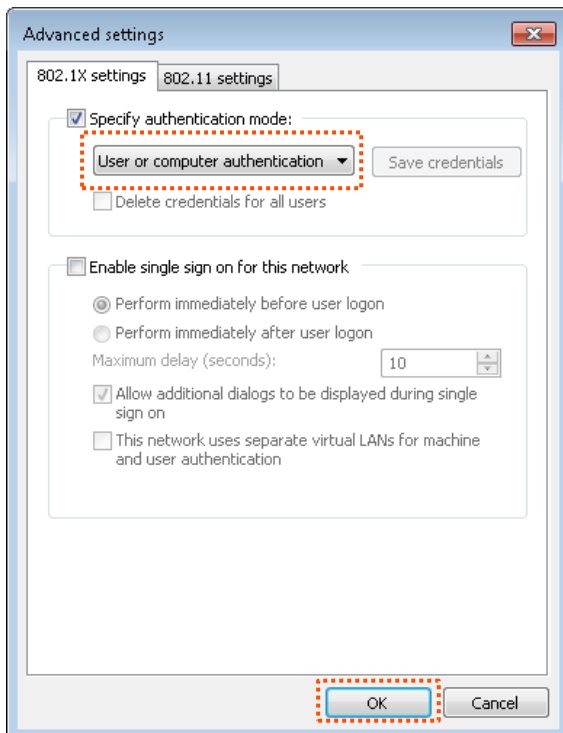
**Step 8** Deselect **Automatically use my Windows logon name and password (and domain if any)** and click **OK**.



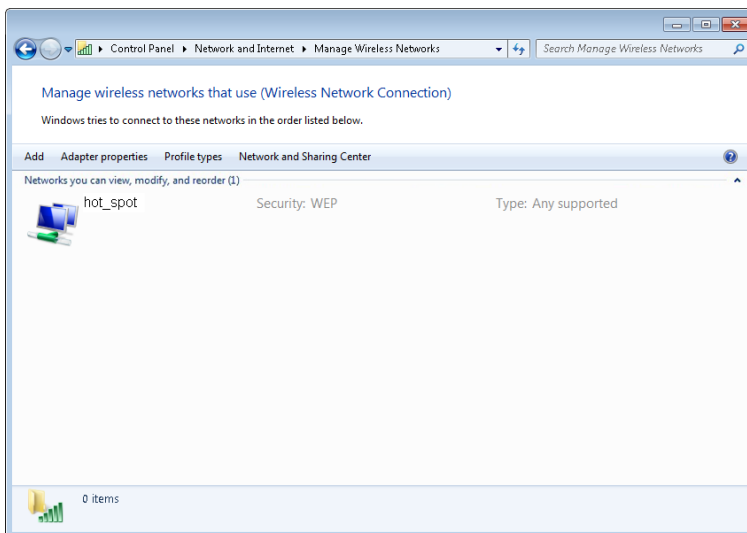
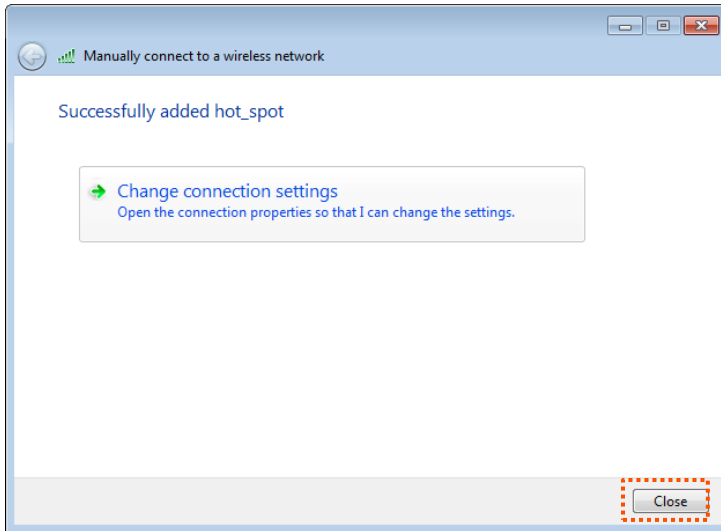
**Step 9** Click **Advanced settings**.



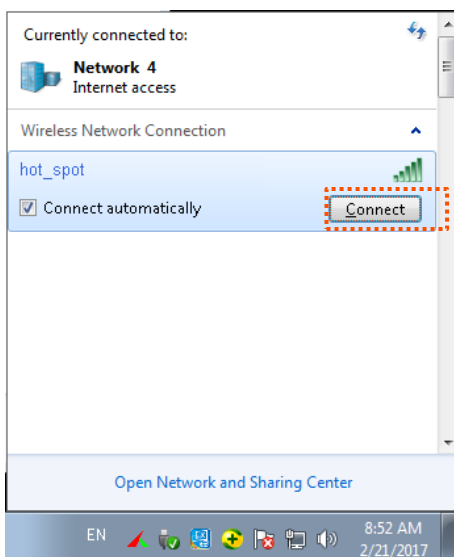
**Step 10** Select **User or computer authentication** and click **OK**.



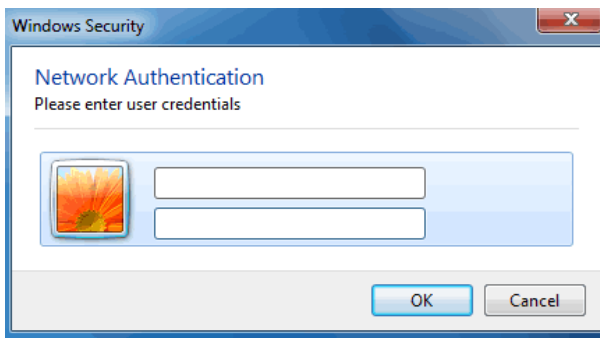
**Step 11** Click **Close**.



**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**.

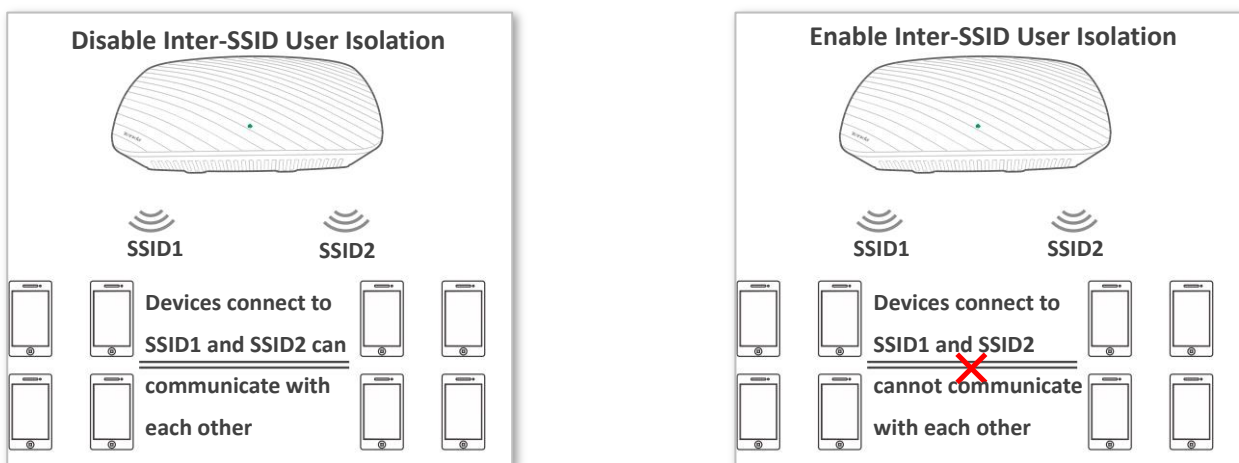
## 7.2 Radio Settings

### 7.2.1 Overview

The Radio module is used to set Radio parameters of the AP. The following briefly describes the SSID isolation function.

#### Inter-SSID User Isolation

This function isolates the wireless clients connected to different wireless networks of the AP. For example, if user 1 connects to the wireless network corresponding to SSID1, whereas user 2 connects to the wireless network corresponding to SSID2, the two users cannot communicate with each other after SSID isolation is implemented.



### 7.2.2 Changing the Radio Settings

2.4 GHz wireless network setup is used for illustration here. The configuration procedure for 5 GHz wireless network is similar.

**Step 1** Choose **Wireless > Radio**.

**Step 2** Change the parameters as required. Generally, you only need to change the **Enable Wireless**, **Channel**, **Channel Lockout**, **TX Power** and **Power Lockout** settings.

**Step 3** Click **Save**.



2.4GHz Radio
5GHz Radio

Enable Wireless

Country China ▼

Network Mode 11b/g/n mixed ▼

Channel Auto ▼

Channel Bandwidth  20  40  20/40

Extension Channel Auto ▼

Channel Lockout

TX Power 20 ▼ (dBm, Range: 10 ~ 20; Default: 20)

Power Lockout

Preamble  Long Preamble  Short Preamble

Short GI  Disable  Enable

Inter-SSID User Isolation  Enable  Disable

Save

Restore

Help

--End

### Parameter description

Parameter	Description
Enable Wireless	It specifies whether to enable the wireless function of the AP.
Country	It specifies the country or region where the AP is used. This parameter helps comply with channel regulations of the country or region.
Network Mode	<p>It specifies the wireless network mode of the AP.</p> <p>Available options of 2.4 GHz wireless network include 11b/g/n mixed, 11b, 11g, and 11b/g/n mixed. Available options of 5 GHz wireless network include 11a, 11ac and 11a/n. This parameter can be set if Channel Lockout is not selected.</p> <ul style="list-style-type: none"> <li>• <b>11b</b>: It indicates that only clients working in the 11b network mode can connect to the AP.</li> <li>• <b>11g</b>: It indicates that only clients working in the 11g network mode can connect to the AP.</li> <li>• <b>11b/g mixed</b>: It indicates that only clients working in the 11b or 11g network mode can connect to the AP.</li> <li>• <b>11b/g/n mixed</b>: It indicates that only clients working in the 11b, 11g, or 11n network mode can connect to the AP.</li> <li>• <b>11a</b>: It indicates that only clients working in the 11a network mode can connect to the AP.</li> <li>• <b>11ac</b>: It indicates that only clients working in the 11ac network mode can connect to the AP.</li> <li>• <b>11a/n</b>: It indicates that only clients working in the 11a or 11n network mode can connect to the AP.</li> </ul>

Parameter	Description
Channel	It specifies the operating channel of the AP. This parameter can be set if Channel Lockout is not selected.
Channel Bandwidth	<p>It specifies the bandwidth of the operating channel of the AP. This parameter can be set if Channel Lockout is not selected.</p> <ul style="list-style-type: none"> <li>• <b>20/20MHz</b>: It indicates that the AP only uses 20 MHz channel bandwidth.</li> <li>• <b>40/40MHz</b>: It indicates that the AP only uses 40 MHz channel bandwidth. The <b>40</b> is effective only for the 802.11b/g/n mixed network mode. The 40MHz option is effective for the 802.11ac and 802.11a/n.</li> <li>• <b>20/40</b>: It indicates that the AP automatically adjusts its channel bandwidth to 20 MHz or 40 MHz according to the ambient environment. This option is effective only for 802.11b/g/n mixed network mode.</li> <li>• <b>80MHz</b>: It indicates that the AP only uses 80 MHz channel bandwidth. This option is effective only for 802.11ac network mode.</li> </ul>
Expansion Channel	It specifies an additional channel used to increase the channel bandwidth if the AP works in the 802.11b/g/n mixed network mode and the channel bandwidth option <b>20/40</b> is selected.
Channel Lockout	It is used to lock the selected channel. After a channel is locked, parameters of the channel cannot be changed, including <b>Country, Network Mode, Channel, Channel Bandwidth, and Expansion Channel</b> .
TX Power	It specifies the transmit power of the AP. This parameter can be set if Power Lockout is not selected.
Power Lockout	It is used to lock the TX power. If this option is selected, the TX power cannot be changed.
Preamble	<p>It specifies whether to use long preamble or short preamble. A preamble is a group of bits located at the beginning of a packet to enable a receiver to perform synchronization and prepare for receiving data.</p> <p>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.</p>
Short GI	<p>It specifies short guard interval.</p> <p>The purpose of the guard interval is to introduce immunity to propagation delays. With this function enabled, the AP can yield a 10% improvement in data throughput.</p>
Inter-SSID User Isolation	<p>It specifies whether to isolate the wireless clients connected to the AP with different SSIDs.</p> <ul style="list-style-type: none"> <li>• <b>Disable</b>: It indicates that the wireless clients connected to the AP with different SSIDs can communicate with each other.</li> <li>• <b>Enable</b>: It indicates that the wireless clients connected to the AP with different SSID cannot communicate with each other. This improves wireless network security.</li> </ul>

## 7.3 Radio Optimizing

### 7.3.1 Overview

#### Application Scenarios

Wireless networks are widely applied to the following two scenarios:

##### ■ Coverage-oriented scenario

This scenario applies to places which require large WiFi coverage, such as offices, public buildings, schools, warehouses, and hospitals.

