USER OPERATING MANUAL

RADIO

Manufactured by,
Senao Neworks.

MANUFACTURER	SENAO NETWORKS
MANUFACTURER'S ADDRESS	NO. 528 Fushing 3rd, Hwa-Ya tech. Park Kueishan, Tao Yuan 333, Taiwan
FACTORY NAME	SENAO NETWORKS
FACTORY ADDRESS	NO. 528 Fushing 3rd, Hwa-Ya tech. Park Kueishan, Tao Yuan 333, Taiwan
VERSION	2.0

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.

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.

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

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Professional installation instruction

1. Installation personal

This product is designed for specific application and needs to be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting.

2. Installation location

The product shall be installed at a location where the radiating antenna can be kept 20cm from nearby person in normal operation condition to meet regulatory RF exposure requirement.

3. External antenna

Use only the antennas which have been approved by the applicant. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC limit and is prohibited.

4. Installation procedure

Please refer to user's manual for the detail.

5. Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.

Table of Contents

Safety precautions: 7
1.1 ODU 8
Description 8
Technical Specification 9
1.0 ODU (Radio) 11
1.1 System Requirement 11
1.2 Hardware Overview 11
1.3 Computer Configuration Instruction 11
1.3.1 Assign a Static IP 12
1.3.2 Logging Method 12
1.4 Status 13
1.4.1 Save/Load 13
1.4.2 Main 14
1.4.3 Wireless Client List 14
1.4.4 System Log 15
1.4.5 Connection Status 15
1.5 System 16
1.5.1 Switching Operation Mode 16
1.5.2 IP Settings: 16
1.5.3 Ethernet Settings 17
1.5.4 Location 18
1.5.5 Spanning Tree Settings 18
1.5.6 Service Settings 19
1.6 Wireless Configuration 19
1.6.1 Wireless Network 19
1.6.2 Wireless Security Settings 21
1.6.3 Wireless MAC Filter 23
1.6.4 Wireless Advanced Settings 24
1.7 Management Settings 25

1.7.1 Administration 25

1.7.2 SNMP Settings 26

1.7.3 Backup/Restore Settings 27

1.7.4 Auto reboot settings 28

1.7.5 Firmware Upgrade 28

1.7.6 Firmware Upgrade Settings 29

1.7.7 Time Settings 29

1.7.8 Log 30

1.7.9 Diagnostics 31

1.8 Device Discovery 31

1.8.1 Reset 32

1.9 LED Indication 32

Safety precautions:

Prior to connecting cables to the ODU, the protective earth terminal (screw) of the ODU must be connected to an external protective ground conductor or to a grounded mast.

Only a qualified person using the proper safety equipment should climb the antenna mast. Only trained professional installers should be used when installing or dismantling ODUs and masts.

Do not use product near water (i.e. wet basement, bathtub, sink or near a swimming pool, etc.), to avoid risk of electrocution

Avoid using and/or connecting the equipment during an electrical storm, to avoid risk of electrocution.

1.1 ODU

Description

Figure 1: Radio (SMAC5700)

Thank you for using SMAC5700. It is a powerful, enhanced, enterprise scale product with functions Outdoor Base and Outdoor Subscriber.

SMAC5700 uses the latest wireless technology 802.11n standard. It has faster transmit/receive wireless speed. SMAC5700 gives you a great advantage to save your time and cost to expend your network. It is also compatible with 802.11a.

SMAC5700 is easily to install almost anywhere with Power over Ethernet for quick indoor installation and regular Power by Adapter. SMAC5700 can manage power level control, Narrow bandwidth selection, Traffic shaping and Real-time RSSI indicator. SMAC5700 is fully support of security encryption including Wi-Fi Protected Access (WPA2-PSK), 128 bit - AES Encryption and IEEE 802.1x with RADIUS.

Technical Specification

PRODUCT MODELS		
SMAC5700 SKU : APX-57200-D	SMAC 5700 Base station unit, 200 Mbps, 5.8 GHz, 2 x N-Type connectors	
INTERFACES		
WIRED ETHERNET	Single auto MDI-X RJ45 10/100/1000 Mbps with POE & Data	
WIRELESS INTERFACE	802.11 a/n	
RADIO SPECS		
RANGE	Upto 20 Km / 12 miles	
MIMO	2x2 MIMO	
MODULATION	OFDM	
FREQUENCY BAND	5.725 GHz- 5.850 GHz	
CHANNEL BANDWIDTH	Configurable : 20 MHz, 40 MHz	
DUPLEX TECHNOLOGY	TDD	
DATA RATE	MCS 0 to 15 for max throughput (6.5 – 300 Mbps) with DDRS BPSK, QPSK, 16-QAM and 64-QAM for (6 Mbps – 54 Mbps) – legacy mode	
ADAPTIVE MODULATION & CODING	Supported	
TX POWER	Up to 24dBm	
TX POWER CONTROL	Transmit power control and distance control (ACK timeout)	
RX SENSITIVITY (BER=10-6) (in dBm)	Channel Size	20 MHz
	MCS0 / MCS8	-90
	MCS1 / MCS9	-87
	MCS2 / MCS10	-85
	MCS3 / MCS11	-80
	MCS4 / MCS12	-77
	MCS5 / MCS13	-73

	MCS6 / MCS14	-71
	MCS7 / MCS15	-70
LED INDICATION	Ethernet status and wireless signal strength indication	
LATENCY		
	< 10 m.sec (typical)	

ANTENNA		
APX-57200-D	TYPE	External
	CONNECTOR	2 x N-Type connector with built in Surge Protection
MANAGEMENT		
LOCAL	Serial interface RS-232 available in PCBA	
REMOTE	Telnet and SSH, Web/GUI, TFTP, SNMP V2	
SNMP	SNMP V1,V2c, V3, Traps, Private MIB	
OTHER	Syslog	
BACKUP	User can backup all settings to a file via WEB & CLI	
PING & TRACEROUTE	Built in functionality from Web GUI	
FIRMWARE UPGRADE	Upgrading firmware via web browser & CLI, settings are reserved after upgrade	
SECURITY		
ENCRYPTION	AES-128 bit	
AUTHENTICATION	802.1X, MAC address, Radius based Authentication	
NETWORK		
BRIDGING	Transparent Bridging (802.1d)	
ROUTING	Static and Dynamic Routing, RIP v1/v2	
IP	Ipv4 Static and Dynamic address,IPV6	
GATEWAY FEATURES	DHCP Server, DHCP Client, Filter	
VLAN	802.1Q – Access VLAN, Trunk and Q-in-Q	
FEATURES		
FILTERING	IP source / destination address , TCP/UDP Port Numbers, MAC address Source or Destination, Multicast traffic, Broadcast	
BANDWIDTH CONTROL	Flexible uplink and downlink bandwidth control	
POWER		
POE (Power Over Ethernet)		
	Power adapter Input – 100-240V/ 0.6A ,50 to 60Hz Power adapter Output – 48VDC /0.5A	

POWER CHORD	6A 250V, 50 Hz 3 Pin Indian type IS:1293
POE Fuse Rating	2 Amp (2A, 250V), which is used in the location F, and F1.
SURGE PROTECTION	
	Inbuilt Ethernet Surge Protection

ENVIRONMENTAL SPECS		
OPERATING, STORAGE TEMPERATURE	HUMIDITY, IP RATING	POWER CONSUMPTION
-15ºC to 60ºC -15ºC to 80ºC	0% - 90%, (non-condensing) IP 67	10W (max)

MECHANICAL SPECS			
DIMENSIONS (PACKED)	DIMENSIONS (UNPACKED)	WEIGHT (PACKED)	WEIGHT (UNPACKED)
14.6 x 9.25 x 8.07 in (370 x 235 x 205 mm)	6.7x 10.2 x 3.1 in (170 x 260 x 80 mm)	2 Kg (4.41 lbs)	1 Kg (2.2 lbs)

1.0 ODU (Radio)

1.1 System Requirement

The following conditions are the minimum system requirement.

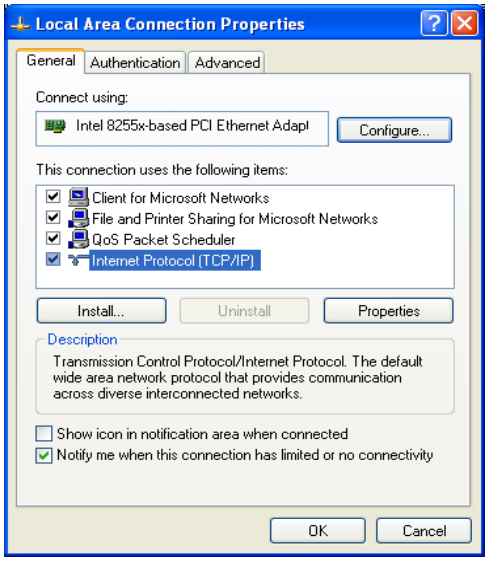
- A computer with an Ethernet interface and operating under Windows XP, Vista, 7 or Linux.
- **Internet Browser** that supports HTTP and JavaScript.

