



IO-Power Outdoor WiFi MIMO AP

APM-101RH / APM-102RH / APM-103RH

Quick Installation Guide V5

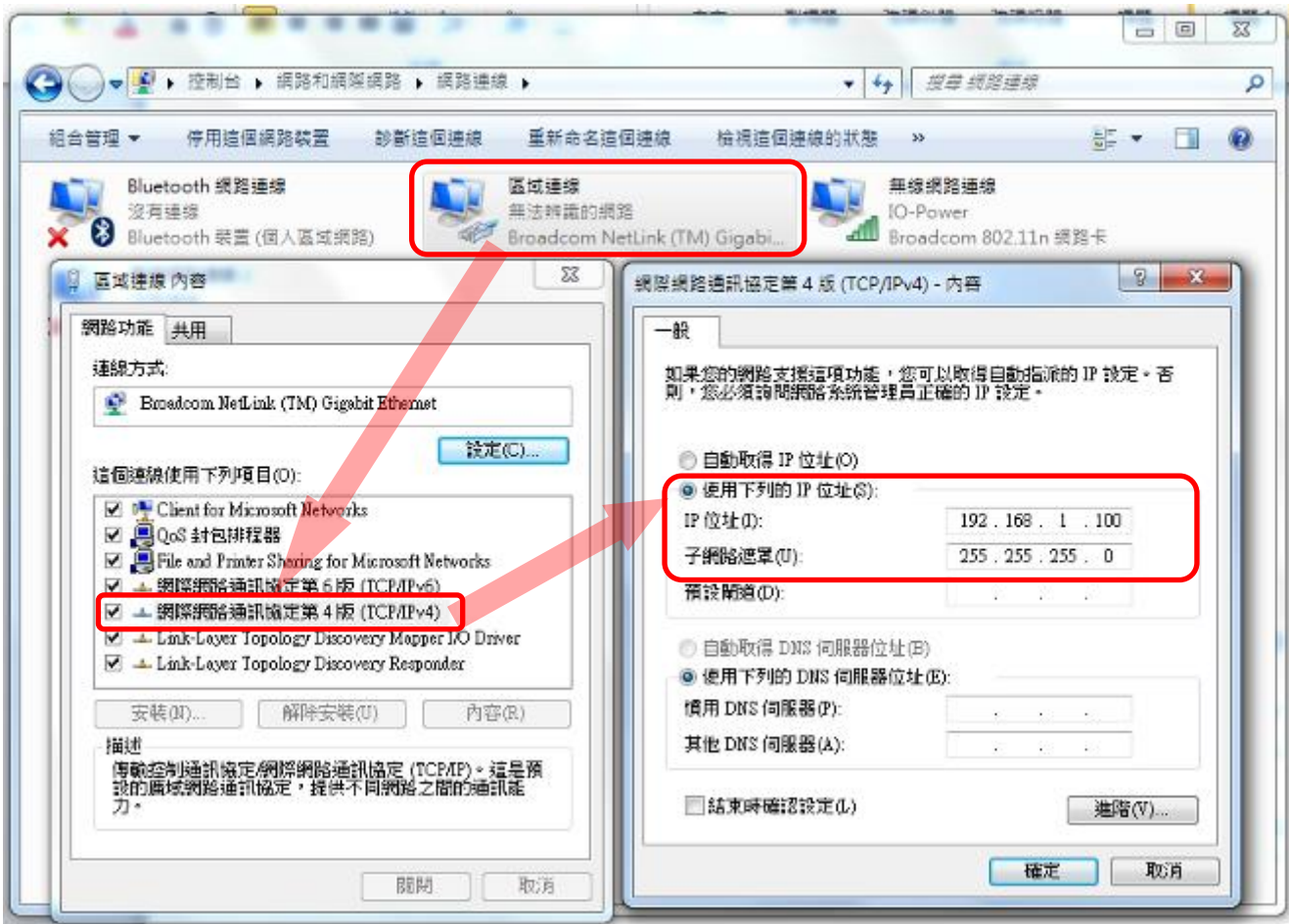
1. System Login

1-1. Log in wireless device through TCP/IP & web browser IP.

A. Set up the IP address of LAN in your computer, set 192.168.1.X (Fixed IP)

(EX: 192.168.1.100)

Remind: IP address of Computer and Wireless device must be the same network segment.



1-2. Power Supply from PoE Install

A. PoE Power Supply Install :

110VAC Adapter transformer to 19VDC power and power through DC connector plugged into DC port and output PoE-48VDC power through PoE's RJ-45 network for wireless devices (Power + Data Out) and plug the other end of the network cable from your computer to a wired network RJ-45 Port (Data In), to build wireless devices and computer cable online.