##### ■ Capacity-oriented scenario

This scenario applies to large, crowd places which require multiple AP deployment, such as

- Conference halls, theatres, showrooms, and ballrooms;
- Indoor/open stadium;
- Classrooms at colleges and universities
- Airports and railway stations.

#### Performance Optimization Parameters

To address different demand of both coverage-oriented and capacity-oriented scenarios, this AP provides a series of parameters for radio optimization, facilitating our customers to create qualified wireless network service.

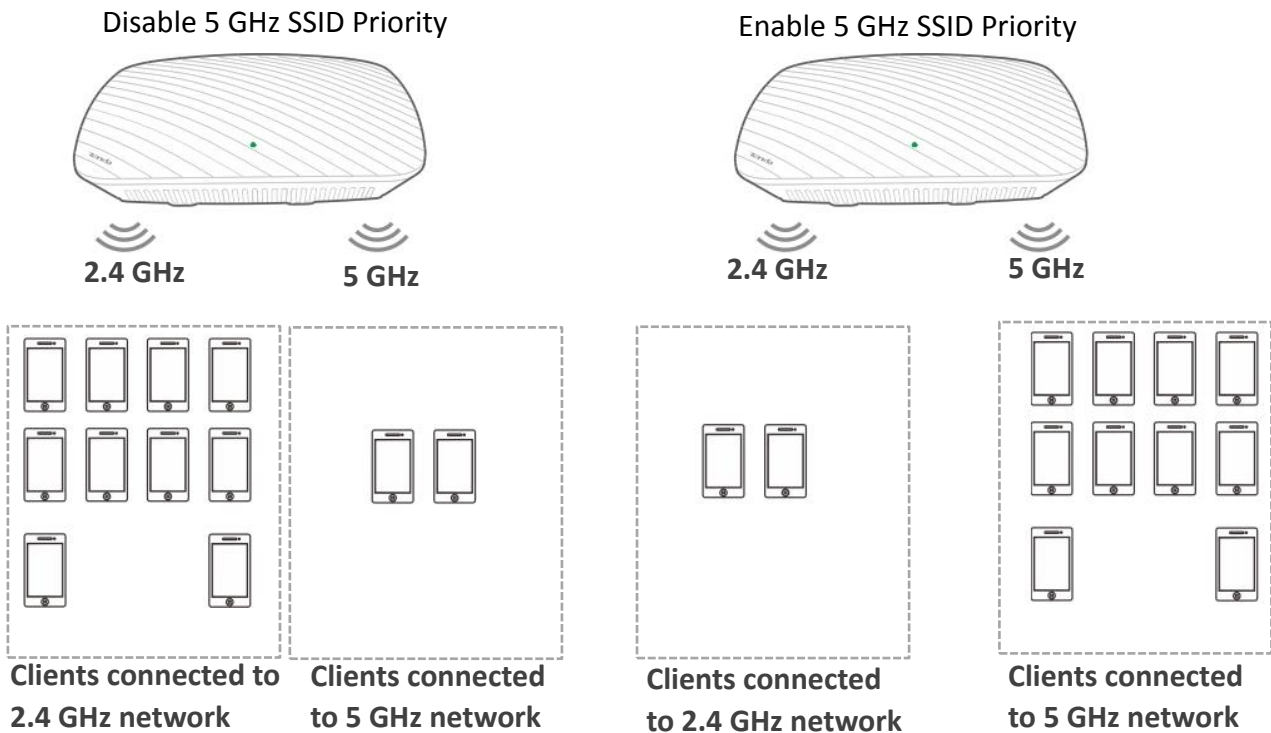
##### ■ 5 GHz SSID Priority

Although the 2.4 GHz band is more widely used than the 5 GHz band in actual wireless networks application, channels and signals on 2.4 GHz suffer more serious congestion and interference since there are only 3 non-overlapped communication channels on this band. The 5 GHz band could provide more non-overlapped communication channels. The quantity could reach more than 20 in some countries.

With the evolvement of the wireless networks, wireless clients that support both the 2.4 GHz and 5 GHz are more popular. However, by default, such dual-band wireless clients choose the 2.4 GHz to connect, resulting in even worse congestion of the 2.4 GHz band and the waste of the 5 GHz band.

The 5 GHz SSID Priority functions enables such dual-band wireless clients to connect the 5 GHz band on network initialization if the 5 GHz signal strength the AP received reaches or exceeds the 5 GHz threshold so as to improve the utilization of the 5 GHz band, reduce the load and interference on the 2.4 GHz band, thus bettering user experience.

Assume that the Maximum Clients of both 2.4 GHz and 5 GHz WiFi networks are set to 10.



The 5 GHz SSID Priority function takes effect only when both of the 2.4 GHz and 5 GHz networks are enabled, and the two networks share the same SSID, security mode and password.

### ■ Airtime Scheduling

In mixed wireless rates environment, the traditional FIFO (First-in First-out) allocates more air interface time to clients with low transmission capacity and low spectrum efficiency, reducing the system throughput of each AP then the system utilization.

The Airtime Scheduling function allocates downlink transmission time to clients so that clients with high transmission rate could transmit more data, improving the throughput of each AP and quantity of clients allowed to be connected.

## 7.3.2 Optimizing Radio

5 GHz wireless network setup is used for illustration here. The configuration procedure for 2.4 GHz wireless network is similar.



You are recommended to retain the default settings if without the professional guidance.

- Step 1** Choose **Wireless > Radio Optimizing**.
- Step 2** Click the tab to select the band of network to be optimized
- Step 3** Change the parameters as needed.
- Step 4** Click **Save**.

2.4GHz Radio Optimizing **5GHz Radio Optimizing**

Beacon Interval  (Range: 100 ~ 999; Default: 100)

Fragment Threshold  (Range: 256 ~ 2346; Default: 2346)

RTS Threshold  (Range: 1 ~ 2347; Default: 2347)

DTIM Interval  (Range: 1 ~ 255; Default: 1)

Receive Signal Strength  Enable  Disable

5GHz SSID Priority  Enable  Disable

5GHZ Threshold  (dBm)

Airtime Scheduling  Enable  Disable

APSD  Enable  Disable

Aging Time

Basic Rate Sets  6  9  12  18  24  36  48  54  All

Supported Rate Sets  6  9  12  18  24  36  48  54  All

--End

## Parameter description

Parameter	Description
Beacon Interval	<p>It specifies the interval for transmitting the Beacon frame.</p> <p>The Beacon frame is transmitted at the specified interval to announce the presence of a wireless network. Generally, a smaller interval enables wireless clients to connect to the AP more quickly, while a larger interval ensures higher data transmission efficiency.</p>
Fragment Threshold	<p>It specifies the threshold of a fragment.</p> <p>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.</p> <p>In case of a high error rate, you can reduce the threshold to enable the AP to resend only the fragments that have not been sent successfully, so as to increase the frame throughput.</p> <p>In an environment without interference, you can increase the threshold to reduce the number of acknowledgement times, so as to increase the frame throughput.</p>
RTS Threshold	<p>It specifies the frame length threshold for triggering the RTS/CTS mechanism.</p> <p>If a frame exceeds this threshold, the RTS/CTS mechanism is triggered to reduce conflicts. The unit is byte.</p> <p>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.</p> <p>The RTS mechanism requires some network bandwidth. Therefore, it is triggered</p>

Parameter	Description
	only when frames exceed this threshold.
DTIM Interval	<p>It specifies the interval for transmitting the Delivery Traffic Indication Message (DTIM) frame. The unit is Beacon.</p> <p>A countdown starts from this value. The AP transmits broadcast and multicast frames in its cache only when the countdown reaches zero.</p> <p>For example, if <b>DTIM Interval</b> is set to <b>1</b>, the AP transmits all cached frames after each beacon frame is transmitted.</p>
Receive Signal Strength	<p>It specifies the minimum strength of received signals acceptable to the AP. If the strength of the signals transmitted by a wireless device is weaker than this threshold, the wireless device cannot connect to the AP.</p> <p>If there are multiple APs, an appropriate value of this parameter ensures that wireless clients connect to the APs with strong signals.</p>
5GHz SSID Priority	<p>Enable: this AP lets the wireless clients that support 2.4 GHz and 5 GHz take priority to connect to 5 GHz network.</p> <p>Disable: wireless clients connect to 2.4 GHz or 5 GHz network at random.</p>
5GHz Threshold	It specifies the minimum strength of received signals acceptable to the device that allows a wireless device to connect to 5 GHz WiFi network. If the strength of the signals transmitted by a wireless device is stronger than this threshold, the wireless device can connect to the 5 GHz WiFi network. Otherwise, it connects to 2.4 GHz WiFi network, or cannot connect to the device.
Airtime Scheduling	It specifies whether to enable the Airtime Scheduling function. It helps equal clients' transmission time, thus improving the experience of clients with high transmission rate.
APSD	It specifies whether to enable the Automatic Power Save Delivery (APSD) function. It helps reduce power consumption of the AP. By default, it is disabled.
Aging Time	It is used to set the aging time of clients. After a wireless client connects to the AP, the AP disconnects from the wireless client if no data is exchanged between them within the interval.
Basic Rate Sets	It specifies rates that wireless clients are required to support in order to connect to the wireless networks of this device.
Supported Rate Sets	It specifies the additional rates that the AP supports, which are optional to wireless clients.

## 7.4 Frequency Analysis

### 7.4.1 Overview

This module includes Frequency Analysis and Rogue AP Detection.

#### ■ Frequency Analysis

This function enables you to check the number of signals on each channel and the usage of channels. Then you can select a low usage channel for this AP to improve the wireless transmission efficiency.

#### ■ Rogue AP Detection.

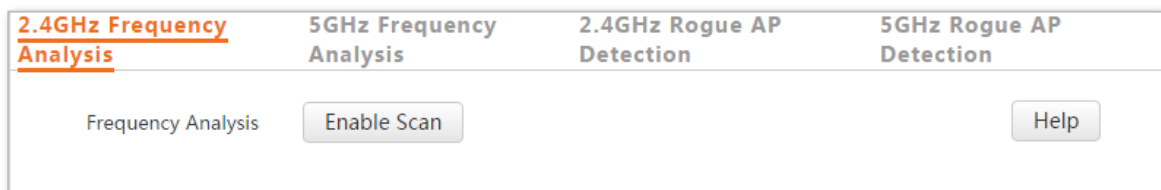
This function enables you to know wireless networks information nearby, including SSID, MAC address, channel and wireless signal strength.

