IEEE 802.11b/g/n
Wireless Outdoor CPE

User's Manual

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About This Manual

This user manual is intended to guide professional installer to install the IEEE 802.11b/g/n Wireless CPE and how to build the infrastructure centered on it. It includes procedures to assist you in avoiding unforeseen problems.

Conventions

For your attention on important parts, special characters and patterns are used in this manual:

Note:

- This indicates an important note that you must pay attention to.

Warning:

- This indicates a warning or caution that you have to abide.

Bold: Indicates the function, important words, and so on.

Federal Communication Commission Interference Statement

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.

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.

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

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. To avoid the possibility of exceeding radio frequency exposure limits, you shall beep a distance of at least 100cm between you and the antenna of the installed equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

Warranty

Hardware warranty is for five (5) years from date of shipment from Distributor warrants that hardware will conform to the current relevant published specifications and will be free from material defects in material and workmanship under normal use and service.

IN NO EVENT SHALL DISTRIBUTOR BE LIABLE TO YOU OR ANY OTHER PARTY FOR ANY DIRECT, INDIRECT, GENERAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OR OTHER DAMAGE RISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION OR ANY OTHER PECUNIARY LOSS, OR FROM ANY BREACH OF WARRANTY, EVEN IF DISTRIBUTOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO CASE SHALL EXCEED THE AMOUNT YOU PAID FOR THE PRODUCT.

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Chapter 1 Introduction

Introduction

Designed for outdoor environment application, the IEEE 802.11b/g/n Wireless CPE is a high-performance last-mile broadband solution that provides reliable wireless network coverage. As an IEEE 802.11b/g compliant wireless device, the IEEE 802.11b/g/n Wireless CPE is able to give stable and efficient wireless performance, while designed with IEEE 802.11n draft 2.0 standard and high output power makes it possible to deliver several times faster data rate than normal wireless device and higher bandwidth with longer range for outdoor applications.

The IEEE 802.11b/g/n Wireless CPE supports four wireless communication connectivity (AP, Wireless Client, Bridge and AP Repeater), allowing for various application requirements thus helping to find the key to the “last mile” with least effort.

With high output power and reliable performance, the IEEE 802.11b/g/n Wireless CPE is an ideal wireless broadband solution for wireless Internet service providers and system integrators!

Appearance

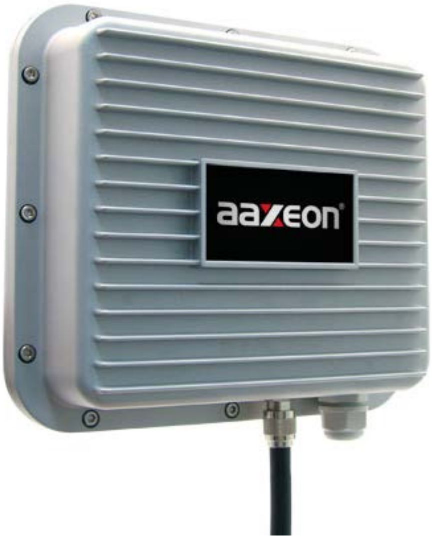


Figure 1 IEEE 802.11b/g/n Wireless CPE

Key Features

- Compliant with IEEE 802.11b/g/n
- Power-over-Ethernet (PoE) IEEE 802.3af Compliant
- IP67 housing endures almost any harsh environments
- Four operating modes including AP, Wireless Client, WDS and AP Repeater
- Support 64/128/152-bit WEP and 802.1X, WPA, WPA2, WPA&WPA2,WPA-PSK, WPA2-PSK, and WPA-PSK&WPA2-PSK etc
- User-friendly Web and SNMP-based management interface

Typical Application

This section describes the typical applications of IEEE 802.11b/g/n Wireless CPE. By default, it is set to AP mode which allows it to establish a wireless coverage; besides, it is also able to join any available wireless network under wireless client mode. The IEEE 802.11b/g/n Wireless CPE is able to deliver stable and efficient broadband connectivity for various applications.

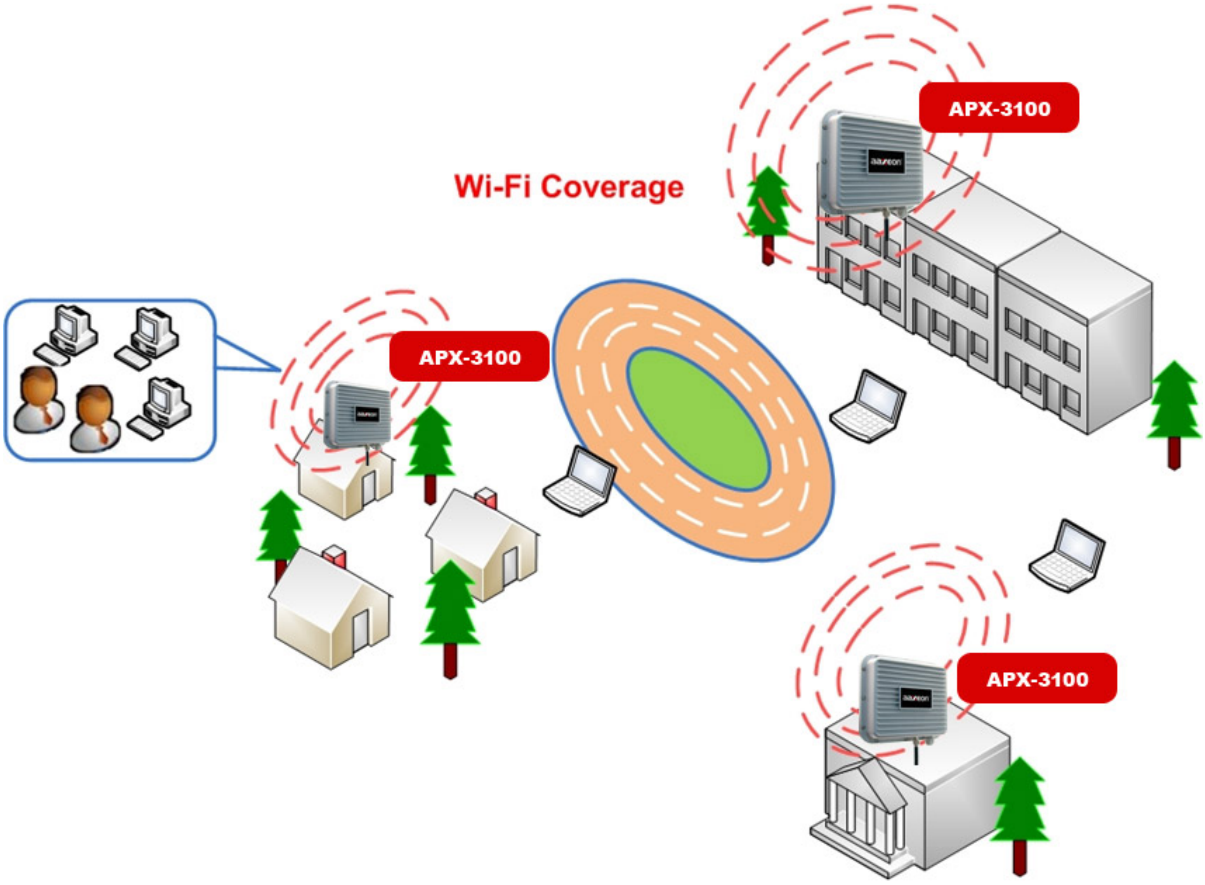


Figure 2 Typical Application

Besides, the IEEE 802.11b/g/n Wireless CPE can also be applied into the following environments:

- Cost-effectively provide long distance backhaul for remote areas (e.g. village, oil well, island, mountain and etc.)
- Establish local backhaul for campus, farm and factory
- Provide and access for video streaming or surveillance for industrial and mining enterprises

Chapter 2 Hardware Installation

This chapter describes safety precautions and product information you have to know and check before installing IEEE 802.11b/g/n Wireless CPE.

Preparation before Installation

Professional Installation Required

Please seek assistance from a professional installer who is well trained in the RF installation and knowledgeable in the local regulations.

Safety Precautions

1. To keep you safe and install the hardware properly, please read and follow these safety precautions.
2. If you are installing IEEE 802.11b/g/n Wireless CPE for the first time, for your safety as well as others', please seek assistance from a professional installer who has received safety training on the hazards involved.
3. Keep safety as well as performance in mind when selecting your installation site, especially where there are electric power and phone lines.
4. When installing IEEE 802.11b/g/n Wireless CPE, please note the following things:
   - ♦ Do not use a metal ladder;
   - ♦ Do not work on a wet or windy day;
   - ♦ Wear shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
5. When the system is operational, avoid standing directly in front of it. Strong RF fields are present when the transmitter is on.

Installation Precautions

To keep the IEEE 802.11b/g/n Wireless CPE well while you are installing it, please read and follow these installation precautions.

1. Users MUST use a proper and well-installed grounding and surge arrestor with the IEEE 802.11b/g/n Wireless CPE; otherwise, a random lightening could easily cause fatal damage to IEEE 802.11b/g/n Wireless CPE. **EMD (Lightning) DAMAGE IS NOT COVERED UNDER WARRANTY.**
2. Users MUST power the IEEE 802.11b/g/n Wireless CPE from an IEEE 802.3af switch or compatible injector. Use of non IEEE 802.3af compatible power source may cause damage to the IEEE 802.11b/g/n Wireless CPE .
3. Before powering on the IEEE 802.11b/g/n Wireless CPE, please verify that the external antenna is properly installed or damage may be caused to the unit.

(*APX-3100 Note: Though Internal Antenna is Selectable in the WEB Management, the APX-3100 only supports external antenna capabilities.*)

Product Package

The product package you have received should contain the following items. If any of them are not included or damaged, please contact your local vendor for support.

● APX-3100	x1
● User Manual CD	x1
● Mounting kits	x1

Note:

- Product CD contains Quick Installation Guide and User Manual.

Hardware Installation

Pole Mounting

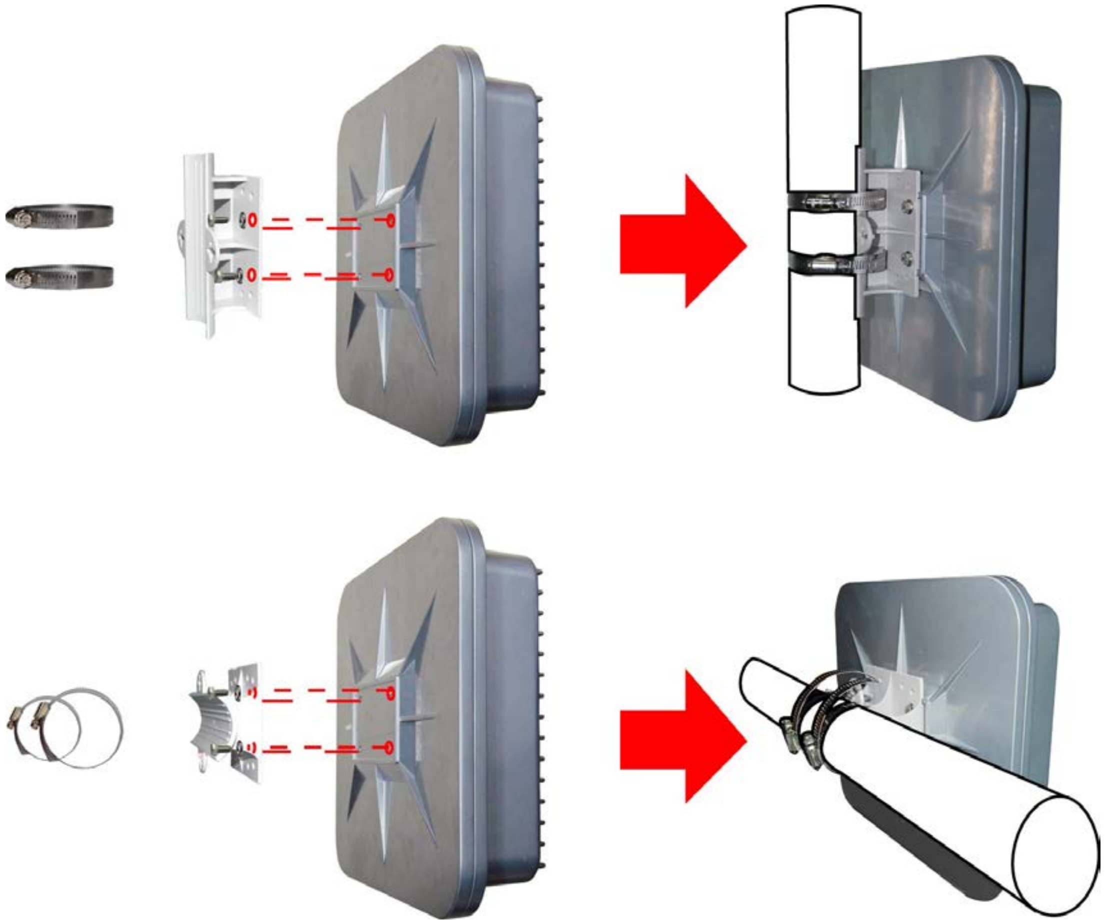


Figure 3 Pole Mounting

Wall Mounting

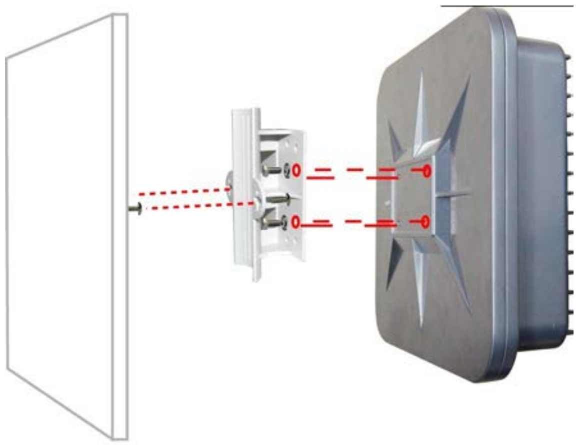


Figure 4 Wall Mounting

Chapter 3 Basic Settings

Factory Default Settings

We'll elaborate the IEEE 802.11b/g/n Wireless CPE factory default settings. You can re-acquire these parameters by default. If necessary, please refer to the "Restore Factory Default Settings".

Table 1 IEEE 802.11b/g/n Wireless CPE Factory Default Settings

Features		Factory Default Settings
Username		admin
Password		password
Wireless Device Name		apXXXXXX (X represents the last 6 digits of Ethernet MAC address)
Operating Mode		AP
Data Rate		Auto
LAN	IP Address	192.168.1.1
	Subnet Mask	255.255.255.0
	Gateway	0.0.0.0
	Primary DNS Server	0.0.0.0
	Secondary DNS Server	0.0.0.0
Spanning Tree		Enable
802.11 Mode		802.11b/g/n
Channel Number		6
SSID		Wireless
Broadcast SSID		Enable
HT Protect		Disable
Data Rate		Auto
Output Power		Full
Channel Mode		20MHz
WMM		Enabled
RTS Threshold (byte)		2346
Fragmentation Length (byte)		2346
Beacon Interval		100
DTIM Interval		1
Space in Meter		0
Flow Control by AP		Disable
Security		Open System
Encryption		None

Wireless Separation		Disable
Access Control		Disable
SNMP	Enable/Disable	Enable
	Read Community Name	Public
	Write Community Name	Private
	IP Address	0.0.0.0

System Requirements

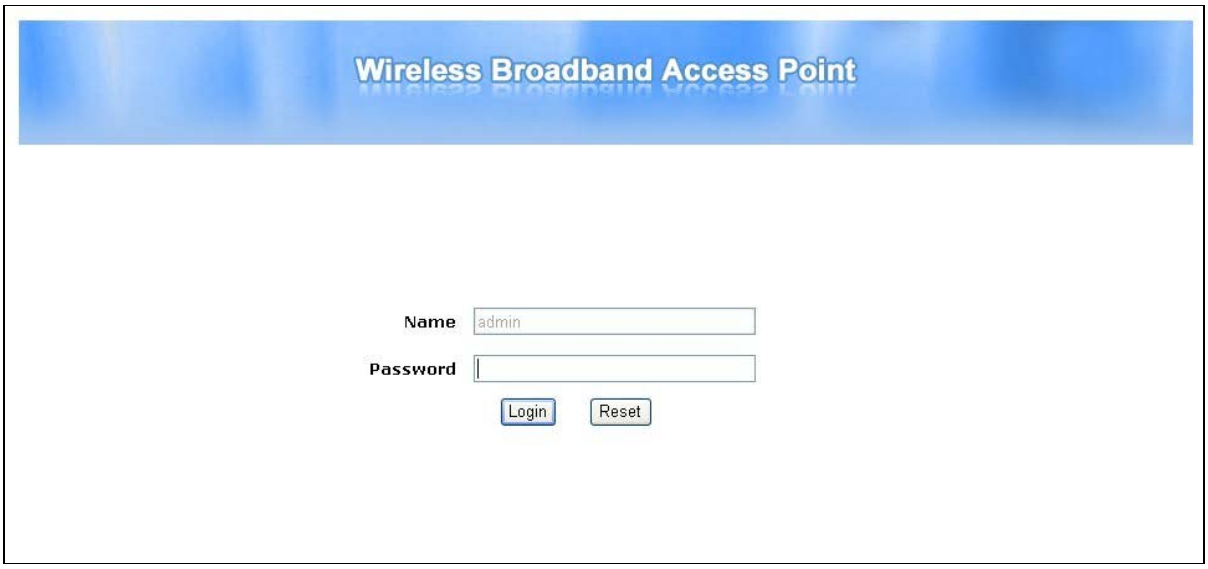
Before configuration, please make sure your system meets the following requirements:

- A computer coupled with 10/ 100 Base-TX adapter;
- Configure the computer with a static IP address of 192.168.1.x, as the default IP address of IEEE 802.11b/g/n Wireless CPE is 192.168.1.1. (X cannot be 0, 1, nor 255);
- A Web browser on PC for configuration such as Microsoft Internet Explorer 6.0 or above, Netscape, Firefox or Google Chrome.

How to Login the Web-based Interface

The IEEE 802.11b/g/n Wireless CPE provides you with user-friendly Web-based management tool.

- Open Web browser and enter the IP address (Default: **192.168.1.1**) of IEEE 802.11b/g/n Wireless CPE into the address field. You will see the login page as below.



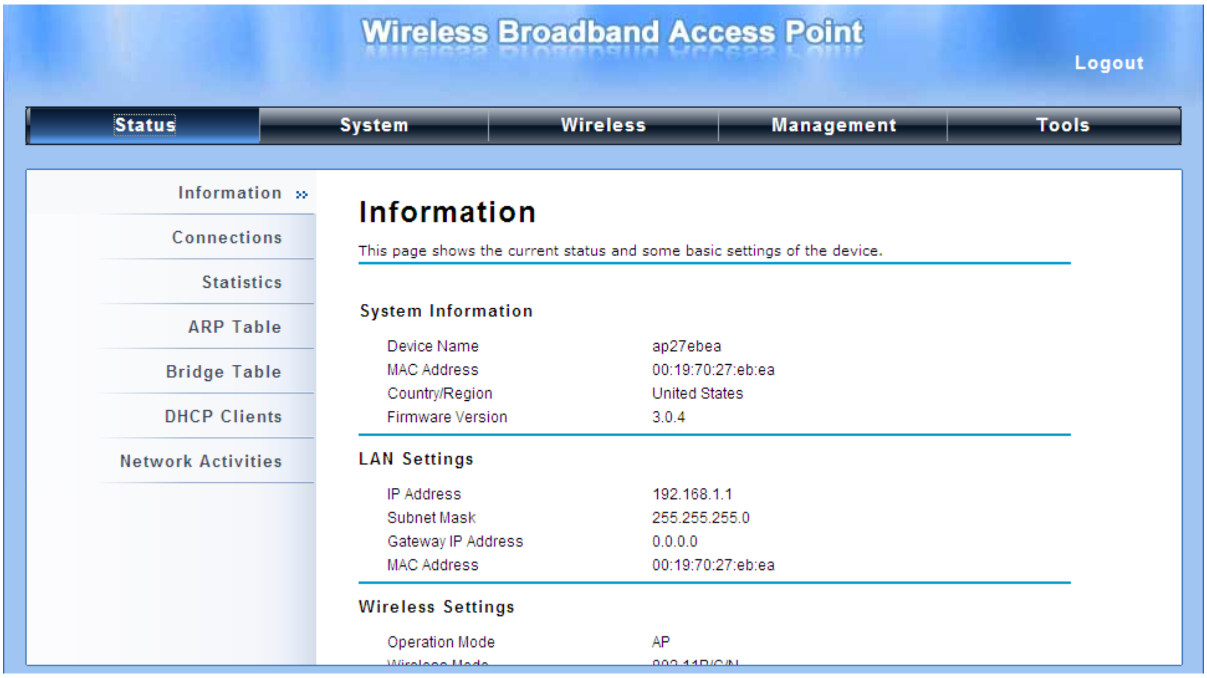
Wireless Broadband Access Point

Name: admin

Password:

Figure 5 Login Page

- Enter the username (Default: **admin**) and password (Default: **password**) respectively and click "**Login**" to login the main page of IEEE 802.11b/g/n Wireless CPE. As you can see, this management interface provides five main options in the black bar above, which are Status, System, Wireless, Management and Tools.



Information

This page shows the current status and some basic settings of the device.

