



## **AW5500**

# **Industrial Wireless Access Point User's Manual**



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Feb., 2012

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# Preface

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## **Purpose of the Manual**

This manual supports you during the installation and configuring of the AW5500 Industrial Wireless Access Point only, as well as it explains some technical options available with the mentioned product. As such, it contains some advanced network management knowledge, instructions, examples, guidelines and general theories designed to help users manage this device and its corresponding software; a background in general theory is a must when reading it. Please refer to the Glossary for technical terms and abbreviations (if any).

## **Who Should Use This User Manual**

This manual is to be used by qualified network personnel or support technicians who are familiar with network operations; it might be useful for system programmers or network planners as well. This manual also provides helpful and handy information for first time users. For any related problems please contact your local distributor, should they be unable to assist you, please redirect your inquiries to [www.atop.com.tw](http://www.atop.com.tw) or [www.atop-tech.com](http://www.atop-tech.com) .

## **Supported Platform**

This manual is designed for the AW5500 Industrial Wireless Access Point and that model only.

## **Warranty Period**

We provide a **5 year limited warranty** for AW5500 industrial wireless access point.

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## **Manufacturers Federal Communication Commission Declaration of Conformity Statement**

### **Model: AW5500**

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a

residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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 device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device is restricted to indoor use when operated in the 5.15 to 5.25 GHz frequency range.

※ FCC requires this product to be used indoors for the frequency range 5.15 to 5.25 GHz to reduce the potential for harmful interference to co-channel Mobile Satellite systems.

### **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.

### **European Community, Switzerland, Norway, Iceland, and Liechtenstein**

Model: AW5500

### **Declaration of Conformity with regard to the R&TTE Directive 1999/5/EC**

This equipment is in compliance with the essential requirements and other relevant provisions of 1999/5/EC.

The following standards were applied:

EMC—EN 301.489-1 v1.4.1; EN 301.489-17 v1.2.1

Health & Safety—EN60950-1: 2001; EN 50385: 2002

Radio—EN 300 328 v 1.7.1; EN 301.893 v 1.5.1

The conformity assessment procedure referred to in Article 10.4 and Annex III of Directive

1999/5/EC has been followed.

This device also conforms to the EMC requirements of the Medical Devices Directive 93/42/EEC.

**Note** This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. For more details, contact Atop Technical Support.

### **European Union**

This system has been evaluated for RF exposure for Humans in reference to the ICNIRP (International Commission on Non-Ionizing Radiation Protection) limits. The evaluation was based on the EN 50385 Product Standard to Demonstrate Compliance of Radio Base stations and Fixed Terminals for Wireless Telecommunications Systems with basic restrictions or reference levels related to Human Exposure to Radio Frequency Electromagnetic Fields from 300 MHz to 40 GHz. The minimum separation distance from the antenna to general bystander is 20cm (7.9 inches).

### **UL Notice for Power supplier**

The series AW5500 products are intended to be supplied by a Listed Power Unit marked with "LPS" (Limited Power Source), or "Class 2" and output rate of 9~48 VDC, 1.0 A minimum, or use the recommended power supply listed in "Optional Accessories".

# 1 Introduction

## 1.1 Product Overview

The **AW5500 Wireless Access Point** series is our new line of wireless products designed to provide a wireless connectivity to clients or mobile stations creating a complete solution for your industrial wireless networking.

As an example, you can connect serial devices to our **Wireless Serial Server** and connect these two to a **Wireless Access Point** device; this example illustrates how to connect serial devices to a local area network or a backbone network, Figure 1.1. The **AW5500** series provide several functionalities to support mobile and wireless networking.



Fig. 1. 1

## 1.2 Features

**AW5500** is our latest addition to our Industrial Wireless products; its small size but powerful architecture makes it a perfect choice for industrial/manufacturing needs in which size is a decisive factor. It rewards our customers with superb connectivity. Among its many characteristics, we could mention:

- Stream input/output with maximum link speed of 300Mps and throughput of 100Mps (environment dependent).
- 5 GHz frequency support to reduce interference on 2.4 GHz with other wireless devices.
- Client isolation to enhance security between wireless clients.
- Different modes of operation:
  - Regular AP
  - WDS Bridge
  - AP Client

## Caution

Beginning from here there will be extreme caution exercised.

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Never install or work on electrical or cabling during periods of lightning activity. Never connect or disconnect power when hazardous gases are present.



**WARNING:** Disconnect the power and allow to cool 5 minutes before touching.

## 2 Getting Started

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### 2.1 Inside the Package

Inside the product purchased you will find the following items<sup>1</sup>:

Table 2. 1

Item	Quantity	Description
AW5500	1	Industrial Wireless Access Point
Antenna	2	3~5dBi antenna
Terminal Block	1	3-pin terminal block
Mounting kit	1	DIN-Rail kit, already mounted on the device's back plate.
Documentation + CD (Utilities)	1	Inside the CD you will find:
		<ul style="list-style-type: none"><li>● User's Manual</li><li>● Installation Guide</li><li>● <b>Device View</b> © Utility</li></ul>

---

**Note**<sup>1</sup>: Please notify your sales representative if any of the above items is missing or damaged in any form upon delivery. If your sales representative is unable to satisfy your enquiries, please contact us directly.