### 7.4.2 Checking the Usage of Channels

**Step 1** Choose **Wireless > Frequency Analysis**.

**Step 2** Click the tab to select a radio band to setup. 2.4 GHz Frequency Analysis is used for illustration here.

**Step 3** Click **Enable Scan**.



--End

Wait for a moment. The following table shows the scanning result.

- **Green** Channel Utilization indicates that the channels are in good condition.
- **Yellow** Channel Utilization indicates that the channels are congested.
- **Red** Channel Utilization indicates that the channels are not available.

The screenshot shows the same interface as above, but with a table displaying the scanning results. The table has columns for Channel (1-13) and rows for Number of Signals and Channel Utilization(%). The utilization values are color-coded: Green (36, 17, 35, 42, 43, 46), Yellow (64, 55, 52, 75), and Red (87, 83, 29).

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of Signals	4	7	5	3	4	14	2	6	5	1	11	0	2
Channel Utilization(%)	64	55	36	17	52	87	83	35	42	43	75	46	29

### 7.4.3 Checking the Wireless Networks Nearby

**Step 1** Choose **Wireless > Frequency Analysis**.

**Step 2** Select the radio band of the wireless network to be checked. 2.4 GHz Rogue AP Detection is used for illustration here.

**Step 3** Click **Enable Scan**.



--End

Wait for a moment. The following table shows the scanning result.

2.4GHz Frequency Analysis		5GHz Frequency Analysis		2.4GHz Rogue AP Detection		5GHz Rogue AP Detection	
Illegal AP Detection		Disable Scan				Help	
ID	SSID	MAC Address	Network Mode	Channel	Bandwidth	Security	Signal Strength
1	Tenda_83F168	c8:3a:35:83:f1:69	bgn	3	20MHz	none	-22dBm
2	mymymy	50:2b:7b:ff:30:81	bgn	6	40MHz	wpa&wpa2/aes...	-24dBm
3	1smater	50:2b:73:f0:3a:61	bgn	6	20MHz	wpa2/aes	-40dBm
4	Tenda_366FC0	c8:3a:35:36:6f:c1	bgn	8	20MHz	wpa&wpa2/aes	-42dBm
5	Tenda_83F169	d8:38:0d:5a:92:81	bgn	6	20MHz	wpa2/aes	-44dBm
6	Tenda_83F110	c8:3a:35:83:f1:11	bgn	4	20MHz	none	-44dBm
7	1@@@@@@	c8:3a:35:83:f1:d1	bgn	4	40MHz	wpa&wpa2/aes...	-46dBm
8	1115Tenda_D70FA8	c8:3a:35:d7:0f:a9	bgn	9	20MHz	wpa&wpa2/aes	-48dBm
9	001-666	c8:3a:35:f1:94:79	bgn	6	20MHz	wpa&wpa2/aes...	-48dBm
10	Tenda_099090	50:2b:73:09:90:91	bgn	11	20MHz	none	-48dBm
11	Tenda_843F00	c8:3a:35:84:3f:01	bgn	10	20MHz	none	-50dBm
12	Tenda_0758	c8:3a:35:ef:07:69	bgn	6	40MHz	wpa&wpa2/aes...	-52dBm



## 7.5 WMM Setup

### 7.5.1 Overview

802.11 networks offer wireless access services based on the Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) channel competition mechanism, which allows all wireless clients to fairly compete for channels. All the services implemented over wireless networks share the same channel competition parameters. Nevertheless, different services usually have different requirements for bandwidth, delay, and jitter. This requires wireless networks to offer accessibility based on the services implemented over the networks.

WMM is a wireless QoS protocol used to ensure that packets with high priorities are transmitted first. This ensures better voice and video service experience over wireless networks.

■ WMM involves the following terms:

- Enhanced Distributed Channel Access (EDCA): It is a channel competition mechanism to ensure that packets with higher priorities are assigned more bandwidth and transmitted earlier.
- Access Category (AC): AC: The WMM mechanism divides WLAN traffic by priority in descending order into the AC-VO (voice stream), AC-VI (video stream), AC-BE (best effort), and AC-BK (background) access categories. The access categories use queues with different priorities to send packets. The WMM mechanism ensures that packets in queues with higher priorities have more opportunities to access channels.

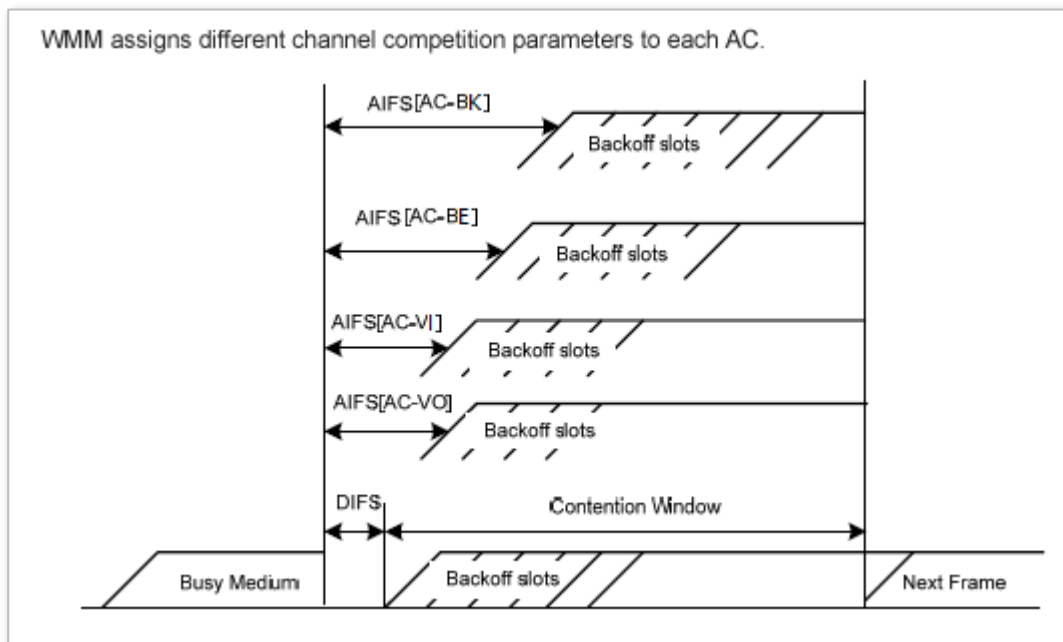
According to the 802.11 protocol family, all devices listen on a channel before using the channel to send data. If the channel stays idle for or longer than a specified period, the devices wait a random backoff period within the contention window. The device whose backoff period expires first can use the channel. The 802.11 protocol family applies the same backoff period and contention window to all devices across a network to ensure that the devices have the same channel contention opportunity.

■ EDCA Parameters

WMM changes the contention mechanism of 802.11 networks by dividing packets into four ACs, among which the ACs with higher priorities have more opportunities to access channels. The ACs help achieve different service levels.

WMM assigns each AC a set of EDCA parameters for channel contention, including:

- Arbitration Inter Frame Spacing Number (AIFSN): Different from the fixed distributed inter-frame spacing (DIFS) specified in the 802.11 protocol family, AIFSN varies across ACs. A greater AIFSN indicates a longer backoff period. See AIFS in the following figure.
- Contention window minimum (CW<sub>min</sub>) and contention window maximum (CW<sub>max</sub>) specify the average backoff period. The period increases along with these two values. See the backoff slots in the following figure.
- Transmission Opportunity (TXOP): It specifies the maximum channel use duration after successful channel contention. The duration increases along with this value. The value 0 indicates that a device can send only one packet through a channel after winning contention for the channel.



#### ■ ACK Policies

WMM specifies the Normal ACK and No ACK policies.

- According to the No ACK policy, no ACK packet is used during wireless packet transmission to acknowledge packet reception. This policy is applicable to scenarios where interference is mild and can effectively improve transmission efficiency. In case of strong interference, lost packets are not sent again if this policy is adopted. This leads a higher packet loss rate and reduces the overall performance.
- According to the Normal ACK policy, each time a receiver receives a packet, it sends back an ACK packet to acknowledge packet reception.

### 7.5.2 Changing the WMM Settings

By default, the WMM function of the AP is enabled and the Optimized For Capacity mode is adopted. Procedure for changing the WMM settings:

- Step 1** Choose **Wireless > WMM Setup**.
- Step 2** Select a radio band to setup. 2.4 GHz WMM is used for illustration here.
- Step 3** Set the **WMM** to **Enable**.
- Step 4** Select the required WMM optimization mode.
- Step 5** If you select **Custom**, set the WMM parameters as required.
- Step 6** Click **Save**.

2.4GHz WMM
5GHz WMM

WMM  Disable  Enable

WMM Optimization Mode  Optimized For Throughput (Concurrent Users <=10)

Optimized For Capacity (Concurrent Users >=10)

Custom

No ACK

EDCA AP Parameters

	CWmin	CWmax	AIFSN	TXOP Limit
AC_BE	7	127	1	4096
AC_BK	15	1023	7	0
AC_VI	7	15	1	3008
AC_VO	3	7	1	1504

EDCA STA Parameters

	CWmin	CWmax	AIFSN	TXOP Limit
AC_BE	31	255	1	3008
AC_BK	15	1023	7	0
AC_VI	7	15	2	3008
AC_VO	3	7	2	1504

## Parameter description

Parameter	Description
WMM	<ul style="list-style-type: none"> <li>• <b>Enable:</b> It is used to enable the WMM function.</li> <li>• <b>Disable:</b> It is used to disable the WMM function.</li> </ul>
WMM Optimization Mode	<p>It specifies the WMM optimization modes supported by the AP:</p> <ul style="list-style-type: none"> <li>• <b>Optimized For Throughput:</b> If 10 or less clients are connected to the AP, you are recommended to select this mode to increase client throughput.</li> <li>• <b>Optimized For Capacity:</b> If more than 10 clients are connected to the AP, you are recommended to select this mode to ensure client connectivity.</li> <li>• <b>Custom:</b> This mode enables you to set the WMM EDCA parameters for manual optimization.</li> </ul>
No ACK	<ul style="list-style-type: none"> <li>• If the check box is selected, the No ACK policy is adopted.</li> <li>• If the check box is deselected, the Normal ACK policy is adopted.</li> </ul>
EDCA Parameters	For details, refer to section <a href="#">7.5.1 Overview</a> .

## 7.6 Access Control

### 7.6.1 Overview

It specifies, based on MAC address filter rules, the wireless devices that can or cannot access the wireless networks of the AP. Devices that have been controlled cannot connect to the corresponding wireless network.

The AP supports the following MAC address filter rules:

- **Disable:** It indicates that access control is disabled.
- **Allow:** It indicates that only the wireless devices with the specified MAC addresses can access the wireless networks of the AP.
- **Disallow:** It indicates that only the wireless devices with the specified MAC addresses cannot access the wireless networks of the AP.

### 7.6.2 Configuring Access Control

**Step 1** Choose **Wireless > Access Control**.

**Step 2** Click the tab to select a radio band to setup. 2.4 GHz Access Control is used for illustration here.

**Step 3** From the **SSID** drop-down list box, select the SSID of the wireless network on which access control must be implemented.

**Step 4** Select an access control mode from the **MAC Filter Mode** drop-down list box.

**Step 5** If you select **Allow** or **Disallow**, enter the MAC addresses to control in the access control list and click **Add**.



**TIP**

If a wireless device to be controlled has been connected to the AP, you can click **Add** corresponding to the device in the wireless client list to directly add it to the access control list.

**Step 6** Click **Save**.

2.4GHz Access Control 5GHz Access Control

Specify a list of devices to allow or disallow a connection to your wireless network via the devices' MAC addresses. This can be set separately on each SSID.