1.2 Hardware Overview

Physical Interface	- 1 x LAN Port with PoE support - 2 x RF port

1.3 Computer Configuration Instruction

The default operating mode is Outdoor Base for AP hardware and Outdoor Subscriber for SU hardware. Device will not assign an IP address to the computer/notebook. Therefore, follow the steps to assign an IP address to your Ethernet card.

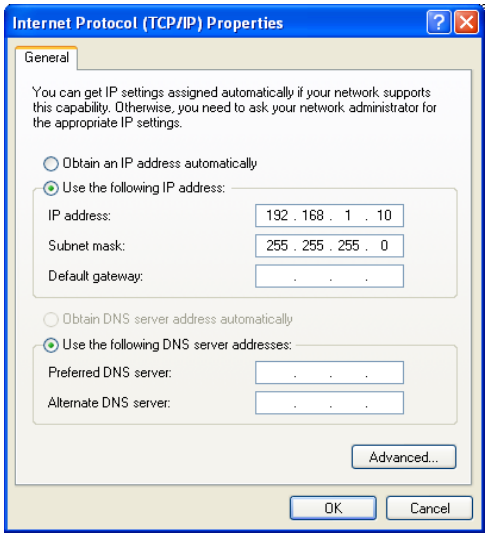


1.3.1 Assign a Static IP

In order to configure SMAC5700, please follow the instruction below:

1. In the **Control Panel**, double click **Network Connections** and then double click on the connection of your **Network Interface Card (NIC)**. You will then see the following screen.

2. Select **Internet Protocol (TCP/IP)** and then click on the **Properties** button. This will allow you to configure the TCP/IP settings of your PC/Notebook



3. Select **Use the following IP address** radio button and then enter the IP address and subnet mask. Ensure that the IP address and subnet mask are on the same subnet as the device.

4. Click on the **OK** button to close this window, and then close LAN properties window.

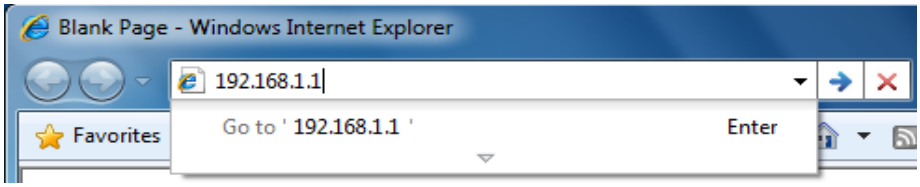
NOTE

IP Address entered in the TCP/IP Properties needs to be at the same subnet of the SMAC5700 IP Address. For example: SMAC5700's default IP Address is **192.168.1.1** so the IP Address in the TCP/IP settings could be **192.168.1.10**.

1.3.2 Logging Method

After complete the IP settings from last section, you can now access the web-based configuration menu.

1. Open web browser.



2. Enter IP **192.168.1.1** into you address filter.

CAUTION

If you have changed the SMAC5700 LAN IP address, make sure you enter the correct IP Address.

3. After connected to the SMAC5700 successfully, browser will pop out a Windows Security window. Please enter the correct **Username** and **Password**.

4. The default Username and Password are both **admin**.

NOTE

If you have changed the Username and Password, please enter your own Username and Password. **Password length** should be **minimum 8** and **maximum 16**.

1.4 Status

Status section is on the navigation drop-down menu. You will then see the options: Main, Statistics, Wireless Client List, System Log and Connection Status. Each option is described in detail below.

1.4.1 Save/Load

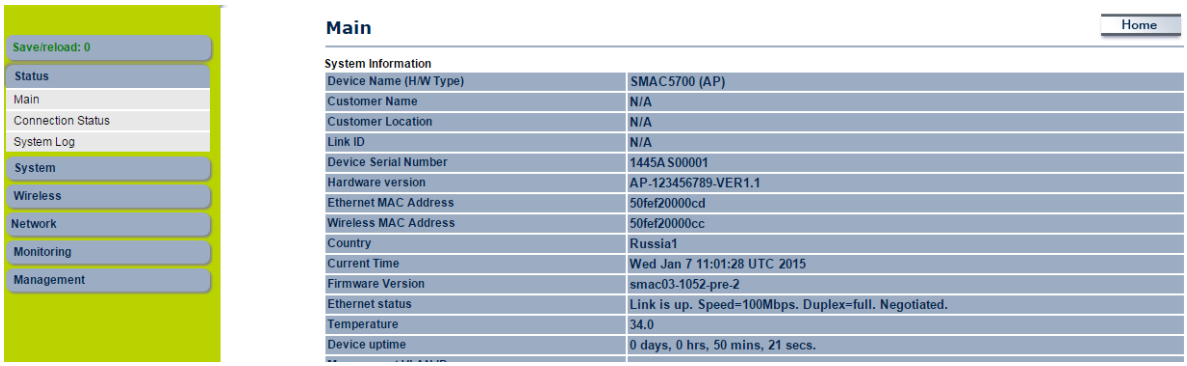
This page allows viewing the modified changes. The changes show in the unsaved changes list table. You can decide to cancel all the changes or to compile to the new setting.

If any configuration changes has been made by the user the Save/Reload button will appear in Red color unless clicking the Save& Apply button.

You cannot cancel the specific settings. You can only compile all the settings or revert to the previous settings.

1.4.2 Main

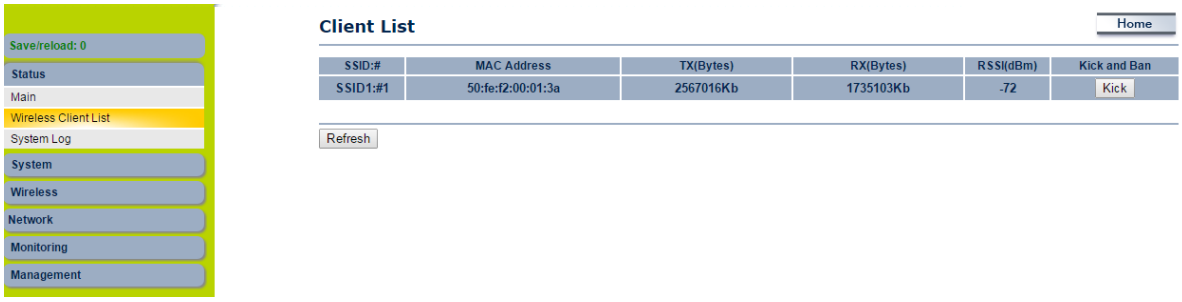
Click on the **Main** link under the **Status** drop-down menu or click **Home** from the top-right of the webpage. The status that is displayed corresponds with the operating mode that is selected. Information such as operating mode, system up time, firmware version, serial number are displayed in the 'System' section. LAN IP address, subnet mask, and MAC address are displayed in the 'LAN' section. In the 'Wireless section, the frequency, channel is displayed. The details of each SSID and its security settings are displayed.



1.4.3 Wireless Client List

Click on the **Wireless Client List** link under the **Status** drop-down menu. This page displays the list of Clients that are associated to the SMAC5700.

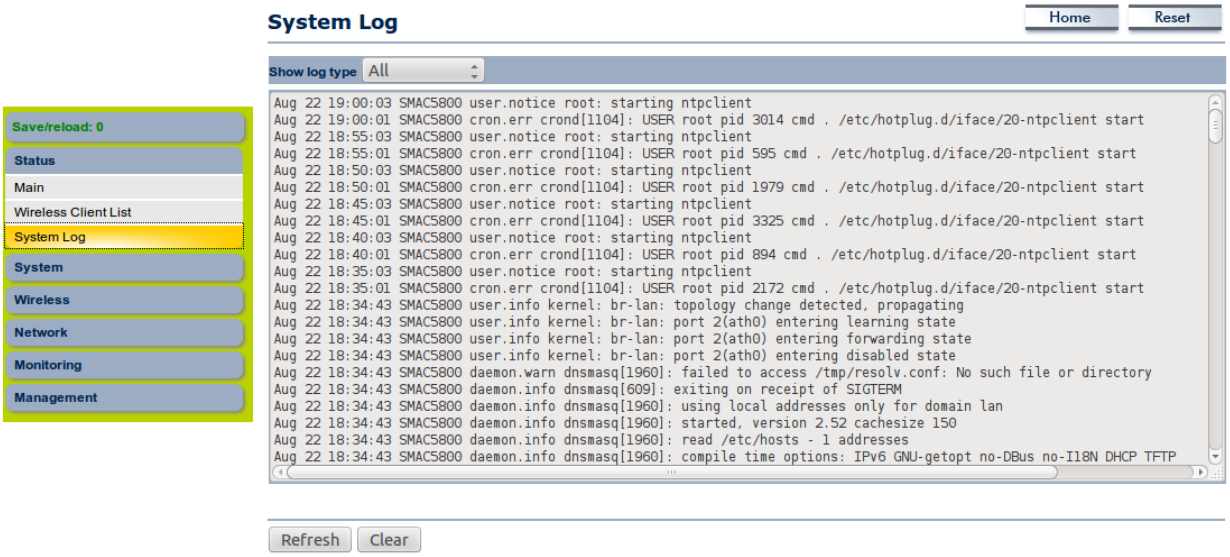
The MAC addresses and signal strength for each client is displayed. Click on the **Refresh** button to refresh the client list. Default refresh time will be 10 seconds.