B. Adapter Install:



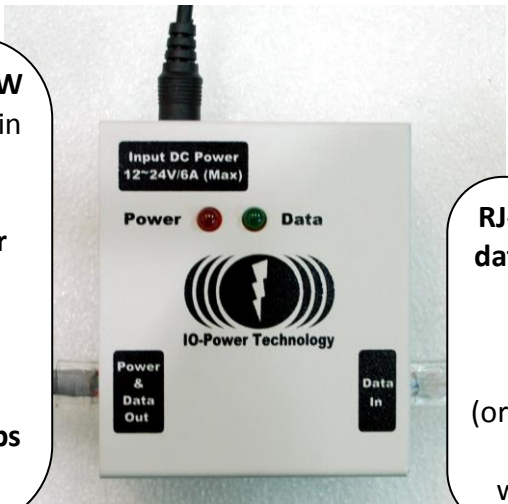
C. PoE (Power over Ethernet) Power Supply for Device:



The bottom of the wireless device POE Ethernet waterproof port

Insert the DC connector of the transformer and power supply input is over more than **12VDC/4A ~ 24VDC/3A**;
 full load power consumption: **APM-101RH needs 10W/H, 102RH 14W/H, 103RH you want to 22W/H.**

PoE (Power over Ethernet) Passive type 48V-72W
 RJ-45 Ethernet jacks, power and data contained in the network cable and power supply to the wireless device and for data transmission.
 --PoE (Power over Ethernet) Passive type power supply maximum 72W/H
 --Network bandwidth is 1Gbps
 --Power supply distance 300 m
 --Network transmission distance of 150 meters
 --Use Cate 5e network cables to cope with 1Gbps transmission.



RJ-45 Ethernet jacks, data contained in the network cable, connect to the computer (or LAN, or camera, or ADSL, or other wireless device ...)

Special note 1: APM-101RH/APM-102RH/APM-103RH with high power RF module, power consumption is relatively large; it is recommend that PoE-48VDC use 72W Passive power pattern.

Special note 2: PoE Power supply Injector, LED lights display:

- PoE (Power over Ethernet) Passive type (48V-72W): after you plugged into power, red LED lit up, after you plug the network cable, **the green light does not light.**
- PoE (Power over Ethernet) Standard type (48V-32W): after you plugged into power, red LED lit up, after you plug the network cable, **the green light lit up.**



1-3. How to run Web UI:

A. Enter the address in the website <http://192.168.1.1>

(The default IP address of wireless devices is 192.168.1.1)

Front-page of wireless devices.



B. Enter account and password, Login to the system (Default Account: admin , Default Password: admin)





2. System Setup (Wireless Devices IP address setup)

2-1. Basic Setup (** No need to setup on this page **)