SSID: Tenda\_099450

MAC Filter Mode: Allow

**Wireless client list**

ID	MAC Address	IP Address	Connection Duration	Add to List
1	1C:5C:F2:B4:40:08	192.168.60.133	00:00:28	Add

MAC Address: 12 : 12 : 12 : 12 : 12 : 12

Action: Add

**Wireless access control list**

1	12:12:12:12:12:12	<input checked="" type="checkbox"/> Enable	Delete
---	-------------------	--	--------

Save Restore Help

--End

## Parameter description

Parameter	Description
SSID	It specifies the SSID that requires wireless client access control.
MAC Filter Mode	<p>It specifies the mode for filtering MAC addresses.</p> <ul style="list-style-type: none"><li>• <b>Disable:</b> It indicates that access control is disabled.</li><li>• <b>Allow:</b> It indicates that only the wireless clients on the access control list can connect to the AP with the selected SSID.</li><li>• <b>Disallow:</b> It indicates that only the wireless clients on the access control list cannot connect to the AP with the selected SSID.</li></ul>

### 7.6.3 Example of Configuring Access Control

2.4 GHz Access Control is used for illustration here.

#### Networking requirement

A wireless network whose SSID is **Home** has been set up in a large apartment. Only family members are allowed to connect to the wireless network.

The Access Control function of the AP is recommended. The family members 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 procedure:

**Step 1** Choose **Wireless > Access Control**.

**Step 2** Select **Home** from the **SSID** drop-down list box.

**Step 3** Select **Allow** from the **MAC Filter Mode** drop-down list box.

**Step 4** Enter **C8:3A:35:00:00:01** in the **MAC Address** text box and click **Add**. Repeat this step to add **C8:3A:35:00:00:02** and **C8:3A:35:00:00:03** as well.

**Step 5** Click **Save**.

**--End**

The following figure shows the configuration.

**2.4GHz Access Control** 5GHz Access Control

Specify a list of devices to allow or disallow a connection to your wireless network via the devices' MAC addresses. This can be set separately on each SSID.

SSID: Home

MAC Filter Mode: Allow

Save Restore Help

ID	MAC Address	IP Address	Connection Duration	Add to List
No clients connected!				
MAC Address			Action	
<input type="text"/> : <input type="text"/> : <input type="text"/> : <input type="text"/> : <input type="text"/> : <input type="text"/>			<input type="button" value="Add"/>	
1	C8:3A:35:00:00:01		<input checked="" type="checkbox"/> Enable	<input type="button" value="Delete"/>
2	C8:3A:35:00:00:02		<input checked="" type="checkbox"/> Enable	<input type="button" value="Delete"/>
3	C8:3A:35:00:00:03		<input checked="" type="checkbox"/> Enable	<input type="button" value="Delete"/>

### Verification

Only the specified wireless devices can connect to the **Home** wireless network.

## 7.7 Advanced

### 7.7.1 Overview

This module is used to configure Recognize Terminal Type and Filter Broadcast Data settings.

#### ■ Recognize Terminal Type

This function is used to recognize the type of the devices connected to the wireless network of the AP for efficient management. The AP can recognize Android, iOS, iPhone, Windows, Mac OS and Other.

#### ■ Filter Broadcast Data settings

By default, the AP forwards lots of invalid broadcast packets, which may affect normal packets transmission. This function filters broadcast packets and reduces airtime consumption, ensuring bandwidth of normal packets transmission.

### 7.7.2 Changing the Advanced Settings

**Step 1** Choose **Wireless > Advanced**.

**Step 2** Change the parameters as required.

**Step 3** Click **Save**.

Advanced

Recognize Terminal Type  Disable  Enable

Filter Broadcast Data  Disable  Enable

Mode Option  ▼

- Only accept DHCP and ARP packets
- Only accept ARP packets

Save

Restore

Help

--End

#### Parameter description

Parameter	Description
Recognize Terminal Type	<ul style="list-style-type: none"><li>• <b>Enable:</b> It specifies whether to enable this function. With this function enabled, you can check the terminal type by choosing <b>Status &gt; Client List</b>.</li><li>• <b>Disable:</b> It specifies whether to disable the function.</li></ul>
Filter Broadcast Data	<ul style="list-style-type: none"><li>• <b>Enable:</b> It specifies whether to enable this function. With this function enabled, the AP reduces airtime consumption and ensures bandwidth of normal packets transmission.</li><li>• <b>Disable:</b> It specifies whether to disable the function.</li></ul>
Mode Option	This option is available after enabling Filter Broadcast Data.

Parameter	Description
	<ul style="list-style-type: none"><li>• Only accept DHCP and ARP packets: It indicates that the AP filters all broadcast or multicast packets except DHCP and ARP broadcast packets.</li><li>• Only accept ARP packets: It indicates that the AP filters all broadcast or multicast packets except ARP broadcast packets.</li></ul>

---



## 7.8 QVLAN Settings

### 7.8.1 Overview

The AP supports 802.1Q VLANs and is applicable in a network environment where 802.1Q VLANs have been defined. By default, the QVLAN function is disabled.

### 7.8.2 Configuring the QVLAN Function

**Step 1** Choose **Wireless > QVLAN**.

**Step 2** Change the parameters as required. Generally, you only need to change the **Enable**, and 2.4 GHz and 5 GHz SSID VLAN ID settings.

**Step 3** Click **Save**.

**QVLAN**

\*Enable

PVID

Manage VLAN

Save

Restore

Help

*2.4G SSID	VLAN ID (1~4094)
Home	<input type="text" value="1000"/>

*5G SSID	VLAN ID (1~4094)
Tenda_099458_5G	<input type="text" value="1000"/>

--End

#### Parameter description

Parameter	Description
Enable	It specifies whether to enable the QVLAN function of the AP. By default, it is disabled.
PVID	It specifies the ID of the default native VLAN of the trunk port of the AP. The default value is <b>1</b> .
Management VLAN	It specifies the ID of the AP management VLAN. The default value is <b>1</b> . After changing the management VLAN, you can manage the AP only after connecting your computer or AP controller to the new management VLAN.
2.4G SSID	It specifies the currently enabled 2.4 GHz SSIDs of the AP.
5G SSID	It specifies the currently enabled 5 GHz SSIDs of the AP.
VLAN ID	It specifies VLAN IDs corresponding to SSIDs. The default value is <b>1000</b> . After the QVLAN function is enabled, the wireless interfaces corresponding to SSIDs functions as access ports. The PVID and VLAN ID of an access port are the same.

If the QVLAN function is enabled, tagged data received by a port of the AP is forwarded to the other ports of the VLAN corresponding to the VID in the data, whereas untagged data received by a port of the AP is forwarded to the other ports of the VLAN corresponding to the PVID of the port that receives the data.

The following table describes how ports of different link types process transmitted and received data.

Port	Method to Process Received Data		Method to Process Transmitted Data
	Tagged Data	Untagged Data	
Access	Forward the data to other ports of the VLAN corresponding to the VID in the data.	Forward the data to the other ports of the VLAN corresponding to the PVID of the port that receives the data	Transmit data after removing tags from the data.
Trunk			<p>If the VID and PVID of a port are the same, transmit data after removing tags from the data.</p> <p>If the VID and PVID of a port are different, transmit data without removing tags from the data.</p>

### 7.8.3 Example of Configuring QVLAN Settings

#### Networking requirement

A hotel has the following wireless network coverage requirements:

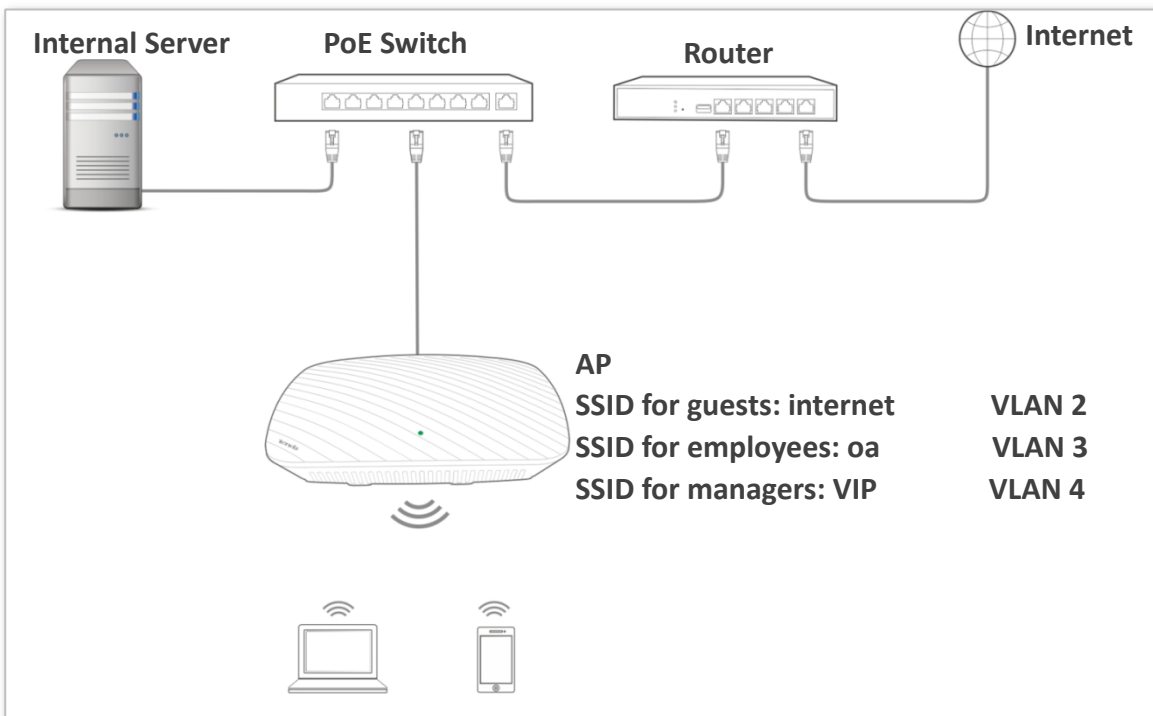
- Guests are connected to VLAN 2 and can access only the internet.
- Employees are connected to VLAN 3 and can access only the internal server.
- Managers of the hotel are connected to VLAN 4 and can access the internet and the internal server.

#### Assumption

The AP enables 2.4 GHz wireless networks and configures the following SSIDs.

- SSID of the wireless network for guests: **internet**
- SSID of the wireless network for employees: **oa**
- SSID of the wireless network for hotel managers: **VIP**

## Network Topology



### Configuration procedure:

#### ■ Configure the AP

- Step 1** Log in to the web UI of the AP and choose **Wireless > QVLAN**.
- Step 2** Select the **Enable** check box.
- Step 3** Change the **VLAN ID** of the SSID **internet** to **2**, the **VLAN ID** of the SSID **oa** to **3**, and the **VLAN ID** of the SSID **VIP** to **4**.
- Step 4** Click **Save**.

**QVLAN**

Enable  \*

PVID

Manage VLAN

Save

Restore

Help

2.4G SSID	VLAN ID (1~4094)
internet	2 *
oa	3 *
VIP	4 *

5G SSID	VLAN ID (1~4094)
Tenda_099458_5G	1000

--End

Wait for the automatic reboot of the AP.

### ■ Configure the switch

Create IEEE 802.1Q VLANs described in the following table on the switch.

Port Connected To	Accessible VLAN ID	Port Type	PVID
AP	1, 2, 3, 4	Trunk	1
LAN server	3, 4	Trunk	1
Router	2, 4	Trunk	1

Retain the default settings of other ports. For details, refer to the user guide for the switch.

