IP-COM

User Guide

IP-COM Access Controller AC2000

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Preface

Thank you for purchasing this IP-COM product! Reading this User Guide will be helpful for you to configure, manage and maintain this product.

Conventions

If not specifically indicated, “AC”, "access controller", “this device”, or “this product” mentioned in this User Guide stands for the IP-COM Wireless Access Controller AC2000V1.0.

Typographical conventions in this User Guide:

Item	Presentation	Example
Button	Frame with shading	“Click the Save button” will be simplified as “click Save”.
Menu	Bold	The menu "System Tools" will be simplified as **System Tools**.
Continuous Menus	→	Go to **System Tools** → **System Status**.

Symbols in this User Guide:

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

Overview of this User Guide

Contents of all chapters in this User Guide are arranged as below:

Chapter	Content
1 Product Overview	General introduction of the product features, physical appearance and working mode.
2 Device Installation	Installation considerations and steps.
3 Web Login	Introduction of Web UI information and login/logout method.
4 Cloud AC Mode	Introduction of all the functions when the access controller working in the "Cloud AC" mode.
5 Sub AC Mode	Introduction of all the functions when the access controller working in the "Sub AC" mode.
6 Root AC Mode	Introduction of all the functions when the access controller working in the "Root AC" mode.
Appendix	Introduction of troubleshooting, system default parameters of the access controller, and the Safety and Emission Statement.

For more documents

For more documents, please go to our website http://www.ip-com.com.cn and search for the appropriate product model to get the latest documents.

Technical Support

If you need more help, please contact us with any of the following ways.

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E-mail: info@ip-com.com.cn

Website: http://www.ip-com.com.cn

Table of Contents

1 Product Overview

1.1 Introduction

IP-COM AC2000V1.0 is a newly developed access controller, specially designed to provide wireless network solutions for SMB (Small and Medium-sized Business), such as hotels, companies, malls and chain restaurants. It can manage up to 512 IP-COM APs concurrently.

The access controller provides three working modes: “Sub AC” mode, “Root AC” mode and “Cloud AC” mode. Descriptions of the three modes are as follows:

- When the wireless network is centralized and on a large scale, you can choose the “Sub AC” mode to have centralized management of all APs in the network.
- When the wireless network is distributed in various regions and each one is on a large scale, you can use the “Root AC” mode plus “Sub AC” mode, in which the “Root AC” manages the “Sub ACs” in various regions and the “Sub AC” is for centralized management of onsite APs.
- When the wireless network is distributed in various regions, with each regional network on a small scale but the total network on a large scale, you can choose the “Cloud AC” mode to have centralized management of all cloud APs scatterd everywhere.

1.2 Features

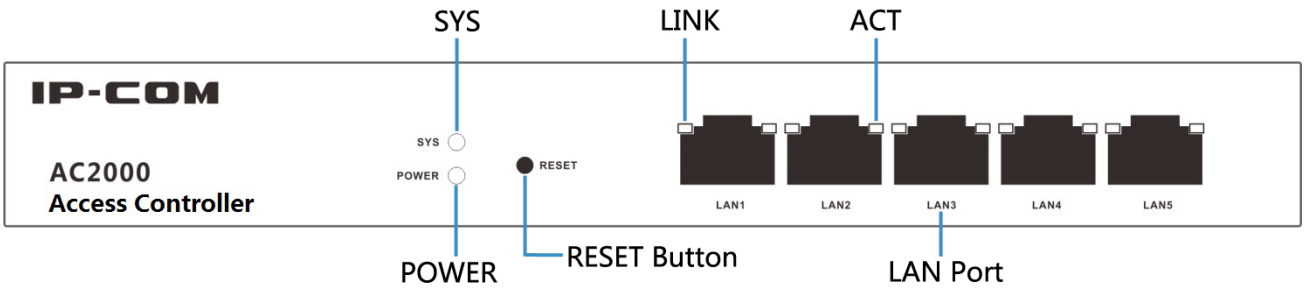
- Provide 5 Ethernet ports of 10/100/1000 Mbps, supporting up to 1000 Mbps wired transmission rate.
- Support three working modes of “Sub AC”, “Root AC” and “Cloud AC”, which can be freely switched according to the wireless network environment.
- Support centralized management of APs and delivering configuration policies to APs in the “Sub AC” mode or “Cloud AC” mode. Support remote management and control of “Sub ACs” in the “Root AC” mode.
- Support “Portal”, “Voucher” and “No Password” authorizations, which can be configured and delivered centrally.
- Support advertisement delivery, which helps customers get the advertisement information from the merchant easily before they surf the Internet with the provided WiFi network.
- Support 802.1Q VLAN protocol and cross-VLAN AP management.
- Provide build-in DHCP server and automatically assign IP addresses to APs that have successfully connected to the access controller.

- Support remote user traffic statistics.
- Support software and email alert so that the network administrator can easily known the instant status of APs without visiting the deployment site.
- Support configuring, rebooting, upgrading, and reseting for the corresponding APs in batch.
- Support centrally turning on/off the LED indicators and timed automatic reboot of APs.
- Support centrally modifying the login username and password of APs.
- Support Web management to configure easily.

1.3 Appearance

Front Panel

The front panel of the access controller includes: indicators, RESET button and LAN ports, as shown below.



➘ Indicators

The access controller has one POWER indicator, one SYS indicator and each LAN port has one LINK indicator and one ACT indicator. The following table shows the descriptions.

Indicator	Color	Status	Description
POWER	Green	Solid	The power is on proper status.
		Off	The Power is off or malfunctions occur.
SYS	Green	Solid	The system is initializing or the access controller malfunctions.
		Blinking	The system works properly.
LINK	Orange	Solid	The corresponding LAN port is connected.
		Off	The corresponding LAN port is not connected or in abnormal connection.
ACT	Green	Blinking	The corresponding LAN port is transmitting data.
		Off	The corresponding LAN port is not transmitting data currently.

➘ RESET Button

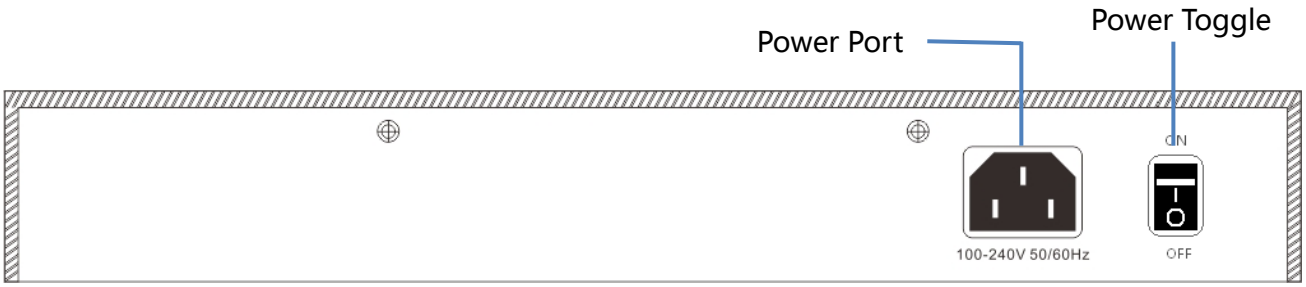
When the access controller is in power-on state, press the RESET button with a needle for 7 seconds to restore it to factory defaults and wait for about 2 minutes to complete the reboot process.

➘ LAN Port

The access controller provides five auto-negotiate 10/100/1000 Mbps RJ45 ports.

Rear Panel

The access controller has one power port and one power switch on the rear panel, as shown below.



➘ Power Port

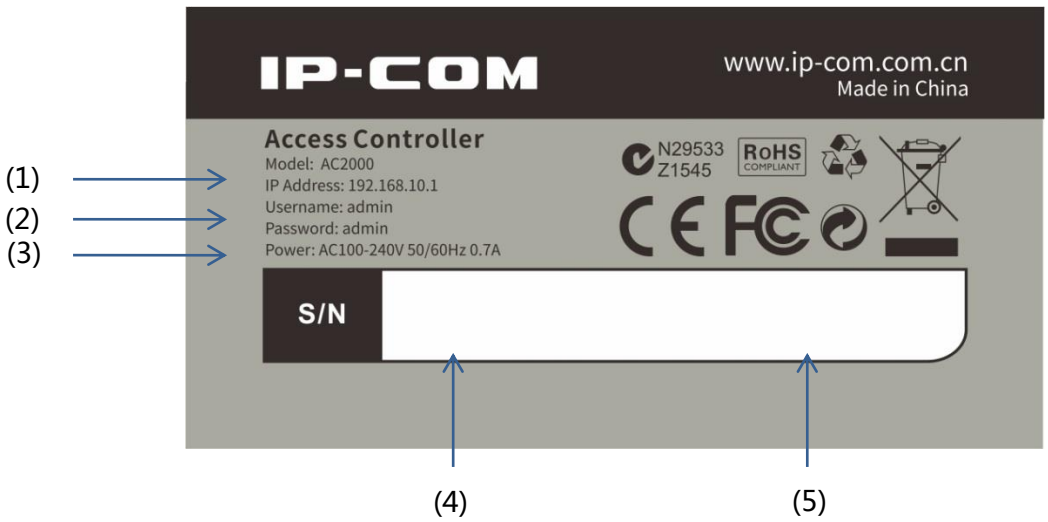
To power on the access controller, please connect the power port to a power outlet with a power cord. For satety, please use the included power cord in the product package.

➘ Power Toggle

To turn on/off the access controller conveniently, press the power switch.

Label

The label is at the bottom of the access controller, shown as follows:



(1): Default IP address of the access controller: 192.168.10.1, which can be used to log in to its Web UI.

(2): Default login username/password for logging in to the Web UI of the access controller.

(3): Power input specification.

(4): Serial number of this access controller, which needs to be filled in when the customer sends the access controller for repair.

(5): MAC address of this access controller.

1.4 Working Mode

The access controller supports three working modes: Sub AC, Root AC and cloud AC, among which you can choose easily according to the networking environment.

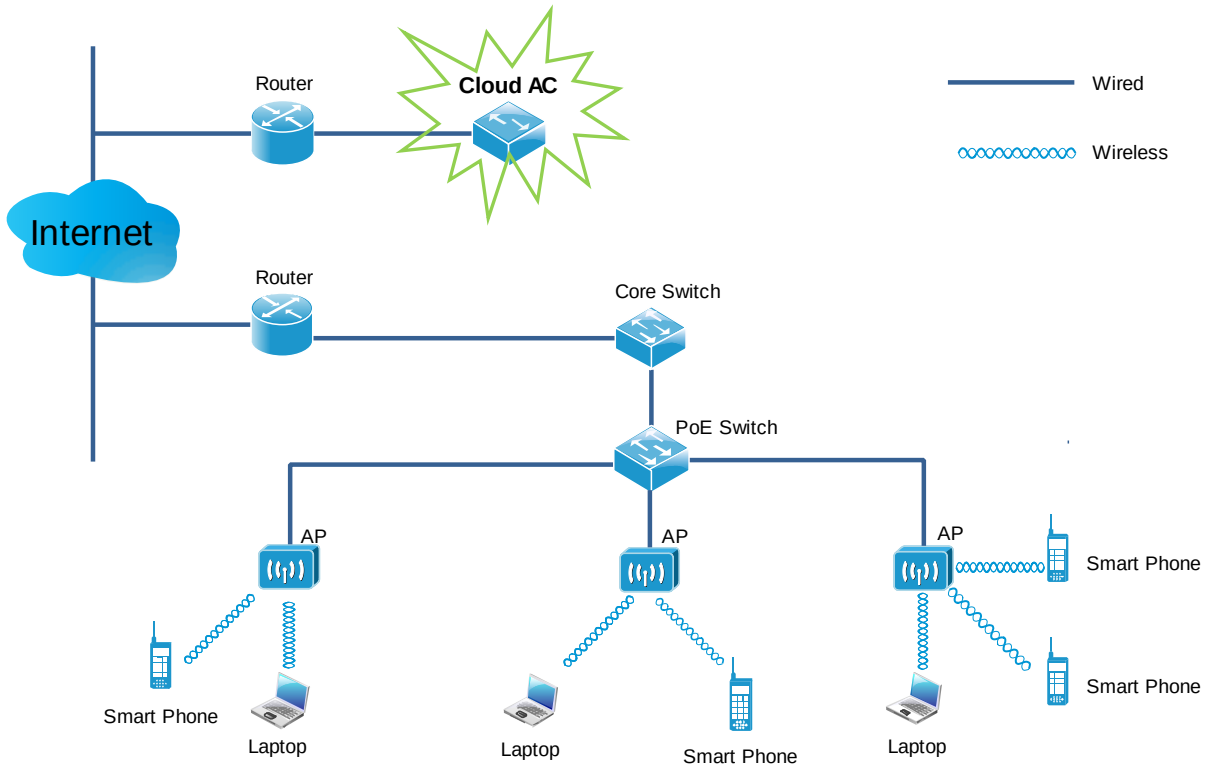
If you want to know about the three working modes in details, please refer to 4.1 Cloud AC Mode Introduction, 5.1 Sub AC Mode Introduction and 6.1 Root AC Mode Introduction.

Tip

In the following network topology, the PoE switch can be directly connected to the access controller if the network is on a small scale.

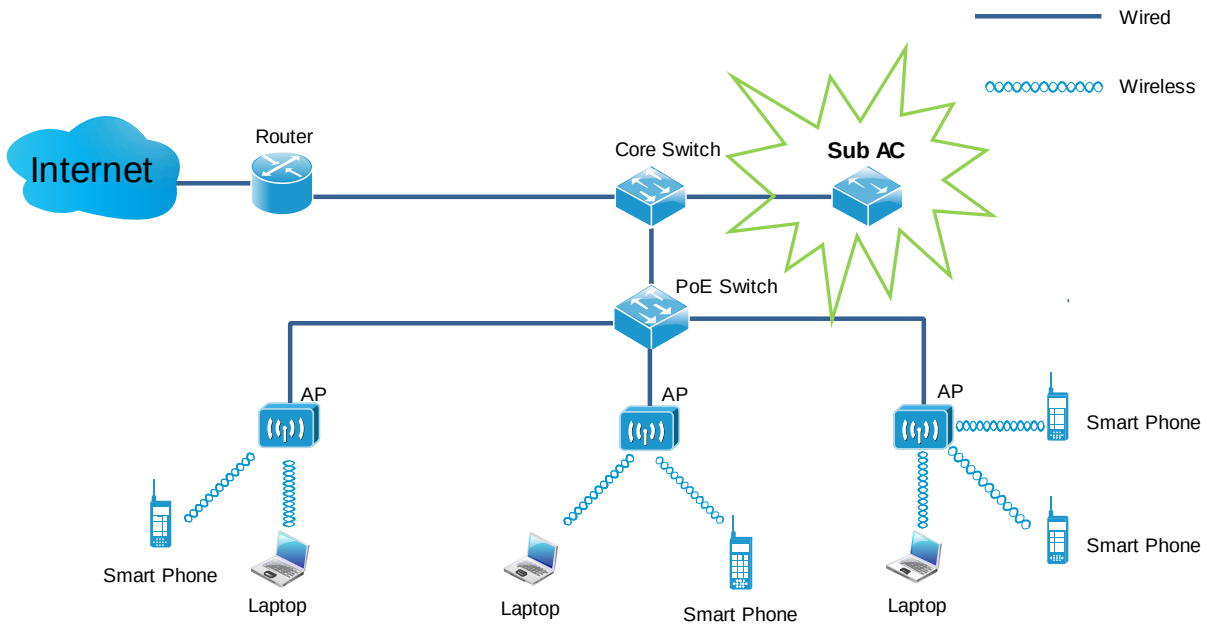
Cloud AC Mode Overview

When the wireless network is distributed in various regions and each one is on a small scale but the total network is on a large scale, you can deploy one access controller to work in “Cloud AC” mode for centralized management of cloud APs scattered everywhere. (The cloud APs must be in the “Cloud” Deployment mode, refer to AP Configuration). The following shows a specific application topology.



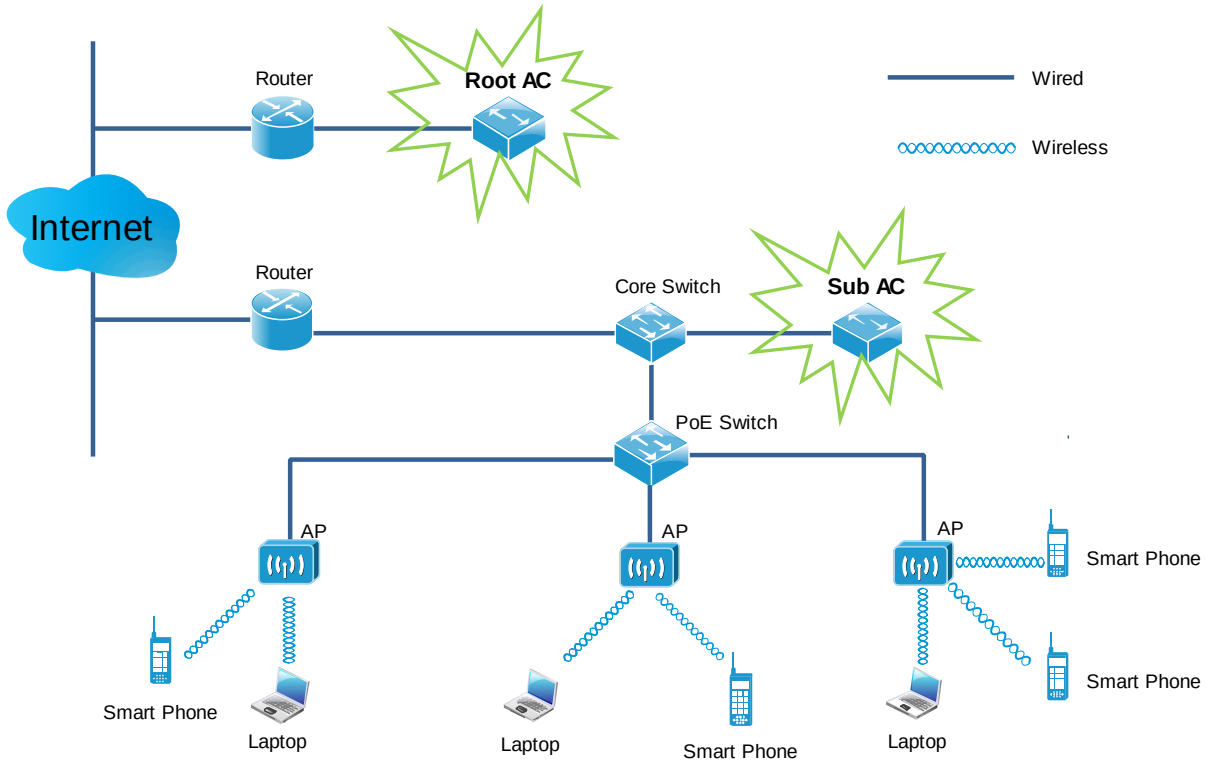
Sub AC Mode Overview

When the wireless network is relatively centralized and on a large scale, you can deploy one access controller to work in “Sub AC” mode for centralized management of APs on the network. The following shows a specific application topology.



Root AC + Sub AC Mode

When the wireless network is distributed in various regions and each one is on a large scale, you can deploy one access controller to work in “Root AC” mode and deploy seveval access controllers to work in “Sub AC” mode. The “Root AC” manages the “Sub ACs” in various regions and the “Sub AC” is for centralized management of onsite APs. The following shows a specific application topology.



2 Device Installation

2.1 Preparations

2.1.1 Safety Considerations

To avoid misusing or resulting the access controller's damage or human body injury, please read the following precautions carefully:

- During installation, please keep the access controller powered off and wear antistatic gloves.
- Use the power cord in the product package to power on the access controller.
- Ensure that the input voltage range is in accordance with that marked on the access controller.
- Ensure that heat emission holes of the access controller are in good ventilation.
- Do not open or remove the access controller housing.
- Please power off the access controller before cleaning. Do not scrub the access controller with any liquid.
- The access controller needs to be kept away from the power line, electric lamp, power grid environment or any place in possible contact with strong power grid.
- Please keep the access controller clean and dust-free.

Note

The disassembly preventing seal is located on a mounting screw of the access controller housing, and required to be kept intact when the agent conducts maintenance. Before opening the access controller housing, you need to contact the local agent to obtain permission. Otherwise, you will take responsibilities for failure of the access controller maintenance due to unauthorized operations.

2.1.2 Environmental Requirements

➘ Temperature/Humidity Requirement

The following table shows temperature and humidity requirements for the access controller.

Environment description	Temperature	Humidity
Operating environment	-10℃ ~ 45℃	5% ~ 90% RH (no condensation)
Storage environment	-40℃ ~ 70℃	5% ~ 90% RH (no condensation)

➘ Cleanliness requirement

The dust falling on the access controller surface causes electrostatic adherence, possibly leading to poor contact with metal nodes. In order to prevent electrostatic from affecting normal operation of the access controller, please do as follows:

1) Keep the indoor air clean and dedust the access controller on a regular basis.

2) Keep the access controller in good contact with ground to guarantee smooth electrostatic transfer.

➘ Anti-lightning requirement

When the lightning stroke occurs, the strong current that is generated instantaneously would cause direct or indirect fatal damage to electronic equipment. To prevent the strong instantaneous current that is generated by lightning from damaging the access controller, the following lightning protection measures need to be taken:

- Confirm that the power outlet, rack and workbench are all in good contact with the ground.
- The cabling shall be reasonable to avoid inducing lightning internally. When outdoor cabling is required, it is recommended to use the signal lightning arrester.

➘ Installation Platform Requirement

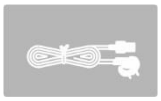
Whether the access controller is installed in a rack or on a workbench, pay attention to the following:

- Ensure that the rack or workbench is secure and stable enough.
- Keep good indoor ventilation, and set aside a heat dissipation distance of about 10 cm around the access controller.
- Do not place weight on the access controller.
- When stack-up is required, the vertical distance between equipment cannot be less than 1.5 cm.

2.1.3 Package Contents

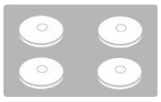
Unpack the package carefully and verify that the following items are included:


Access Controller


Power cord


L-shaped brackets

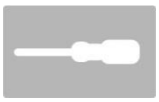

Screws


Anti-slip Footpads

Install Guide

2.1.4 Tool Preparation

During the access controller installation, the user is required to prepare the following installation tools possibly to be used.


Cross screwdriver


Antistatic gloves


Ladder


Ethernet cables

2.2 Hardware Installation

This access controller can be installed in a rack or on workbench. Please choose the proper installation mode according to your installation environment.

2.2.1 Rack Installation

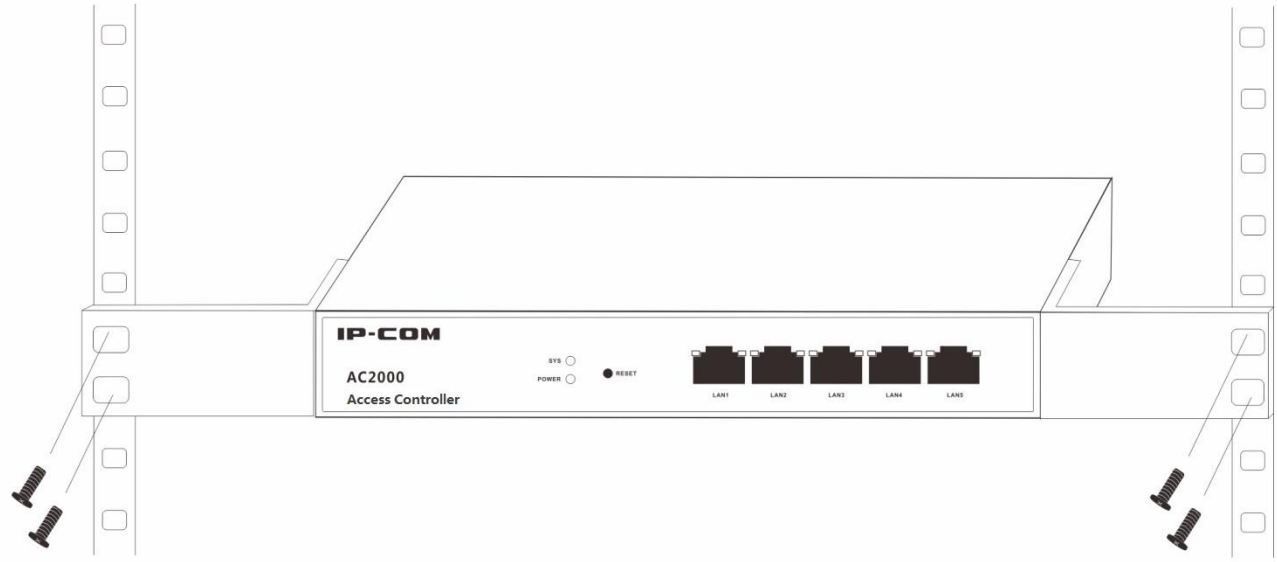
The access controller provides L-shaped brackets and screws, which are helpful for the installation in a standard 19-inch rack. The installation steps are as follows:

Step 1: Check the ground connection and stationarity of the rack.

Step 2: Fix and install the two L-shaped brackets respectively on each side of the access controller using the screws included in the package.

Step 3: Fix the L-shaped brackets on the rack using screws. (You need prepare the screws)

The rack installation completes.



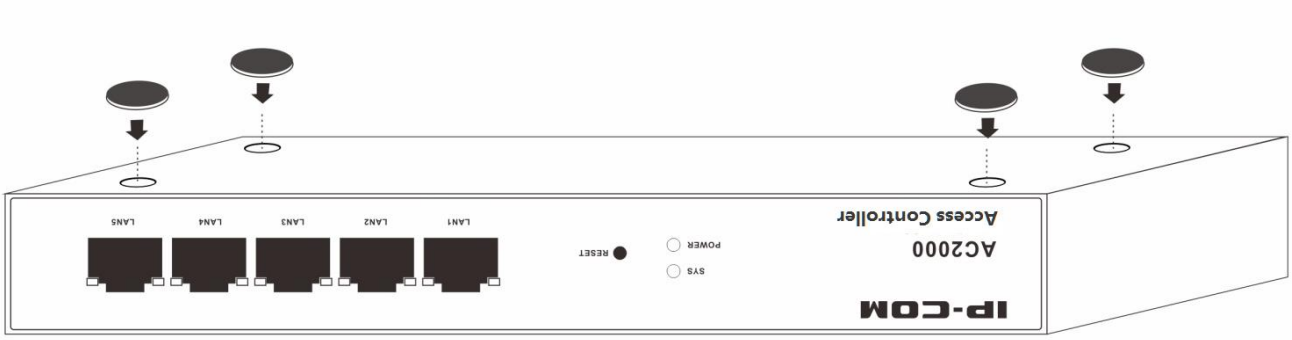
2.2.2 Workbench Installation

If you don’t have a standard 19-inch rack, please use a workbench to install the access controller.

The installation steps are as follows:

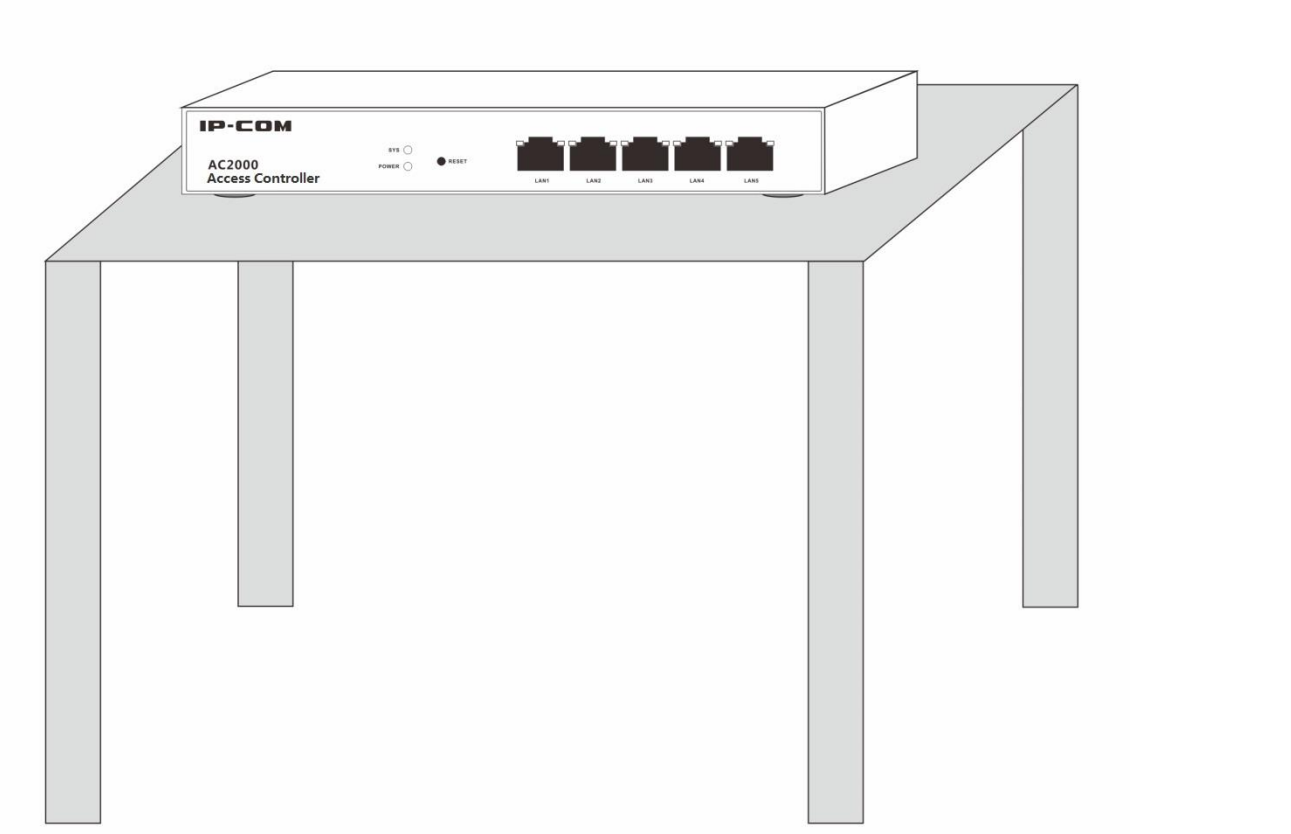
Step 1: Place the access controller upside down on a workbench which is big enough, clean and steady.

Step 2: After removing the rubber-faced protective paper of the four anti-slip footpads one by one, stick the pads into the round grooves corresponding to four corners of the housing undersurface respectively.



Step 3: Flip the access controller for placement on the workbench with face up.

The workbench installation completes.



2.3 Power on the Device

First, connect the access controller’s power port to a power outlet with the power cord in the package.

And then press the power switch on the access controller’s rear panel to power on the access controller. After powered on, the access controller automatically conducts initialization.

Check the indicators which should show the following one by one:

- All indicators (POWER, SYS and LINK/ACT) are on for self-inspection.
- POWER and SYS remain on, and others are all off.

After startup, The POWER indicator is on, the SYS indicator blinks, the LINK indicator of the LAN port which has connected to other active network devide is on, and the ACT indicator is off or blinks.

3 Web Login

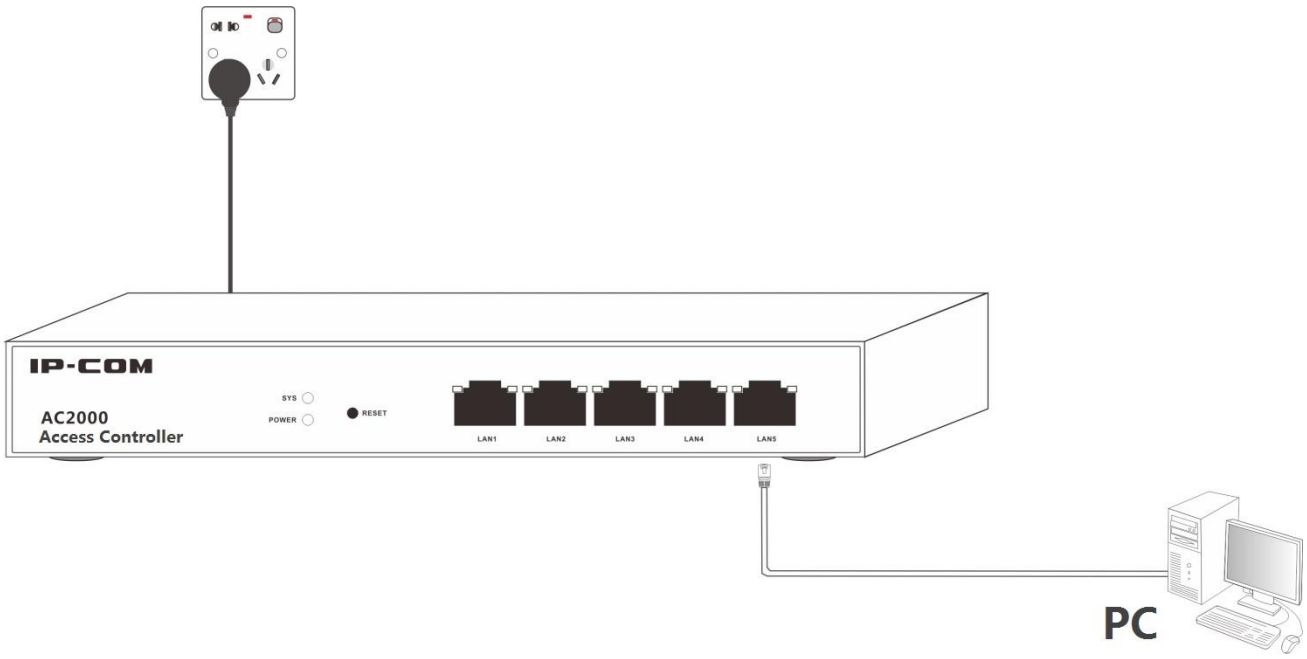
3.1 Login

This access controller provides the Web UI to help the administrator manage and maintain the access controller easily. When using the access controller for the first time, you can log in to the access controller's Web UI via a browser with default login information. The access controller's default login information includes:

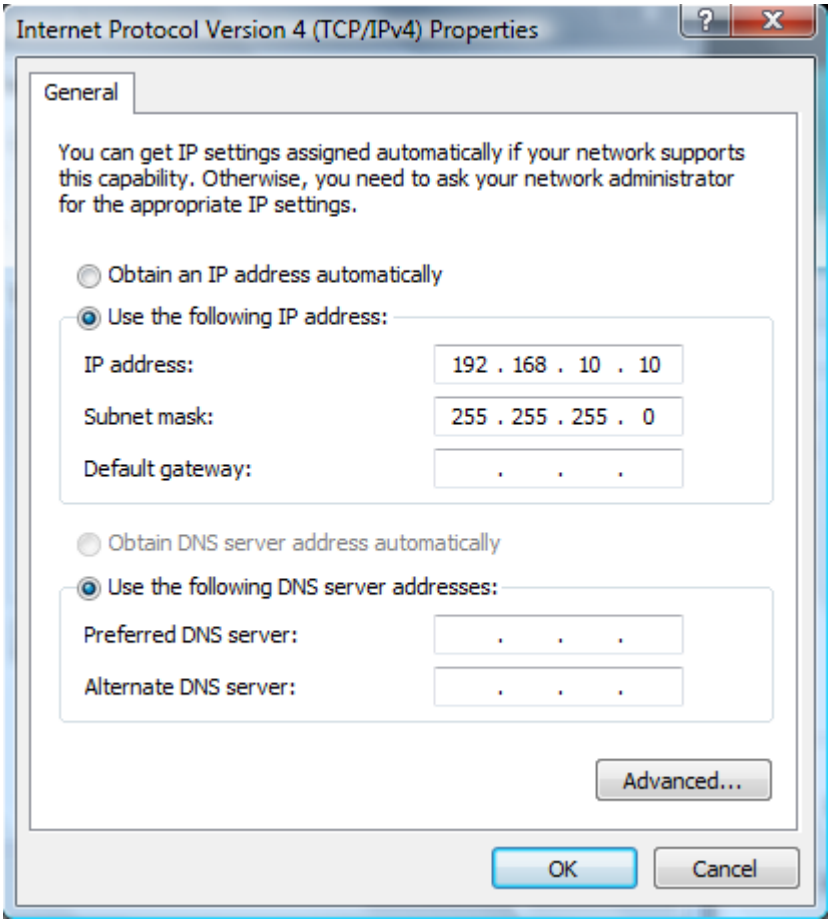
Login Information	Default Value
IP address	192.168.10.1
Username	admin
Password	admin

Login Steps: (assuming that the access controller's login information is the default value)

Step 1: Connect the managing PC to any LAN ports of the access controller with an ethernet cable.



Step 2: Set the local IP address of the PC to “192.168.10.X” (X is in the range of 2~254), with a subnet mask of “255.255.255.0”.

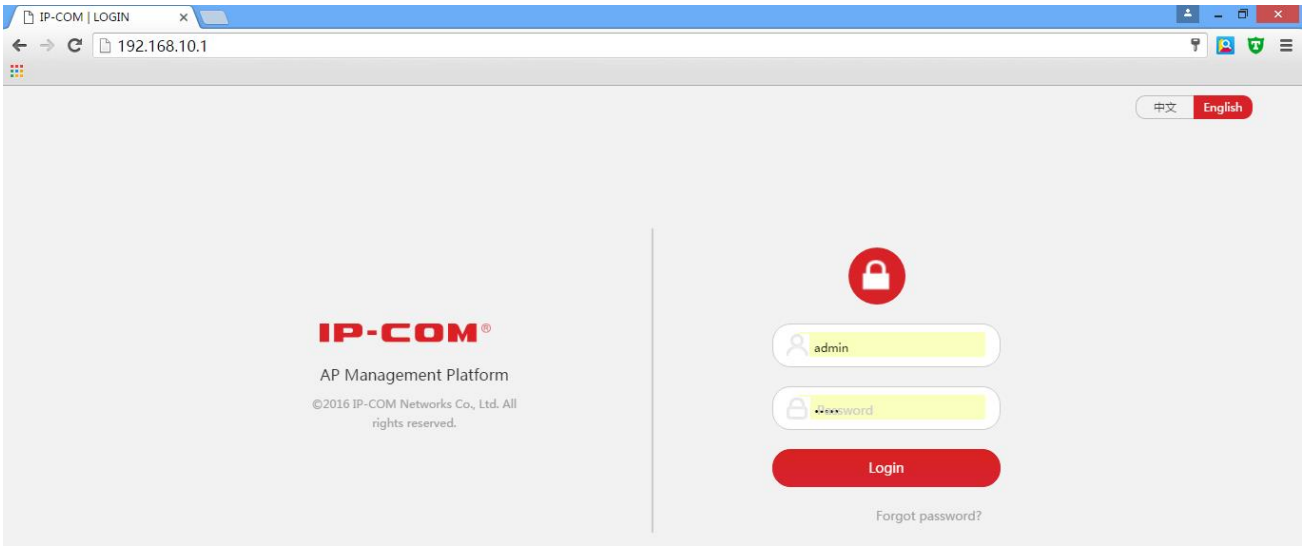


Step 3: Launch a browser on the PC, enter “192.168.10.1” in the address bar, and then press “Enter” or “Return”.

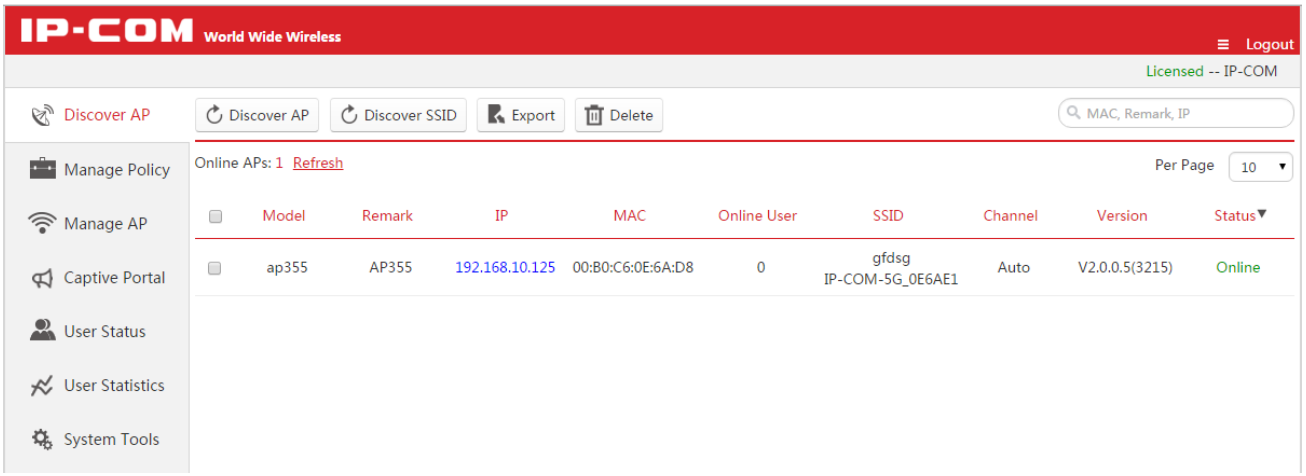
Step 4: After entering “admin” for both the username and the password, click Login.

Tip

- If the following page does not appear, please refer to **Question 1** in Appendix.
- The Web UI of this access controller supports both Chinese and English, between which you can choose based on your needs. This user guide gives a description in English.

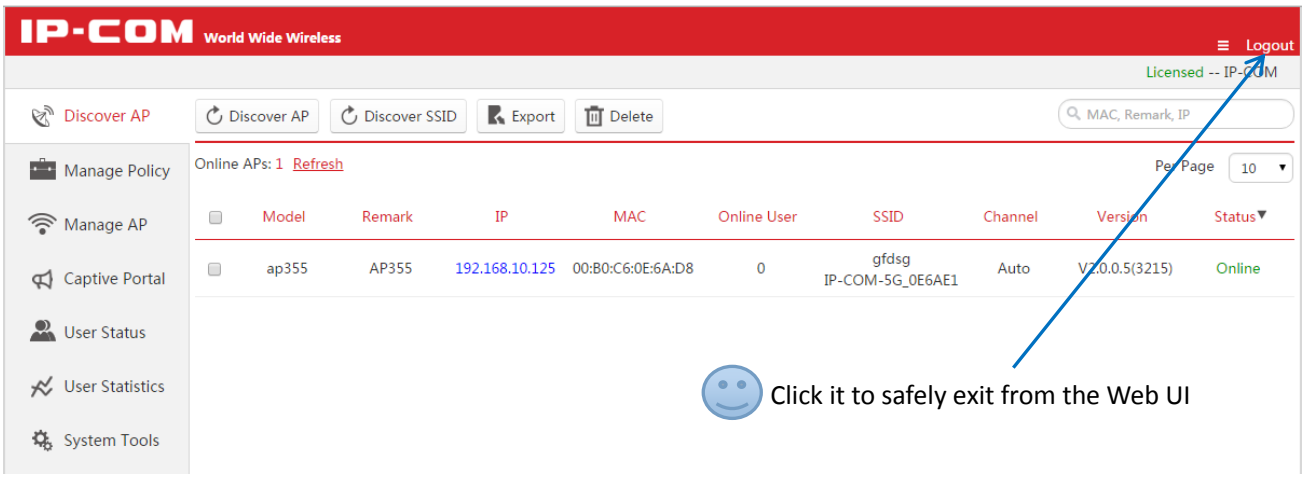


Step 5: After logging in to the access controller's Web UI successfully, the following page appears. For detail configurations, please refer to the next few charpers.



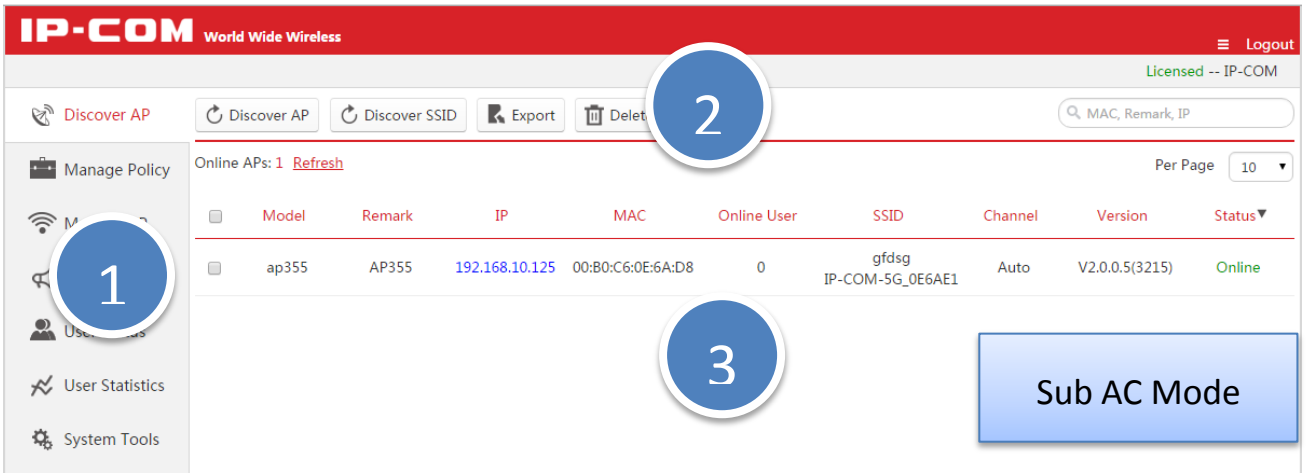
3.2 Logout

Close the browser window directly or click "Logout" on the top right corner to safely exit from the access controller's Web UI.



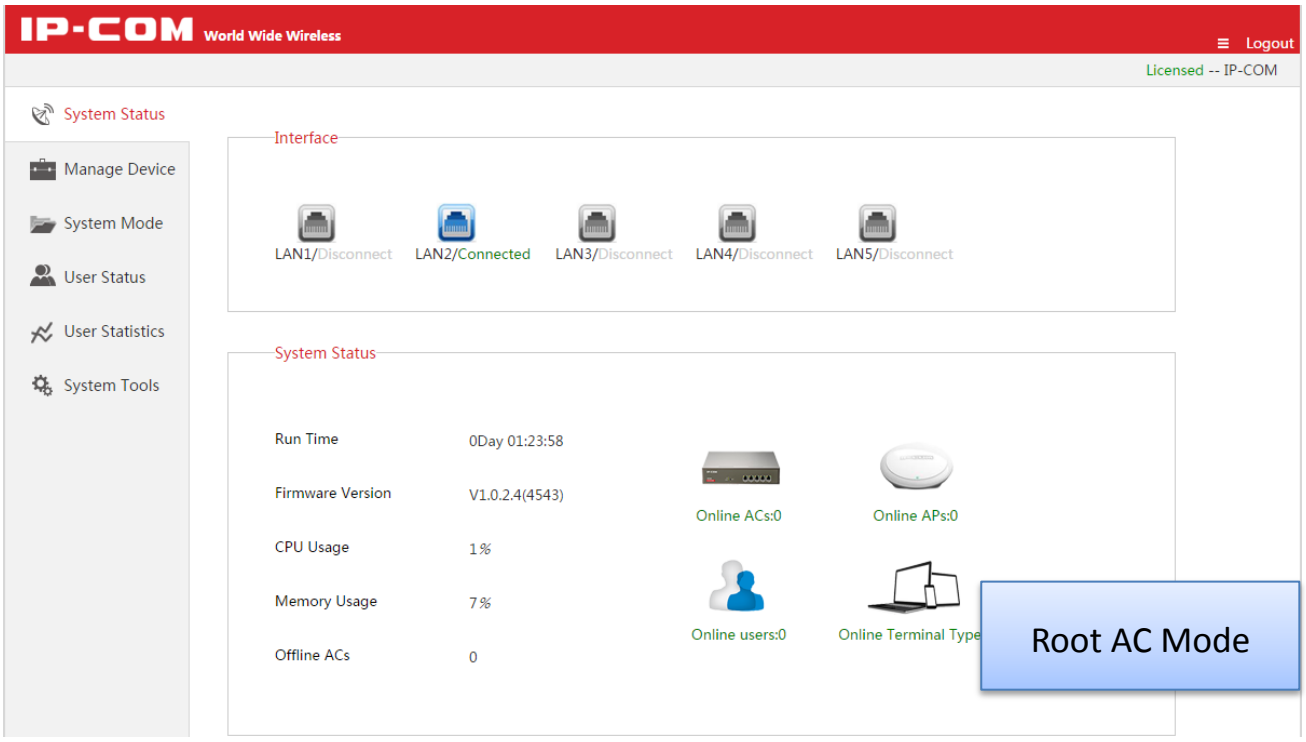
3.3 Layout of Web UI

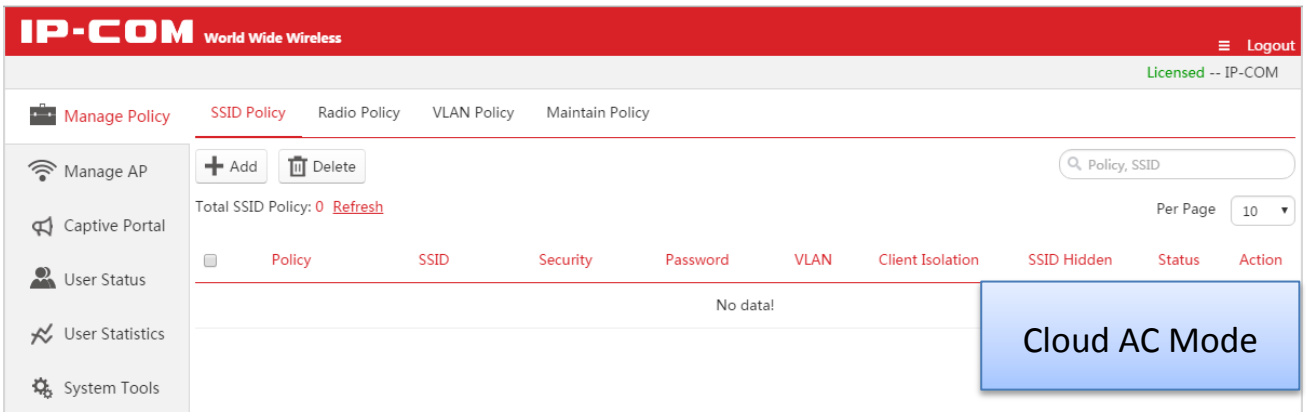
The Web UI is divided into three parts: primary navigation bar, secondary navigation bar and configuration area, as shown in the following figure.