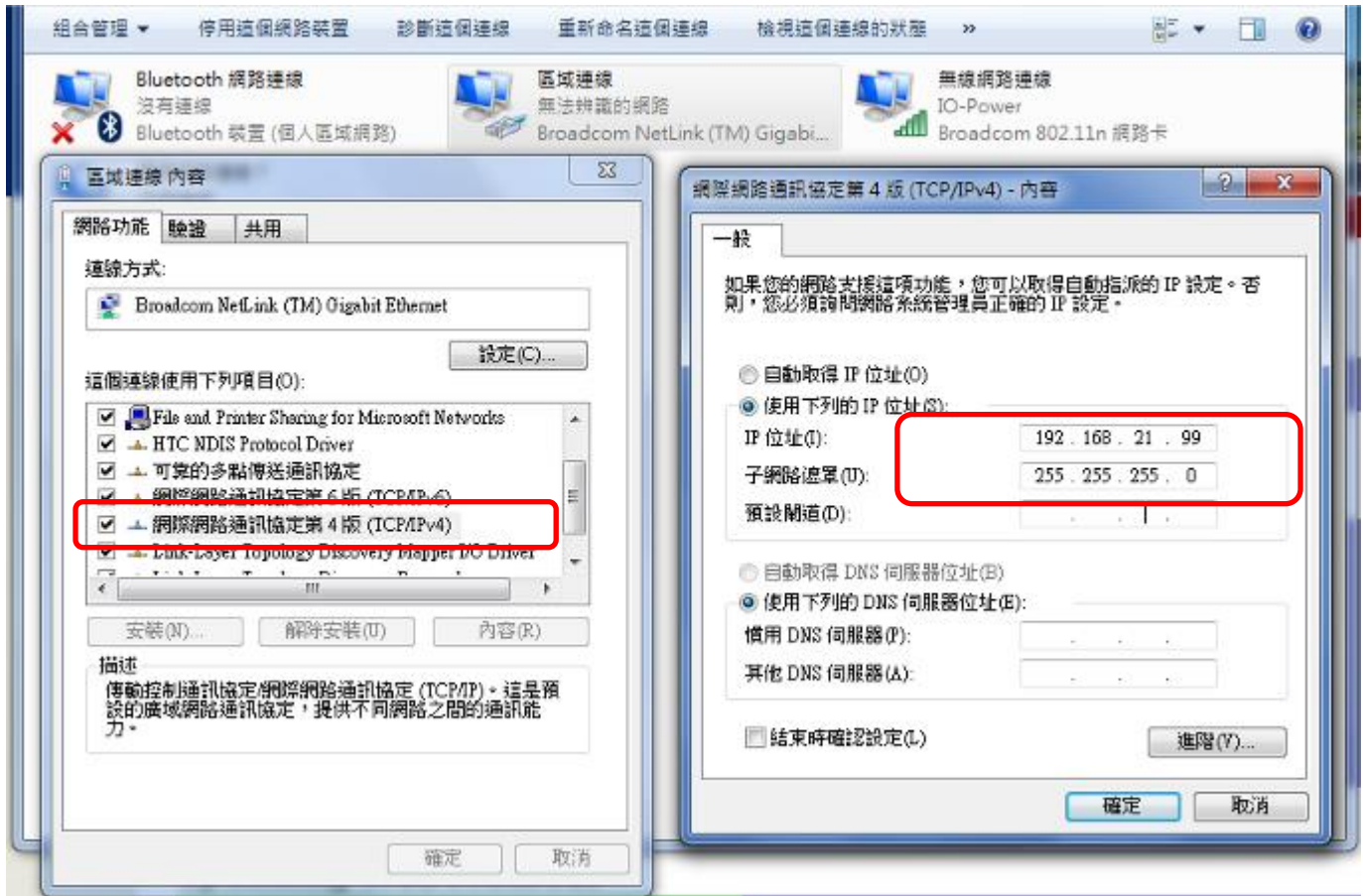
The screenshot shows the 'System Basic' and 'System Time' configuration sections. The 'System Basic' section includes fields for Language (English), Device Name (IO-Power), and Language (English). The 'System Time' section includes fields for System Date (2000-01-05), System Time (05:21:58), Time Synchronization (NONE), GMT Timezone (GMT), and Time Server. There are 'Cancel' and 'Apply' buttons at the bottom.

2-2. Network Setup (** Necessary setup on this page **) IP address setup of wireless devices. **Suggest you to change the 192.168.1.1 network segment, in order to avoid conflict with the IP address of the other network devices, such as 192.168.21.1 instead of 21 segments.**

The screenshot shows the 'System Operation Mode' and 'IP Setup' configuration sections. The 'System Operation Mode' section shows Mode: Bridge. The 'IP Setup' section shows IP Address: 192.168.1.1, Subnet Mask: 255.255.255.0, Default Gateway: 0.0.0.0, DNS 1: 0.0.0.0, and DNS 2: 0.0.0.0. A red box highlights the Subnet Mask field, and a red arrow points down to the 'IP Setup' section below, where the IP Address field is highlighted with a red box and contains the value 192.168.21.1.



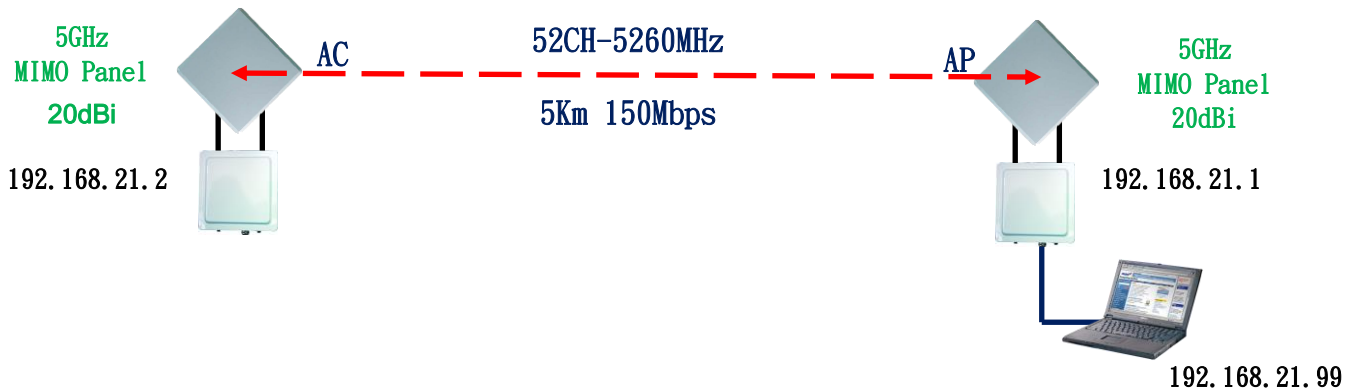
Reminds: When the IP address has been changed (EX.192.168.21.1) , Be sure to change to the same network segment of your computer (EX.192.168.21.99) , Then keep up setting.