This will be shown in **Outdoor Base** only

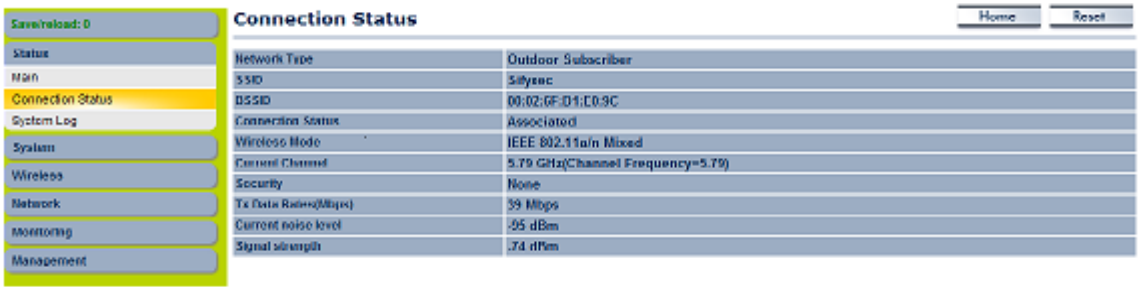
1.4.4 System Log

Click on the **System Log** link under the **Status** drop-down menu. The device automatically logs (records) events of possible interest in its internal memory. If there is not enough internal memory for all events, logs of older events are deleted, but logs of the latest events are retained.



1.4.5 Connection Status

Click on the **Connection Status** link under the **Status** drop-down menu. This page displays the current status of the network, including network type, SSID, BSSID, connection status, wireless mode, current channel, security, data rate, noise level and signal strength.

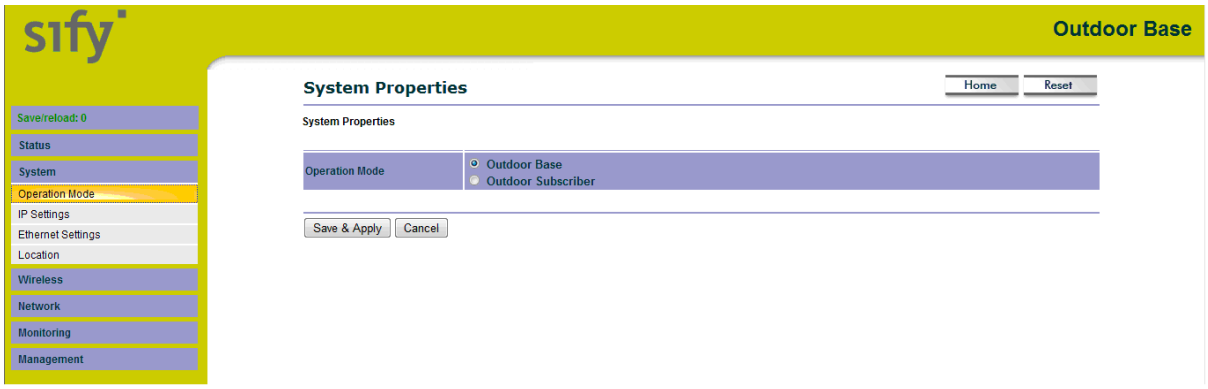


This will be shown in **Outdoor Subscriber** mode only.

1.5 System

1.5.1 Switching Operation Mode

The SMAC5700 supports operation modes: Outdoor Base, Outdoor Subscriber. In order to switching between the operating modes, please go to **System** -> click **Operation mode**.



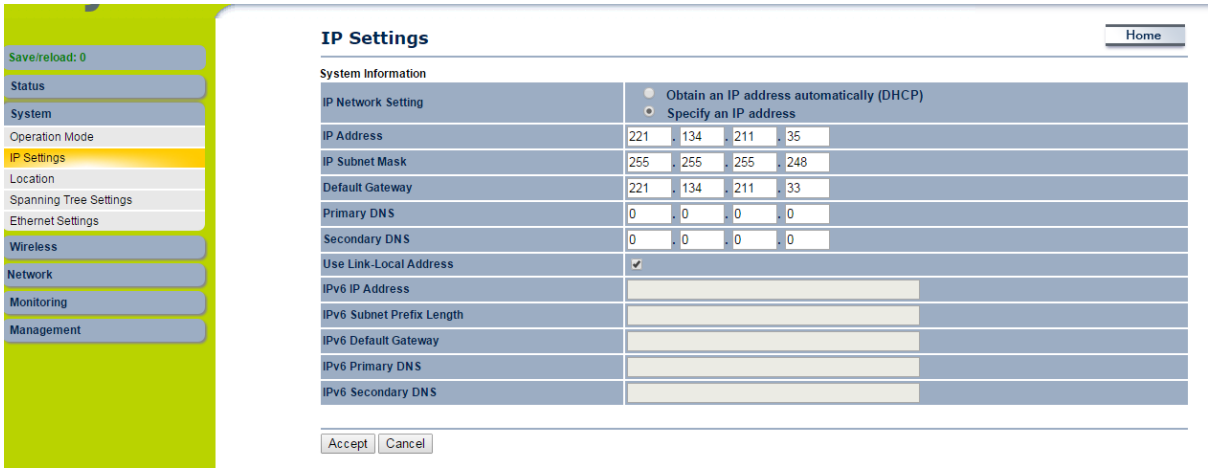
Operation Mode: Select an operation mode via **Radio Button**.

Click **Save & Apply** to confirm the changes.

Accept does not compile the changes, you must go to Status -> Save/Load to apply the new settings.

1.5.2 IP Settings:

Go to **System** -> Click **IP settings**

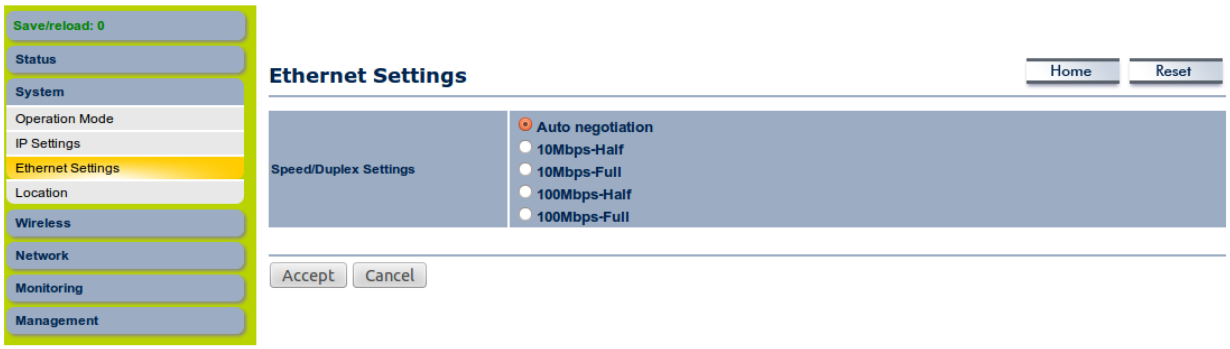


IP Network Setting	Select Radio button for **Obtain an IP address automatically** or **Specify an IP address**.
IP Address	Specify LAN port IP address.
IP Subnet Mask	Specify Subnet Mask.
Default Gateway	Specify Default Gateway
Primary DNS	Specify Primary DNS
Secondary DNS	Specify Secondary DNS
Accept / Cancel	Press Accept to confirm the changes or Cancel to return previous settings.

Accept does not compile the changes, you must go to Status -> Save/Load to apply the new settings. IPV6 feature also included in this device.

1.5.3 Ethernet Settings

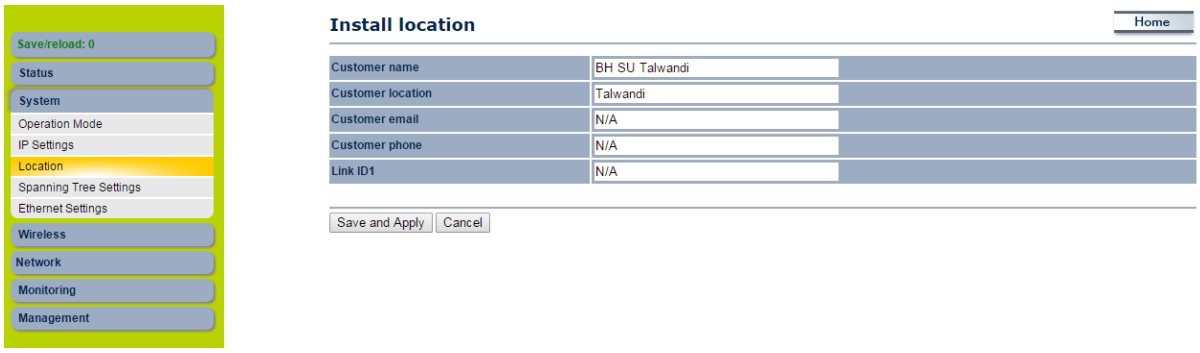
Go to **System -> Ethernet settings** to change the speed and duplex of the device SMAC5700.