Number	Name	Description
1	Primary navigation bar	The navigation bar organizes the access controller's menu of all functions in the form of a navigation tree. The user can easily choose the function menu from the navigation bar, with selection result shown in the configuration area.
2	Secondary navigation bar	
3	Configuration area	The area is for users to configure and view.

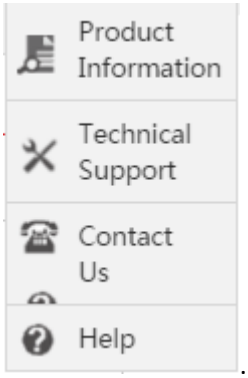
The access controller supports three working modes: Root AC, Sub AC and cloud AC, which have different Web management pages. The access controller works in the "Sub AC" mode by default. If you want to switch the working mode, go to **System Tools→ Maintain→ System Mode** for operations.





3.4 Elements of Web UI

The descriptions of common elements are as follows.

Element	Description
(Top right corner of the homepage)	Click it to unfold  .
	Search bar, for entering key words to find and locate the information. For supported key words, see the input box prompt.
Per Page 10	Click the drop-down box to select how many pieces of information to be displayed on each page.
Refresh	Click to refresh displayed information.
	Click to edit corresponding information.
	Check one: Select only one item. Check all: Select all items displayed on the page.
Licensed	This indicates that the access controller has been authorized for activation and can be used normally.

The descriptions of common buttons are as follows:

Button	Description
Delete	Click to delete the selected information in “Offline” or “Unused” status.
OK	Click to save and make current page configurations take effect.

4 Cloud AC Mode

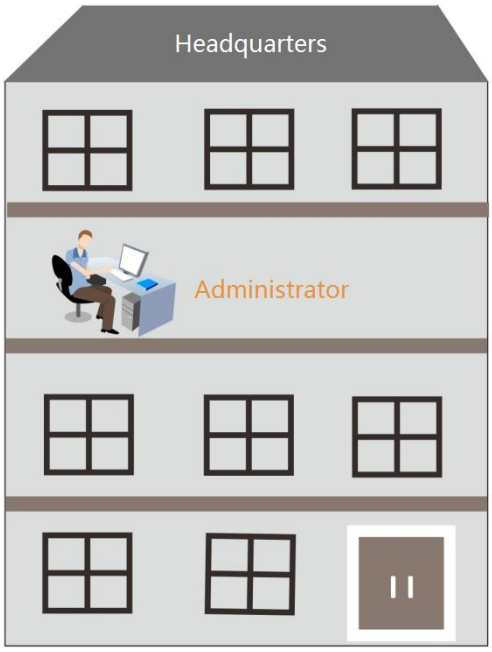
4.1 Cloud AC Mode Introduction

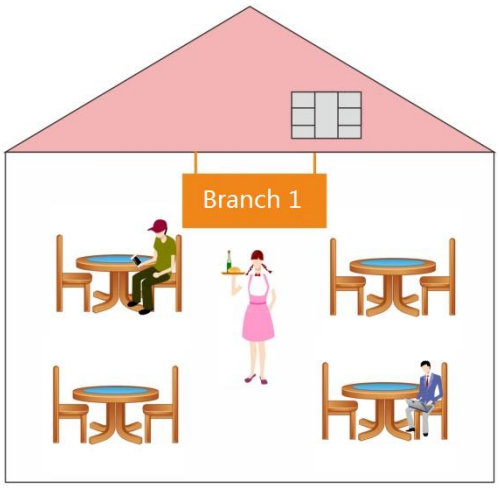
When the wireless network is distributed in various regions and each one is on a small scale but the total network is on a large scale, you can deploy one access controller to work in “Cloud AC” mode for centralized management of cloud APs scattered everywhere. (The cloud APs must be in the “Cloud” Deployment mode, refer to AP Configuration). The following is a specific application example.

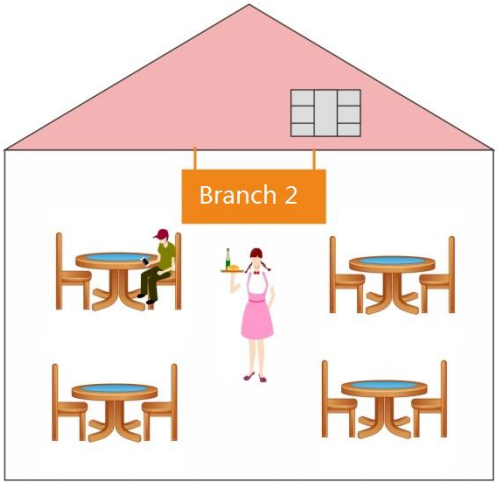
Networking Requirements

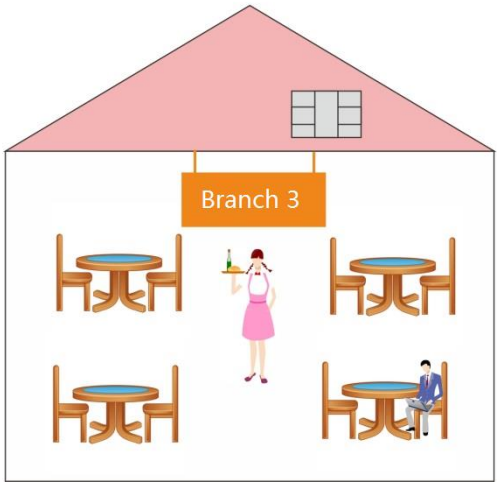
A national chain-restaurant needs to achieve wireless coverage. Requirements are as follows:

- Customers in each branch can surf the Internet with the provided WiFi network, and can view the advertisements of newest menus from the restaurant.
- The administrator at the headquarters can view the instant status of cloud APs in all branches, and can deliver configuration policies and advertisements to cloud APs, to achieve remote management and diagnosis, without visiting each branch.


Headquarters
Administrator


Branch 1


Branch 2


Branch 3

Scheme Design

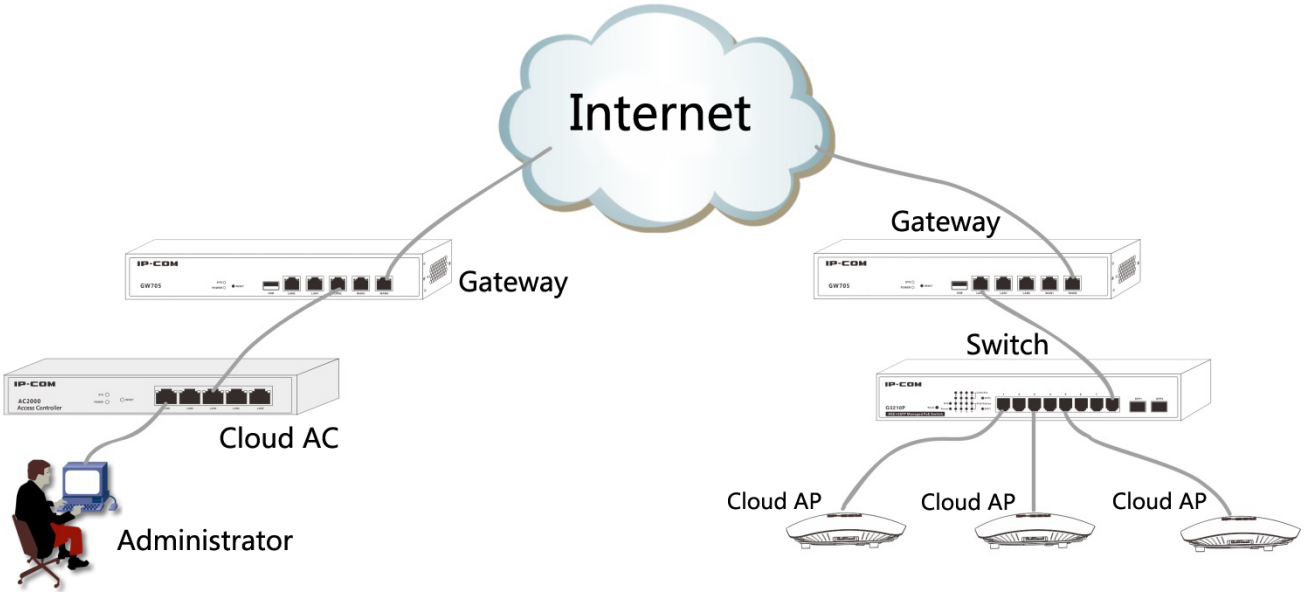
To create an exclusive wireless network for the restaurant, you can use IP-COM access controller + AP to work together. Details are as follows:

- At the restaurant headquarters, deploy an access controller AC2000, working in the "Cloud AC" mode, for centralized management of the distributed regional cloud APs.
- In every branch, deploy one or more APs, working in the "Cloud" Deployment mode, and specify the "Cloud AC Address" to the public IP address or domain name of the headquartes' gateway.
- The gateway, connecting the access controller at the headquarters, should enable two ports to the public network, one for managing cloud AP and the other for upgrading cloud AP.
- On the access controller, configure and deliver advertisements to cloud APs in each branch. Thus customers can view the advertisements from the restaurant before surf the Internet.

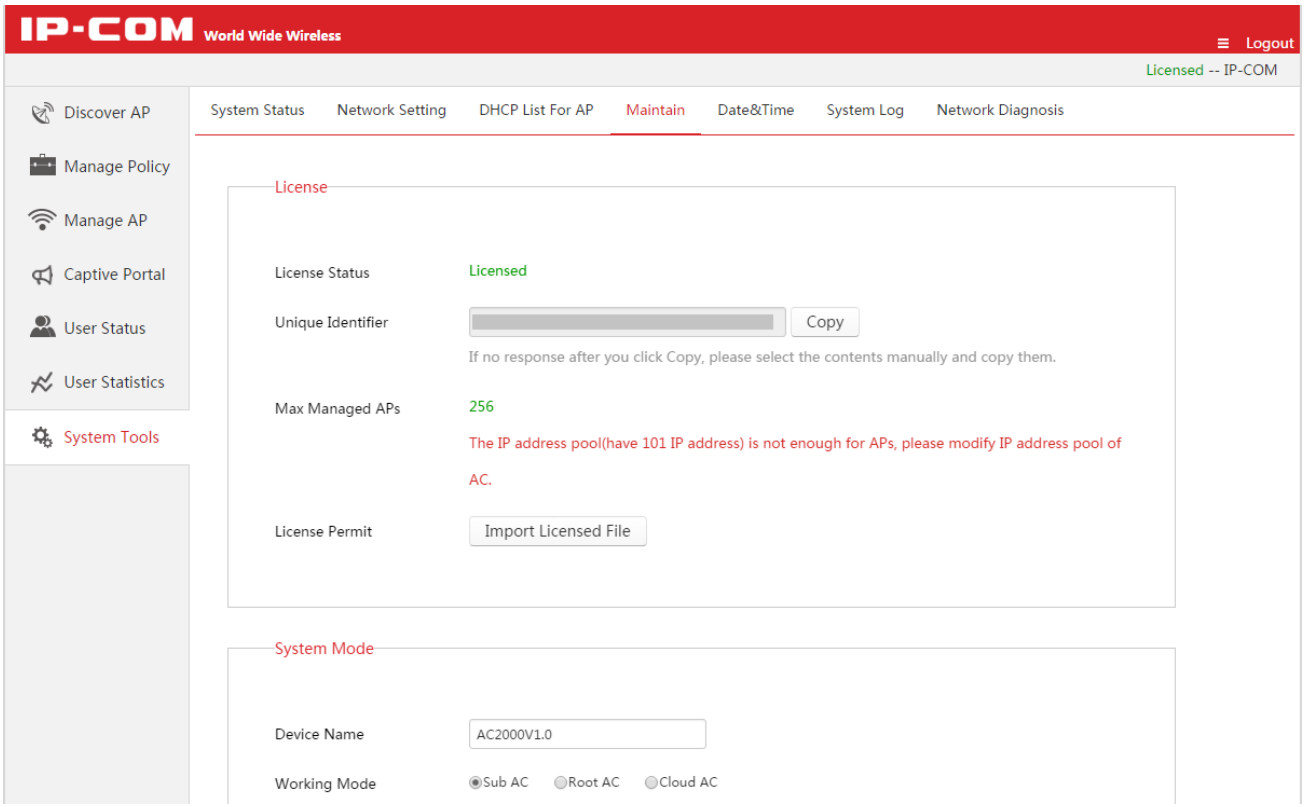
Assumptions are as follows:

- The domain name, binding to the public IP address of the gateway which connects the access controller, is "head.noip.com".
- The LAN IP address of the gateway, which connects the access controller, is 192,168.20.100, with DNS proxy function.
- The gateway, which connects the access controller, has enabled two ports to the public network: "8888" for managing the cloud APs and "8899" for upgrading cloud APs.

Network Topology

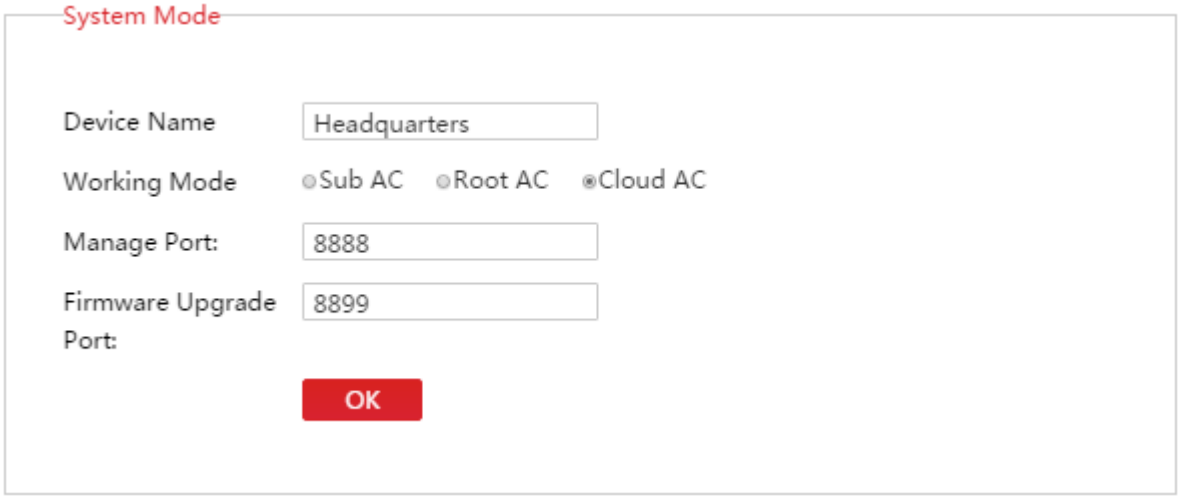


Access Controller Configuration

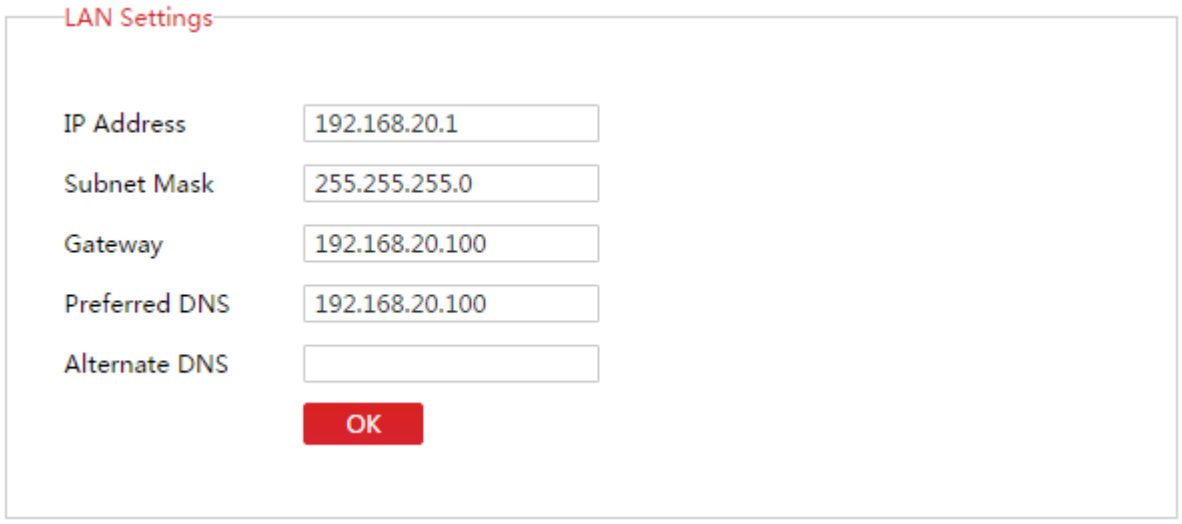


The configuration steps are as follows: (Assume that the access controller works in "Sub AC" mode by default.)

1. Log in to the Web UI of the access controller, and go to **System Tools→Maintain →System Mode**.
2. Enter the **Device Name** of the “Cloud AC”, such as “Headquarters”.
3. Select "Cloud AC" mode in the **Working Mode** line.
4. Enter "8888" in the **Manage Port** box.
5. Enter "8899" in the **Firmware Upgrade Port** box.
6. Click OK and wait for the access controller to complete the reboot process.



7. Log in to the Web UI of the access controller again and go to **System Tools→Network Setting→LAN Settings** to configure the corresponding parameters to make the access controller connect to the Internet through the gateway. In this example, we configure the parameters as follows.



Tip

After the access controller connects to Internet successfully, you can go to **Manage AP** to view the information of cloud APs in each branch.

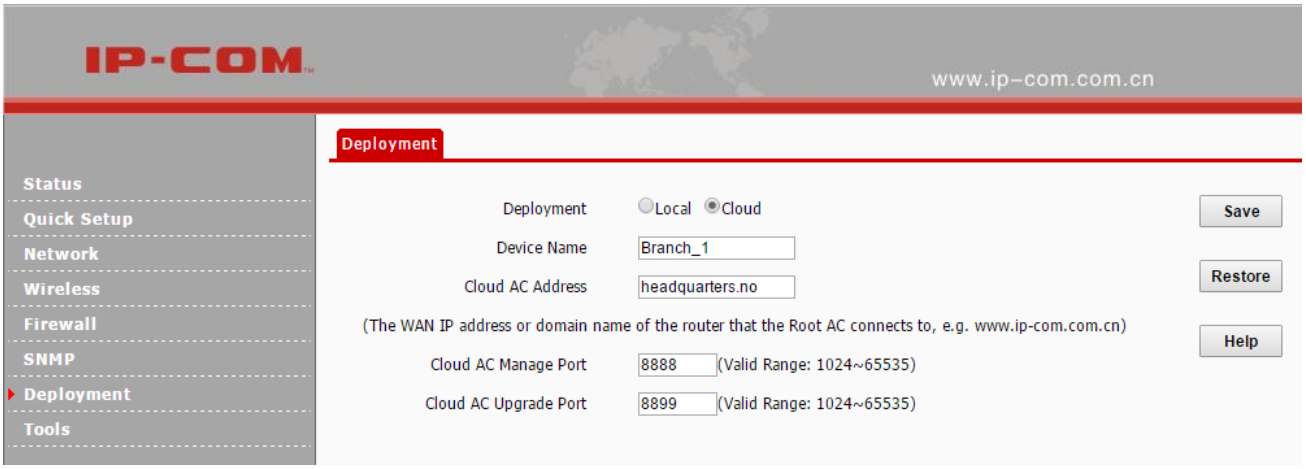
8. Go to **Captive Portal**, and create advertisements and deliver them to cloud APs of each branch.

   For details, please refer to 4.4 Captive Portal.

AP Configuration

The configuration steps are as follows: (Here we take AP355 as an example.)

1. Log in to the Web UI of AP, go to **Deployment** and select "Cloud".
2. Set up **Device Name** as you like. In order to manage different AP easily, it is recommended to set up the Device Name as AP's branch name or location. Here we take "Branch_1" as an example.
3. Enter "head.noip.com" in the **Cloud AC Address** box.
4. Enter "8888" in the **Cloud AC Manage Port** box.
5. Enter "8899" in the **Cloud AC Upgrade Port** box.
6. Click **Save** to apply your settings.



7. Go to **Network→LAN Setup**, and set up the AP's IP address information to make it connect to the Internet.

4.2 Manage Policy

Tip

Configuration in this section also applies to 5.3 Manage Policy in "Sub AC" mode.

To create SSID Policy, Radio Policy, VLAN Policy, and Maintain Policy, you can use this section to help you.

After creating appropriate policies, you can deliver these policies to the APs in **Manage AP** page. For details, refer to 4.3 Manage AP.

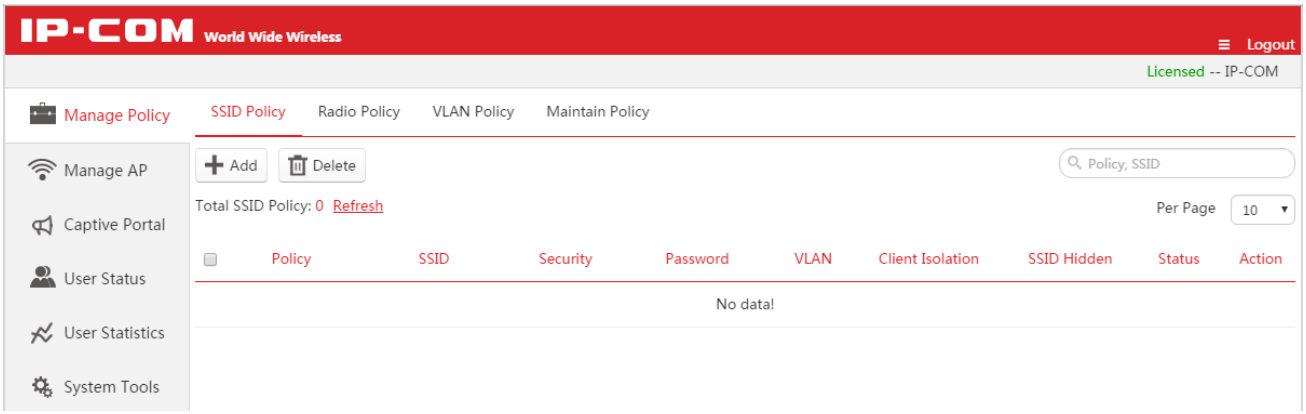
4.2.1 SSID Policy

SSID Policy Overview

To create a SSID policy, click **Manage Policy →SSID Policy** to enter the following page.

SSID parameters include SSID name, Security key, VLAN ID, and so on.

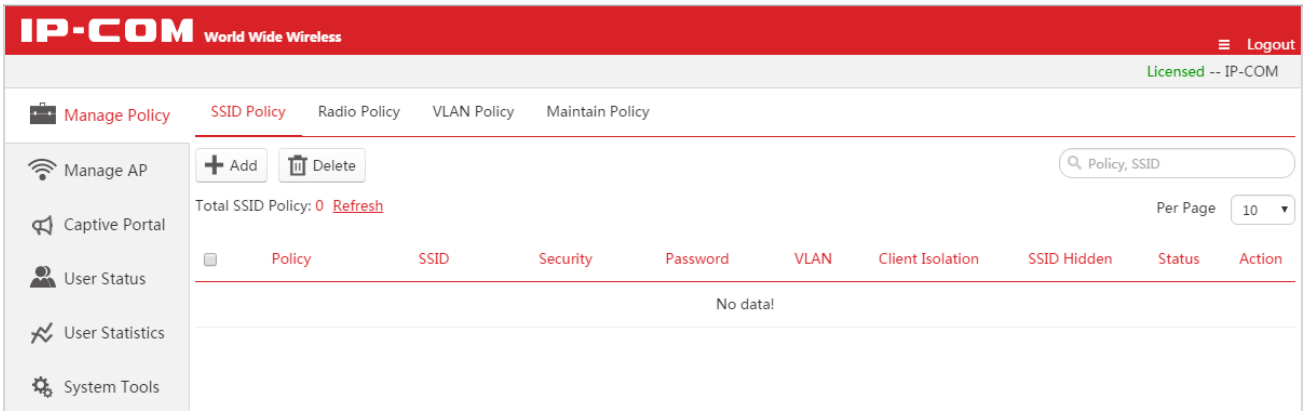
This page displays the basic information of SSID policies.



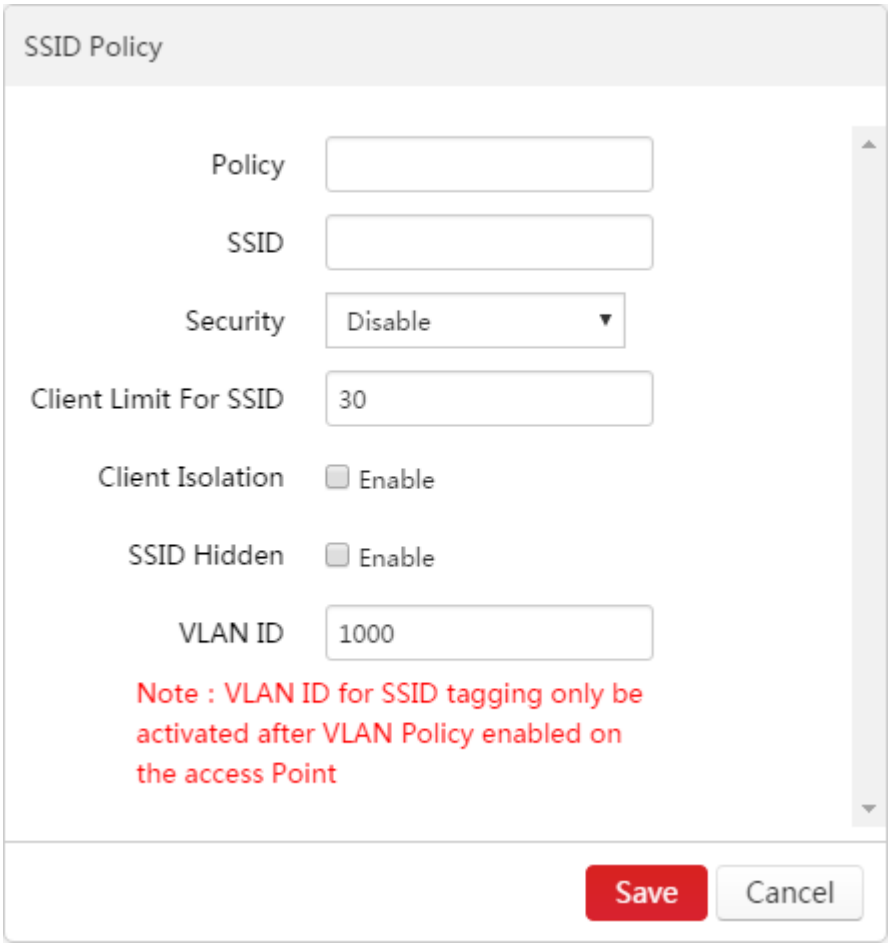
Buttion Description:

Add	Click the button to add a new SSID policy.
Delete	Click the button to delete the selected SSID policies in "Not Used" status.
(Action)	Modify the parameters except Policy name. Tip It is not recommended to modify the “Used” policies.

Add SSID Policy



To create a SSID policy, click + Add . This access controller supports creating up to 40 SSID policies.



Parameter description

Item	Description
Policy	Enter a unique SSID Policy name.
SSID	Enter a SSID name. The range of Length is 1~32 bytes.

Item	Description
Security	The access controller supports the following three types of Security Mode: • No encryption: If you select this option, all clients can connect to your WiFi. In order to ensure network security, it is not recommended to select this one. • WPA-PSK: The security mode of the wireless network is WPA-PSK. • WPA2-PSK: The security mode of the wireless network is WPA2-PSK.
Encryption	(Available only when WPA-PSK or WPA2-PSK is selected.) The access controller supports the following three types of encryption: • AES: AES is short for Advanced Encryption Standard. This encryption algorithm ensures a higher wireless rate. • TKIP: TKIP is short for Timing Key Integrity Protocol. Wireless rate can only reach 54Mbps with this algorithm. • TKIP&AES: Compatible with TKIP and AES. The wireless client can use either AES or TKIP algorithm to connect to the WiFi.
Security Key	(Available only when WPA-PSK or WPA2-PSK is selected.) Wireless clients need to enter this security key to conncet to a corresponding AP. The range of length is 8~63 characters.
Key interval	(Available only when WPA-PSK or WPA2-PSK is selected.) Configure the key update interval for encrypting WPA data. Theoretically, the shorter the key interval is, the more secure the WPA data will be. If set to “0”, the key will not be updated.
Client Limit For SSID	Set the maximum number of wireless clients allowed to connect, the range is 1~64. If this value is greater than AP’s the maximum supported number, the latter takes effect after the policy is delivered.
Client Isolation	Enable/Disable the SSID "client isolation". • Enable: Wireless clients that connect to the SSID can't communicate with each other. • Disable: Wireless clients that connect to the SSID can communicate with each other.
SSID Hidden	Enable/Disable "hide SSID" function. • Enable: If you enable “SSID Hidden” function, the SSID name will not be broadcasted so that the SSID names can not be found in the clients' available network list. Wireless clients need to manually enter the SSID name to connect to the SSID. • Disable: The SSID name will be broadcasted and will be discovered by adjacent devices.

Item	Description
VLAN ID	Set VLAN ID of the SSID and all packets from connected clients will be tagged with this VLAN ID. The range is 1~4094. **Note** VLAN ID is not effective unless VLAN Policy is delivered.
Status	Display whether the Policy is used or not.
Action	Modify the parameters except Policy name. Tip It is not recommended to modify the “Used” policies.

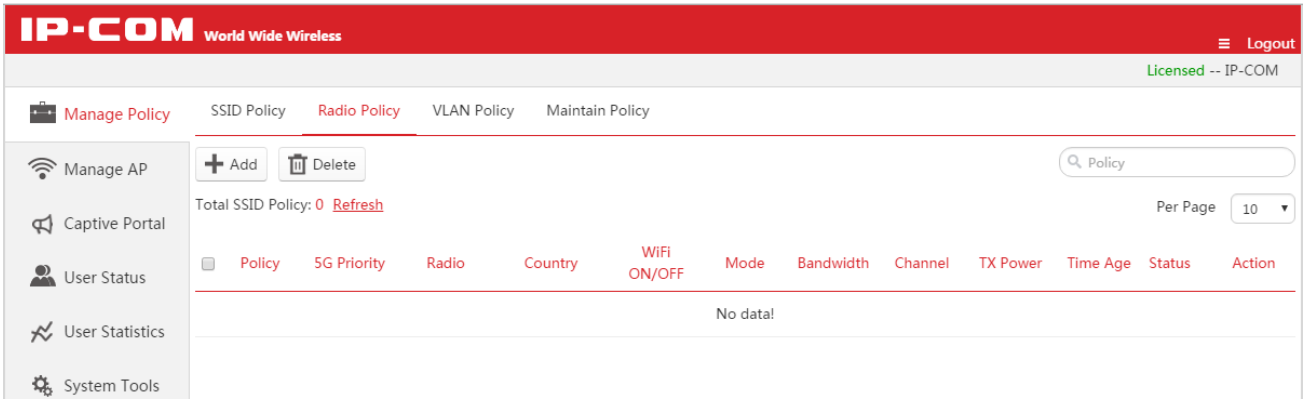
4.2.2 Radio Policy

Radio Policy Overview

To create a radio policy, click **Manage Policy** → **Radio Policy** to enter the following page.

Radio Policy parameters include 5G Prority, Radio, Mode, Bandwidth, Channel, Time Age, and so on.

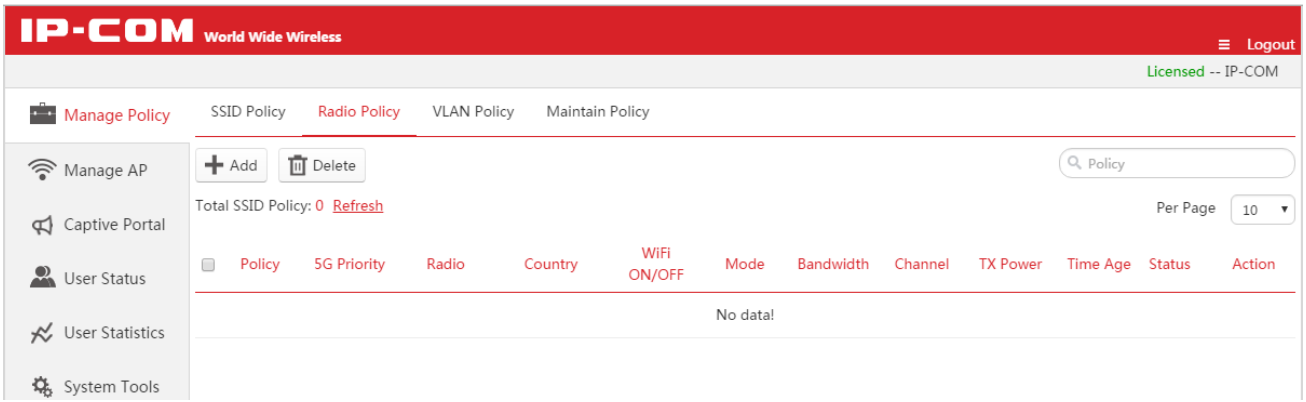
This page displays the basic information of Radio policies.



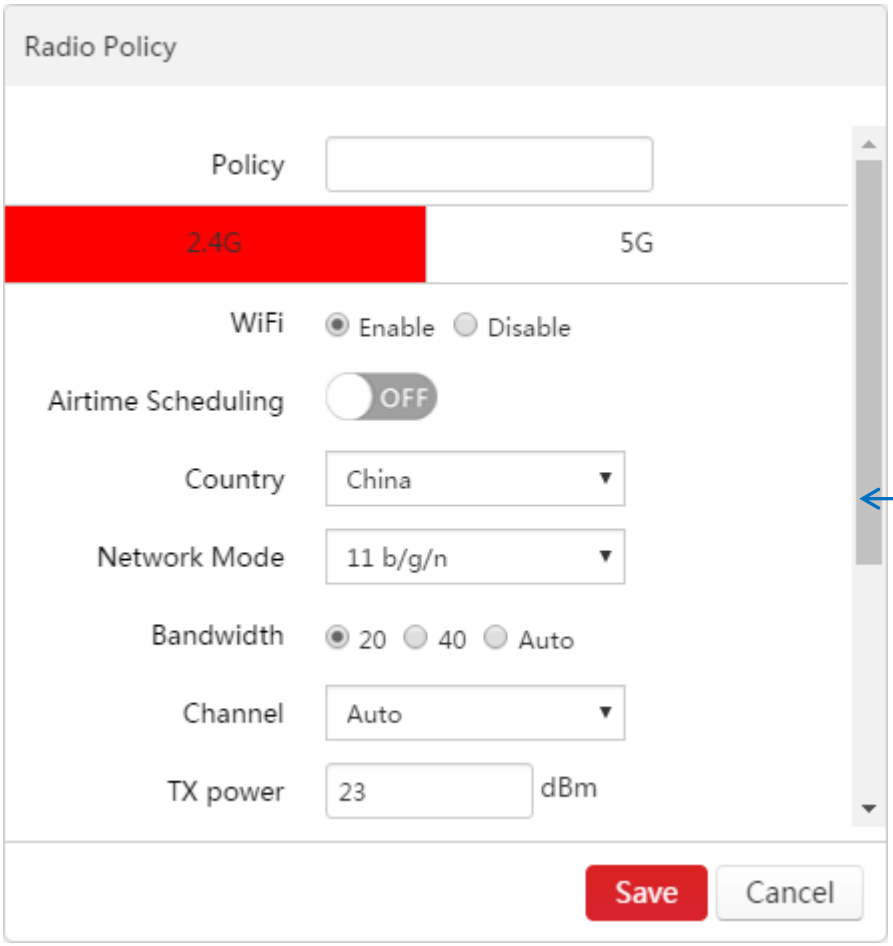
Buttion Description:

Add	Click the button to add a new Radio policy.
Delete	Click the button to delete the selected Radio plicies in “Not Used” status.
(Action)	Modify the parameters except Policy name. Tip It is not recommended to modify the “Used” policies.

Add Radio Policy



To add a radio policy, click + Add .



Drag down to display all the contents.

Parameter description

Item	Description
Policy	Enter a unique Radio Policy name.
Radio	Support 2.4G and 5G band. Different radio provides different signal strength and quality over different distance ranges. Signals in the 2.4 GHz band tend to pass through physical barriers better and carry farther than those in the 5 GHz band, but they do not provide as high a data rate. Signals in the 5 GHz band provide faster data rates for better throughput, but the signal attenuates faster and is best suited for open spaces. As 5 GHz signal does not travel as far as 2.4 GHz signal, you may need more APs for 5G range.
WIFI	Enable/disable 2.4G or 5G radio.
Airtime scheduling	It is recommended to enable this function. Dynamic airtime scheduling gives equal airtime rather than frame transmission opportunity to clients, thereby allowing high-speed clients to achieve much higher throughput without significantly impacting the slow-speed clients.
Country	Countries apply for their own regulations to the allowable channels, allowed users and maximum power levels within the frequency ranges. Consult your local authorities as these regulations may be out of date as they are subject to change at any time. Most contries allow the first eleven channels in the spectrum.
Network Mode	Select a Network Mode. 2.4G band includes 11b, 11g, 11b/g and 11b/g/n, while 5G band includes 11a, 11ac and 11a/n. Descriptions are as follows. • 11b: Works in 2.4G band and supports up to 11 Mbps. • 11g: Works in 2.4G band and supports up to 54 Mbps. • 11b/g: If you select this option, wireless clients supporting 802.11b or 802.11g can connect to the WiFi. • 11b/g/n: If you select this option, wireless clients supporting 802.11b, 802.11g or 802.11n can connect to the WiFi. • 11a: Works in 5G band and supports up to 54 Mbps. • 11ac: Works in 5G band and supports up to 1300Mbps. It is a newer standard that uses wider channels, QAM and spatial streams for higher throughput • 11a/n: Works in 5G band and supports up to 300Mbps, compatible with 11n.

Bandwidth	Select the wireless bandwidth. • 20: 20MHZ channel bandwidth. • 40: 40MHZ channel bandwidth. • 80: 80MHZ channel bandwidth. • Auto: Automatically adjust the channel bandwidth to 20MHZ or 40MHZ based on surrounding environment.
Channel	Select the wireless channel. Channel range differs from country and radio band.
Extension Channel	When bandwidth is 40 or Auto, this is used to determine the channel range of AP.
TX power	AP wireless transmit power, range: 1~99dBm. If this value is greater than the maximum supported power of an AP, the latter takes effect after the policy is delivered.
RSSI Threshold	RSSI is short for Received Signal Strength Indication. If a wireless client's signal is lower than this value, the client can not connect to the AP, which helps the client to connect to an AP with stronger signal.
WMM	Wi-Fi Multimedia (WMM) provides basic Quality of Service (QoS) features to IEEE 802.11 networks. WMM prioritizes traffic according to four Access Categories (AC) - voice, video, best effort, and background. However, it does not provide guaranteed throughput. It is suitable for well defined applications that require QoS, such as Voice over IP (VoIP) on Wi-Fi phones (VoWLAN).
SSID Isolation	Enable/Disable SSID isolation. When enabled, wireless clients that connect to different SSID of the AP cannot communicate with each other.
APSD	APSD is short for Automatic Power Save Delivery. It is basically a feature mode that allows your mobile devices to save more battery while connect to your WiFi network. By allowing your mobile devices to enter standby or sleep mode, it conserves energy. It is only effective when you enable WMM.
Time Age For Client	After a client connects to the AP: If there is no data transmission within the time period, AP will actively disconnect the client. If data transmission is detected within the time period, AP will recalculate the time age.
5G priority	"5G priority" refers to a scenario when a dual band client connects to a dual band AP, the AP makes it connect to 5G band in higher prority, which helps the AP to reduce interference and workload in 2.4G band and hence improve user experience.

Status	Display whether the Policy is used or not.
Action	Modify the parameters except Policy name. Tip It is not recommended to modify the “Used” policies.

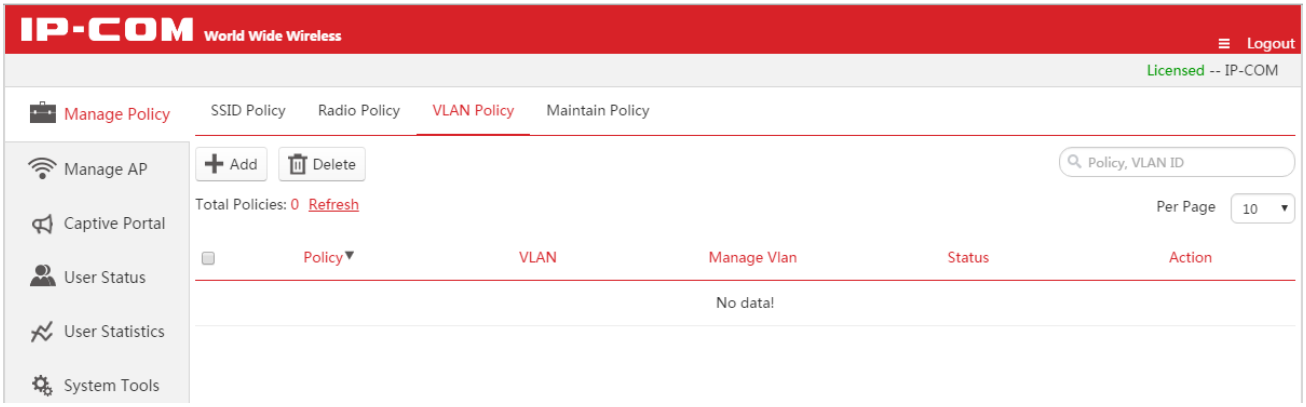
4.2.3 VLAN policy

VLAN policy Overview

To create a VLAN policy, click **Manage Policy → VLAN Policy** to enter the following page.

VLAN policy includes AP's PVID, management VLAN, trunk ports, and so on.

This page displays the basic information of VLAN policies.

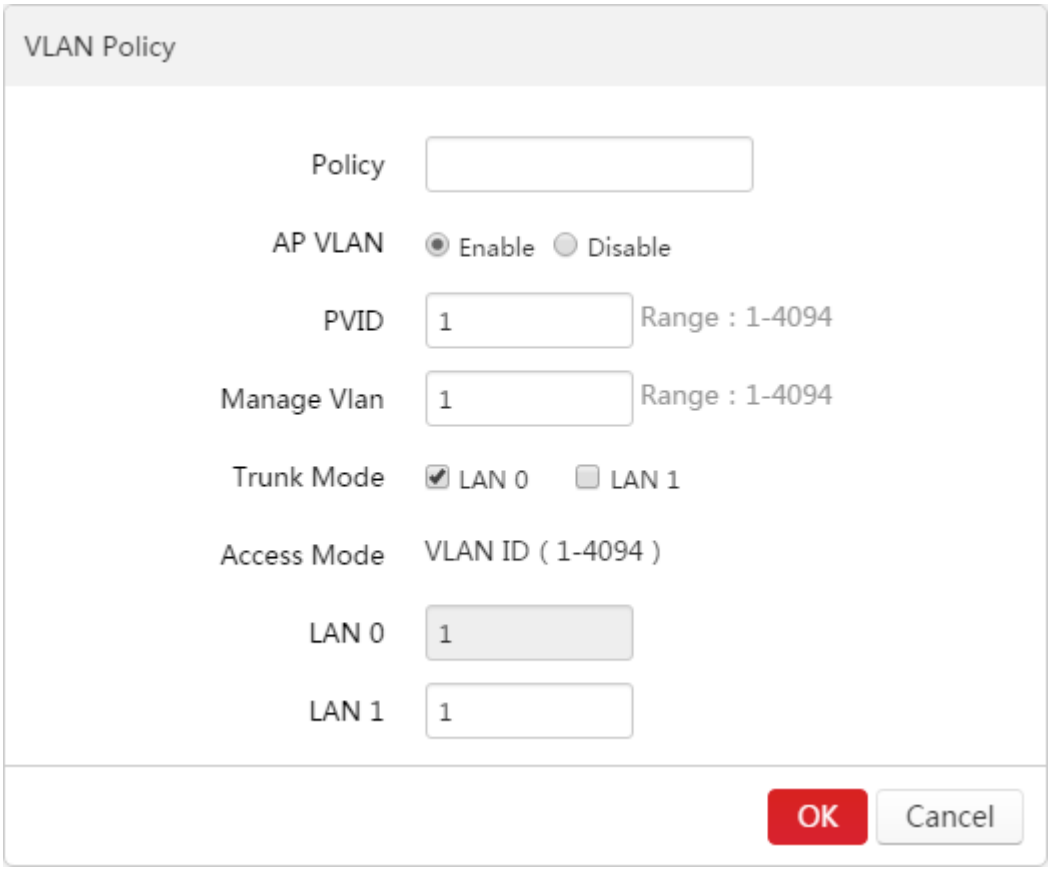


Buttion Description:

Add	Click the button to add a new VLAN policy.
Delete	Click the button to delete the selected VLAN policies.
Action	Modify the parameters except Policy name. Tip It is not recommended to modify the “Used” policies.

Add VLAN policy

To add a VLAN policy, go to **Manage Policy → VLAN Policy**, and click + Add .



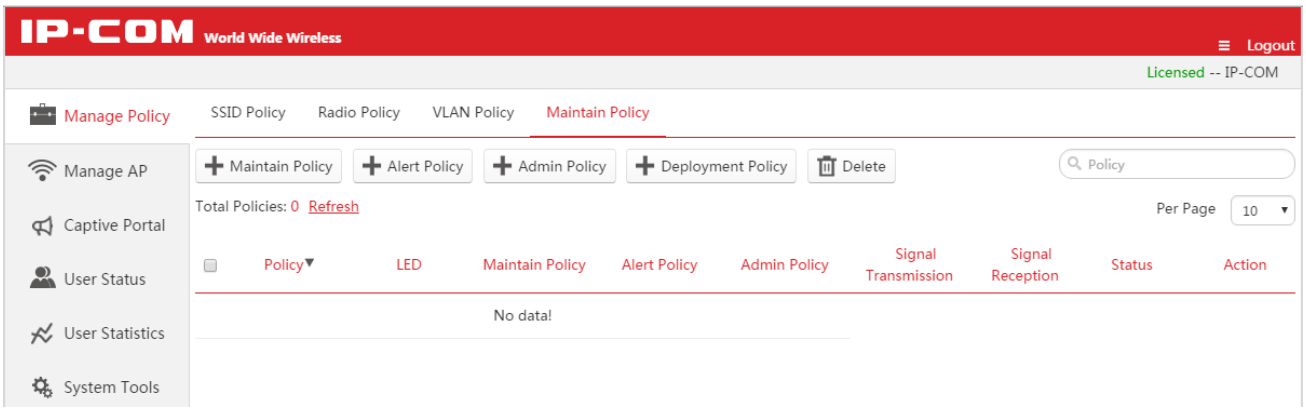
Parameter description

Item	Description
Policy	Enter a unique VLAN Policy name.
AP VLAN	Enable/disable AP's 802.1Q VLAN feature. After this feature is enabled and this VLAN policy is delivered to AP, "VLAN ID" in **Manage Policy → SSID policy** takes effect.
PVID	Enter AP Trunk port's default VLAN ID. It is recommended to set to "1".
Manage Vlan	AP's Management VLAN ID. **Note:** • If you modify this value and deliver this VLAN policy to AP, you need to go to **System Tools → Network setting → VLAN Settings** to set the same VLAN ID to the AC and **reboot the AC**. Only after that, the AC can manage AP again. • Only when a management computer and an AP are in the same VLAN, can the computer access the AP's Web UI.
Trunk Mode	Select wired LAN port as a trunk port which allows all VLAN packets to pass. **Note**: If AP has only one LAN port, select LAN0.
Access Mode	Display the port(s) in access mode. If a port has been a trunk port, it cannot be an access port.

LAN 0 LAN 1	Set up the Access port's VLAN ID.
Status	Display whether the Policy is used or not.
Action	Modify the parameters except Policy name. Tip It is not recommended to modify the “Used” policies.

4.2.4 Maintain Policy

To create a maintain policy, alert Policy, admin Policy or deployment policy, click **Manage Policy → Maintain Policy** to enter the following page.



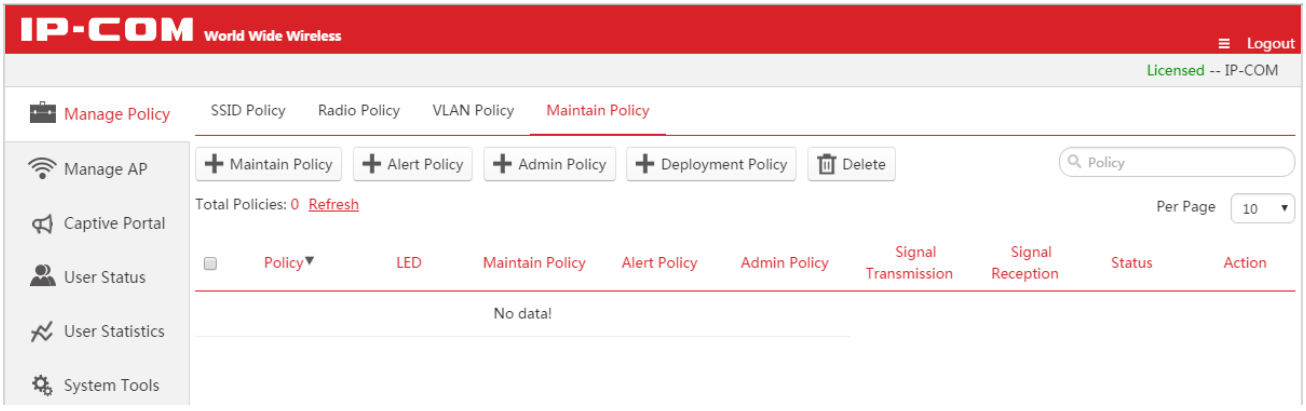
Buttion Description:

Maintain Policy	Click the button to add a new Maintain Policy.
Alert Policy	Click the button to add a new Alert Policy.
Admin Policy	Click the button to add a new Password Policy.
Deployment Policy	Click the button to add a new Deployment Policy.
Delete	Click the button to delete the selected policies in “Not Used” status.