---

## 2.2 Front & Power Panels

The **Front** (Fig. 2.1), and **Power panels** (Fig. 2.2), are as follow:

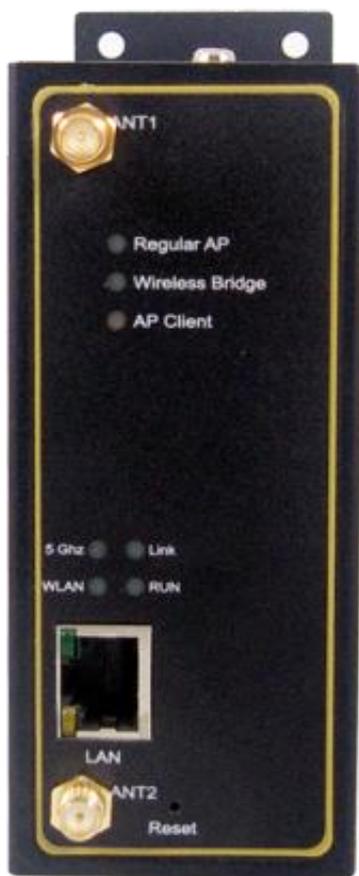


Fig. 2. 1



Fig. 2. 2

The Rear panel (where you can mount the device on a rail or to the wall), looks as in Fig. 2.3, a simple mounting instruction is given on Fig. 2.4.



Fig. 2. 3

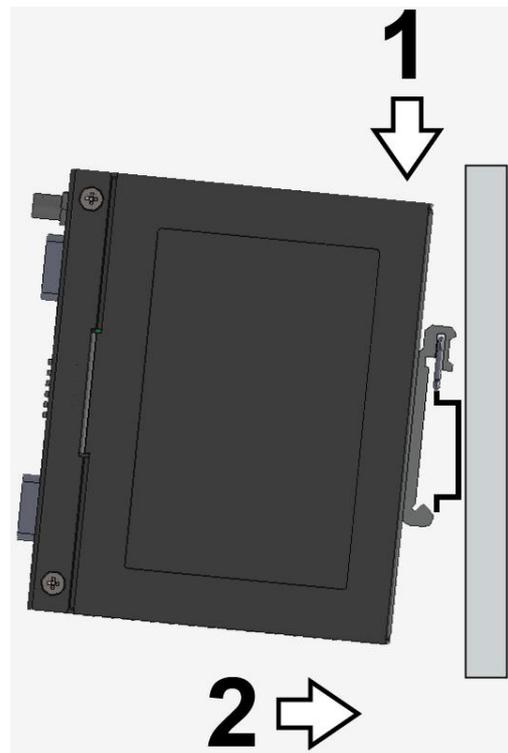


Fig. 2. 4

**Note:** this unit comes with a mount kit, for more information on this and how to install the AW5500 please refer to the Hardware Installation Guide

## 2.3 First Time Installation

Before installing the device, please adhere to all safety procedures described below, Atop will not be held liable for any damages to property or personal injuries resulting from the installation or overall use of the device. **Do not attempt to manipulate the product in any way if unsure of the steps described here<sup>2</sup>, in such cases please contact your dealer immediately.**

1. Prepare the necessary cables, DC adapter, power cord, LAN cable, etc.; **do not connect the unit yet.**
2. Install both antennas to the SMA connectors.

3. Proceed then to plug the power source to the unit, starting from the ground and then the terminal block.
4. Place the device in the desired location and connect it to the **LAN** via an **Ethernet cable** with an **RJ45 connector**.
5. Connect your computer to the **LAN** network. Default configurations will be addressed later on Section 2.4.

---

**Note**<sup>2</sup>: remember to please consult your Hardware Installation Guide when attempting an installation. Also, please follow all safe procedures when doing so.

---

### 2.3.1 Web Configuration Overview

**AW5500** series' Web Configuration is designed into three different modes for ease of use to suit customer needs. The Web Configuration appears as follows, Fig. 2.5.

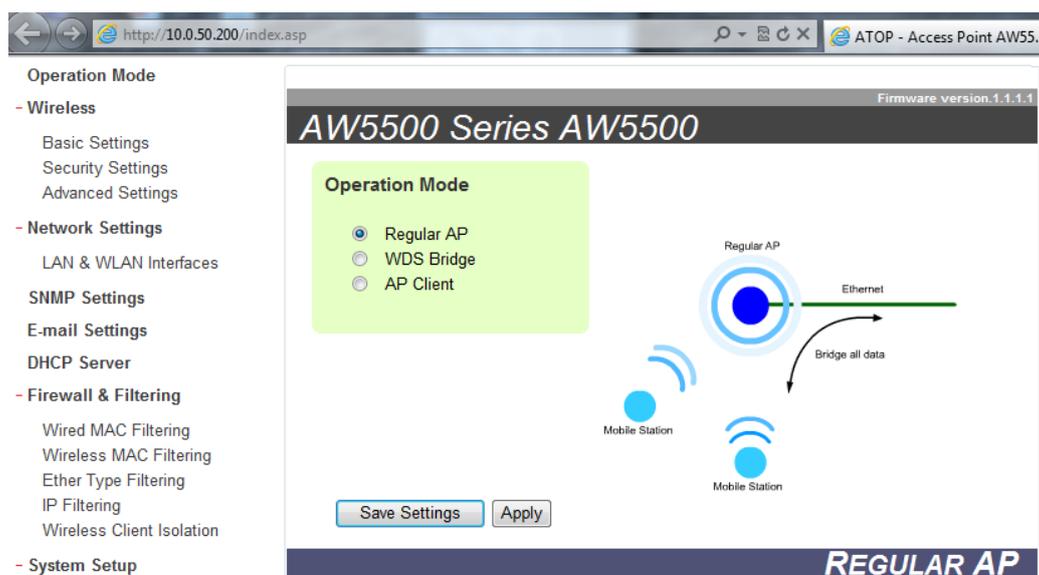


Fig. 2. 5

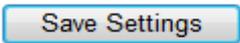
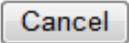
On the left side, a menu-tree appears with all the modes and options available, while on the right side of your screen the contents of each mode/option will be displayed in a graphical state. Since each Mode of operation is different, the content will differ each, for more information on each selection please refer to each option's Section throughout the manual.