System Information

Device Name	ap27ebea
MAC Address	00:19:70:27:eb:ea
Country/Region	United States
Firmware Version	3.0.4

LAN Settings

IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Gateway IP Address	0.0.0.0
MAC Address	00:19:70:27:eb:ea

Wireless Settings

Operation Mode	AP

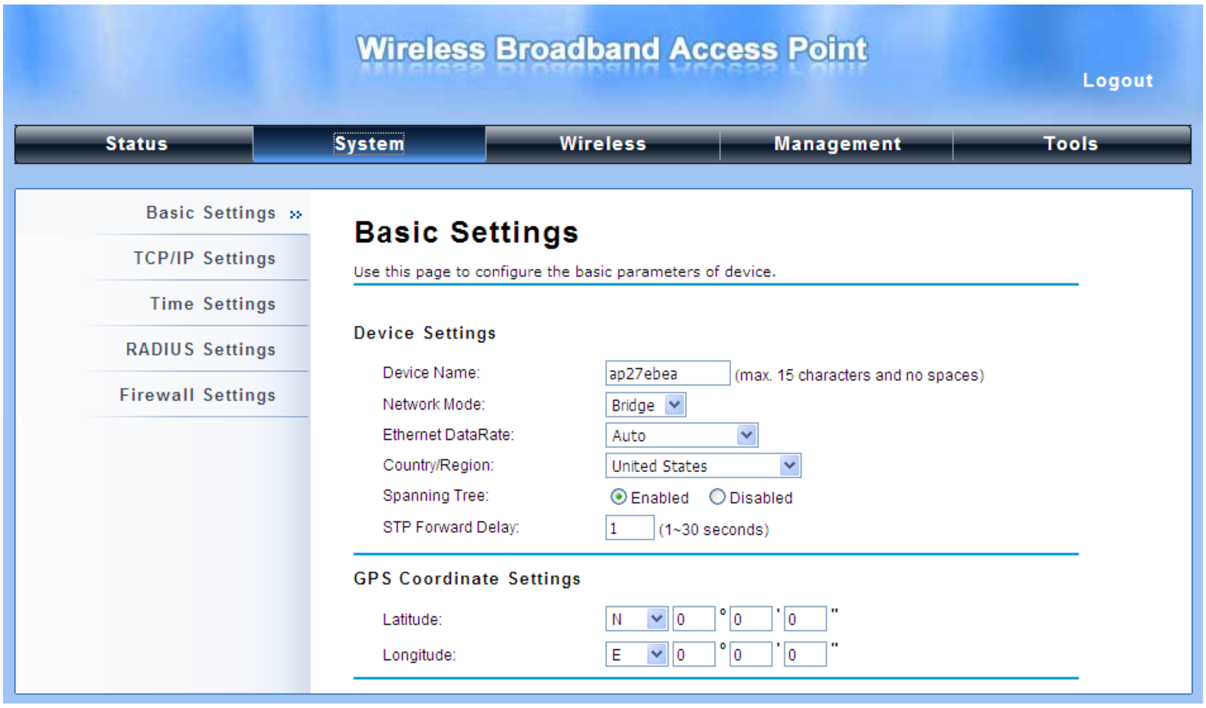
Figure 6 Main Page

Note:

- The username and password are case-sensitive, and the password should be no more than 19 characters!

Basic System Settings

For users who use the IEEE 802.11b/g/n Wireless CPE for the first time, it is recommended that you begin configuration from “**Basic Settings**” in “**System**” shown below:



Basic Settings

Use this page to configure the basic parameters of device.

Device Settings

Device Name: ap27ebea (max. 15 characters and no spaces)

Network Mode: Bridge

Ethernet DataRate: Auto

Country/Region: United States

Spanning Tree: ● Enabled ○ Disabled

STP Forward Delay: 1 (1~30 seconds)

GPS Coordinate Settings

Latitude: N 0 ° 0 ' 0 "

Longitude: E 0 ° 0 ' 0 "

Figure 7 Basic System Settings

- **Basic Settings**

Device Name: Specify the device name, which is composed of no more than 15 characters with (0-9), (A-Z), (a-z) or (-).

Network Mode: Specify the network mode, including Bridge and Router. It is easy to configure parameters in Bridge Mode; however, users must pay extra attention to the way they configure the device when it is set to Router Mode. For details, please refer to **TCP/IP Settings”**.

Ethernet Data Rate: Specify the transmission rate of data for Ethernet. Default is **Auto**.

Country Region: The availability of some specific channels and/or operational frequency bands is country dependent.

Spanning Tree: Spanning Tree Protocol (STP) is a link management protocol for AP which provides path redundancy while preventing loops in a network. STP allows only one active path at a time between the access points but establish the redundant link as a backup if the initial link fails.

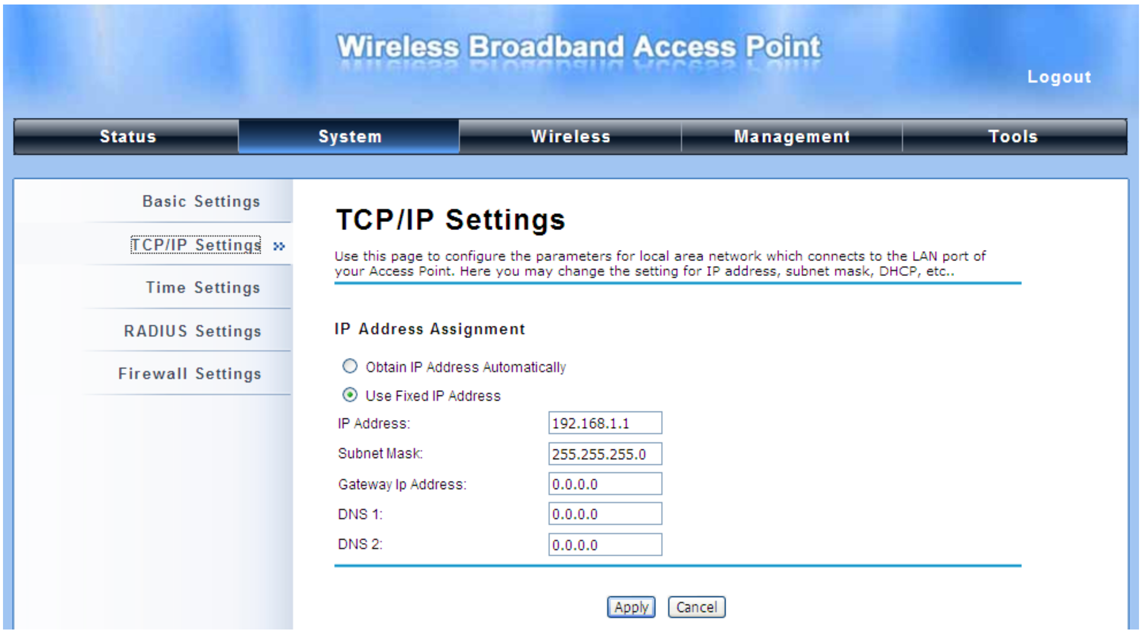
STP Forward Delay: STP Forward Delay is the time spent in detecting and learning network tree topology state before entering the forward state. Default time value is 1 sec.

GPS Coordinate Settings

The GPS Coordinate Setting helps you mark the latitude and longitude of the Power R2 Extender. Just enter the coordinates and click the **Apply** button.

- **TCP/IP Settings**

Open "**TCP/IP Settings**" in "**System**" as below to configure the parameters for LAN which connects to the LAN port of the CPE. In this page, users may change the settings for IP Address, Subnet Mask, and DHCP Server.



TCP/IP Settings

Use this page to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc..

IP Address Assignment

○ Obtain IP Address Automatically

● Use Fixed IP Address

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Gateway Ip Address: 0.0.0.0

DNS 1: 0.0.0.0

DNS 2: 0.0.0.0

Figure 8 TCP/IP Settings (Bridge)

Obtain IP Address Automatically: If a DHCP server exists in your network, you can check this option, thus the IEEE 802.11b/g/n Wireless Outdoor CPE is able to obtain IP settings automatically from that DHCP server.

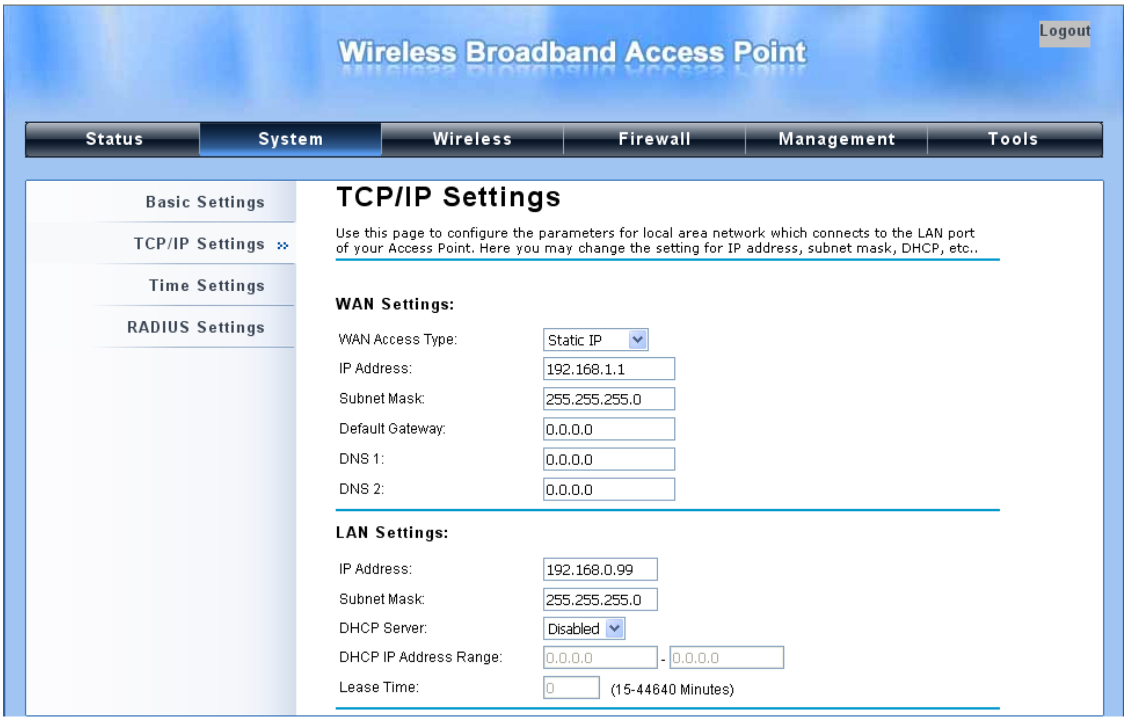
Note:

- When the IP address of the CPE is changed, the clients on the network often need to wait for a while or even reboot before they can access the new IP address. For an immediate access to the bridge, please flush the netbios cache on the client computer by running the "nbtstat –r" command before using the device name of the CPE to access its Web Management page.
- In case the IEEE 802.11b/g/n Wireless Outdoor CPE is unable to obtain an IP address

from a valid DHCP server, it will fall back to default static IP address.

Use Fixed IP Address: Check this option. You have to specify a static IP address, subnet mask, default gateway and DNS server for the CPE manually. Make sure the specified IP address is unique on your network in order to prevent IP conflict.

If the IEEE 802.11b/g/n Wireless Outdoor CPE is configured as Router mode, you need to configure some additional TCP/IP parameters for accessing the Internet.



TCP/IP Settings

Use this page to configure the parameters for local area network which connects to the LAN port of your Access Point. Here you may change the setting for IP address, subnet mask, DHCP, etc..

WAN Settings:

WAN Access Type: Static IP
IP Address: 192.168.1.1
Subnet Mask: 255.255.255.0
Default Gateway: 0.0.0.0
DNS 1: 0.0.0.0
DNS 2: 0.0.0.0

LAN Settings:

IP Address: 192.168.0.99
Subnet Mask: 255.255.255.0
DHCP Server: Disabled
DHCP IP Address Range: 0.0.0.0 - 0.0.0.0
Lease Time: 0 (15-44640 Minutes)

Figure 9 TCP/IP Settings (Router)

WAN Settings: Specify the Internet access method to Static IP, DHCP or PPPOE. Users must enter WAN IP Address, Subnet Mask, Gateway settings provided by your ISPs.

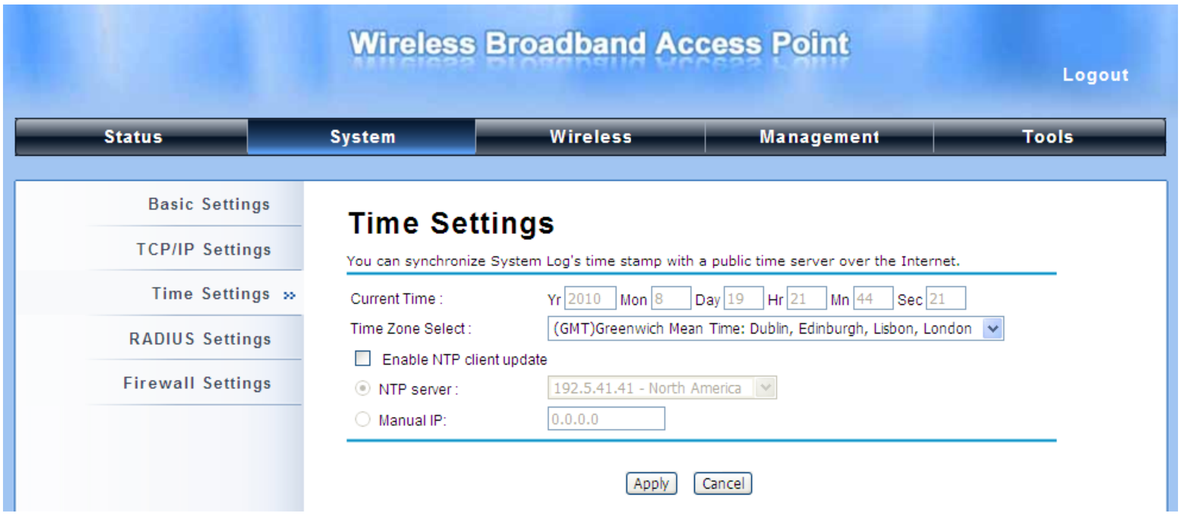
LAN Settings: When DHCP Server is disabled, users can specify IP address and subnet mask for the CPE manually. Make sure the specified IP address is unique on your network in order to prevent IP conflict. When DHCP Server is enabled, users may specify DHCP IP Address Range, DHCP Subnet Mask, DHCP Gateway and Lease Time (15-44640 minutes). A DHCP relay agents is used to forward DHCP requests and replies between clients and servers when they are not on the same physical subnet. To enable the DHCP relay agent, check the "**Enable DHCP Relay**" checkbox and enter the IP address of the DHCP server.

Warning:

- In AP mode, the IEEE 802.11b/g/n Wireless Outdoor CPE must establish connection with another wireless device before it is set to Router mode. To access the unit in Router mode via wired port, please type the WAN IP address to enter the web page for WAN is on wired port and LAN is on wireless port. Or, you can access device through the wireless device connected with the CPE.
- In wireless client mode, users can access the CPE via its wired port, for WAN is on wireless port and LAN is on wired port when device is set to Router mode.
- Bridge mode and AP Repeater mode are similar to AP mode when device is set to Router mode; WAN is on wired port and LAN is on wireless port. Thus users must also connect the CPE with another wireless device before it is set to Router mode and access the CPE via the connected wireless device.

Time Settings

Compliant with NTP, the IEEE 802.11b/g/n Wireless Outdoor CPE is capable of keeping its time in complete accord with the Internet time. Make configuration in “**Time Settings**” from “**System**”. To use this feature, check “**Enable NTP Client Update**” in advance.



Time Settings

You can synchronize System Log's time stamp with a public time server over the Internet.

Current Time : Yr 2010 Mon 8 Day 19 Hr 21 Mn 44 Sec 21

Time Zone Select : (GMT)Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London

□ Enable NTP client update

○ NTP server : 192.5.41.41 - North America

○ Manual IP: 0.0.0.0

Figure 10 Time Settings

- **Current Time**

  Display the present time in Yr, Mon, Day, Hr, Min and Sec.

- **Time Zone Select**

  Select the time zone from the dropdown list.

- **NTP Server**

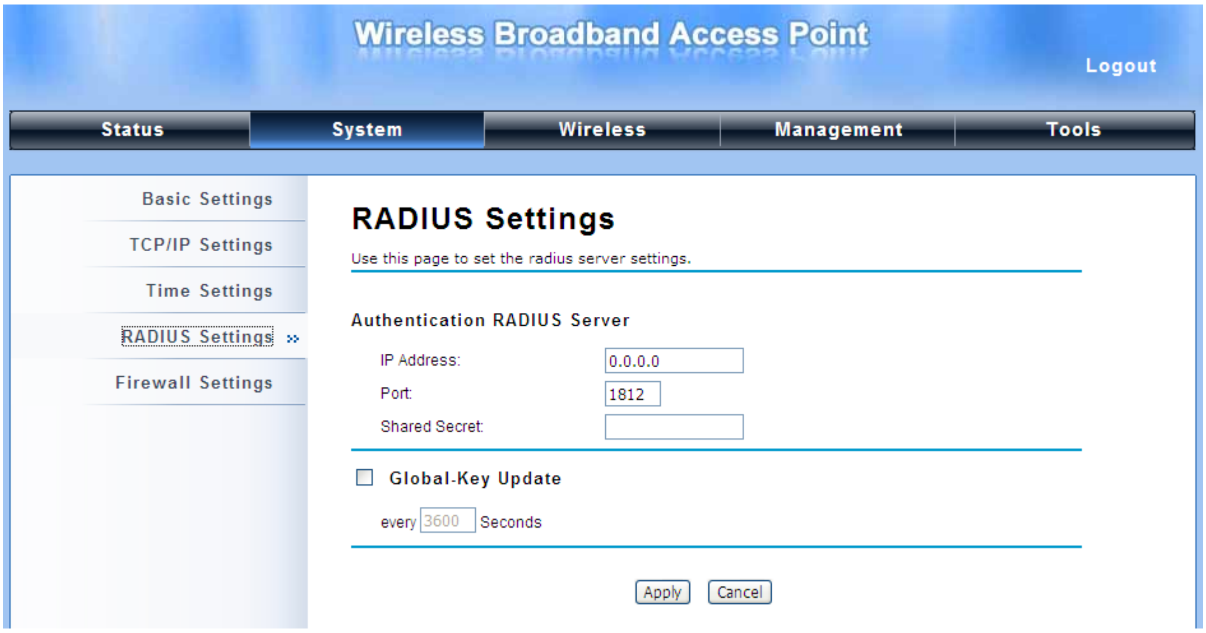
  Select the time server from the "**NTP Serve**r" dropdown list or manually input the IP address of available time server into "**Manual IP**".

  Hit "**Apply**" to save settings.

RADIUS Settings

RADIUS (Remote Authentication Dial-In User Service) is a server for remote user authentication and accounting; playing a central role in the network in providing the capabilities of authenticating, authorizing, accounting, auditing, alarming and etc. It allows an organization to maintain user profiles in a central database that all remote servers can share.

Open "**RADIUS Settings**" in "**System**" to make RADIUS configuration.



RADIUS Settings

Use this page to set the radius server settings.

Authentication RADIUS Server

IP Address: 0.0.0.0

Port: 1812

Shared Secret:

□ Global-Key Update

every 3600 Seconds

Figure 11 RADIUS Settings

- **Authentication RADIUS Server**

  This is for RADIUS authentication. It can communicate with RADIUS through IP Address, Port and Shared Secret.

  IP Address: Enter the IP address of the Radius Server;

  Port: Enter the port number of the Radius Server;

  Shared Secret: This secret, which is composed of no more than 31 characters, is shared by the

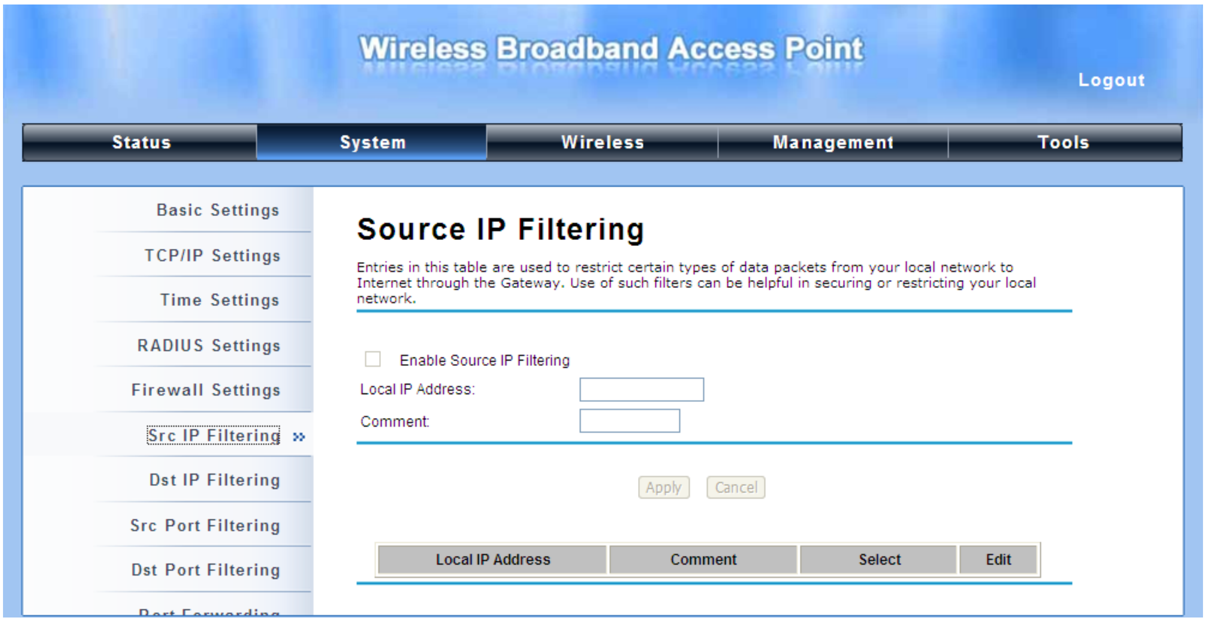
IEEE 802.11b/g/n Wireless CPE and RADIUS during authentication.

Global-Key Update: Check this option and specify the time interval between two global-key updates.

Firewall Settings

The firewall is a system or group of systems that enforce an access control policy between two networks. It may also be defined as a mechanism used to protect a trusted network from an un-trusted network. IEEE 802.11b/g/n Wireless CPE has capabilities of Source IP Filtering, Destination IP Filtering, Source Port Filtering, Destination Port Filtering, Port Forwarding as well as DMZ. This is available only under Router Mode.

Source IP Filtering: The source IP filtering gives users the ability to restrict certain types of data packets from your local network to Internet through IEEE 802.11b/g/n Wireless CPE. Use of such filters can be helpful in securing or restricting your local network.



Source IP Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.

□ Enable Source IP Filtering

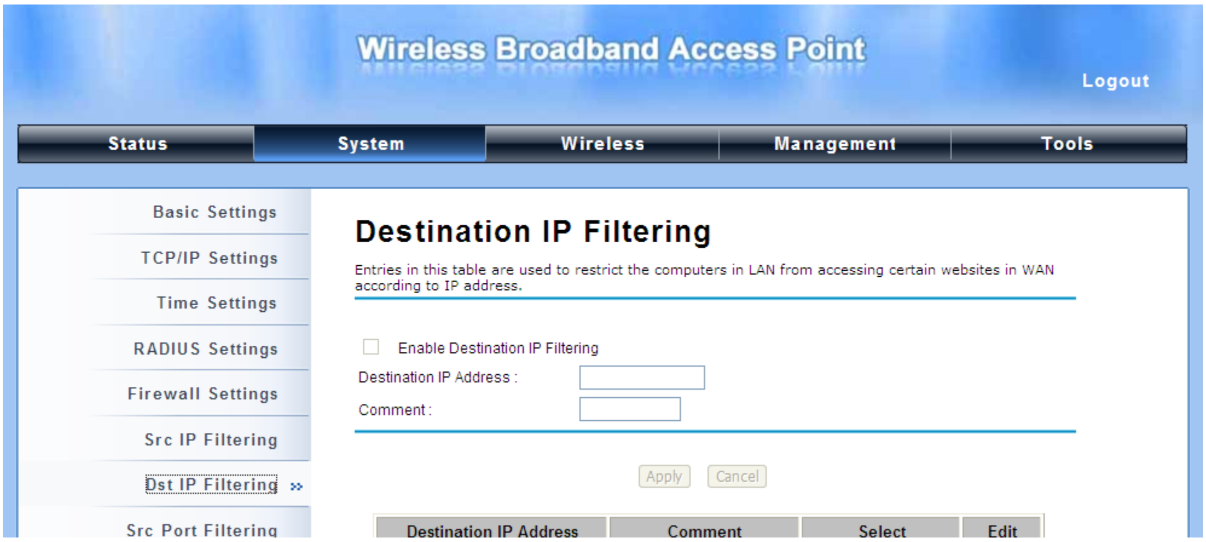
Local IP Address:

Comment:

Local IP Address	Comment	Select	Edit

Figure 12 Source IP Filtering

Destination IP Filtering: The destination IP filtering gives you the ability to restrict the computers in LAN from accessing certain websites in WAN according to specified IP addresses. Check the "**Enable Source IP Filtering**" checkbox and enter the IP address of the clients to be restricted. Hit **Apply** to make the setting take effect.