### ■ Configure the router and the internal server

To ensure that wireless devices connected to the AP can access the internet, the router and internal server are required to support the QVLAN function. Refer to the following details:

For the router:

Port Connected To	Accessible VLAN ID	Port Type	PVID
Switch	2, 4	Trunk	1

For the internal server:

Port Connected To	Accessible VLAN ID	Port Type	PVID
Switch	3, 4	Trunk	1

For details of configuration procedure, refer to the user guide of the router and the internal server.

**--End**

## Verification

Wireless clients connected to the **internet** wireless network can access only the internet, the wireless clients connected to the **oa** wireless network can access only the internal server, and wireless clients connected to **VIP** wireless network can both access the internet and the internal server.

# 8 SNMP

## 8.1 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.

### 8.1.1 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.

### 8.1.2 Basic SNMP Operations

The AP allows the following basic SNMP operations:

- Get: An SNMP manager performs this operation to query the SNMP agent of the AP 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 AP.

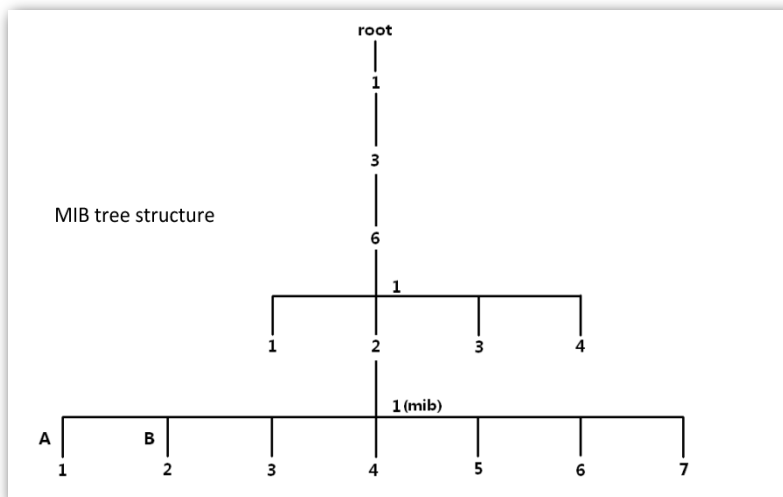
### 8.1.3 SNMP Protocol Version

The AP 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.

### 8.1.4 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 called 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.



## 8.2 Configuring the SNMP Function

**Step 1** Choose **SNMP** and set **SNMP Agent** to **Enable**.

**Step 2** Set related SNMP parameters.

**Step 3** Click **Save**.

**SNMP**

Here you can configure SNMP settings. SNMP v1 and v2c are supported.

SNMP Agent  Disable  Enable

Administrator Name

Device Name


Location

Read Community

Read/Write Community

--End

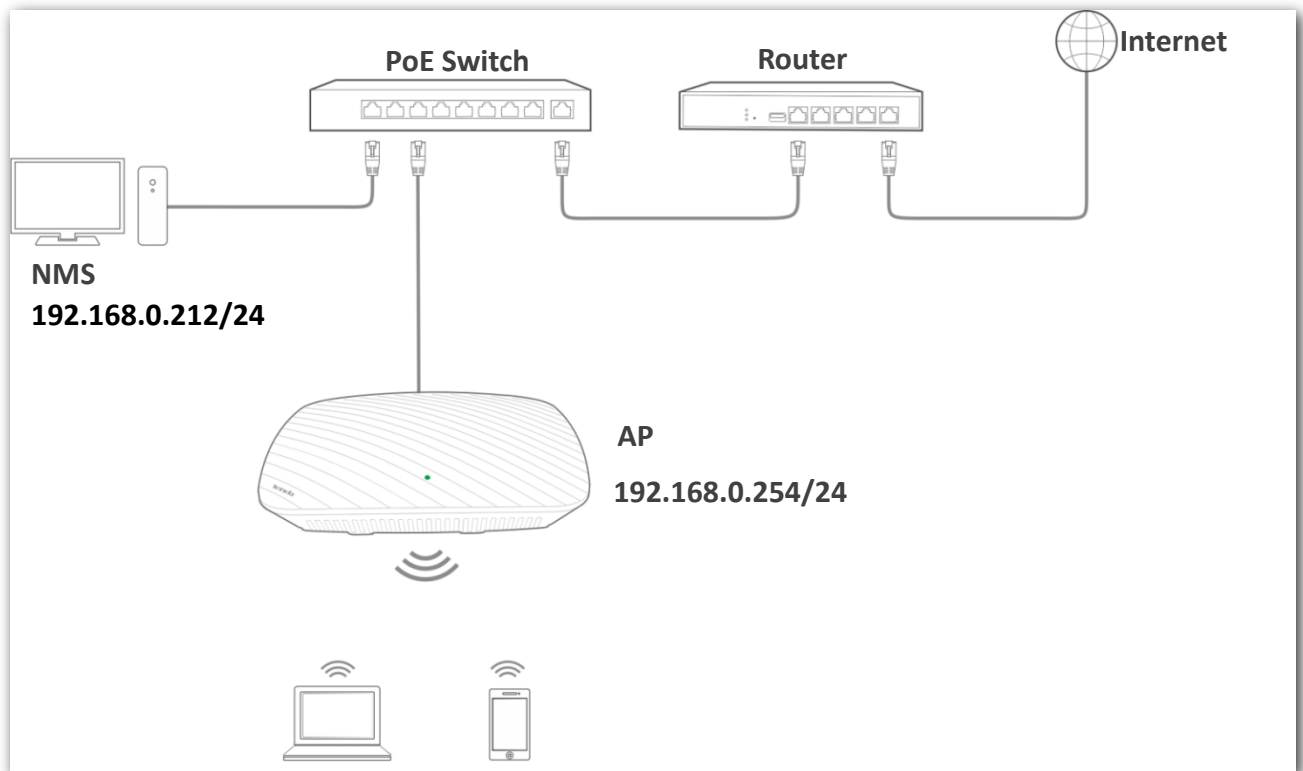
### Parameter description

Parameter	Description
SNMP Agent	<p>It specifies whether to enable the SNMP agent function of the AP. By default, it is disabled.</p> <p>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 AP supports SNMP V1 and SNMP V2C.</p>
Administrator Name	<p>It specifies the name of the administrator of the AP. The default name is <b>Administrator</b>. You can change the location as required.</p>
Device Name	<p>It specifies the device name of the AP. The default device name is the model of the AP.</p> <div style="text-align: center;">  <b>TIP</b> </div> <p>It is recommended that you change the AP name so that you can easily identify the AP when managing the AP using SNMP.</p>
Location	<p>It specifies the location where the AP is used. You can change the location as required.</p>
Read Community	<p>It specifies the read password shared between SNMP managers and this SNMP agent. The default password is <b>public</b>.</p> <p>The SNMP agent function of the AP allows an SNMP manager to use the password to read variables in the MIB of the AP.</p>
Read/Write Community	<p>It specifies the read/write password shared between SNMP managers and this SNMP agent. The default password is <b>private</b>.</p> <p>The SNMP agent function of the AP allows an SNMP manager to use the password to read/write variables in the MIB of the AP.</p>

## 8.3 Example of Configuring the SNMP Function

### Networking Requirement

- The AP connects to an NMS over an LAN. This IP address of the AP is 192.168.0.254/24 and the IP address of the NMS is 192.168.0.212/24.
- The NMS use SNMP V1 or SNMP V2C to monitor and manage the AP.



### Configuration Procedure

#### ■ Configure the AP

Assume that the administrator name is **Tom**, read community is **Tom**, and read/write community is **Tom123**.

- Step 1** Log in to the web UI of the AP and choose **SNMP**.
- Step 2** Set **SNMP Agent** to **Enable**.
- Step 3** Set the SNMP parameters.
- Step 4** Click **Save**.



**SNMP**

Here you can configure SNMP settings. SNMP v1 and v2c are supported.

SNMP Agent  Disable  Enable

Administrator Name

Device Name

Location

Read Community

Read/Write Community

Save

Restore

Help

--End

### ■ Configure the NMS

On an NMS that uses SNMP V1 or SNMP V2C, set the read community to **Tom** and read/write community to **Tom 123**. For details about how to configure the NMS, refer to the configuration guide for the NMS.

### Verification

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

# 9 Tools

## 9.1 Firmware Upgrade

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



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

### Configuration procedure:

- Step 1** Download the package of a later firmware version for the AP from <http://www.tendacn.com> to your local computer, and decompress the package.
- Step 2** Log in to the web UI of the AP and choose **Tools > Firmware Upgrade**.
- Step 3** Click **Choose File** and select the file for upgrading the firmware.
- Step 4** Click **Upgrade**.

### Firmware Upgrade

Use this section to update device's firmware for better functionalities or new features.

Select a Firmware File:  No file chosen

Current Firmware Version: V1.0.0.8(1418); Release Date: 2018-01-11

Note: Do not disconnect the device from power and network connections while upgrade is in process, otherwise it may be permanently damaged. When upgrade is complete, the device restarts automatically. Upgrade may take about 90 seconds. Please wait.

--End

Wait until the progress bar is complete. Log in to the web UI of the AP again. Choose **Status > System Status** and check whether the upgrade is successful based on **Firmware Version**.



After the firmware is upgraded, you are recommended to restore the factory settings of the AP and configure the AP again, so as to ensure stability of the AP and proper operation of new functions.

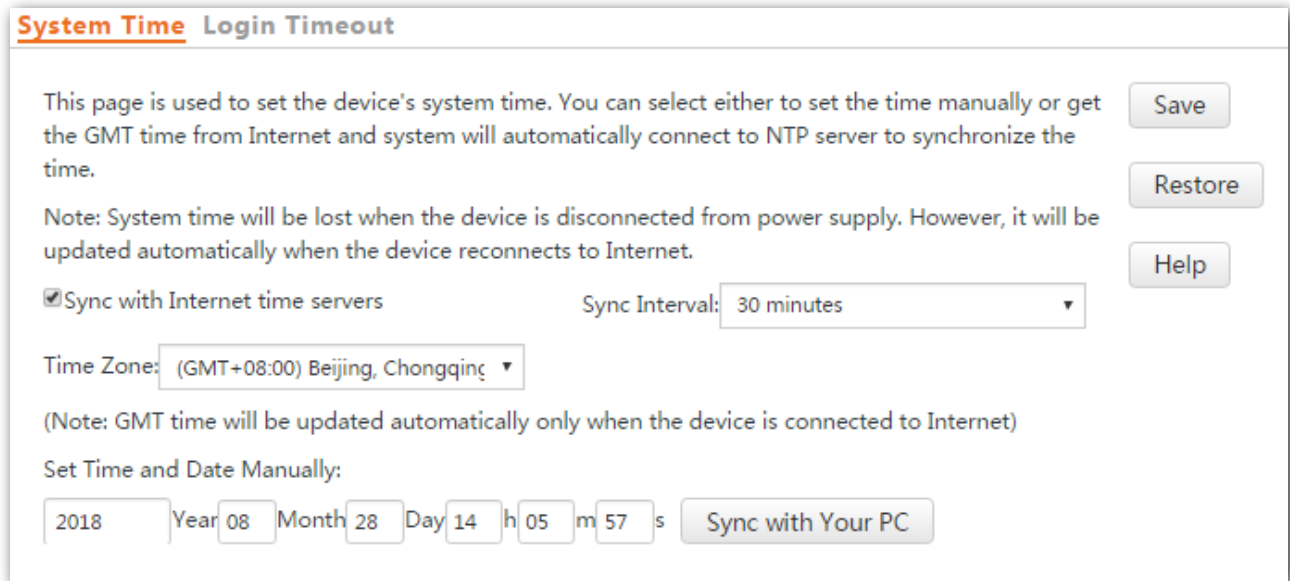
## 9.2 Time & Day

This module enables you to set the [system time](#) and [login timeout](#) interval of the AP.