This page displays summary about maintain policy. Parameters are described below:

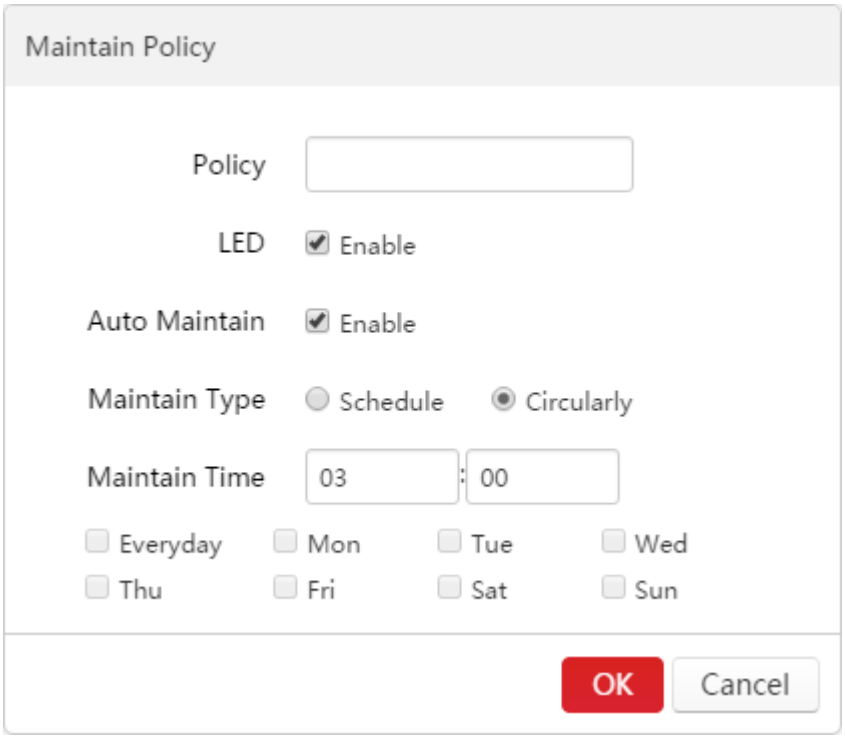
Item	Description
Policy	Display the unique name of a policy.
LED	If the policy is a maintain policy, it displays the LED status: enable or disable. Otherwise, it displays "----".
Maintain/Alert/Admin Policy	Display corresponding information of a Maintain/Alert/Admin Policy.
Signal Transmission	Signal interference between APs can be effectively reduced by adjusting the transmit power of AP. If it is a capacity-oriented network, please select "High Density". Otherwise, select "Coverage".
Signal Reception	Select a Signal Reception Method based on different scenarios. **Coverage**: It is used in a coverage-oriented network to ensure a higher WiFi coverage. **High Density**: It is used in a capacity-oriented network to ensure a better signal quality. **Default**: The signal reception is between "Coverage" and "High Density".
Status	Display whether the Policy is used or not.
Action	Modify the parameters except Policy name. Tip It is not recommended to modify the "Used" policies.

Maintain Policy



This section helps you to configure the maintain policy, including LED status and auto reboot time.

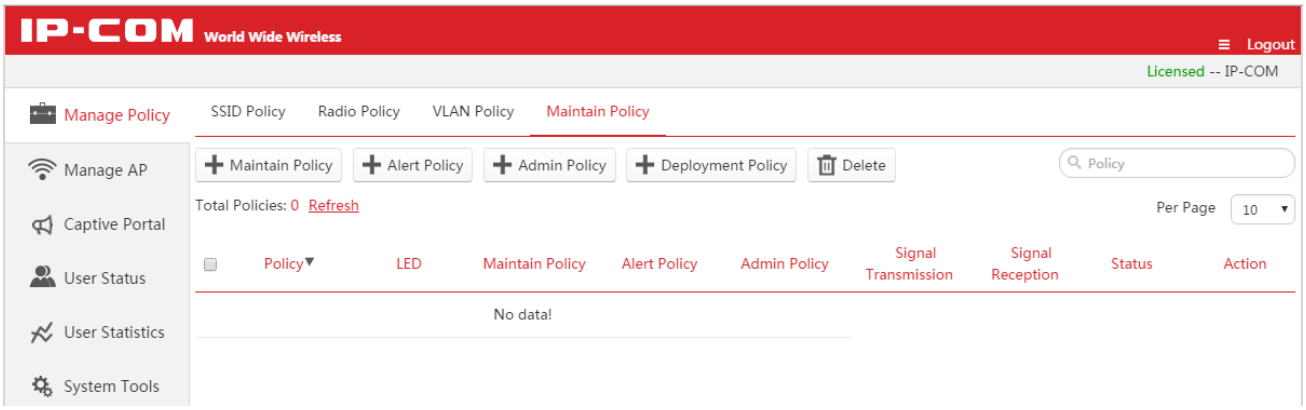
Click + Maintain Policy to add a maintain policy.



Parameter description

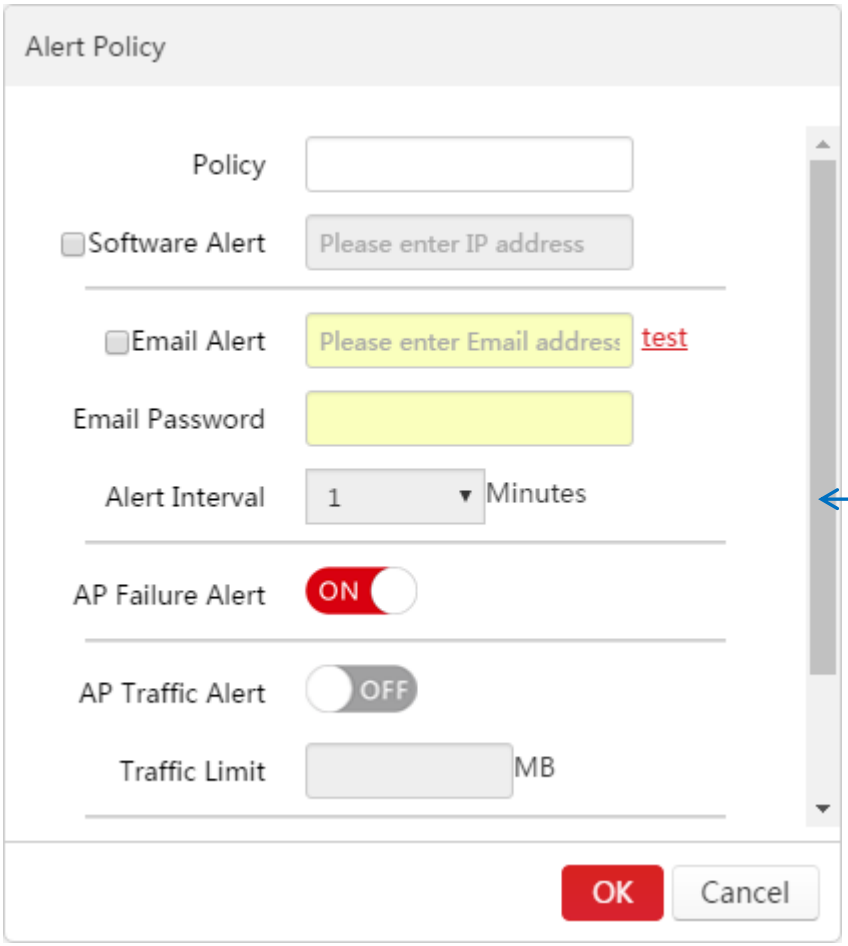
Item	Description
Policy	Enter a unique maintain Policy name, which cannot be the same with other maintain/alert/admin/deployment policies.
LED	Enable/Disable AP's LED indicators.
Auto Maintain	Enable/Disable AP's auto reboot feature. If enabled, the AP will automatically reboot at a specified time (recommended in leisure time) to ensure AP's performance.
Maintain Type	Select AP reboot type. • Circularly: The AP will automatically reboot periodically at a specified interval. • Schedule: The AP will automatically reboot at specified date and time.
Maintain Time	Specify AP reboot interval when **Circularly** is selected.
Maintain Time(Schedule)	Specify AP reboot time when **Schedule** is selected.
Everyday, Mon, Tue, Wed, Thu, Fri, Sat, Sun	Specify AP reboot date when **Schedule** is selected.

Alert Policy



This section helps you to configure AP Alert Policies, including Software Alert, Email Alert, and AP alert configurations.

Click + Alert Policy to add an alert policy.



Drag down to display all the contents.

Parameter Description:

Item	Description
Policy	Enter a unique alert Policy name, which cannot be the same with other maintain/alert/admin/deployment policies.

Software Alert	Enable/Disable the software alert function. When enabled, please enter IP address of the host which receives alert logs, and the access controller will send alert logs directly to the alert client program running on the host. **Tip**: For the description of alert client program, please refer to Running Alert Client.
Email Alert	Enable/Disable Email Alert function. When enabled, please enter an email address for sending/receiving AP alert logs, and the access controller will regularly send alert logs using the email address to the same email address of the network administrator.
E-mail password	Enter the sending email password.
Alert Interval	When you enable the email alert function, please enter the interval of sending alert logs.
AP Failure Alert	Enable/Disable AP Failure Alert. If enabled, the access controller will send alert logs, such as AP reboot, AP online or offline, and so on.
AP Traffic Alert	Enable/Disable AP Traffic Alert. If enabled, the access controller will send alert logs when AP traffic reaches its limit.
Traffic Limit	The access controller will send alert logs when AP traffic reaches this limit.
AP Client Alert	Enable/Disable AP Client Alert. The access controller will send alert logs when the number of connected clients reaches its limit.
Client Limit	The access controller will send alert logs when AP's connected clients reach this number.

Running Alert Client: (Take Windows 7 for example)

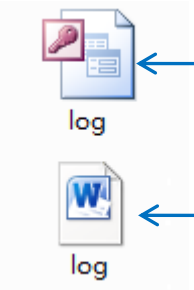
1. Contact IP-COM technical support engineer to get alert client software.

2. Save the software in a specified folder on a computer, e.g. "D:\AP_alarm".

3. Double-click the icon  .

If the "Do you want to allow the following program from unknown Publisher to make changes to this computer" dialogue prompts, click Yes .

After a successful installation, it will generate the following two files in the folder:



The AC will send AP's alert logs to this file on the host. Please make sure to keep the file.

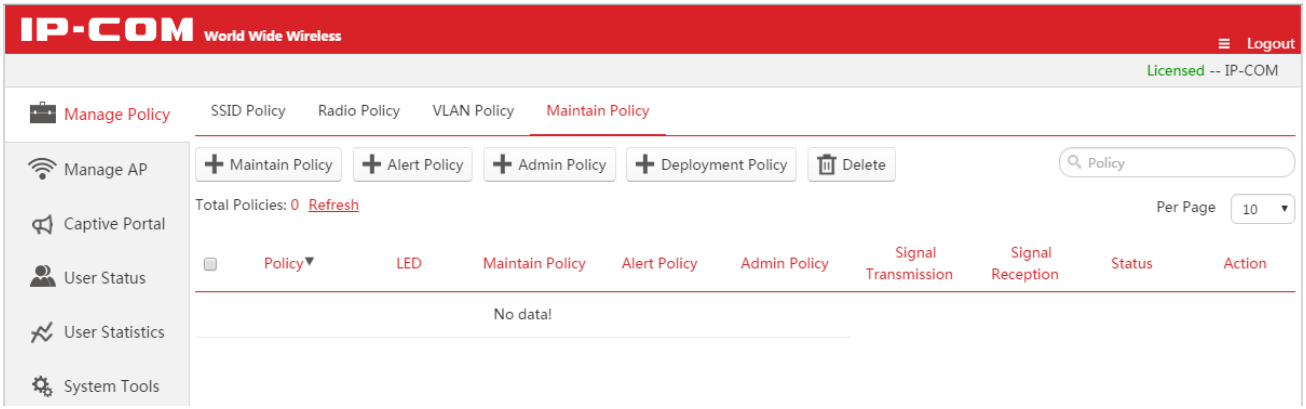
This is the system temporary file, ignore it.

The network administrator can view AP's alert logs on the alert client program. Do as follows.

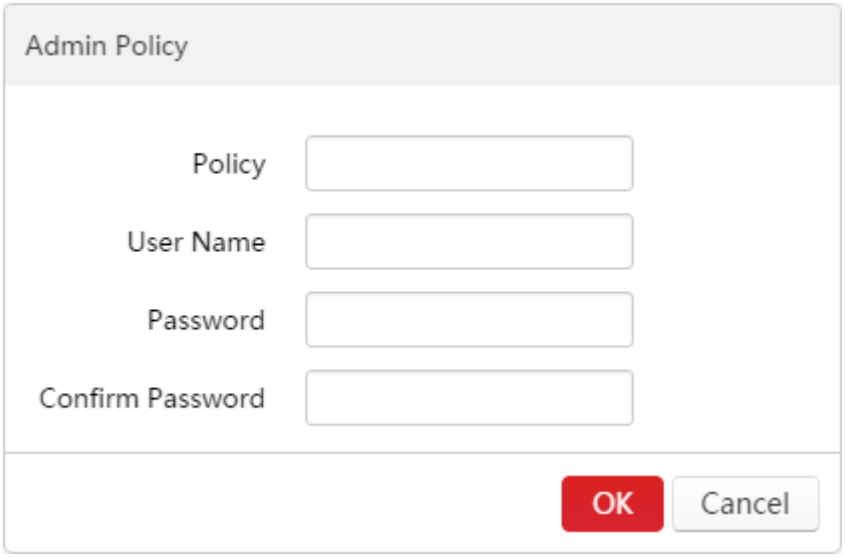
1. Double-click the alert client icon.

2. View AP alert logs on the pop-up page. Click Refresh to view the latest alert logs.

Admin Policy



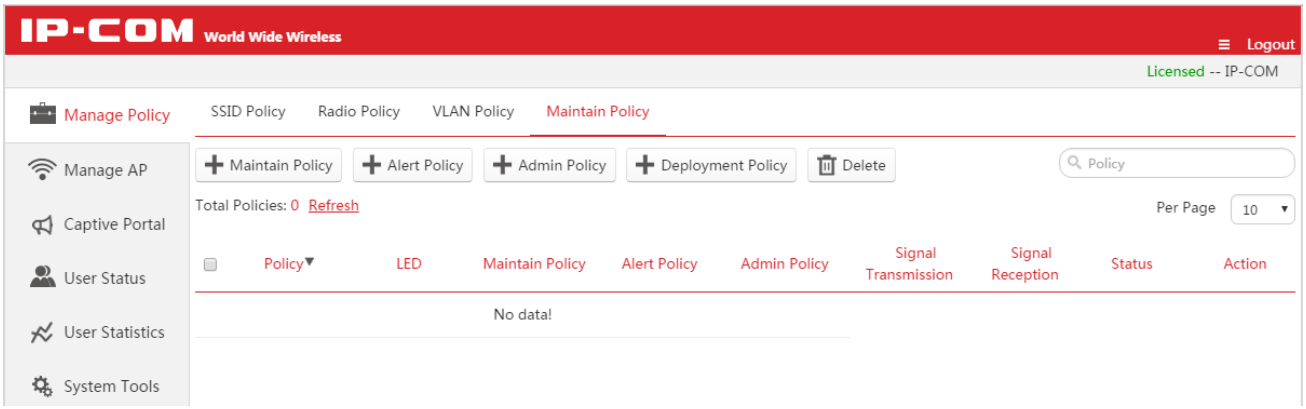
This section helps you to configure login account and password of AP. Click + Admin Policy to add an Admin policy. The access controller supports up to 10 Admin policies.



Parameter Description:

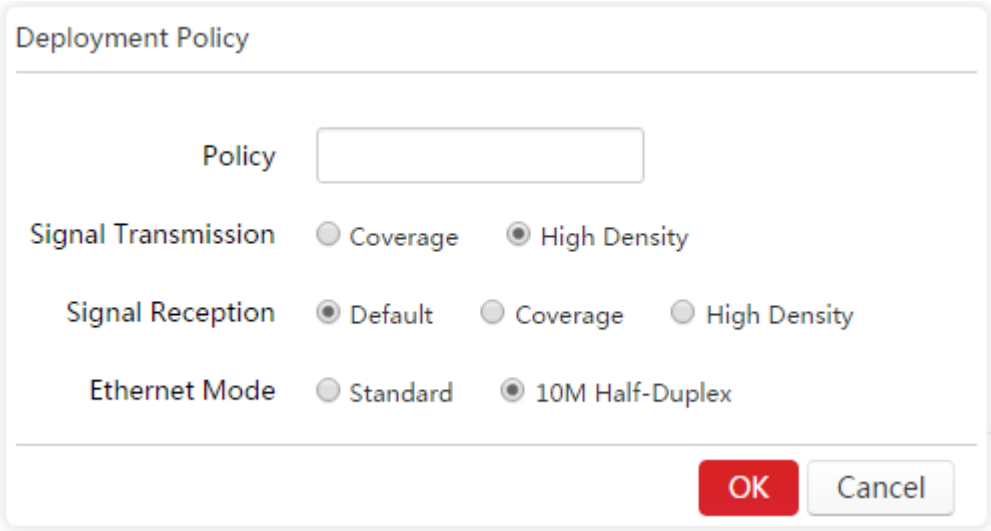
Item	Description
Policy	Enter a unique Admin Policy name, which cannot be the same with other maintain/alert/admin/deployment policies.
User name	Set up AP's login account. It supports letters (case-sensitive), numbers, and underscores. The range of length is 3~32 characters.
Password	Set up AP's login password. It supports letters (case-sensitive), numbers, and underscores. The range of length is 3~32 characters.
Confirm Password	Repeat the password.

Deployment Policy



This section helps you to configure deployment policies, including Signal Transmission, Signal Reception, and Ethernet Mode.

Click + Deployment Policy to add a deployment policy.



Parameter Description:

Item	Description
Policy	Enter a unique SSID deployment policy name, which cannot be the same with other maintain/alert/admin/deployment policies.
Signal Transmission	Signal interference between APs can be effectively reduced by adjusting the transmit power of AP. If it is a capacity-oriented network, please select “High Density”. Otherwise, select “Coverage”.
Signal Reception	Select a Signal Reception Method based on different scenarios. **Coverage**: It is used in a coverage-oriented network to ensure a higher WiFi coverage. **High Density**: It is used in a capacity-oriented network to ensure a better signal quality. **Default**: The signal reception is between “Coverage” and “High Density”.
Ethernet mode	Select AP LAN port's Ethernet mode. The default option is “10M Half-Duplex”. This mode can transmit in a longer distance with lower speed. When the distance between AP and the other device are more than 100 meters, please select "10M half-duplex" to make signal travels further. You must ensure that the other device works in auto negotiation mode, or AP LAN port can't send and receive data.

4.3 Manage AP

Tip

Configuration in this section also applies to 5.4 Manage AP in Sub AC mode.

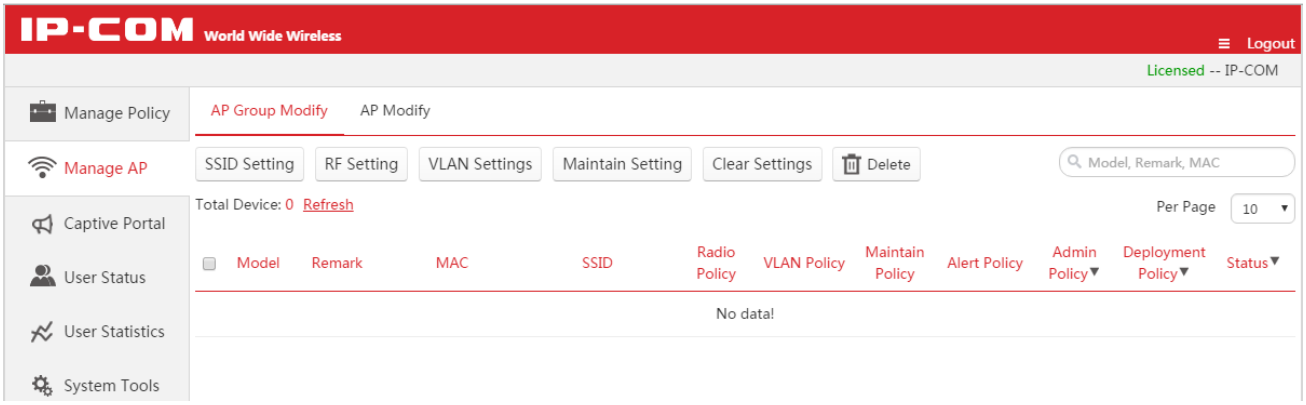
To deliver the configured policies to appropriate APs and manage the APs, use this section to help you.

This section includes two parts, **AP Group Modify** and **AP Modify**.

4.3.1 AP Group Modify

Overview

To deliver SSID policy, radio policy, VLAN policy and maintain policy to APs, click **Manage AP → AP Group Modify** to enter the following page.



Buttion Description:

SSID Setting	Click this button to deliver a SSID Policy to selected online APs.
RF Setting	Click this button to deliver a Radio Policy to selected online APs.
VLAN Settings	Click this button to deliver a VLAN Policy to selected online APs.
Maintain Setting	Click this button to deliver a Maintain Policy to selected online APs.
Clear Settings	Click this button to restore the maintain policy and alert policy of the selected online APs to factory default.
Delete	Click the button to delete the selected "offline" APs.

Parameter Description:

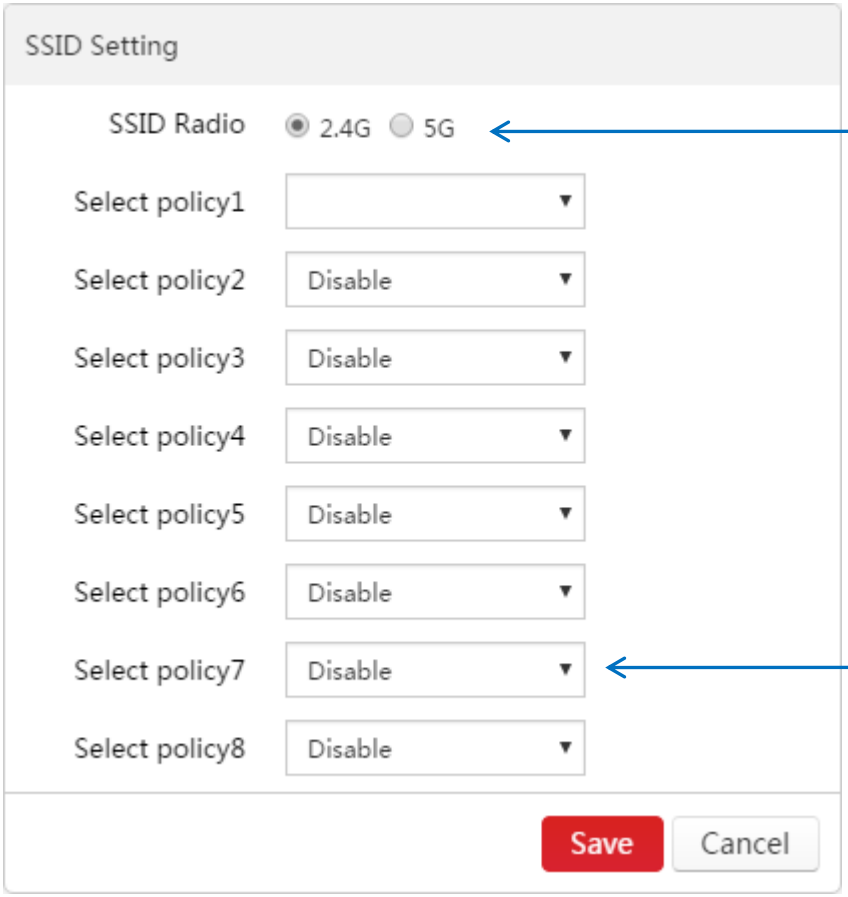
Item	Description
Model	Display AP model.
Remark	Display AP remark. In order to manage different AP easily, it is recommended to set up the Remark name as AP's branch name or location.
MAC	Display AP MAC address.
SSID	Display AP's SSID(s). If more than one SSID is delivered to AP, it displays all SSID names when the cursor is hovering over.
Radio Policy	Display the delivered radio policy name.
VLAN policy	Display the delivered VLAN policy name.
Maintain Policy	Display the delivered maintain policy name.
Alert Policy	Display the delivered alert policy name.
Admin Policy	Display the delivered admin policy name.
Deployment Policy	Display the delivered deployment policy name.
Status	Display whether the AP is online or offline. Online: The AP and AC have successfully established a connection, and the AC can manage the AP. Offline: The AP and AC failed to establish a connection and the AC can't manage the AP. **Tip** If the AP is offline, it keeps configuration delivered before. Users can still use their wireless network unless the AP is restored to factory default.

SSID Setting

To deliver SSID policies to online APs, do as follows:

1. Select online APs.
2. Click SSID Setting .
3. In the drop-down list, select the SSID policy name.
4. Click Save .

   The SSID policies will be delivered to the selected APs.



☺ Tips:

If an AP does not support 5G band, the 5G band will not be set.

If some of the selected APs support 2.4G and others support 2.4G and 5G, then the AC will automatically deliver policies based on AP's actual supported band.

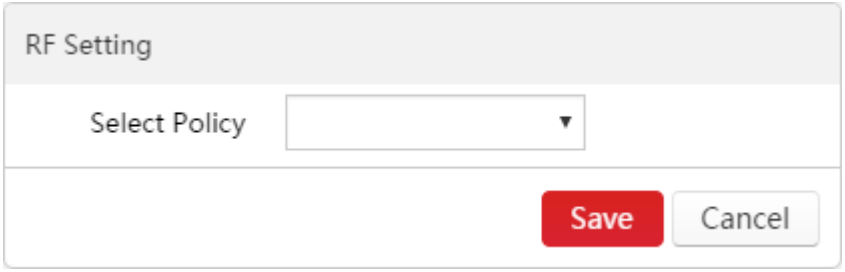
If an AP only supports 2 SSIDs, then policies after policy 2 will not be delivered even if you select more than 2 SSIDs.

RF Setting

To deliver a RF policy to online APs, do as follows:

1. Select online APs.
2. Click RF Setting .
3. In the drop-down list, select the policy name.
4. Click Save .

   The RF policy will be delivered to the selected online APs.

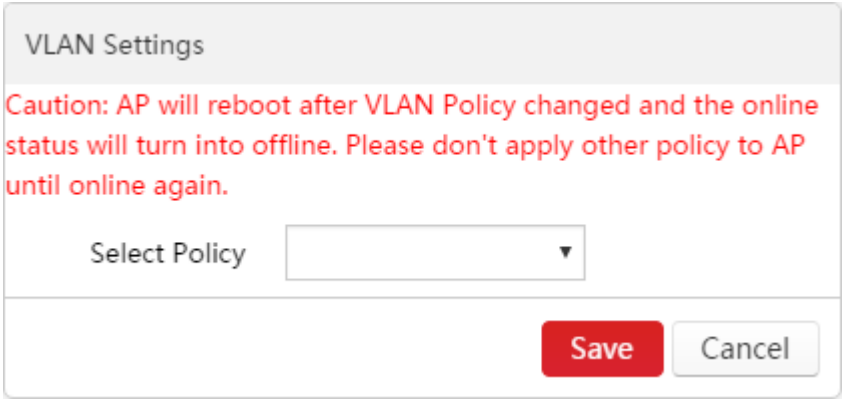


VLAN Settings

To deliver a VLAN policy to online APs, do as follows:

1. Select online APs.
2. Click VLAN Settings .
3. In the drop-down list, select the policy name.
4. Click Save.

   The VLAN policy will be delivered to the selected APs.

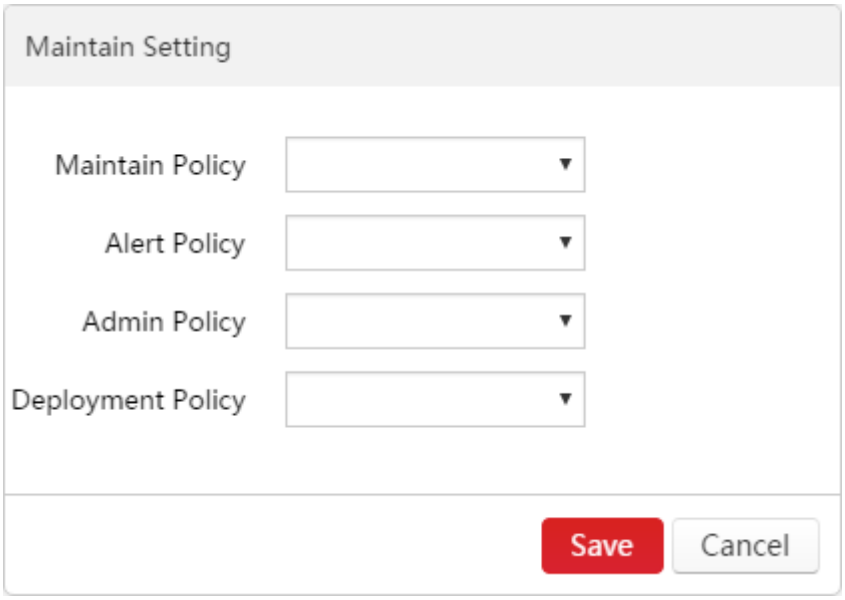


Maintain Setting

To deliver maintain policies to online APs, do as follows:

1. Select online APs.
2. Click Maintain Policy .
3. In the drop-down list, select the corresponding policy name.
4. Click Save.

   The maintain policies will be delivered to the selected APs.



Clear Settings

To restore maintain policy and alert policy of the selected online APs to factory default. Do as follows:

1. Select online APs.
2. Click Clear Settings.

Tip:

- Other policies will not be restored to factory default.
- The maintain policy here does not include Alert Policy, Admin Policy or Deployment Policy.

Delete

To delete offline APs:

1. Select the APs.
2. Click Delete .

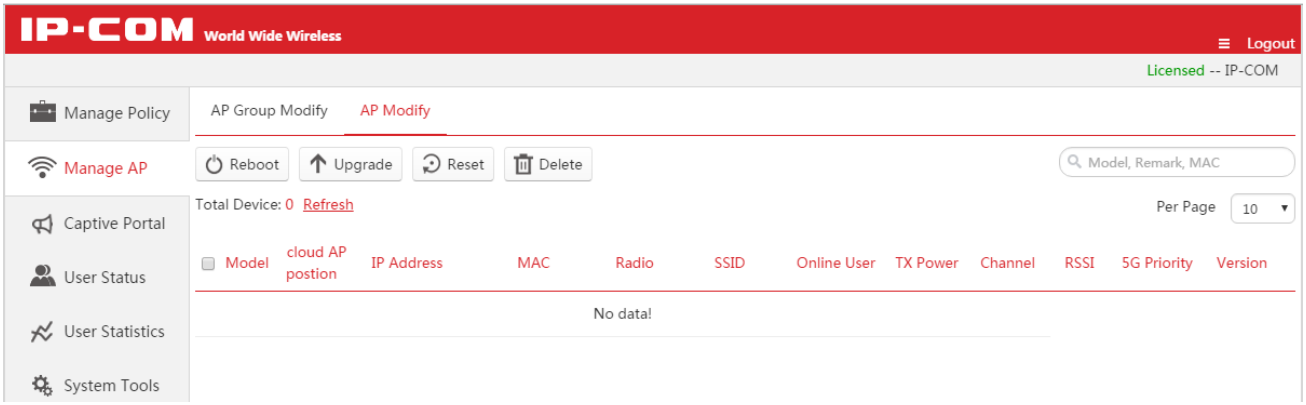
Tip:

Online APs will not be deleted even if you select them.

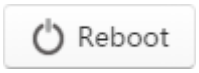
4.3.2 AP Modify

Overview

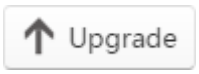
To reboot, upgrade and reset selected online APs, to delete selected offline APs or to change RF settings of an AP, click **Manage AP → AP Modify** to enter the following page.



Operation button's description:

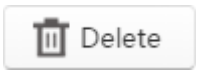


Click the button to reboot the selected online APs.



Click the button to upgrade a firmware for the selected online APs.

Click the button to restore the selected online APs to factory default.



Click the button to delete the selected offline APs.

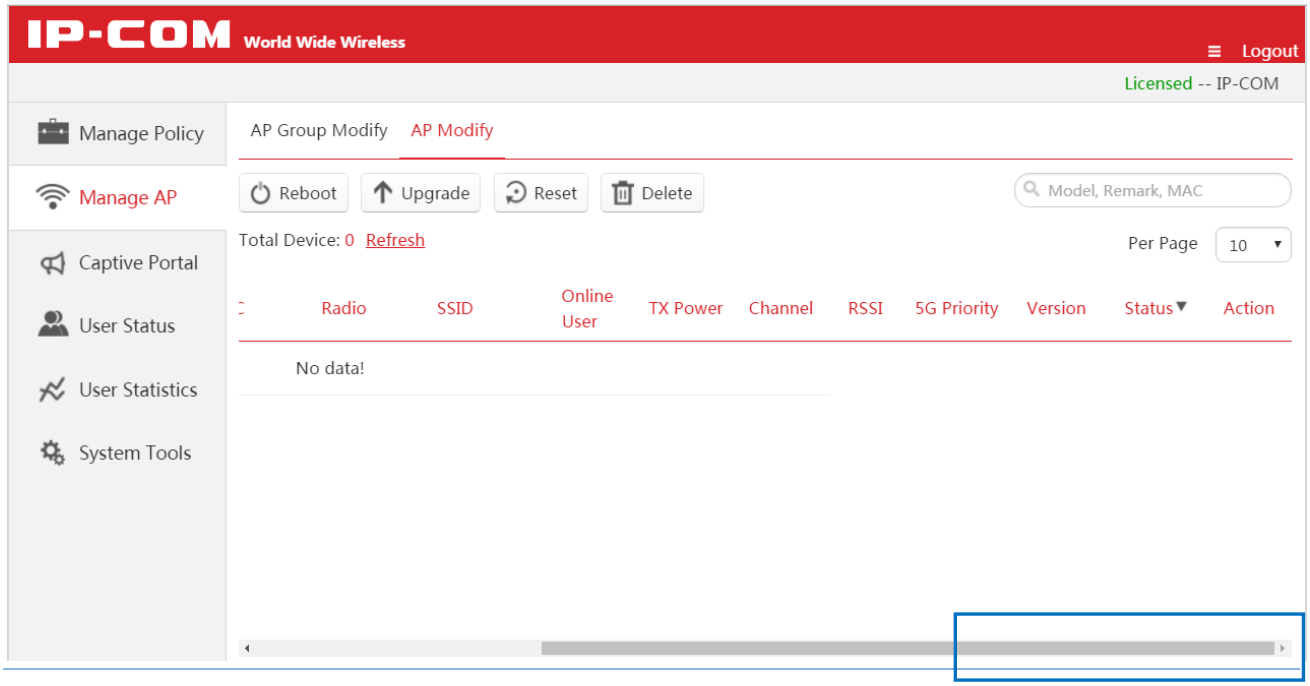
Parameter Description:

Item	Description
Model	Display AP model.
Cloud AP position	Display AP remark. In order to manage different AP easily, it is recommended to set up the “Cloud AP position” as its branch name or location.
IP address	Display the public IP address of the cloud AP. It is generally the public IP address the cloud AP’s gateway.
MAC	Display AP MAC address.
Radio	Display the AP's frequency band. It may be 2.4G or 5G or 2.4G and 5G.
SSID	Display AP’s SSID(s). If more than one SSID is delivered to AP, it displays all SSID names when the cursor is hovering over.
Online Users	Display the amount of online users which connect to the AP.
TX Power	Display the AP's wireless transmit power.
Channel	Display the AP’s channel.
RSSI	RSSI is short for Received Signal Strength Indication. If a wireless client’s signal is lower than this value, the client can not connect to the AP, which helps the client to connect to an AP with stronger signal.

5G Priority	"5G priority" refers to a scenario when a dual band client connects to a dual band AP, the AP makes it connect to 5G band in higher prority, which helps the AP to reduce interference and workload in 2.4G band and hence improve user experience.
Version	Display the firmware version of the AP.
Status	Display whether the AP is online or offline. Online: The AP and AC have successfully established a connection, and the AC can manage the AP. Offline: The AP and AC failed to establish a connection and the AC can't manage the AP. **Tip** If the AP is offline, it keeps configuration delivered before. Users can still use their wireless network unless the AP is restored to factory default.
Action	Click to modify the AP's RF settings. For details, please refer to Modify.

Tip

If "Status" and "Action" does not appear in this page, please zoom in the page, e.g. 125%, and then drag the slider at the bottom of the page so that you can view the AP's "status" and click in "Actions" field to modify AP parameters.



Reboot

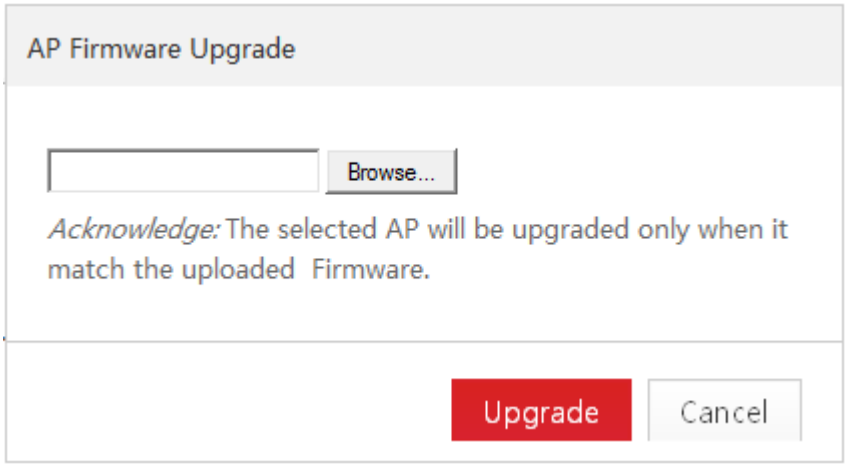
To reboot online APs:

1. Select online APs which need to reboot.
2. Click Reboot.

Upgrade

To upgrade a firmware for online APs:

1. Select online APs which need to upgrade.
2. Click Upgrade.
3. Follow on-screen instructions to finish firmware upgrade.



Note

When an AP firmware is upgrading, please DO NOT power off the AP or it may cause damage to the AP! If a sudden power off occurs, please upgrade again. If you cannot log in to AP's Web UI after a sudden power off, please contact our technical support engineer.

Reset

To reset online APs to factory default:

1. Select online APs which need to reset.
2. Click Reset.

Delete

To delete offline APs:

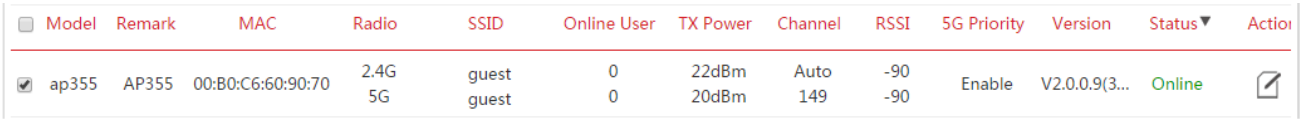
1. Select offline APs.

2. Click Delete.

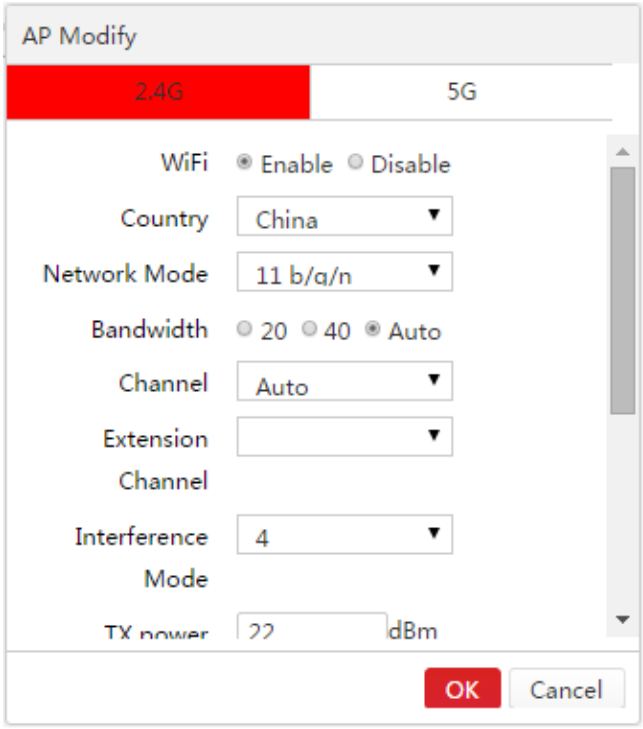
Tip

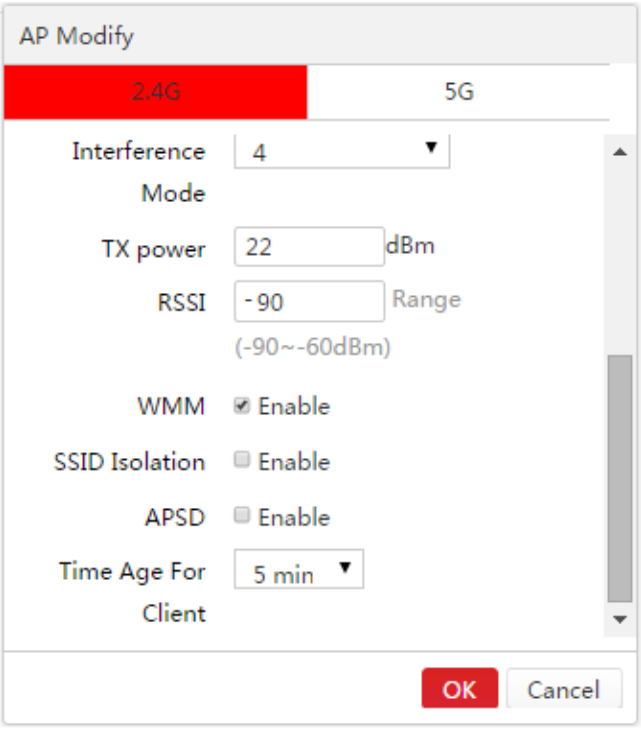
If the AP is offline, it keeps configuration delivered before. Users can still use their wireless network unless the AP is restored to factory default.

Modify



Click  on the right page to modify the AP's RF settings.





Parameter Description:

Item	Description
WiFi	Enable/disable AP's WIFI in each band.
Country	Countries apply for their own regulations to the allowable channels, allowed users and maximum power levels within the frequency ranges. Consult your local authorities as these regulations may be out of date as they are subject to change at any time. Most contries allow the first eleven channels in the spectrum.
Network Mode	Select a Network Mode. 2.4G band includes 11b, 11g, 11b/g and 11b/g/n, while 5G band includes 11a, 11ac and 11a/n. Descriptions are as follows. • 11b: Works in 2.4G band and supports up to 11 Mbps.

	• 11g: Works in 2.4G band and supports up to 54 Mbps. • 11b/g: If you select this option, wireless clients supporting 802.11b or 802.11g can connect to the WiFi. • 11b/g/n: If you select this option, wireless clients supporting 802.11b, 802.11g or 802.11n can connect to the WiFi. • 11a: Works in 5G band and supports up to 54 Mbps. • 11ac: Works in 5G band and supports up to 1300Mbps. It is a newer standard that uses wider channels, QAM and spatial streams for higher throughput • 11a/n: Works in 5G band and supports up to 300Mbps, compatible with 11n.
Bandwidth	Select the wireless bandwidth. • 20: 20MHZ channel bandwidth. • 40: 40MHZ channel bandwidth. • 80: 80MHZ channel bandwidth. • Auto: Automatically adjust the channel bandwidth to 20MHZ or 40MHZ based on surrounding environment.
Channel	Select the wireless channel. Channel range differs from country and radio band.
Extension Channel	When bandwidth is 40 or Auto, this is used to determine the channel range of AP.
Interference Mode	Configure Interference mode. Value range: 0 ~ 4, the default value is "2". • 0: Disable all interference immunity. • 1: Enable the same frequency interference immunity. • 2: Force to enable radio interference immunity. • 3: Automatically enable radio interference immunity. • 4: Automatically enable radio interference immunity and noise reduction. **Tip**: Different AP models have different recommended interference mode. Please contact IP-COM technical support engineer for help.
TX power	AP wireless transmit power, range: 1~99dBm. If this value is greater than the maximum supported power of an AP, the latter takes effect after the policy is delivered.
RSSI	RSSI is short for Received Signal Strength Indication. If a wireless client's signal is lower than this value, the client can not connect to the AP, which helps the client to connect to an AP with stronger signal.
WMM	Wi-Fi Multimedia (WMM) provides basic Quality of Service (QoS) features to IEEE 802.11

	networks. WMM prioritizes traffic according to four Access Categories (AC) - voice, video, best effort, and background. However, it does not provide guaranteed throughput. It is suitable for well defined applications that require QoS, such as Voice over IP (VoIP) on Wi-Fi phones (VoWLAN).
SSID Isolation	Enable/Disable SSID isolation. When enabled, wireless clients that connect to different SSID of the AP cannot communicate with each other.

APSD	APSD is short for Automatic Power Save Delivery. It is basically a feature mode that allows your mobile devices to save more battery while connect to your WiFi network. By allowing your mobile devices to enter standby or sleep mode, it conserves energy. It is only effective when you enable WMM.
Time Age For Client	After a client connects to the AP: If there is no data transmission within the time period, AP will actively disconnect the client. If data transmission is detected within the time period, AP will recalculate the time age.

4.4 Captive Portal

Assume that you own a restaurant, and you want your customers to know more information about your restaurant to help you promote your prducts. Then you can follow this part to create advertisements and deliver them to SSID. In this way, your customers can get to know the advertisements after they successfully connect to your SSID.

This section includes **Create Ads, Ads Push, Global Settings, Create Account,** and **Voucher.**

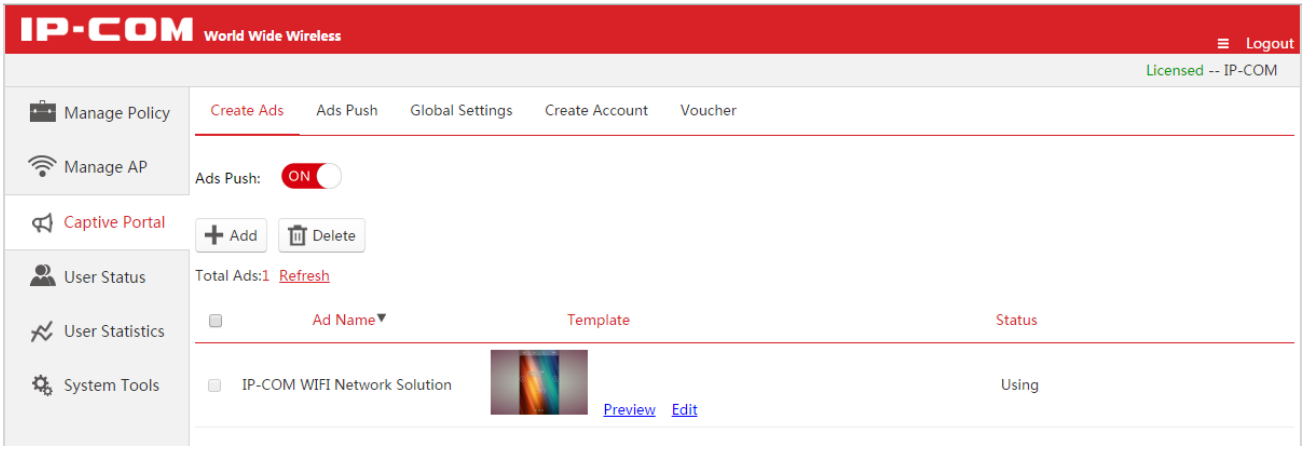
4.4.1 Create Ads

Tip

Configuration in this section also applies to 5.5.1 Create Ads in "Sub AC" mode.

To create a concrete advertisement, follow this section.

Click **Captive Portal** to get into the following page. By default, "Ads Push" function is disabled. You can click the toggle (OFF to ON) to enable this function. After you enable "Ads Push" function and don’t deliver any other advertisement, the system will deliver the default advertisement, which name is “IP-COM WIFI Network Solution” and authorization method is "No Password".



Parameter Description:

Item	Description
Ad Name	Display the description of the advertisement.
Template	Display the advertisement template styles. Click Preview to preview the advertisement. Click Edit to redesign the advertisement content. **Tip** The advertisement in "Using" status cannot be edited.
Status	Display whether the advertisement is using or not.

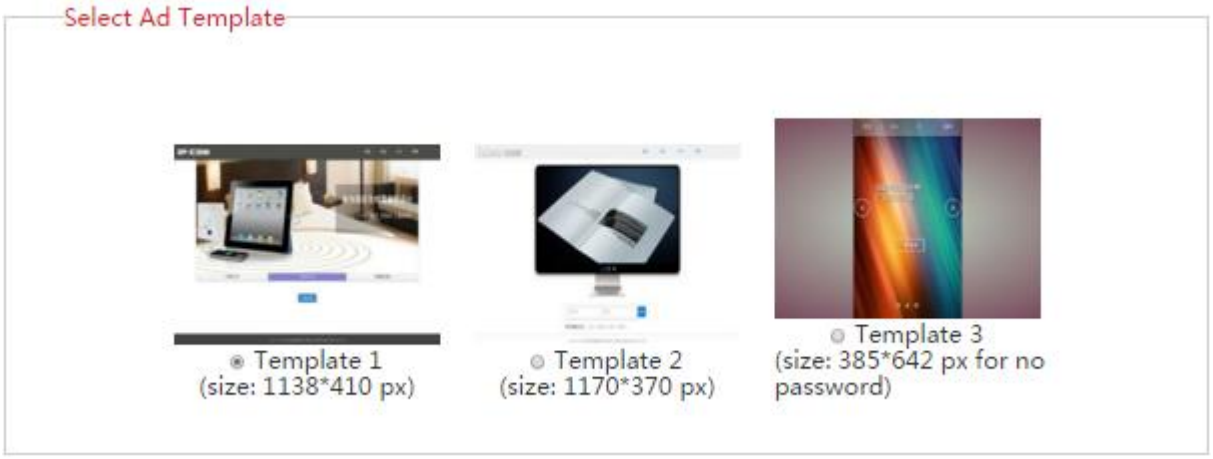
Buttion Description:

Add — Click the button to create an advertisement. The access controller can create up to 10 advertisements, including 1 default advertisement and 9 custom advertisements.