- Operation Mode
- Wireless
  - Basic Settings
  - Security Settings
  - Advanced Settings
- Network Settings
  - LAN & WLAN Interfaces
- SNMP Settings
- E-mail Settings
- DHCP Server
- Firewall & Filtering
  - Wired MAC Filtering
  - Wireless MAC Filtering
  - Ether Type Filtering
  - IP Filtering
  - Wireless Client Isolation
- System Setup
  - Admin Settings
  - Date/Time Settings
  - Alert Event
  - Firmware Upgrade
  - Backup & Restore Configuration
- System Status
  - System Information
  - Site Monitor
  - Wireless client table
  - Traffic Log & Statistics
  - DHCP Status
- Reboot

Fig. 2. 6

It is worth noting that as a first step to view your device’s overall settings, you should use **Device View** © (the utility provided in the CD); please refer to [Sec. 3.1](#) for more details. There will be however, three buttons which will be present during almost each selection:

Table 2. 2

Button	Functionality
	Saves the current configuration input on the page only. The configuration itself will not be applied to the device. We recommend users to use this button before the configuration process is completed and then press “Apply” at the last step
	Save and apply the current configuration input on the page. On some pages, the device may need to reboot, we strongly advice to save the device’s settings before reboot.
	Cancel the current configuration input and shows the original setting.

## 2.4 Factory Default Settings

Upon arrival, the device will be set as **Regular AP**, the rest of the settings are as follow:

Table 2. 3

Mode	Regular AP	WDS Bridge	AP Client
<b>Wireless</b>			
<b>Basic Settings</b>			
Radio Off	Disabled		N.A.
Network Name	AW55XX		
SSID Broadcast	Enabled		
Wireless Mode	802.11b/g/n		
Channel	1 (Automatic Channel Selection enabled)		
Bandwidth	40 MHz		
Secondary Channel	None (disabled)		
Transmit Rate	Best (auto)		
WDS Mode		Root AP	
<b>Security Settings</b>			
Security Mode	Disabled	N.A.	N.A.
<b>WDS Settings</b>			
Encryption Type	N.A.	None	N.A.
Root AP		blank	
<b>Advanced Settings</b>			
Country Code	US (United States)		
Short GI	Enabled		
STP	STP		
WMM	Enabled		
<b>Mobile Station</b>			
Radio On/Off	N.A.		Disabled
SSID			AW5500
BSSID (MAC Address)			Default according to device's settings
Topology			Infrastructure
Band mode			None
TxRate			
Channel			

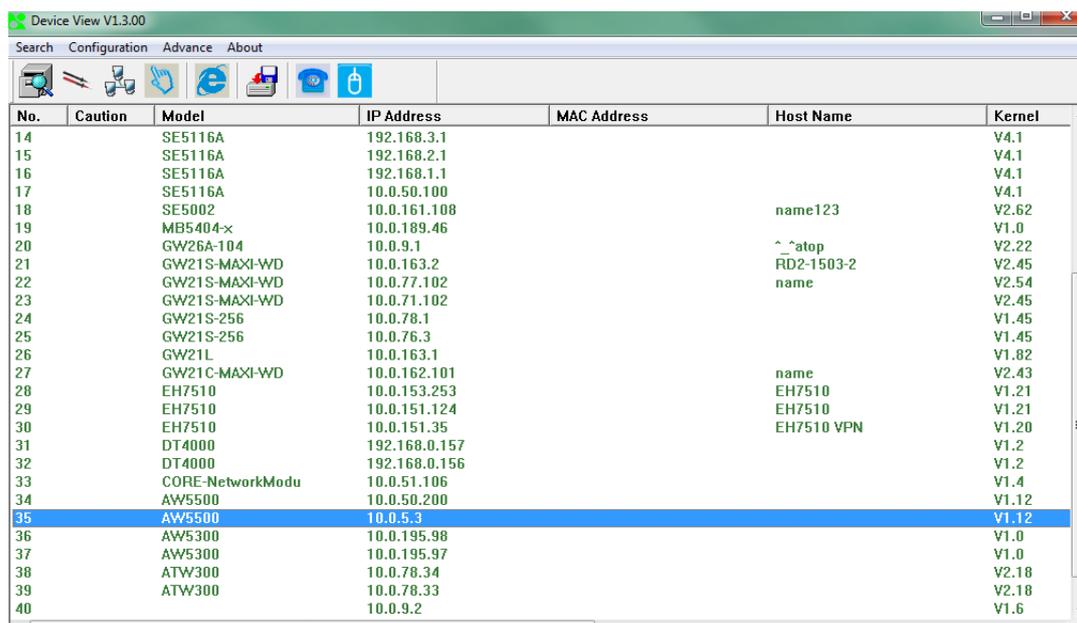
Bandwidth		
Secondary Channel		
Authentication Mode		OPEN
Encryption Type		None
WEP Key		
WPA-PSK/WPA2-PSK (Passphrase)		AW55XX
WPA-PSK/WPA2-PSK (with RADIUS)		
User		
Password		None
<b>Network Settings</b>		
DHCP	Manual (box unchecked)	
IP Address	10.0.50.200	
Subnet Mask	255.255.0.0	
Default Gateway	10.0.50.1	
Preferred DNS	168.95.1.1	
Alternate DNS	None	
<b>SNMP Settings</b>		
System Contact	Contact	
System Location	Location	
Read Community	None (SNMP disabled)	
Write Community		
SNMP Trap Server	0.0.0.0	
<b>E-mail Settings</b>		
Sender	blank	
Receiver		
SMTP Server		
Authentication	unchecked	
User name	None (if above unchecked)	
Password		
<b>DHCP Server</b>		
DHCP	Disabled (unchecked)	
From IP Address	None (if above unchecked)	
To IP Address		
Netmask		