Destination IP Filtering

Entries in this table are used to restrict the computers in LAN from accessing certain websites in WAN according to IP address.

□ Enable Destination IP Filtering

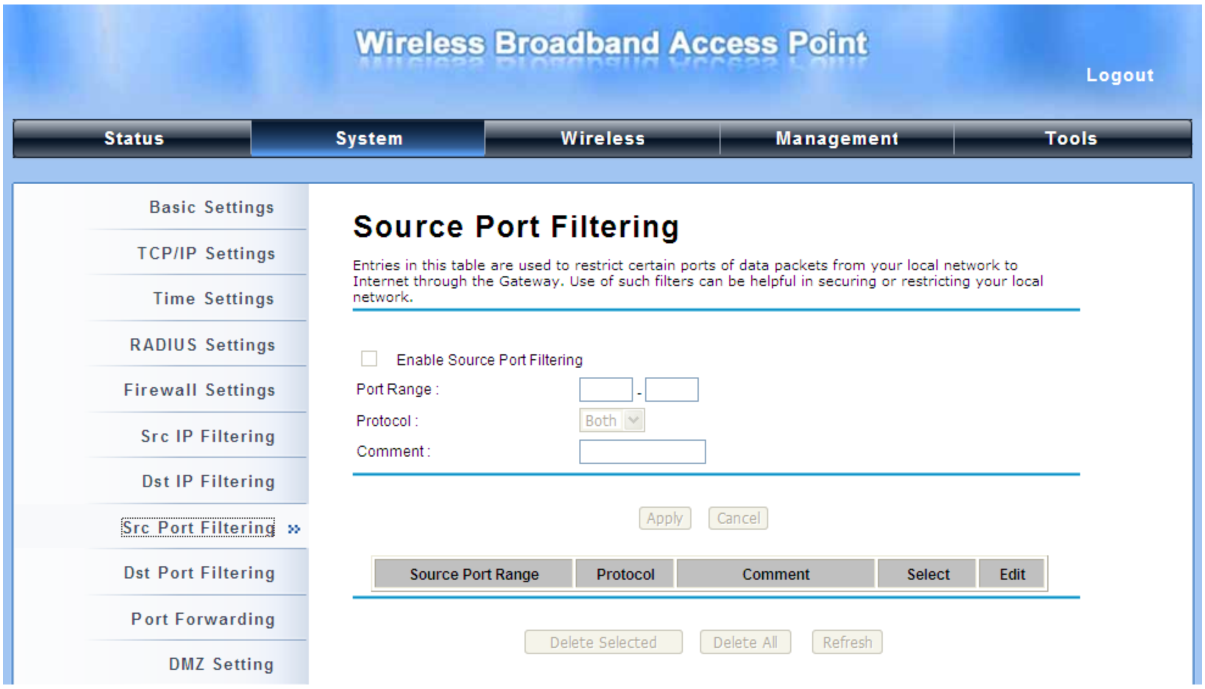
Destination IP Address :

Comment :

Destination IP Address	Comment	Select	Edit

Figure 13 Destination IP Filtering

Source Port Filtering: The source port filtering enable you to restrict certain ports of data packets from your local network to Internet through IEEE 802.11b/g/n Wireless CPE. Use of such filters can be helpful in securing or restricting your local network.



Source Port Filtering

Entries in this table are used to restrict certain ports of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.

□ Enable Source Port Filtering

Port Range : -

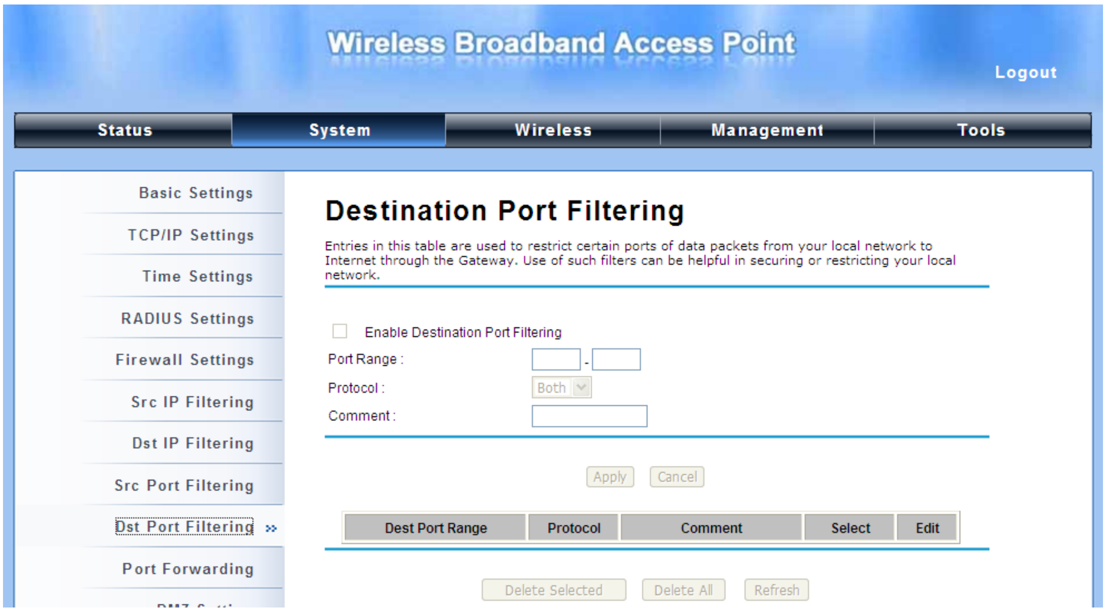
Protocol : Both

Comment :

Source Port Range	Protocol	Comment	Select	Edit

Figure 14 Source Port Filtering

Destination Port Filtering: The destination port filtering enables you to restrict certain ports of data packets from your local network to Internet through IEEE 802.11b/g/n Wireless CPE. Use of such filters can be helpful in securing or restricting your local network.



Destination Port Filtering

Entries in this table are used to restrict certain ports of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.

□ Enable Destination Port Filtering

Port Range : -

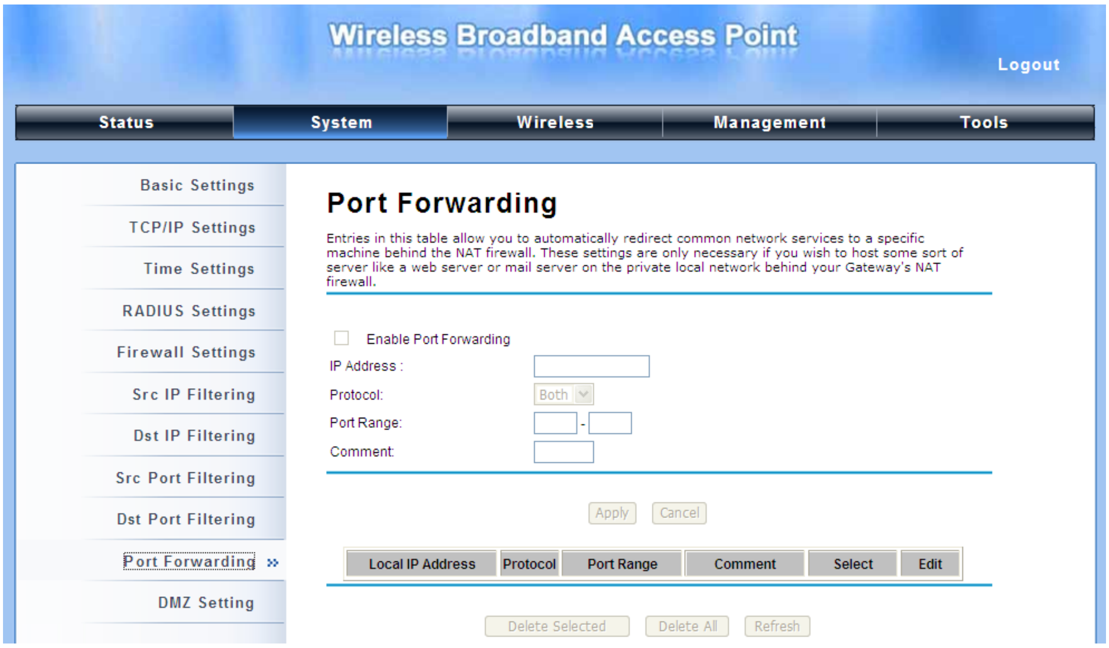
Protocol : Both

Comment :

Dest Port Range	Protocol	Comment	Select	Edit

Figure 15 Destination Port Filtering

Port Forwarding: The port forwarding allows you to automatically redirect common network services to a specific machine behind the NAT firewall. These settings ne are only necessary if you wish to host some sort of server like a web server or mail server on the private local network behind IEEE 802.11b/g/n Wireless CPE's NAT firewall.



Port Forwarding

Entries in this table allow you to automatically redirect common network services to a specific machine behind the NAT firewall. These settings are only necessary if you wish to host some sort of server like a web server or mail server on the private local network behind your Gateway's NAT firewall.

□ Enable Port Forwarding

IP Address :

Protocol: Both

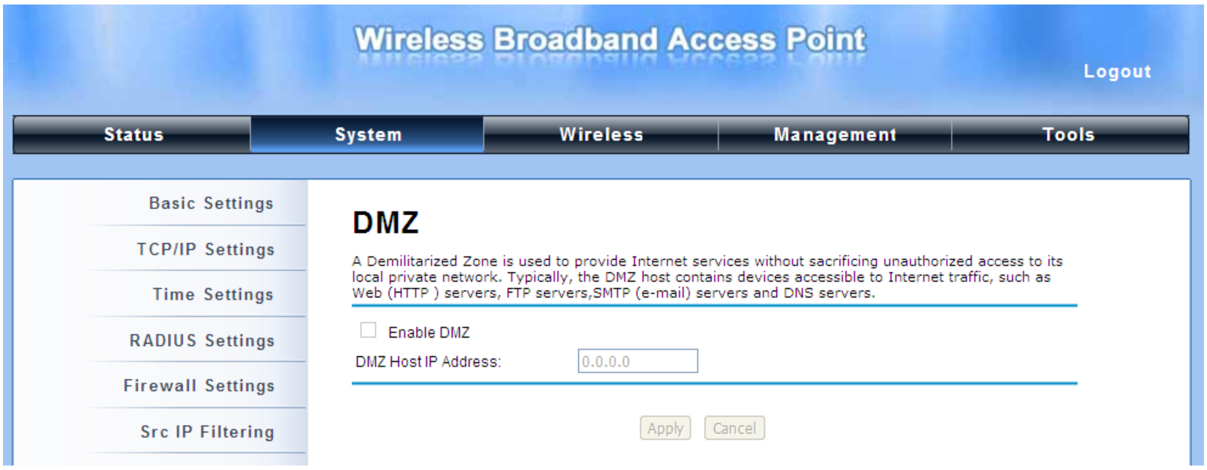
Port Range: -

Comment:

Local IP Address	Protocol	Port Range	Comment	Select	Edit

Figure 16 Port Forwarding

DMZ: A Demilitarized Zone is used to provide Internet services without sacrificing unauthorized access to its local private network. Typically, the DMZ host contains devices accessible to the Internet traffic, such as Web (HTTP) servers, FTP servers, SMTP (e-mail) servers and DNS servers.



DMZ

A Demilitarized Zone is used to provide Internet services without sacrificing unauthorized access to its local private network. Typically, the DMZ host contains devices accessible to Internet traffic, such as Web (HTTP) servers, FTP servers,SMTP (e-mail) servers and DNS servers.

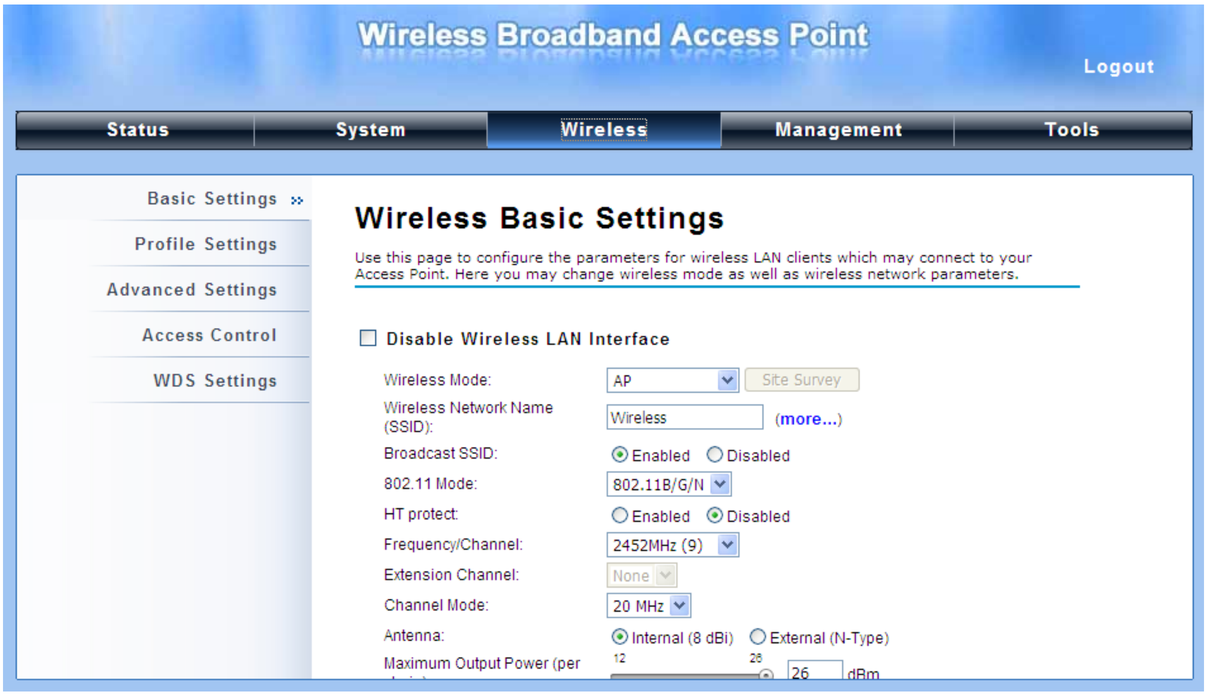
☐ Enable DMZ

DMZ Host IP Address: 0.0.0.0

Figure 17 DMZ

Basic Wireless Settings

Open “**Basic Settings**” in “**Wireless**” as below to make basic wireless configuration.



Wireless Basic Settings

Use this page to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless mode as well as wireless network parameters.

☐ Disable Wireless LAN Interface

Wireless Mode:	AP
Wireless Network Name (SSID):	Wireless
Broadcast SSID:	● Enabled ○ Disabled
802.11 Mode:	802.11B/G/N
HT protect:	○ Enabled ● Disabled
Frequency/Channel:	2452MHz (9)
Extension Channel:	None
Channel Mode:	20 MHz
Antenna:	● Internal (8 dBi) ○ External (N-Type)
Maximum Output Power (per	26 dBm

Figure 18 Basic Wireless Settings

- **Disable Wireless LAN Interface**

  Check this option to disable WLAN interface, then the wireless module of IEEE 802.11b/g/n Wireless CPE will stop working and no wireless device can connect to it.

- **Wireless Mode**

  Four operating modes are available in IEEE 802.11b/g/n Wireless CPE.

  AP: The IEEE 802.11b/g/n Wireless CPE establishes a wireless coverage and receives connectivity from other wireless devices.

  Wireless Client: The IEEE 802.11b/g/n Wireless CPE is able to connect to the AP and thus join the wireless network around it.

  Bridge: The IEEE 802.11b/g/n Wireless CPE establishes wireless connectivity with other APs by keying in remote MAC address. Please refer to the "**WDS Setting**" for detailed configuration.

  AP Repeater: The IEEE 802.11b/g/n Wireless CPE servers as AP and Bridge concurrently. In other words, the IEEE 802.11b/g/n Wireless CPE can provide connectivity services for CPEs under Bridge mode.

- **Wireless Network Name (SSID)**

  This wireless network name is shared among all associated devices in your wireless network. Keep it identical on all those devices. Note that the SSID is case-sensitive and can not exceed 32 characters.

- **Broadcast SSID**

  Under AP mode, hiding network name is necessary when you are in a wireless environment that may have potential risk. By disabling broadcast SSID, the STA can not scan and find IEEE 802.11b/g/n Wireless CPE, so that malicious attack by some illegal STA could be avoided.

- **802.11 Mode**

  The IEEE 802.11b/g/n Wireless CPE can communicate with wireless devices of 802.11b/g or 802.11b/g/n.

- **HT Protect**

  Enable HT (High Throughput) protect to ensure HT transmission with MAC mechanism. Under 802.11n mode, wireless client can be divided into HT STA and Non-HT STA, among which the one with HT protect enabled gets higher throughput.

- **Frequency/Channel**

  Channel varies much as the available band differs from country to country. Select a proper operating channel in the drop-down list according to your situation.

- **Extension Channel**

  Only applicable to AP, AP Repeater, and 40MHz channel width) indicates the use of channel bonding that allows the IEEE 802.11b/g/n Wireless CPE to use two channels at once. Two options are available: Upper Channel and Lower Channel.

- **Channel Mode**

  Four levels are available: 5MHz, 10MHz, 20MHz and 40MHz. The last one can enhance data throughput, but it takes more bandwidth, thus it might cause potential interference.

- **Antenna**

  By default, IEEE 802.11b/g/n Wireless CPE uses its built-in antenna for directional transmission; however, if you prefer to use an external antenna for your case-dependent applications, you can switch from “Internal (8 dBi)” to”External (N-Type)”.

  When **External (N-Type)** is selected, an Antenna Gain bar will appear to allow you specify the gain of the external antenna. The antenna gain calculates the TX power back off needed to remain in compliance with regulations.

✎**Note:**

- You are able to choose “External (N-Type)” only when you have well done installing the external antenna; otherwise, it might damage IEEE 802.11b/g/n Wireless CPE itself.
- The maximum output power will vary depending on the country selected in order to comply with the local regulation.
- The output power here is counted from the RF single chain only not including the 8dBi internal antenna.

- **Maximum Output Power (per chain):**

  Specify the signal transmission power. The higher the output power is, the wider the signal can cover, but the power consumption will be greater accordingly.

- **Data Rate**

  Usually “**Auto**” is preferred. Under this rate, the IEEE 802.11b/g/n Wireless CPE will automatically select the highest available rate to transmit. In some cases, however, like where there is no great demand for speed, you can have a relatively-low transmit rate for compromise of a long distance.

- **Extension Channel Protection Mode**

  This is to avoid conflict with other wireless network and boost the ability of your device to catch all 802.11g transmissions. However, it may decrease wireless network performance. Compared to CTS-Self; the transmission amount of CTS-RTS is much lower.

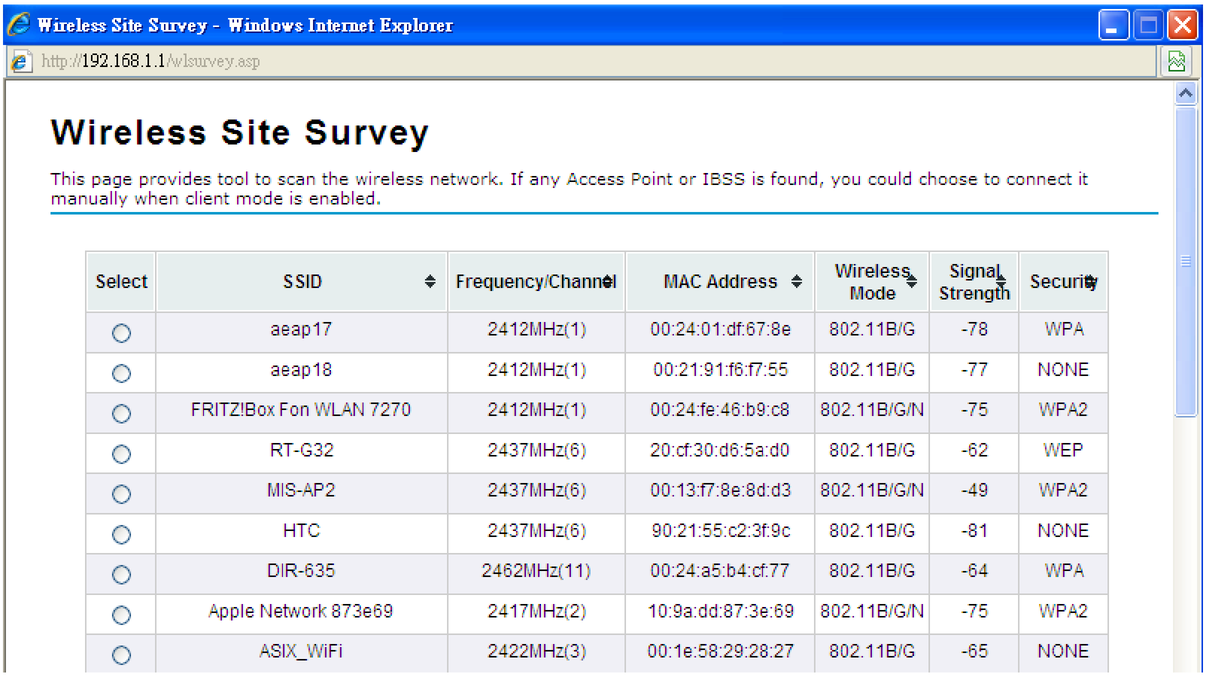
- **Enable MAC Clone**

  Available only under wireless client mode, it hides the MAC address of the AP while displays the one of associated wireless client or the MAC address designated manually.

Site Survey

Under wireless client mode, the IEEE 802.11b/g/n Wireless CPE is able to perform site survey, through which, information on the available access points will be detected.

Open "**Basic Settings**" in "**Wireless**", by clicking the "**Site Survey**" button beside "**Wireless Mode**" option, the wireless site survey window will pop up with a list of available AP in the vicinity. Select the AP you would like to connect and click "**Selected**" to establish connection.