Delete — Click the button to delete the selected unused advertisements.

To create an ad, click +Add to enter following the advertisement designing page, which consists of five parts, includes "Select Ad Template", "Basic Information", "Ad Slide Image", "Navigation Settings" and "Authorization". Details are as follows.

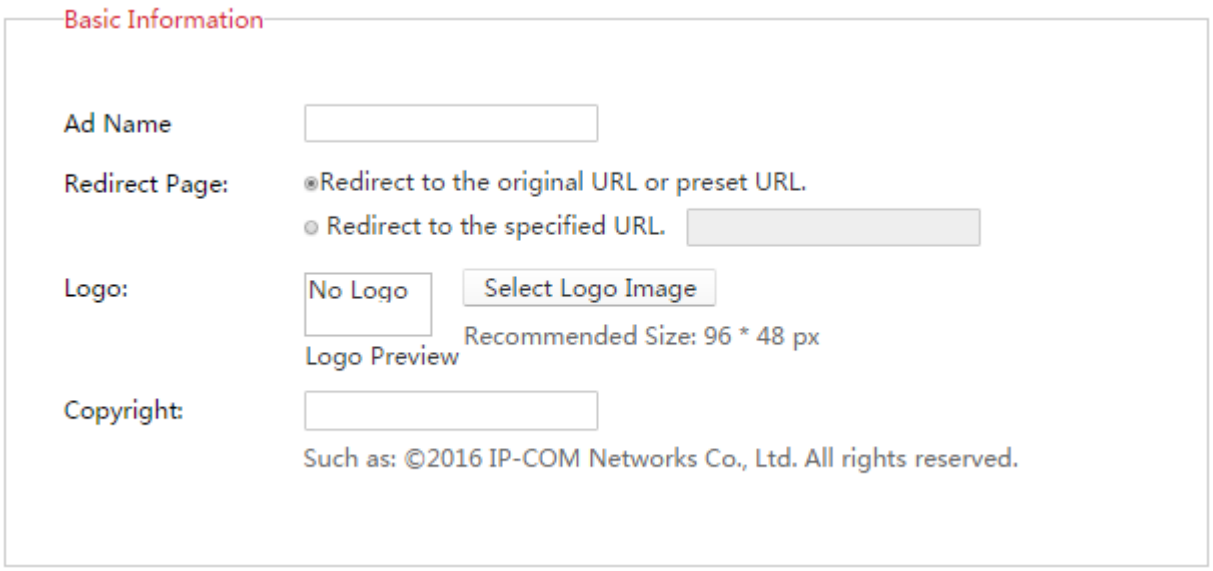
1. Select the advertisement template



Template 3 only applies to "No Password" authorization method.

Template 1 and template 2 apply to "Portal" and "Voucher" authorization methods.

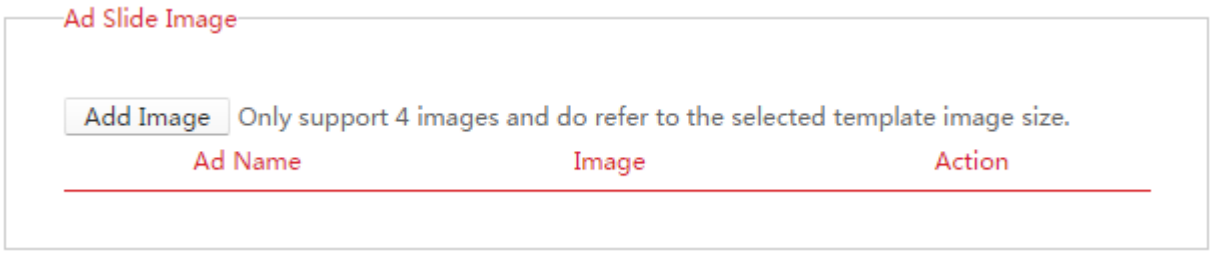
2. Set up the basic information of the advertisement



Parameter's Help Info:

Item	Description
Ad Name	Enter the name of the advertisement. The length of "Ad Name" can be up to 32 bytes.
Redirect Page:	Specify the redirect URL, which will appear automatically after the user has successfully authorized. The length of URL can be up to 128 bytes, supporting domain name or IP address.
Logo	Upload a business Logo image. The image size cannot exceed 128 KB, and 96 * 48 pixel is recommended.
Copyright	Enter the copyright information of the advertisement.

3. Add Slide Image Settings



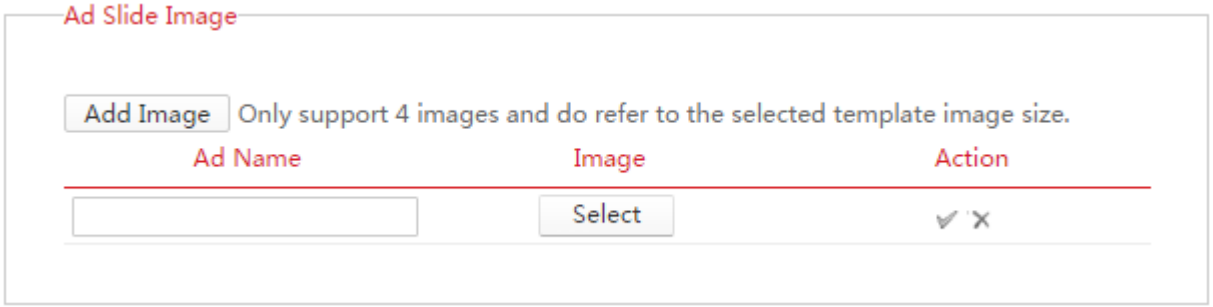
In this section, you can add, edit, or delete the advertisement slide image.

To add slide images:

1. Click Add Image .
2. Enter the name of the slide image in the **Ad Name** box.
3. Click Select to upload the slide image.

   (The ratio of the image is 16:9, and the image will adjust itself automatically.

   The image size cannot exceed 128 KB.)

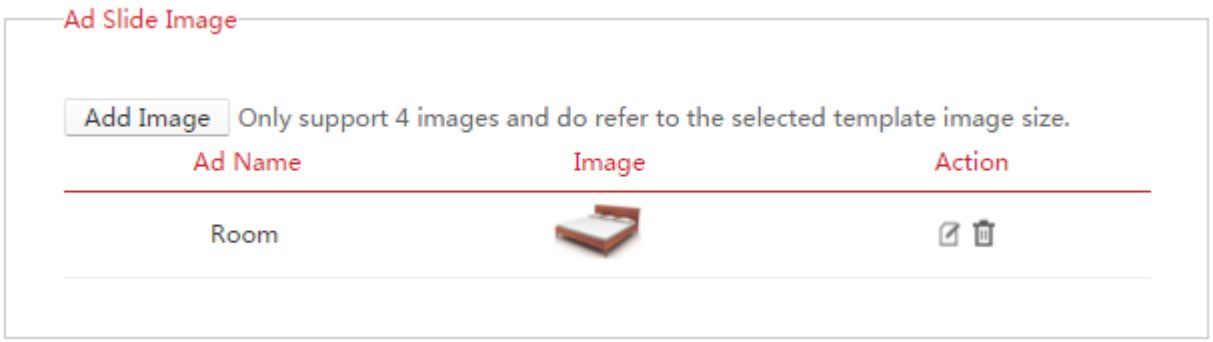


4. Click to save your settings in this section. (Click to clear the unsaved information.)

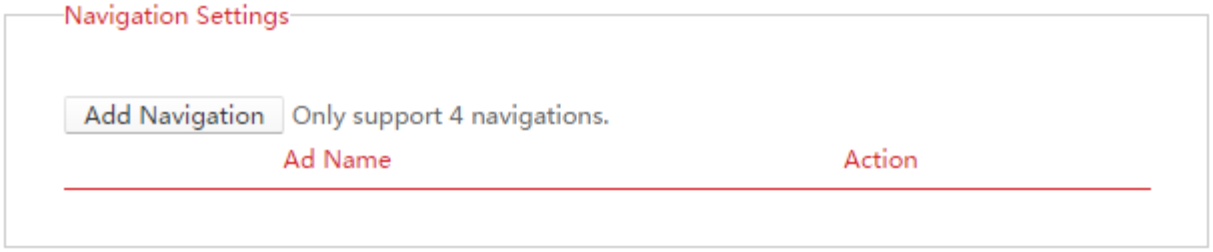
   A slide image has successfully created

5. Repeate 1~4 to create more slide images.

After you complete creating slide images, you can click to modify the added slide image, and click to delete it.



4. Add Navigations

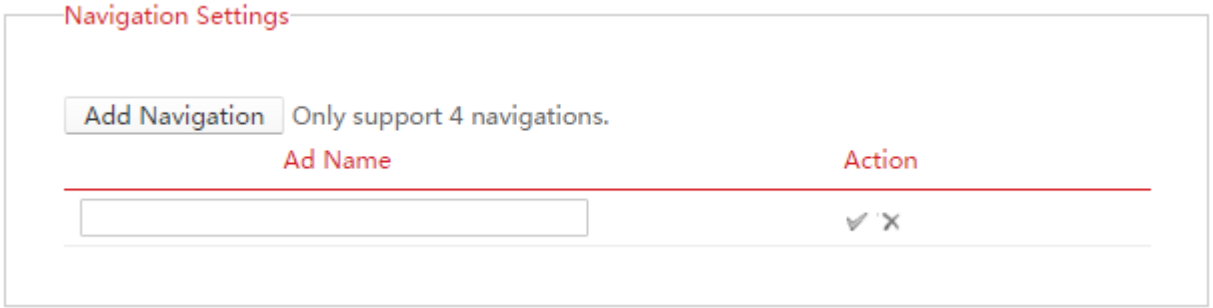


In this section, you can add, edit, or delete the navigation name.

To add Navigation:

1. Click Add Navigation.

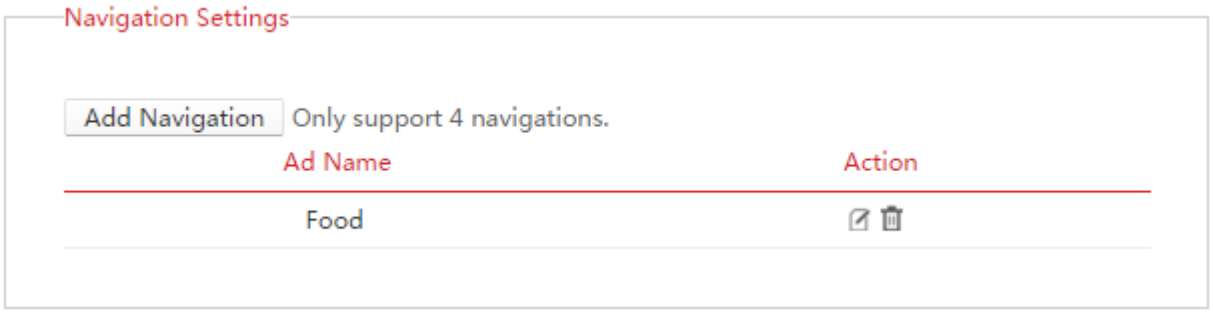
2. Enter the name of navigation in the **Ad Name** box. (The length is up to 12 bytes.)



3. Click to save your settings in this section. (Click to clear the unsaved information.)

4. Repeat 1~3 to add more navigations.

After you complete creating navigations, you can click to modify the added slide image, and click to delete it.

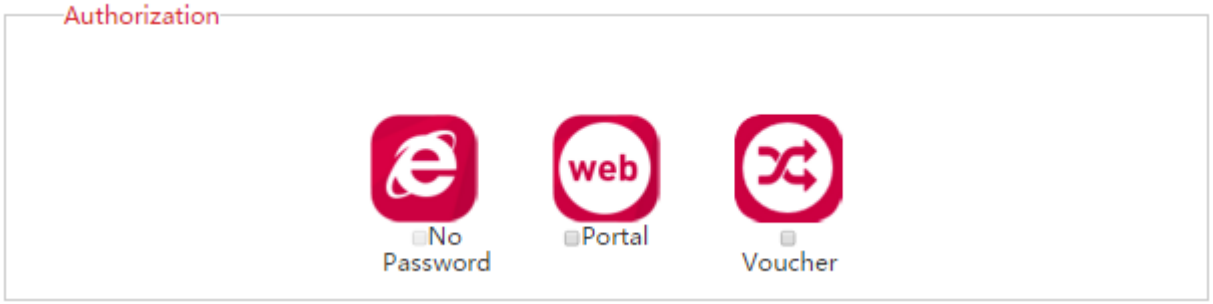


5. Check to select the authorization method

This access controller supports "No Password", "Portal" and "Voucher" authorization methods.

Template 3 only applies to "No Password" authorization method.

Template 1 and template 2 apply to "Portal" and "Voucher" authorization methods.



No Password

If you select “No Password” authorization, users don’t need to enter any authorization information when connecting to your WiFi. They just need to click the button Click to Access Internet after they view the advertisement.

Tip:

- "No Password" authorization method only applies to template 3.
- "No Password" and other authorization methods cannot be selected at the same time.

Portal

If you select “Portal” authorization, users need to enter username and password to surf the Internet after they connect to your WiFi and view the advertisement.

If using the "Portal" authorization, you need to create the "Portal" account and password on the access controller. For details, please refer to 4.4.4 Create Account.

Voucher

If you select “Portal” authorization, users need to enter a voucher to surf the Internet after they connect to your WiFi and view the advertisement.

For the configuration of "Voucher", please refer to 4.4.5 Voucher.

Save your settings

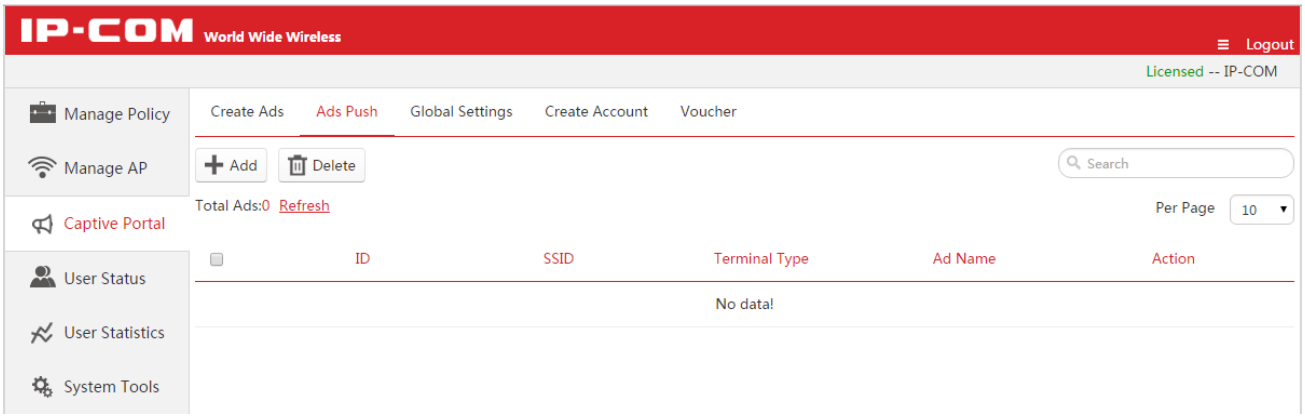
Click **OK** to apply your settings.

4.4.2 Ads Push

Tip

Configuration in this section also applies to 5.5.2 Ads Push in "Sub AC" mode.

After creating the advertisements, you need to deliver them to corresponding SSID and users. Click **Captive Portal →Ads Push** to get into the following page.

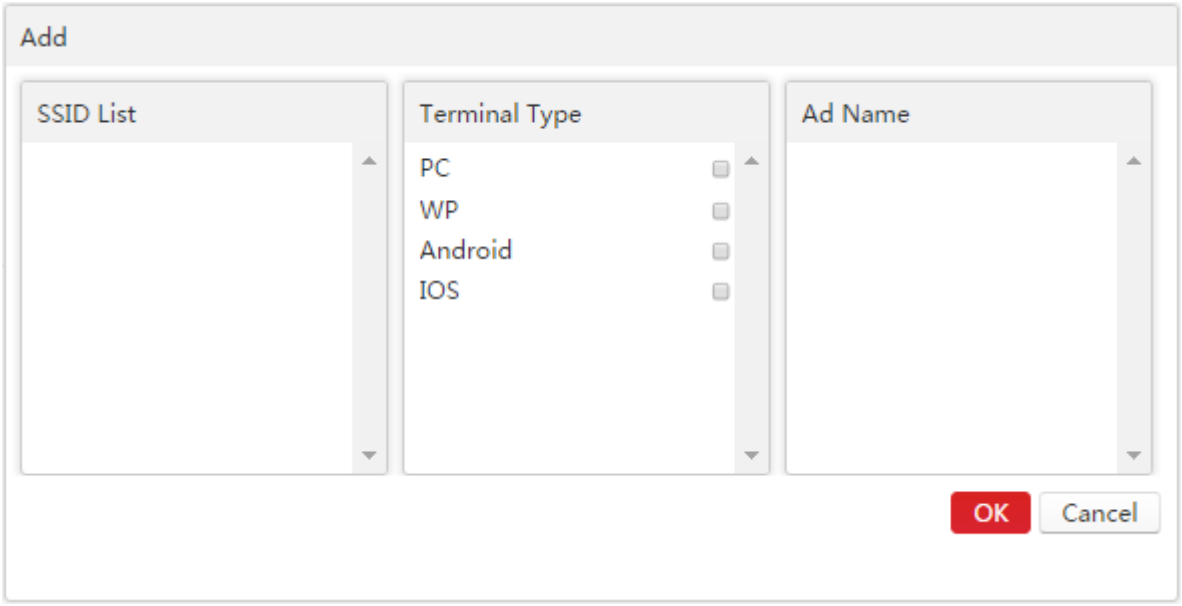


Button Description:

Add	Click the button to add a new advertisement delivery policy.
Delete	Click the button to delete the selected advertisement delivery policies.

To deliver an ad:

1. Click +Add to enter the advertisement delivery page.
2. Select appropriate SSID, Terminal Type and Ad Name.
3. Click OK to apply your settings.



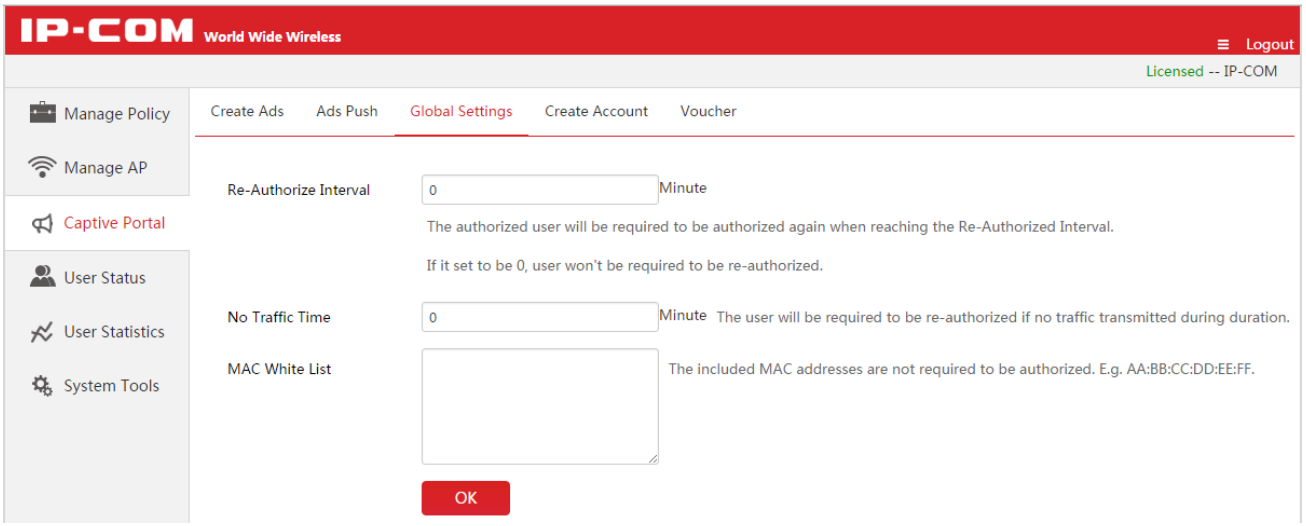
Parameter Description:

Item	Description
SSID List	Select the SSID you want to deliver the advertisement to.
Terminal Type	Select the terminal type to accept the advertisement. Among them, "PC" means the operating system of a computer. "WP" is short for Windows Phone, which means the mobile operating system from Microsoft. "Android" means the Android operating system. "IOS" means the mobile operating system from Apple.
Ad Name	Select the advertisement name you want to deliver.

4.4.3 Global Settings

To set up the global parameters for authorization, click **Captive Portal→Global Settings** to enter the following page.

Cloud AC Mode



Parameter Description:

Item	Description
Re-Authorize Interval	The user will be required to re-authorize when his authorized duration reaches this specified time. The range is 20 ~ 360 minutes, and "0" means no need to re-authorize.
No Traffic Time	During this specified time, if the user has not transmitted any Internet data, he will be required to re-authorize. The range is 5 ~ 3600 minutes, and "0" means no need to re-authorize.
MAC White List	Enter the MAC address of devices which are not required to authorize. Up to 20 MAC addresses are allowed, and each line supports one MAC address. E.g: AA:BB:CC:DD:EE:FF.

4.4.4 Create Account

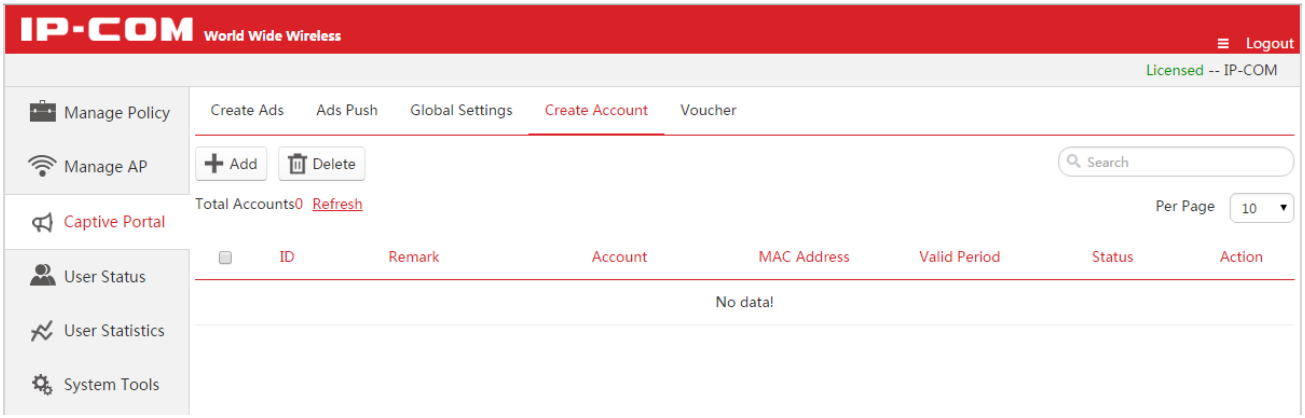
Tip

Configuration in this section also applies to 5.5.4 Create Account in "Sub AC" mode.

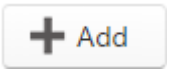
If you select “Portal” authorization in your ad, you need to come to this section to create Portal accounts.

Click **Captive Portal →Create Account** to get into the following page.

This access controller supports creating up to 150 "Portal" accounts.



Buttion Description:



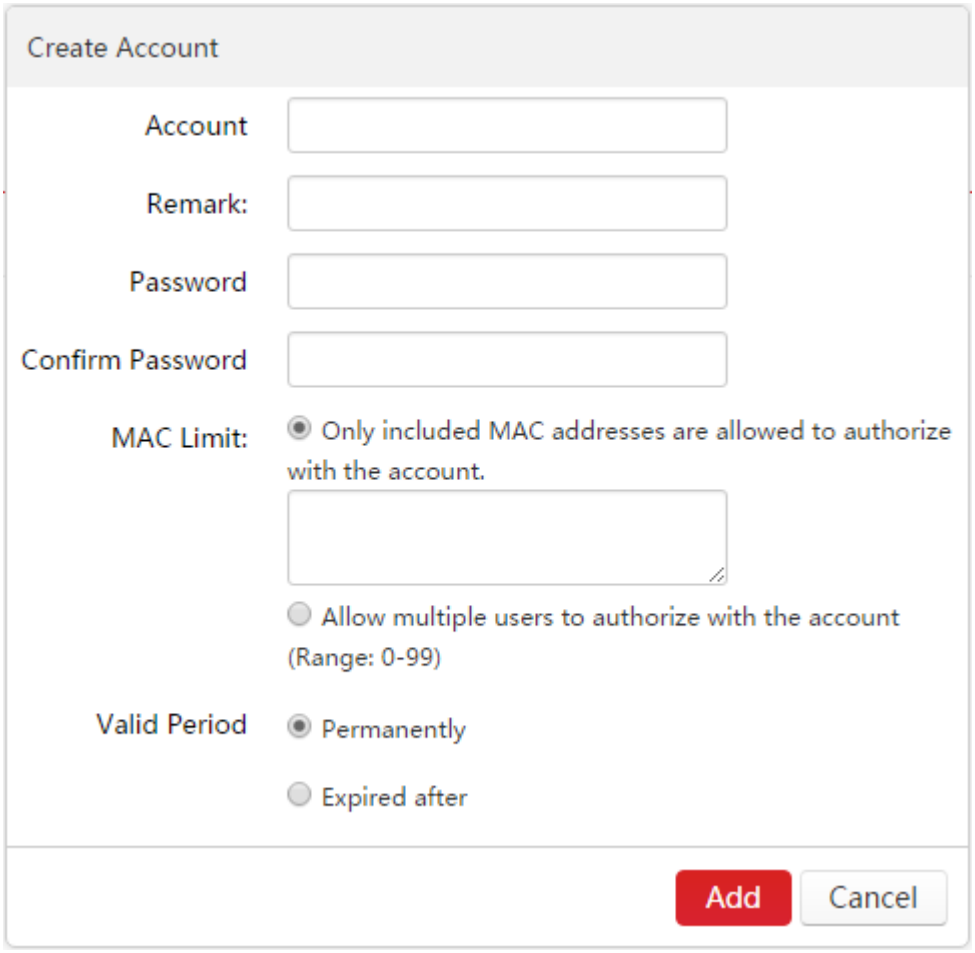
Click the button to create a new "Portal" account.

Click the button to delete the selected unused "Portal" accounts.

(Action) Click the button to modify only the unused "Portal" accounts.

To create a portal account:

1. Click + Add to enter the "Create Account" page.
2. Set the account information.
3. Click Add to apply your settings.



Parameter Description:

Item	Description
Account	Enter the account of the "Portal" authorization. The length of the account is 2 ~ 15 characters, supporting numbers, letters and underlines.
Remark	Enter the description of the account.
Password	Enter the password of the "Portal" authorization. The length of the password is 2 ~ 15 characters, supporting numbers, letters and underlines.
Confirm Password	Enter the password again.

MAC Limit	Specify the MAC address of devices to be allowed to authorize with the account. • Only included MAC addresses are allowed to authorize with the account: If you select this option, please enter the MAC addresses to be allowed to authorize with the account. Up to 20 MAC addresses are allowed, and each line supports one MAC address. E.g: AA:BB:CC:DD:EE:FF. • Allow multiple users to authorize with the account: If you select this option, please enter the number of users to be allowed to authorize with the account.
Valid Period	Specify the effective time of the account. • Permanently: The account never expires. • Expired after: Enter the effective time of the account. When reaching the specified time, the account will be deactivated automatically. The format of time is 2016-05-10 00:00.

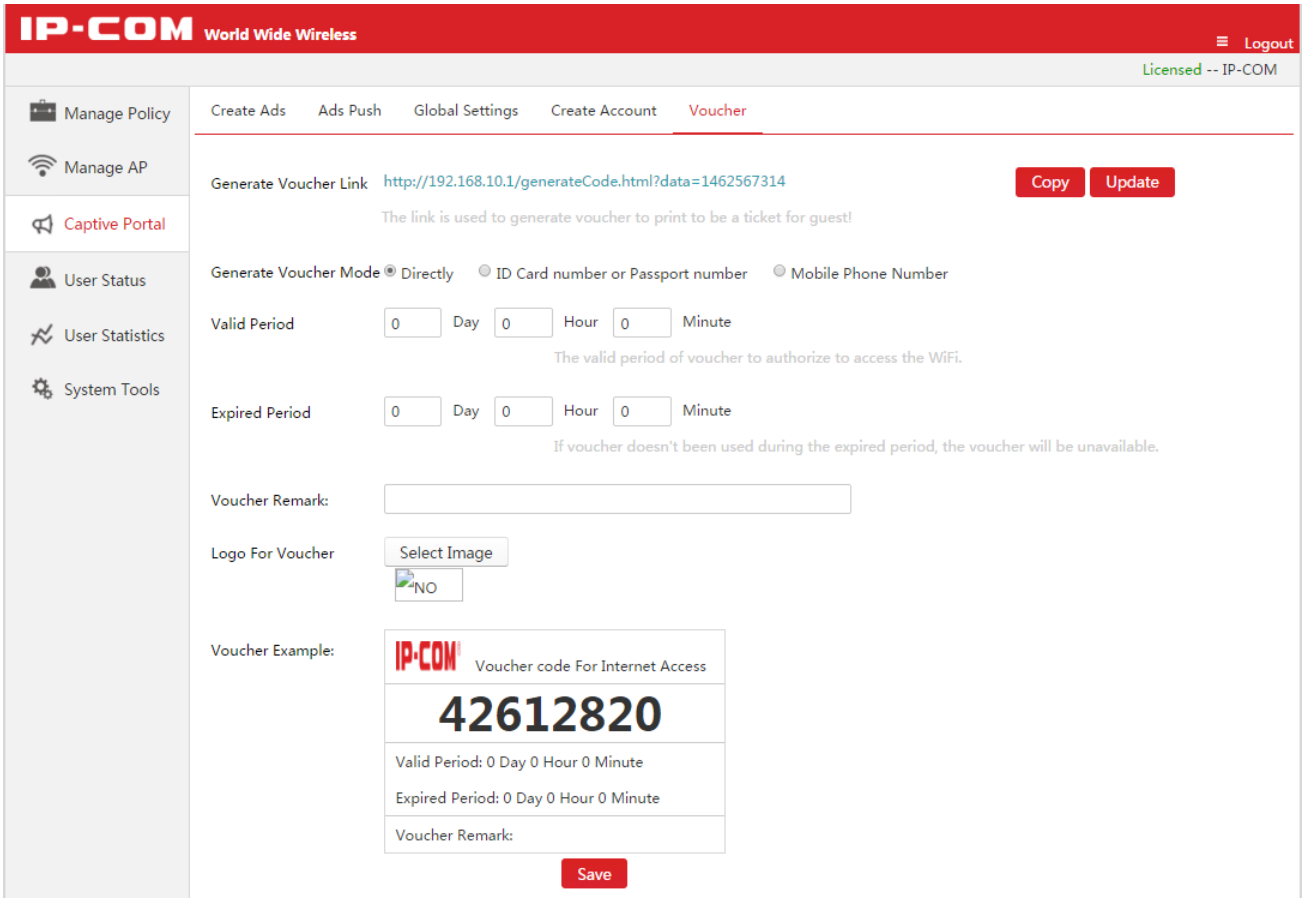
4.4.5 Voucher

Tip

Configuration in this section also applies to 5.5.5 Voucher in "Sub AC" mode.

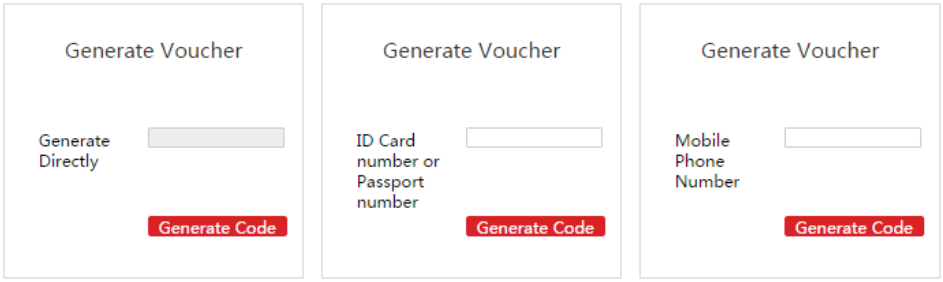
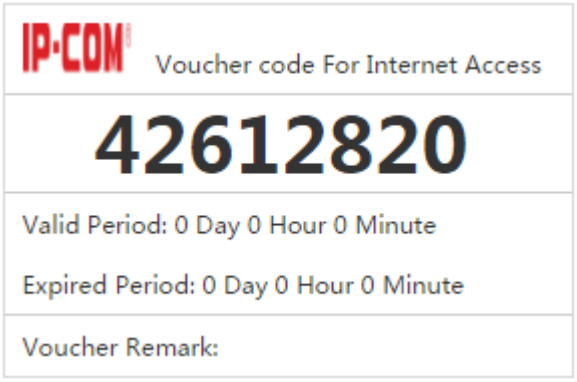
If you select “Voucher” authorization in your ad, you need to come to this section to configure the voucher information.

Each voucher is a unique password. Users with a voucher can surf the Internet while others cannot.



Parameter Description:

Item	Description
Generate Voucher Link	A seller can use the link to generate a unique voucher and print it to each customer to surf the Internet. Click the link to visit the voucher link page. Click "Copy" to copy the link for future use. The seller can visit the voucher link page with the the copied link. Click "Update" to generate a new voucher link and the previous link will be unavailable.

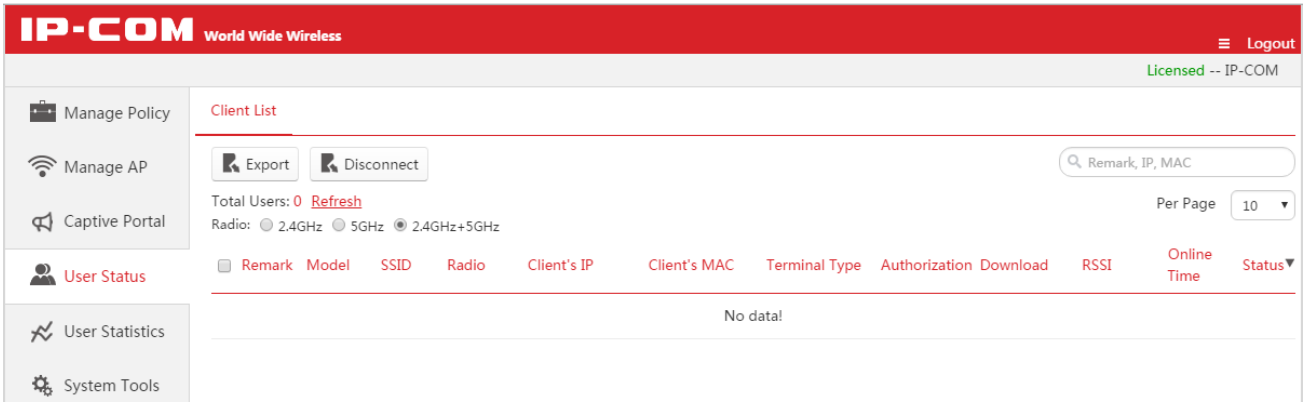
Generate Voucher Mode	• Directly: If you select this option, you can use the voucher link page to generate a voucher directly, without offering any information. • ID Card number or Passport number: If you select this option, an ID card or passport number is required to generate a voucher. • Mobile Phone Number: If you select this option, a mobile phone number is required to generate a voucher. 
Valid Period	Set up a valid period for each voucher. "0" means every voucher can be used without time limit.
Expired Period	During the expired period, if the voucher is not used it will be unavailable.
Voucher Remark	The remark of the voucher. It is optional.
Logo For Voucher	Upload a Logo image, which will be displayed on the voucher. It is recommended to upload the Logo of the seller.
Voucher Example	Display the voucher example. 

4.5 User Status

Tip

Configuration in this section also applies to 5.6 User Status in “Sub AC" mode.

To check the information of authorized users or export the information to a directory, click **User Status** to enter this page.



To export this page's information into an appropriate directory, click Export on the page and then follow on-screen instructions. The exported file is in the format *Filename.xls*.

If a warning message appears when you open the exported file, click Yes(Y).

Parameter Description:

Item	Description
Remark	Display AP remark. In order to manage different AP easily, it is recommended to set up the Remark name as AP's branch name or location.
Model	Display AP model.
SSID	Display the AP's SSID which the user connects to.
Radio	Display the AP's radio band which the user connects to.
Client's IP	Display the user device's IP address.
Client's MAC	Display the User device's MAC address.
Terminal Type	Display the User device's operating system type.
Authorization	Display the User's authorization method.
Download	Display the user's total download traffic.
RSSI	RSSI is short for Received Signal Strength Indication. If a wireless client's signal is lower than AP's specified value, the client can not connect to the AP, which helps the client to connect to an AP with stronger signal. The RSSI here displays the user's RSSI.
Online Time	Display the authorized online period of the user.
Status	Display whether the user is online or offline. Online: The user has successfully authorized to the AP currently. Offline: The user does not authorize to the AP currently.

4.6 User Statistics

Tip

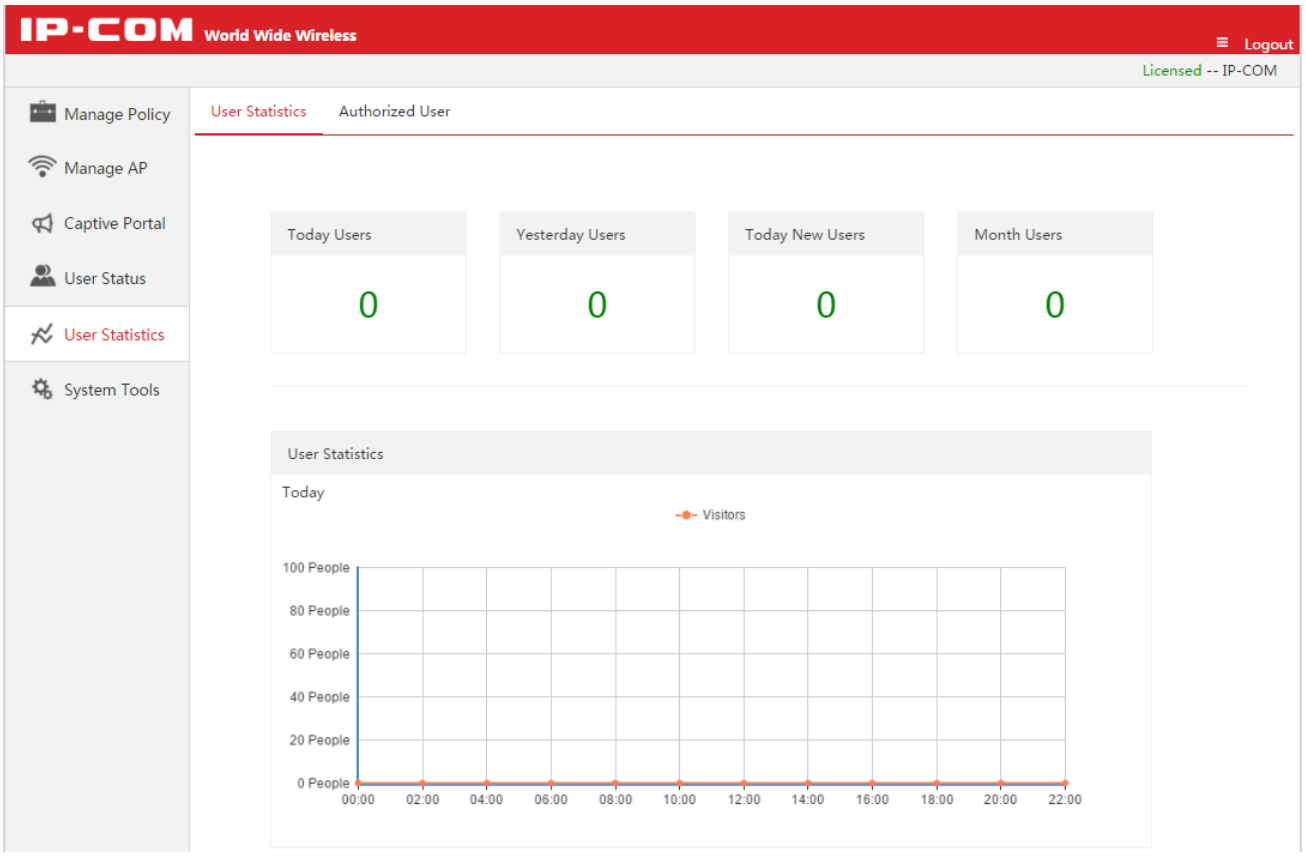
Configuration in this section also applies to 5.7 User Statistics in "Sub AC" mode.

4.6.1 User Statistics

Tip

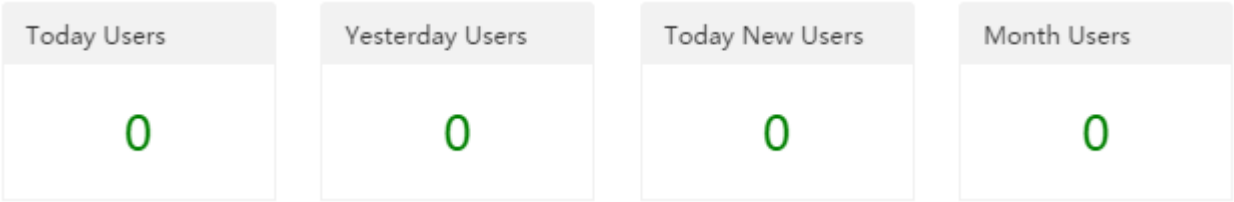
Configuration in this section also applies to 6.6.1 User Statisticsin "Root AC" mode.

To view the statistics result of authorized users, click **User Statistics** to enter the following page.



Online Users

This section displays the amount of authorized online users of today, yesterday and this month and the amount of new authorized users of today.



User Statistics

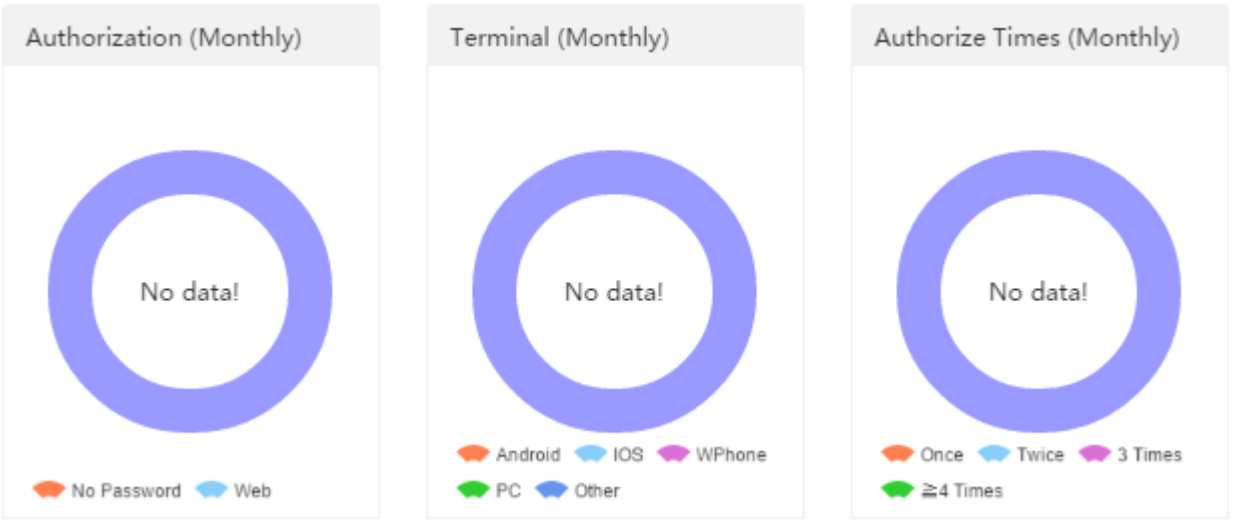
This section displays the amount of authorized users at each moment in the current day.

Authorization/Terminal/Authorize Times

Authorization: Display the ratio of different authorization method in the current month.

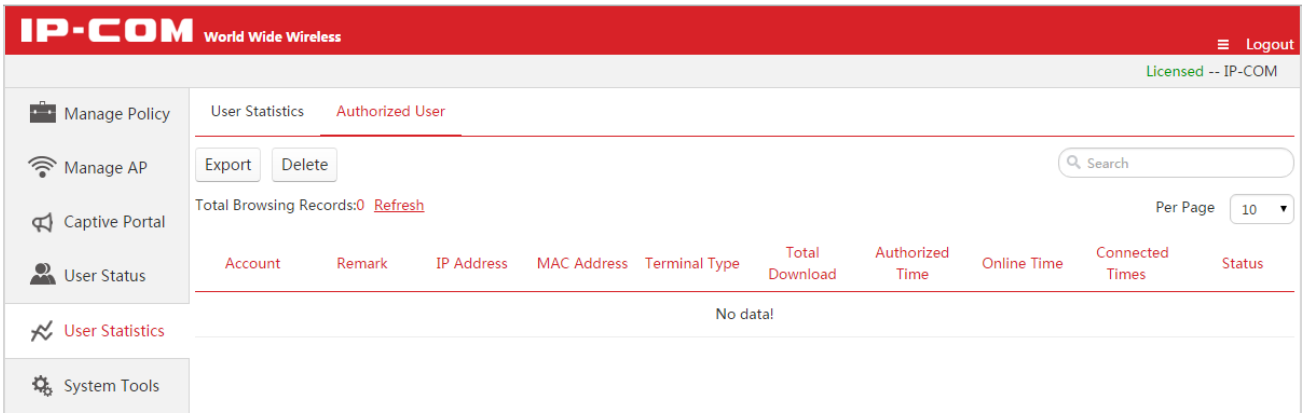
Terminal: Display the ratio of different authorized terminal or operating system in the current month.

Authorize Times: Display the ratio of different authorization time in the current month.



4.6.2 Authorized User

To view the the detail information of authorized users or export the information to a directory, click **User Statistics→Authorized User** to enter the following page.



Buttion Description:

Export	Export the detail information of authorized users in this month.
Delete	Delete all the user information which corresponds to offline APs.

Parameter Description:

Item	Description
Account	Display the authorization account and its authorization method of the user.
Remark	Display the description of AP which the user has connected to.
IP Address	Display the IP address that the user has obtained.
MAC Address	Display the MAC address of the user.
Terminal Type	Display the terminal type or operating system of the user.
Total Download	Display the total download traffic of the user.
Authorized Time	Display the authorized time of the user for the first time.
Online Time	Display the total amount of Internet time of the user.
Connected Times	Display the amount of times the user has connected to the AP.
Status	Display the instant Internet connection status of the user.

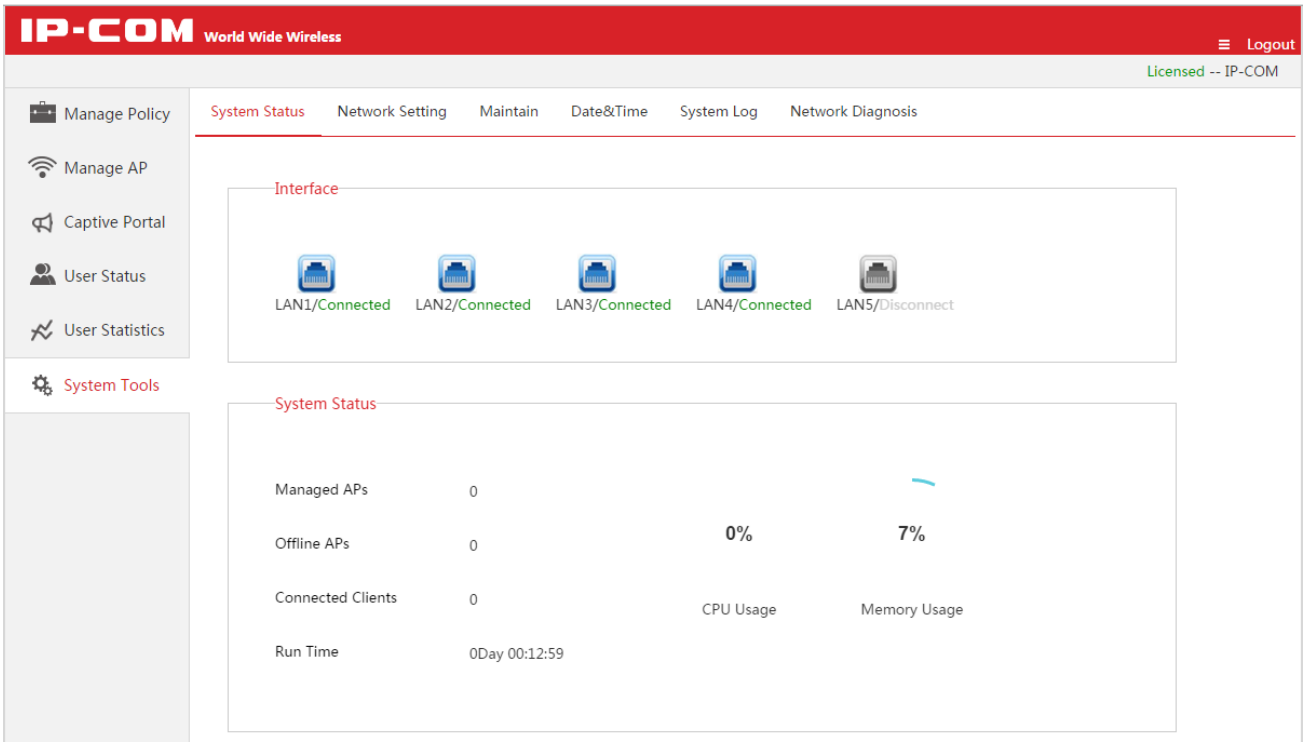
4.7 System tools

4.7.1 System Status

Tip

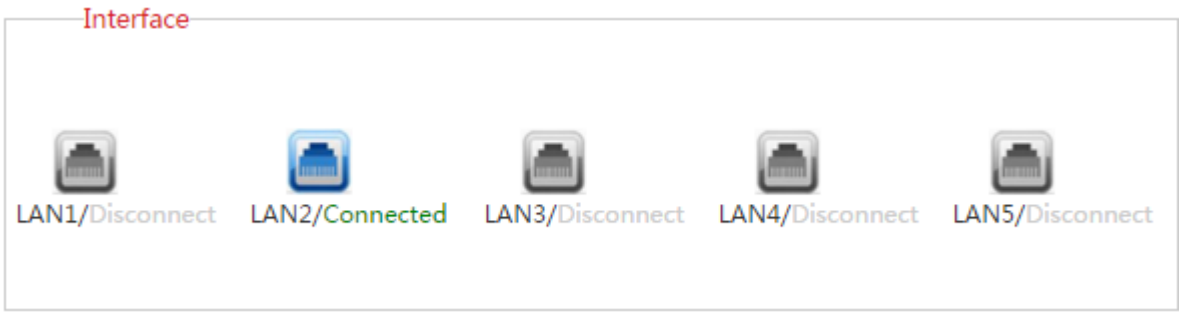
Configuration in this section also applies to 5.8.1 System Status in "Sub AC" mode.