Lease Time (Minutes)			
Static Connection			
<b>Firewall &amp; Filtering</b> (a total of 64 entries available per option)			
Wired MAC Filtering	Disabled MAC Filtering		
· Access Control List	None (if above checked)		
Wireless MAC Filtering	Disabled		
· Access Control List	None (if above checked)		
Ether Type Filtering	Disabled		
· Ethernet Type Filtering List	None (if above checked)		
IP Filtering	Disabled		
· IP Filtering List	None (if above checked)		
Wireless Client Isolation	No blocking	N.A.	
<b>System Setup</b>			
Username	admin		
Old Password	NULL (Blank)		
New Password			
Repeat new password			
Device name	Value according to device's settings		
NTP	Unchecked		
NTP Server	None (if above unchecked)		
Time Zone			
Manual Time Settings	2006/1/1 00:00		
Alert Event	All unchecked		
Firmware Upgrade	Path directed to Desktop		
Backup & Restore Configuration			
<b>System Status</b>			
System Information	Default table according to device's settings		
Site Monitor	Default table according to connection		
Wireless client table			N.A.
Traffic Log & Statistics			
· Refresh Rate	No refresh		
DHCP Status	No DHCP entry		

# 3 Web Console Configuration

## 3.1 Administrator Login

As soon as the device is connected on the web, the user can proceed to navigate through its configuration using **Device View** ©, (utility that comes in the CD); as noted in Fig. 3.1 below, important information such as the IP, MAC address, etc is going to be displayed.



The screenshot shows the 'Device View V1.3.00' application window. It features a menu bar with 'Search', 'Configuration', 'Advance', and 'About'. Below the menu is a toolbar with various icons. The main area contains a table with the following columns: 'No.', 'Caution', 'Model', 'IP Address', 'MAC Address', 'Host Name', and 'Kernel'. The table lists 27 devices, with the 25th device (No. 25) highlighted in blue. This device is an 'AW5500' with IP address '10.0.5.3' and kernel version 'V1.12'.

No.	Caution	Model	IP Address	MAC Address	Host Name	Kernel
14		SE5116A	192.168.3.1			V4.1
15		SE5116A	192.168.2.1			V4.1
16		SE5116A	192.168.1.1			V4.1
17		SE5116A	10.0.50.100			V4.1
18		SE5002	10.0.161.108		name123	V2.62
19		MB5404-x	10.0.189.46			V1.0
20		GW26A-104	10.0.9.1		^_atop	V2.22
21		GW21S-MAXI-WD	10.0.163.2		RD2-1503-2	V2.45
22		GW21S-MAXI-WD	10.0.77.102		name	V2.54
23		GW21S-MAXI-WD	10.0.71.102			V2.45
24		GW21S-256	10.0.78.1			V1.45
25		GW21S-256	10.0.76.3			V1.45
26		GW21L	10.0.163.1			V1.82
27		GW21C-MAXI-WD	10.0.162.101		name	V2.43
28		EH7510	10.0.153.253		EH7510	V1.21
29		EH7510	10.0.151.124		EH7510	V1.21
30		EH7510	10.0.151.35		EH7510 VPN	V1.20
31		DT4000	192.168.0.157			V1.2
32		DT4000	192.168.0.156			V1.2
33		CORE-NetworkModu	10.0.51.106			V1.4
34		AW5500	10.0.50.200			V1.12
35		AW5500	10.0.5.3			V1.12
36		AW5300	10.0.195.98			V1.0
37		AW5300	10.0.195.97			V1.0
38		ATW300	10.0.78.34			V2.18
39		ATW300	10.0.78.33			V2.18
40			10.0.9.2			V1.6

Fig.3. 1

If the name of your device is double-clicked, a window will pop-out that will prompt you to enter username and password (see [Factory Default Settings](#) for more information), proceed then to click "OK", Fig. 3.2.



Fig.3. 2

The settings will then be accessed, Fig. 3.3 by introducing first the username and password; as mentioned before, it will be in **Regular AP** as its default.



Fig.3. 3

## 3.2 Overview Information

AW5500 is an Industrial Wireless solution for applications in harsh environments. The AW5500 is tough enough, expected to operate at temperatures ranging from -10°C~60°C. The ease of installation makes it attractive as it uses a DIN-Rail for fixing itself to virtually any surface in your workplace. Reliability is a key factor when wireless solutions are needed, that is why

AW5500's size makes it ideal for small places when considering its positioning without affecting real-time, control and overall performance.

### 3.2.1 Secure Wireless Network

AW5500 is designed to provide you security support when building a network. We recommend using WPA2-PSK with AES as a minimum when securing your network; also remember to set it at 802.11n for a full speed performance. For more information on this and more please read [Chapter 3, Sec. 3.3.2](#)

## 3.3 Wireless Settings

Wireless Settings includes the basic Wi-Fi settings and wireless security. There are however, some concepts to be mentioned before going one step forward on the wireless settings. As you know, 802.11 is a set of standards for WLAN communication at the 2.4, 3.6 and 5 GHz frequencies. The AW5500 works only with the 2.4 and 5 GHz range, it follows the below mentioned standards:

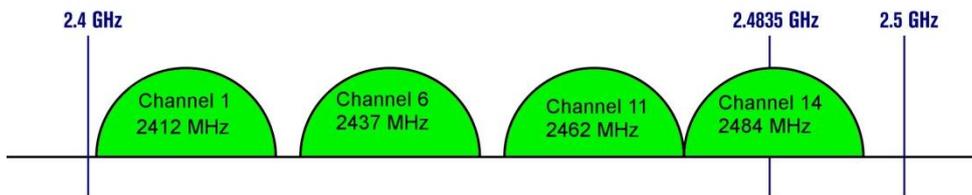
- **802.11a:** (also known as **802.11a-1999**), is a 54 Mbps (around 20 Mbps net throughput), 5 GHz signaling standard; since 2.4 GHz is used by a big number of different devices interference here is less than in **802.11b**. However, signals will not penetrate as much as 802.11b because they are absorbed more readily by walls and other solid objects (when on a single path), but not when use in multi-path environments i.e., indoors, office.
- **802.11b:** the first of the standards to be created; an 11 Mbps (4-5 Mbps net throughput), 2.4 GHz signaling standard. Although it performs much better than traditional dial-up networking, the performance of 802.11b is still significantly less than **802.11a** and other, newer standards.
- **802.11g:** very similar to 802.11b, the main difference being that it is done in a maximum raw data rate of 54 Mbps (20 Mbps net throughput), at the same 2.4 GHz bandwidth.
- **802.11n:** more resistant to signal interference from outside sources. Improves the amount of bandwidth supported by using multiple wireless signals and antennas (MIMO technology) instead of one. Net throughput on a 2x2 solution is about 100Mbps on our models.