The moment you click "**Accept** "the changes will take effect immediately, there is no need to save/reload.

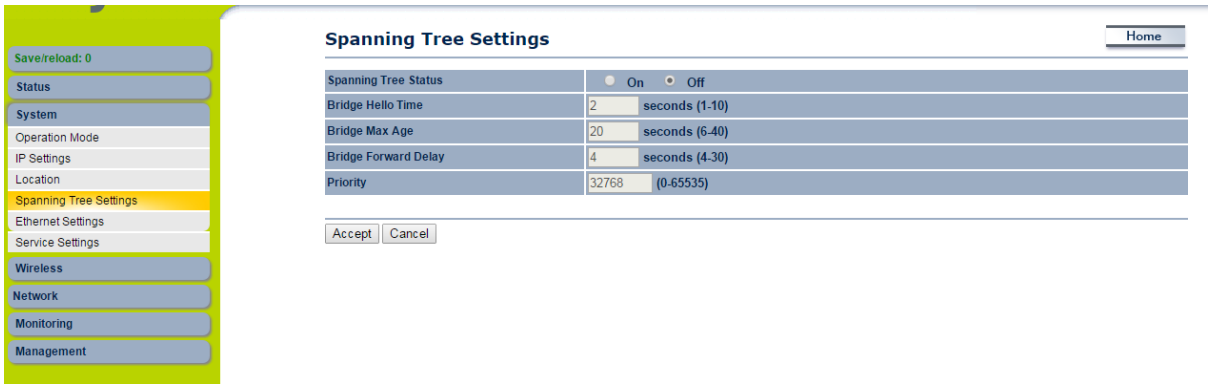
1.5.4 Location

Go to **System -> Location** to configure the customer name, customer location, customer email ID, customer mobile number & Link ID.



1.5.5 Spanning Tree Settings

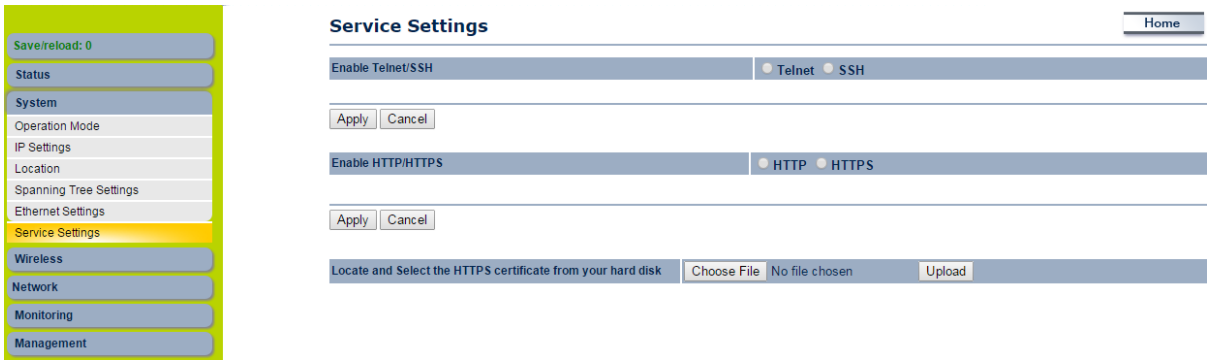
Go to **System -> Spanning Tree settings** to enable the spanning tree option and configure the STP parameters like hello time, Max Age, Forward Delay & Priority.



Accept does not compile the changes, you must go to Status -> Save/Load to apply the new settings.

1.5.6 Service Settings

Go to **System -> Service settings** to enable/disable the HTTPS/HTTP,SSH/TELNET options. Also upload the certificate for safety login through HTTPS.



The moment you click "**Accept** "the changes will take effect immediately, there is no need to save/reload

1.6 Wireless Configuration

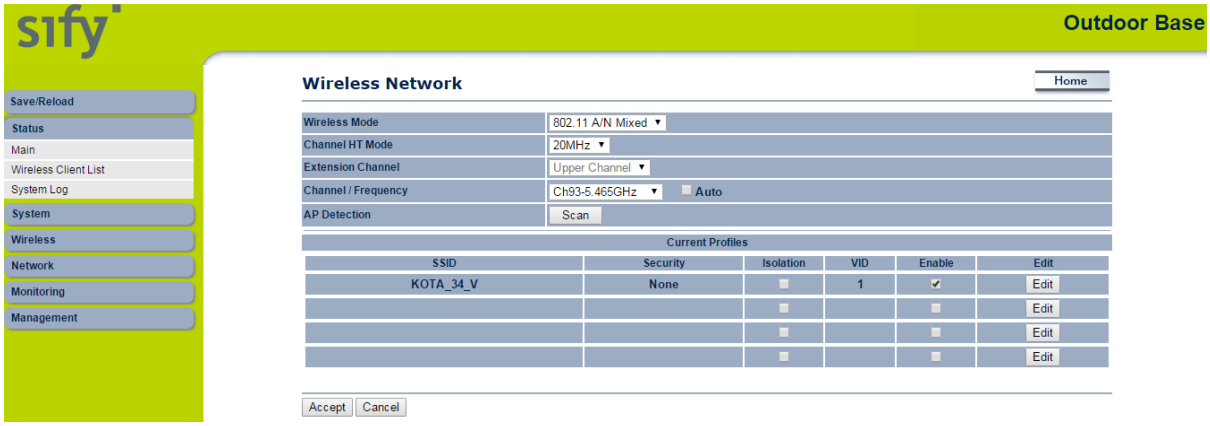
This section will guide you through all the wireless settings. Please read the instruction carefully. Inappropriate setting could lower the performance or affect the network structure. Before you continue, please make sure you have chosen the correct operating mode.

1.6.1 Wireless Network

This section is the basic wireless settings. Please read the description carefully and check the steps on chapter 10 in case you need more detail information.

For Outdoor Base Mode

Under **Wireless** → Click **wireless Network**

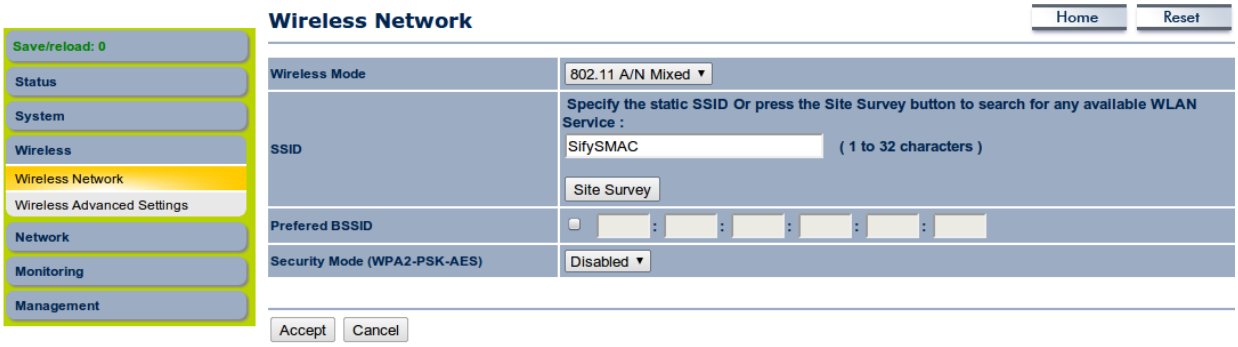


Wireless Mode	The wireless mode supports **802.11a/n** mixed modes. It is compatible with the most common known wireless band.
Channel HT Mode	The default channel bandwidth is **20 MHz**. The larger channel can provide better transmit quality and speed. 40 MHz options also available
Extension Channel	Specify the upper channel or lower channel selection. It may influence the Auto channel function
Channel / Frequency	Specify the channel/frequency.
Auto	Place a **Check** mark to enable Auto channel selection.
Current Profile	Configure the SSID, it can help to divide group of clients to access the network. Just **Edit** to configure the profile.

Accept does not compile the changes, you must go to Status -> Save/Load to apply the new settings.

For Outdoor Subscriber

Under **Wireless** → Click **wireless Network**



Wireless Mode	The wireless mode supports **802.11a/n** mixed modes. It is compatible with the most common known wireless band.
Channel HT Mode	Automatically detect the change when changed on Outdoor base
Channel / Frequency	Automatically detect the change when changed on Outdoor base
Accept / Cancel	Press Accept to confirm the changes or Cancel to return previous settings.
Current Profile	Configure the SSID, it can help to divide group of clients to access the network .Just **Edit** to configure the profile.

Accept does not compile the changes, you must go to Status -> Save/Load to apply the new settings. Please refer to the chapter 4.4.1 for more detail.