### 9.2.1 System Time

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

To access the page, choose **Tools > Time & Date**.



The screenshot shows a web interface for configuring system time. At the top, there are two tabs: "System Time" (selected) and "Login Timeout". Below the tabs, there is a descriptive paragraph: "This page is used to set the device's system time. You can select either to set the time manually or get the GMT time from Internet and system will automatically connect to NTP server to synchronize the time." To the right of this text are three buttons: "Save", "Restore", and "Help". Below the paragraph is a note: "Note: System time will be lost when the device is disconnected from power supply. However, it will be updated automatically when the device reconnects to Internet." Under the note, there is a checked checkbox labeled "Sync with Internet time servers" and a "Sync Interval:" dropdown menu set to "30 minutes". Below that is a "Time Zone:" dropdown menu set to "(GMT+08:00) Beijing, Chongqing". A note below the time zone says: "(Note: GMT time will be updated automatically only when the device is connected to Internet)". At the bottom, there is a section titled "Set Time and Date Manually:" with input fields for Year (2018), Month (08), Day (28), Hour (14), Minute (05), and Second (57), followed by a "Sync with Your PC" button.

The AP 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.

### Synchronizing with internet time servers

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

For details about how to connect the AP to the internet, refer to [LAN Setup](#).

#### Procedure for configuring the AP to synchronize its system time with the internet:

- Step 1** Choose **Tools > Time & Date > System Time**.
- Step 2** Select the **Sync with Internet time servers** check box.
- Step 3** Set **Sync Interval** to the interval at which the AP synchronizes its system time with a time server of the internet. The default value 30 minutes is recommended.
- Step 4** Set **Time Zone** to your time zone.
- Step 5** Click **Save**.

**System Time** Login Timeout

This page is used to set the device's system time. You can select either to set the time manually or get the GMT time from Internet and system will automatically connect to NTP server to synchronize the time.

Note: System time will be lost when the device is disconnected from power supply. However, it will be updated automatically when the device reconnects to Internet.

Sync with Internet time servers      Sync Interval: 30 minutes

Time Zone: (GMT+08:00) Beijing, Chongqing

(Note: GMT time will be updated automatically only when the device is connected to Internet)

Set Time and Date Manually:

2018 Year 08 Month 28 Day 14 h 05 m 57 s      Sync with Your PC

Save      Restore      Help

--End

## Manually setting the system time

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

### Configuration procedure:

- Step 1** Choose **Tools > Time & Date > System Time**.
- Step 2** Deselect **Sync with Internet time servers**.
- Step 3** Enter a correct date and time, or click **Sync with Your PC** to synchronize the system time of the AP with the system time (ensure that it is correct) of the computer being used to manage the AP.
- Step 4** Click **Save**.

**System Time** Login Timeout

This page is used to set the device's system time. You can select either to set the time manually or get the GMT time from Internet and system will automatically connect to NTP server to synchronize the time.

Note: System time will be lost when the device is disconnected from power supply. However, it will be updated automatically when the device reconnects to Internet.

Sync with Internet time servers      Sync Interval: 30 minutes

Time Zone: (GMT+08:00) Beijing, Chongqing

(Note: GMT time will be updated automatically only when the device is connected to Internet)

Set Time and Date Manually:

2018 Year 08 Month 28 Day 14 h 05 m 57 s      Sync with Your PC

Save      Restore      Help

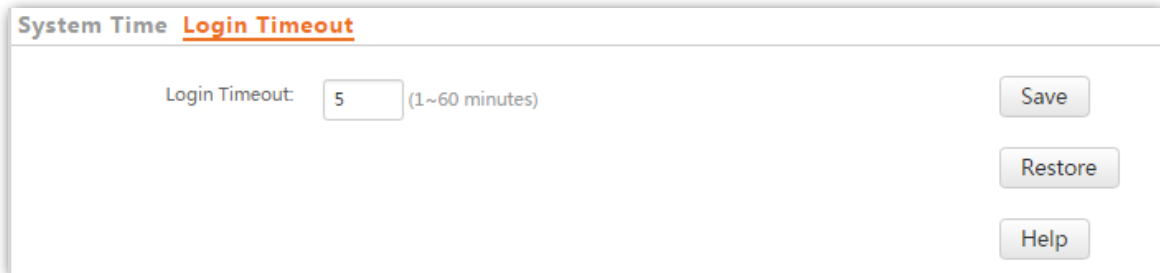
--End

## 9.2.2 Login Timeout

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

**Procedure for setting the login timeout interval:**

- Step 1** Choose **Tools > Time & Date**, and click the **Login Timeout** tab.
- Step 2** Change the login timeout interval as required.
- Step 3** Click **Save**.



The screenshot shows a web interface for configuring the login timeout. At the top, there are two tabs: "System Time" and "Login Timeout", with "Login Timeout" being the active tab. Below the tabs, the text "Login Timeout:" is followed by a text input field containing the number "5". To the right of the input field is the text "(1~60 minutes)". On the right side of the form, there are three buttons: "Save", "Restore", and "Help".

**--End**

## 9.3 Logs

### 9.3.1 View Logs

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

To access the page, choose **Tools > Logs** and click **View Logs**.

Index	Time	Type	Log Content
36	2018-08-28 13:53:32	system	web 192.168.0.131 login
35	2018-08-28 12:56:08	system	web 192.168.0.131 login time expired
34	2018-08-28 11:43:07	system	2.4GHz WiFi(wlan1-va1) up
33	2018-08-28 11:43:07	system	2.4GHz WiFi(wlan1-va0) up
32	2018-08-28 11:43:07	system	2.4GHz WiFi(wlan1) up
31	2018-08-28 11:42:59	system	2.4GHz WiFi(wlan1-va0) down

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

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



- When the AP reboots, the previous logs are lost.
- The AP reboots when the AP is powered on after a power failure, the QVLAN function is configured, the firmware is upgraded, an AP configuration is backed up or restored, or the factory settings are restored.

## 9.3.2 Log Setup

To access the page, choose **Tools > Logs** and click **Log Setup**.

On this page, you can set the number of logs to be displayed and configure log servers.

View Logs **Log Setup**

Number of Logs  (Default: 150, Range: 100~300)

Enable (To use the following rules, you must check this box.)

ID	Log Server IP	Log Server Port	Enable	Action
----	---------------	-----------------	--------	--------

### ■ Setting the Number of Logs to Be Displayed

By default, the AP can display a maximum of 150 logs on the View Logs page. You can change the number as required.

#### Configuration procedure:

- Step 1** To access the page, choose **Tools > Logs** and click **Log Setup**.
- Step 2** Change the number of logs as required within the range of 100 to 300.
- Step 3** Click **Save**.

View Logs **Log Setup**

\*Number of Logs  (Default: 150, Range: 100~300)

Enable (To use the following rules, you must check this box.)

ID	Log Server IP	Log Server Port	Enable	Action
----	---------------	-----------------	--------	--------

--End

### ■ Configuring Log Server Settings

After a log server is specified, the AP sends its logs to the log server. You can view all the historical logs of the AP on the log server.



To ensure that system logs can be sent to a log server, choose **Network > LAN Setup** and set the IP address, subnet mask, and gateway of the AP for communicating with the log server.

**Procedure for adding a log server:**

**Step 1** To access the page, choose **Tools > Logs** and click **Log Setup**.

**Step 2** Click **Add**.

The screenshot shows the 'Log Setup' page with the following elements:

- Number of Logs:  (Default: 150, Range: 100~300)
- Enable (To use the following rules, you must check this box.)
- Table headers: ID, Log Server IP, Log Server Port, Enable, Action
- Buttons: Save, Restore, Help, Add

**Step 3** Set parameters as follows:

- Set **Log Server IP** to the IP address of the log server.
- Set **Log Server Port** to the UDP port number used to send and receive system logs. The default port number 514 is recommended.
- Select **Enable** to enable the log server function.

**Step 4** Click **Save**.

The screenshot shows the 'Log Setup' page with the following elements:

- Log Server IP:
- Log Server Port:
- Enable:
- Buttons: Save, Restore, Help

**Step 5** Select **Enable (To use the following rules, you must check this box.)**.

**Step 6** Click **Save**.

**--End**

The following figure shows the configuration.

The screenshot shows the 'Log Setup' page with the following elements:

- Number of Logs:  (Default: 150, Range: 100~300)
- Enable (To use the following rules, you must check this box.)
- Table:

ID	Log Server IP	Log Server Port	Enable	Action
1	192.168.0.88	514	Enable	Edit Delete
- Buttons: Save, Restore, Help, Add



### **Procedure for changing log server settings**

**Step 1** To access the page, choose **Tools > Logs** and click **Log Setup**.

**Step 2** Click **Edit** corresponding to the log server settings to be changed.

**Step 3** Change the parameter settings as required.

**Step 4** Click **Save**.

**--End**

### **Procedure for deleting log server settings**

**Step 1** To access the page, choose **Tools > Logs** and click **Log Setup**.

**Step 2** Click **Delete** corresponding to the log server settings to be deleted.

**--End**

## 9.4 Configuration

### 9.4.1 Backup & Restore

The backup function enables you to back up the current configuration of the AP to a local computer. The restoration function enables you to restore the AP to a previous configuration.

If the AP enters the optimum condition after you greatly change the configuration of the AP, you are recommended to back up the new configuration, so that you can restore it after upgrading or resetting the AP.

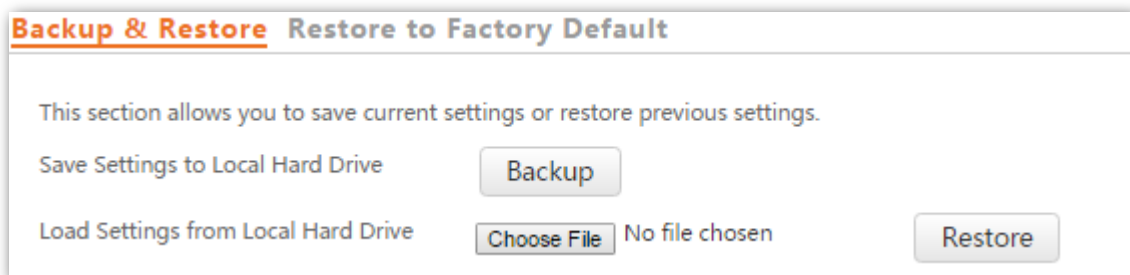


If you need to apply same or similar configurations to many APs, you can configure one of the APs, back up the configuration of the AP, and use the backup to restore the configuration on the other APs. This improves configuration efficiency.

#### Backing Up the Current Configuration

**Step 1** Choose **Tools > Configuration > Backup & Restore**.

**Step 2** Click **Backup** and follow the on-screen instructions to perform operations.



--End

#### Restoring a Configuration

**Step 1** Choose **Tools > Configuration > Backup & Restore**.

**Step 2** Click **Choose File** and select the file of the configuration to be restored.

**Step 3** Click **Restore** and follow the on-screen instructions to perform operations.

--End

### 9.4.2 Restoring the Factory Settings

If you cannot locate a fault of the AP or forget the password of the web UI of the AP, you can reset the AP to restore its factory settings and then configure it again. The AP can be reset using software or hardware.

After the factory settings are restored, the login IP address of the AP is changed to **192.168.0.254**, and the user name and password of the AP are changed to **admin**.