### 3.3.1 Basic Settings

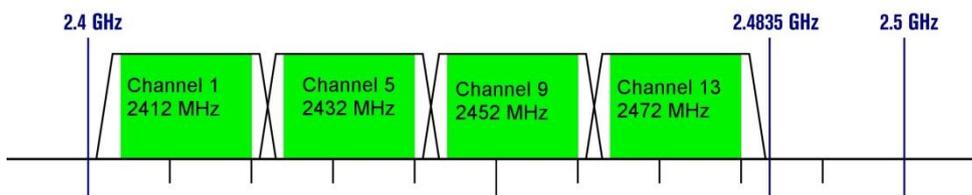
To set up a wireless network, several parameters are needed as shown in. Input the **SSID** or **Network Name** of your network, and the channel number of your access point. The **SSID** and the **Channel** number should be unique to prevent degraded performance from radio interference and SSID conflict. You can use the “**Scan network**” to know about the SSID and channel number of surrounding access points in the device’s coverage area, please be patient as this process might take as long as 10 seconds. Select “**Automatic Channel Select**” to let the device automatically assign the best available channel number. Usually when setting the channels automatically, (and depending on the environment), channels 1, 6, 11, are non overlapping channels for 2.4 GHz Fig. 3.4; bear in mind that this frequency is still prone to interference from a wide variety of sources. Please take a look at the picture below for a graphical illustration of the concept.

## Non-Overlapping Channels for 2.4 GHz WLAN

### 802.11b (DSSS) channel width 22 MHz



### 802.11g/n (OFDM) 20 MHz ch. width – 16.25 MHz used by sub-carriers



### 802.11n (OFDM) 40 MHz ch. width – 33.75 MHz used by sub-carriers

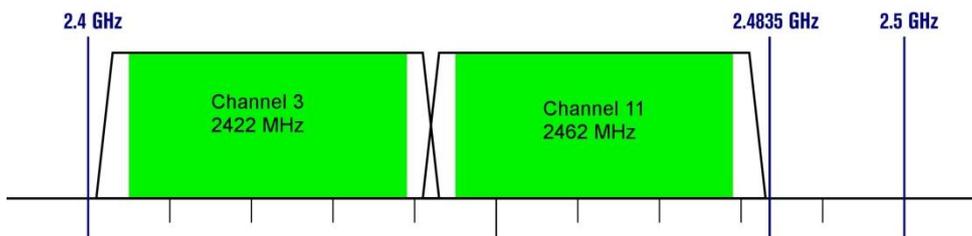


Fig.3. 4

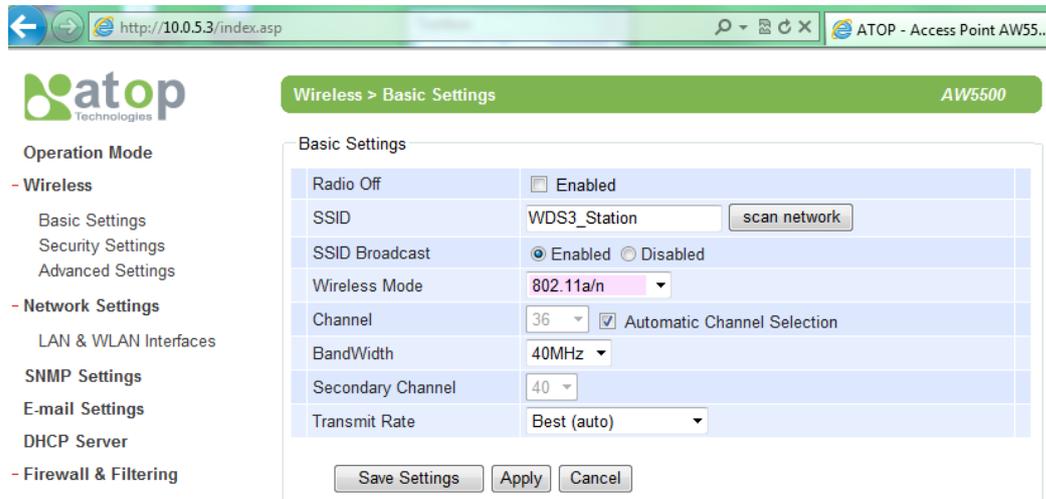


Fig.3. 5

The **SSID Broadcast** is the function to allow any wireless client to search for this access point presence, it is enabled by default. When the **SSID Broadcast** is disabled, wireless clients need to manually input the SSID in their wireless client configuration, increasing network security to prevent an access from unsolicited clients.

You can also specify “**Wireless Mode**” of this access point according to your needs. The **802.11b/g/n** mode is set by default and it will be compatible with all wireless clients. Our device can be used together with other standard wireless AP when configured to AP Client mode.

Link Speed can be optimized up to 300 Mbps by choosing 802.11 b/g/n or 802.11a/n; again, remember that 2.4 GHz frequency is easily interfered by other devices that operate in the same region (namely, Bluetooth, Zigbee, Microwave, etc.) so it is better to choose the 802.11a/n which operates in the 5 GHz when your network allows it.