Wireless Site Survey - Windows Internet Explorer
http://192.168.1.1/wlsurvey.asp

Wireless Site Survey

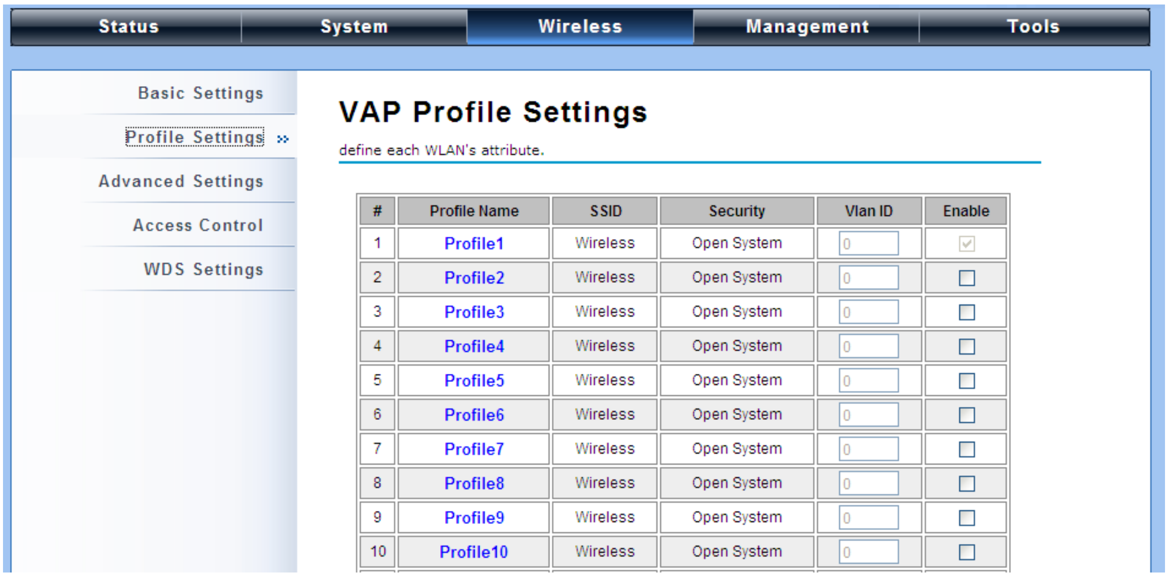
This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

Select	SSID	Frequency/Channel	MAC Address	Wireless Mode	Signal Strength	Security
○	aeap17	2412MHz(1)	00:24:01:df:67:8e	802.11B/G	-78	WPA
○	aeap18	2412MHz(1)	00:21:91:f6:f7:55	802.11B/G	-77	NONE
○	FRITZ!Box Fon WLAN 7270	2412MHz(1)	00:24:fe:46:b9:c8	802.11B/G/N	-75	WPA2
○	RT-G32	2437MHz(6)	20:cf:30:d6:5a:d0	802.11B/G	-62	WEP
○	MIS-AP2	2437MHz(6)	00:13:f7:8e:8d:d3	802.11B/G/N	-49	WPA2
○	HTC	2437MHz(6)	90:21:55:c2:3f:9c	802.11B/G	-81	NONE
○	DIR-635	2462MHz(11)	00:24:a5:b4:cf:77	802.11B/G	-64	WPA
○	Apple Network 873e69	2417MHz(2)	10:9a:dd:87:3e:69	802.11B/G/N	-75	WPA2
○	ASIX_WiFi	2422MHz(3)	00:1e:58:29:28:27	802.11B/G	-65	NONE

Figure 19 Site Survey

VAP Profile Settings

Available in AP mode, the IEEE 802.11b/g/n Wireless Outdoor CPE allows up to 16 virtual SSIDs on a single BSSID and to configure different profile settings such as security and VLAN ID to each SSID. To create a virtual AP, you may check the **Enable** box of the profile and click on the profile (eg. Profile 2) to configure wireless and security settings. Hit **Apply** to active the profile.

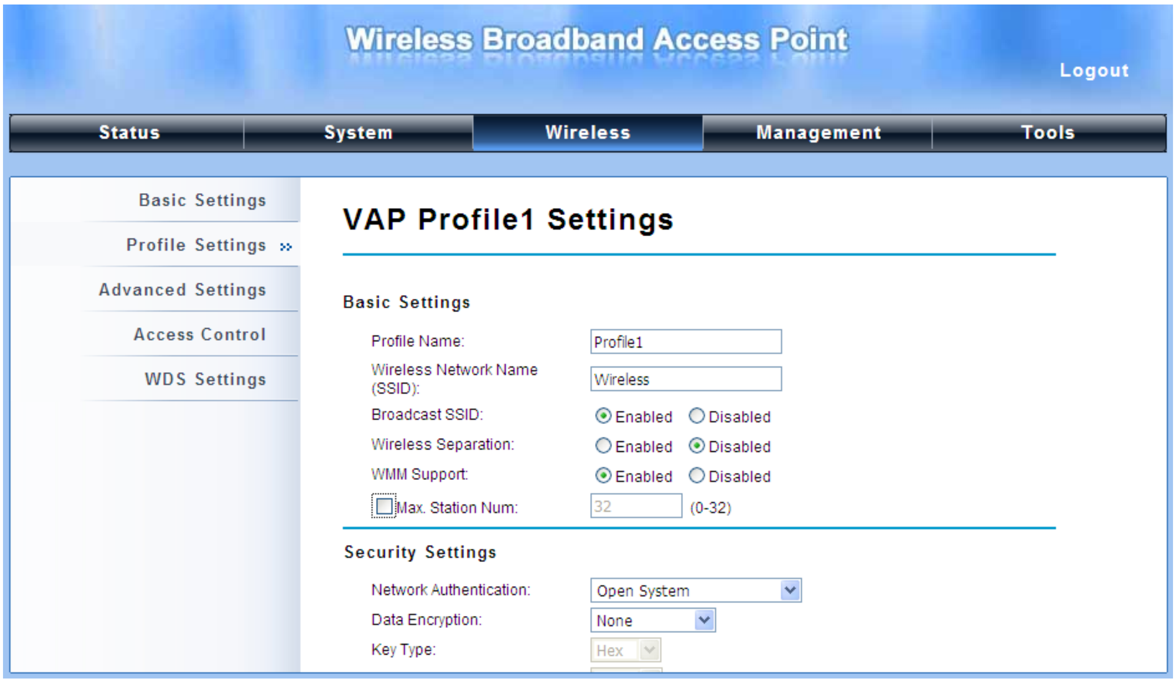


VAP Profile Settings

define each WLAN's attribute.

#	Profile Name	SSID	Security	Vlan ID	Enable
1	Profile1	Wireless	Open System	0	☑
2	Profile2	Wireless	Open System	0	☐
3	Profile3	Wireless	Open System	0	☐
4	Profile4	Wireless	Open System	0	☐
5	Profile5	Wireless	Open System	0	☐
6	Profile6	Wireless	Open System	0	☐
7	Profile7	Wireless	Open System	0	☐
8	Profile8	Wireless	Open System	0	☐
9	Profile9	Wireless	Open System	0	☐
10	Profile10	Wireless	Open System	0	☐

Figure 20 VAP Profile Settings



VAP Profile1 Settings

Basic Settings

Profile Name: Profile1

Wireless Network Name (SSID): Wireless

Broadcast SSID: ● Enabled ○ Disabled

Wireless Separation: ○ Enabled ● Disabled

WMM Support: ● Enabled ○ Disabled

☐ Max. Station Num: 32 (0-32)

Security Settings

Network Authentication: Open System

Data Encryption: None

Key Type: Hex

Figure 21 VAP Profile Settings

- **Basic Setting**

  Profile Name: Name of the VAP profile

  Wireless Network Name: Enter the virtual SSID for the VAP

  Broadcast SSID: In AP mode, hiding network name is necessary when you are in a wireless environment that may have potential risk. By disabling broadcast SSID, the STA cannot scan and find the IEEE 802.11b/g/n Wireless Outdoor CPE, so that malicious attack by some illegal STA could be avoided.

  Wireless Separation: Wireless separation is an ideal way to enhance the security of network transmission. Under the mode except wireless client mode, enable "**Wireless Separation**" can prevent the communication among associated wireless clients.

  WMM Support: WMM (Wi-Fi Multimedia) is a subset of 802.11e. It allows wireless communication to define a priority limit on the basis of data type under AP mode only, thus those time-sensitive data, like video/audio data, may own a higher priority than common one. To enable WMM, the wireless client should also support it

  Max. Station Number: By checking the "**Max. Station Num**" the CPE will only allow up to 32 wireless clients to associate with for better bandwidth for each client. By disabling the checkbox the CPE will allow up to 128 clients to connect, but it is likely to cause network congestion or poor performance.

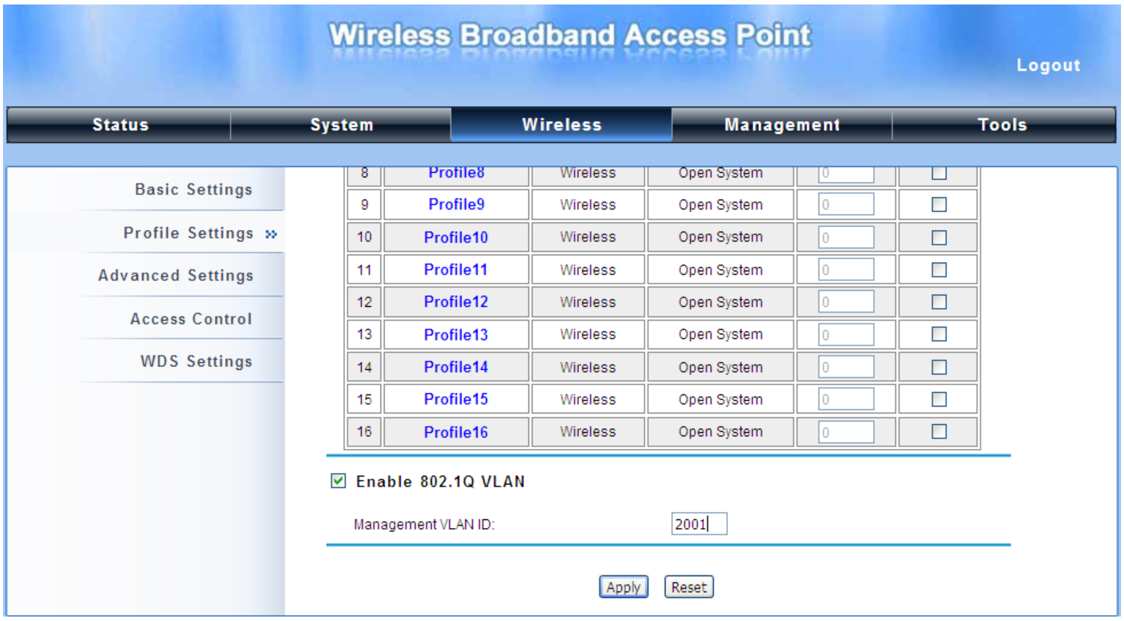
- **Security Setting:**

  To prevent unauthorized radios from accessing data transmitting over the connectivity, the IEEE 802.11a/n Wireless Outdoor CPE provides you with rock solid security settings. For detailed information please go to **Chapter 4 Wireless Security Setting**.

VLAN Tab

If your network uses VLANs, you can assign one SSID to a VLAN, and client devices using the SSID are grouped in that VLAN.

To allow users on the VLAN to access the WEB page of the IEEE 802.11a/n Wireless Outdoor CPE, you need to enable "**Enable 802.1Q VLAN**" and assign a management VLAN ID for your device. Make sure the assigned management VLAN ID is identical to your network VLAN ID to avoid failures of accessing the Web page of the IEEE 802.11b/g/n Wireless CPE.



8	Profile8	Wireless	Open System	0	□
9	Profile9	Wireless	Open System	0	□
10	Profile10	Wireless	Open System	0	□
11	Profile11	Wireless	Open System	0	□
12	Profile12	Wireless	Open System	0	□
13	Profile13	Wireless	Open System	0	□
14	Profile14	Wireless	Open System	0	□
15	Profile15	Wireless	Open System	0	□
16	Profile16	Wireless	Open System	0	□

☑ Enable 802.1Q VLAN

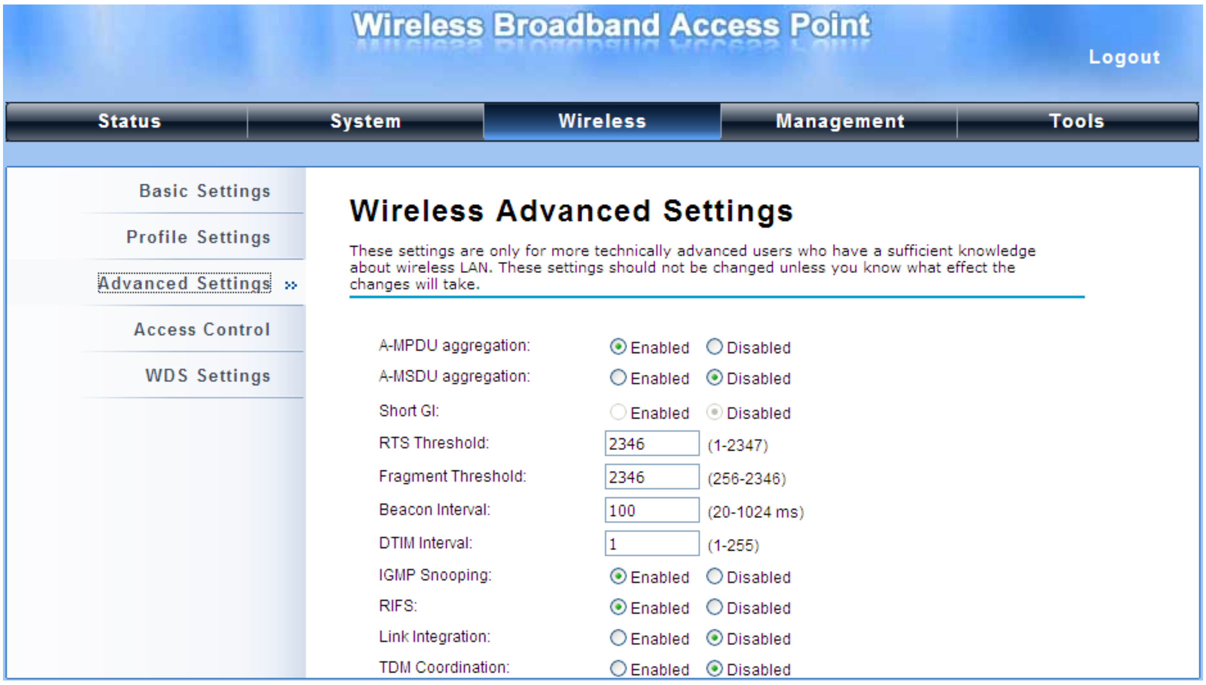
Management VLAN ID: 2001

Figure 22 Management VLAN ID

Chapter 4 Advanced Settings

Advanced Wireless Settings

Open "**Advanced Settings**" in "**Wireless**" to make advanced wireless settings.



Wireless Advanced Settings

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will take.

A-MPDU aggregation:	● Enabled	○ Disabled
A-MSDU aggregation:	○ Enabled	● Disabled
Short GI:	○ Enabled	● Disabled
RTS Threshold:	2346	(1-2347)
Fragment Threshold:	2346	(256-2346)
Beacon Interval:	100	(20-1024 ms)
DTIM Interval:	1	(1-255)
IGMP Snooping:	● Enabled	○ Disabled
RIFS:	● Enabled	○ Disabled
Link Integration:	○ Enabled	● Disabled
TDM Coordination:	○ Enabled	● Disabled

Figure 23 Advanced Wireless Settings

- **A-MPDU/A-MSDU Aggregation**

  The data rate of your AP except wireless client mode could be enhanced greatly with this option enabled; however, if your wireless clients don't support A-MPDU/A-MSDU aggregation, it is not recommended to enable it.

- **Short GI**

  Under 802.11n mode, enable it to obtain better data rate if there is no negative compatibility issue.

- **RTS Threshold**

  The IEEE 802.11b/g/n Wireless CPE sends RTS (Request to Send) frames to certain receiving station and negotiates the sending of a data frame. After receiving an RTS, that STA responds with a CTS (Clear to Send) frame to acknowledge the right to start transmission. The setting range is 0 to 2346 in byte. Setting it too low may result in poor network performance. Leave it at its default of 2346 is recommended.

- **Fragmentation Length**

  Specify the maximum size in byte for a packet before data is fragmented into multiple packets. Setting it too low may result in poor network performance. Leave it at its default of 2346 is recommended.

- **Beacon Interval**

  Specify the frequency interval to broadcast packets. Enter a value between 20 and 1024.

- **DTIM Interval**

  DTIM, which stands for Delivery Traffic Indication Message, is contained in the data packets. It is for enhancing the wireless transmission efficiency. The default is set to 1. Enter a value between 1 and 255.

- **Preamble Type**

  It defines some details on the 802.11 physical layer. “**Long**” and “**Auto**” are available.

- **IGMP Snooping**

  Available in AP/Router mode, IGMP snooping is the process of listening to IGMP network traffic. By enabling IGMP snooping, the AP will listen to IGMP membership reports, queries and leave messages to identify the ports that are members of multicast groups. Multicast traffic will only be forwarded to ports identified as members of the specific multicast group or groups.

- **RIFS**

  RIFS (Reduced Interframe Spacing) is a means of reducing overhead and thereby increasing network efficiency.

- **Link Integration**

  Available under AP/Bridge/AP repeater mode, it monitors the connection on the Ethernet port by checking “**Enabled**”. It can inform the associating wireless clients as soon as the disconnection occurs.

- **TDM Coordination**

  Stands for “Time-Division Multiplexing Technique”, this resource reservation control mechanisms can avoid packet collisions and send the packets much more efficiently allowing for higher effective throughput rates. This function is only available in AP/CPE mode. It is highly recommended to enable TDM coordination when there are multiple CPEs needed to connect to the AP in your application.

- **LAN2LAN CPE**

  LAN2LAN CPE mode enables packet forwarding at layer 2 level. It is fully transparent for all the Layer2 protocols.

- **Space in Meter**

  To decrease the chances of data retransmission at long distance, the IEEE 802.11b/g/n Wireless CPE can automatically adjust proper ACK timeout value by specifying distance of the two nodes.

- **Flow Control**

  It allows the administrator to specify the incoming and outgoing traffic limit by checking "**Enable Traffic Shaping**". This is only available in Router mode.

Note:

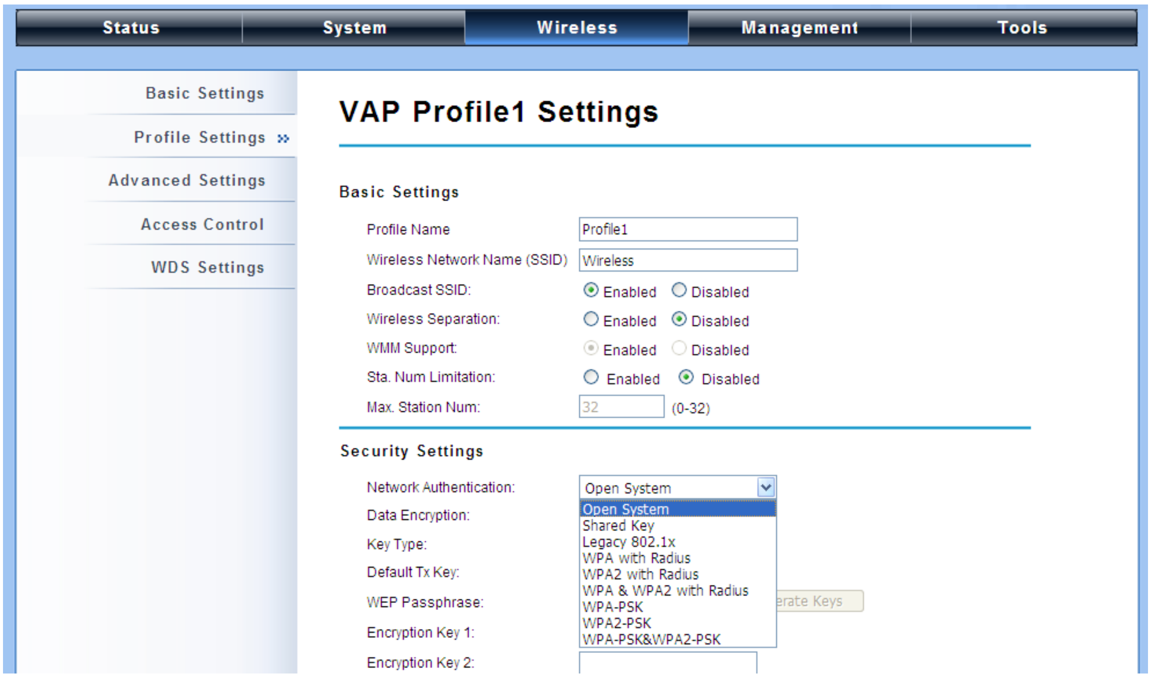
- We strongly recommend you leave most advanced settings at their defaults except "Distance in Meters" adjusted the parameter for real distance; any modification on them may negatively impact the performance of your wireless network.

Wireless Security Settings

To prevent unauthorized radios from accessing data transmitting over the connectivity, the IEEE 802.11b/g/n Wireless CPE provides you with rock solid security settings.

Data Encryption and Authentication Settings

Open "**Profile Setting**" in "**Wireless**" and enter "**VAP Profile 1 Settings**" as below.



VAP Profile1 Settings

Basic Settings

Profile Name: Profile1

Wireless Network Name (SSID): Wireless

Broadcast SSID: ● Enabled ○ Disabled

Wireless Separation: ○ Enabled ● Disabled

WMM Support: ● Enabled ○ Disabled

Sta. Num Limitation: ○ Enabled ● Disabled

Max. Station Num: 32 (0-32)

Security Settings

Network Authentication: Open System

Data Encryption:

Key Type:

Default Tx Key:

WEP Passphrase:

Encryption Key 1:

Encryption Key 2:

Figure 24 Security Settings

- **Network Authentication**

Open System: It allows any device to join the network without performing any security check.

Shared Key: Data encryption and key are required for wireless authentication (Not available in Bridge/AP Repeater mode).

Legacy 802.1x: Available in AP/Wireless Client mode, it provides the rights to access the wireless network and wired Ethernet. With User and PC identity, centralized authentication as well as dynamic key management, it controls the security risk of wireless network to the lowest. To serve the 802.1x, at least one EAP type should be supported by the RADIUS Server, AP and wireless client.

WPA with RADIUS: Available in AP/Wireless Client mode, with warrant (username, password and etc.) offered by user, this kind of authentication can be realized with specific RADIUS server. This is the common way to be adopted in large enterprise network.

WPA2 with RADIUS: Available in AP/Wireless Client mode, as a new version of WPA, only all the clients support WPA2, can it be available. If it is selected, AES encryption and RADIUS server is required. It is only available in AP/Wireless Client mode.