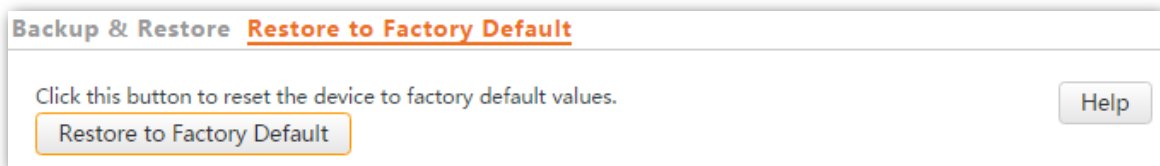


When the factory settings are restored, your configuration is lost. Therefore, you need to reconfigure the AP to connect to the internet. Restore the factory settings of the AP only when necessary.

To prevent AP damages, ensure that the power supply of the AP is normal when the AP is reset.

## Restoring the Factory Settings Using Software

- Step 1** Choose **Tools > Configuration** and click the **Restore to Factory Default** tab.
- Step 2** Click the **Restore to Factory Default** button.



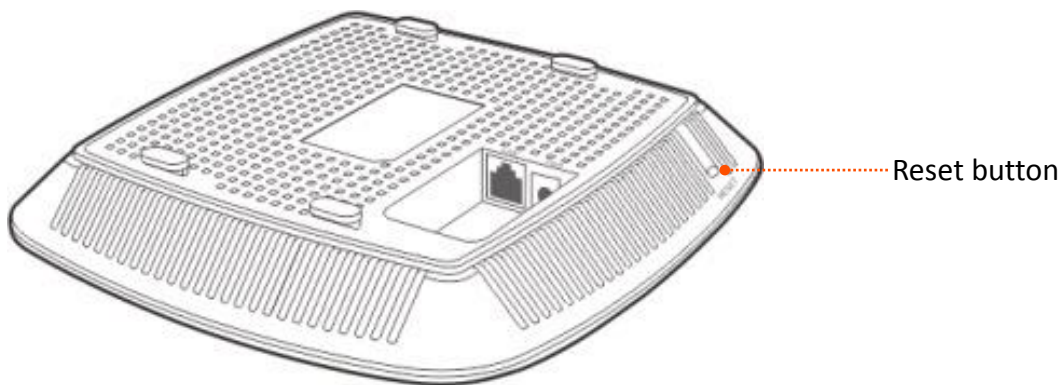
--End

## Restoring the Factory Settings Using Hardware

This method enables you to restore the factory settings without logging in to the web UI of the AP.

**Configuration procedure:**

- Step 1** When the AP is working properly, hold down the reset button for 8 seconds.



- Step 2** Wait about 1 minute.

--End

## 9.5 User Name & Password

To access page for changing user names and passwords, choose **Tools > Username & Password**.

On this page, you can change the login account information of the AP to prevent unauthorized login.


### User Name & Password

Use this section to change your login user name and password.  
Note: User name and password can only include 1 ~ 32 letters, numbers or underscore!

Access Mode	User Name	Enable	Action
Administrator	admin	<input checked="" type="checkbox"/>	Change
User	user	<input checked="" type="checkbox"/>	Delete Change

Save  
Restore  
Help

### Parameter description

Parameter	Description
Access Mode	<ul style="list-style-type: none"><li>• <b>Administrator Name:</b> An account of this type enables you to view and modify settings of the AP.</li><li>• <b>User:</b> An account of this type enables you to view settings of the AP.</li></ul>
User Name	It specifies the user name of an account. By default, the AP has one administrator account and one user account. Both the user name and password of the administrator account are <b>admin</b> . Both the user name and password of the user account are <b>user</b> .
Enable	It specifies whether an account is enabled. <ul style="list-style-type: none"><li>• The administrator account is always enabled.</li><li>• The user account is enabled by default and can be disabled.</li></ul>
Action	<b>Change:</b> This button is used to change the user name and password of the account corresponding to the button. <b>Delete:</b> This button is used to delete the user account. <b>Add:</b> This button is used to add the user account after the account is deleted.
	 <b>NOTE</b> After changing, deleting, or adding an account, click <b>Save</b> .

## 9.6 Diagnostics

If the network connection fails, you can use the diagnostics tool included with the AP to locate the faulty node.

### Configuration procedure:

The link to [www.google.com](http://www.google.com) is used as an example.

**Step 1** Choose **Tools > Diagnostics**.

**Step 2** Enter the IP address or domain name to be pinged in the **Please enter** text box. In this example, enter **ping www.google.com**.

**Step 3** Click **Ping**.



**--End**

The diagnosis result will be displayed in a few seconds in the black text box below the **Please enter** text box. See the following figure.

## Diagnostics

Input an IP address(eg: 192.168.0.254) or a domain name(eg: www.google.com):

Please enter:

```
PING www.google.com (69.63.190.26): 56 data bytes  
--- www.google.com ping statistics ---  
3 packets transmitted, 0 packets received, 100% packet  
loss
```

## 9.7 Device Reboot

This module enables you to manually reboot the AP or configure the AP to automatically reboot.



When the AP reboots, all connections are released. You are recommended to reboot the AP at an idle hour.

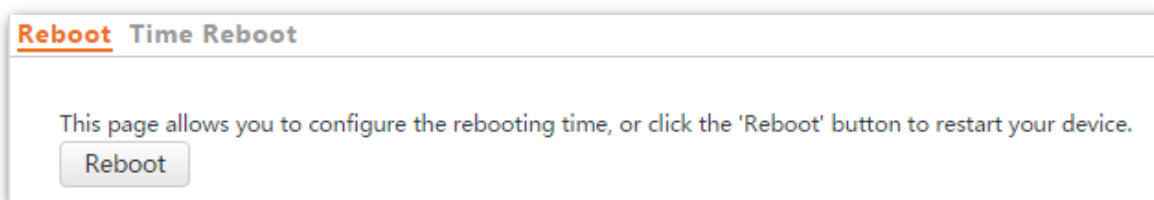
### 9.7.1 Manual Reboot

If a setting does not take effect, you can try rebooting the AP to resolve the problem.

#### Configuration procedure:

**Step 1** To access the page, choose **Tools > Reboot**.

**Step 2** Click **Reboot**.



--End

### 9.7.2 Automatic Reboot

Automatic Reboot allows you to reboot the AP at your specified time to avoid unstable WLAN performance due to long- time running. The AP supports the following two ways of automatic reboot.

#### Rebooting the AP at an interval

##### Configuration procedure:

**Step 1** Choose **Tools > Reboot** and click the **Time Reboot** tab.

**Step 2** Select the **Enable Auto Reboot** check box.

**Step 3** Set **AUTO Reboot Type** to **As Interval**.

**Step 4** Set **Reboot Interval** to a value in minutes, such as 1440.

**Step 5** Click **Save**.

**Reboot** Time Reboot

Enable Auto Reboot

AUTO Reboot Type

Reboot Interval  (minute, range: 10~7200)

Save

Restore

Help

--End

## Rebooting the AP at specified time

Configuration procedure:

- Step 1** Choose **Tools > Reboot** and click the **Time Reboot** tab.
- Step 2** Select the **Enable Auto Reboot** check box.
- Step 3** Set **AUTO Reboot Type** to **As Scheduled**.
- Step 4** Select the day or days when the AP reboots.
- Step 5** Set the time when the AP reboots, such as **23:59**.
- Step 6** Click **Save**.

**Reboot** Time Reboot

Enable Auto Reboot

AUTO Reboot Type

Time Reboot on  Everyday  Mon  Tue  Wed  Thur  Fri  Sat

Sun

Time Reboot at  eg: 23:59

Save

Restore

Help

--End



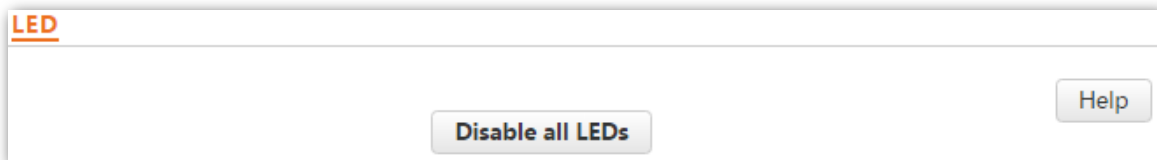
## 9.8 LED

This function enables you to turn on/off the LED indicator of the AP. By default, the LED indicator is turned on.

### Procedure for turning off the LED indicator:

**Step 1** Choose **Tools > LED**.

**Step 2** Click **Disable all LEDs**.



**--End**

### Procedure for turning on the LED indicator:

**Step 1** Choose **Tools > LED**.

**Step 2** Click **Enable all LEDs**.

**--End**

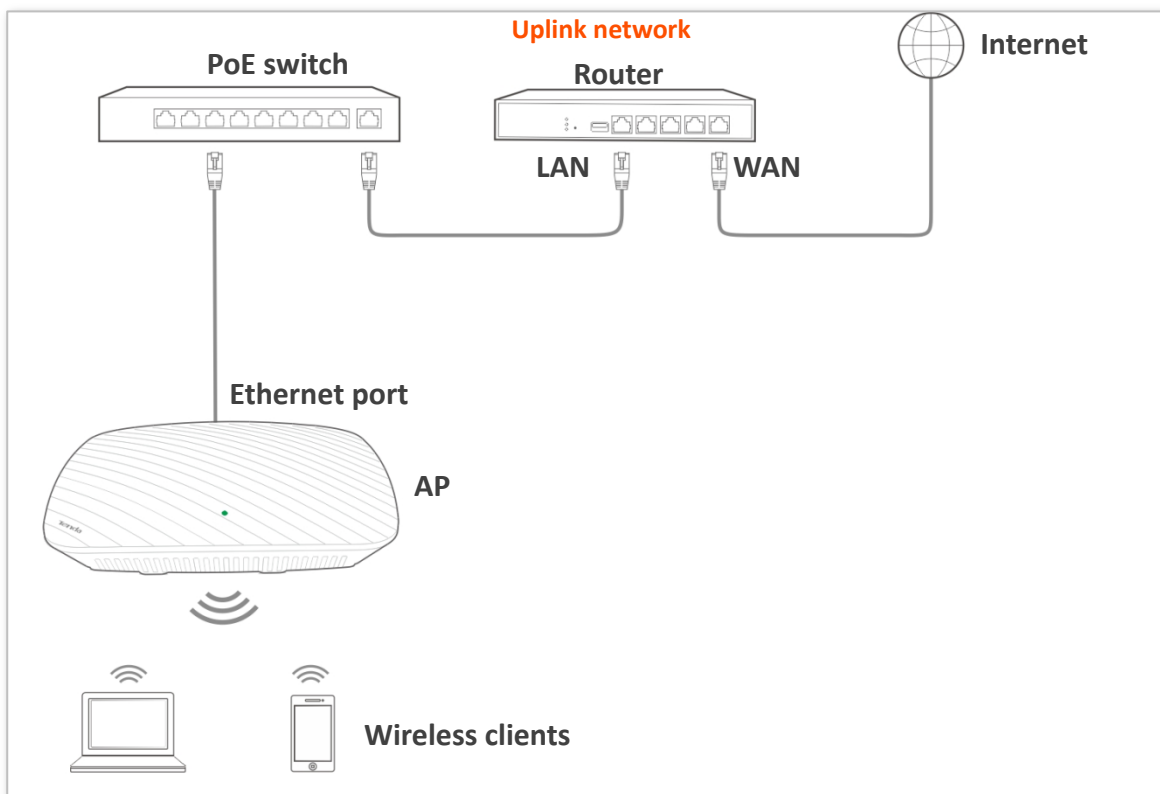
## 9.9 Uplink Detection

### 9.9.1 Overview

In AP mode, the AP connects to its upstream network using the LAN0 port. If a critical node between the LAN0 port and the upstream network fails, the AP as well as the wireless clients connected to the AP cannot access the upstream network. If uplink detection is enabled, the AP regularly pings specified hosts through the LAN0 port. If all the hosts are not reachable, the AP stops its wireless service and wireless clients cannot find the SSIDs of the AP. The client can reconnect to the AP only after the connection between the AP and the upstream networks is recovered.