3. Wireless setup (P to P wireless device setting)

EX: Planning two APM-101R , set a Point to Point wireless transmission system.



3-1. (AP Mode) Radio Setup (Wireless setup-NIC setting)

Exp: Red frame option must be set. Green frame option , set by default do not need to change.



3-2. (AP Mode) WLAN Setup (Wireless operation setting—Wireless software setting)

Exp: Wireless AP(Access Point = AP)has to set a name(SSID) , for other wireless devices(Wireless Station = AP Client = AC)。 PTP_AP1_1 is the name of wireless device this time(SSID)。

Wireless station SSID setup

Select wireless Access Point SSID need broadcast or not

Select wireless interface Enable

Select wireless mode

Select limited data rate or Auto

Select wireless interface fixed rate or Auto

Select multicast limited rate or Auto

Press Apply

EXP: Red frame option must be set. Green frame option , set by default do not need to change.



**** Remember , IP address of second wireless device must be set 192.168.21.2****

3-3. (AC Mode) Radio Setup (Wireless operation setting— RF modules)

Radio Setup | WLAN Setup | Wireless Security | WMM Setup | Bandwidth Control

RADIO - 1

Wireless Band :	802.11n HT20	Wireless Band :	802.11n HT40 Plus
Channel :	1 CH - 2412MHz	Channel :	Auto
Transmission Power :	Full	Transmission Power :	Full
Antenna Number :	2	Antenna Number :	2
Short Guard Interval :	On	Short Guard Interval :	On(400ns)
Aggregation :	Enable	Aggregation :	Disabled <input type="radio"/> Enable <input checked="" type="radio"/>
Distance(x 100m) :	0	Distance(x 100m) :	10

Set the wireless response from the parameters each 100m represent 1 Unit Distance less than 1000 m, set 10parameters.

Select wireless band, AC and AP transmission need the same frequency mode.

Select wireless channel/frequency Recommend starting set the same channel to accelerate connection successful. and then change to Auto , helps to adjust AP channel , AC can Automatically change the channel to re-connection .

EXP: Red frame option must be set. Green frame option , set by default do not need to change.

3-4. (AC Mode) WLAN Setup (Wireless operation setting—Feature Setting)

Exp: Wireless AP(Access Point = AP)has to set a name(SSID) , for other wireless devices(Wireless Station = AP Client = AC)。PTP_AP1_1 is the name of wireless device this time(SSID)。

Radio Setup | **WLAN Setup** | Wireless Security | WMM Setup | Bandwidth Control

RADIO-1 WLAN Setup

SSID :	wireless_1	Broadcast	SSID :	wireless_1	PTP_AP1_1	<input checked="" type="checkbox"/> Broadcast
Enable :	Yes	Enable :	No <input type="radio"/> Yes <input checked="" type="radio"/>	WLAN Mode :	Wireless Station	
WLAN Mode :	Access Point	AP MAC Address :	00:00:00:00:00:00	RTS :	2312	
RTS :	2312	Fragmentation :	2346	Limited Data Rate :	Auto	
Fragmentation :	2346					
Data Rate :	Auto (Limited)					