WPA&WPA2 with RADIUS: Available in AP mode, it provides options of WPA (TKIP) or WPA2 (AES) for the client. If it is selected, the data encryption type must be TKIP + AES and the RADIUS server must be set.

WPA-PSK: It is a simplified WPA mode with no need for specific authentication server. In this so-called WPA Pre-Shared Key, all you have to do is just pre-enter a key in each WLAN node and this is the common way to be adopted in large and middle enterprise as well as residential network.

WPA2-PSK: As a new version of WPA, only all the clients support WPA2, can it be available. If it is selected, the data encryption can only be AES and the passphrase is required.

WPA-PSK&WPA2-PSK: Available in AP mode, it provides options of WPA (TKIP) or WPA2 (AES) encryption for the client. If it is selected, the data encryption can only be TKIP + AES and the passphrase is required.

- **Data Encryption**

  If data encryption is enabled, the key is required and only sharing the same key with other wireless devices can the communication be established.

  None: Available only when the authentication type is open system.

  64 bits WEP: It is made up of 10 hexadecimal numbers.

  128 bits WEP: It is made up of 26 hexadecimal numbers.

  152 bits WEP: It is made up of 32 hexadecimal numbers.

  TKIP: Temporal Key Integrity Protocol, which is a kind of dynamic encryption, is co-used with WPA-PSK, etc.

  AES: Advanced Encryption Standard, it is usually co-used with WPA2-PSK, WPA, WPA2, etc.

  TKIP + AES: It allows for backwards compatibility with devices using TKIP.

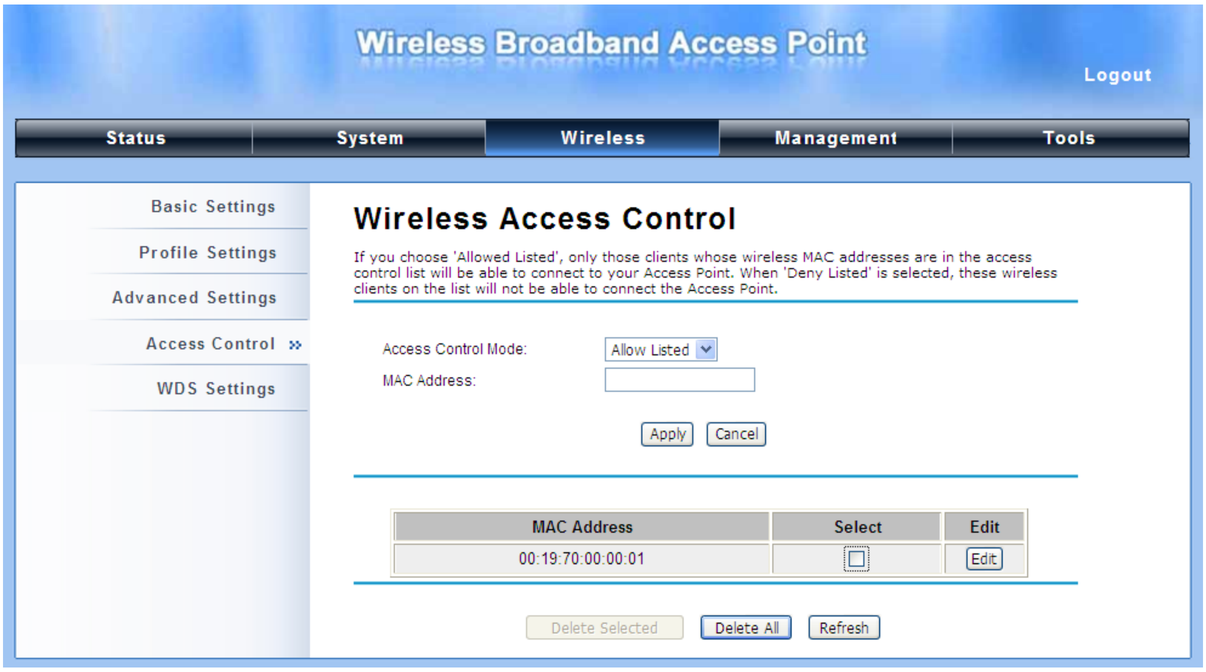
✎**Note:**

- We strongly recommend you enable wireless security on your network!
- Only setting the same Authentication, Data Encryption and Key in the IEEE 802.11b/g/n Wireless CPE and other associated wireless devices, can the communication be established!

Access Control

The Access Control appoints the authority to wireless client on accessing IEEE 802.11b/g/n Wireless CPE, thus a further security mechanism is provided. This function is available only under AP mode.

Open “**Access Control**” in “**Wireless**” as below.



Wireless Access Control

If you choose 'Allowed Listed', only those clients whose wireless MAC addresses are in the access control list will be able to connect to your Access Point. When 'Deny Listed' is selected, these wireless clients on the list will not be able to connect the Access Point.

Access Control Mode: Allow Listed

MAC Address:

MAC Address	Select	Edit
00:19:70:00:00:01	□	Edit

Figure 25 Access Control

- **Access Control Mode**

  If you select “**Allow Listed**”, only those clients whose wireless MAC addresses are in the access control list will be able to connect to your AP. While when “**Deny Listed**” is selected, those wireless clients on the list will not be able to connect the AP.

- **MAC Address**

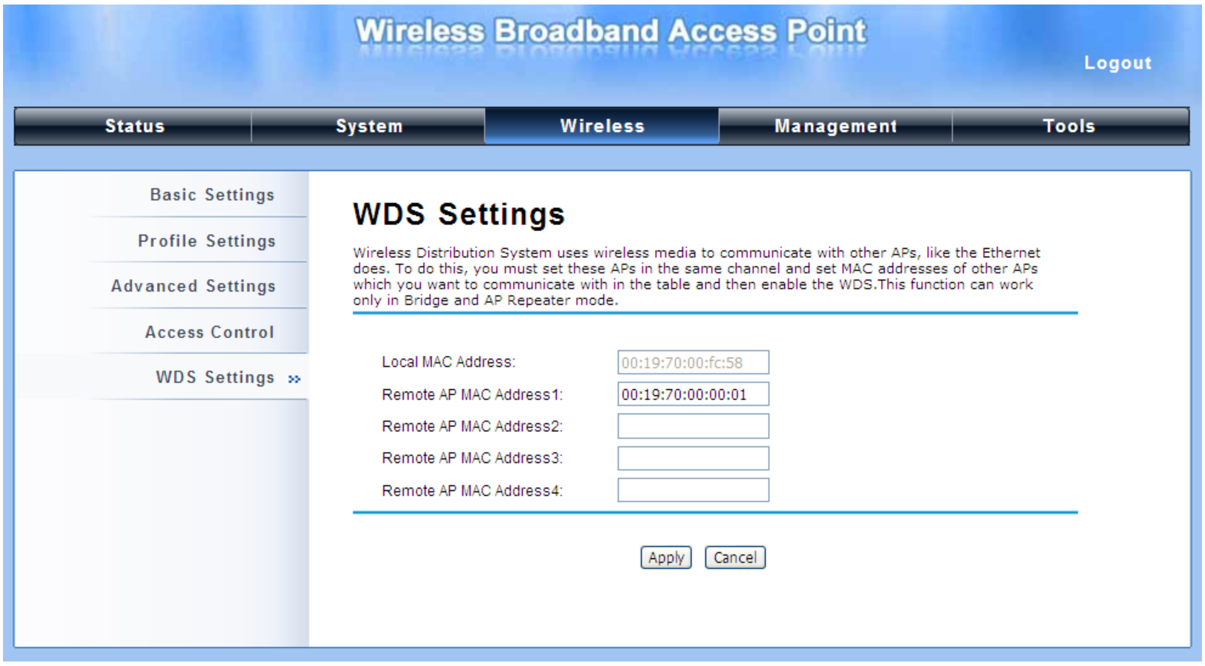
  Enter the MAC address of the wireless client that you would like to list into the access control list, click “**Apply**” then it will be added into the table at the bottom.

- **Delete Selected/All**

  Check the box before one or more MAC addresses of wireless client(s) that you would like to cancel, and click “**Delete Selected**” or “**Delete All**” to cancel that access control rule.

WDS Settings

Extend the range of your network without having to use cables to link the Access Points by using the Wireless Distribution System (WDS): Simply put, you can link the Access Points wirelessly. Open "**WDS Settings**" in "**Wireless**" as below:



WDS Settings

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does. To do this, you must set these APs in the same channel and set MAC addresses of other APs which you want to communicate with in the table and then enable the WDS.This function can work only in Bridge and AP Repeater mode.

Local MAC Address:	00:19:70:00:fc:58
Remote AP MAC Address1:	00:19:70:00:00:01
Remote AP MAC Address2:	
Remote AP MAC Address3:	
Remote AP MAC Address4:	

Figure 26 WDS Settings

Enter the MAC address of another AP you wirelessly want to connect to into the appropriate field and click "**Apply**" to save settings.

Note:

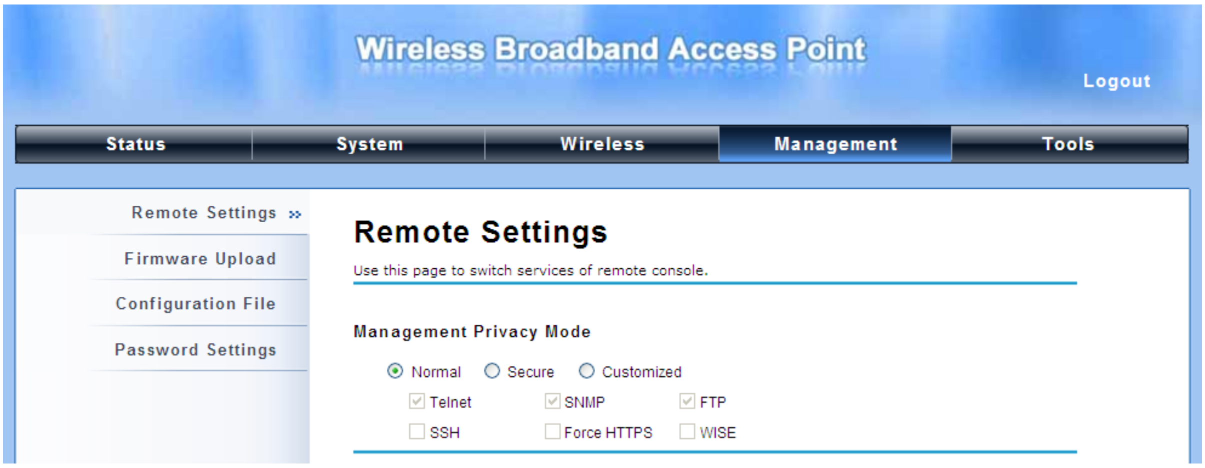
- WDS Settings is available only under Bridge and AP Repeater Mode.
- Bridge uses the WDS protocol that is not defined as the standard thus compatibility issues between equipment from different vendors may arise. Moreover, Tree or Star shape network topology should be used in all WDS use-cases (i.e. if AP2 and AP3 are specified as the WDS peers of AP1, AP2 should not be specified as the WDS peer of AP3 and AP3 should not be specified as the WDS peer of AP2 in any case). Mesh and Ring network topologies are not supported by WDS and should be avoided in all the use cases.

Chapter 5 Management

Remote Management

The IEEE 802.11b/g/n Wireless Outdoor CPE provides a variety of remotes managements including Telnet, SNMP, FTP, SSH, HTTPS and exclusive WISE tool, making configuration more convenient and secure.

With **Normal** selected, Telnet, SNMP and FTP are activated as default remote management options. To use secure management tools such as SSH, HTTPS and WISE, please select "**Secure**". You may also choose "**Customized**" to enable any methods as desired.



Remote Settings

Use this page to switch services of remote console.

Management Privacy Mode

● Normal ○ Secure ○ Customized

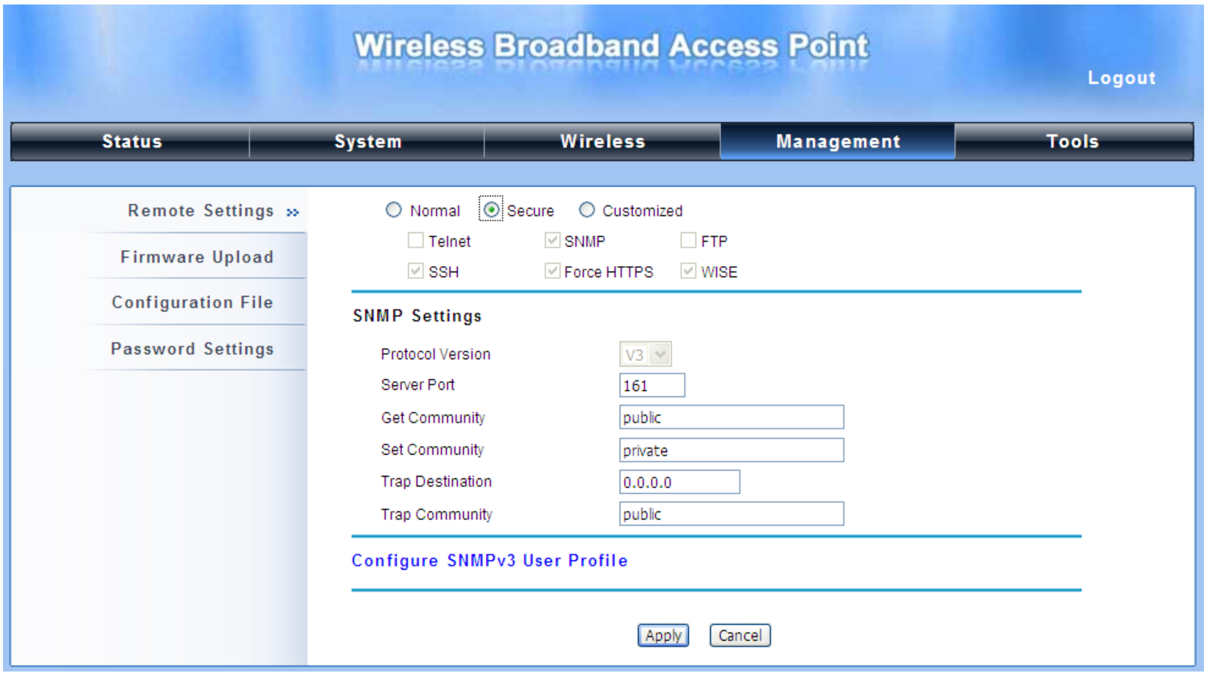
☑ Telnet ☑ SNMP ☑ FTP

□ SSH □ Force HTTPS □ WISE

Figure 27 Remote Settings

SNMP Management

The IEEE 802.11b/g/n Wireless CPE supports SNMP for convenient remote management. Open "**Remote Settings**" in "**Management**" shown below. Set the SNMP parameters and obtain MIB file before remote management.



○ Normal ● Secure ○ Customized

□ Telnet ☑ SNMP □ FTP

☑ SSH ☑ Force HTTPS ☑ WISE

SNMP Settings

Protocol Version	V3
Server Port	161
Get Community	public
Set Community	private
Trap Destination	0.0.0.0
Trap Community	public

Configure SNMPv3 User Profile

Figure 28 SNMP Configuration

- **Protocol Version**

  Select the SNMP version, and keep it identical on the IEEE 802.11b/g/n Wireless CPE and the SNMP manager. The IEEE 802.11b/g/n Wireless CPE supports SNMP v2/v3.

- **Server Port**

  Change the server port for a service if needed; however you have to use the same port to use that service for remote management.

- **Get Community**

  Specify the password for the incoming Get and GetNext requests from the management station. By default, it is set to public and allows all requests.

- **Set Community**

  Specify the password for the incoming Set requests from the management station. By default, it is set to private.

- **Trap Destination**

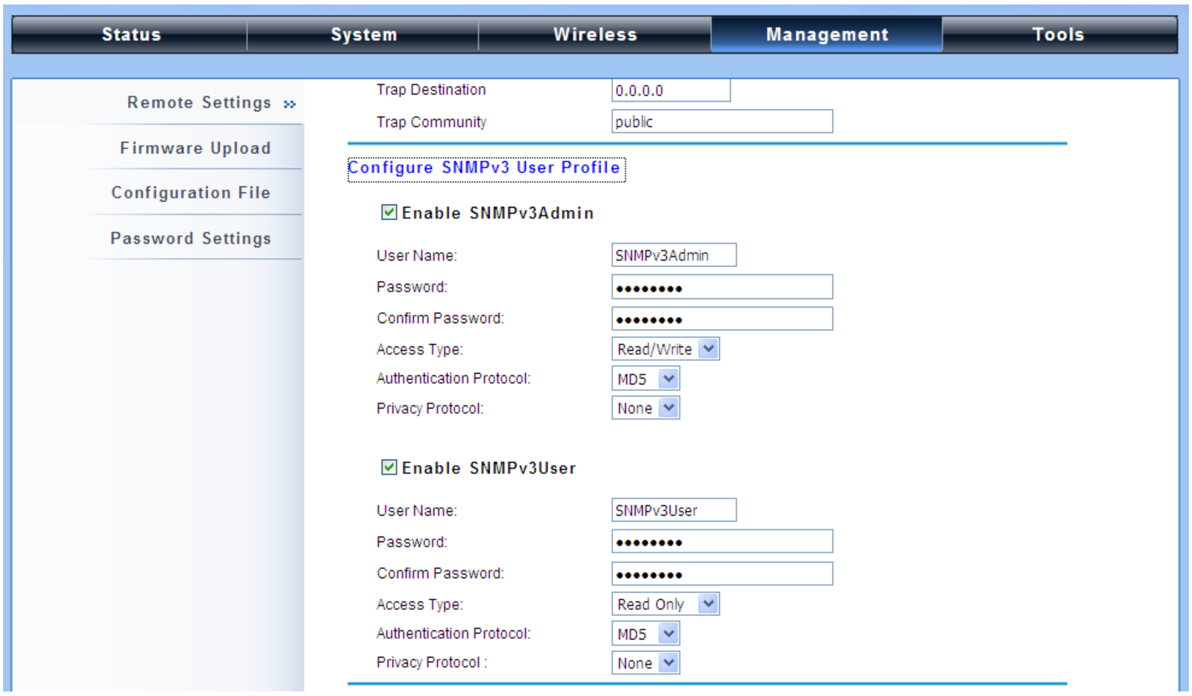
  Specify the IP address of the station to send the SNMP traps to.

- **Trap Community**

  Specify the password sent with each trap to the manager. By default, it is set to public and allows all requests.

Configure SNMPv3 User Profile

For SNMP protocol version 3, you can click "**Configure SNMPv3 User Profile**" in blue to set the details of SNMPv3 user. Check "**Enable SNMPv3 Admin/User**" in advance and make further configuration.



Trap Destination: 0.0.0.0
Trap Community: public

Configure SNMPv3 User Profile

☑ Enable SNMPv3Admin

User Name: SNMPv3Admin
Password: ••••••••
Confirm Password: ••••••••
Access Type: Read/Write
Authentication Protocol: MD5
Privacy Protocol: None

☑ Enable SNMPv3User

User Name: SNMPv3User
Password: ••••••••
Confirm Password: ••••••••
Access Type: Read Only
Authentication Protocol: MD5
Privacy Protocol : None

Figure 29 Configure SNMPv3 User Profile

- **User Name**

  Specify a user name for the SNMPv3 administrator or user. Only the SNMP commands carrying this user name are allowed to access the IEEE 802.11b/g/n Wireless CPE.

- **Password**

  Specify a password for the SNMPv3 administrator or user. Only the SNMP commands carrying this password are allowed to access the IEEE 802.11b/g/n Wireless CPE.

- **Confirm Password**

  Input that password again to make sure it is your desired one.

- **Access Type**

  Select "**Read Only**" or "**Read and Write**" accordingly.

- **Authentication Protocol**

  Select an authentication algorithm. SHA authentication is stronger than MD5 but is slower.

- **Privacy Protocol**

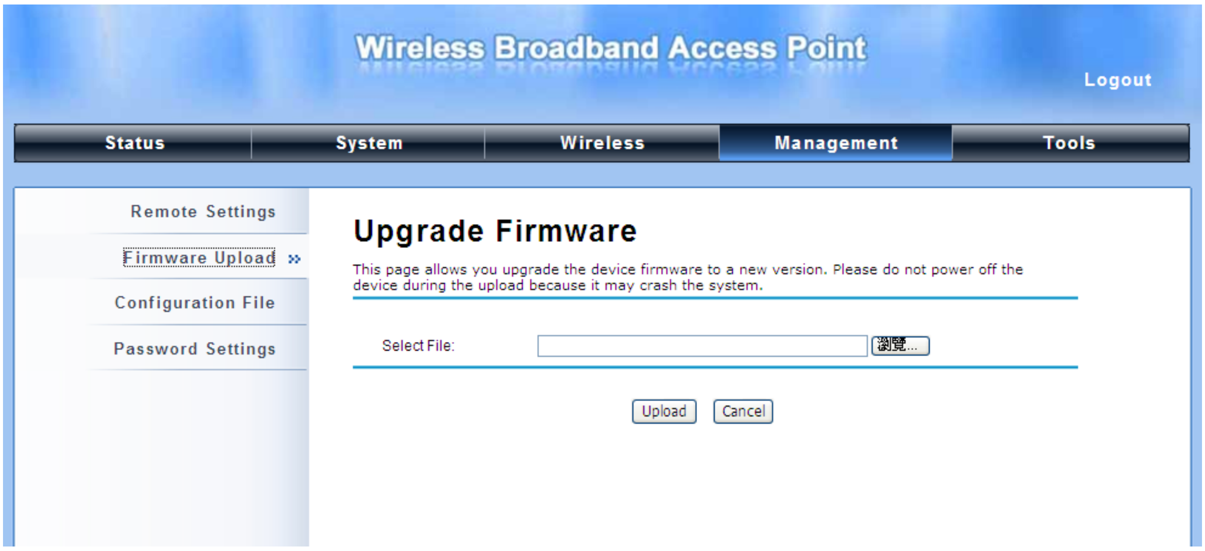
  Specify the encryption method for SNMP communication. None and DES are available.

  None: No encryption is applied.

DES: Data Encryption Standard, it applies a 58-bit key to each 64-bit block of data.

Upgrade Firmware

Open “**Firmware Upload**” in “**Management**” and follow the steps below to upgrade firmware locally or remotely through IEEE 802.11b/g/n Wireless CPE’s Web:



Upgrade Firmware

This page allows you upgrade the device firmware to a new version. Please do not power off the device during the upload because it may crash the system.

Select File:

Figure 30 Upgrade Firmware

- Click “**Browse**” to select the firmware file you would like to load;
- Click “**Upload**” to start the upload process;
- Wait a moment, the system will reboot after successful upgrade.