Below there is a table which shows Basic Settings for the device, default Radio Off is Disabled, and SSID Broadcast is enabled (as factory defaults); other settings on Table 3.1

Table 3. 1

Caption	Default
Radio Off	Disabled (box not checked)
SSID	AW55XX
SSID Broadcast	Enabled
Wireless Mode	802.11b/g

Channel	1 (Automatic Channel Selection box checked)
Bandwidth <sup>1</sup>	40 MHz
Secondary Channel	5
Transmit Rate	Best (auto)

**Note<sup>1</sup>:** when 40 MHz is used, AW5500 will be using two non-overlapping channels to transmit its data; this is not recommended for 802.11b/g/n since it will create a non-overlapping channel for other APs. HT40 (40 MHz), is recommended for 802.11a/n because it offers a wider frequency range and it is easier for AW5500 to find empty channels as well.

- **Radio Off:** when enabled, this allows the user to turn off the wireless completely, when Radio Off is disabled (meaning there is), the user should be able to see AW5500's SSID in its **Wireless client list**.

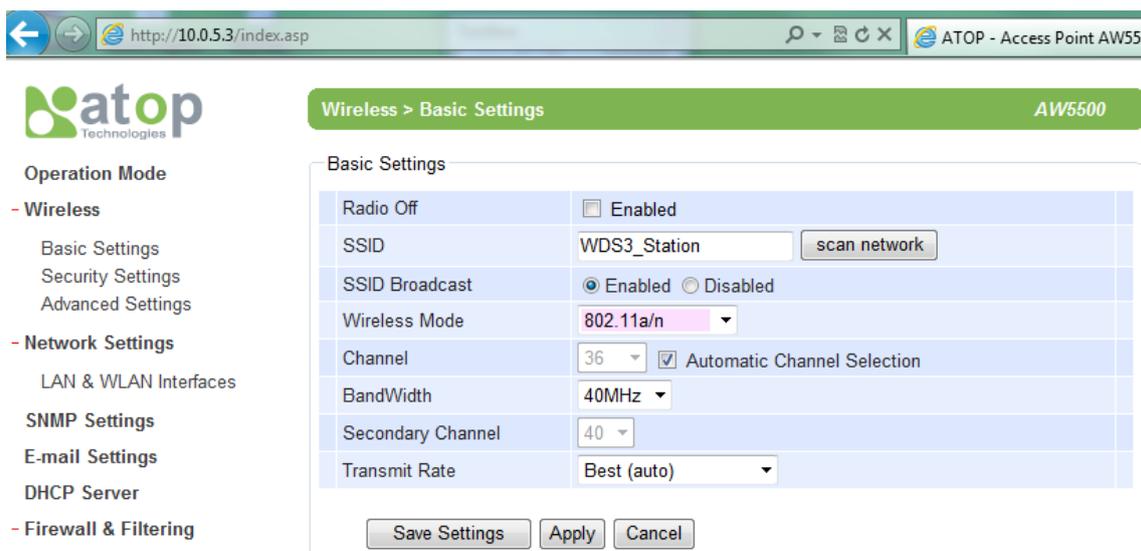


Fig.3. 6

- **SSID:** specifies the device network's name to other devices. Whenever the **Network Name** is changed, it will be visible on your wireless device. There is a **"Scan Network"** button to the right of the empty box, this button makes it possible to look for another networks on the vicinity. Once clicked, it will start scanning and prompt a window as in Fig. 3.7.

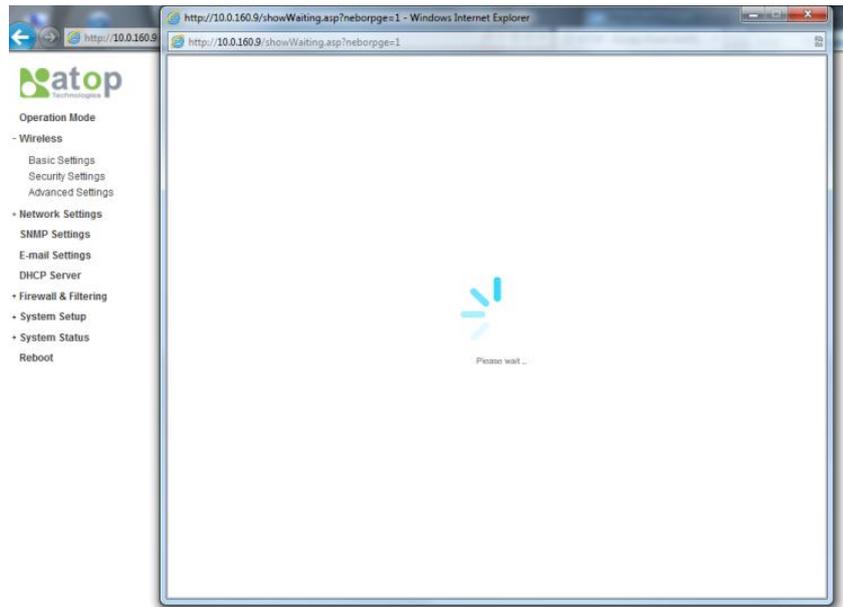
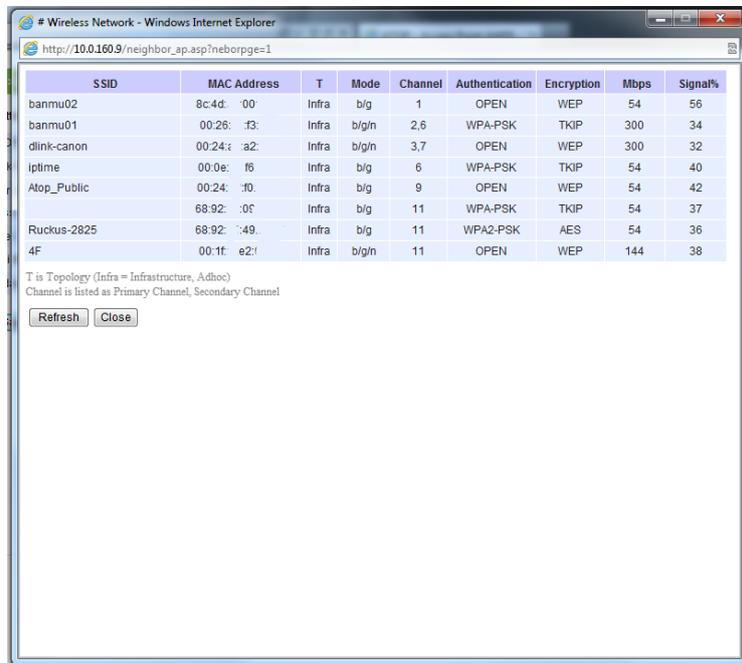