To check the access controller's Interface status, system status and the Network Information, go to **System Tools → System Status.**

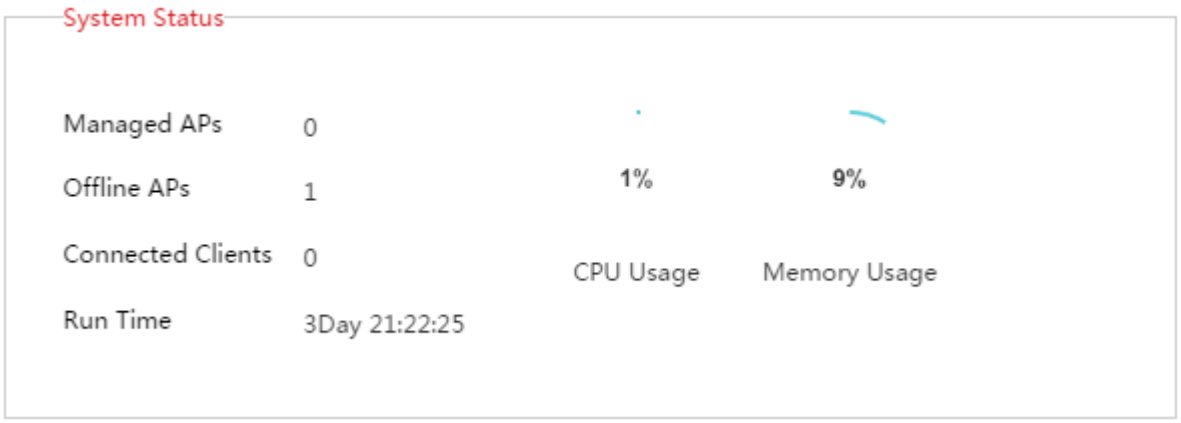


Interface Status

This section displays the connection status of each physical interface of the access controller.



System Status

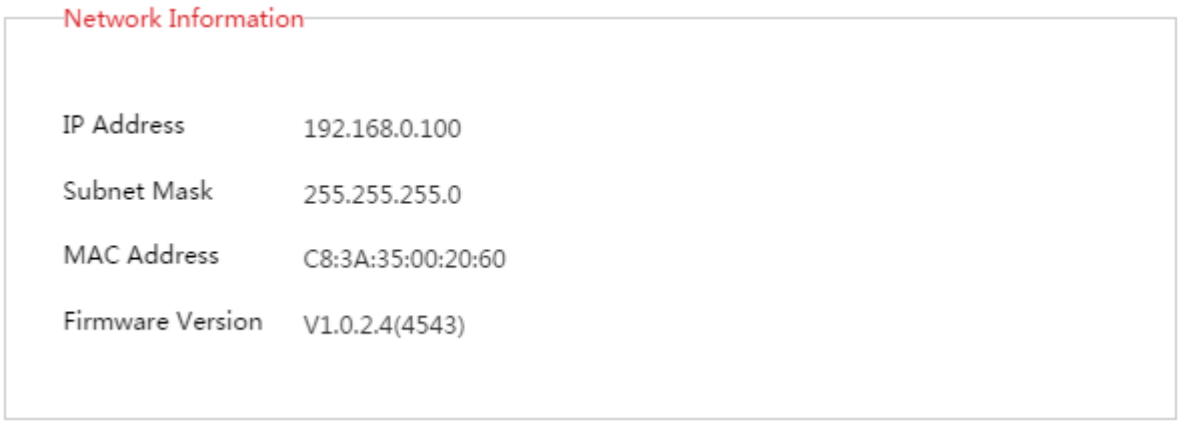


This section displays the the status of following parameters.

Item	Description
Managed APs	Display the amount of online APs which can be managed by the AC currently.
Offline APs	Display the amount of offline APs which can not be managed by the AC currently.
Connected clients	Display the amount of online users that connect to online APs.
Run Time	Display the duration of time that the access controller has been running from last reboot. Run time will be re-counted when the access controller reboots.
CPU Usage	Display the percentage of used CPU space of the AC.
Memory Usage	Display the percentage of used memory space of the AC.

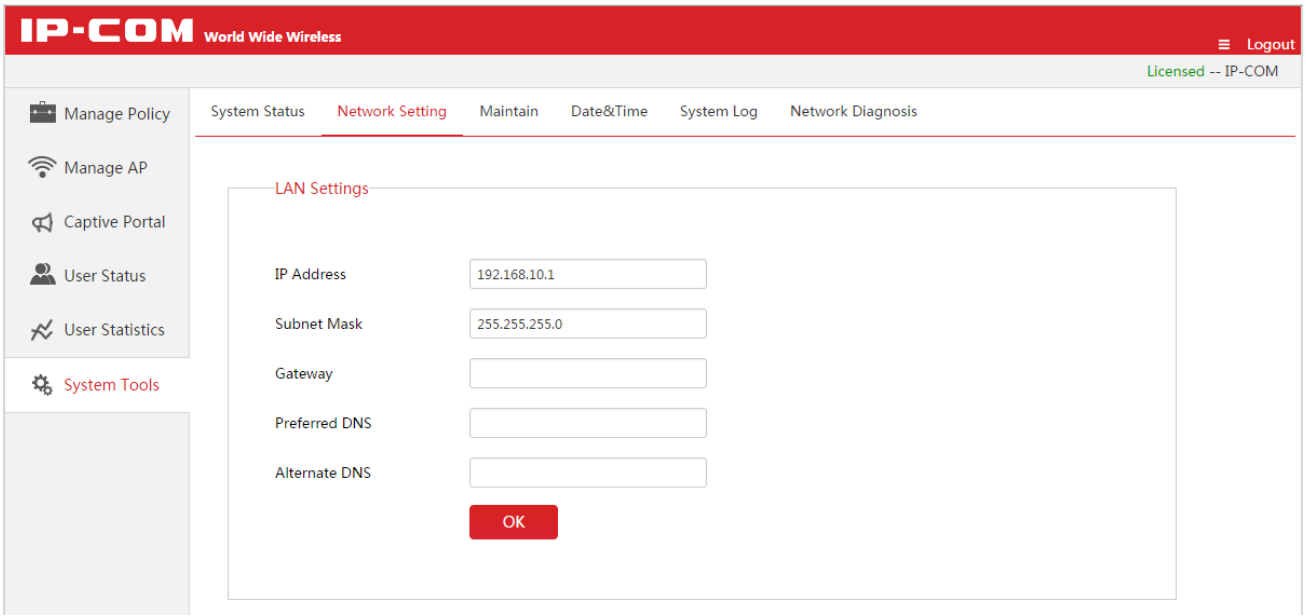
Network Information

This section displays the access controller's LAN IP address/subnet mask, MAC address, and the Firmware Version.



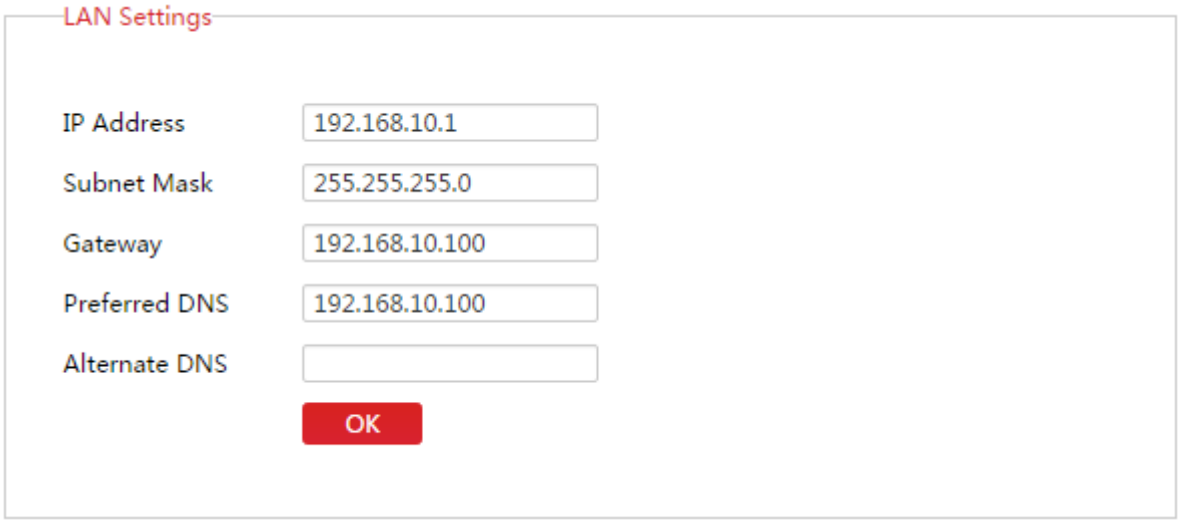
4.7.2 Network Settings

To set up IP information to connect to Internet, and set up the VLAN information, click **System Tools → Network Setting** to enter the following page.



LAN Settings

To make your AC connect to Internet, you need enter the correct IP address, subnet mask, gateway and Preferred/Alternate DNS in this section.



Parameter Description:

Item	Description
IP Address	Set up the AC's IP Address. In order to connect to Internet, in general, this IP address and the uplink router's LAN IP address should be on the same IP segment.
Subnet Mask	Set up the AC's subnet mask. The default value is 255.255.255.0.
Gateway	Set up the AC's default gateway. In order to connect to Internet, in general, it is set to the uplink router's LAN IP address.
Preferred DNS	Set up the AC's DNS server address. It is generally set to the uplink router's LAN IP address.
Alternate DNS	Optional: When the Preferrd DNS address goes wrong, the Alternate DNS address will take the place of Preferred DNS address.

VLAN Settings

Tip

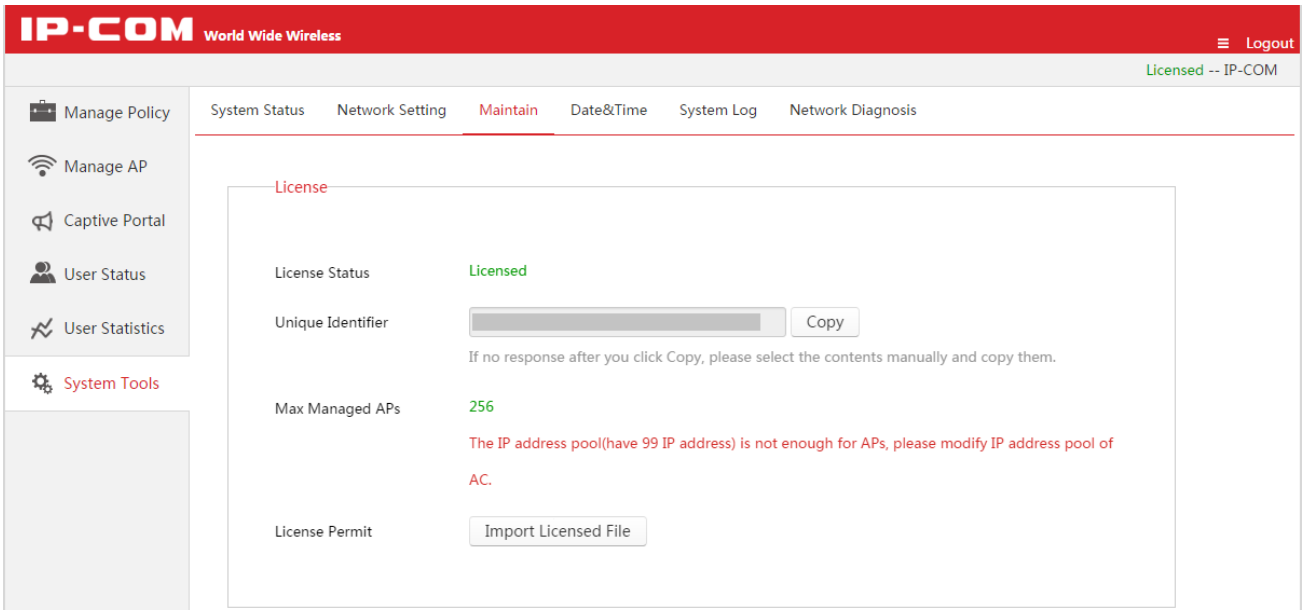
- It is not recommended to configure **VLAN Settings** in the "Cloud AC" mode.
- If you need to configure VLAN settings in "Cloud AC" mode, please refer to VLAN Settings in "Sub AC" mode.

4.7.3 Maintain

Tip

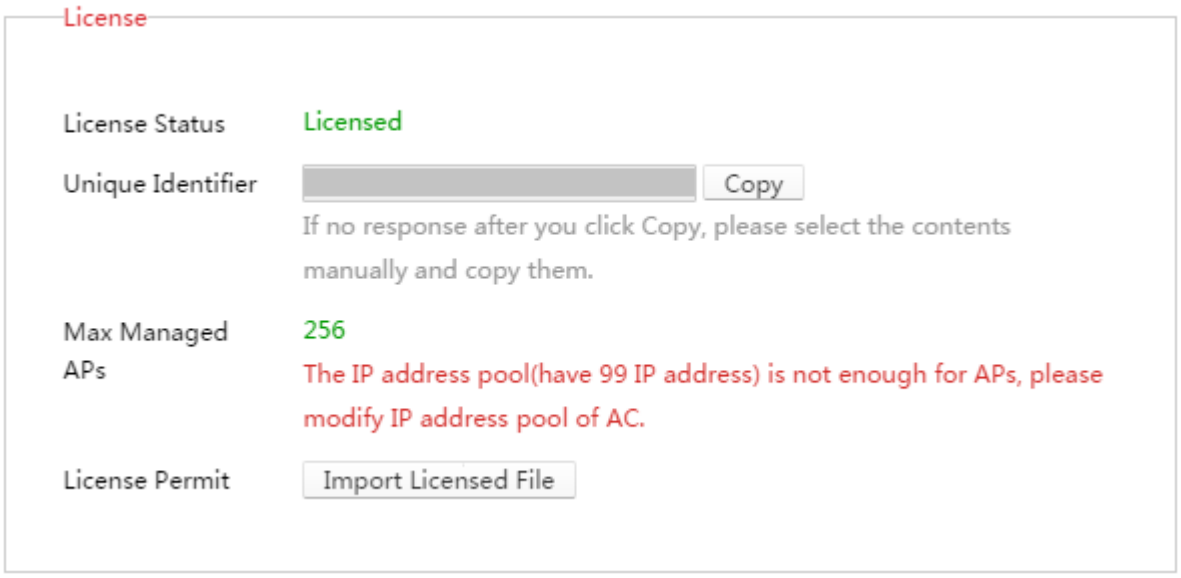
Configuration in this section also applies to 5.8.4 Maintain in"Sub AC" mode.

To configure License, System Mode, User Management, and Maintenance, click **System Tools → Maintain** to enter this page.



License

By default, the AC can manage up to 256 APs. If you want the access controller to manage more APs (management of up to 512 APs), please contact IP-COM technical support engineer to obtain a corresponding license file.



To update your license:

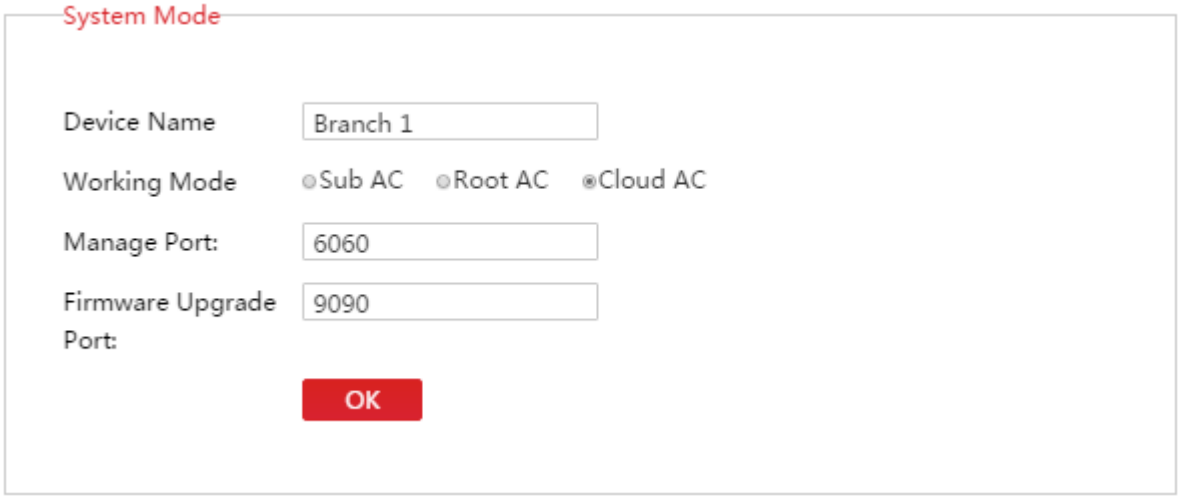
1. Contact IP-COM technical support engineer to obtain a license file.
2. Log in to the AC's Web UI, go to **System Tools → Maintain → License**, click Import Licensed File.
3. In the pop-up dialog box, locate and select the license file and click Open(O).
4. In the pop-up dialog box, click OK .
   You license completes updating.

System mode

Tip

Configuration in this section also applies to 6.4 System mode in "Root AC" mode.

The access controller supports three working modes: Sub AC, Root AC and cloud AC, among which you can choose easily according to the networking environment.



Parameter Description:

Item	Description
Device Name	In order to locate the AC easily, it is recommended to set up the Device Name as AC's location.
Working Mode	Select the working mode of the access controller. For details, please refer to 5.1 Sub AC Mode Introduction, 6.1 Root AC Mode Introduction and 4.1 Cloud AC Mode Introduction.
Root AC Address	In "Sub AC" mode, your are required to enter the public IP address or binded domain name of the gateway which connects the Root AC.

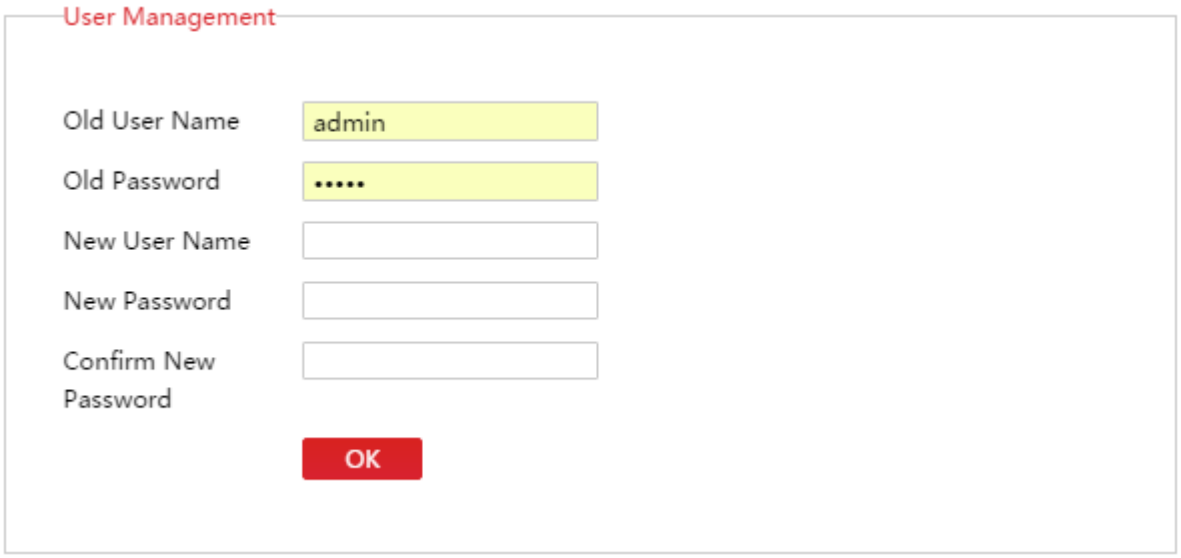
Manage Port	When Root AC needs to manage Sub ACs, the “Manage Port” of Sub ACs and Root AC must be the same. When Cloud AC needs to manage Cloud APs, the “Manage Port” Cloud APs and Cloud AC must be the same.
Firmware Upgrade Port	When Root AC needs to upgrade a firmware for Sub ACs, the “Firmware Upgrade Port” of Sub ACs and Root AC must be the same. When Cloud AC needs to upgrade a firmware for Cloud APs, the “Firmware Upgrade Port” of Cloud APs and Cloud AC must be the same.

User Management

Tip

Configuration in this section also applies to 6.7.3 User management in"Root AC" mode.

Here, you can modify the login user name and password to prevent rogue users from entering the Web UI to change settings. Both user name and password’s length range is 3~32 characters, supportting letters (case-sensitive), numbers and underscores.



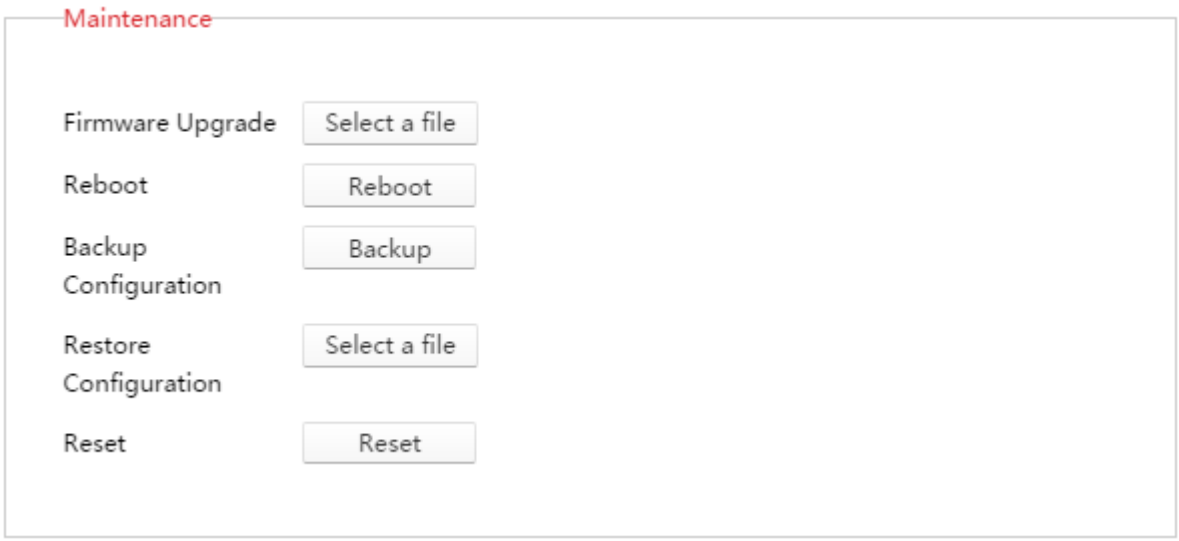
After changing user name and password successfully, the Web UI will automatically be logged out. Please enter the new user name and password to login again.

Maintenance

Tip

Configuration in this section also applies to 6.7.2 Device maintenance in"Root AC" mode.

Here, you can upgrade, reboot, backup/restore and reset your access controller.



Firmware Upgrade

When the access controller works abnormally in some circumstances, please visit http://www.IP-com.com.cn to search for released software to solve this problem.

Note

When an AC firmware is upgrading, please DO NOT power off the AC or it may cause damage to the AC! If a sudden power off occurs, please upgrade again. If you cannot log in to AC's Web UI after a sudden power off, please contact our technical support engineer.

To upgrade a firmware for AC:

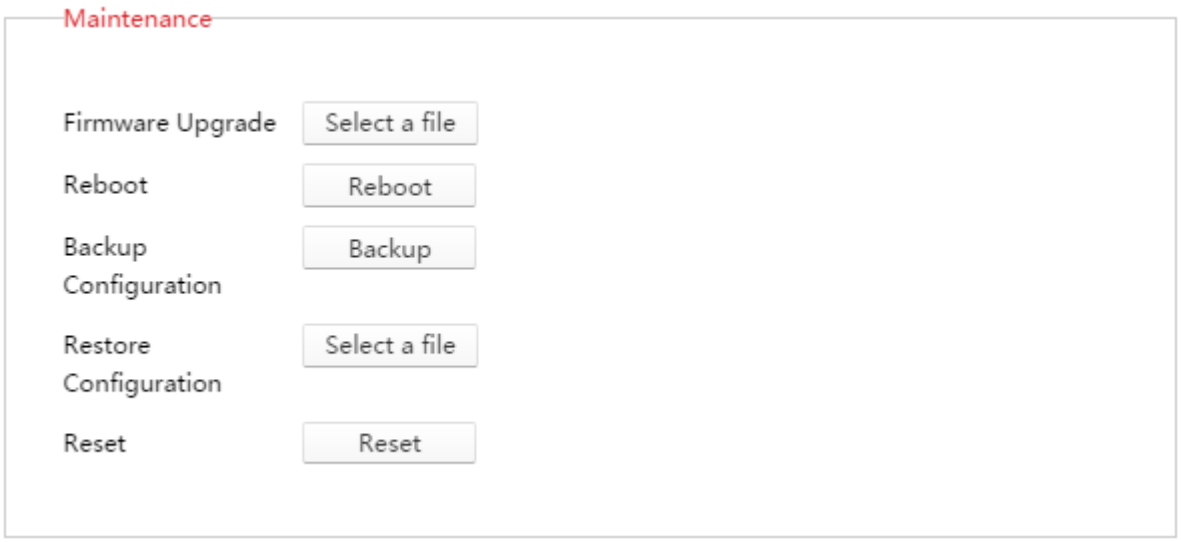
1. Go to http://www.ip-com.com.cn to download the AC's firmware to an appropriate directory.
2. Log in to the AC's Web UI and go to **System Tools → Maintain → Maintenance → Firmware Upgrade**.
3. Click Select a file to select and upload the AC's firmware from the appropriate directory.
4. In the pop-up dialog box, click OK to upgrade the firmware.
5. Waite until the progress bar runs to 100%.

You can go to **System Tools → System Status → Network Information → Firmware Version** to check whether the upgrade is successful.

Reboot

To make some settings take effect or to enhance the ACs performance, please reboot the AC.

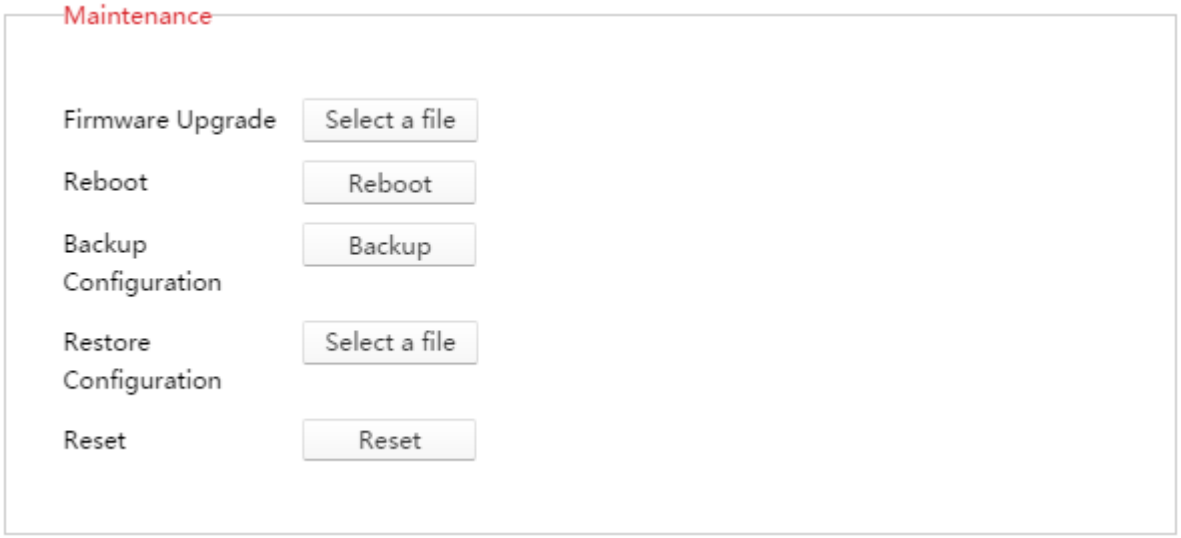
Click Reboot to reboot the AC.



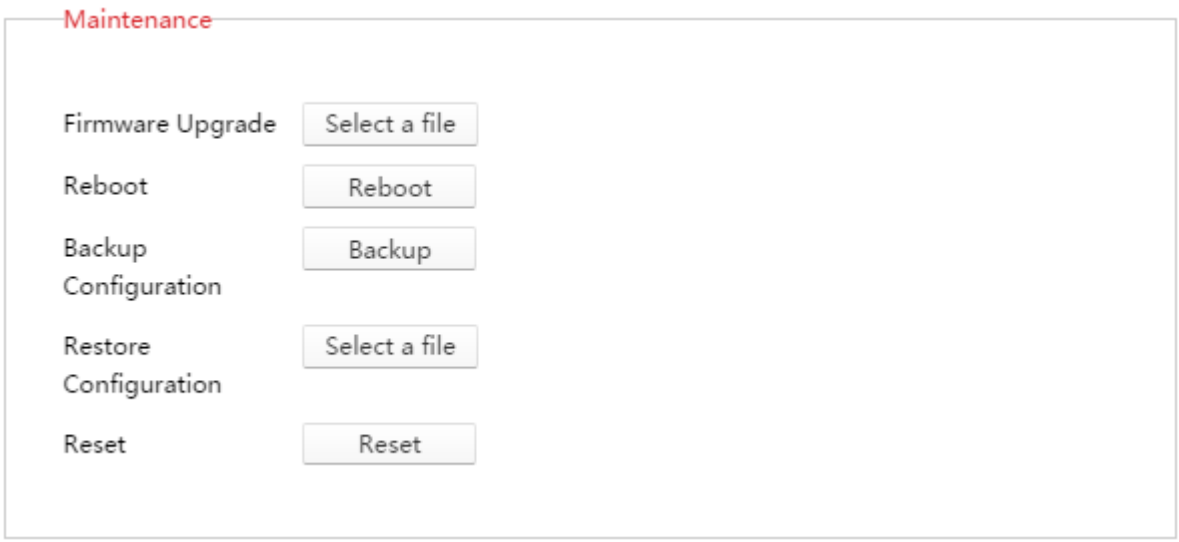
Backup Configuration

It is recommended to backup the configuration after you make a lot of configurations.

Click Backup and follow the on-screen instruction to complete the backup process.



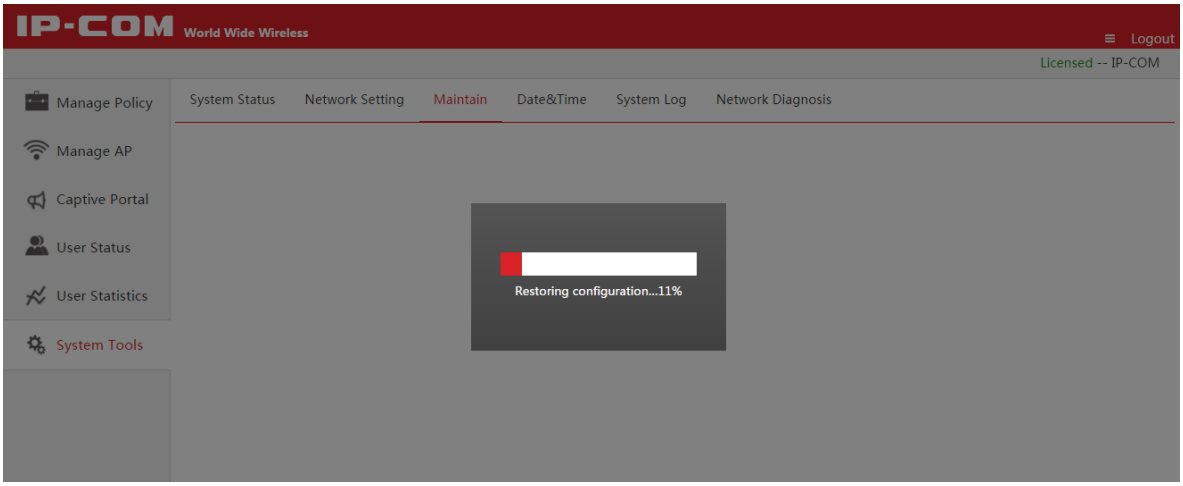
Restore Configuration



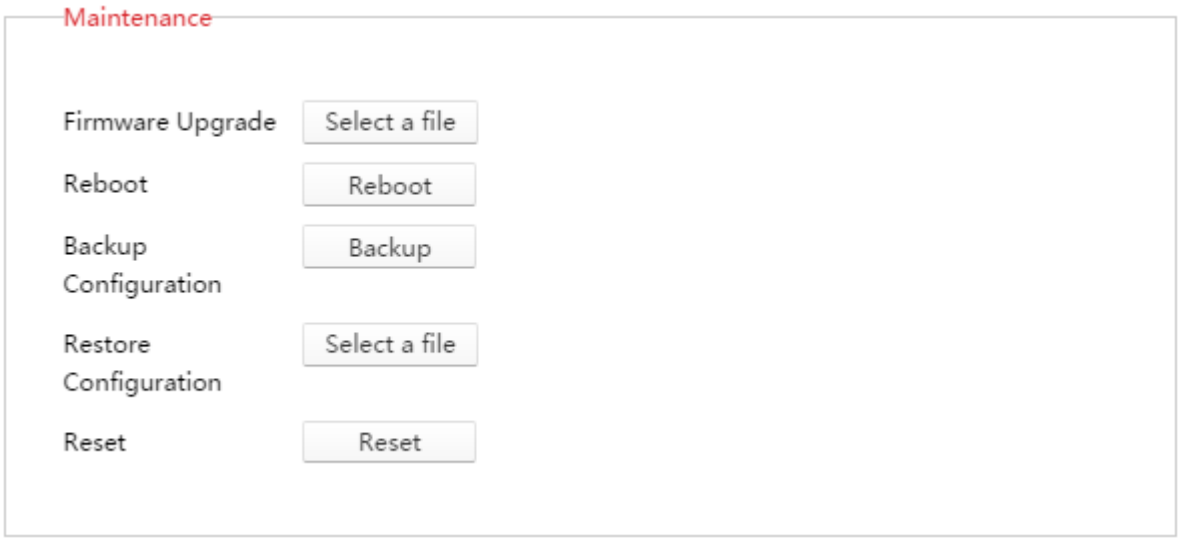
If you need configure multiple ACs to the same configuration, or if your AC's performance goes down because of improper configuration, you can restore your AC to a previous working configuration.

To restore configurations:

1. Click Select a file.
2. In the pop-up dialog box, select the saved backup configuration file and click Open(O).
3. In the pop-up dialog box, click OK to restore the configuration.
4. Wait until the progress bar finishes.



Reset



If you want to clear all configurations of the AC, please click Reset in the above picture and follow the on-screen instructions to restore the AC to factory default.

Besides, if you forget the AC's login username or password, you can restore the AC to factory default by pressing **RESET** button in the front panel of the device, doing as follows:

1. When the AC is powered on, use a needle to press the **RESET** button for 7 seconds.
2. Wait for about 2 minutes, the AC will complete its resetting process.

Tip

After restoring to factory default, the AC works in "Sub AC" mode. Login IP address is "192.168.10.1". Both login user name and password are"admin". For other default settings, please refer to B Default parameter setting.

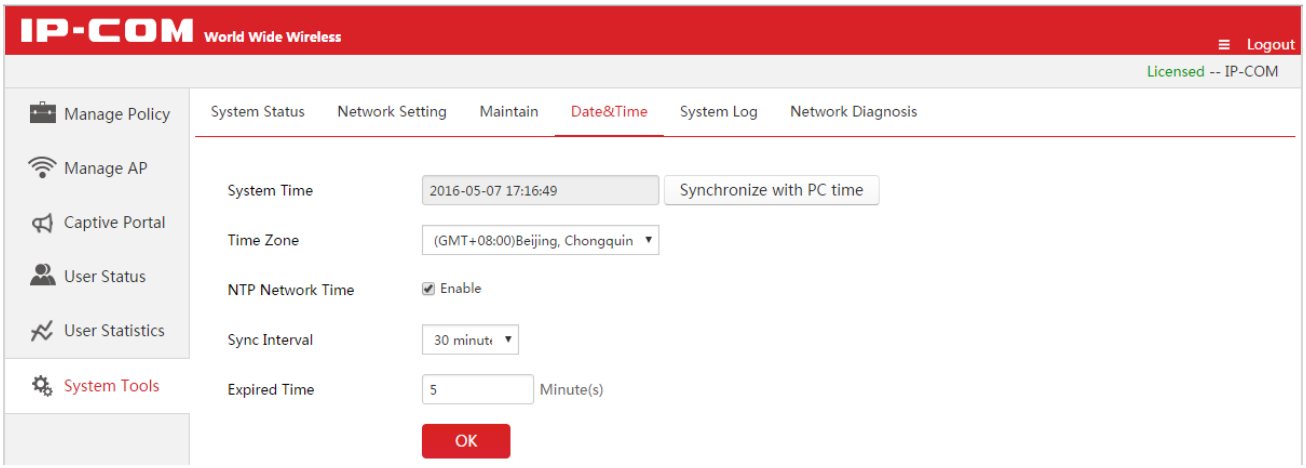
4.7.4 Date&Time

Tip

Configuration in this section also applies to 5.8.5 Date&Time in "Sub AC" mode.

Configuration in this section also applies to 6.7.4 Date&Time in"Root AC" mode.

To set your access controller's system time and Web Expired time, go to **System tools → Date&Time**.



Tip

Time will be lost if the AC is powered off. But if you enable “NTP Network Time”, the AC will synchronize time with Internet after reboot. And then time-related functions will perform correctly.

Parameter Description:

Item	Description
System time	Display the AC's current time.
Synchronize with PC time	When clicked Synchronize with PC time, the AC will synchronize time with your computer. And you must ensure that your PC’s time is correct.
Time Zone	Select GMT time zone where the AC is deployed.
NTP network time	When enabled, the AC’s time will synchronize with Internet time server periodically at a specific time interval.
Sync Interval	Select how often the AC will synchronize with Internet time server. Default option is 30 minutes.
Expired Time	If the user has no operation in the Web UI within the expired time, the system will automatically be logged out itself. Range: 5~60 minutes. Default value: 5 minutes.

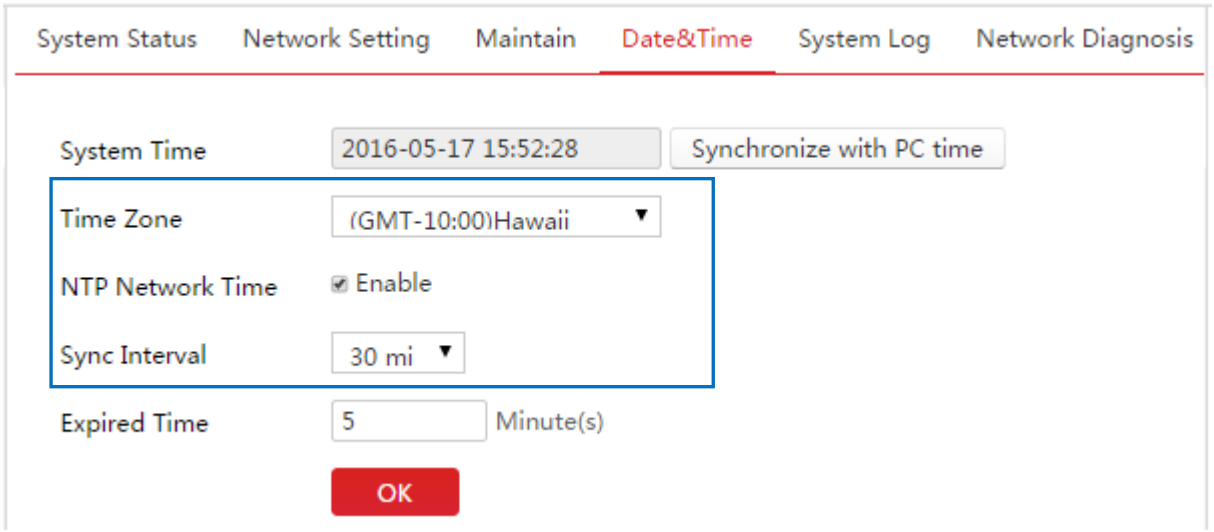
NTP Network Time

When enabled **NTP Network Time** function, the access controller will synchronize with Internet time server periodically at a specific time interval.

NTP Network Time requires a successful Internet connection. (To connect to Internet, please refer to LAN Settings)

To configure NTP Network Time:

1. Choose standard GMT **Time Zone** where your AC is deployed, e.g. "(GMT-10:00) Hawaii ".
2. Check to enable the **NTP Network Time** function.
3. Select a **Synchronization Interval**. It is recommended to keep for "30 minutes".
4. Click OK.

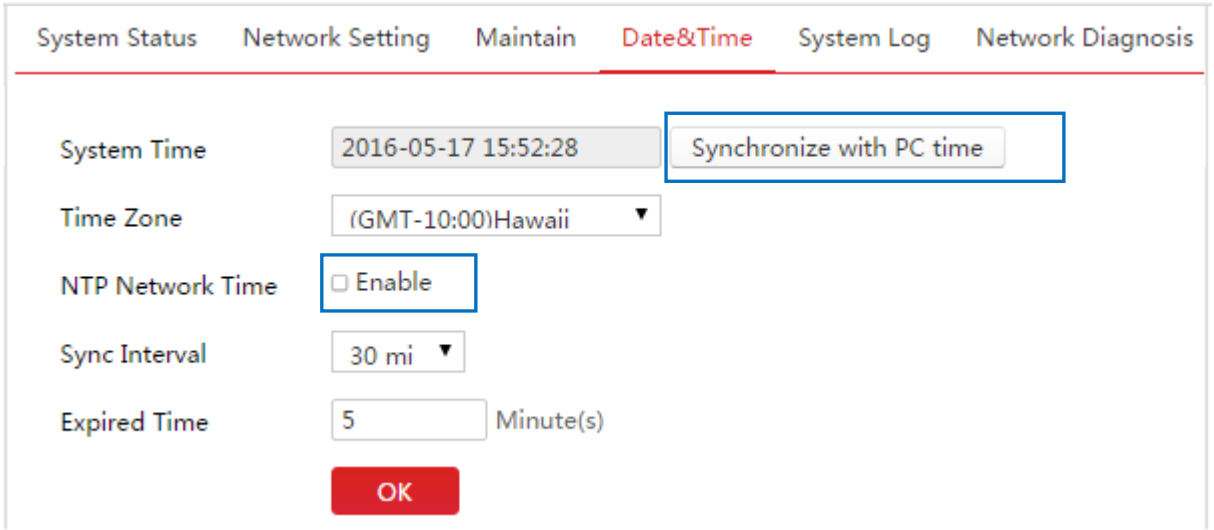


Synchronize with PC time

When clicked Synchronize with PC time, the AC will synchronize time with your computer. And you must ensure that your PC's time is correct.

To synchronize with PC time:

1. Click Synchronize with PC time.
2. Do not check **NTP Network Time** to disable NTP Network Time function.
3. Click OK.



4.7.5 System log

Tip

Configuration in this section also applies to 5.8.6 System log in “Sub AC" mode.

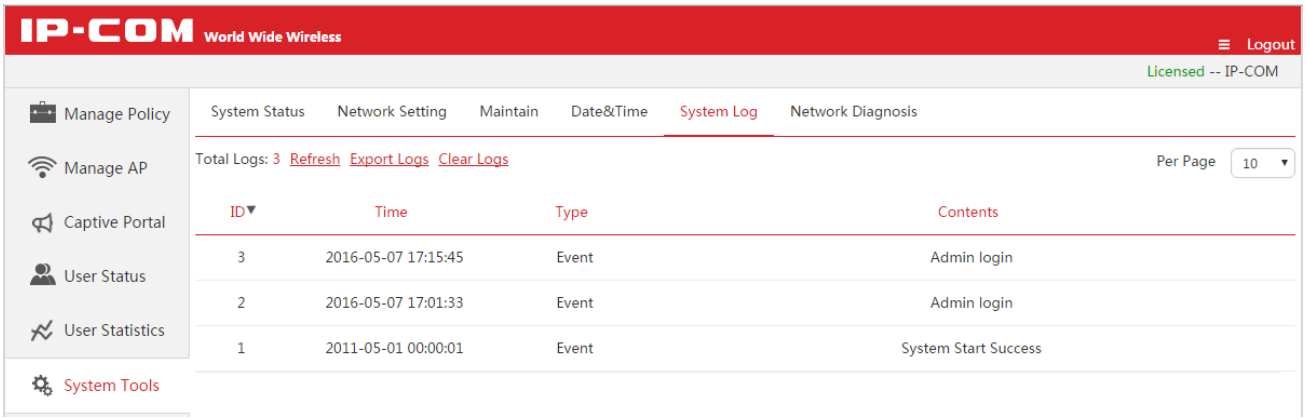
Configuration in this section also applies to 6.7.5 System Log in"Root AC" mode.

The AC’s log system makes records of AP connections and alert information. You can sort logs by clicking the downward or upword triangle in each field shown in the list, depending on whether you want to descendly or ascendly view logs. The latest log will be displayed first. The system can keep up to 3000 pieces of logs. Oldest logs will be deleted to leave space for newest ones.

Click **System Tools → System Log** to get into this page.

Tip

In order to better monitor your network status and problem, please make sure the access controller's time is correct. To configure the correct time for the AC, refer to 4.7.4 Date&Time.



To check the latest log information, please click Refresh.

To save your logs to a appropriate directory, please click Export logs.

To delete all logs, please click Clear logs.

Note

- All the system logs will be lost if you reboot your AC.
- The configurations including powering on AC, resetting AC to factory default or upgrading a firmware for AC, will make the AC reboot.

4.7.6 Network Diagnosis

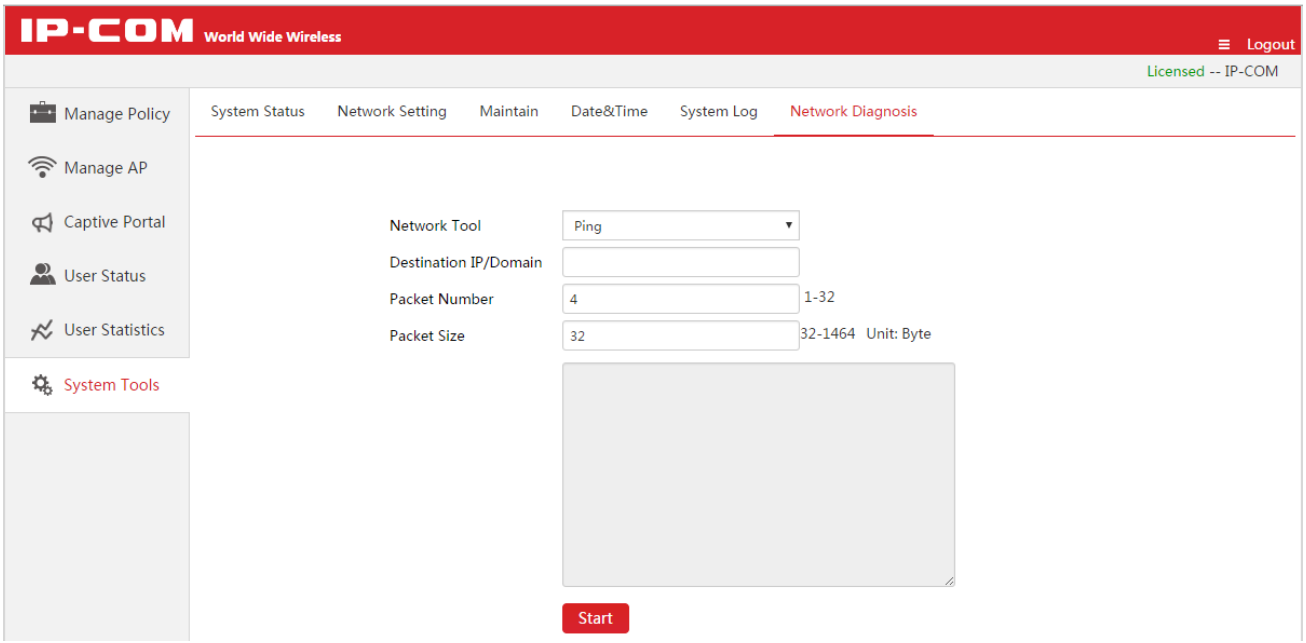
Tip

Configuration in this section also applies to 5.8.7 Network Diagnosis in "Sub AC" mode.

Configuration in this section also applies to 6.7.6 Network Diagnosis in "Root AC" mode.