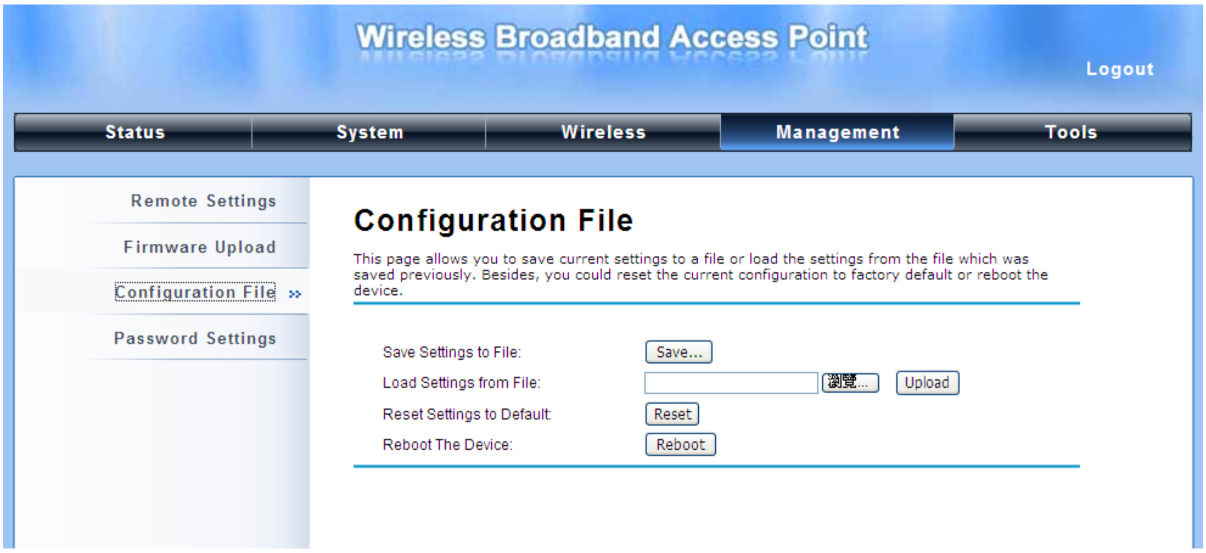
Note:

- Do NOT cut the power off during upgrade, otherwise the system may crash!

Backup/ Retrieve Settings

It is strongly recommended you back up configuration information in case of something unexpected. If tragedy hits your device, you may have an access to restore the important files by the backup. All these can be done by the local or remote computer.

Open “**Configuration File**” in “**Management**” as below:



Configuration File

This page allows you to save current settings to a file or load the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default or reboot the device.

Save Settings to File: Save...

Load Settings from File: 瀏覽... Upload

Reset Settings to Default: Reset

Reboot The Device: Reboot

Figure 31 Backup/Retrieve Settings

- **Save Setting to File**

  By clicking “**Save**”, a dialog box will pop up. Save it, then the configuration file **ap.cfg** will be generated and saved to your local computer.

- **Load Settings from File**

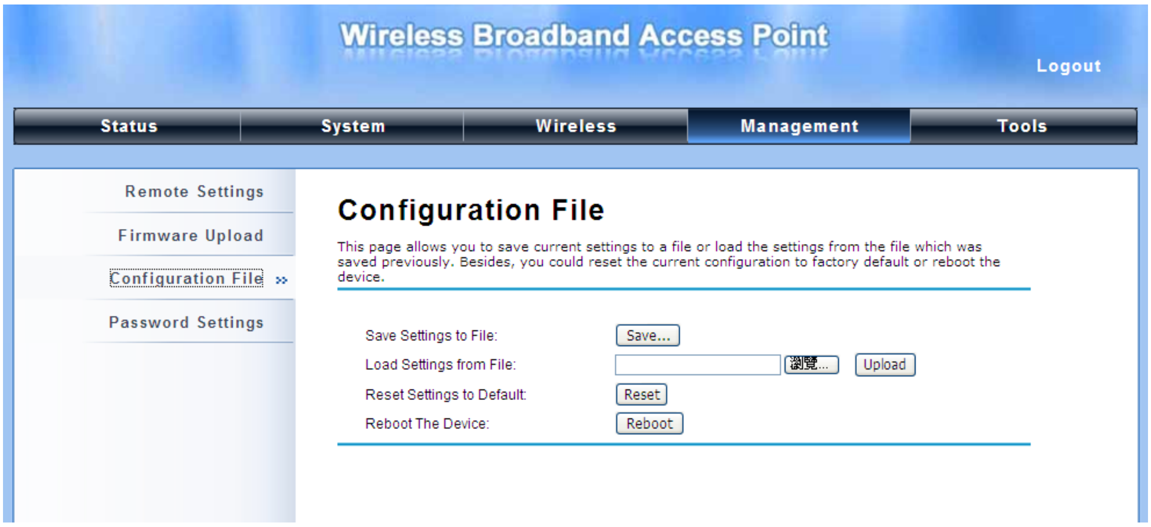
  By clicking “**Browse**”, a file selection menu will appear, select the file you want to load, like **ap.cfg**; Click “**Upload**” to load the file. After automatically rebooting, new settings are applied.

Restore Factory Default Settings

The IEEE 802.11b/g/n Wireless CPE provides two ways to restore the factory default settings:

- **Restore factory default settings via Web**

  From “**Configuration File**”, clicking “**Reset**” will eliminate all current settings and reboot your device, then default settings are applied.



Configuration File

This page allows you to save current settings to a file or load the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default or reboot the device.

Save Settings to File:

Load Settings from File:

Reset Settings to Default:

Reboot The Device:

Figure 32 Restore Settings

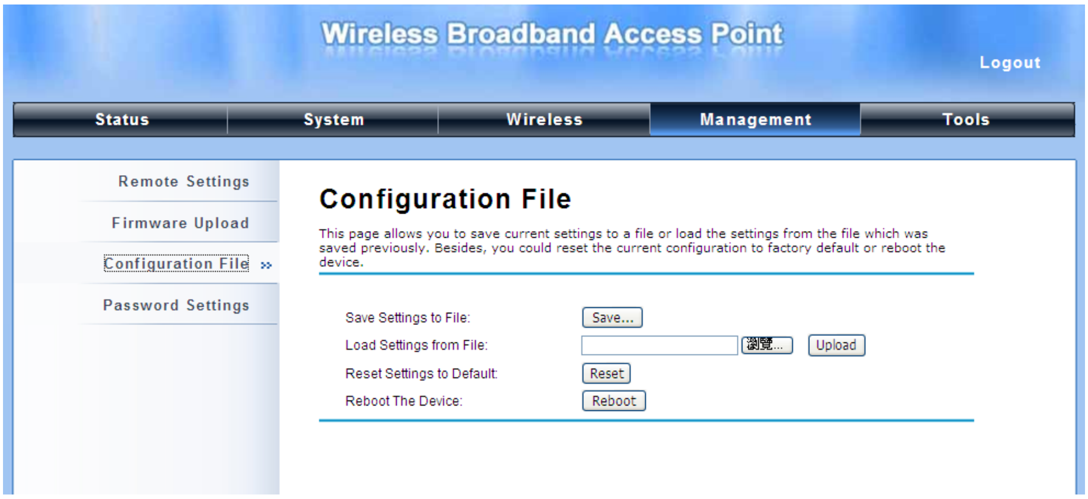
- **Restore factory default settings via Reset Button**

If software in IEEE 802.11b/g/n Wireless CPE is unexpectedly crashed and no longer reset the unit via Web, you may do hardware reset via the reset button. Press and hold the button for at least 5 seconds and then release it until the PWR LED gives a blink.

Reboot

You can reboot your IEEE 802.11b/g/n Wireless CPE from "**Configuration File**" in "**Management**" as below:

Click "**Reboot**" and hit "**Yes**" upon the appeared prompt to start reboot process. This takes a few minutes.



Configuration File

This page allows you to save current settings to a file or load the settings from the file which was saved previously. Besides, you could reset the current configuration to factory default or reboot the device.

Save Settings to File:

Load Settings from File:

Reset Settings to Default:

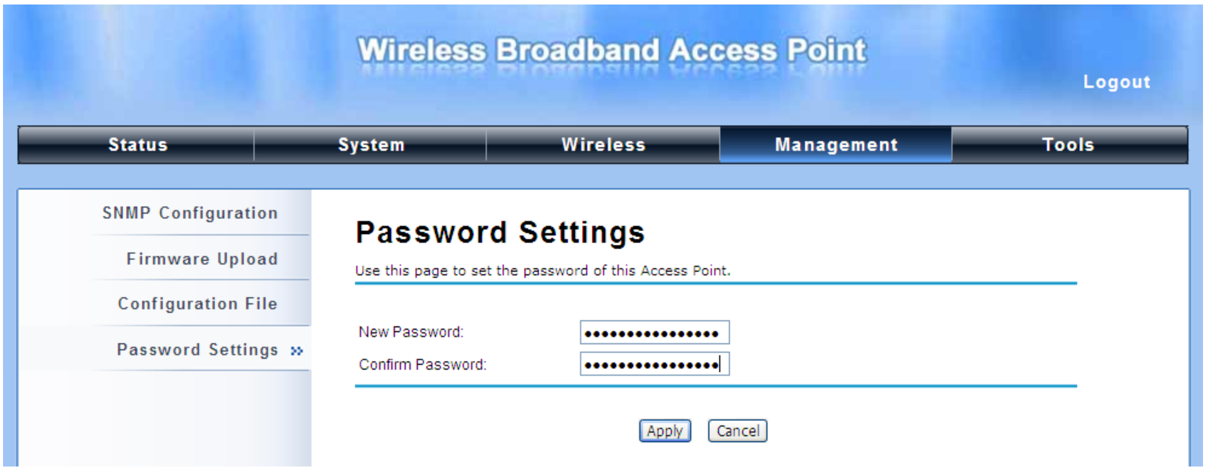
Reboot The Device:

Figure 33 Reboot

Password

From “**Password Settings**” in “**Management**”, you can change the password to manage your IEEE 802.11b/g/n Wireless CPE.

Enter the new password respectively in “**New Password**” and “**Confirm Password**” fields; click “**Apply**” to save settings.



Password Settings

Use this page to set the password of this Access Point.

New Password: ●●●●●●●●●●●●●●●●

Confirm Password: ●●●●●●●●●●●●●●●●

Figure 34 Password

Note:

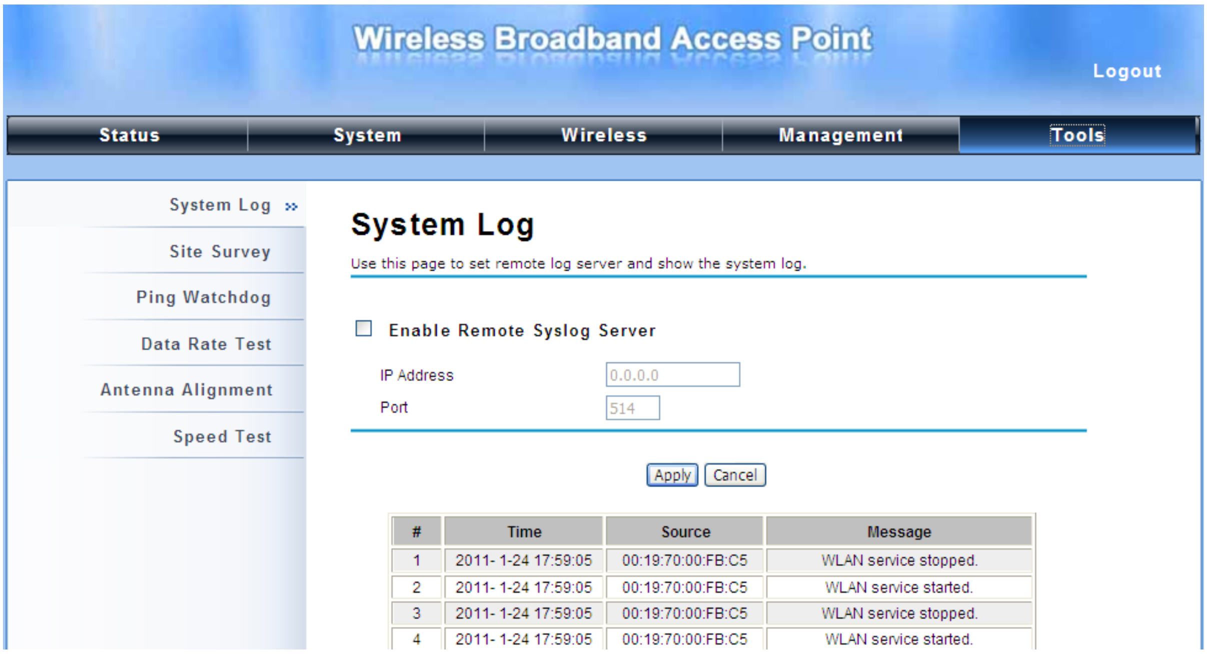
- The password is case-sensitive and its length cannot be exceed 19 characters!

Chapter 6 Monitoring Tools

System Log

System log is used for recording events occurred on the IEEE 802.11b/g/n Wireless CPE, including station connection, disconnection, system reboot and etc.

Open “**System Log**” in “**Tools**” as below.



System Log

Use this page to set remote log server and show the system log.

□ Enable Remote Syslog Server

IP Address: 0.0.0.0

Port: 514

#	Time	Source	Message
1	2011- 1-24 17:59:05	00:19:70:00:FB:C5	WLAN service stopped.
2	2011- 1-24 17:59:05	00:19:70:00:FB:C5	WLAN service started.
3	2011- 1-24 17:59:05	00:19:70:00:FB:C5	WLAN service stopped.
4	2011- 1-24 17:59:05	00:19:70:00:FB:C5	WLAN service started.

Figure 35 System Log

- **Remote Syslog Server**

  Enable Remote Syslog: Enable System log to alert remote server.

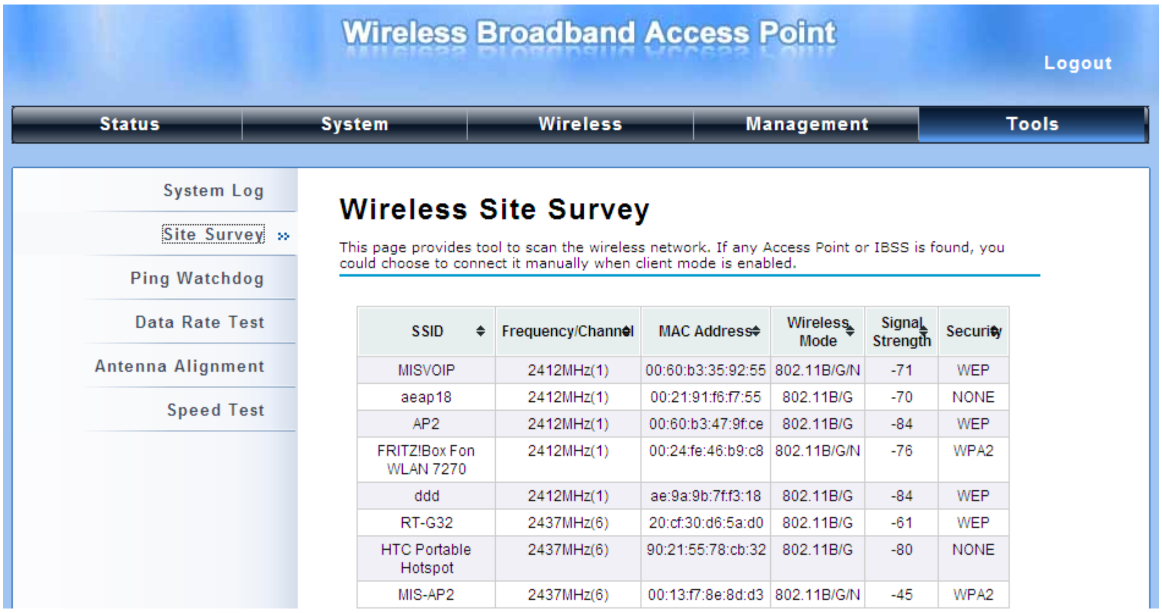
  IP Address: Specify the IP address of the remote server.

  Port: Specify the port number of the remote server.

Site Survey

Only available under Wireless Client mode, site survey allows you to scan all the APs within coverage.

Open “**Site Survey**” in “**Tools**” as below and select the desired AP to connect.



Wireless Site Survey

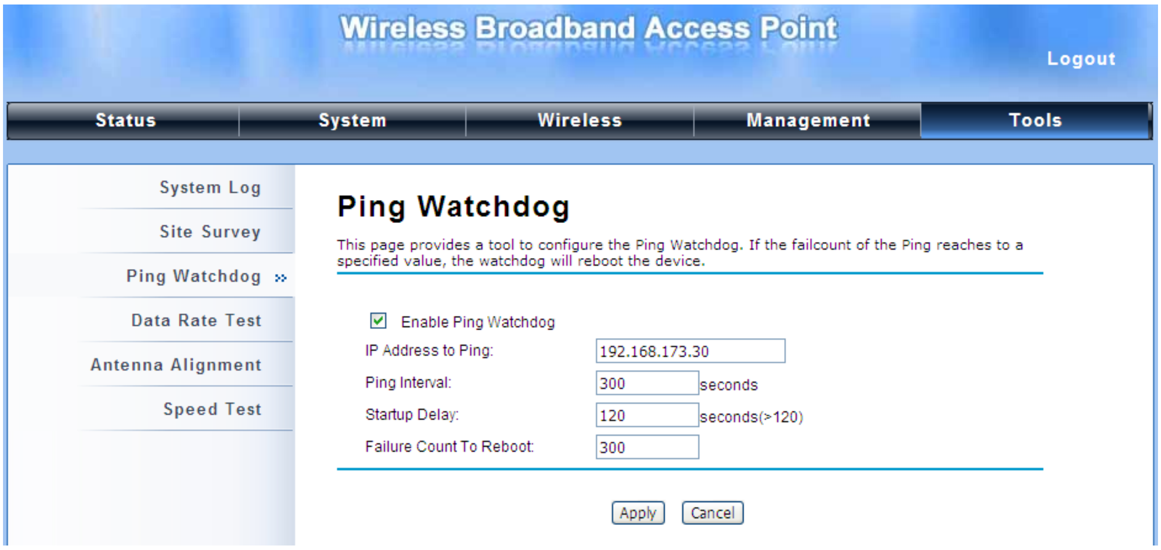
This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

SSID	Frequency/Channel	MAC Address	Wireless Mode	Signal Strength	Security
MISVOIP	2412MHz(1)	00:60:b3:35:92:55	802.11B/G/N	-71	WEP
aeap18	2412MHz(1)	00:21:91:f6:f7:55	802.11B/G	-70	NONE
AP2	2412MHz(1)	00:60:b3:47:9f:ce	802.11B/G	-84	WEP
FRITZ!Box Fon WLAN 7270	2412MHz(1)	00:24:fe:46:b9:c8	802.11B/G/N	-76	WPA2
ddd	2412MHz(1)	ae:9a:9b:7f:f3:18	802.11B/G	-84	WEP
RT-G32	2437MHz(6)	20:cf:30:d6:5a:d0	802.11B/G	-61	WEP
HTC Portable Hotspot	2437MHz(6)	90:21:55:78:cb:32	802.11B/G	-80	NONE
MIS-AP2	2437MHz(6)	00:13:f7:8e:8d:d3	802.11B/G/N	-45	WPA2

Figure 36 Site Survey

Ping Watch Dog

If you mess your connection up and cut off your ability the log in to the unit, the ping watchdog has a chance to reboot due to loss of connectivity.



Ping Watchdog

This page provides a tool to configure the Ping Watchdog. If the failcount of the Ping reaches to a specified value, the watchdog will reboot the device.

☑ Enable Ping Watchdog

IP Address to Ping:	192.168.173.30	
Ping Interval:	300	seconds
Startup Delay:	120	seconds(>120)
Failure Count To Reboot:	300	

Figure 37 Ping Watchdog

- **Ping Watchdog**

  Enable Ping Watchdog: To activate ping watchdog, check this checkbox.

  IP Address to Ping: Specify the IP address of the remote unit to ping.

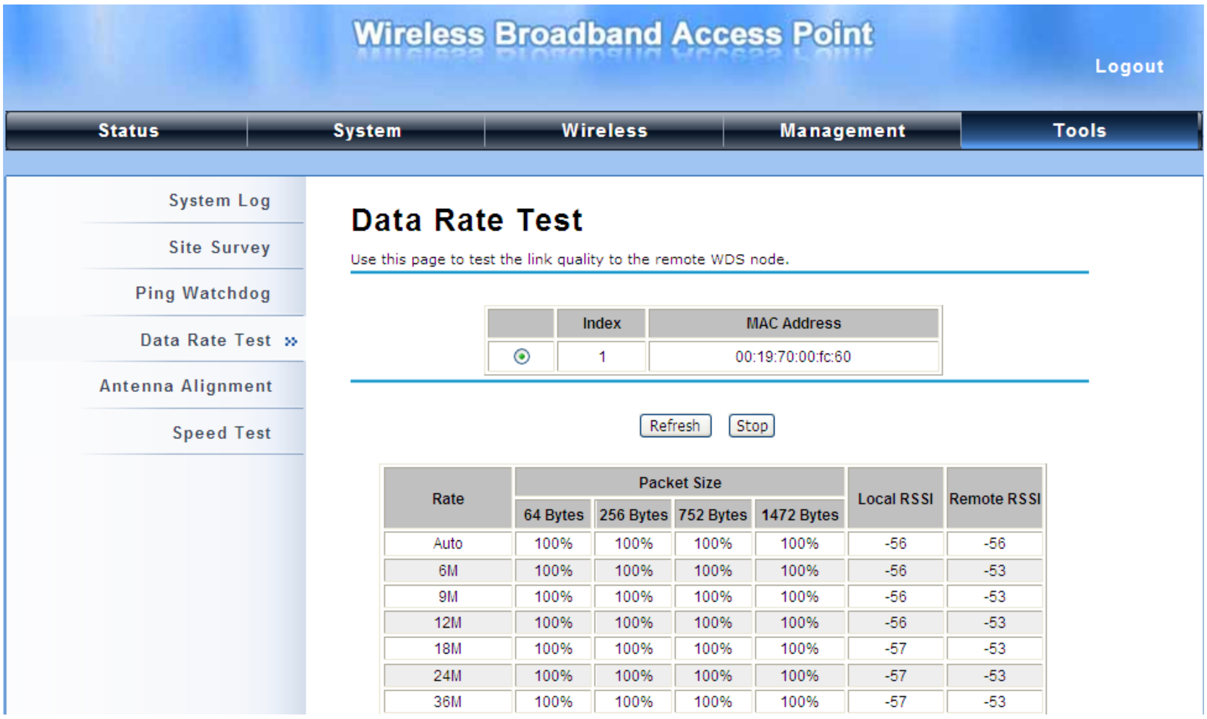
  Ping Interval: Specify the interval time to ping the remote unit.

  Startup Delay: Specify the startup delay time to prevent reboot before the IEEE 802.11b/g/n Wireless CPE is fully initialized.

  Failure Count To Reboot: If the ping timeout packets reached the value, the IEEE 802.11b/g/n Wireless CPE will reboot automatically.