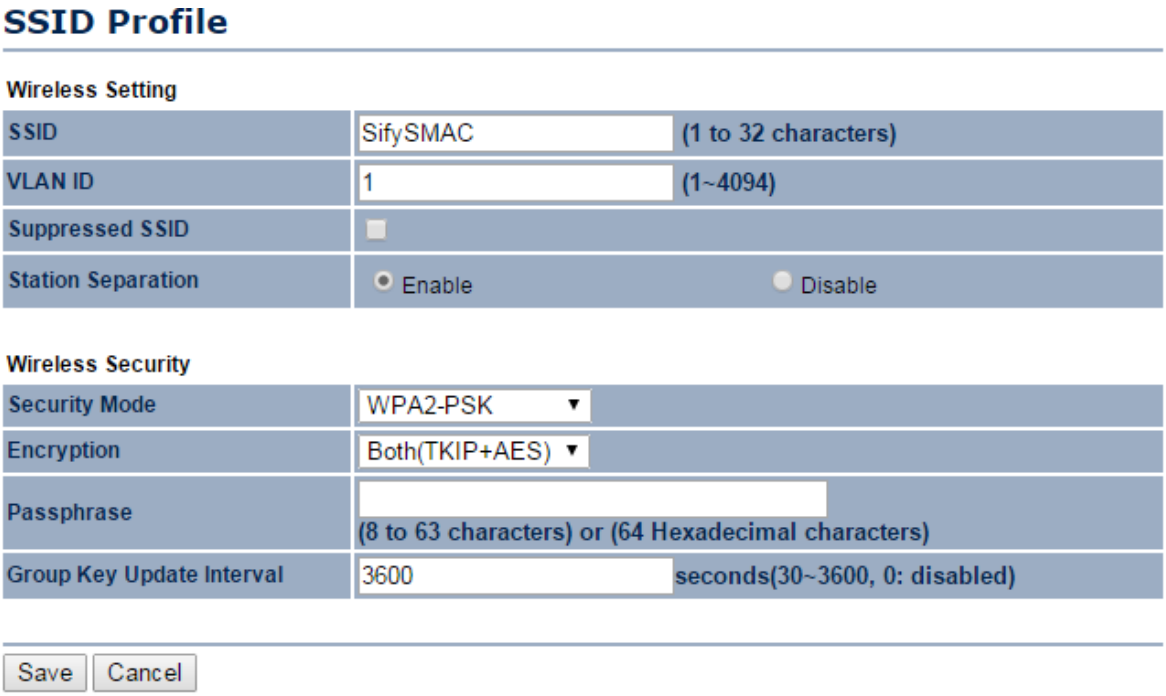
1.6.2 Wireless Security Settings

Wireless Security Settings section will guide you to the entire Security mode configuration:

We strongly recommend that WPA2-PSK as your security settings.

For Outdoor Base:

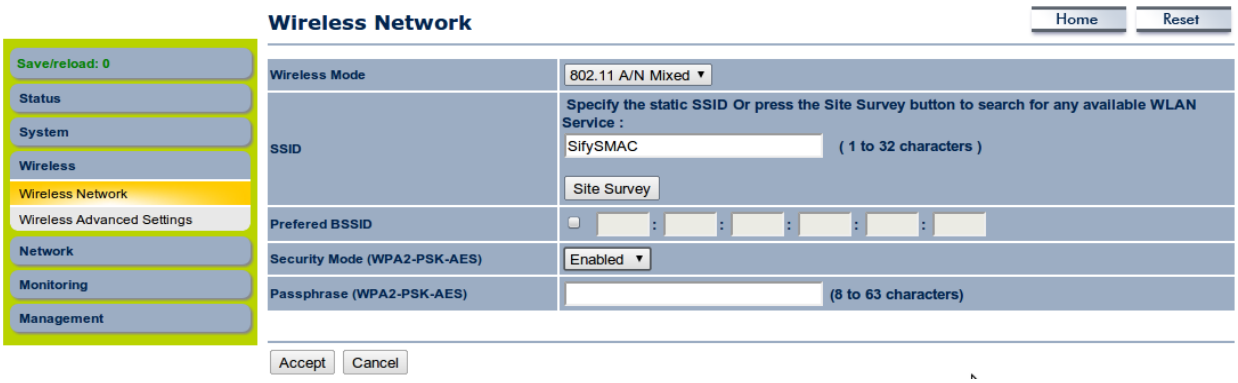
Under **Wireless** → Click **wireless Network**



Security Mode	Select **Enabled** from the drop down list to begin the configuration.
Encryption	Advanced Encryption System.
Passphrase	Specify the security password.
Passphrase Length	64 Hexadecimal characters password length.(**minimum 8 characters)**

For Outdoor Subscriber:

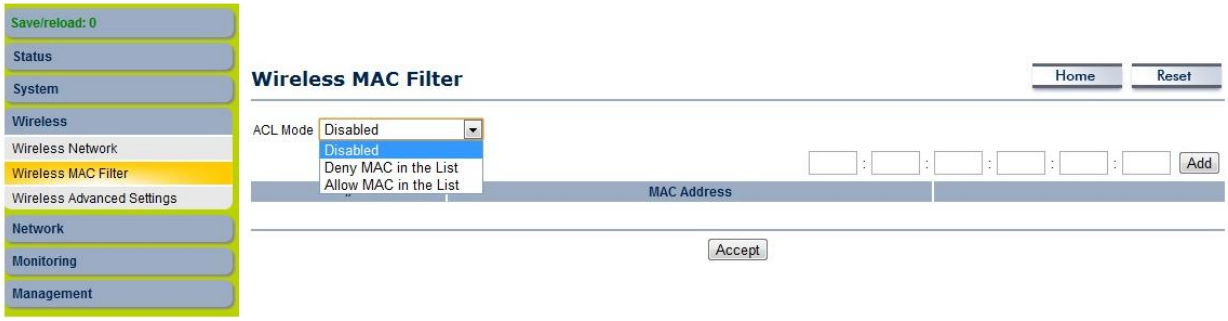
Under **Wireless** → Click **wireless Network**



Security Mode	Select **WPA2-PSK** from the drop down list to begin the configuration.
Encryption	Select **AES** for Encryption type.
Passphrase	Specify the security password.
Passphrase Length	64 Hexadecimal characters password length.(**minimum 8 characters**)

1.6.3 Wireless MAC Filter

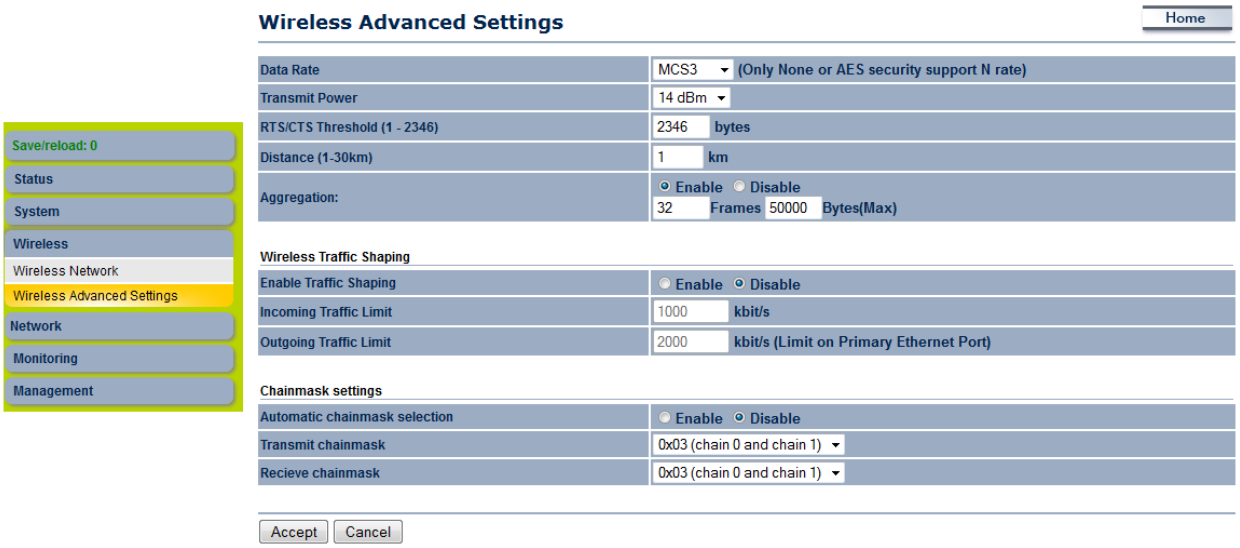
Wireless MAC Filters is used to Allow or Deny wireless clients, by their MAC addresses, accessing the Network. You can manually add a MAC address to restrict the permission to access SMAC5700. The default setting is Disable Wireless MAC Filters.



ACL Mode	ACL Mode can help to deny or allow certain Client to access the network. Select Disable Deny MAC in the list or Allow MAC in the list from the drop down list.
MAC Address Filter	Specify the Wireless MAC address manually.
Add	Press **Add** to add the Wireless MAC address in the table.
Apply	Press **Apply** to apply the changes.