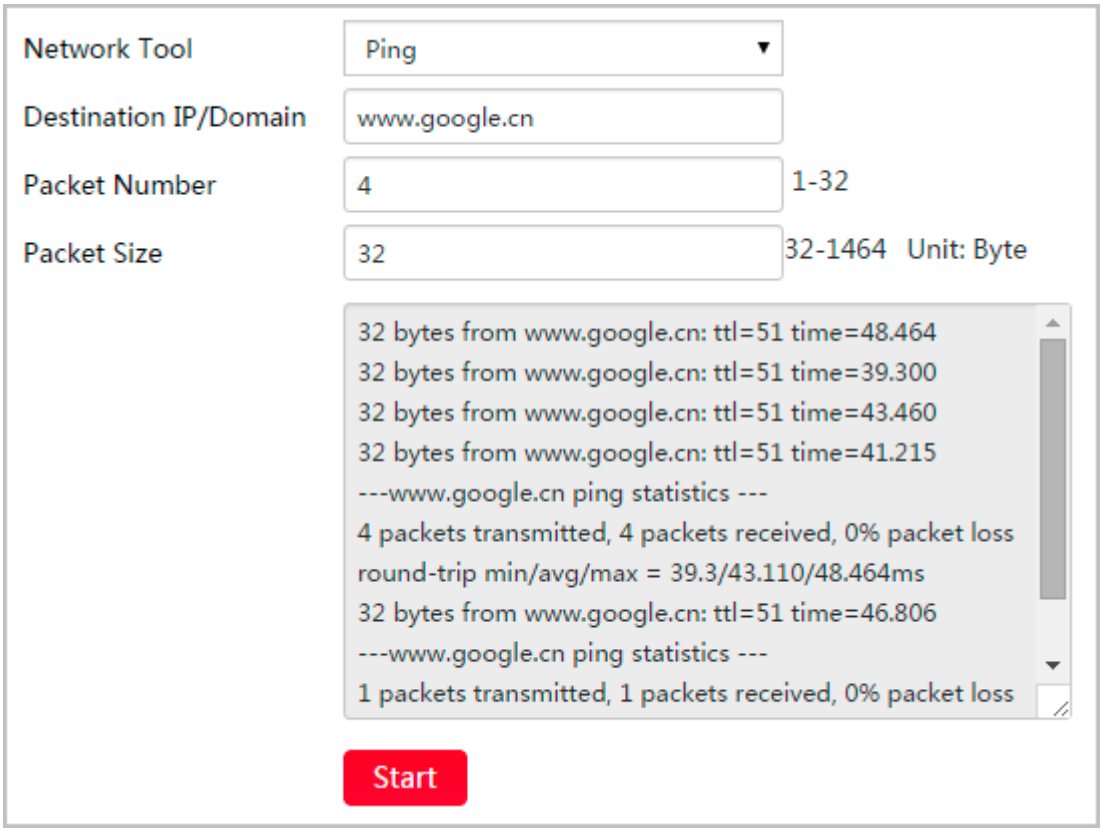
To detect network connection status of the AC, click **System Tools → Network Diagnosis** to enter this page.

This access controller provides Ping and Traceroute diagnosis tools.



Ping

Ping is a commonly used diagnosis and troubleshooting command. It consists of ICMP request and response packets. If the network works normally, the target device will return response packets.

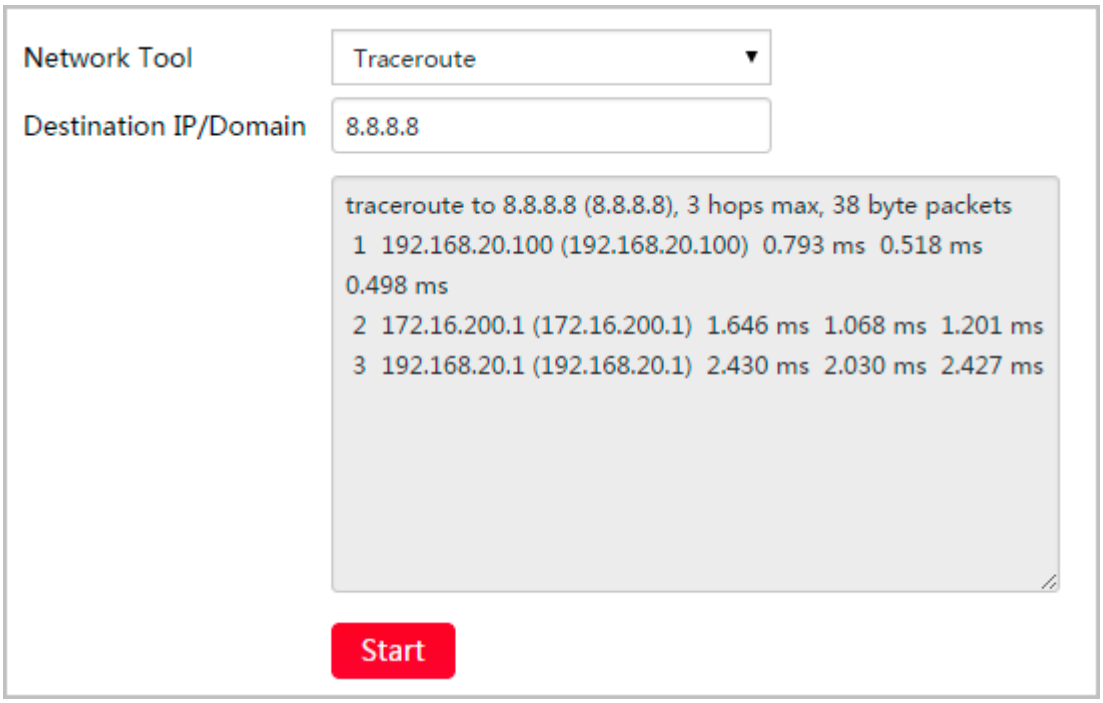


Parameter Description:

Item	Description
Destination IP/Domain	Set the target IP address or domain name, e.g. www.google.cn.
Packet Number	Set the number of request packets.
Packet Size	Set the size of request packets.

Traceroute

Traceroute is a computer network diagnostic tool for displaying the route (path) and measuring transit delays of packets across an Internet Protocol (IP) network.



5 Sub AC Mode

5.1 Sub AC Mode Introduction

When the wireless network is relatively centralized and on a large scale, you can deploy one access controller to work in “Sub AC” mode for centralized management of APs on the network.

The following is a specific application example.

Network Requirements

A hotel needs to achieve wireless coverage. Requirements are as follows:

- Customers in each room can surf the Internet with the provided WiFi network, and can view the advertisement of favourable prices or other information from the hotel.
- The administrator can have centralized management of all APs in the hotel.

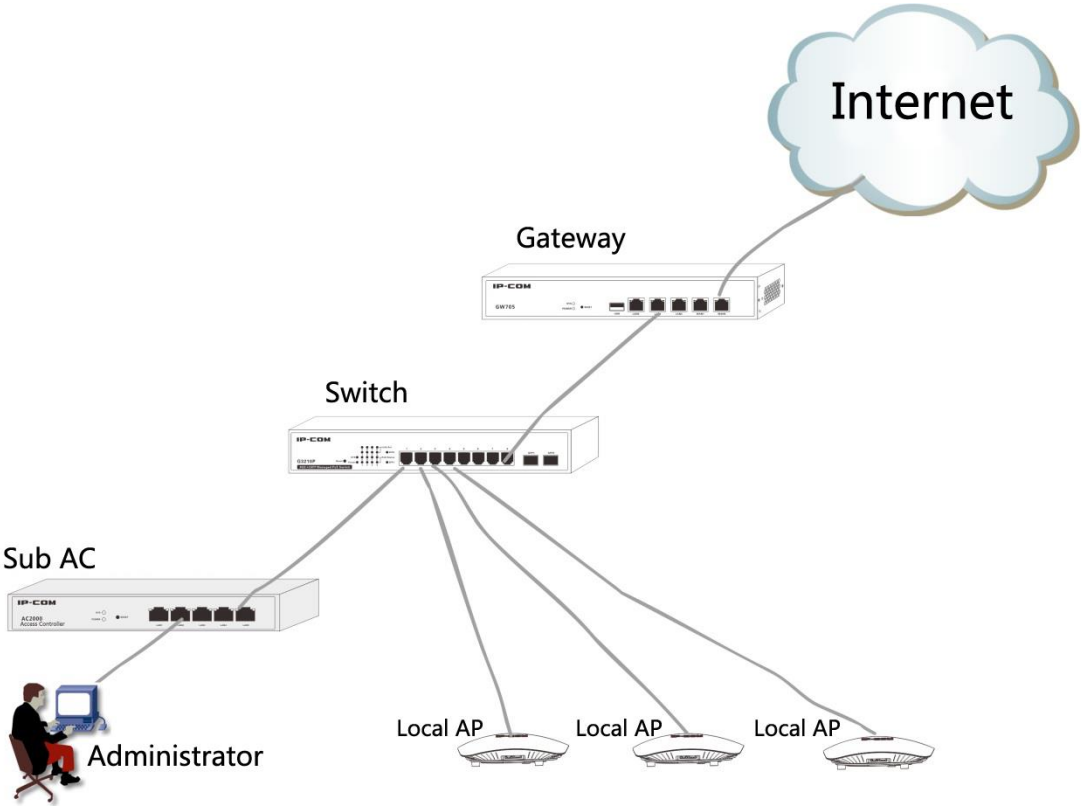
Scheme Design

To create an exclusive wireless network for the hetel, you can use IP-COM access controller + AP to work together

Details are as follows:

- Deploy an access controller AC2000, working in the "Sub AC" mode, to have centralized management of all APs in the hotel.
- Deploy one or more APs working in the "Local" deployment mode.
- On the access controller, create advertisements and deliver them to APs in the hotel. Thus customers can view the advertisements from the hotel before surf the Internet with the provided WiFi network.

Network Topology



AP Configuration

As the AP works in "Local" deployment mode by default, there is no need to configure the AP, just plug and play.

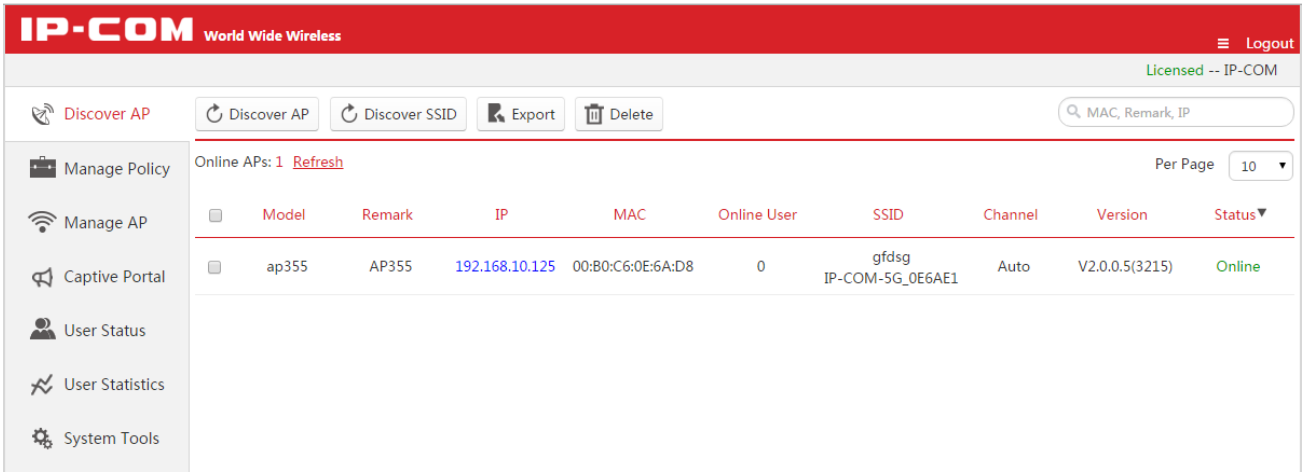
Access Controller Configuration

As the access controller works in "Sub AC" mode by default, there is no need to change the working mode of the access controller. But you need to create and deliver advertisements to APs in the hotel. For details, please refer to 4.4 Captive Portal.

5.2 Discover AP

To discover AP or SSID on your network, or check the correspongding information, please follow this part.

Click **Discover AP** to enter the following page.



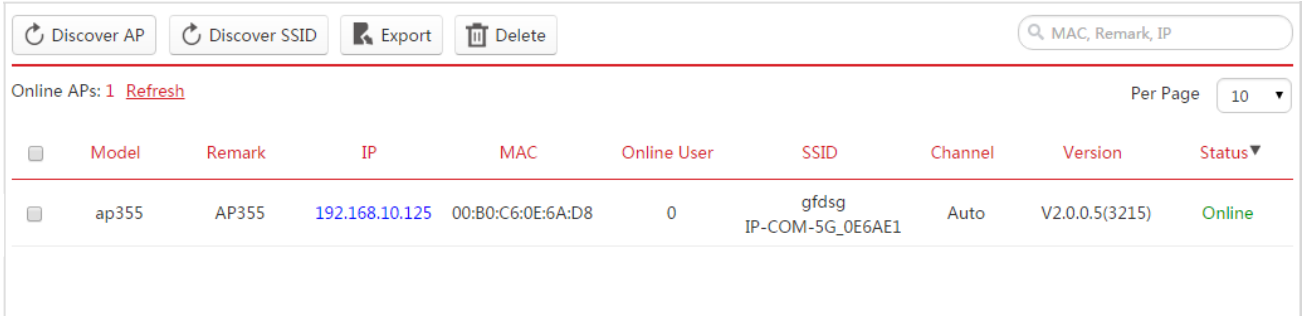
Buttion Description:

Discover AP	Click the button to scan the APs in the network.
Discover SSID	Click the button to scan the enabled SSID information of online APs.
Export	Export the AP information or SSID information displayed on this page to a directory in the format *Filename.xls*.
Delete	Delete the information of selected offline APs.

5.2.1 Discover AP

Overview

The access controller can save information of up to 2000 APs, including 500 online APs.



Parameter Description:

Item	Description
Model	Display the model of the AP.
Remark	Display the description of the AP. By default, it is the model of the AP. You can click it to modify the remark when the AP is online. It is recommended to set up the remark to the location of the AP, such as "Room-606". If so, when the network has a problem, it will be easy to pinpoint the deployment location of the AP according to the logs or alert information.
IP	Display the IP address of the AP. When the AP has connected to the access controller for the first time, the DHCP Server of the access controller will assign an IP address to the AP automatically.
MAC	Display the MAC address of the AP, which can be found on the AP's label.
Online User	The amount of online users which connects to the WiFi of the AP.
SSID	Display the primary SSID on the 2.4G and 5G band respectively.
Channel	Display the channel of the AP, and you can go to **Manage Policy → Radio Policy** to configure it. If you set up the channel to "Auto", it will display "Auto" instead of the specific channel.
Version	Display the firmware version of the AP.
Status	Display the connection status between the AP and the access controller. • Online: The AP has successfully connected to the access controller and can be managed by the access controller. • Offline: The AP has disconnected to the access controller and cannot be managed by the access controller.  **Tip** When the AP is offline, the configuration delivered by the access controller is still working and users can connect to the WiFi of the AP to surf the Internet, unless you restore the AP to factory defaults.

Export the scanned AP information

To export this page's information into an appropriate directory, click Export on the page and then follow on-screen instructions. The exported file is in the format *Filename.xls*.

If a warning message appears when you open the exported file, click Yes(Y).

Delete information of Offline APs

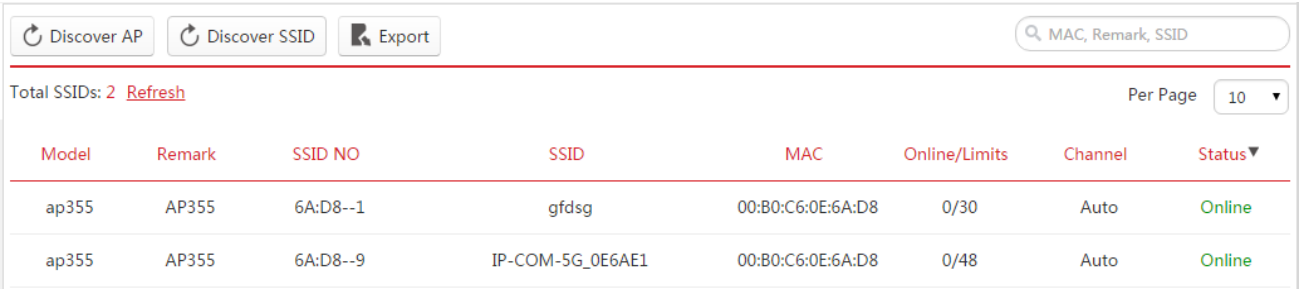
1. Select the APs you want to delete.
2. Click Delete .

Tip: Online APs will not be deleted even you select them.

5.2.2 Discover SSID

Overview

To scan SSIDs on your network, click Discover SSID , the scanned information will be displayed on the page.



Parameter Description:

Item	Description
Model	Display the model of the AP.
Remark	Display the description of the AP. By default, it is the model of the AP. You can click it to modify the remark when the AP is online. It is recommended to set up the remark as the location of the AP, such as "Room-606". If so, when the network has a problem, it will be easy to pinpoint the deployment location of the AP according to the logs or alert information.
SSID NO	Display the order of the SSID. The format is “xx:xx--a”, ”xx:xx” stands for the last four characters of the AP’s MAC address, and “a” is a digit number which represents the order of the SSID. For example, “xx:xx--6” means the sixth SSID of the AP, whose MAC address is "yy:yy:yy:yy:xx:xx".
SSID	The SSID name of the AP.
MAC	Display the MAC address of the AP, which can be found on the AP’s label.
Online/Limits	“Online” represents the amount of instant online users which connect to the SSID, and “Limits” represents the max users which are allowed to connect to the SSID.

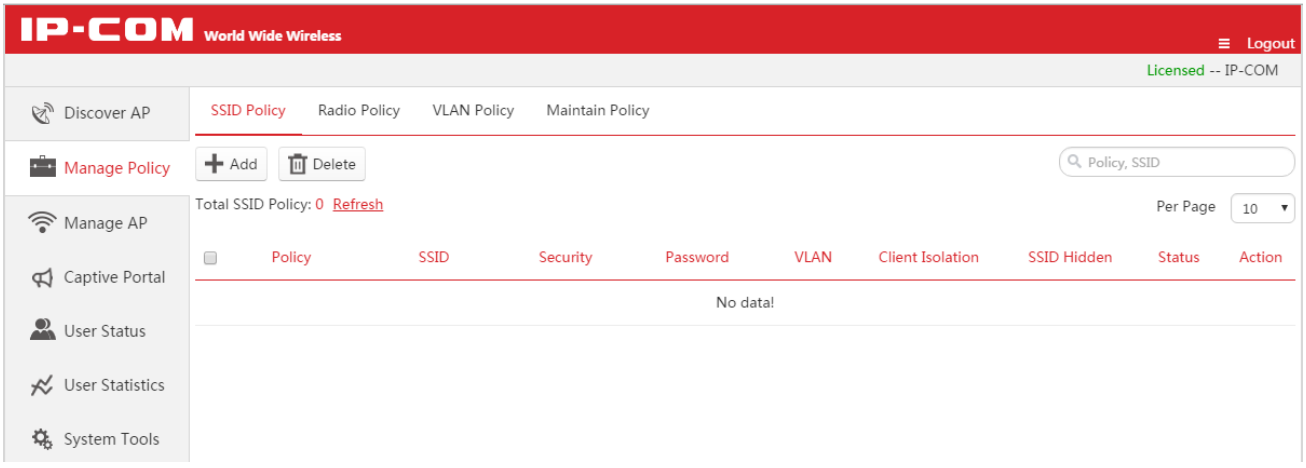
Channel	Display the channel of the AP, and you can go to **Manage AP →AP Group Modify→RF Setting** to configure it. If you set up the channel to "Auto", it will display "Auto" instead of the specific channel.
Status	Display the connection status between the AP and the access controller. • Online: The AP has successfully connected to the access controller and can be managed by the access controller. • Offline: The AP has disconnected to the access controller and cannot be managed by the access controller. **Tip** When the AP is offline, the configuration delivered by the access controller is still working and users can connect to the WiFi of the AP to surf the Internet, unless you restore the AP to factory defaults.

Export the scanned SSID information

To export this page's information into an appropriate directory, click Export on the page and then follow on-screen instructions. The exported file is in the format *Filename.xls*.

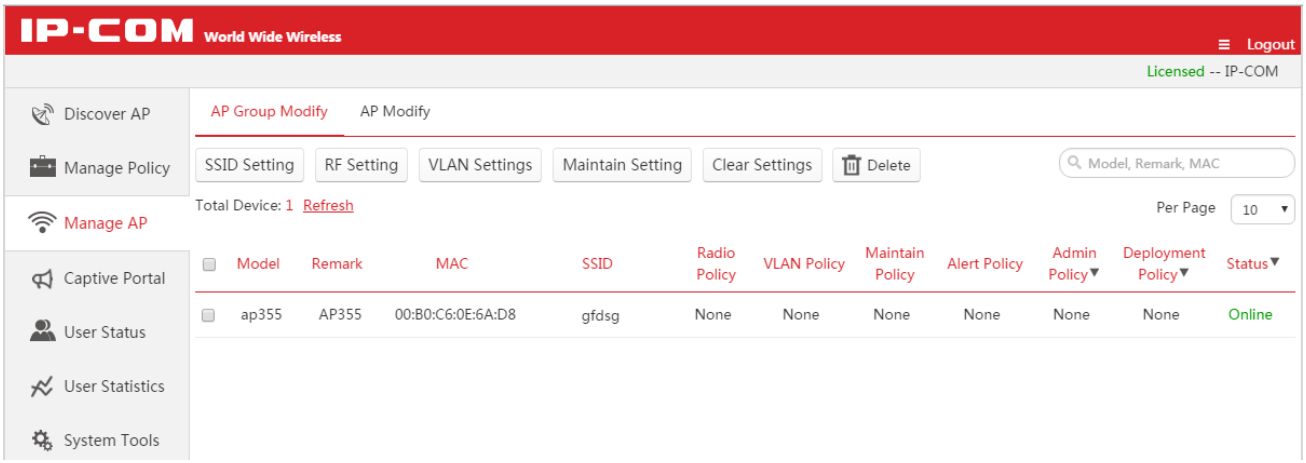
If a warning message appears when you open the exported file, click Yes(Y).

5.3 Manage Policy



For the configuration in this section, please refer to 4.2 Manage Policy in "Cloud AC" Mode.

5.4 Manage AP



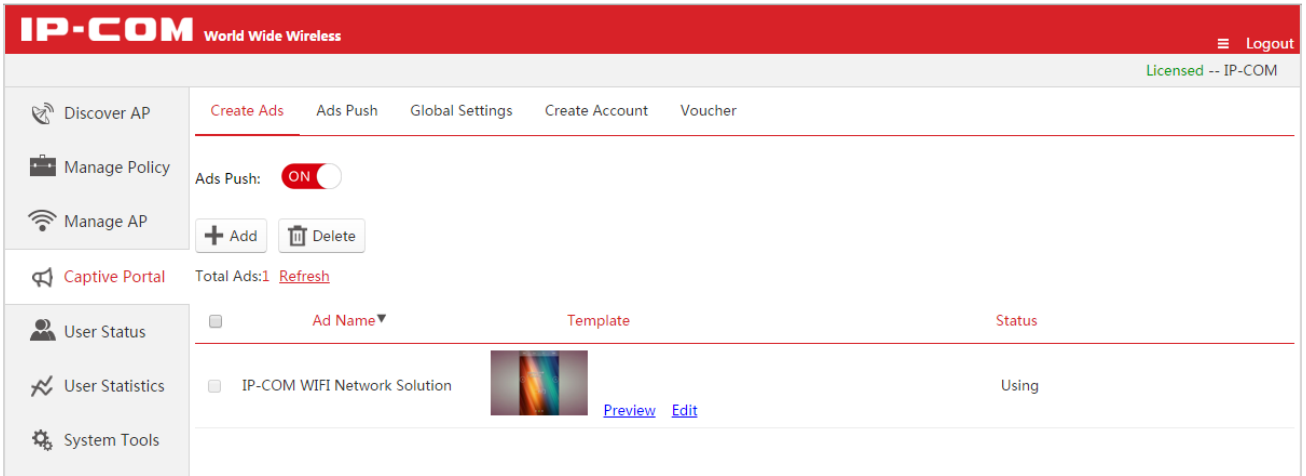
For the configuration in this section, please refer to 4.3 Manage AP in "Cloud AC" Mode.

5.5 Captive Portal

Assume that you own a restaurant, and you want your customers to know more information about your restaurant to help you promote your prducts. Then you can follow this part to create advertisements and deliver them to SSID. In this way, your customers can get to know the advertisements after they successfully connect to your SSID.

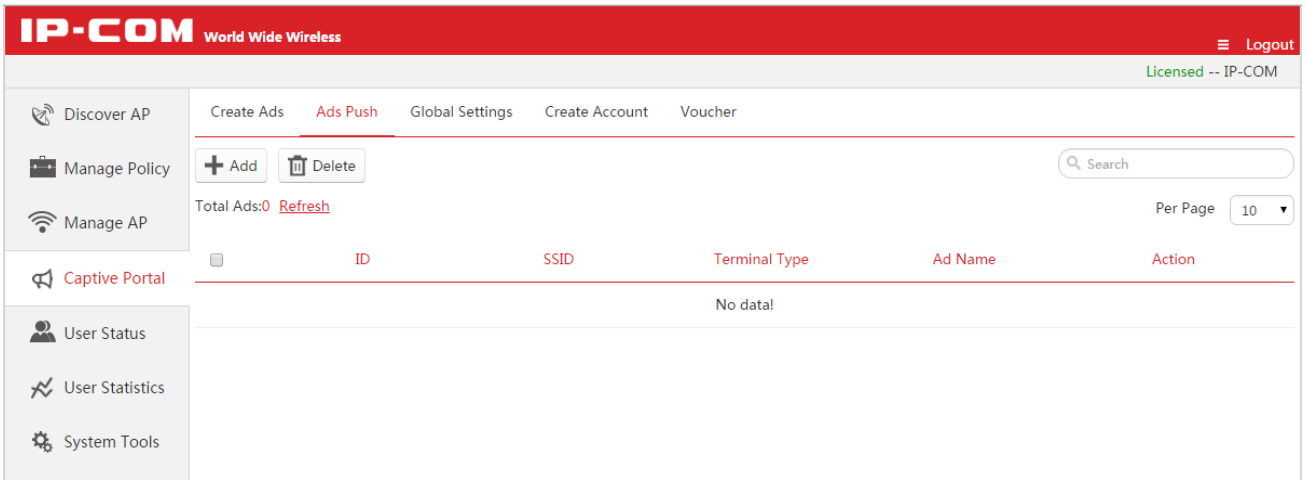
This section includes **Create Ads, Ads Push, Global Settings, Create Account,** and **Voucher.**

5.5.1 Create Ads



For the configuration in this section, please refer to 4.4.1 Create Ads in "Cloud AC" mode.

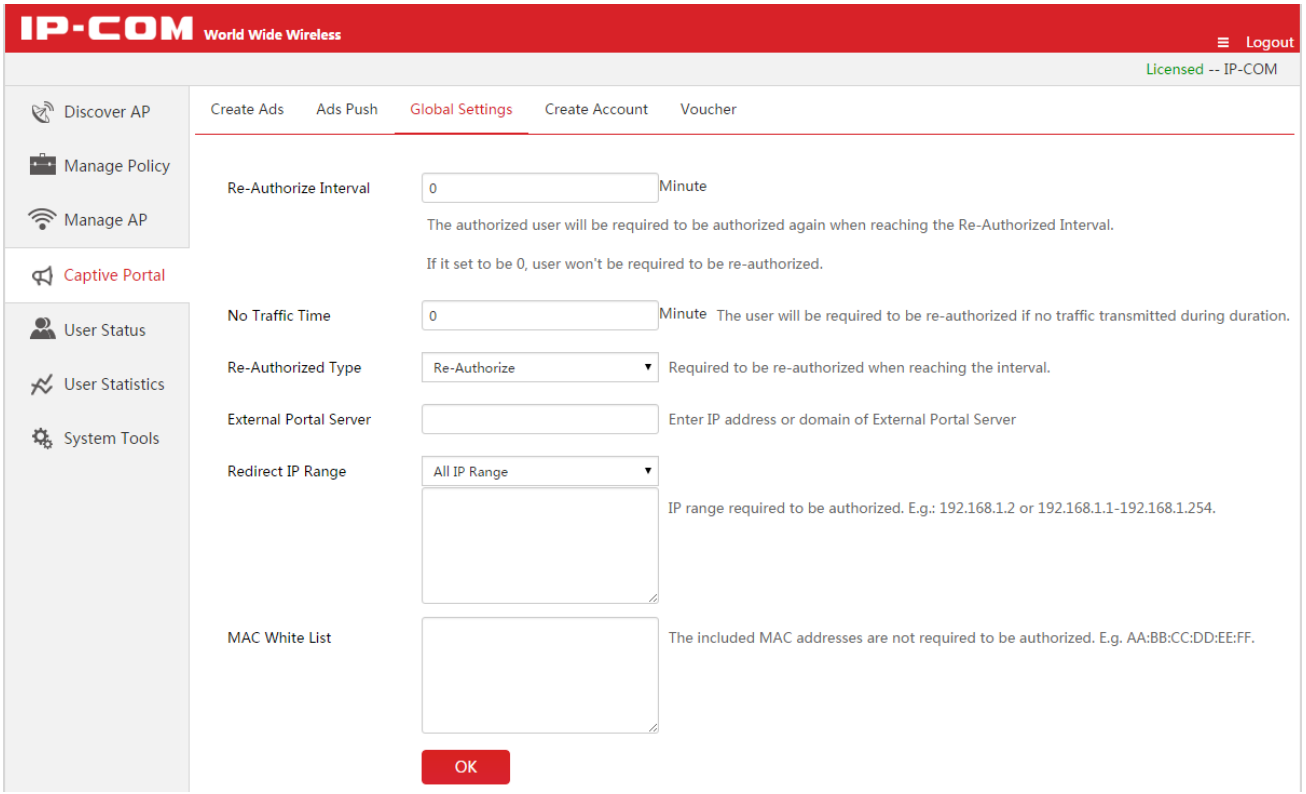
5.5.2 Ads Push



For the configuration in this section, please refer to 4.4.2 Ads Push in "Cloud AC" mode.

5.5.3 Global Settings

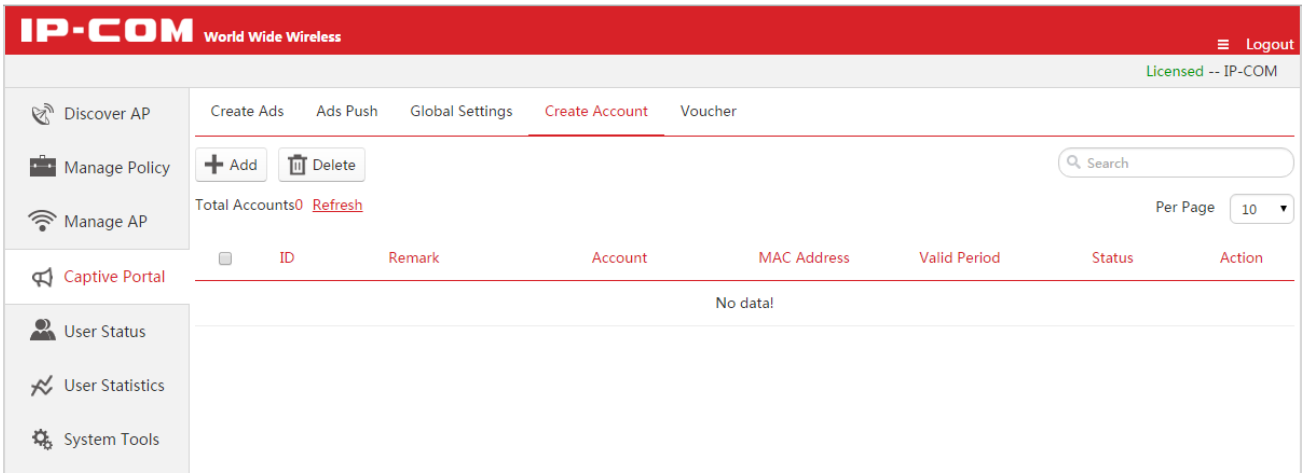
To set up the global parameters for authorization, click **Captive Portal→Global Settings** to enter the following page.



Parameter Description:

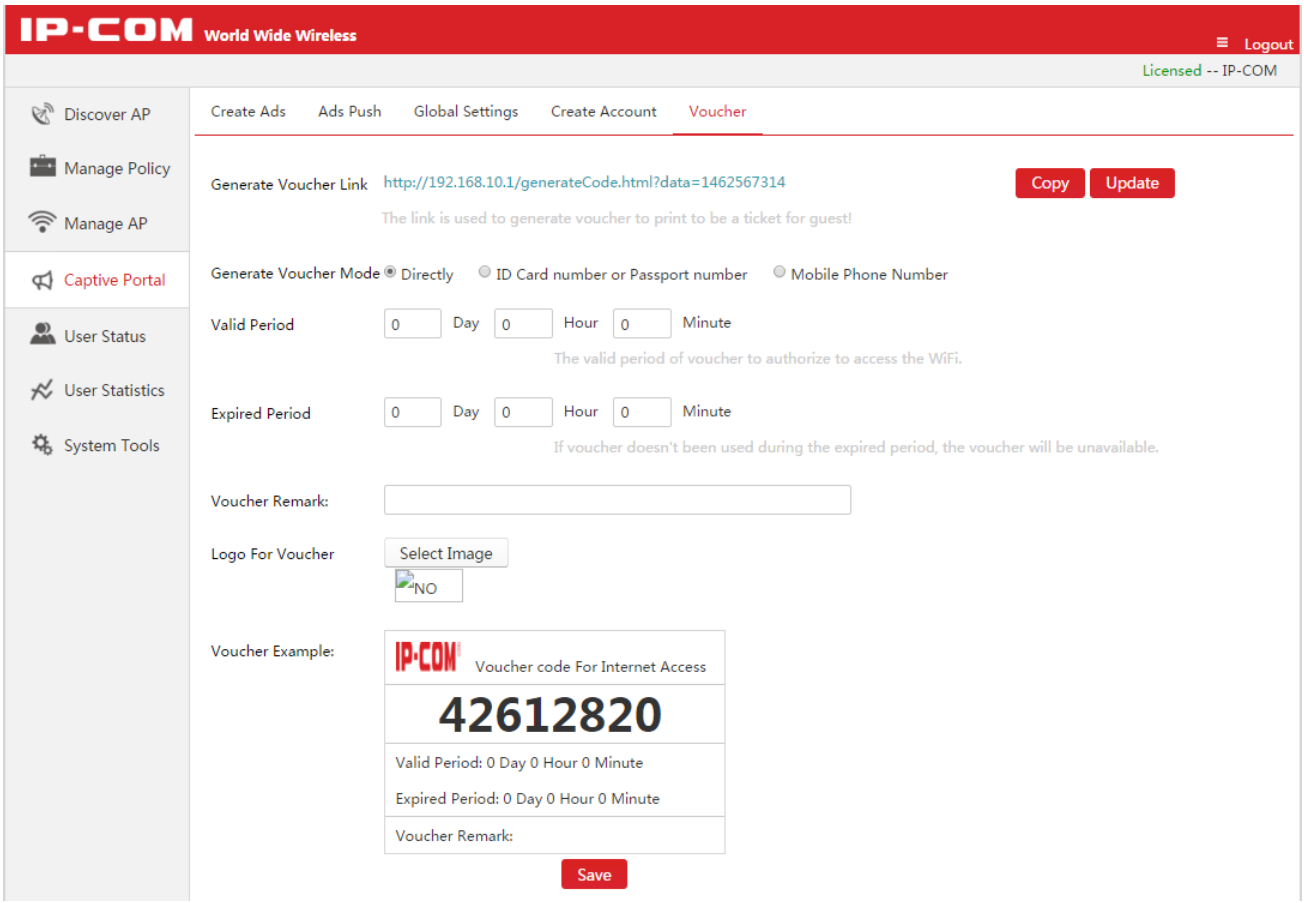
Item	Description
Re-Authorize Interval	The user will be required to re-authorize when his authorized duration reaches this specified time. The range is 20 ~ 360 minutes, and "0" means no need to re-authorize.
No Traffic Time	During this specified time, if the user has not transmitted any Internet data, he will be required to re-authorize. The re-authorize method is dependent on the “Re-Authorized Type”. The range is 5 ~ 3600 minutes, and "0" means no need to re-quthorize.
Re-Authorized Type	Select the Re-Authorized Type. • Re-Authorize: During the “No Traffic Time”, if the user has not transmitted any Internet data, he will be required to re-authorize. • Redirect Page: During the “No Traffic Time”, if the user has not transmitted any Internet data, the redirect page will appear and the user can continue to surf the Internet.
External Portal Server	Enter IP address or domain name of External Portal Server. This function needs to be customed by our technician.
Redirect IP Range	Set up the IP address range to be authorized. • Included IP Range: Only the IP addresses in the following box need to authorize. • Excluded IP Range: The IP addresses in the following box donot need to authorize, while other IP addresses need to authorize. • ALL IP Range: All the IP need to authorize.  **Tip** The IP address format is 192.168.1.2 or 192.168.1.1-192.168.1.254. Up to 20 IP addresses can be added, with one IP address each line.
MAC White List	Enter the MAC addresses which are not required to authorize. Up to 20 MAC addresses are allowed, and each line supports one MAC address. E.g: AA:BB:CC:DD:EE:FF.

5.5.4 Create Account



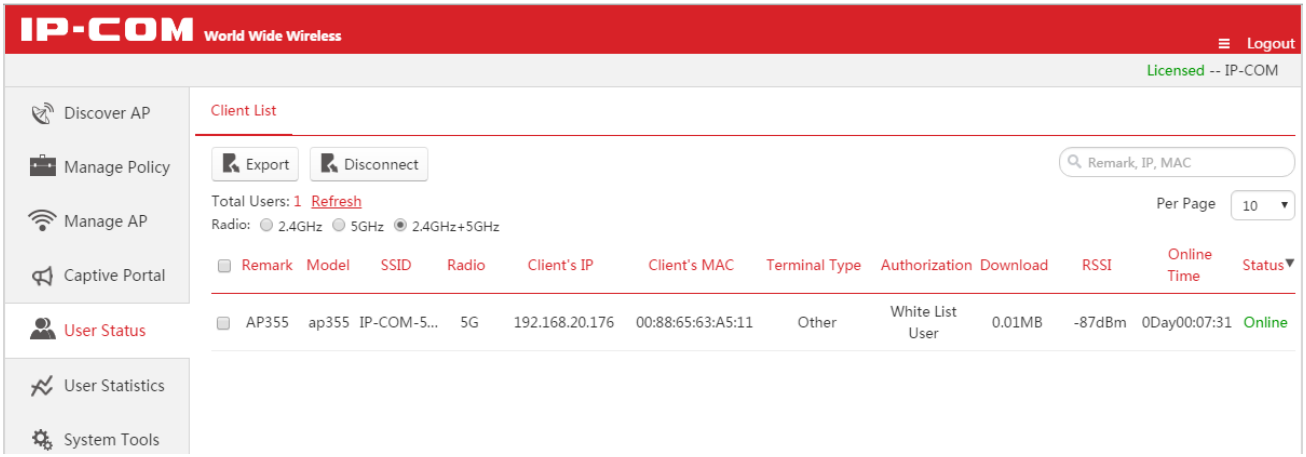
For the configuration in this section, please refer to 4.4.4 Create Account in "Cloud AC" mode.

5.5.5 Voucher



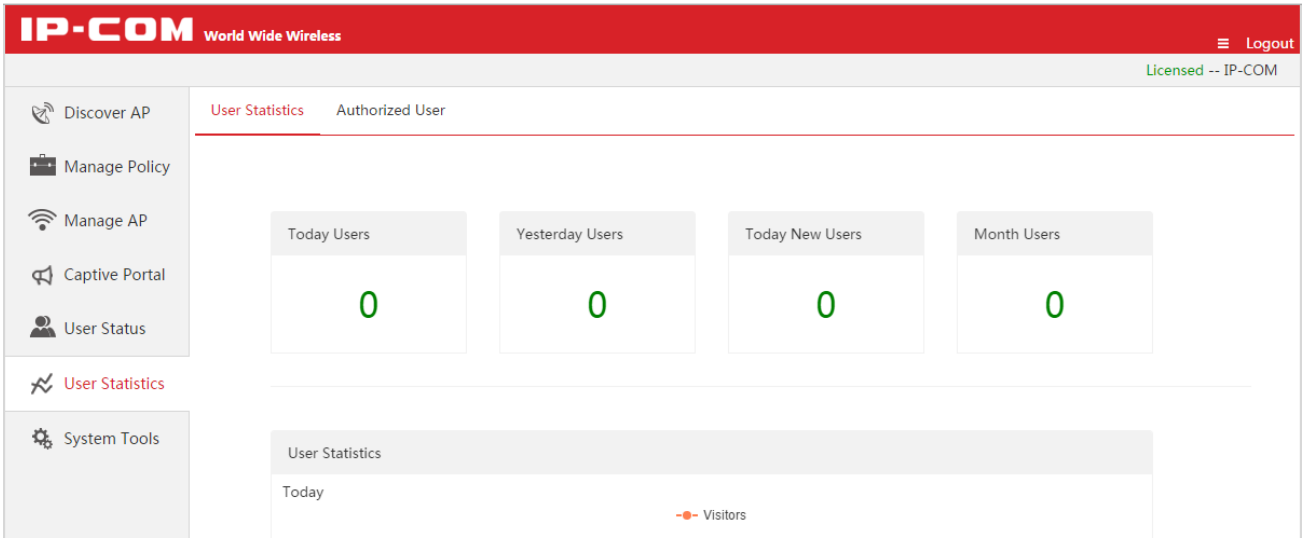
For the configuration in this section, please refer to 4.4.5 Voucher in "Cloud AC" mode.

5.6 User Status



For the configuration in this section, please refer to 4.5 User Status in "Cloud AC" Mode.

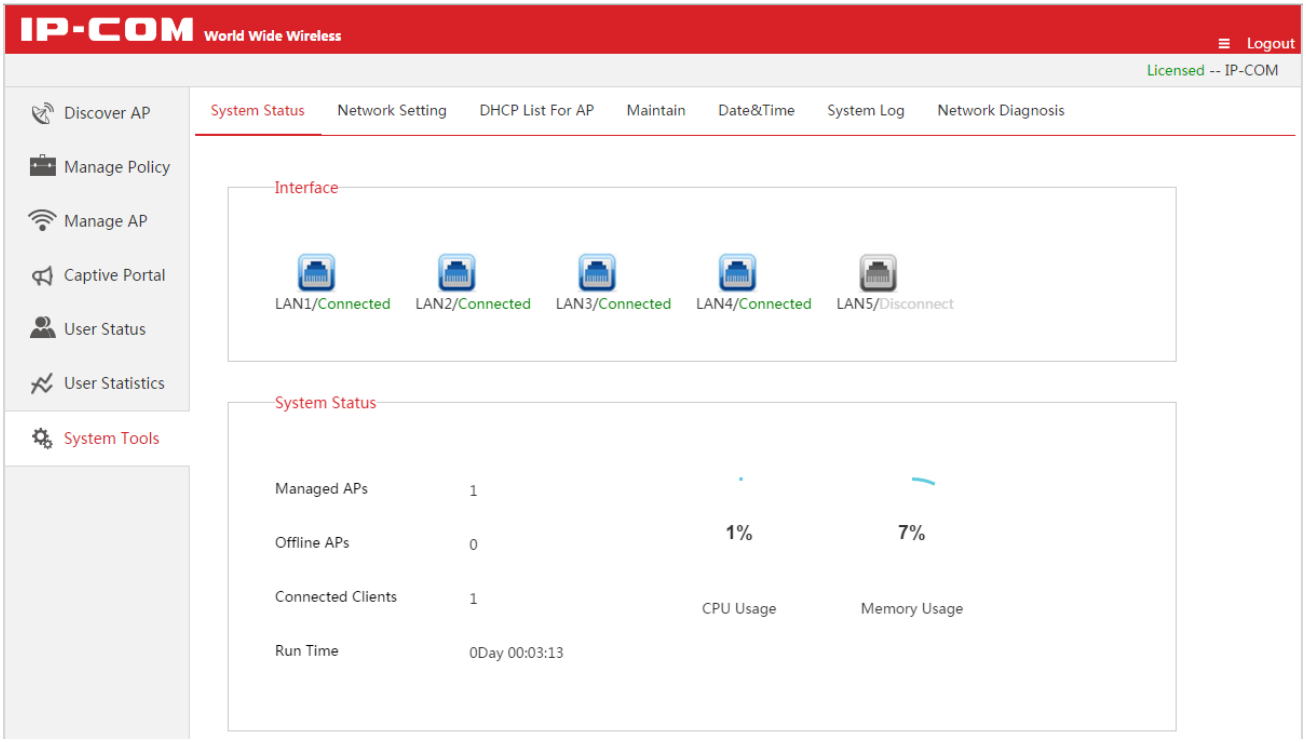
5.7 User Statistics



For the configuration in this section, please refer to 4.6 User Statistics in "Cloud AC" mode.

5.8 System Tools

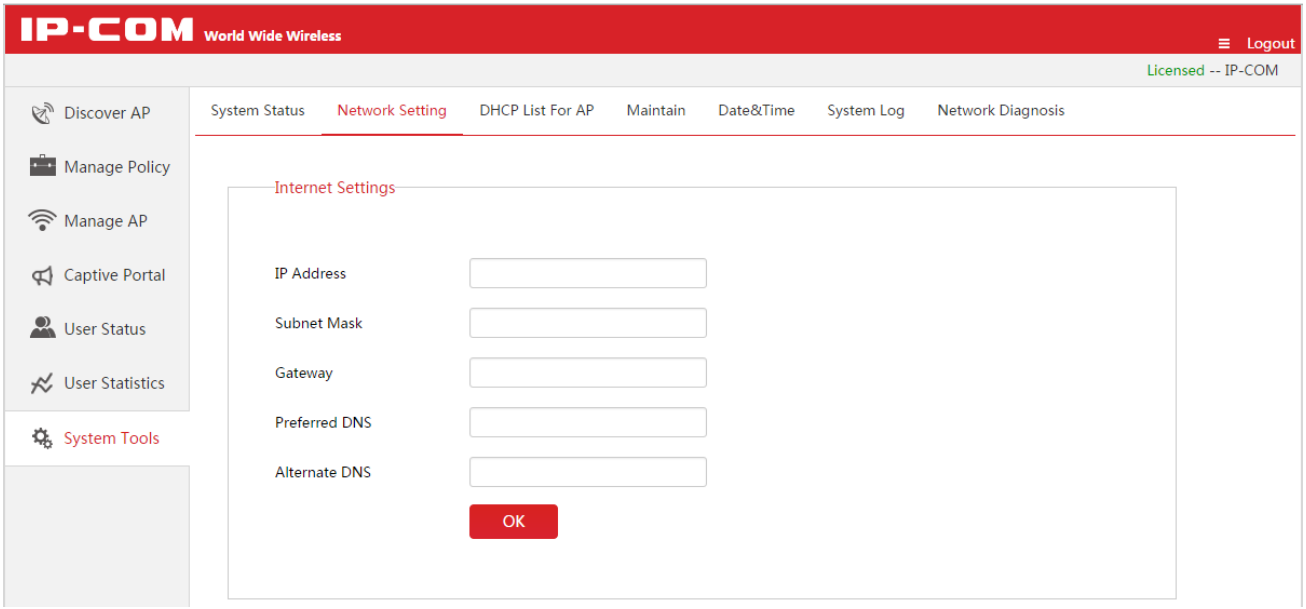
5.8.1 System Status



For the configuration in this section, please refer to 4.7.1 System Status in"Cloud AC" Mode.

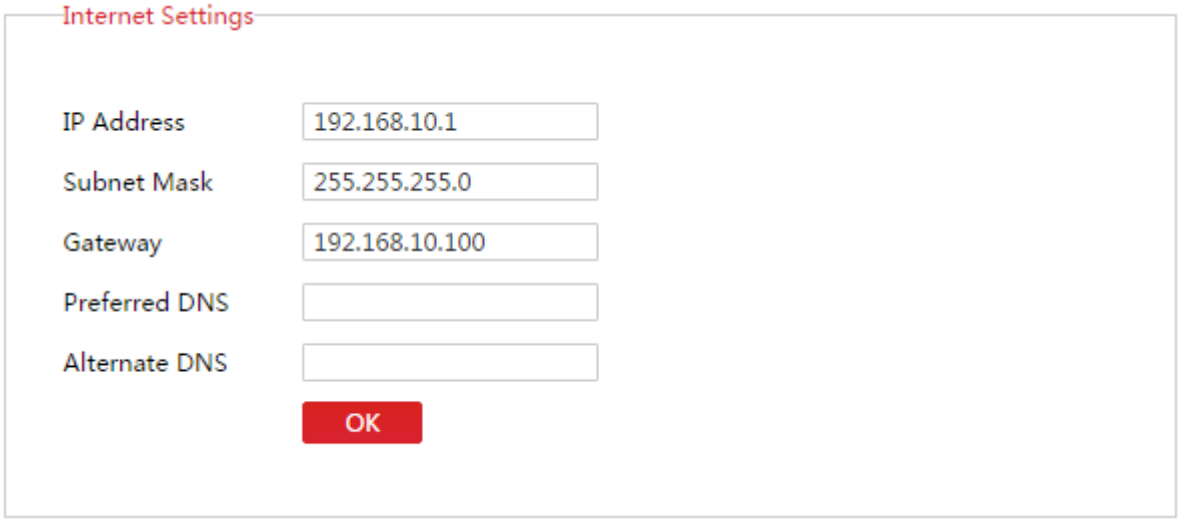
5.8.2 Network Settings

To set up the AC's network settings, including Internet and LAN Settings, DHCP settings and VLAN Settings, click **System Tools → Network Setting** to enter the following page.



Internet settings

To make your AC conncet to Internet, you need to set up the AC's IP address, subnet mask, gateway, preferred/alternate DNS, shown as follows.