Fig.3. 7

Once it has finished scanning, names and basic properties of neighboring networks will be shown as in Fig. 3.8



SSID	MAC Address	T	Mode	Channel	Authentication	Encryption	Mbps	Signal%
banmu02	8c:4d: 00	Infra	b/g	1	OPEN	WEP	54	56
banmu01	00:26: f3:	Infra	b/g/n	2,6	WPA-PSK	TKIP	300	34
dlink-canon	00:24: : a2:	Infra	b/g/n	3,7	OPEN	WEP	300	32
iptime	00:0e: f6	Infra	b/g	6	WPA-PSK	TKIP	54	40
Atop_Public	00:24: :10:	Infra	b/g	9	OPEN	WEP	54	42
	68:92: :0f	Infra	b/g	11	WPA-PSK	TKIP	54	37
Ruckus-2825	68:92: :49:	Infra	b/g	11	WPA2-PSK	AES	54	36
4F	00:1f: e2:f	Infra	b/g/n	11	OPEN	WEP	144	38

T is Topology (Infra = Infrastructure, Adhoc)  
Channel is listed as Primary Channel, Secondary Channel

Fig.3. 8

When no neighbors have been found the answer is as follows, Fig. 3.9.

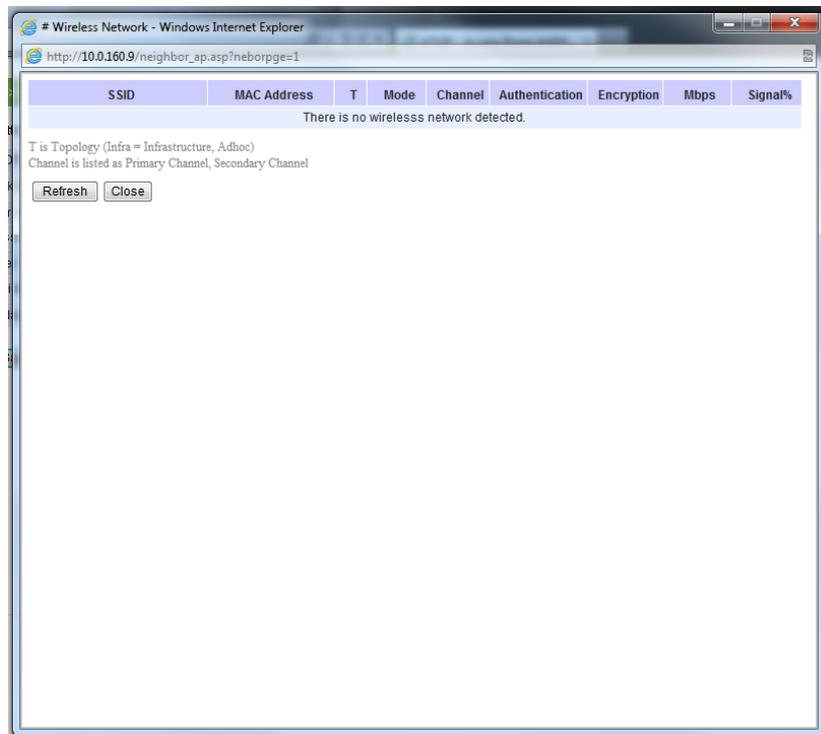


Fig.3. 9

- **Secondary Channel:** the second channel that AW5500 uses when the 40 MHz bandwidth is enabled a better description is given on Table 3.2.

Table 3. 2

Primary channel	20 MHz	40 MHz above			40 MHz below		
	Blocks	2nd ch.	Center	Blocks	2nd ch.	Center	Blocks
1	1-3	5	3	1-7	Not Available		
2	1-4	6	4	1-8	Not Available		
3	1-5	7	5	1-9	Not Available		
4	2-6	8	6	2-10	Not Available		
5	3-7	9	7	3-11	1	3	1-7
6	4-8	10	8	4-12	2	4	1-8
7	5-9	11	9	5-13	3	5	1-9
8	6-10	12	10	6-13	4	6	2-10
9	7-11	13	11	7-13	5	7	3-11
10	8-12	Not Available			6	8	4-12
11	9-13	Not Available			7	9	5-13
12	10-13	Not Available			8	10	6-13
13	11-13	Not Available			9	11	7-13

- **Transmit Rate:** a maximum data transmission of 300 Mbps is supported, however, data transmission is to be made on a different amount in exchange for a more stable connection (refer to Table 3.3).