1.6.4 Wireless Advanced Settings

Under **Wireless** → Click **Wireless Advanced Settings**



Data Rate	Select Data Rate from the drop down list. Data rate will affect the efficiency of the throughput. If the data rate is set to a small number, the lower through will get but it can transmit to longer distance.
Transmit Power	Select Transmit Power to increase or decrease Transmit Power. Higher transmit power will sometimes cause unable to connect to the network. On the other hand, the lower transmit power will cause client unable to connect to the device.
RTS/CTS Threshold	Specify Threshold package size for RTC/CTS. Using small number of the threshold will cause RTS/CTS packets to be sent more often to consuming more of the available bandwidth. In addition, if the heavy load traffic occurs, the wireless network can be recovered easily from interferences or collisions.
Distance	Specify distance rage between AP and Clients. Longer distance may lose high connection speed.

Short GI	Short GI is improved of 802.11n and 802.11a/g. It can increase 10% of the internet speed during the data transmission. For example, the 802.11a/g's GI is 800us; the short GI will be 400us.
Aggregation	Aggregation is to merge the typical size of data's header to one data. It is useful for the small size but larger amount packets.
Wireless Traffic Shaping	Place a **Check** to enable Wireless Traffic Shaping function.
Incoming Traffic Limit	Specify the wireless transmission speed for downloading in Kbits/seconds
Outgoing Traffic Limit	Specify the wireless transmission speed for uploading in kbits/seconds
Accept / Cancel	Press Accept to confirm the changes or Cancel to return previous settings.

1. Changing Wireless Advanced Settings may cause insufficient wireless connection quality.

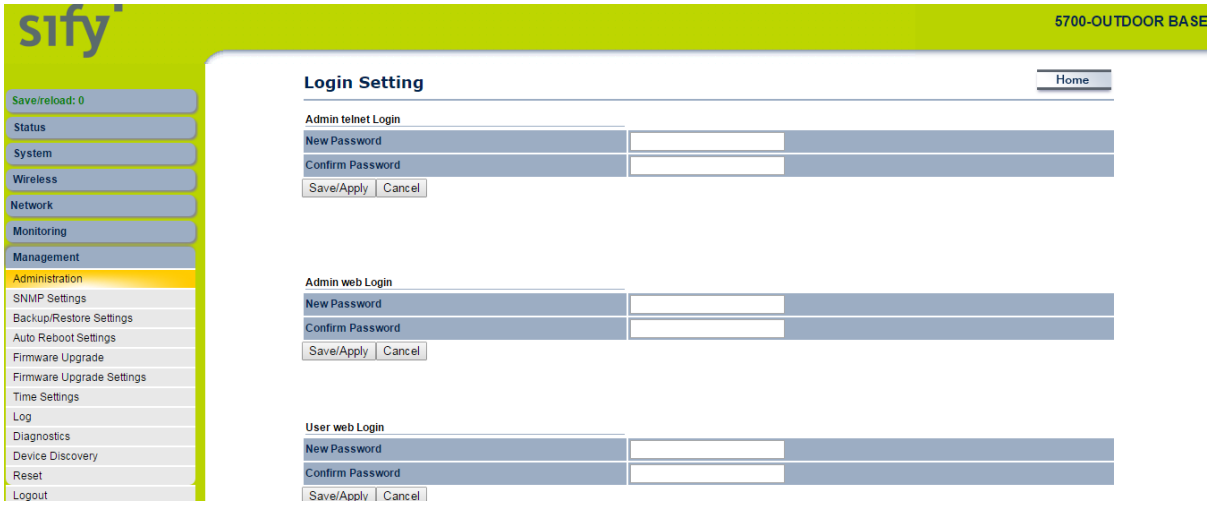
2. Accept does not compile the changes; you must go to Status -> Save/Load to apply the new settings.

1.7 Management Settings

Management section is on the navigation drop-down menu. You will then see seven options: administration, management VLAN, SNMP settings, backup/restore settings, firmware upgrade, time settings, and log. Each option is described below.

1.7.1 Administration

Click on the **Administration** link under the **Management** menu. This option allows you to create a user name and password for the device. Also we can provide Admin / User access & telnet by creating separate passwords. By default, this device is configured with a user name and password **admin**. For security reasons it is highly recommended that you create a new user name and password.

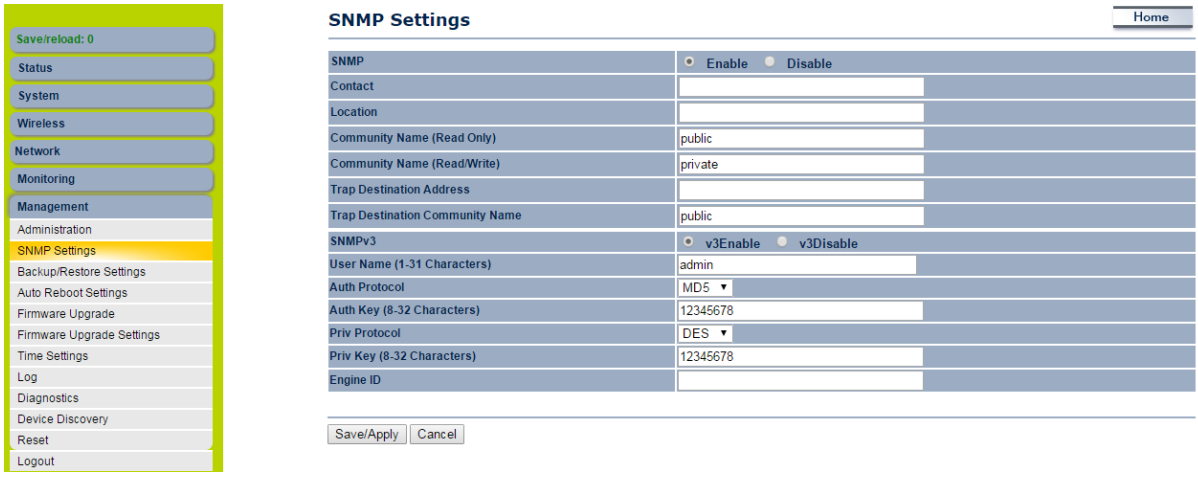


Password	Specify a Password for logging in Admin telnet / WEB as well as User
Confirm Password	Re-enter the Password for confirmation. Password length should be minimum 8 and maximum 16.
Save/Apply / Cancel	Press Save/Apply to apply the changes or Cancel to return previous settings.

Press Save/Apply will change the setting immediately. It will not be able to undo the action.

1.7.2 SNMP Settings

Click on the **SNMP Settings** link under the **Management** menu. This is a networking management protocol used to monitor network-attached devices. SNMP allows messages (called protocol data units) to be sent to various parts of a network. Upon receiving these messages, SNMP-compatible devices (called agents) return data stored in their Management Information Bases. It can support SNMP V3 feature also.

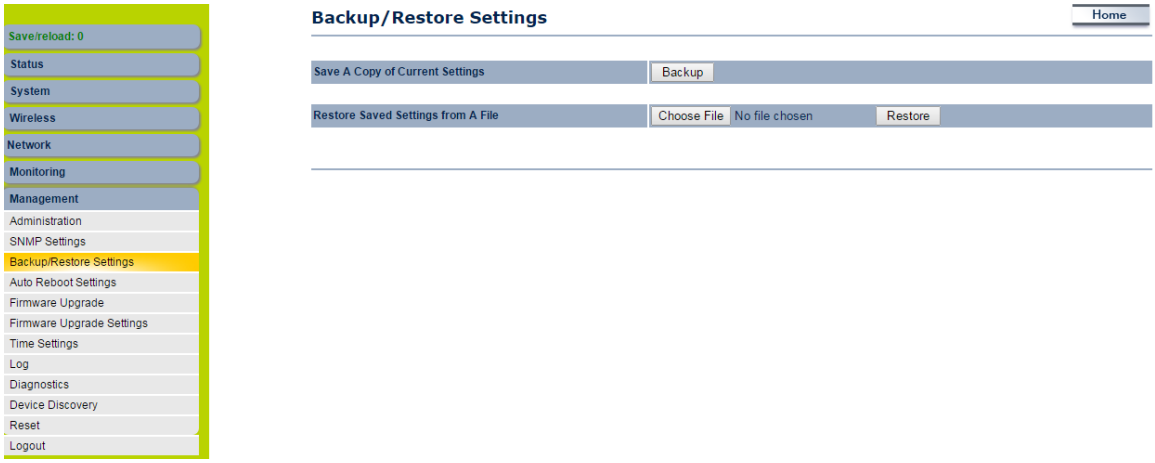


Enable/Disable	Select the Radio button to Enable or Disable SNMP function.
Contact	Specify the contact details of the device.
Location	Specify the location of the device.
Community Name(Read only)	Specify the password for access the SNMP community for read only access. By default its public; better keep it in default password.
Community Name(Read/Write)	User cant able to change the default SNMP Read/Write password.
Trap Destination IP Address	Specify the IP address that will receive the SNMP trap.
Trap Destination Community Name	Specify the Destination Community name.
Save/Apply / Cancel	Press Save/Apply to apply the changes or Cancel to return previous settings.

Press Save/Apply will change the setting immediately. It will not be able to undo the action.