Setting the wireless AP's SSID

Select WLAN mode Wireless Station

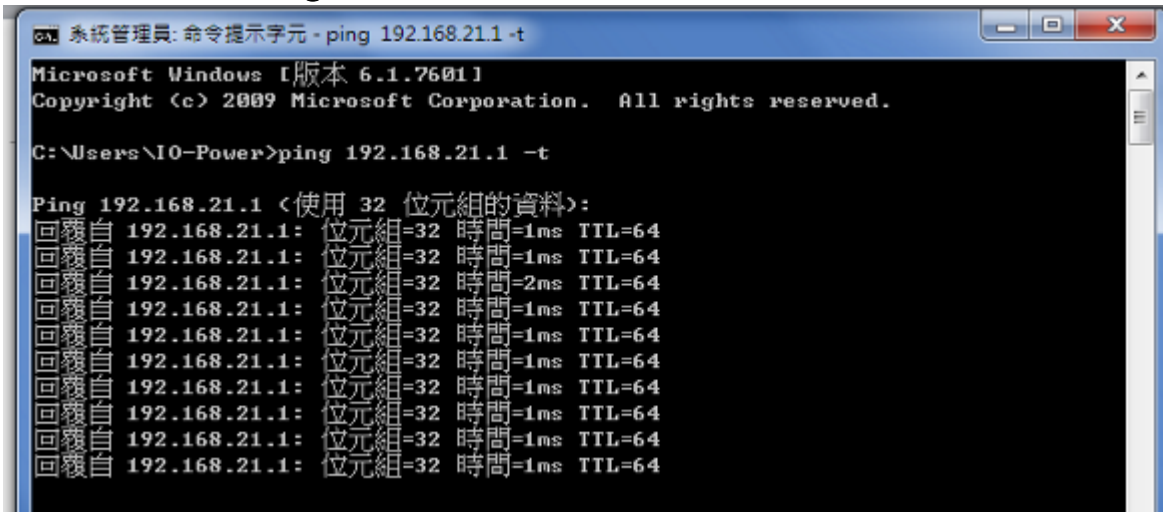
Strongly recommended Do not fill the AP Mac address , to avoid lock the AP , It will leads to it can no longer automatically connect with other AP .

EXP: Red frame option must be set. Green frame option , set by default do not need to change.