Date Rate Test

The Data Rate Test allows you test the current RSSI at each data rate between your IEEE 802.11b/g/n Wireless CPEs.



Data Rate Test

Use this page to test the link quality to the remote WDS node.

	Index	MAC Address
●	1	00:19:70:00:fc:60

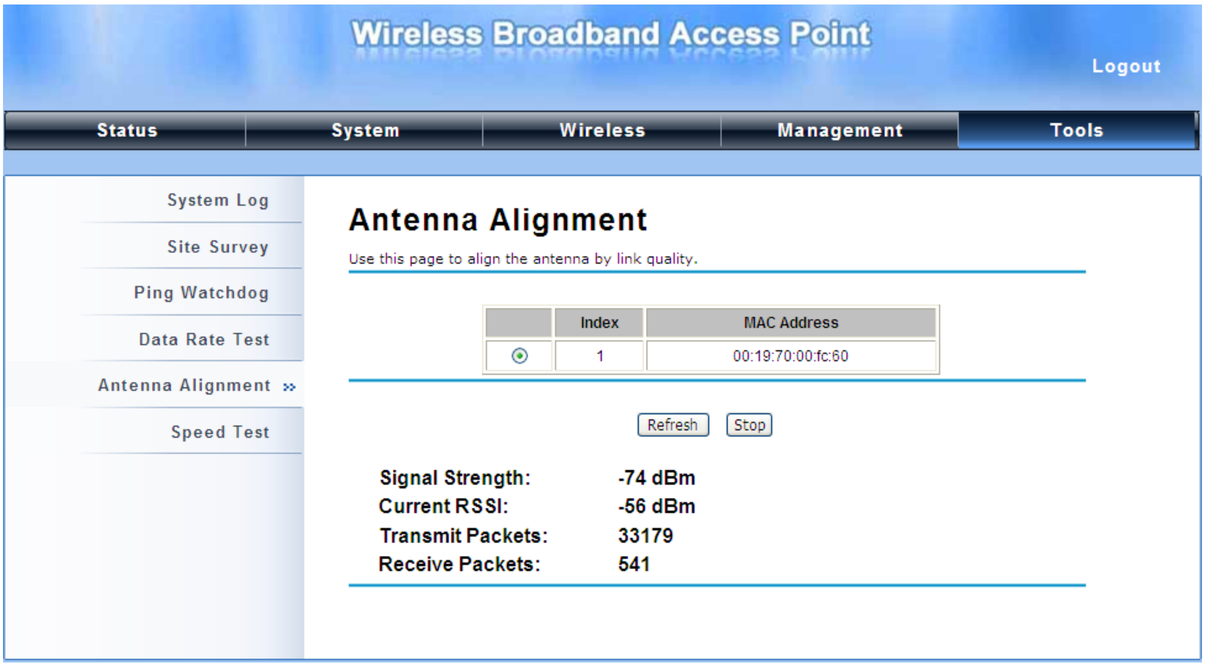
Rate	Packet Size				Local RSSI	Remote RSSI
	64 Bytes	256 Bytes	752 Bytes	1472 Bytes		
Auto	100%	100%	100%	100%	-56	-56
6M	100%	100%	100%	100%	-56	-53
9M	100%	100%	100%	100%	-56	-53
12M	100%	100%	100%	100%	-56	-53
18M	100%	100%	100%	100%	-57	-53
24M	100%	100%	100%	100%	-57	-53
36M	100%	100%	100%	100%	-57	-53

Figure 38 Data Rate Test

Antenna Alignment

Under Bridge mode, when the bridges are not easily visible from the location where the dish will be installed, the antenna alignment tool can help you evaluate the position of the unit and adjust the angle of the antenna more precisely. Keep it that in real circumstances a lot of additional factors should be taken into account when your unit is installed. These factors include various obstacles (buildings, trees), the landscape, the altitude, transponder orientation, polarization, etc.

To use the tool, select the desired remote WDS bridge and click “Start”, the web page will display the measured signal strength, RSSI and transmit/receive packets. If the signal quality is not quite good, try to adjust the antenna and see if the quality improves or not.



Antenna Alignment

Use this page to align the antenna by link quality.

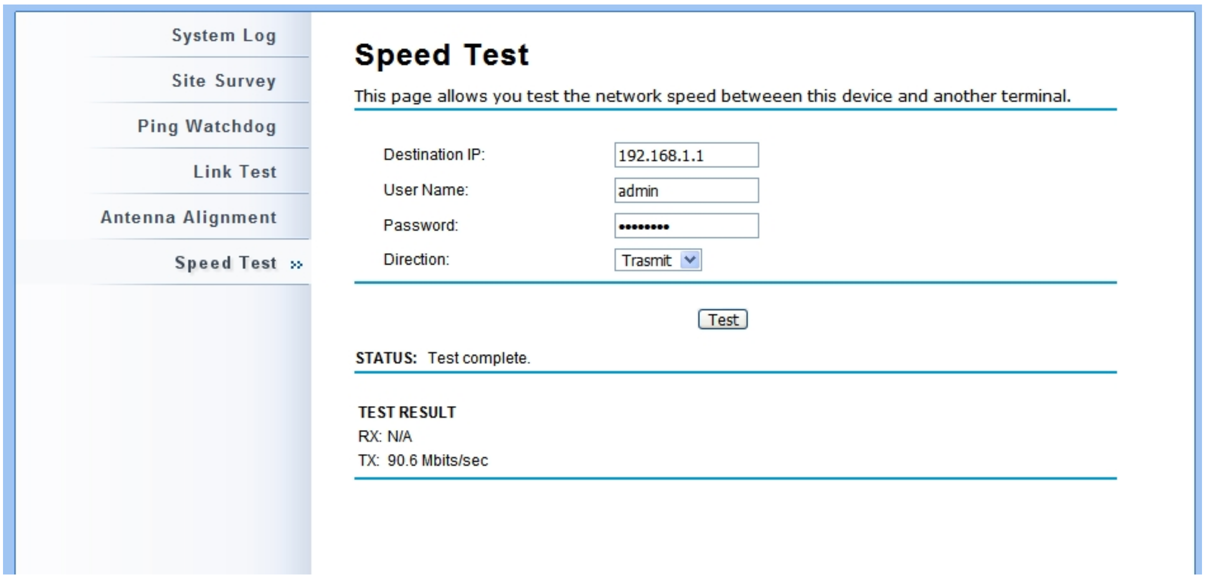
	Index	MAC Address
●	1	00:19:70:00:fc:60

Signal Strength:	-74 dBm
Current RSSI:	-56 dBm
Transmit Packets:	33179
Receive Packets:	541

Figure 39 Antenna Alignment

Speed Test

The speed test is to monitor the current data transmission (TX) and data reception (RX) rate with the remote 802.11an Wireless Outdoor CPE. Enter the IP address of the remote CPE, type in the user name/password and click “**Test**”. The result will display in the bottom **STATUS**. You may test single TX/RX or bi-direction.



Speed Test

This page allows you test the network speed betweeen this device and another terminal.

Destination IP: 192.168.1.1

User Name: admin

Password: ••••••••

Direction: Trasmit

STATUS: Test complete.

TEST RESULT

RX: N/A

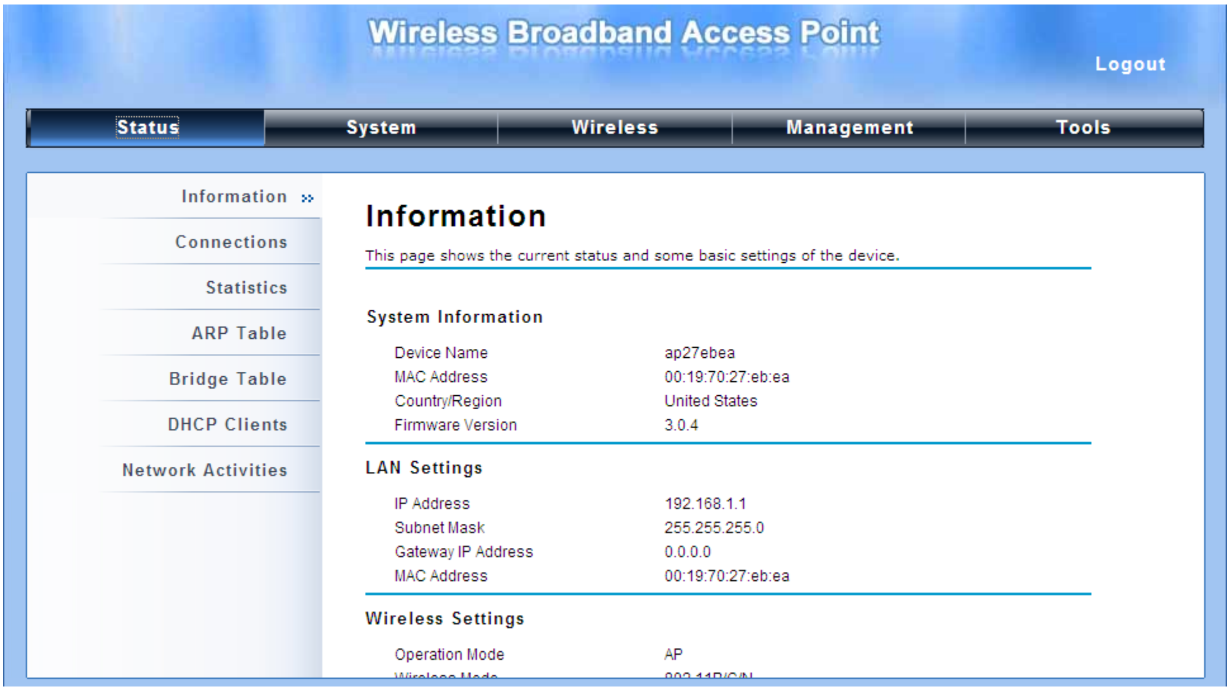
TX: 90.6 Mbits/sec

Figure 40 Speed Test

Chapter 7 Status

View Basic Information

Open “**Information**” in “**Status**” to check the basic information of the CPE, which is read only. Information includes system information, LAN settings, wireless setting and interface status. Click “**Refresh**” at the bottom to have the real-time information.



Information

This page shows the current status and some basic settings of the device.

System Information

Device Name	ap27ebea
MAC Address	00:19:70:27:eb:ea
Country/Region	United States
Firmware Version	3.0.4

LAN Settings

IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Gateway IP Address	0.0.0.0
MAC Address	00:19:70:27:eb:ea

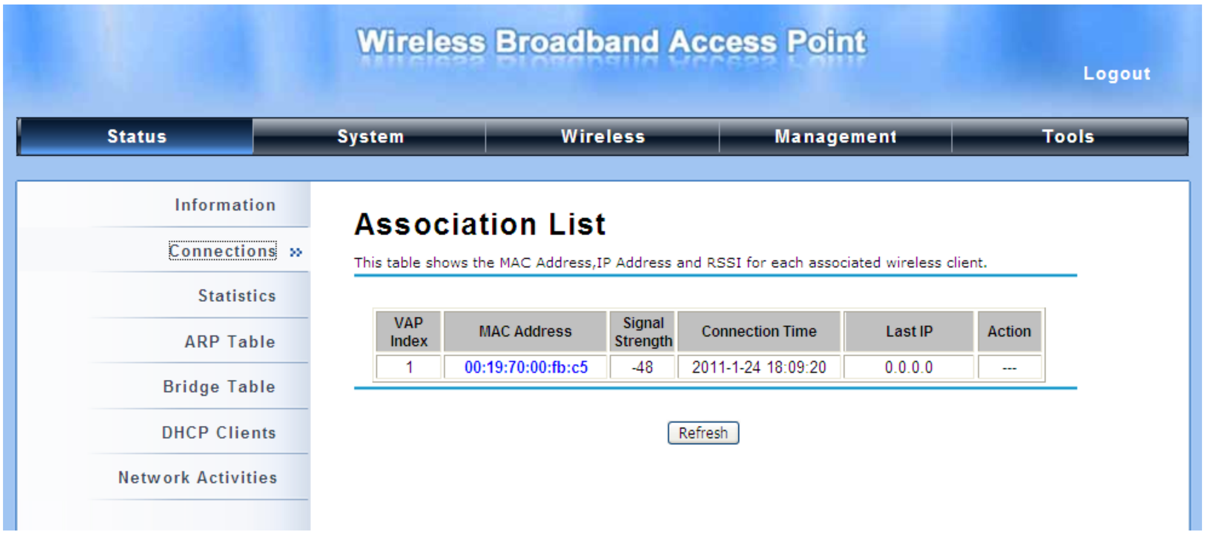
Wireless Settings

Operation Mode	AP
Wireless Mode	802.11B/G/N

Figure 41 Basic Information

View Association List

Open “**Connections**” in “**Status**” to check the information of associated wireless devices such as MAC address, signal strength, connection time, IP address, etc. All is read only. Click “**Refresh**” at the bottom to update the current association list.



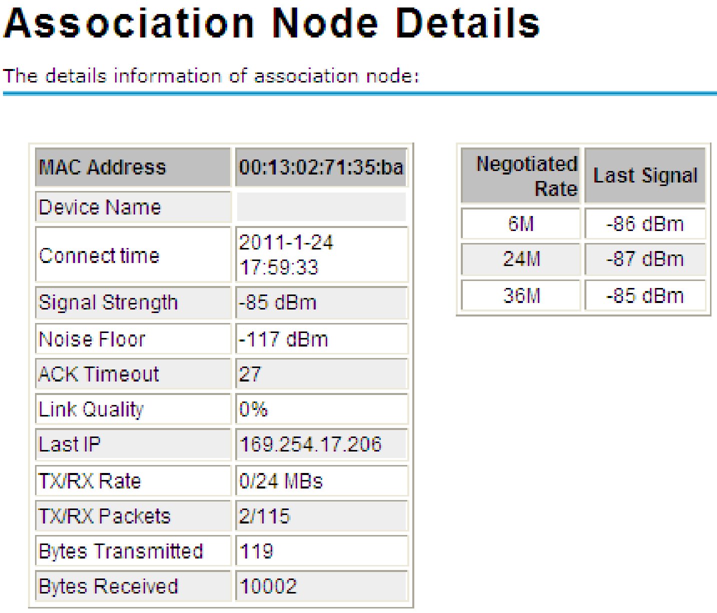
Association List

This table shows the MAC Address,IP Address and RSSI for each associated wireless client.

VAP Index	MAC Address	Signal Strength	Connection Time	Last IP	Action
1	00:19:70:00:fb:c5	-48	2011-1-24 18:09:20	0.0.0.0	---

Figure 42 Connection

By clicking on the MAC address of the selected device on the web you may see more details including device name, connection time, signal strength, noise floor, ACK timeout, link quality, IP information, current data rate, current TX/RX packets.



Association Node Details

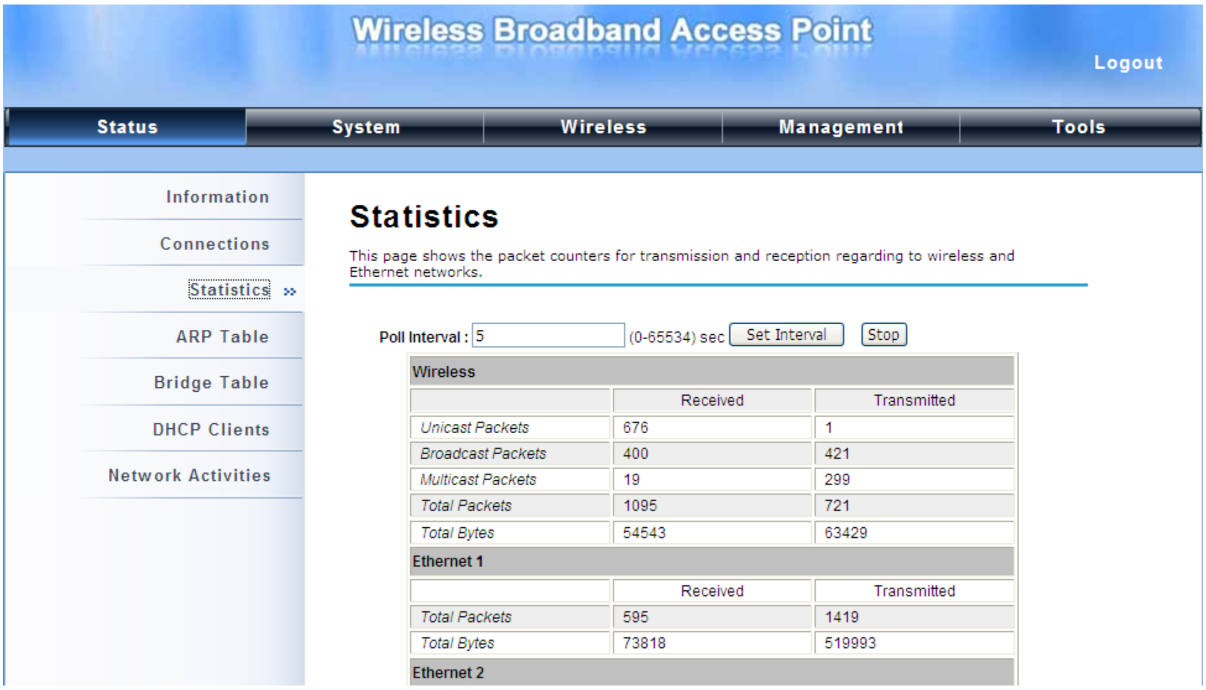
The details information of association node:

MAC Address	00:13:02:71:35:ba
Device Name	
Connect time	2011-1-24 17:59:33
Signal Strength	-85 dBm
Noise Floor	-117 dBm
ACK Timeout	27
Link Quality	0%
Last IP	169.254.17.206
TX/RX Rate	0/24 MBs
TX/RX Packets	2/115
Bytes Transmitted	119
Bytes Received	10002

Negotiated Rate	Last Signal
6M	-86 dBm
24M	-87 dBm
36M	-85 dBm

View Network Flow Statistics

Open “**Statistics**” in “**Status**” to check the data packets received on and transmitted from the wireless and Ethernet ports. Click “**Refresh**” to view current statistics.



Statistics

This page shows the packet counters for transmission and reception regarding to wireless and Ethernet networks.

Poll Interval : 5 (0-65534) sec

Wireless		
	Received	Transmitted
Unicast Packets	676	1
Broadcast Packets	400	421
Multicast Packets	19	299
Total Packets	1095	721
Total Bytes	54543	63429
Ethernet 1		
	Received	Transmitted
Total Packets	595	1419
Total Bytes	73818	519993
Ethernet 2		

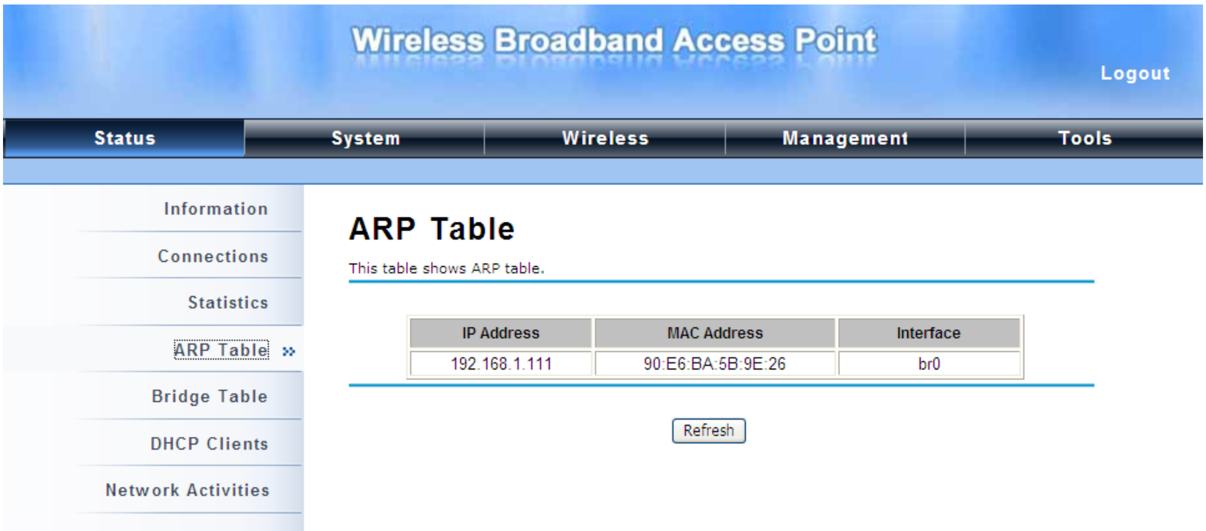
Figure 43 Network Flow Statistics

- **Poll Interval**

Specify the refresh time interval in the box beside “**Poll Interval**” and click “**Set Interval**” to save settings. “**Stop**” helps to stop the auto refresh of network flow statistics.

View ARP Table

Open “**ARP Table**” in “**Status**” as below. Click “**Refresh**” to view current table.



ARP Table

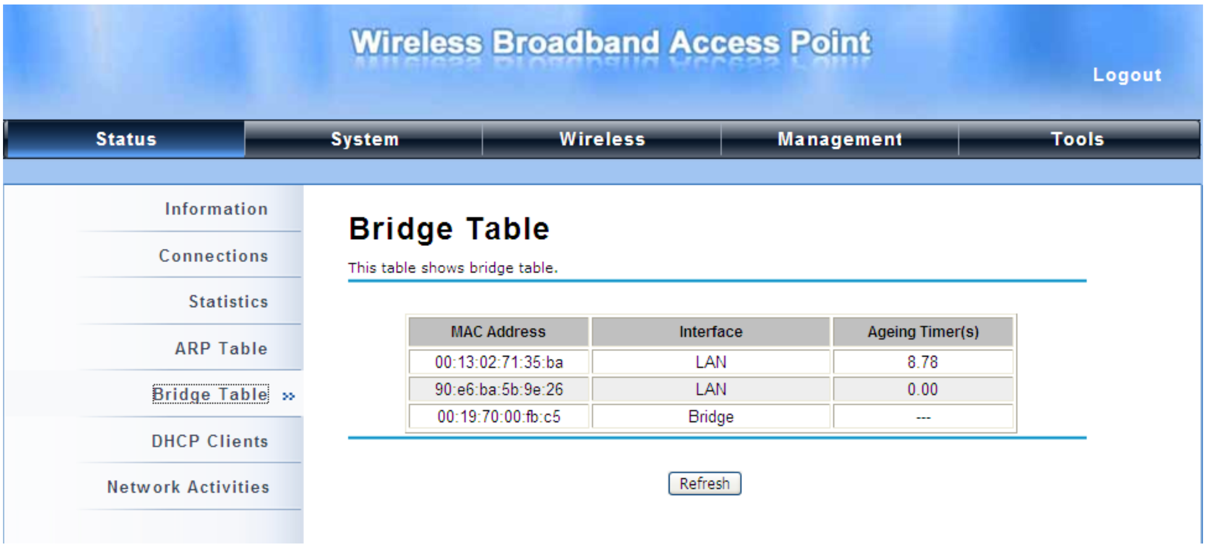
This table shows ARP table.