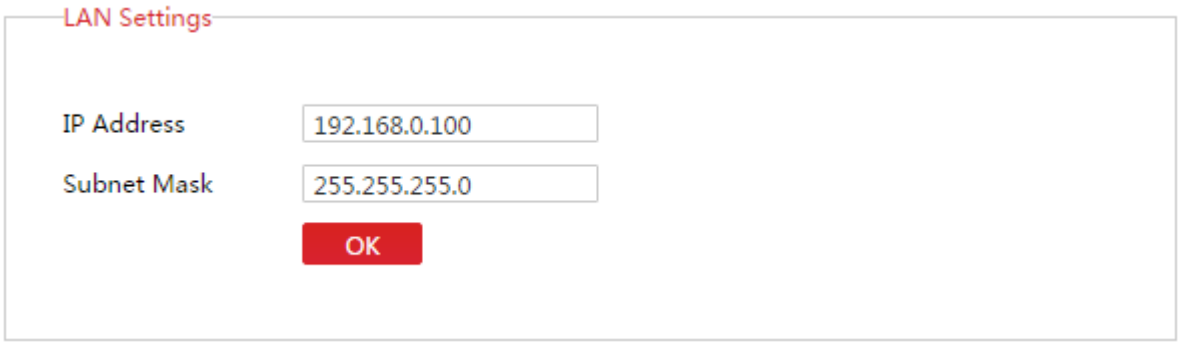
Parameter Description:

Item	Description
IP Address	Set up the AC's IP Address. In order to connect to Internet, in general, this IP address and the uplink router's LAN IP address should be on the same IP segment.
Subnet Mask	Set up the AC's subnet mask. The default value is 255.255.255.0.
Gateway	Set up the AC's default gateway. In order to connect to Internet, in general, it is set to the uplink router's LAN IP address.
Preferred DNS	Set up the AC's DNS server address. It is generally set to the uplink router's LAN IP address.

Alternate DNS	Optional: When the Preferrd DNS address goes wrong, the Alternate DNS address will take the place of Preferred DNS address.

LAN settings

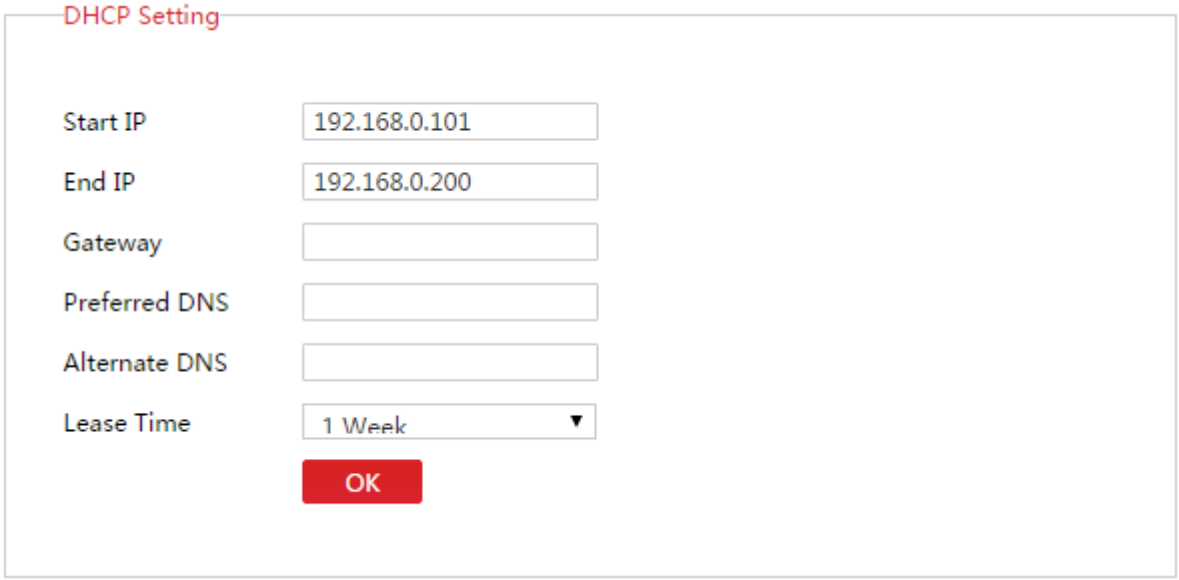
LAN Settings can configure the Sub AC's IP address and subnet mask for logining to the AC's Web UI. If the IP address is changed, you need to change your PC's IP address to the same IP segment with the AC. And then you can login again.



DHCP Setting

DHCP Server can assign IP addresses to connected APs, but can not assign IP address to connected users.

DHCP Server is enabled automatically and can't be disabled.



Parameter Description:

Item	Description
Start IP	Enter the Start IP address of DHCP address pool.
End IP	Enter the End IP address of DHCP address pool. **Note**

	Start IP and End IP must be on the same IP segment.
Gateway	Enter the gateway which will be assigned to APs. If it keeps blank, APs will not obtain a gateway.
Preferred DNS	Enter the DNS server address which will be assigned to APs. If it keeps blank, APs will not obtain a DNS address.
Alternate DNS	It is optional.
Lease Time	Lease Time is the assigned IP address's effective time period. When lease time is due, the online APs can renewal the lease time.

VLAN Settings

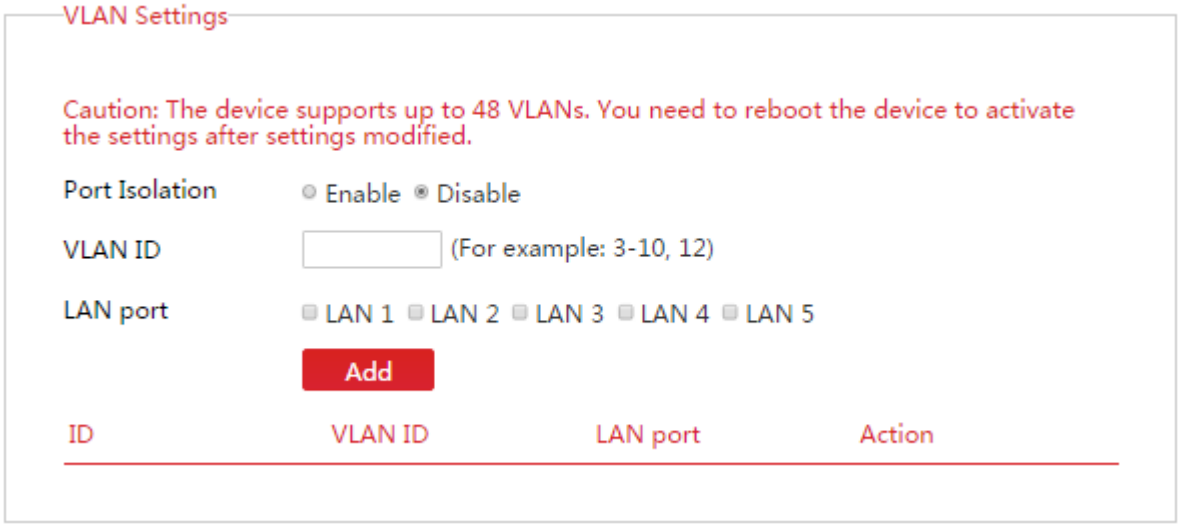
VLAN Settings

Tip

Configuration in this section also applies to VLAN Settings in "Cloud AC" mode.

This section helps you to configure AC's VLAN information so that the AC can manage APs across different VLANs.

The AC supports to create up to 48 different VLANs.



To add a VLAN rule for AC:

1. Port Isolation: Select "Enable".
2. VLAN ID: Enter the VLAN ID.

   The AC Supports entering multiple VLAN IDs, use hyper (-) to indicate continuous VLANs and use comma (,) to indicate indivisual VLANs.

   For example, "3-10, 12" means from VLAN 3 to VLAN 10, plus VLAN12, totally 9 VLANs.

3. LAN port: Select LAN ports corresponding to the VLAN IDs.
4. Click Add to save the VLAN rule and it will be displayed in the list below.
5. Go to **System tools → Maintain → Maintenance**, click reboot to make the VLAN rule effective.

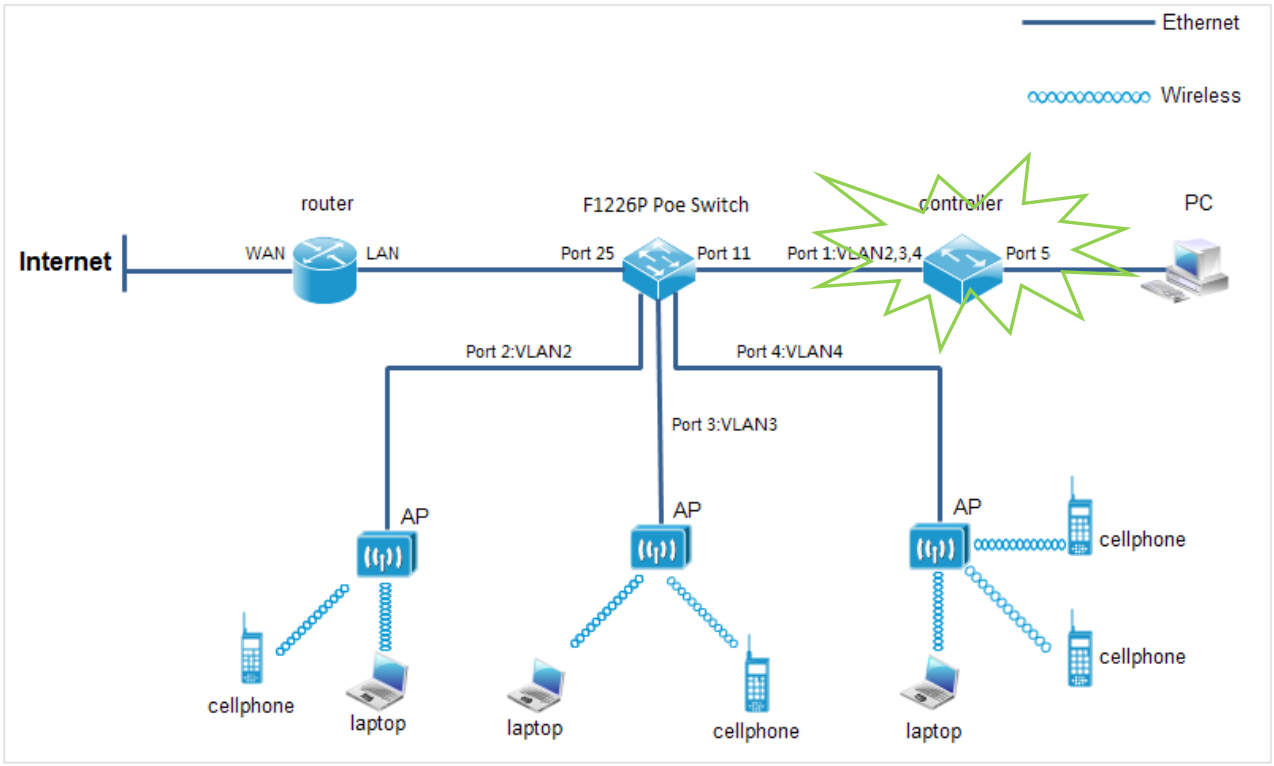
Tip

- After you configure VLAN rules, DO remember to go to **System Tools → Maintain → Maintenance** to reboot the AC to make VLAN rules effective.
- After a VLAN ID is added to an LAN port of AC, this port can accept packets with the same VLAN ID or with no VLAN tag.
- Every physical port can only be configured once.
- If you want to delete a VLAN rule, click at the end of this rule.
- If you want to modify a VLAN rule, you need to delete this rule first, and then add a new rule.

Example of Cross-VLAN Management

Network Topology

In the figure below, the access controller needs to manage APs in different VLANs.



Topology description:

Take IP-COM's F1226P PoE Switch as an example:

1. Creat four 802.1QVLAN entries on the switch. VLAN ID and related ports are described below:

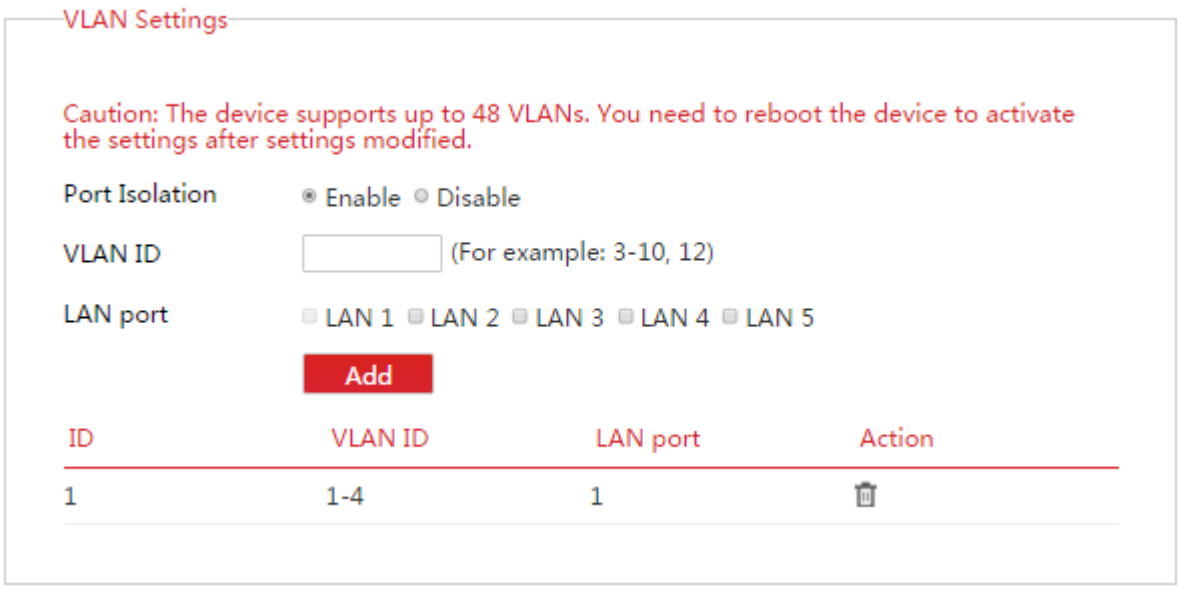
VLAN ID	Port No.
1	All ports
2	2,11,25
3	3,11,25
4	4,11,25

2. The VLAN policy of each port are as follows:

Port No.	PVID	Tag action
2	2	Remove Tag
3	3	Remove Tag
4	4	Remove Tag

11	1	Add tag
25	1	Remove Tag

Access controller's configuration:

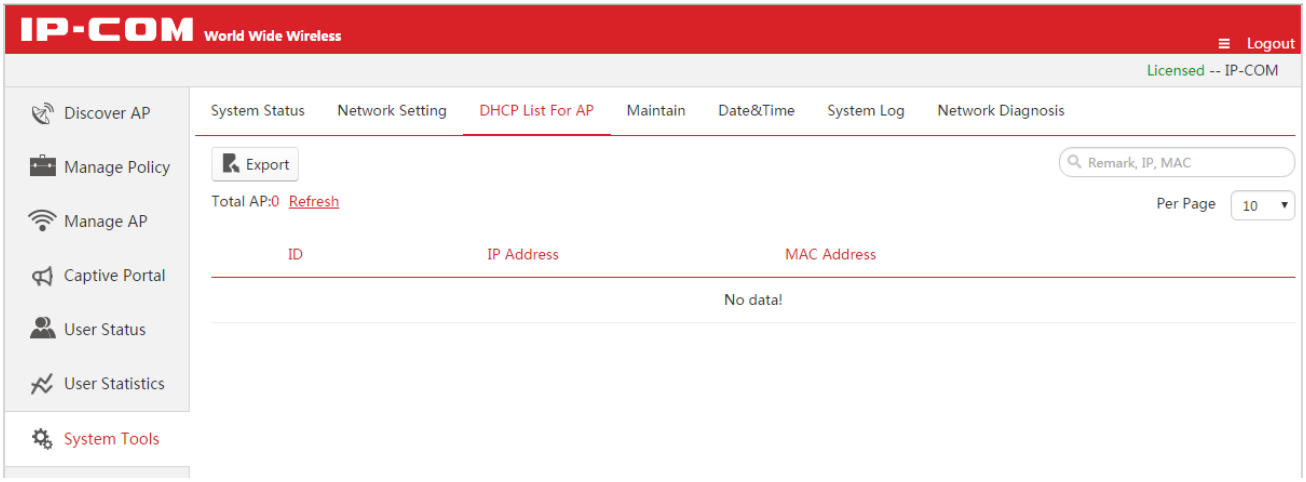


1. Log in to the access controller's Web UI, go to **System Tools → Network Setting → VLAN Settings**.
2. Port Isolation: Check to enable VLAN function.
3. VLAN ID: Enter VLAN ID "**1-4**".
4. LAN Port: Select LAN 1.
5. Click Add.
6. Go to **System Tools → Maintain → Maintenance** to reboot the AC to make this VLAN rule effective.

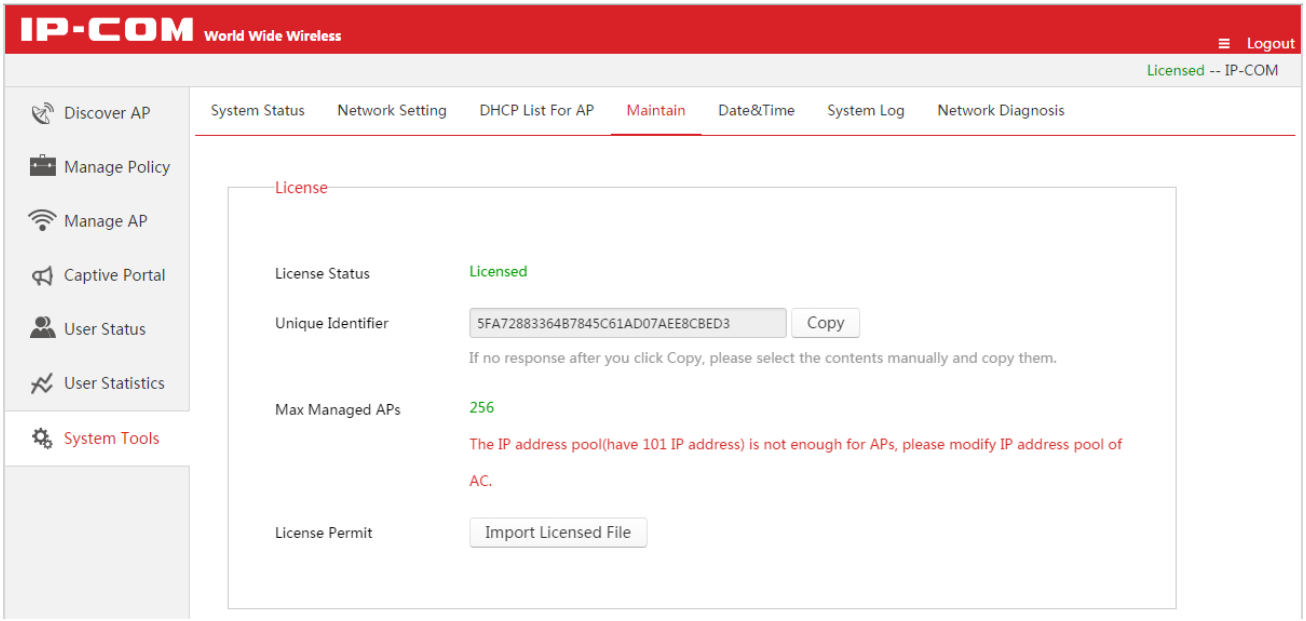
5.8.3 DHCP List For AP

This page displays AP's IP address obtained from AC's DHCP Server, and AP's MAC address.

Click **System tools → DHCP List For AP** to enter this page.

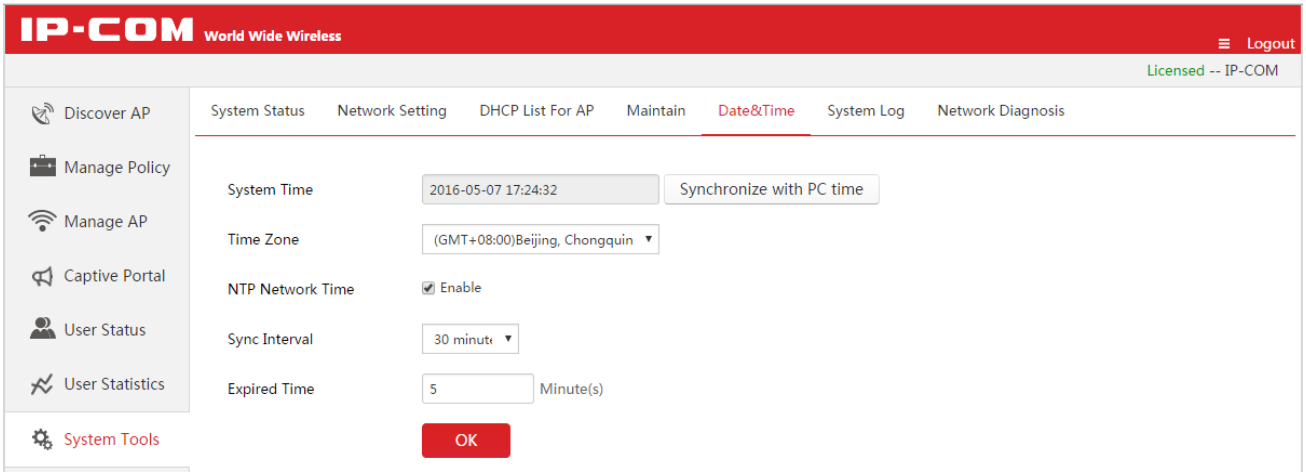


5.8.4 Maintain



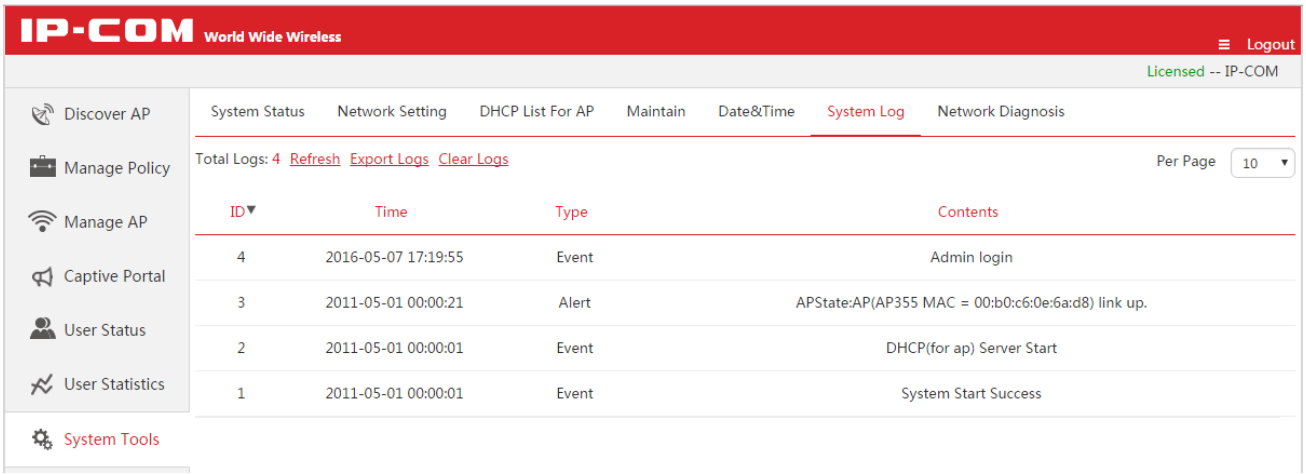
For the configuration in this section, please refer to 4.7.3 Maintain in "Cloud AC" Mode.

5.8.5 Date&Time



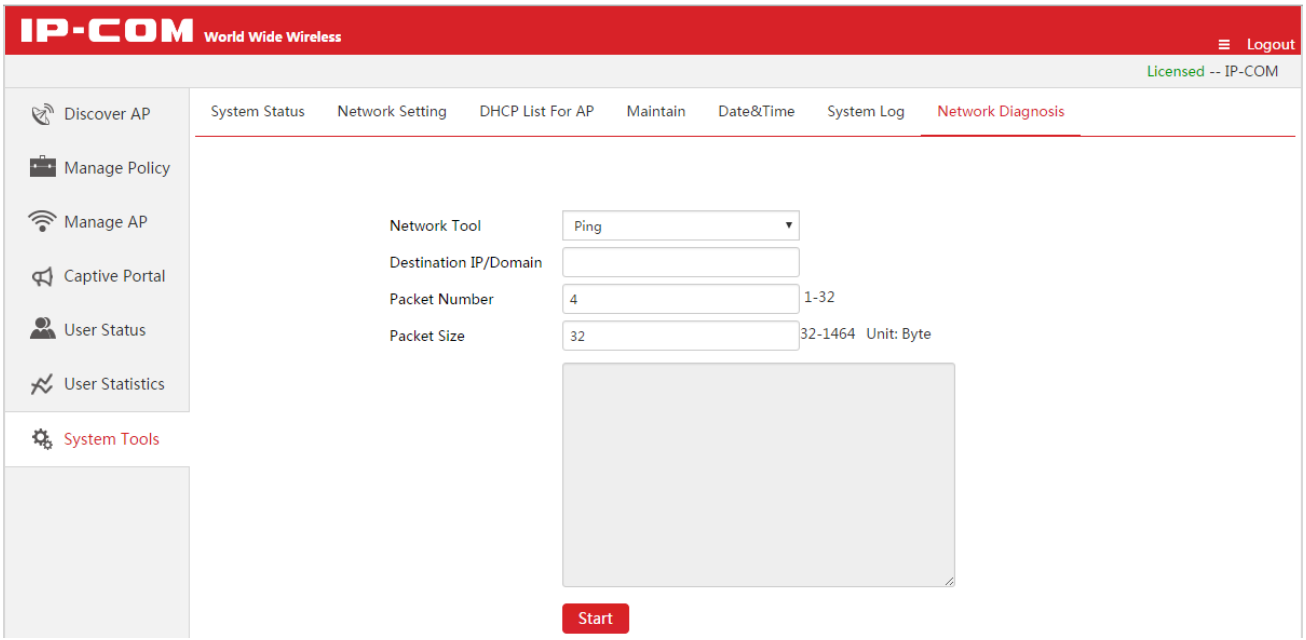
For the configuration in this section, please refer to 4.7.4 Date&Time in"Cloud AC" Mode.

5.8.6 System log



For the configuration in this section, please refer to 4.7.5 System log in “Cloud AC" Mode.

5.8.7 Network Diagnosis



For the configuration in this section, please refer to 4.7.6 Network Diagnosis in "Cloud AC" Mode.

6 Root AC Mode

6.1 Root AC Mode Introduction

When the wireless network is distributed in various regions and each one is on a large scale, you can deploy one access controller to work in “Root AC” mode and deploy seveval access controllers to work in “Sub AC” mode. The “Root AC” manages the “Sub ACs” in various regions and the “Sub AC” is for centralized management of onsite APs. And in this way, it reduces network management complexity. The “Root AC” can manage up to 64 “Sub ACs” concurrently. The following is a specific application example.

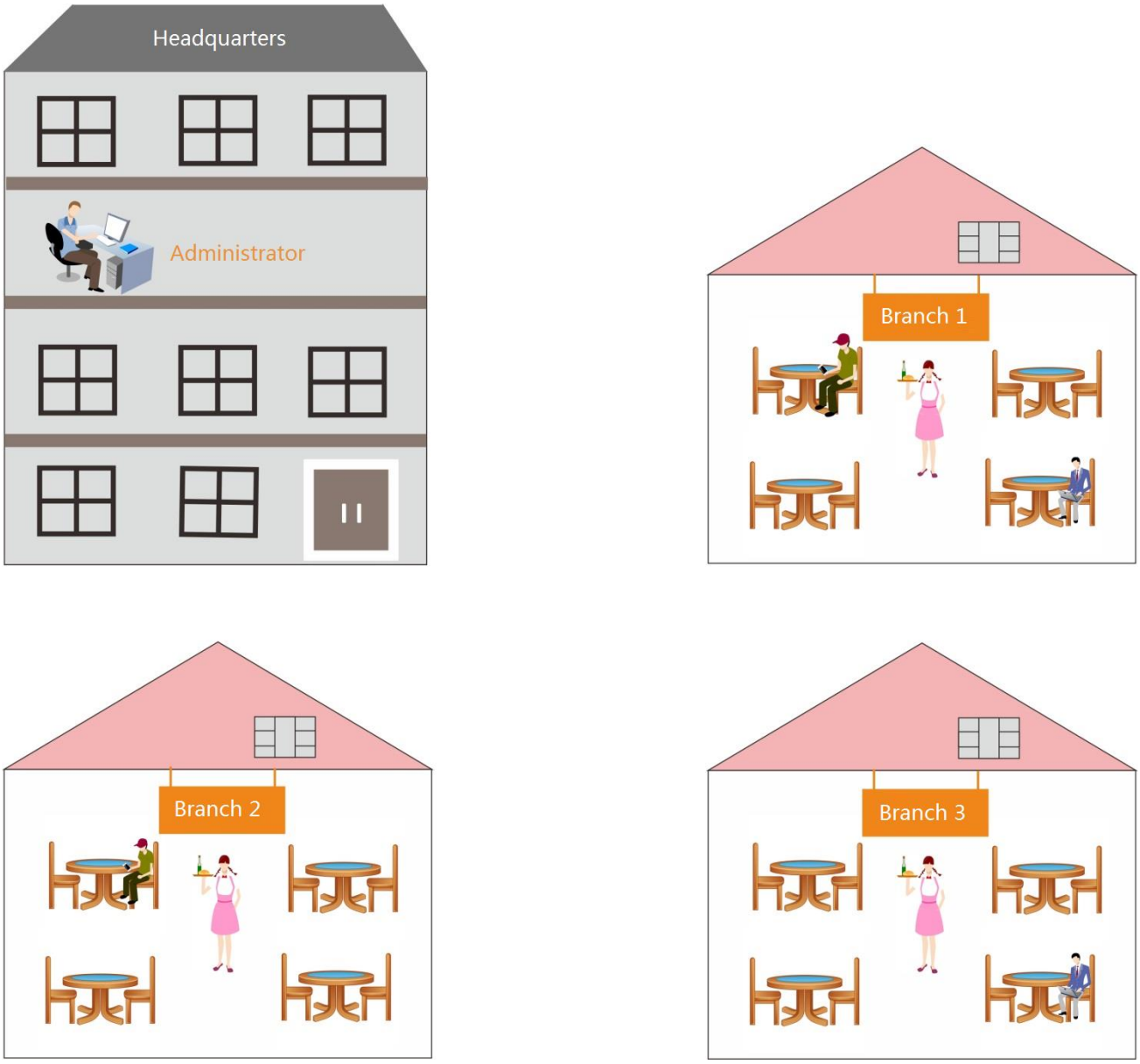
Networking requirement

A nationwide hotel chain needs to achieve wireless coverage. Requirements are as follows:

1) Customers in each branch can access the Internet via WiFi and view the advertisement of favourable prices or other information provided by each branch.

2) The “Sub AC” in each branch centrally delievers configurations and advertisements to APs in the same branch.

3) The senior manager at the hotel headquarters can view the occupancy rate of each branch without paying a visit.



Scheme Design

To create an exclusive wireless network for the hetel, you can use IP-COM access controller + AP to work together

Details are as follows:

- At the hotel headquarters, deploy one access controller AC2000, working in the “Root AC” mode, for centralized management of “Sub ACs” in all branches.
- In each branch, deploy one or more access controllers, working in the “Sub AC” mode, for centralized management of its local APs.
- On the “Sub AC”, specify the “Root AC Address” to the public IP address (or its corresponding domain name) of the headquarters’s gateway.
- In each branch, deploy appropriate amount of APs for the wireless user to connect to.

- The gateway, which connects the “Root AC”, needs to enable two ports to the public network. One for managing the “Sub ACs” and the other for upgrading “Sub ACs”.
- On the “Sub AC” of each branch, create and deliver advertisements to APs in the same branch, so that customers can view the advertisements before surfing the Internet.

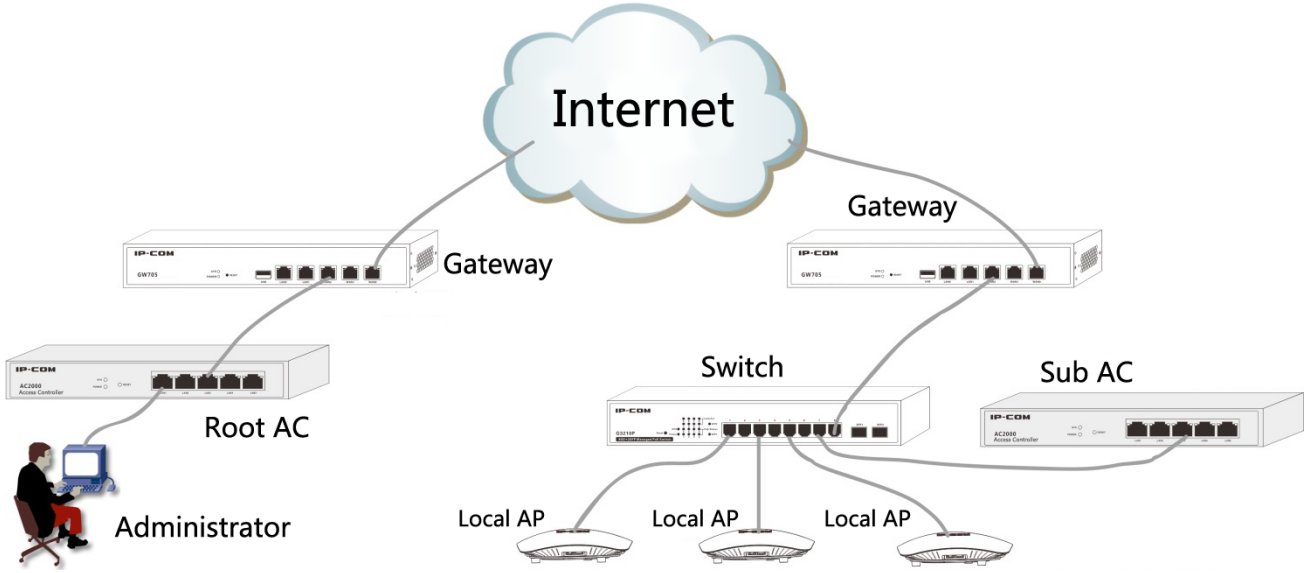
Assumptions are as follows:

- The domain name bound to the public IP address of the headquartes’s gateway is “head.noip.com”.
- The headquarters’s gateway has a LAN IP address of 192.168.0.1 and provides DNS proxy function.
- The headquarters’s gateway has enabled two ports to the public network: “6060” is for managing “Sub ACs” and “9090” is for upgrading “Sub ACs”.
- Each branch’s gateway has a LAN IP address of 192.168.1.1 and provides DNS proxy function.

Network Topology

Tip

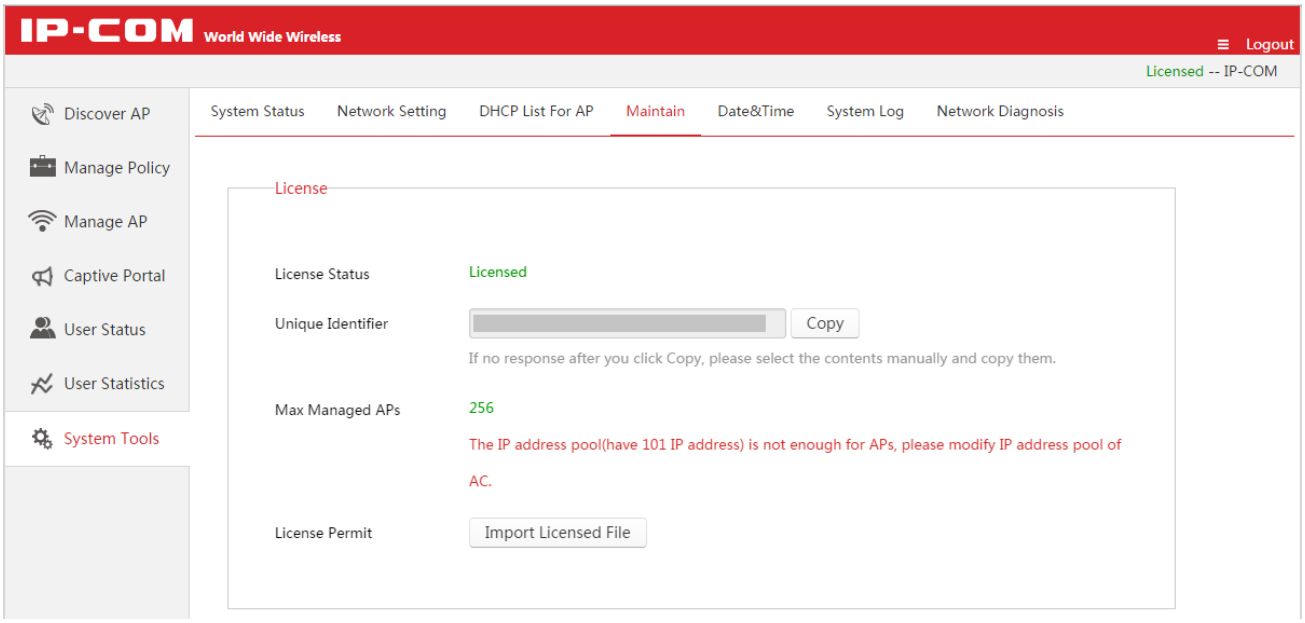
One branch is taken as an example in this topology, other branches are similar.



AP Configuration

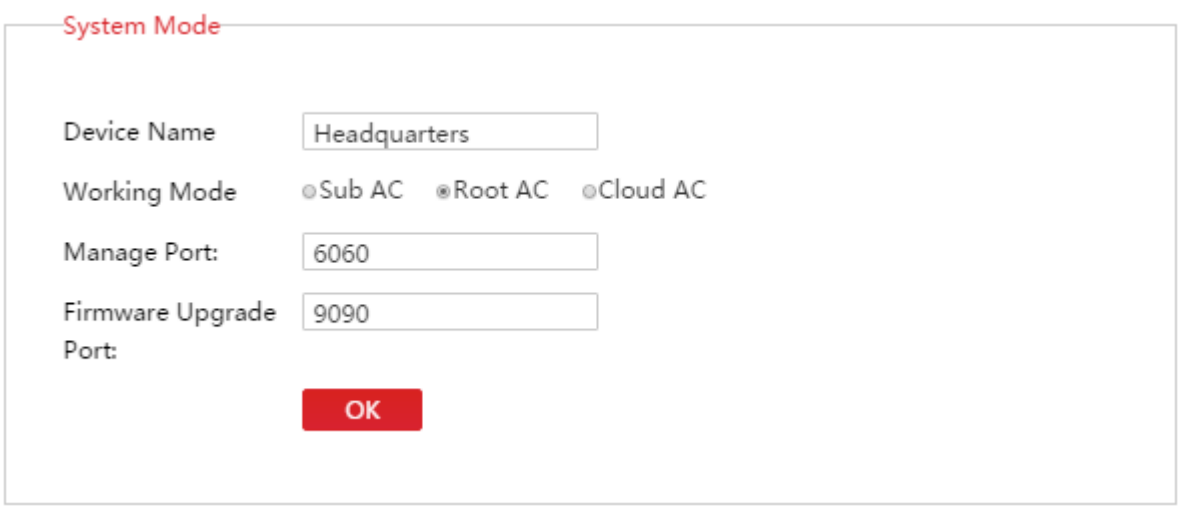
No configuration is required for AP, plug and play.

Root AC Configuration

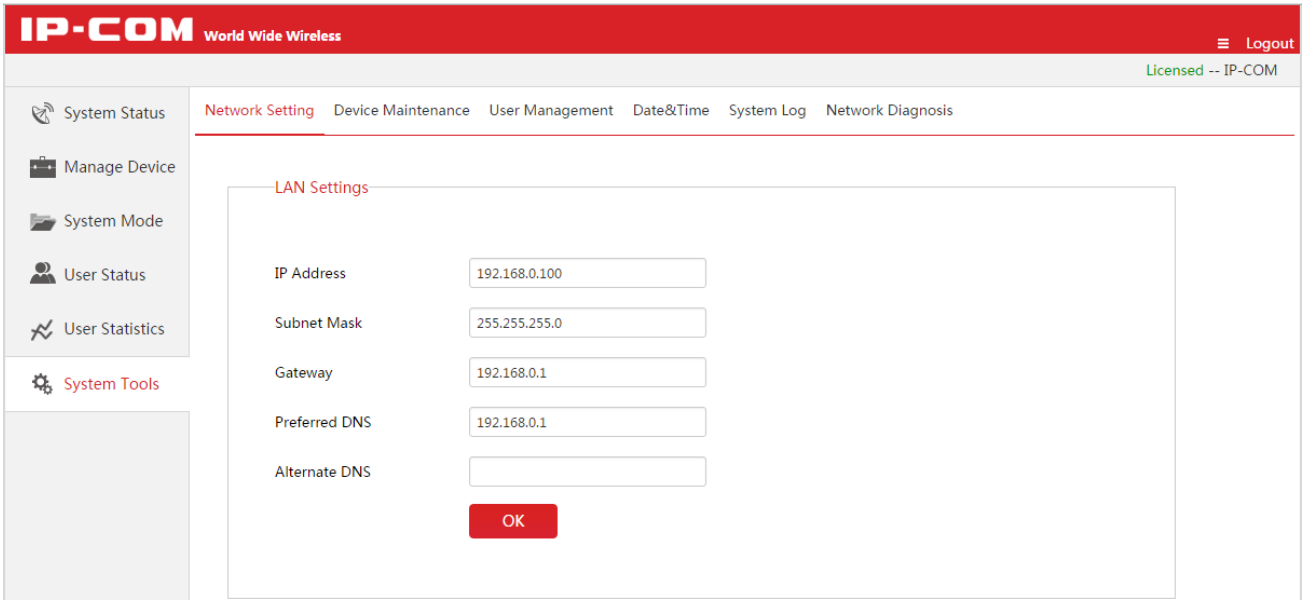


The configuration steps are as follows: (Assume that the access controller works in "Sub AC" mode previously.)

1. Log in to the Web UI of the access controller, and go to **System Tools→Maintain →System Mode**.
2. Device Name: In order to better locate this access controller, it is recommended to set to the headquarters' location, such as "Headquarters".
3. Working Mode: Select "Root AC".
4. Manage Port: Enter "6060".
5. Firmware Upgrade port: Enter "9090".
6. Click OK and wait for the access controller to complete the reboot process.



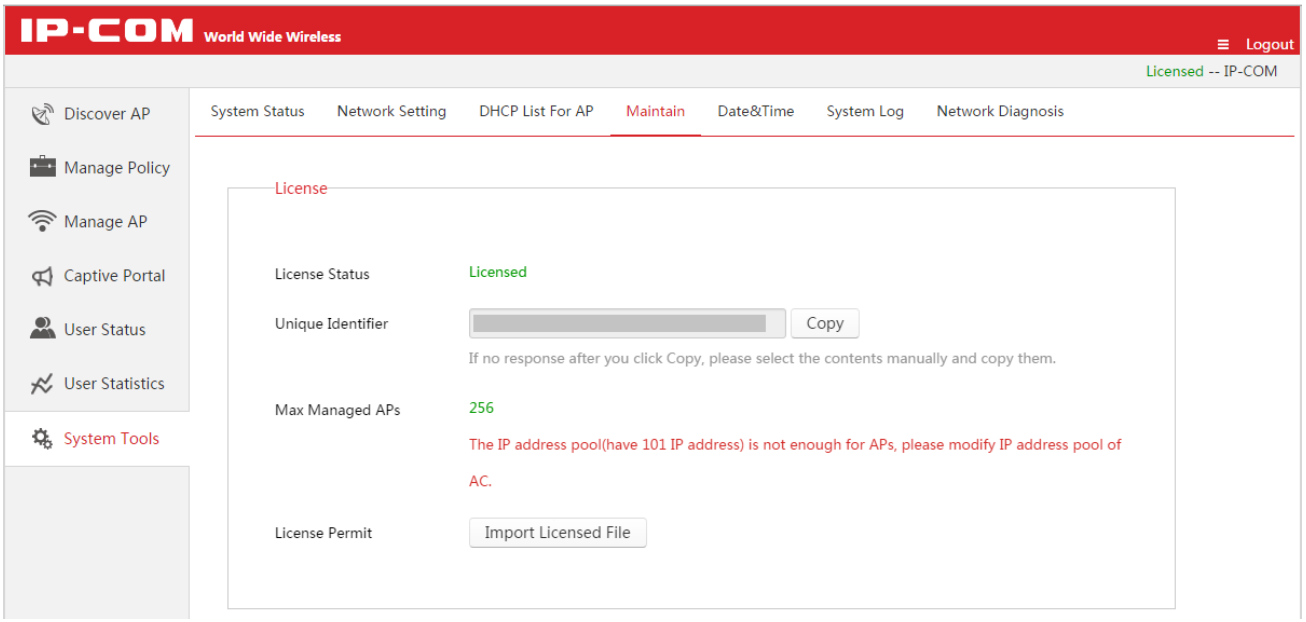
7. Log in to the access controller's Web UI again, and go to **System Tools→Network Setting** to configure the corresponding parameters to make the access controller connect to the Internet through the gateway. In this example, we configure the parameters as follows.



Tip

After the access controller connects to the Internet, go to **Manage Device** to view and manage the Sub ACs in each branch.

Sub AC Configuration



The configuration steps are as follows: (Assume that the access controller works in "Sub AC" mode previously.)

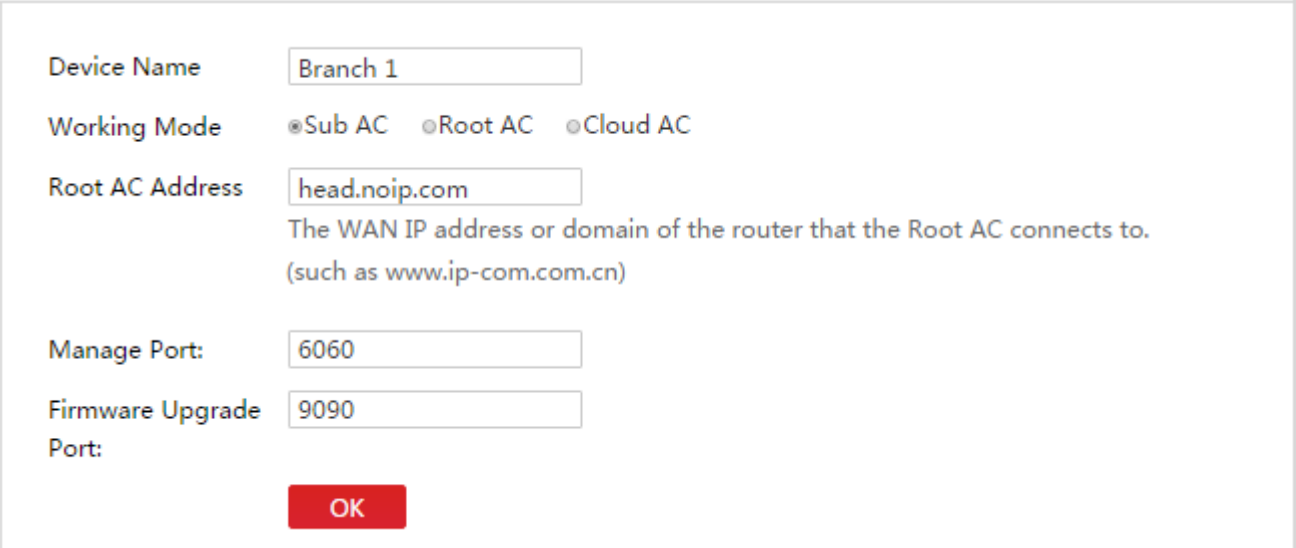
1. Log in to the Web UI of the access controller, and go to **System Tools→Maintain →System Mode**.
2. Device Name: In order for the administrator at the hotel headquarters to better locate each Sub AC, it is recommended to set to the location of each branch, such as “Branch 1”.
3. Working Mode: Select “Sub AC”.

4. Root AC Address: Enter “head.noip.com”.

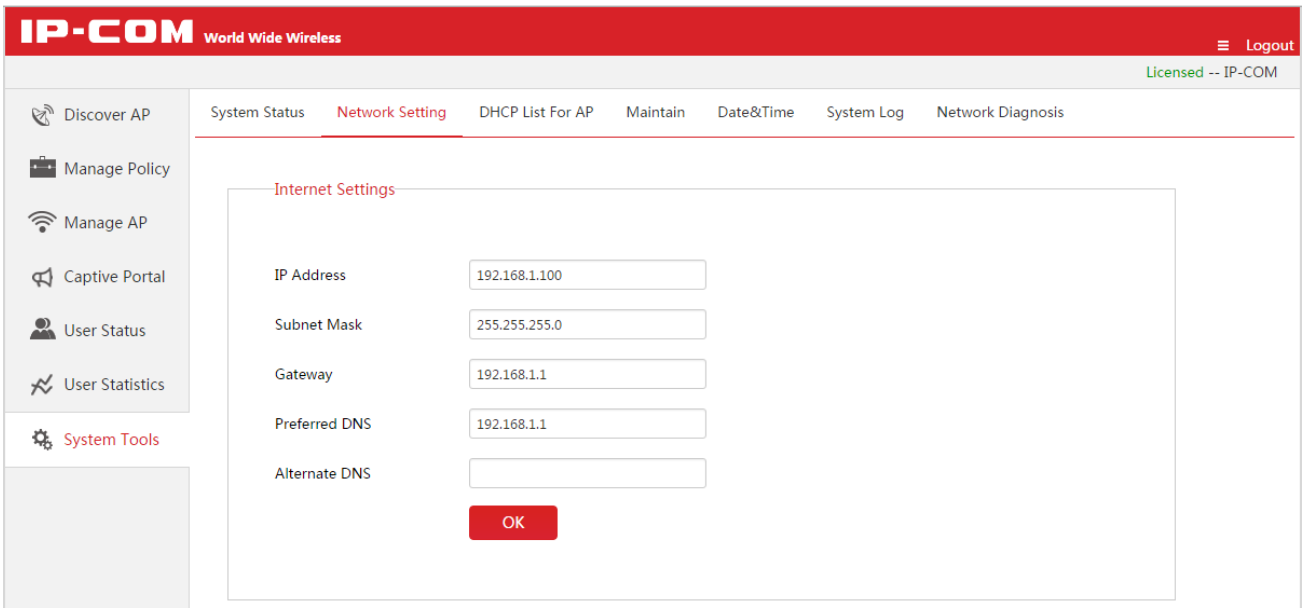
5. Manage Port: Enter "6060".

6. Firmware Upgrade Port: Enter "9090".

7. Click OK.



8. Go to **System tools→ Network Setting→ Internet Settings** to configure the corresponding parameters to make the access controller connect to the Internet through the gateway. In this example, we configure the parameters as follows.