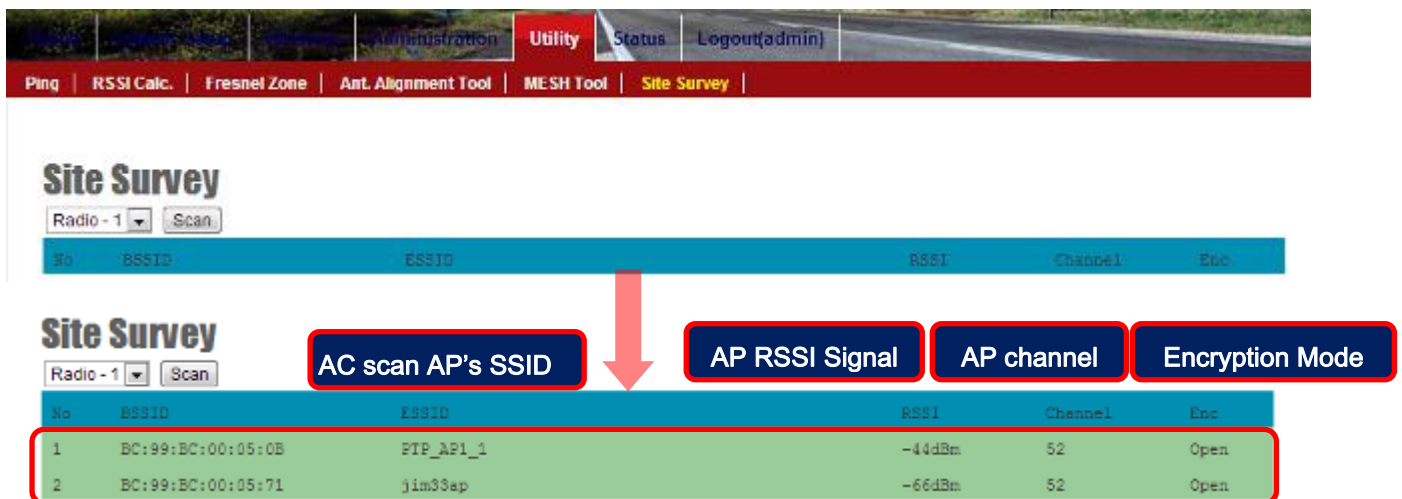


4. Test Point to Point wireless of AP & AC connection is complete

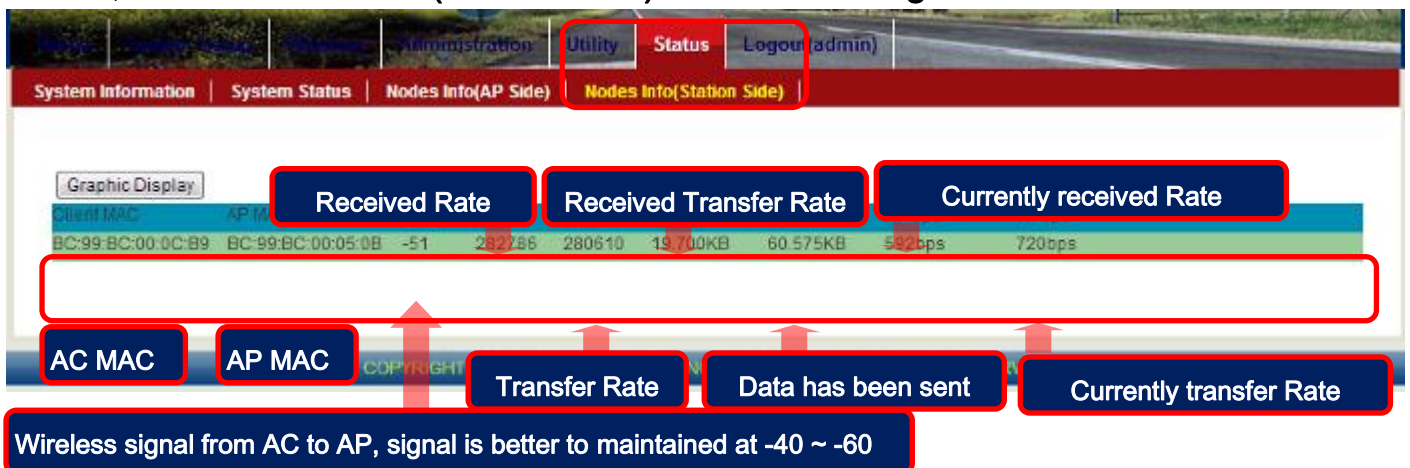
4-1. Check the Ping of the Wireless devices connection



4-2. From the client side of wireless AC (Wireless Station=AC) get into the website of device , in Utility/Site Survey, scan the AP signal of the environment.



4-3. From the client side of wireless AP (Wireless Station=AC) get into the website of device , in Status / Nodes (Station Side) scan the AP signal of the environment.



Please download manual from internet: <http://www.io-power.com/Product%20User%20Manual.htm>



5. Wireless AP encryption settings:

5-1. Wireless AP encryption settings:

Wireless Security Setting

SSID :	HOPS_22AP_3	SSID :	HOPS_22AP_3	Select to encrypt the wireless AP SSID
MAC Filter :	Disable	MAC Filter :	<input checked="" type="radio"/> Disable <input type="radio"/> Allow <input type="radio"/> Deny	
Security :	Disable	Security :	WPA+WPA2 PSK	Be sure to select the WPA+WPA2 PSK
		Passphrase Key :	securitykey123	Please fill in the 13 English or numeric character
		Encryption :	AES-based CCMP	Be sure to select the AES-based CCMP
		Rekey Interval :	600	

Select to encrypt the wireless AP SSID: SSID to encrypt on behalf of the wireless card mode

MAC address filtering (MAC Filter): It does not start the MAC address filtering (Disable), only allows setting the MAC ID online (Allow), does not allow to set the MAC ID for wireless online (Deny).

Wireless security encryption (Security): select WPA+WPA2 PSK encryption technology.

The encryption key password (Passphrase Key): set yourself AP encryption key password.

Encryption mode (Encryption): **select AES-based CCMP. (Do not select TKIP or Both, only the AES encryption supports full speed transfers)**

Change key password is the number of intervals (Rekey Interval): 600

5-2. Wireless AC (Wireless Station) encryption settings:

Select to encrypt the wireless AP SSID: SSID to encrypt on behalf of the wireless card mode.

AC link AP by setting SSID first, so encryption settings need same wireless AP.

Wireless security encryption (Security): select WPA+WPA2 PSK encryption technology.

The encryption key password (Passphrase Key): set yourself AP encryption key password.

Encryption mode (Encryption): **select AES-based CCMP. (Do not select TKIP or Both, only the AES encryption supports full speed transfers)**

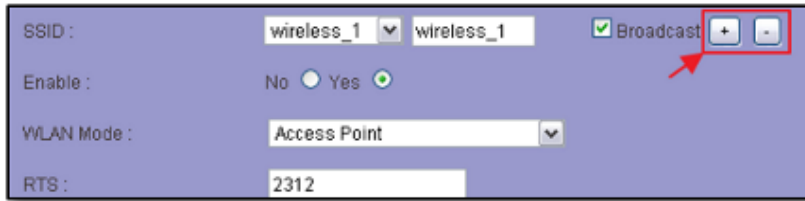
Wireless Security Setting

SSID :	HOPS_33AP_2	SSID :	HOPS_33AP_2	Please select an encrypted wireless AP SSID
Security :	Disable	Security :	WPA+WPA2 PSK	Be sure to select the WPA+WPA2 PSK
		Passphrase Key :	securitykey123	Please fill in the 13 English or numeric character
		Encryption :	AES-based CCMP	Be sure to select the AES-based CCMP