1.7.3 Backup/Restore Settings

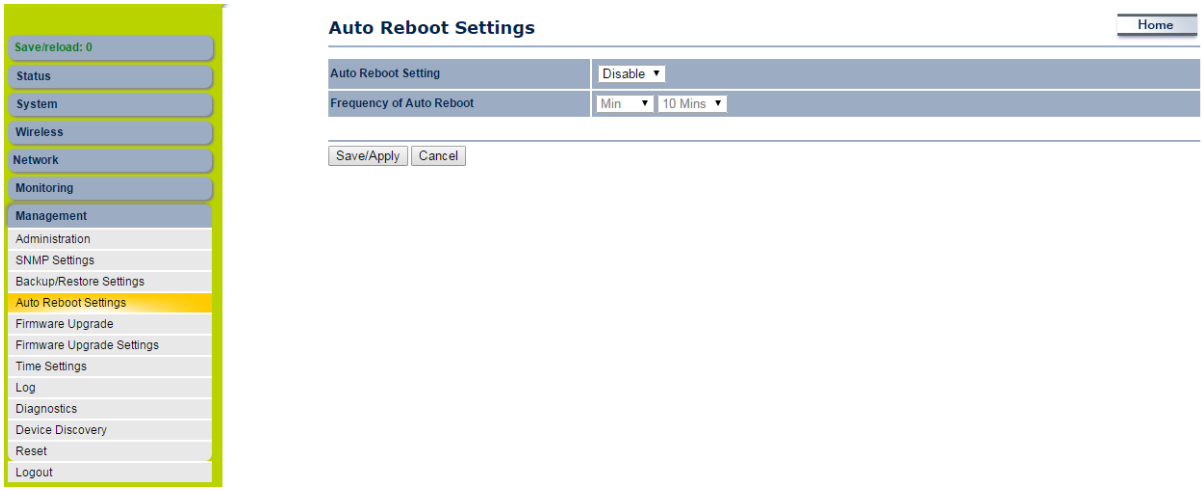
Click on the **Backup/Restore Setting** link under the **Management** menu. This option is used to save the current settings of the device in a file on your local disk or load settings on to the device from a local disk. This feature is very handy for administrators who have several devices that need to be configured with the same settings.



Save A Copy of Current Settings	Click on **Backup** to save current configured settings.
Restore Saved Settings from a File	SMAC5700 can restore a previous setting that has been saved. Click on Browse to select the file and Restore.

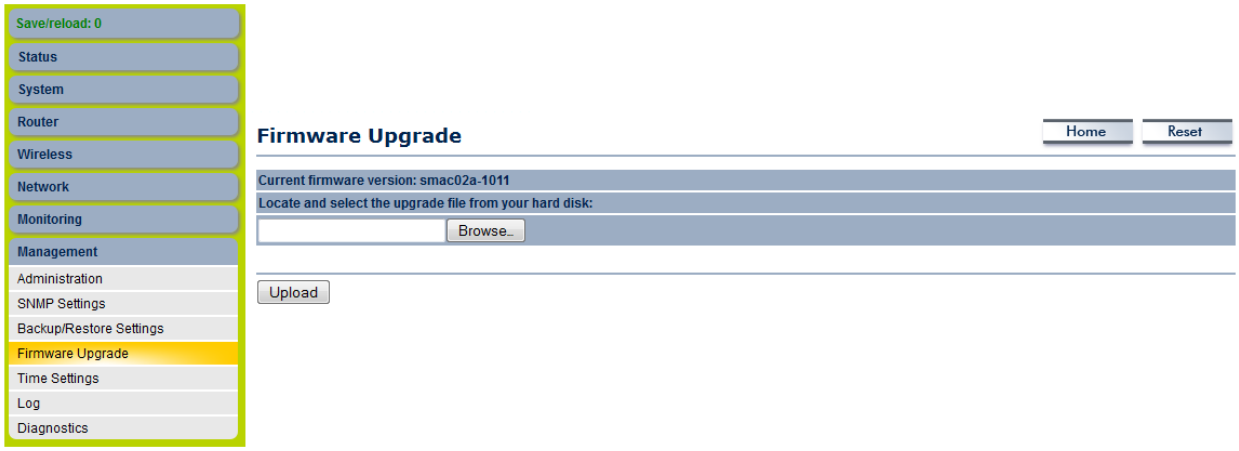
1.7.4 Auto reboot settings

Click on the **Auto reboot setting** link under the **Management** menu for auto rebooting the radio.



1.7.5 Firmware Upgrade

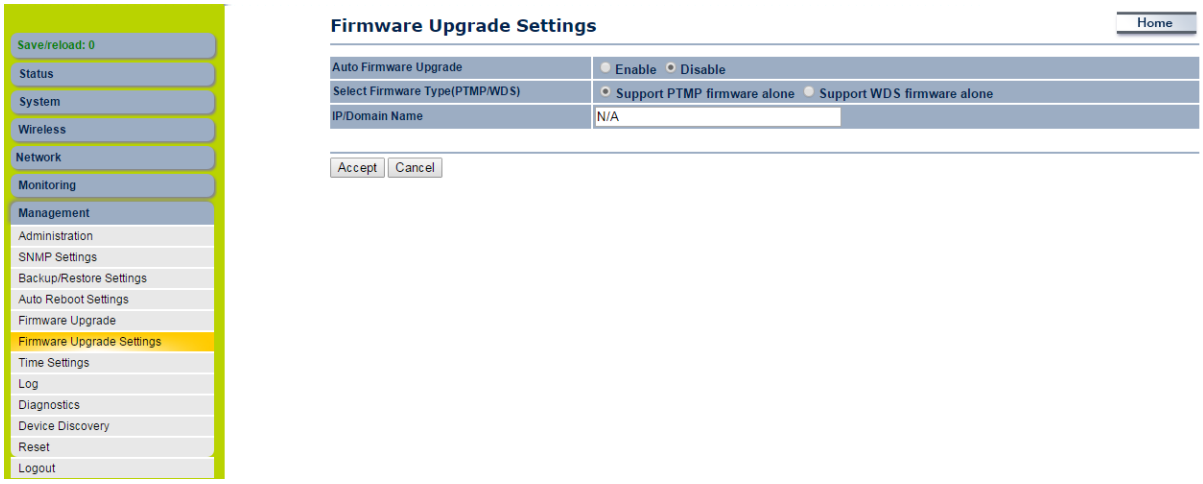
Click on the **Firmware Upgrade** link under the **Management** menu. This page is used to upgrade the firmware of the device. Make sure that downloaded the appropriate firmware from your vendor.



Upgrade process may take few minutes (approximate 3 minutes); please do not power off the device and it may cause the device crashed or unusable. SMAC5700 will restart automatically once the upgrade is completed.

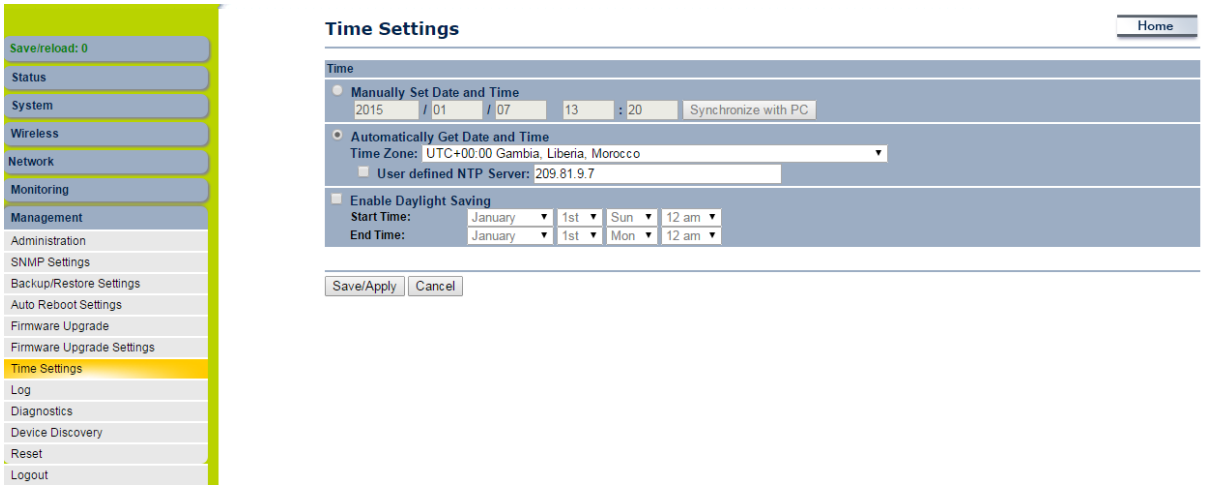
1.7.6 Firmware Upgrade Settings

Click on the **Firmware Upgrade Settings** link under the **Management** menu. This page is used to upgrade the firmware from remote. Latest firmware can be uploaded in server and connected devices can upgrade automatically when reboots.



1.7.7 Time Settings

Click on the **Time Settings** link under the **Management** menu. This page allows you to configure the time on the device. You may do this manually or by connecting to a NTP server.