If the uplink of the AP with uplink detection enabled is faulty, wireless clients can connect to the upstream network through another nearby AP that works properly.

See the following topology (The LAN0 port serves as the uplink port).



### 9.9.2 Configuring Uplink Detection

**Configuration procedure:**

- Step 1** Choose **Tools > Uplink Detection**.
- Step 2** Select the **Enable** check box of **Uplink Detection**.
- Step 3** Set **Ping Host1** or **Ping Host2** to the IP address of the host to be pinged through the LAN0 port of the AP, such as the IP address of the switch or router directly connected to the AP.
- Step 4** Set **Ping Interval** to the interval at which the AP detects its uplink.

**Step 5** Click **Save**.

**Uplink Detection**

Uplink Detection  Enable Save

Ping Host1

Ping Host2

Ping Interval  10 ~ 100 Minutes Restore

Help

**--End**

# Appendixes

## A.1 FAQ

**Q1. I cannot access the web UI of the AP after entering 192.168.0.254. What should I do?**

**A1: Check the following items:**

- Verify that the IP address of your computer is 192.168.0.X (X: 2~253).
- Clear the cache of your web browser or replace the web browser, and try login again.
- Disable the firewall of your computer or replace the computer, and try login again.
- If two or more APs are connected to your network without an AP controller, connect one of the APs to your network and change the IP address of the AP. Repeat this procedure to change the IP addresses of the other APs.
- The AP may be being managed by an AP controller and therefore its IP address is no longer 192.168.0.254. In that case, log in to the web UI of the AP controller to view the new IP address of the AP, and log in to the AP using the new IP address.
- If you have manually changed the IP address of the AP, change the IP address of your computer to another IP address that belongs to the same network segment as the new IP address of the AP and log in again using the new IP address of the AP.
- If the problem persists, restore the factory settings of the AP and try login again.

**Q2. My wireless AP controller cannot find the AP. What should I do?**

**A2. Check the following items:**

- Verify that the devices are connected properly and the AP has started.
- If VLANs have been defined on your network, verify that the corresponding VLAN has been added to your AP controller.
- Restart the AP or restore the factory settings of the AP, and try scanning the AP again.

**Q3. Can I log in to the web UI of the AP to configure the AP after using an AC controller to manage the AP?**

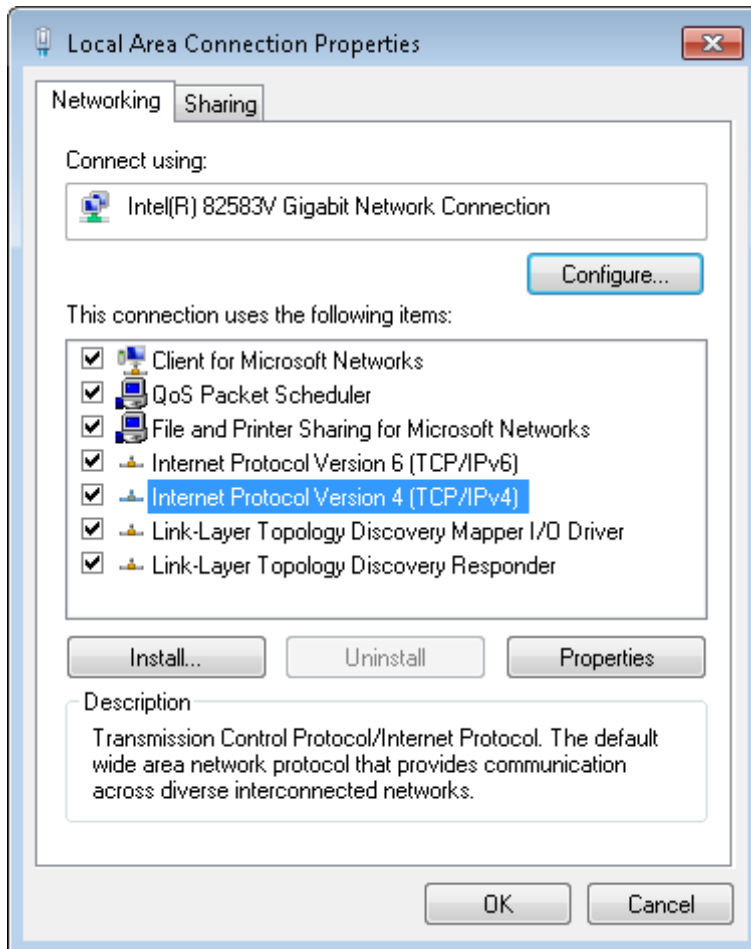
**A3.** Yes. You are recommended to change the user name and password of the administrator account (see [9.5 User Name & Password](#)) if you use an AC to manage the AP. This improves network security.

For more technical assistance, visit our website at <http://www.tendacn.com> or send your question to [support@tenda.cn](mailto:support@tenda.cn). We will help you resolve your problem as soon as possible.

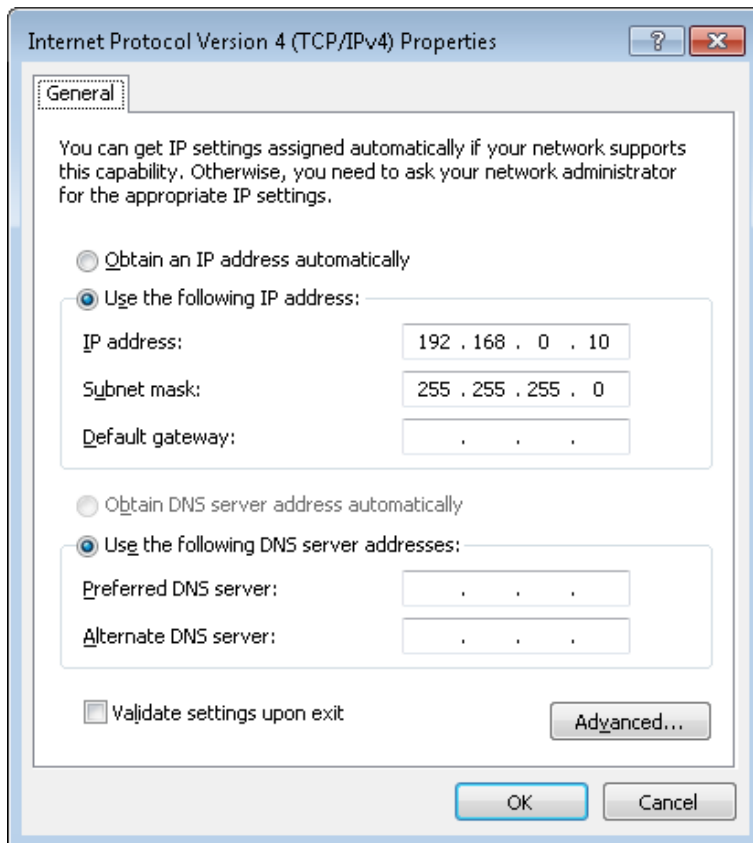
## A.2 Setting the IP Address of Your Computer

### Example: Windows 7

- Step 1** Choose **Start > Control Panel**, click **Network and Internet**, click **Network and Sharing Center**, and click **Change adapter settings**.
- Step 2** Right-click **Local Area Connection** and choose **Properties**. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.



- Step 3** Select **Use the following IP address**. Set **IP address** to an IP address that is different from the IP address of the LAN port of the AP but belongs to the same network segment as the IP address of the LAN port of the AP. Set **Subnet mask** to **255.255.255.0**. Click **OK**.



The **Local Area Connection Properties** dialog box appears.

**Step 4** Click **OK**.

**--End**

## A.3 Default Parameter Settings

The following table lists the factory settings of the AP.

Parameter		Default Value	
Login	IP address	192.168.0.254	
	User Name/Password	Administrator	admin/admin
		User	user/user
Quick Setup	Working Mode	AP Mode	
LAN Setup	Address Mode	Static IP	
	IP Address (management IP address)	192.168.0.254	
	Subnet Mask	255.255.255.0	
	Gateway	192.168.0.1	
	Primary DNS Server	8.8.8.8	
	Secondary DNS Server	8.8.4.4	
	Device Name	<i>Model + Hardware version number, such as i21V1.0</i>	
DHCP Server	DHCP Server	Disable	
	Start IP	192.168.0.100	
	End IP	192.168.0.200	
	Lease Time	1 day	
	Subnet Mask	255.255.255.0	
	Gateway	192.168.0.1	
	Primary DNS Server	8.8.8.8	
	Secondary DNS Server (Optional)	8.8.4.4	
SSID Setup	SSID	2.4 GHz	<p>Supports 8 SSIDs.</p> <p>SSID is Tenda_XXXXXX, where XXXXXX indicates the last 6 characters in the MAC address specified on the label on the external surface of the AP - +7</p> <p>The primary SSID is enabled, and others are disabled.</p>
		5 GHz	<p>Supports 4 SSIDs.</p> <p>SSID is Tenda_XXXXXX_5G, where XXXXXX indicates the last 6 characters in the MAC address specified</p>



Parameter		Default Value	
		on the label on the external surface of the AP + 8 - +11  The primary SSID is enabled, and others are disabled.	
	Broadcast SSID	Enable	
	AP Isolation	Disable	
	WMF	Enable	
	Probe Broadcast Packets Control	Disable	
	Maximum Clients	48	
	Chinese SSID Encode	UTF-8	
	Security Mode	None	
Radio	Wireless network	Enable	
	Network Mode	2.4 GHz	11b/g/n
		5 GHz	11ac
	Channel	Auto	
	Channel Bandwidth	2.4 GHz	20/40 MHz
		5 GHz	80MHz
	Extension Channel	Auto	
	Channel Lockout	Enable	
	TX Power	2.4 GHz	20 dBm
		5 GHz	18 dBm
	Power Lockout	Enable	
	Preamble	Long Preamble	
	Short GI	Enable	
Inter-SSID User Isolation	Disable		
Radio Optimizing	Beacon Interval	100 ms	
	Fragment Threshold	2346	
	RTS Threshold	2347	
	DTIM Interval	1	

Parameter		Default Value	
	Receive Signal Strength	Disable	
	Airtime Scheduling	Enable	
	Interference mitigation	1	
	APSD	Disable	
	Aging Time	5 minutes	
	5GHz SSID Priority	Disable	
	Basic Rate Sets	2.4 GHz	1, 2, 5.5, 11
		5 GHz	6, 12, 24
Supported Rate Sets	2.4 GHz	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54	
	5 GHz	6, 9, 12, 18, 24, 36, 48, 54	
WMM Setup	WMM function	Enable	
	WMM Optimization Mode	Optimized For Capacity (Concurrent Users >=10)	
Access Control		Disable	
Advanced	Recognize Terminal Type	Disable	
	Filter Broadcast Data	Disable	
QVLAN	QVLAN function	Disable	
	PVID	1	
	Manage VLAN	1	
	2.4 GHz SSID VLAN ID	1000	
	5 GHz SSID VLAN ID	1000	
SNMP	SNMP Agent		Disable
	SNMP Parameters	Administrator Name	Administrator
		Device Name	<i>Model + Hardware version number, such as i21V1.0</i>
		Location	ShenZhen
		Read Community	public
		Read/Write Community	private
Tools	System Time	Sync with Internet	Enable

Parameter		Default Value
	Time Servers	
	Time Zone	(GMT+08:00) Beijing, Chongqing, Hong Kong, Urumqi, Taipei
	Page Timeout	5 minutes
	Number of Logs	150
	Time Reboot	Disable
	LED Control	Switch on LEDs
	Uplink Detection	Disable