Note1: IEEE 802.11 n draft forbids WEP or TKIP with higher throughput. If you use these types of security, the throughput will reduce to 54Mbps. The newest Intel Wireless Adapter Driver for Client side uses the old IEEE 802.11g, instead of being unable to connect. It also comes to meet IEEE 802.11n. Source: <http://www.intel.com/support/wireless/wlan/4965agn/sb/cs-025643.htm>



Note 2: in the "wireless network WLAN Setup" SSID setting page, by abolishing the [Broadcast] broadcasting function of safety protection.



When wireless system deployment completed final, recommends to hook selected right of [Broadcast] broadcast function canceled hook selected, it will let wireless base station of SSID name not for public broadcast, such setting wireless system will into stealth of environment, the system was search and the was attack risk down minimum; only deployment SI engineer and maintain personnel only will knows wireless base station of SSID name, other people will cannot know SSID name, so hide the SSID can greatly improve security.

6. Advanced Settings

6-1. Country Code of wireless setting

(Each country for the using of WiFi frequency and channel, they have their own regulations and management of national wireless communication, change the country code can meet the national wireless frequency)

Change the country code of device: Open DOS Mode

6-1-1. Enter telnet 192.168.1.1 (Default IP), If you have change the IP address, please enter the IP address you have been changed.

```
Microsoft Windows [版本 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\IO-Power>telnet 192.168.1.1
```

6-1-2. **Account ID: admin Password PW: admin (Default)**, If you have change the ID and PW of device, please enter the new ID and PW you set.

Get the country code of your device.

`/>get general/country code`

```
(none) login: admin
Password:
/>get general/countrycode
general/countrycode: 840 - UNITED STATES
/>
```

General/country code: 840 - UNITED STATES



6-1-3.Change country code:840-UNITED STATES (美國) change to 156-CHINA (中國)

(System will reboot)

`/>set general/country code`

```
<none> login: admin
Password:
/>get general/countrycode
general/countrycode: 840 - UNITED STATES
/>set general/countrycode
This setting takes effect after a reboot,
the system will automatically reboot,
whether to continue ?<y/n> ?
country code[840 - UNITED STATES] : 156
OK ...
Reboot system now ...
/>_
```

6-1-4.Change country code:156-CHINA (中國) change to 250-FRANCE (法國)

(System will reboot)

`/>set general/countrycode`

```
<none> login: admin
Password:
/>get general/countrycode
general/countrycode: 156 - CHINA
/>set general/countrycode
This setting takes effect after a reboot,
the system will automatically reboot,
whether to continue ?<y/n> ?
country code[156 - CHINA] : 250
OK ...
Reboot system now ...
/>_
```

6-1-5.Country code of main country

(036)AUSTRALIA (076)BRAZIL (124)CANADA (156)CHINA (250)FRANCE
(276)GERMANY (356)INDIA (360)INDONESIA (380)ITALY (392)JAPAN (410)KOREA
ROC (458)MALAYSIA (484)MEXICO (554)NEW_ZEALAND (586)PAKISTAN (608)PHILIPPINES
(616)POLAND (643)RUSSIA (682)SAUDI ARABIA (702)SINGAPORE
(710)SOUTH AFRICA (724)SPAIN (158)TAIWAN (764)THAILAN (792)TURKEY
(826)UNITED KINGDOM (704)VIET NAM



6-2. Start / Turn off DFS (Dynamic frequency-channel selection) (To avoid the military radar signal cover)

Technical background:

Auto DFS: (Auto Dynamic Frequency Selection)

What is Auto DFS? Simply saying : It is automatically hide the radar sweep.

What is Auto TPC? Simply saying: it is automatically adjust the output power , to avoid interference with military radar .

Auto DFS + Auto TPC = 802.11h , Which means , the technical of 802.11h refers to these two option.

These two functions are mandatory , Non-compliant products will not be the countries of the European Union and the requirements of this specification wireless products marketing authorization. (After append operation radio frequency again--can interfere with medical equipment.) WiFi 802.11A/802.11An 5GHz frequency, some with military radar times the frequency of the same frequency, so the military priority, followed by civil under the terms of the private WiFi 5GHz frequencies used by wireless devices, automatically avoid frequencies used by the army, and so lead to Auto function requirements for certification of DFS and outdoor use.

Outdoor wireless devices certified by definition, need to have more than 3 times in a row under the radar in pursuit of the automatic frequency hopping.