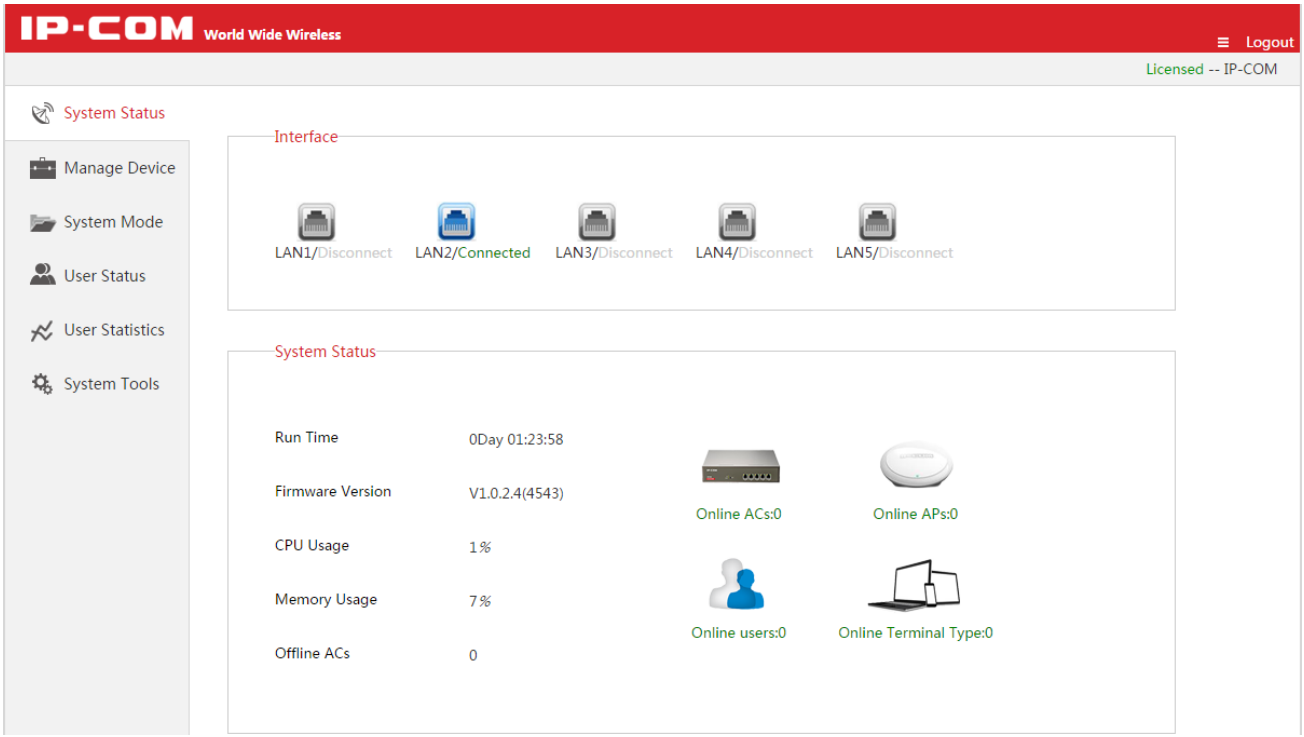


9. Go to **Captive Portal**, and create advertisements and deliver them to Sub ACs in each branch.

   For details, please refer to 4.4 Captive Portal.

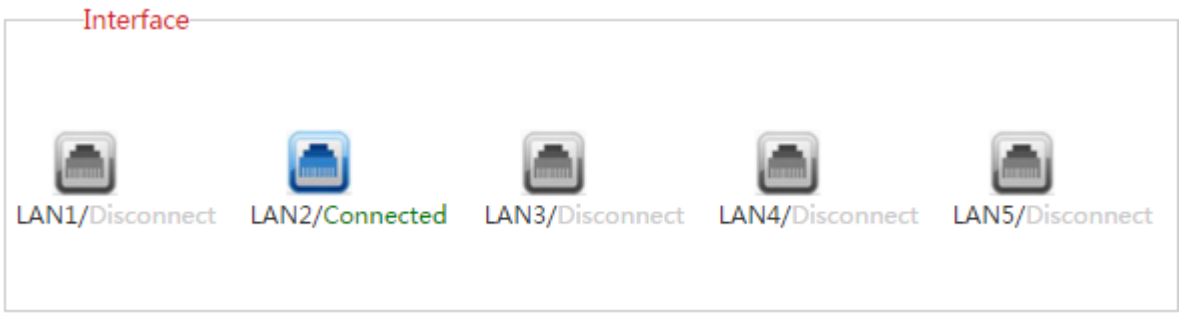
6.2 System status

This page displays the physical interface status, system status, and network connection status of the access controller. Click **system status** to access the page.

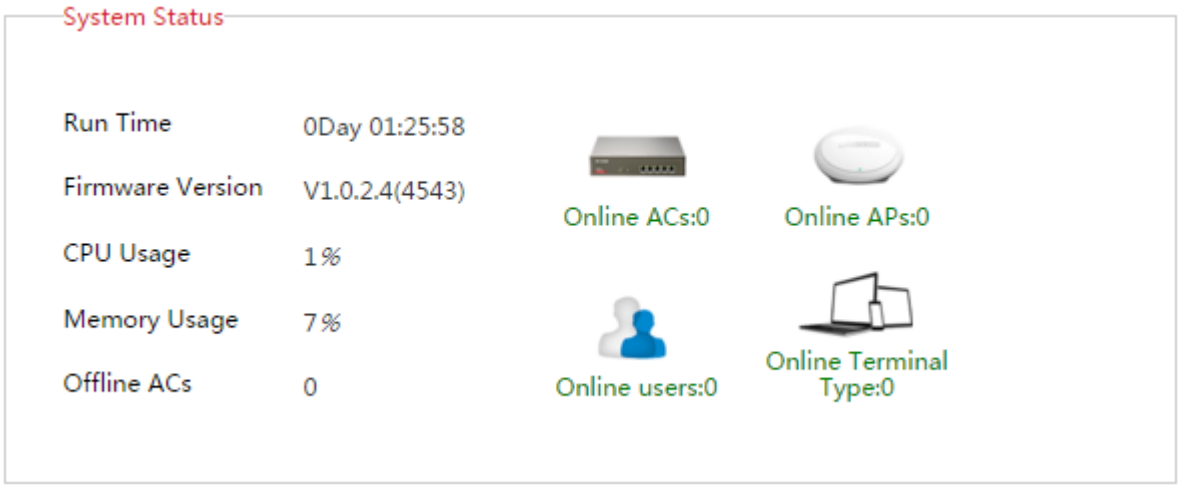


Interface status

This section displays the connection status of each physical interface of the access controller.



System status

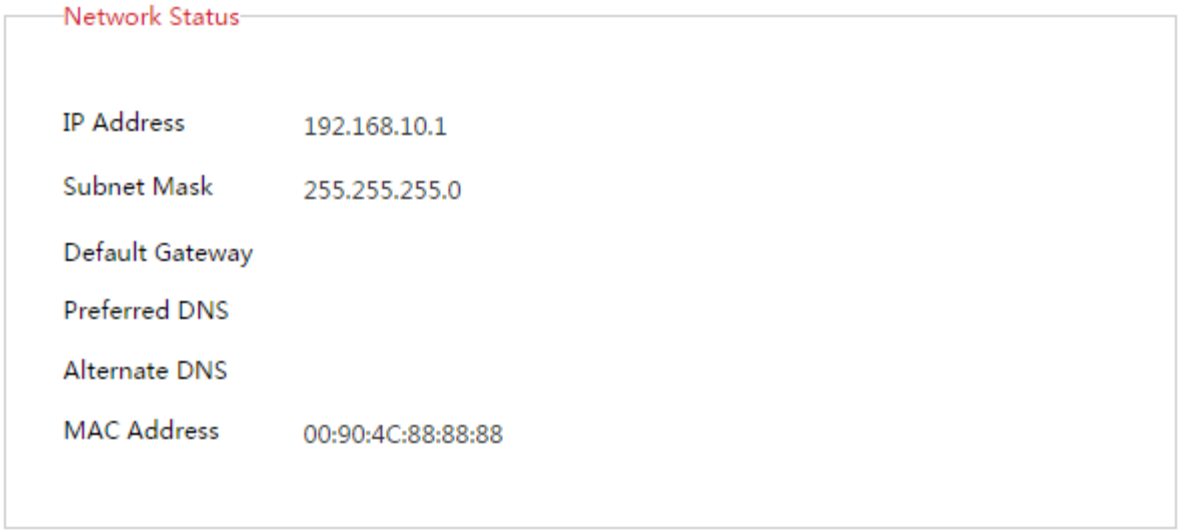


This section displays the the status of following parameters.

Item	Description
Run Time	Displays the duration of time that the access controller has been running from last reboot. Run time will be reset when the access controller reboots.
Firmware Version	Displays the current firmware version of the access controller. After upgrading a firmware for the access controller, check the version here to ensure the firmware has been upgraded successfully.
CPU Usage	Displays the percentage of used CPU space.
Memory Usage	Displays the percentage of used memory space.
Offline ACs	Displays the amount of offline Sub ACs.
Online ACs	Displays the amount of online Sub ACs.
Online APs	Displays the amount of online APs that connect to online Sub ACs.
Online users	Displays the amount of online users that connect to online APs.
Online Terminal Type	Displays the amount of online terminal types. For example, if the online terminals only include IOS and Andriod, then the amount is 2.

Network status

This section displays IP information and MAC address of the access controller.



6.3 Device management

If you want to check the information of Sub ACs and their managed APs, or remotely upgrade a firmware for Sub ACs, or log in to Sub ACs, then follow this section to help you.

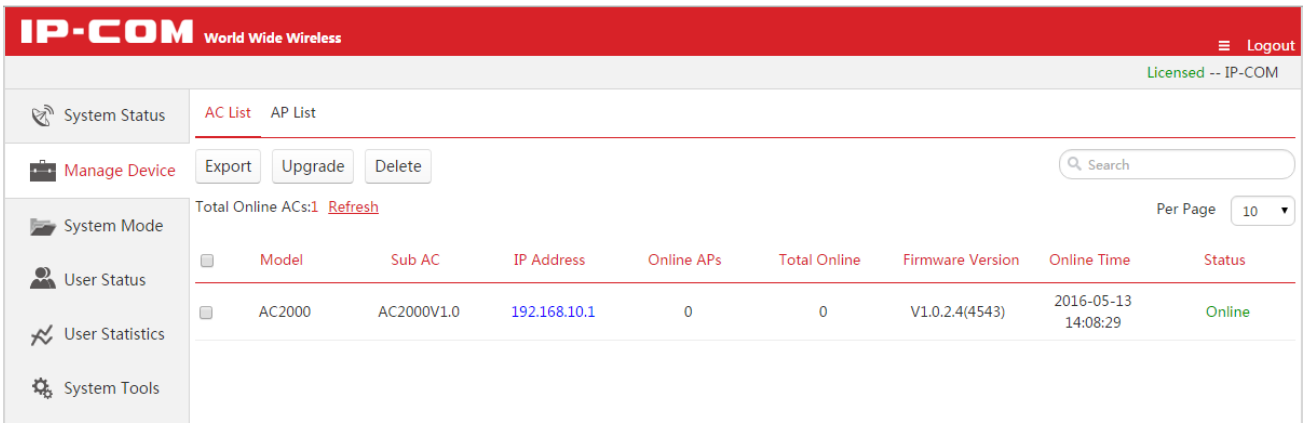
Tip

Sub ACs report information (such as Sub AC information, AP information) to Root AC at intervals of 15 minutes.

6.3.1 AC List

Overview

To check Sub AC's status, upgrade a firmware for Sub ACs or log in to Sub ACs, please click **Manage Device→AC List** to enter the following page.



Buttion Description:

Export	Click the button to export Sub ACs' information on this page.
Upgrade	Click the button to upgrade a firmware for selected Sub ACs.
Delete	Click the button to delete information of selected offline Sub ACs.

Parameter Description:

Item	Description
Model	Display the device type of Sub AC, such as AC2000.
Sub AC	Display the name of Sub AC. In order to manage different Sub ACs easily, it is recommended to set up the Sub AC's name to the Sub AC's branch name or location.
IP Address	Display the public IP address of Sub AC. You can click the address to remotely log in to the Web UI of Sub AC.
Online APs	Display the total number of APs manged by the Sub AC currently.
Total Online	Display the total number of online users connected to the online APs.
Firmware Version	Display the system firmware version of Sub AC.
Online Time	Display the online moment when Sub AC connects to Root AC.
Status	Display whether the Sub AC is online or offline. Online: The Sub AC and Root AC have successfully established a connection, and the Root AC can manage the Sub AC. Offline: The Sub AC and Root AC fail to establish a connection and the Root AC can't manage the Sub AC.

Export the AC List

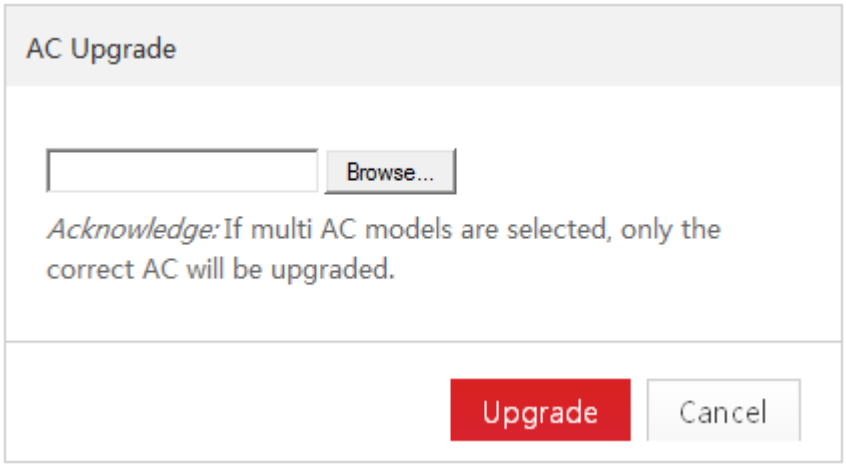
To export this page's information into an appropriate directory, click Export on the page and then follow on-screen instructions. The exported file is in the format *Filename.xls*.

If a warning message appears when you open the exported file, click Yes(Y).

Upgrade a Firmware for Sub AC

To upgrade a firmware for online Sub ACs:

1. Check the box to select the Sub ACs.
2. Click Upgrade to enter the following page.



3. Click Browse ... to select and upload a firmware from an appropriate directory.

   (The firmware must correspond to the AC model.)

4. Click Upgrade and then follow the on-screen instructions to complete the upgrade process.

Note

When an AC firmware is upgrading, please DO NOT power off the AC or it may cause damage to the AC! If a sudden power off occurs, please upgrade again. If you cannot log in to AC's Web UI after a sudden power off, please contact our technical support engineer.

Delete Offline Sub ACs

To delete offline Sub ACs:

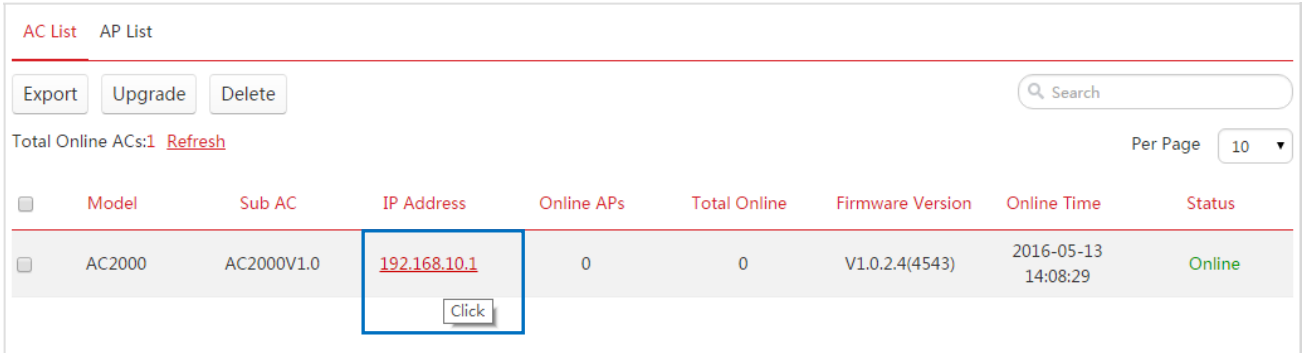
1. Check the box to select the offline Sub ACs.

   (Online ACs will not be deleted even if you select them.)

2. Click Delete on this page.

Remotely Login the Web UI of Sub AC

If you want to remotely log in to the Web UI of a Sub AC, click its IP address, shown as follows.

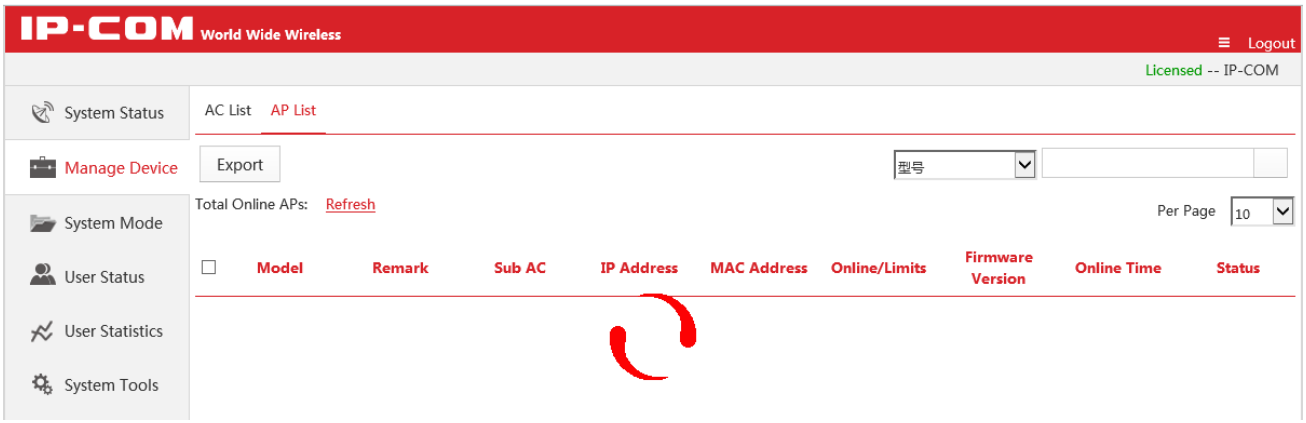


6.3.2 AP List

Overview

To check the APs' information, please click **Manage Device → AP List** to enter the following page.

All APs in this section are managed by Sub ACs, the status of the APs may be online of offline.



Buttion Description:

Export Click the button to export APs' information displayed on the page.

Parameter Description:

Item	Description
Model	Display AP model.
Remark	Display AP remark. In order to manage different AP easily, it is recommended to set up the Remark name as AP's branch name or location.
Sub AC	Display the name of Sub AC which the AP connects to. In order to manage different Sub ACs easily, it is recommended to set up the Sub AC name to the Sub AC's branch name or location.
IP Address	Display the AP's IP address.
MAC Address	Display the AP's MAC address.
Online/Limits	"Online" represents the amount of instant online users which connect to all SSIDs of the AP, and "Limits" represents the max users which are allowed to connect to the AP.
Firmware Version	Display the AP's current firmware version.
Online time	Display the online moment of the AP.
Status	Display whether the AP is online or offline. Online: The AP and Sub AC have successfully established a connection, and the Sub AC can

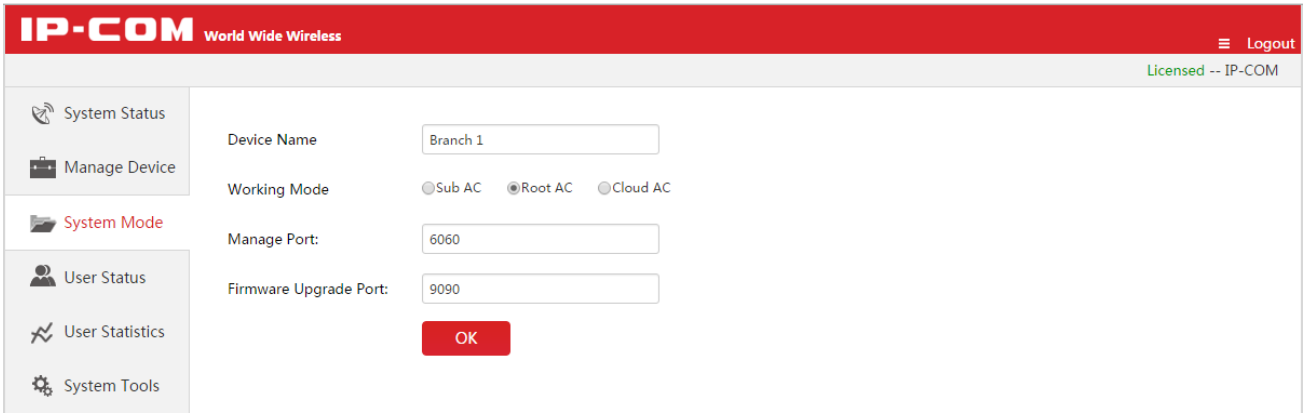
	manage the AP. Offline: The AP and Sub AC failed to establish a connection and the Sub AC can't manage the AP. **Tip** If the AP is offline, it keeps configuration delivered before. Users can still use their wireless network unless the AP is restored to factory default.

Export the AP list

To export this page's information into an appropriate directory, click Export on the page and then follow on-screen instructions. The exported file is in the format *Filename.xls*.

If a warning message appears when you open the exported file, click Yes(Y).

6.4 System mode



For the configuration in this section, please refer to System mode in "Cloud AC" mode.

6.5 User status

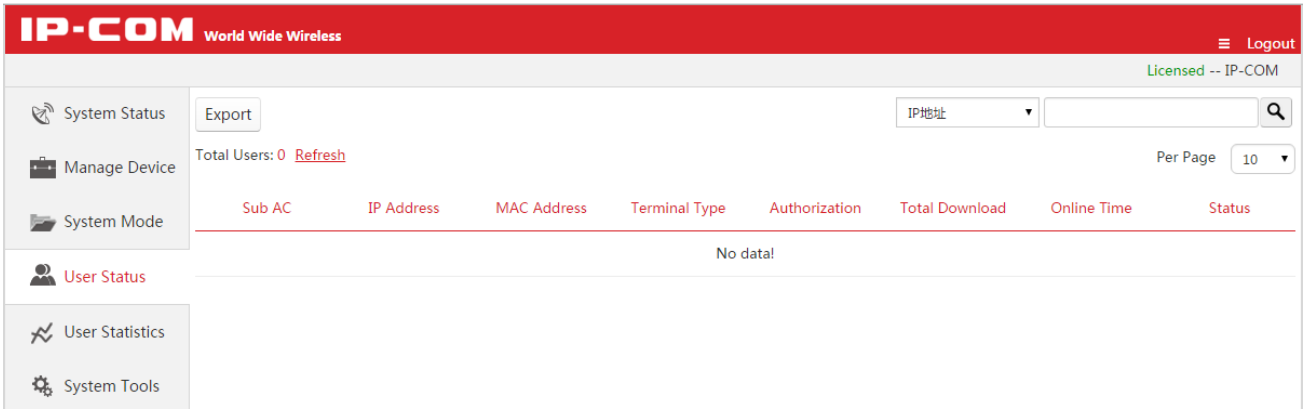
Overview

To view users' information, or export the information to an appropriate directory, please click **User Status** to enter the following page.

All the users in this section are managed by APs, and the APs are managed by Sub ACs.

Tip

Sub ACs report information (such as Sub AC information, AP information) to Root AC at intervals of 15 minutes.



Parameter Description:

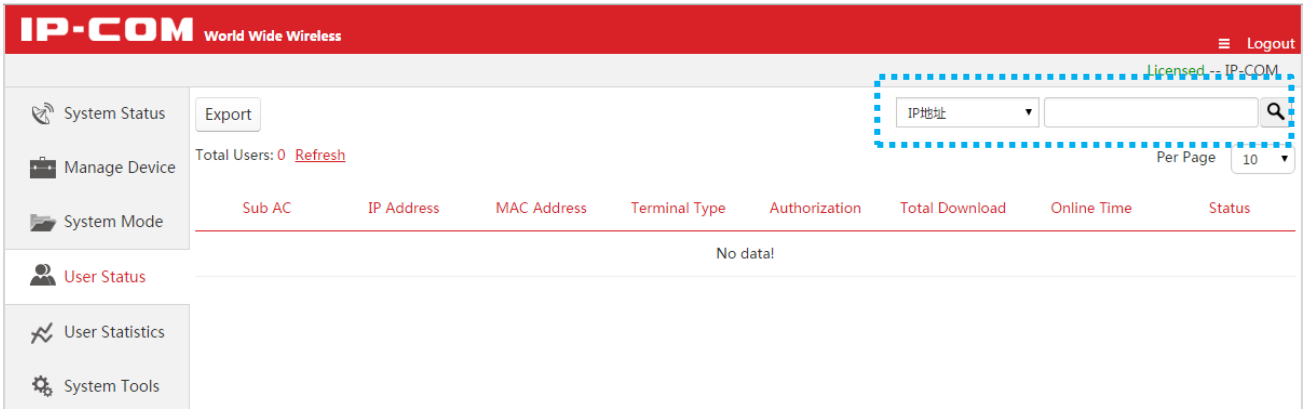
Item	Description
Sub AC	Display the name of Sub AC which the user connects to through the AP.
IP address	Display the online user’s IP address.
MAC address	Display the online user’s MAC address.
Terminal type	Display the online user’s operation system.
Authorization	Display the online user's authorization method.
Total download	Display the total amount of data downloaded by the user.
Online Time	Display the online duration of the user.
Status	Display whether the user is online or offline.

Export

To export this page’s information into an appropriate directory, click Export on the page and then follow on-screen instructions. The exported file is in the format *Filename.xls*.

If a warning message appears when you open the exported file, click Yes(Y).

Search

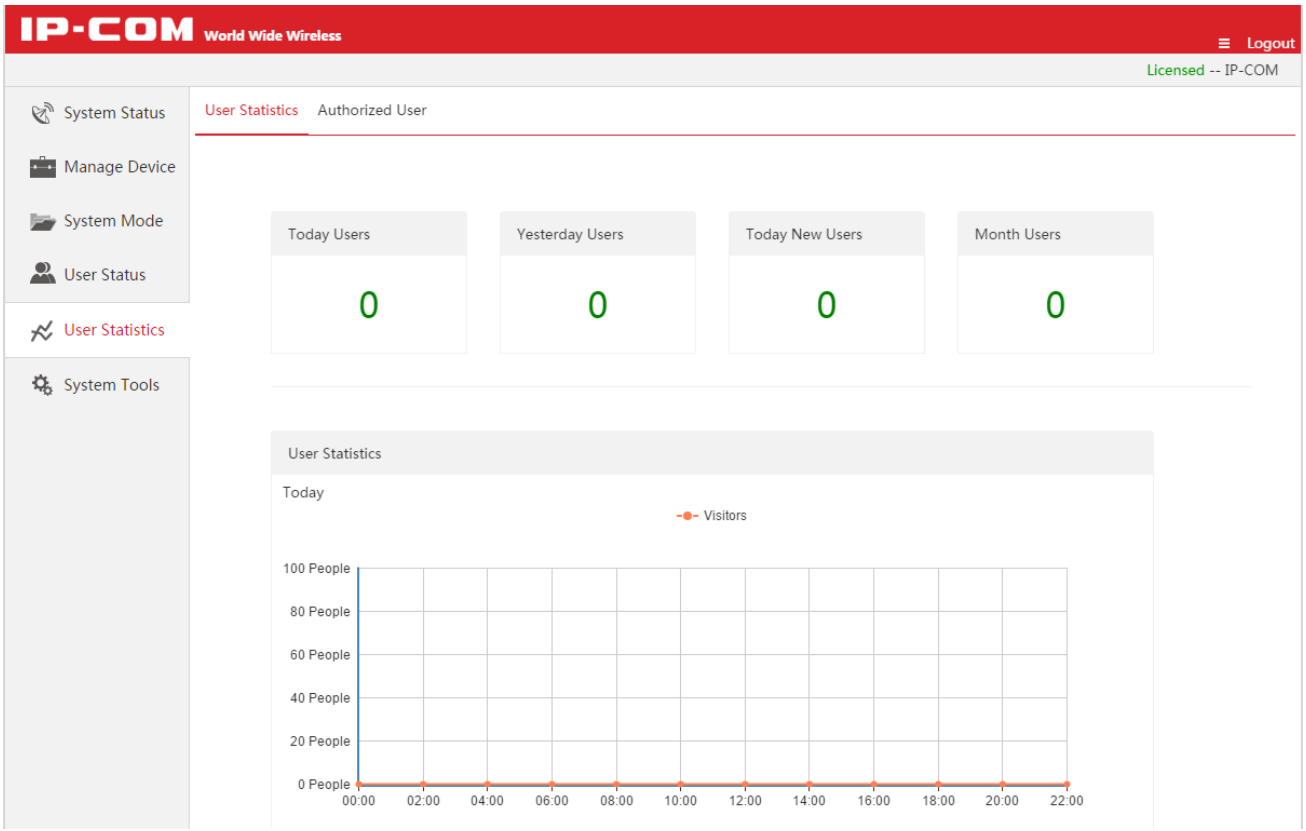


In the top right corner, you can search a specified user lists based on IP address, MAC address, authorization method or terminal type.

6.6 User Statistics

Sub ACs report information (such as Sub AC information, AP information) to Root AC at intervals of 15 minutes.

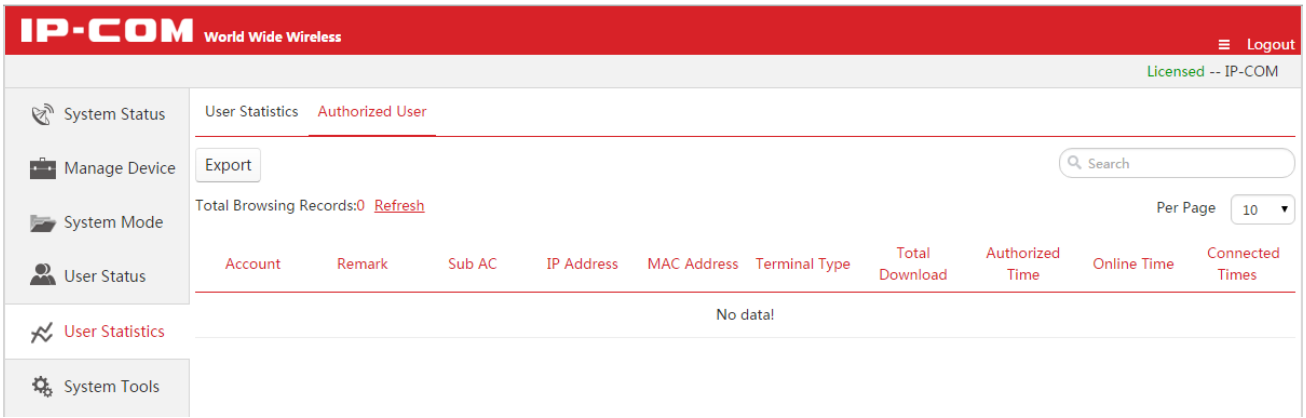
6.6.1 User Statistics



For the configuration in this section, please refer to 4.6.1 User Statistics in “Cloud AC” mode.

6.6.2 Authorized User

To view the information of authorized user, please click **User Statistics→Authorized User** to enter the following page. This page only displays the information of authorized users in this month.



Button Description:

Export	Click this button to export the detail information of authorized users in this month.
Delete	Click this button ot delete all the user information which corresponds to offline APs.

Parameter Description:

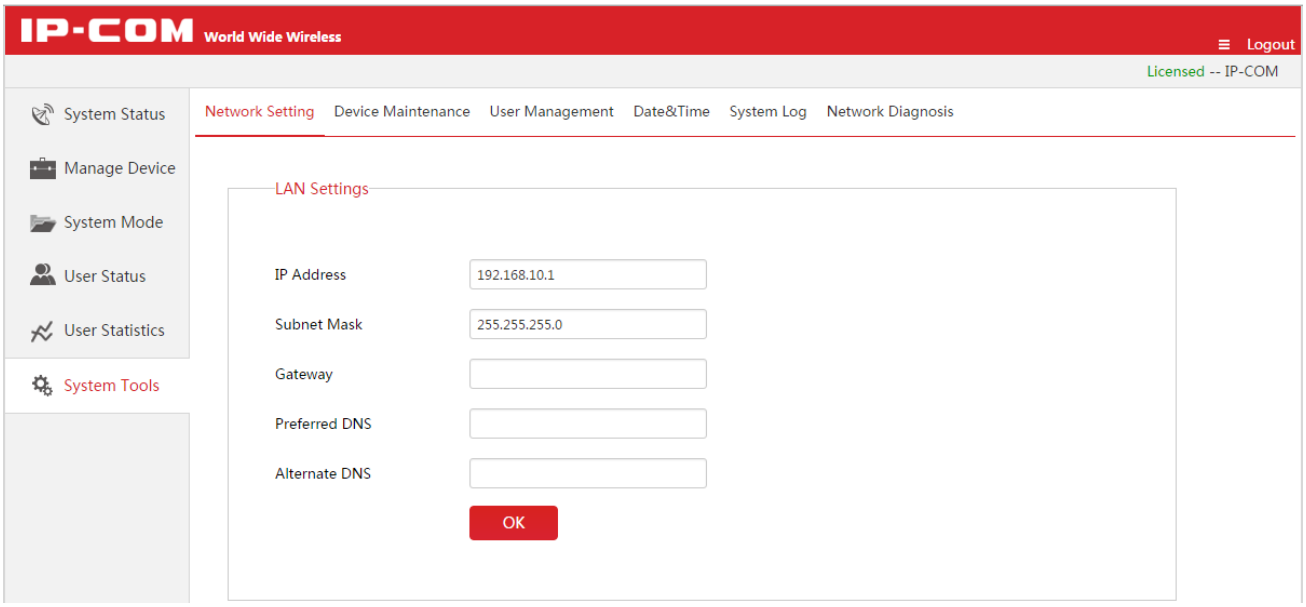
Item	Description
Account	Display the authorization account and its authorization method of the user.
Remark	Display the description of AP which the user has connected to.
Sub AC	Display the name of Sub AC which the user connects to through the AP.
IP Address	Display the IP address that the user has obtained.
MAC Address	Display the MAC address of the user.
Terminal Type	Display the terminal type or operating system of the user.
Total Download	Display the total download traffic of the user.
Authorized Time	Display the authorized time of the user for the first time.
Online Time	Display the user's total amount of online time to surf the Internet.
Connected Times	Display the amount of times the user has connected to the AP.

6.7 System tools

6.7.1 Network settings

To make the Root AC connect to Internet, you need to set up the network settings for the Root AC.

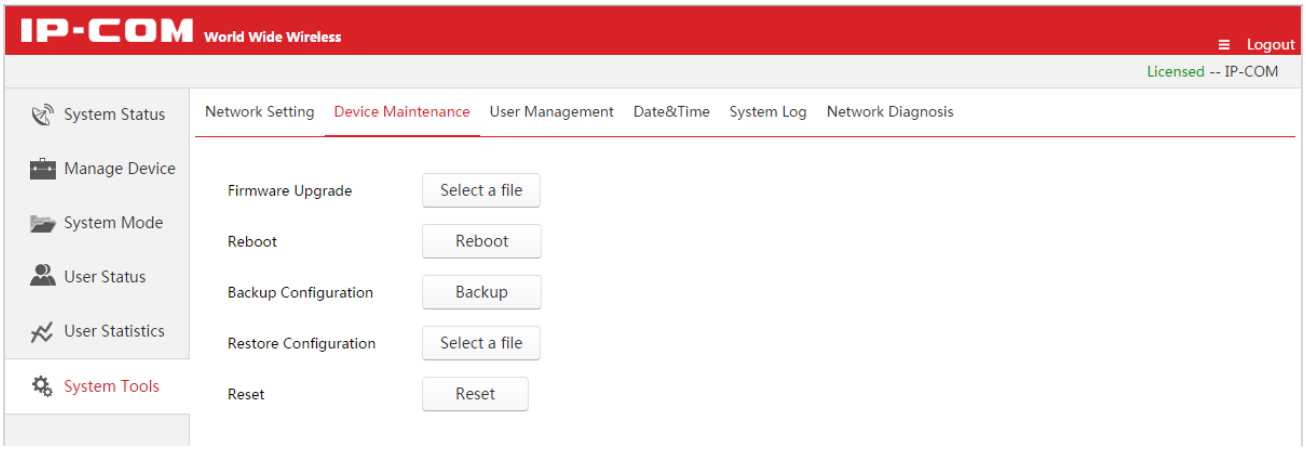
Click **System Tools → Network Setting** to enter the following page.



Parameter Description:

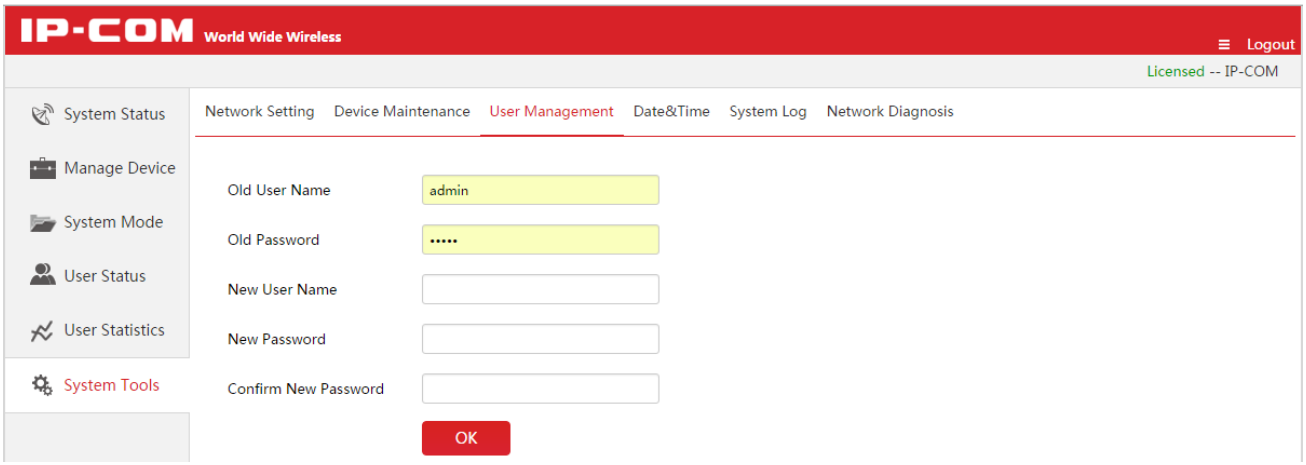
Item	Description
IP Address	Set up the AC's IP Address. In order to connect to Internet, in general, this IP address and the uplink router's LAN IP address should be on the same IP segment.
Subnet Mask	Set up the AC's subnet mask. The default value is 255.255.255.0.
Gateway	Set up the AC's default gateway. In order to connect to Internet, in general, it is set to the uplink router's LAN IP address.
Preferred DNS	Set up the AC's DNS server address. It is generally set to the uplink router's LAN IP address.
Alternate DNS	Optional: When the Preferrd DNS address goes wrong, the Alternate DNS address will take the place of Preferred DNS address.

6.7.2 Device maintenance



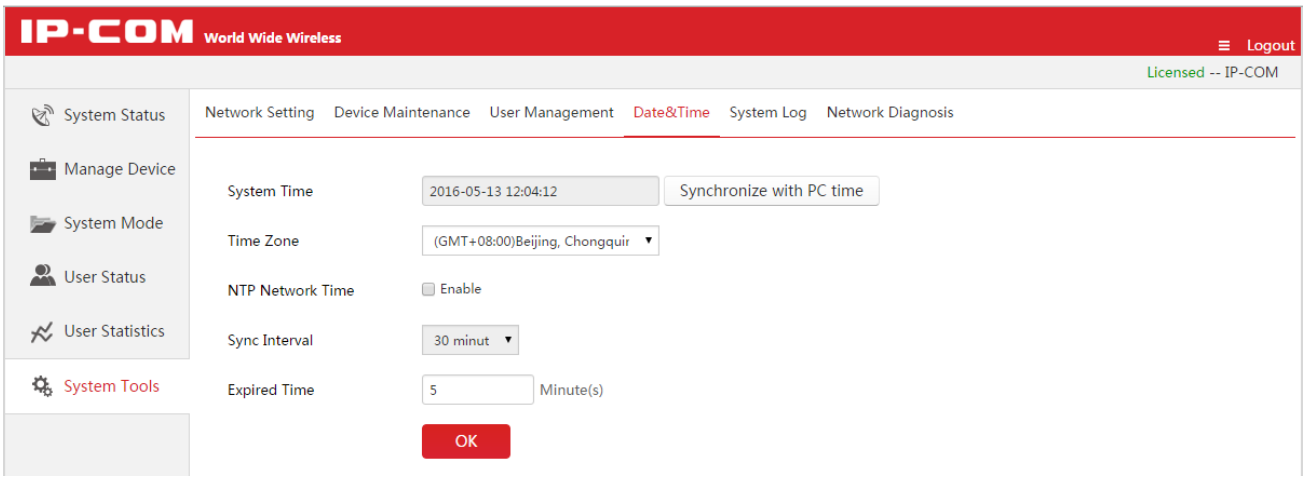
For the configuration in this section, please refer to Maintenance in “Cloud AC” mode.

6.7.3 User management



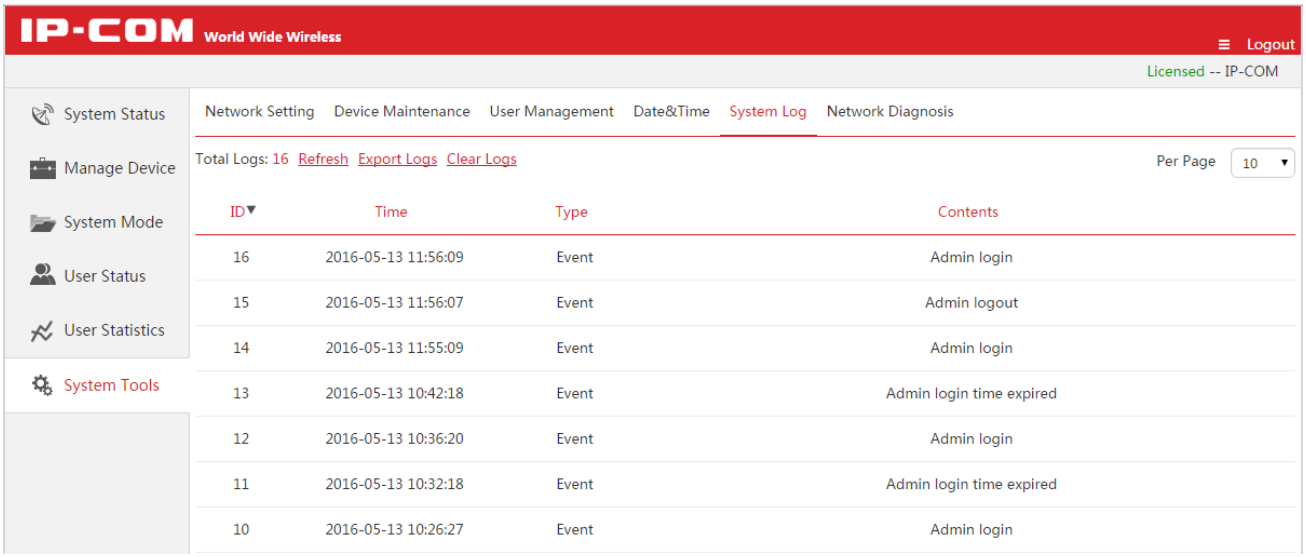
For the configuration in this section, please refer to User Management in “Cloud AC” mode.

6.7.4 Date&Time



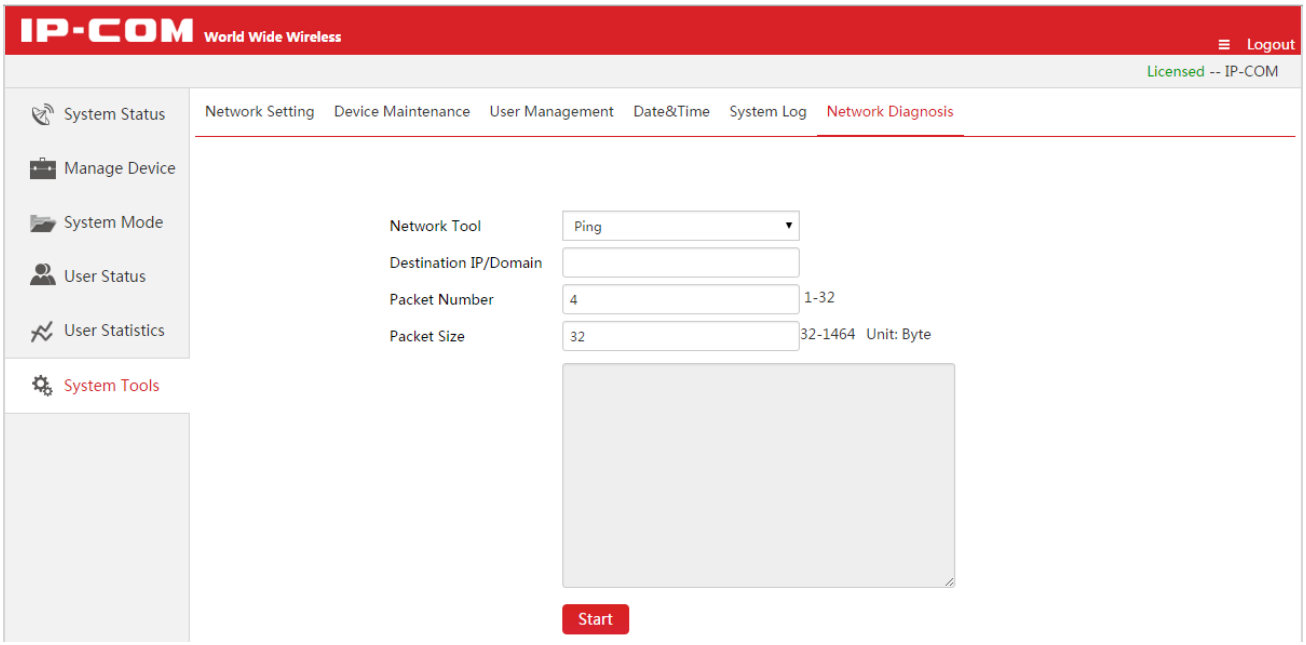
For the configuration in this section, please refer to 4.7.4 Date&Time in “Cloud AC” mode.

6.7.5 System Log



For the configuration in this section, please refer to 4.7.5 System log in “Cloud AC” mode.

6.7.6 Network Diagnosis



For the configuration in this section, please refer to 4.7.6 Network Diagnosis in “Cloud AC” mode.

Appendix

A Troubleshooting

Question 1: What should I do if I fail to log in to the AC's Web UI with "192.168.10.1" for the first time?

Answer: Please try the following methods step by step to solve your problem:

1. Ensure that the IP address of your computer is 192.168.10.X ("X" is 2~254), and try again.
2. Empty the browser cache or replace another browser, and try again.
3. Disable the computer's firewall or replace another computer, and try again.
4. Restore the AC to its factory default, and try again. For details, refer to **Question 3**.
5. Ensure that any other devices's IP address is not 192.168.10.1, and try again.

Question 2: What should I do if I foget the login user name and password to log in to the AC's Web UI?

Answer: Try the following methods to solve your problem:

- Please use the default login information (IP is "192.168.10.1", user name is "admin", and password is "admin") to login again.
- If that does not work, please restore the AC to its factory default, and use the default login information to re-login. Please refer to **Question 3** to restore the AC to factory default.

Question 3: How can I restore the AC to its factory default?

Answer: When the AC is powered on, press the **RESET** button on the front panel and wait for about 2 minutes, the AC completes the restore process. You can use a needle to press the **RESET** button.

Note

After you restore the AC to its factory default, all the manually configured settings will be lost, and you need to do one of the following things:

- Manually set up the configurations again.
- If you fortunately backup the appopriate configurations before, you can restore the previous configurations to AC, without manually setting the configurations again. To backup and restore the configurations, refer to Backup Configuration and Restore Configuration.

Question 4: My wirelesss terminals can't connect to my AP normally, why?

Answer: This AC's build-in DHCP server can only assign IP address to AP so that the wireless terminals can't obtain IP address from the AC's DHCP server.

You need to set up another DHCP server to assign IP address to the terminals.

If you have any other questions, please go to IP-COM website http://www.ip-com.com.cn, or send an E-mail to info@ip-com.com.cn, or make a telephone call: (86 755) 2765 3089, and we will serve you as soon as possible.

B Factory Default Settings

Item		Default Value
Login information	Login Method	http (Web UI)
	Login IP	192.168.10.1
	Login user name	admin
	Login password	admin
	Login time-out duration	5 minutes
Advertisement delivery		Disabled
Policy configuration		Null
Internet configuration		Not configured
LAN Setting	IP address	192.168.10.1
	Subnetwork mask	255.255.255.0
DHCP Setting	Status	Enable (Can’t be disabled)
	Start IP	192.168.10.100
	End IP	192.168.10.200
	Gateway	Null
	Primary DNS	Null
	Alternate DNS	Null
	Lease Time	One week
VLAN configuration		Null
License	Status	Licensed
	Max Managed APs	256
System mode	Device name	AC2000V1.0
	Working mode	Sub AC
	Root AC Address	Null
	Manage Port	Null
	Firmware Upgrade	Null

	Port	
User management	Login user name	admin
	Login password	admin
Time setup	NTP network time	Enable
	Sync Interval	30 minutes
	Time zone	(GMT+08:00)Beijing, Chongqing, Hong Kong Special Administrative Region (HKSAR), Urumchi
	Expired Time	5 minutes

C Safety and Emission Statement

CE Mark Warning

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

NOTE: (1) The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. (2) To avoid unnecessary radiation interference, it is recommended to use a shielded RJ45 cable.

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

— Reorient or relocate the receiving antenna.

— Increase the separation between the equipment and receiver.

— Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

— Consult the dealer or an experienced radio/TV technician for help.

Caution!

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: (1) The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. (2) To avoid unnecessary radiation interference, it is recommended to use a

shielded RJ45 cable.