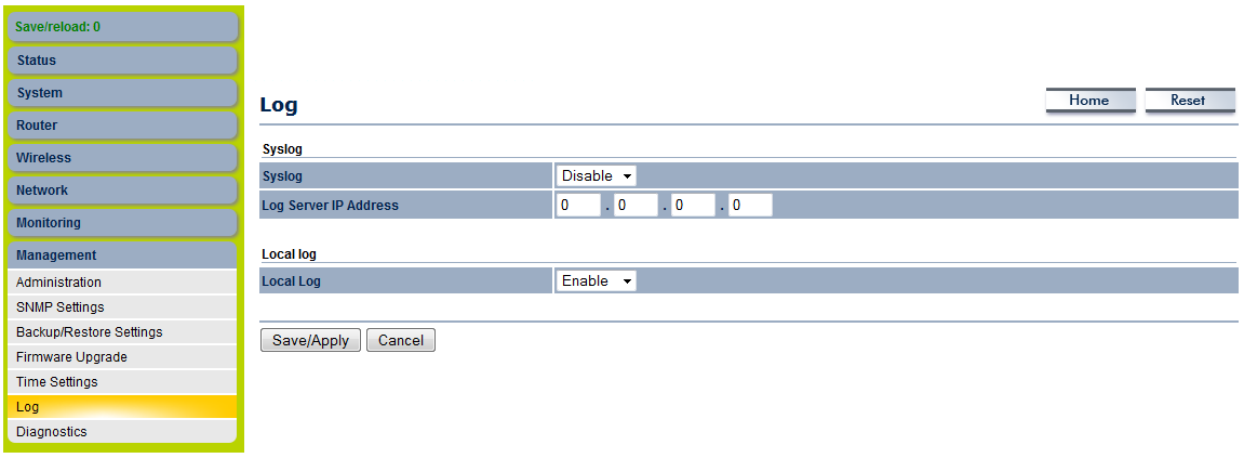


Manually Set Date and Time	Manually setup the date and time.
Automatically Get Date and Time	Specify the Time Zone from the drop down list and Place a **Check** to specify the IP address of the NTP Server manually or uses default NTP Server.
Save/Apply / Cancel	Press Save/Apply to apply the changes or Cancel to return previous settings.

Press Save/Apply will change the setting immediately. It will not be able to undo the action.

1.7.8 Log

Click on the **Log** link under the **Management** menu. The **Log** page displays a list of events that are triggered on the Ethernet and Wireless interface. This log can be referred when an unknown error occurs on the system or when a report needs to be sent to the technical support department for debugging purposes.

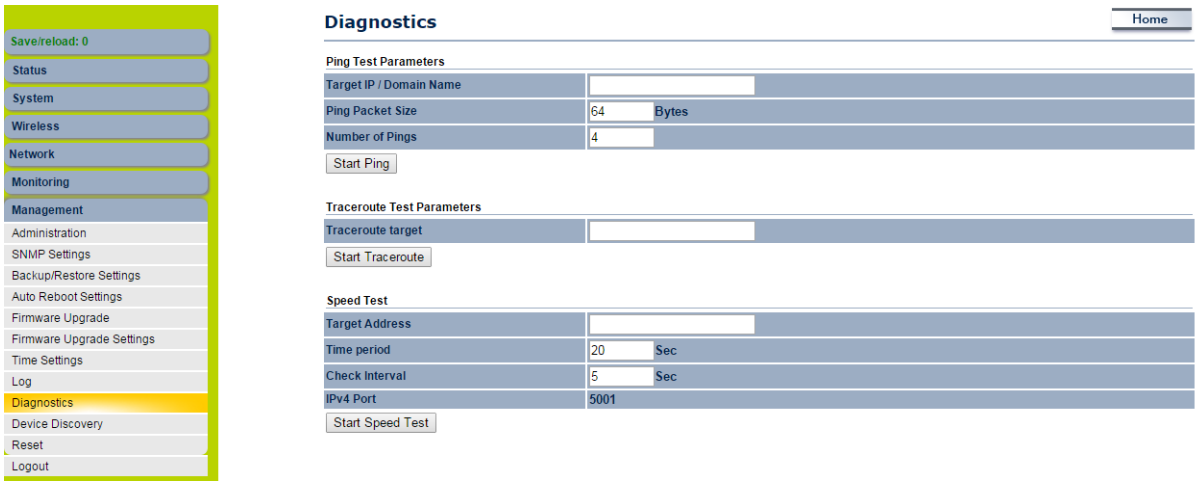


Syslog	Select Enable or Disable Syslog function from the drop down list.
Log Server IP Address	Specify the Log Server IP address.
Local Log	Select Enable or Disable Local Log service.
Save/Apply / Cancel	Press Save/Apply to apply the changes or Cancel to return previous settings.

Press Save/Apply will change the setting immediately. It will not be able to undo the action.

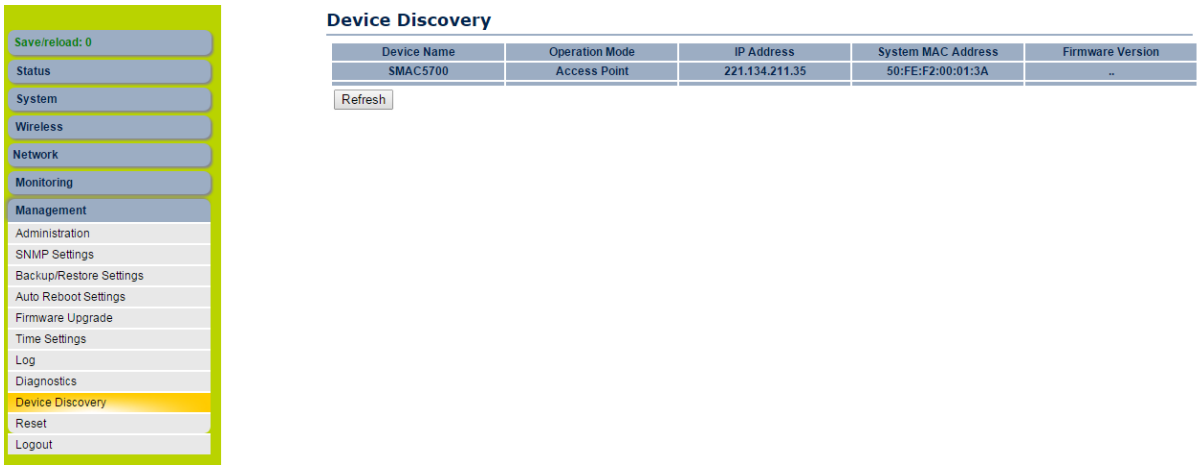
1.7.9 Diagnostics

Click on the **Diagnostics** link under the **Management** menu. This function allows you to detect connection quality and trace the routing table to the target.



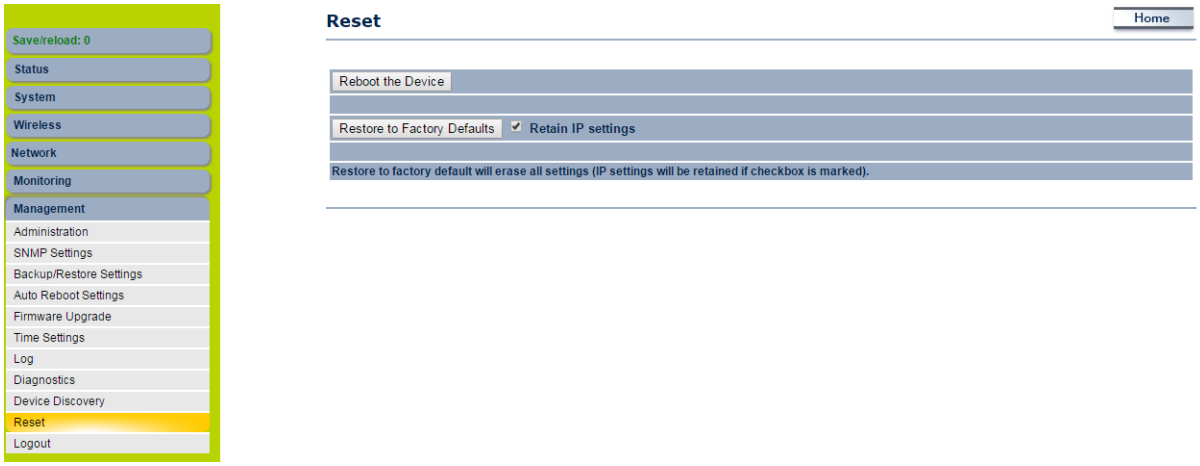
1.8 Device Discovery

. Click on the **Device discovery** link under the **Management** menu. This function displays the device information as well as associated SU information.



1.8.1 Reset

Click on the **Reset** link under the **Management** menu. This page is used to reboot & reset the device to factory default. We can restore the factory setting with retain the IP setting, hence IP reachability will be available & all other parameters will go to factory settings.



1.9 LED Indication

LED indication in Outdoor Subscriber (SU) mode and LED blinking format is given below.

NAME	Condition	Signal Strength
WLAN_LED	GREEN blinking fast	Excellent (less than -63)
	GREEN blinking slow	Good (-64 to -74 dBm)
	Alternate GREEN and AMBER	Average (-75 to -80 dBm)
	AMBER blinking	Poor (above -81 dBm)
	OFF	Wireless Link DOWN