For example: when your outdoor wireless equipment (access points), using 5.26GHz (52 channel) in transmission. Suddenly receives to also is 5.26GHz of radar signals, your outdoor wireless equipment (access points) required automatically jumped opened 5.26Ghz (52 channel), jumped to as 5.28GHz (56 channel); if then and receives to 5.28GHz of radar signals, your outdoor wireless equipment (access points) required again automatically jumped opened 5.28Ghz (56 channel), Such a situation must be more than 3 times in a row automatically jump frequency function, to meet the certification and specification. In addition, the radar waves in pursuit of radio frequency (channel), must in less than 30 minutes is no longer available.

Practical experience with a true description:

On the erection of actual experience, we often meet with wireless systems military radar frequency sweeping interference, whether suffering from military radar frequency sweeping interference characteristics:

A. wireless devices set to the operation mode of AP (using 5GHz), and does not 5GHz wireless signal is sent immediately after startup.

Reason: If wireless devices set to the AP and use the 5GHz, radio-frequency, has just started, according to regulations required wireless signal detection and listening to the space environment to determine whether military radar or medical equipment of wireless signals, if you want to avoid, having



to wait for the set detect listening time to complete, can begin to operate, sending wireless AP mode signal.

B. wireless system online, normal operation of the system, wireless online suddenly interrupts suddenly breaks suddenly even the phenomenon that is online or wireless.

Reason: because once the use of radio frequency (channel) radar waves swept up by the military, the wireless device will be hopping; will inevitably lead to the original wireless online outages.

C. set operation mode of AP wireless devices use channels in wireless client (Wireless Station) uses wireless scan when the Site Survey of the space environment, only to find that the original set of channels and settings are not identical, this is determined by an army radar frequency sweeping interference 100%.

For example: the original set of wireless devices AP channel for 60Ch (5.300GHz), but the Wireless Site Survey results appear 44Ch (5.220GHz), and when this happens, it is 100% to determine the radar frequency sweeping interference by the military after the automatic frequency hopping.

Site Survey

Radio - 3

No	BSSID	ESSID	RSSI	Channel	Enc
1	34:4F:3F:70:00:35	11_ap_101R	-54dBm	36	WPA
2	34:4F:3F:70:00:2F	wireless_1	-64dBm	44	WPA
3	34:4F:3F:70:00:4E	33_ap_103R	-76dBm	100	WPA

6-2-1. Get the DFS setting information of device

`/>get general/dfschan`

```
(none) login: admin
Password:
/>get general/dfschan
DFS Channel: supported
/>
```

DFS Channel: supported (enable)

6-2-2. Turn off the function of DFS, Parameter 0: supported turn on, Parameter 1: filtered turn off

`/>set general/dfschan`

```
(none) login: admin
Password:
/>get general/dfschan
DFS Channel: supported
/>set general/dfschan
This setting takes effect after a reboot,
the system will automatically reboot,
whether to continue ?(y/n) ?
DFS Channel(0: supported, 1: filtered): [0] : 1
OK ...
Reboot system now ...
/>
```



6-2-3. Turn on the function of DFS, Parameter 0: supported turn on, Parameter 1: filtered turn off

```
/>set general/dfschan
```

```
(none) login: admin
Password:
/>set general/dfschan
This setting takes effect after a reboot,
the system will automatically reboot,
whether to continue ?(y/n) ?
DFS Channel(0: supported, 1: filtered): [0] : 0
OK ...
Reboot system now ...
/>
```

6-3.Restart the website of your wireless device:

Because of Internet Explorer (IE) or Firefox (火狐)或 Chrome (Google) web browser , Version differences or parameter setting , it will not functioning properly of the wireless device website , may not convenient for user , Through the command line , it can restart the web (about 10 seconds to finish) , it will helps the user.

```
/>restart_web
```

```
(none) login: admin
Password:
/>restart_web
Web server start in 10 seconds..
/>
```

6-4.Set the Wireless Module Interface for CPE Operation Mode:

When the wireless module interface be set up as client mode to link another wireless devices of other companies. Except you can use WDS mode to link another wireless device (the bandwidth will be reduced to 50%), even you can also do command line to set the wireless module interface for CPE operation mode. They can link by 300Mbps transmission rate and the throughput will up to 160Mbps.

```
/>set general/cpe_wlanif
```

```
(none) login: admin
Password:
/>cd general
general>set cpe_wlanif
Please select CPE mode WLAN interface from 1 to 3 (0 is disabled)
CPE Active wireless IF (0: disabled): [1] : 1
CPE select wireless 1 interface OK ...
general(*)>_
```