IP Address	MAC Address	Interface
192.168.1.111	90:E6:BA:5B:9E:26	br0

Figure 44 ARP Table

View Bridge Table

Open “**Bridge Table**” in “**Status**” as below. Click “**Refresh**” to view current connected status..



Bridge Table

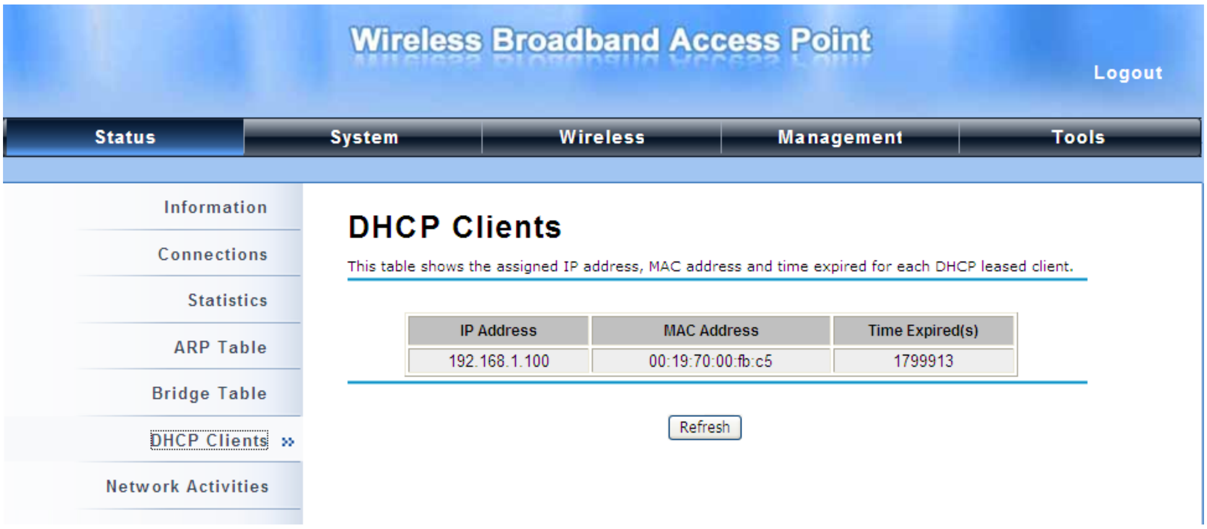
This table shows bridge table.

MAC Address	Interface	Ageing Timer(s)
00:13:02:71:35:ba	LAN	8.78
90:e6:ba:5b:9e:26	LAN	0.00
00:19:70:00:fb:c5	Bridge	---

Figure 45 Bridge Table

View Active DHCP Client Table

Open “**DHCP Clients**” in “**Status**” as below to check the assigned IP address, MAC address and time expired for each DHCP leased client. Click “**Refresh**” to view current table.



DHCP Clients

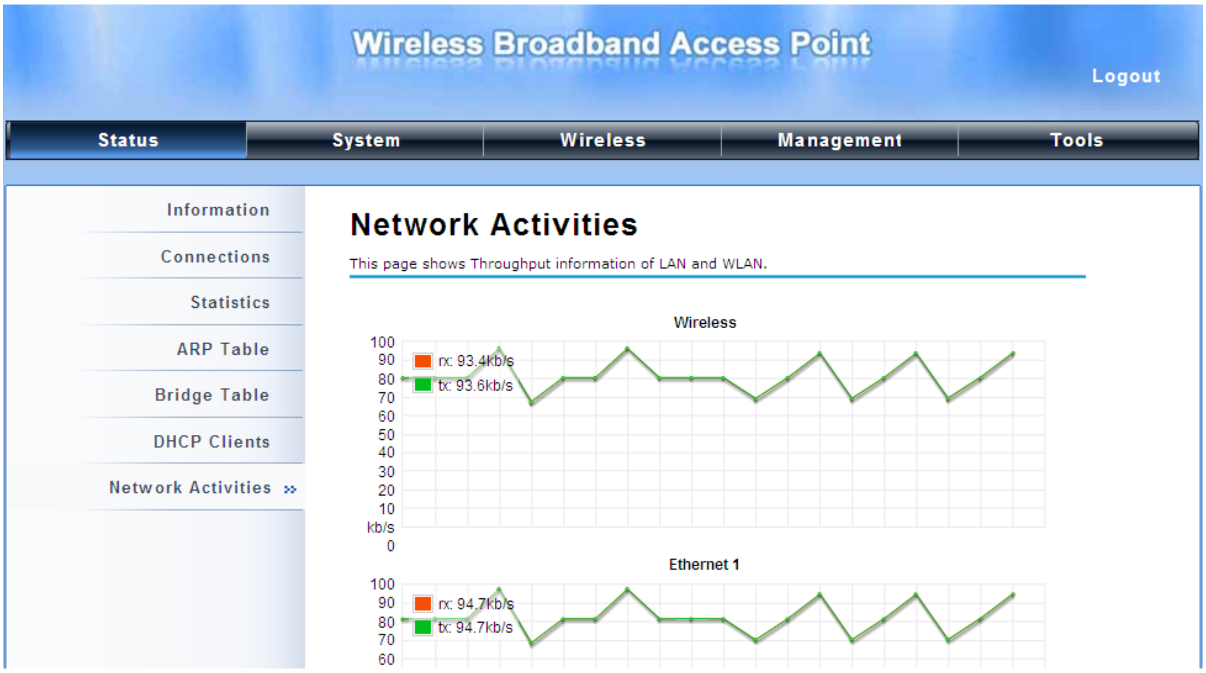
This table shows the assigned IP address, MAC address and time expired for each DHCP leased client.

IP Address	MAC Address	Time Expired(s)
192.168.1.100	00:19:70:00:fb:c5	1799913

Figure 46 DHCP Client Table

View Network Activities

The network activities allows you to monitor the current Wireless and Ethernet TX/RX data traffic in graphical and numerical form on the Web of the Skyport. The chart scale and throughput dimension (Bps, Kbps, Mbps) changes dynamically according to the mean throughput value. Throughput statistics can be updated manually using the “**Refresh**” button.



Network Activities

This page shows Throughput information of LAN and WLAN.

Figure 47 Network Activities

Chapter 8 Troubleshooting

This chapter provides troubleshooting procedures for basic problems with the IEEE 802.11b/g/n Wireless CPE. For warranty assistance, contact your service provider or distributor for the process.

Q 1. How to know the MAC address of IEEE 802.11b/g/n Wireless CPE?

MAC Address distinguishes itself by the unique identity among network devices. There are two ways available to know it.

- Each device has a label posted with the MAC address.
- On the IEEE 802.11b/g/n Wireless CPE Web-based management interface, you can view the MAC Address from "View Basic Information".

Q 2. What if I would like to reset the unit to default settings?

You may restore factory default settings in "**Configuration File**" from "**Management**".

Q 3. What if I would like to backup and retrieve my configuration settings?

You may do the backup by generating a configuration file or retrieve the settings you have backed up previously in "**Configuration File**" from "**Management**".

Q 4. What if I can not access the Web-based management interface?

Please check the followings:

- Check whether the power supply is OK; Try to power on the unit again.
- Check whether the IP address of PC is correct (in the same network segment as the unit);
- Login the unit via other browsers such as Firefox.
- Hardware reset the unit.

Q 5. What if the wireless connection is not stable after associating with an AP under wireless client mode?

- Since the IEEE 802.11b/g/n Wireless CPE comes with a built-in directional antenna, it is recommended make the IEEE 802.11b/g/n Wireless CPE face to the direction where the AP is to get the best connection quality.

- In addition, you can start “**Site Survey**” in “**Wireless Basic Settings**” to check the signal strength. If it is weak or unstable (The smaller the number is, the weaker the signal strength is.), please join other available AP for better connection.

Appendix A. ASCII

WEP can be configured with a 64-bit, 128-bit or 152-bit Shared Key (hexadecimal number or ACSII). As defined, hexadecimal number is represented by 0-9, A-F or a-f; ACSII is represented by 0-9, A-F, a-f or punctuation. Each one consists of two-digit hexadecimal.

Table 2 ACSII

ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent
!	21	9	39	Q	51	i	69
"	22	:	3A	R	52	j	6A
#	23	;	3B	S	53	k	6B
$	24	<	3C	T	54	l	6C
%	25	=	3D	U	55	m	6D
&	26	>	3E	V	56	n	6E
‘	27	?	3F	W	57	o	6F
(	28	@	40	X	58	p	70
)	29	A	41	Y	59	q	71
*	2A	B	42	Z	5A	r	72
+	2B	C	43	[	5B	s	73
,	2C	D	44	\	5C	t	74
-	2D	E	45	]	5D	u	75
.	2E	F	46	^	5E	v	76
/	2F	G	47	_	5F	w	77
0	30	H	48	`	60	x	78
1	31	I	49	a	61	y	79
2	32	J	4A	b	62	z	7A
3	33	K	4B	c	63	{	7B
4	34	L	4C	d	64	|	7C
5	35	M	4D	e	65	}	7D
6	36	N	4E	f	66	~	7E
7	37	O	4F	g	67		
8	38	P	50	h	68		

Appendix B. SSH Settings

Table 3 CLI Commands

get	set	del	Keyword				Descriptions
√	√		time				--time setting
√				-now			--current system time
√	√			-zone			--time zone
√	√			-NTPUpdate			-- NTP Update
√	√			-servertype			--server type
√	√			-IP			-IP
√	√			-Manual IP			-Manual IP
√	√		system				--system setting
√				-swversion			--system firmware version
√	√			-systemmac			--system MAC address
√	√			-devname			--system name
√	√			-country			--country/region
	√			-ethernet1DataRate			--ether port 1 data rate
√	√			-ethernet2DataRate			--ether port 2 data rate
√	√			-macclone			--mac clone enable
√	√			-clonedmac			--cloned mac address
√	√			-poepower			--secondary RJ45 power
√	√			-stp			--Spanning Tree
√	√			-stpForwardDelay			--STP forward delay
√	√			-gpslatitude			--gps latitude
√	√			-gpslongitude			--gps longitude
√	√		ipset				
√	√			-networkmode			--network mode select (bridge or router)
√	√			-bridge			--bridge mode ip settings
√	√				-iptype		--fixed/dynamical ip(dhcp client)
√	√				-ipaddr		--ip address
√	√				-netmask		--subnet mask
√	√				-gateway		--gateway ip address
√	√				-dns1		--dns1
√	√				-dns2		--dns2
√	√			-router			--router mode ip settings
√	√				-wan		--wan ip settings
√	√					-accesstype	--router mode access type
√	√					-staticipadd	--static ip address

						r	
√	√					-staticnetmask	--static subnet mask
√	√					-staticgateway	--static gateway ip address
√	√					-staticdns1	--static dns1
√	√					-staticdns2	--static dns2
√	√					-dhcpclienthostname	--dhcp client hostname
√						-pppoeconnectstatus	--pppoe connect status
√						-pppoelocalip	--obtains IP from pppoe server
√	√					-pppoestaticipaddr	--pppoe static ip address
√	√					-pppoeusername	--pppoe username
√	√					-pppoepassword	--pppoe password
√	√					-pppoeservername	--pppoe server name
√	√					-pppoeconnectmode	--pppoe connect mode
√	√					-pppoeidletime	--pppoe idle time
√	√				-lan		--lan ip settings
√	√					-ipaddr	--lan ip address
√	√					-netmask	--lan subnet mask
√	√					-dhcpserverenable	--dhcp server enable
√	√					-dhcpserveripstart	--dhcp server ip start
√	√					-dhcpserveripend	--dhcp server ip end
√	√					-dhcpserverleasetime	--dhcp server leasetime
√	√					-dhcprelayenable	--dhcp relay enable
√	√					-dhcpserverip	--dhcp server ip
√	√		wlan				--wlan setting
√	√			-operationmode			--operation mode
√	√			-ssid			--wireless network name
√	√			-ssidhided			--wireless SSID broadcast

√	√			-radio			--radio switch
√	√			-wirelessmode			--wireless mode
√	√						
√	√			-HTprotect			--HT protect
√	√			-frequency/channel			-wireless frequency/channel (depends on country and wireless mode)
√	√			-power			--power
√	√			-rate			--rate
√	√			-antenna			--antenna type
√	√			-antennaGain			--antenna gain setings
√	√			-wmm			--wmm settings
√	√			-Isolation			--wireless isolate communication between clients
√	√			-maxStaNum			--max sta connection number
√	√			-StaNumLmt			--Whether manually limit the number o f station
√	√			-spaceInMeter			--wireless bwa space in meter setting
√	√			-LinkIntegration			--wireless bwa coverage class setting
√	√			-channelMode			--channel mode
√	√			-channelOffset			--channel offset of 40MHz
√	√			-extension			--extension
√	√			-A-MPDU			--A-MPDU
√	√			-A-MSDU			--A-MSDU
√	√			-shortGI			--short GI
√	√			-RIFS			--rifs
√	√			-RTS			--RTS
√	√			-fragment			--fragment
√	√			-beacon			--beacon
√	√			-DTIM			--DTIM
√	√			-preamble			--preamble
√	√			-IGMP			--IGMP
√	√			-stdm			--stdm setting
√	√			-cpeType			--CPE Type
√	√			-authentication			--wireless authentication type
√	√			-encryption			--wireless data encryption
√	√	√		-key			--wireless wep key setting
√	√				-type		--wireless wep key type

√	√				-default		--wireless wep default key index
√	√	√			-1		--wireless wep key 1
√	√	√			-2		--wireless wep key 2
√	√	√			-3		--wireless wep key 3
√	√	√			-4		--wireless wep key 4
√	√	√		-wpa			--wireless WPA setting
√	√	√			-psk		--wireless pre-shared key (PSK) for WPA-PSK
√	√				-reauthtime		--wireless WPA re-auth period (in seconds)
√	√				-keyupdate		--enable wireless WPA global key update
√	√	√		-eap			--WPA EAP setting
√	√	√			-eaptype		--WPA EAP Type
√	√	√			-innereaptype		--WPA inner EAP Type
√	√				-username		--WPA user name
√	√				-loginname		--WPA login name
√	√				-password		--WPA password
√	√				-usercert		--WPA cert file
√	√				-privatekey password		--WPA private key password
√	√			-trafficshaping			--traffic shaping
√	√				-enable		--enable Traffic Shaping
√	√				-downlimit		--Incoming Traffic Limit
√	√				-downburst		--Incoming Traffic Burst
√	√				-uplimit		--Outgoing Traffic Limit
√	√				-upburst		--Outgoing Traffic Burst
√	√			-wdsMac			--WDS Remote Mac
√					-local		--local macAddr
√	√				-remote1		--remote macAddr1
√	√				-remote2		--remote macAddr2
√	√				-remote3		--remote macAddr3
√	√				-remote4		--remote macAddr4
√	√			-wdsSeparation			--WDS Separation
√				-association			--list of associated wireless clients
√	√		vapprofile 1(2, 3,etc)				--VAP setting
√	√			-active			--on/off this vap
√	√			-profileName			--Name of profile
√	√			-ssid			--ssid of this vap

√	√			-ssidhided			--Broadcast SSID Enable or Disable
√	√			-vlanID			--vlanID of this vap
√	√			-Isolation			--wireless separation
√	√			-wmm			--WMM Support
√	√			-MaxStaNum			--Max Station Number
√	√			-StaNumLmt			--Whether manually limit the number o f station
√	√			-authentication			--wireless authentication type
√	√			-encryption			--wireless data encryption
√	√			-default			--wireless wep default key index
√	√			-wpa			--wireless WPA setting
√				-association			--list of associated wireless clients
√	√		vlan				--vlan setting
√	√			-active			--enable 802.1Q VLAN
√	√			-manageID			--Management VLAN ID
√	√		radius				--radius setting
√	√			-IPaddr			--IP address
√	√			-port			--port
	√			-shared secret			--Shared Secret
√	√		firewall				--firewall setting
√	√			-srcipfilter			--source ip filter settings
√	√				-enable		--source ip filter enable
√	√				-addrule		--add a source ip filter rule
	√				-delerule		--delete source ip filter rule
√					-rulelist		--show source ip filter rule lists
√	√			-destipfilter			--destination ip filter settings
√	√				-enable		--destination ip filter enable
√	√				-addrule		--add a destination ip filter rule
	√				-delerule		--delete destination ip filter rule
√					-rulelist		--show destination ip filter rule lists
√	√			-srcportfilter			--source port filter settings
√	√				-enable		--source port filter enable
√	√				-addrule		--add a source port filter rule
	√				-delerule		--delete source port filter rule

√					-rulelist		--show source port filter rule lists
√	√			-destportfilter			--destination port filter settings
√	√				-enable		--destination port filter enable
√	√				-addrule		--add a destination port filter rule
	√				-delerule		--delete destination port filter rule
√					-rulelist		--show destination port filter rule lists
√	√			-portforward			--port forward settings
√	√				-enable		--port forward enable
√	√				-addrule		--add a port forward rule
	√				-delerule		--delete port forward rule
√					-rulelist		--show port forward rule lists
√	√			-dmzenable			--dmz enable
√	√			-dmzipaddr			--dmz ip address
√	√		remote				--remote management setting
√	√			-privacy			--radius IP address
√	√			-telnet			--enable telnet
√	√			-snmp			--enable snmp
√	√			-ftp			--enable ftp
√	√			-ssh			--enable ssh
√	√			-forcehttps			--force https
√	√			-wise			--enable wise tools
√	√		snmp				--SNMP setting
√	√			-version			--Protocol Version
√	√			-port			--Server Port
√	√			-getCommunity			--SNMP Read Community
√	√			-setCommunity			--SNMP Write Community
√	√			-trapdestination			--Trap Destination
√	√			-trapcommunity			--Trap Community
√	√			-v3Admin			--v3Admin
√	√				-on		--Enable SNMPv3Admin
√	√				-name		--name
	√				-password		--password
√	√				-accessType		--access type
√	√				-authentica		--Authentication Protocol

					tion		
√	√				-Privacy		--privacy protocol
√	√			-v3User			-v3User
√	√				-on		--Enable SNMPv3User
√	√				-name		--name
	√				-password		--password
√	√				-accessType		--access type
√	√				-authentication		--Authentication Protocol
√	√				-Privacy		--privacy protocol
√	√		coovachilli				--CoovaChilli setting
√	√			-coovaChilliEnable			--Coovachilli Enable
√	√			-primaryRadiusServer			--Primary RADIUS Server
√	√			-secondaryRadiusServer			--Secondary RADIUS Server
√	√			-radiusAuthPort			--RADIUS Authentication Port
√	√			-radiusAcctPort			--RADIUS Accounting Port
√	√			-radiusSharedSecret			--RADIUS Shared Secret
√	√			-radiusNasid			--RADIUS Nasid
√	√			-radiusAdminUsername			--RADIUS Admin Username
√	√			-radiusAdminPassword			--RADIUS Admin Password
√	√			-uamPortalUrl			--UAM Portal URL
√	√			-uamSecret			--UAM Secret
√	√		syslog				--syslog
√	√			-client			--enable syslog client
√	√			-ipaddr			--syslog server IP address
√	√			-port			--syslog server port number
	√			-clear			--syslog clear
√	√		pingwdg				--ping watchdog
√	√			-enable			--enable
√	√			-interval			--interval
√	√			-startdelay			--startup delay
√	√			-failcount			--failure count
√	√			-ip			--ip address
√	√	√	acl				--access control
√	√			-mode			--enable wireless access control (ACL)
		√		-delete			--delete a local ACL

							address
√		√		-list			--delete or display all local ACL address
	√			-MacAddr			--add mac address to Current Access Control List
√			statistics				--statistics
√				-Wireless			--Wireless LAN
√				-Ethernet			--Ethernet LAN
√		√	log list				--syslog list
	√		password				--system password
	√		reset				--restore factory
	√		reboot				--reboot system
	√		exit				--logout from CLI

Appendix C. GPL Declamation

PUBLIC SOFTWARE DECLAMATION

In the software we delivered, there may contains some public software, if it is, please read below carefully:

1. Definition

"**Public Software**", when applicable, shall mean that portion of the Licensed Software, in source code form, set forth in the below Table, and provided under the terms set forth in <u>the Section 5, the indicated website</u>, the complete license terms can be found.

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5. Public Software Name and Description

Table 4 Public Software Name and Description

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Busybox		**http://www.busybox.net/downloads/busybox-1.01.tar.bz2**	**GNU GENERAL PUBLIC LICENSE Version 2**	**http://www.gnu.org/licenses/old-licenses/gpl-2.0.html**
brctl	**Copyright (C) 2000 Lennert Buytenhek**	**http://nchc.dl.sourcef**	**GNU GENERAL PUBLIC LICENSE Version 2**	**http://www.gnu.org/licenses/old-li**

		orge.net/sourceforge/bridge/bridge-utils-1.0.6.tar.gz		censes/gpl-2.0.html
dropbear	Copyright (c) 2002-2006 Matt Johnston Portions copyright (c) 2004 Mihnea Stoenescu	http://matt.ucc.asn.au/dropbear/dropbear-0.51.tar.bz2	GNU GENERAL PUBLIC LICENSE Version 2	http://www.gnu.org/licenses/old-licenses/gpl-2.0.html
hostapd	Copyright (c) 2002-2006, Jouni Malinen <jkmaline@cc.hut.fi> and contributors	http://hostap.epitest.fi/releases/hostapd-0.4.8.tar.gz	GNU GENERAL PUBLIC LICENSE Version 2	http://www.gnu.org/licenses/old-licenses/gpl-2.0.html
wpa_supplicant	Copyright (c) 2003-2005, Jouni Malinen <jkmaline@cc.hut.fi> and contributors	http://hostap.epitest.fi/releases/wpa_supplicant-0.4.7.tar.gz	GNU GENERAL PUBLIC LICENSE Version 2	http://www.gnu.org/licenses/old-licenses/gpl-2.0.html
mtdutil		ftp://ftp.uk.linux.org/pub/people/dwmw2/mtd/cvs/mtd/util/	GNU GENERAL PUBLIC LICENSE Version 2	http://www.gnu.org/licenses/old-licenses/gpl-2.0.html
ntpclient	Copyright 1997, 1999, 2000, 2003 Larry Doolittle	http://doolittle.icarus.com/ntpclient/ntpclient_2003_194.tar.gz	GNU GENERAL PUBLIC LICENSE Version 2	http://www.gnu.org/licenses/old-licenses/gpl-2.0.html
procps	Author: Albert Cahalan, Michael K. Johnson, Jim Warner, etc.	http://procps.sourceforge.net/procps-3.2.7.tar.gz	GNU GENERAL PUBLIC LICENSE Version 2 GNU LIBRARY GENERAL PUBLIC LICENSE Version 2	http://www.gnu.org/licenses/old-licenses/gpl-2.0.html http://www.gnu.org/licenses/old-licenses/library.html
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