**Table 3. 3**

MCS index	Spatial streams	Modulation type	Data rate (Mbit/s)			
			20 MHz channel		40 MHz channel	
			800 ns <u>GI</u>	400 ns <u>GI</u>	800 ns <u>GI</u>	400 ns <u>GI</u>
0	1	<u>BPSK</u>	6.50	7.20	13.50	15.00
1	1	<u>QPSK</u>	13.00	14.40	27.00	30.00
2	1	<u>QPSK</u>	19.50	21.70	40.50	45.00
3	1	16- <u>QAM</u>	26.00	28.90	54.00	60.00
4	1	16- <u>QAM</u>	39.00	43.30	81.00	90.00
5	1	64- <u>QAM</u>	52.00	57.80	108.00	120.00
6	1	64- <u>QAM</u>	58.50	65.00	121.50	135.00
7	1	64- <u>QAM</u>	65.00	72.20	135.00	150.00
8	2	<u>BPSK</u>	13.00	14.40	27.00	30.00
9	2	<u>QPSK</u>	26.00	28.90	54.00	60.00
10	2	<u>QPSK</u>	39.00	43.30	81.00	90.00
11	2	16- <u>QAM</u>	52.00	57.80	108.00	120.00
12	2	16- <u>QAM</u>	78.00	86.70	162.00	180.00
13	2	64- <u>QAM</u>	104.00	115.60	216.00	240.00
14	2	64- <u>QAM</u>	117.00	130.00	243.00	270.00
15	2	64- <u>QAM</u>	130.00	144.40	270.00	300.00

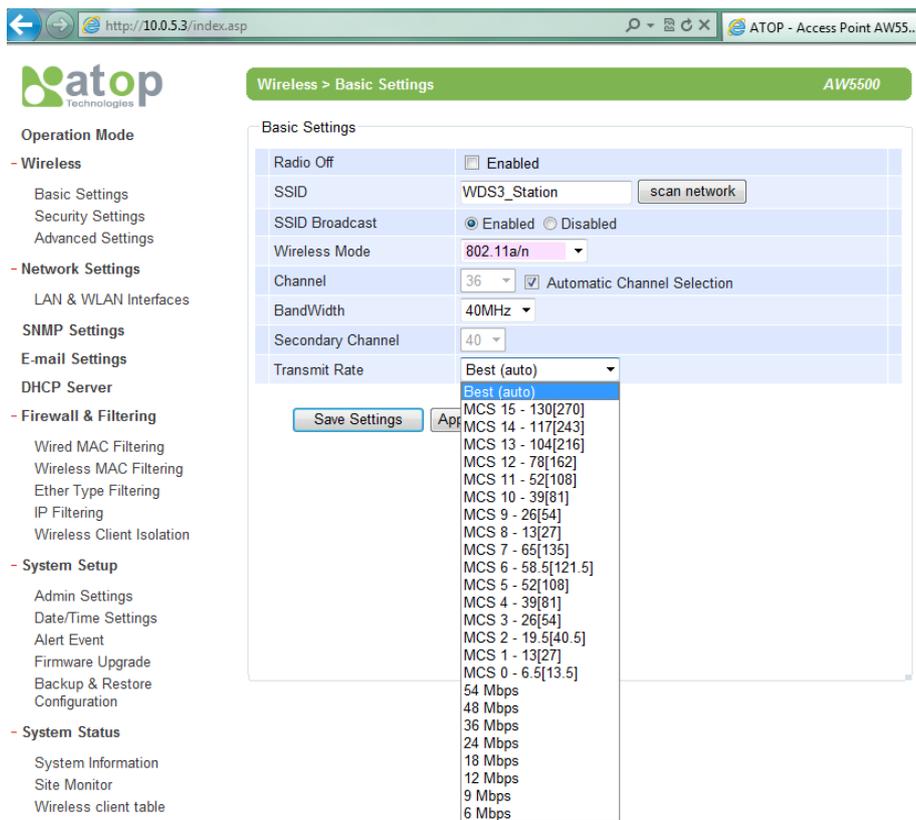


Fig.3. 10

### 3.3.2 Security Settings

These settings provide an overall network security (according to the user's needs), by default Wireless Security is set as Disabled, Fig. 3.11.

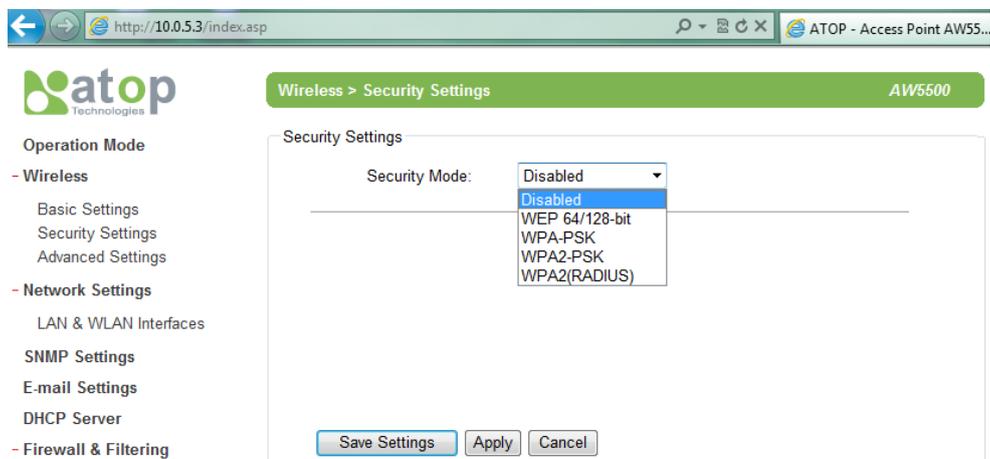


Fig.3. 11

A number of Security Settings are available for you:

- **WEP 64/128-bit Hex:** stands for **W**ired **E**quivalent **P**rivacy. Which is a moderately weak security algorithm, and although it implies security in a wired connection, it is weaker than **WPA** protocols. It is not recommended unless a really large network is being administered. Up to 4 different hexadecimal or ASCII keys can be entered in this section, Fig. 3.12.

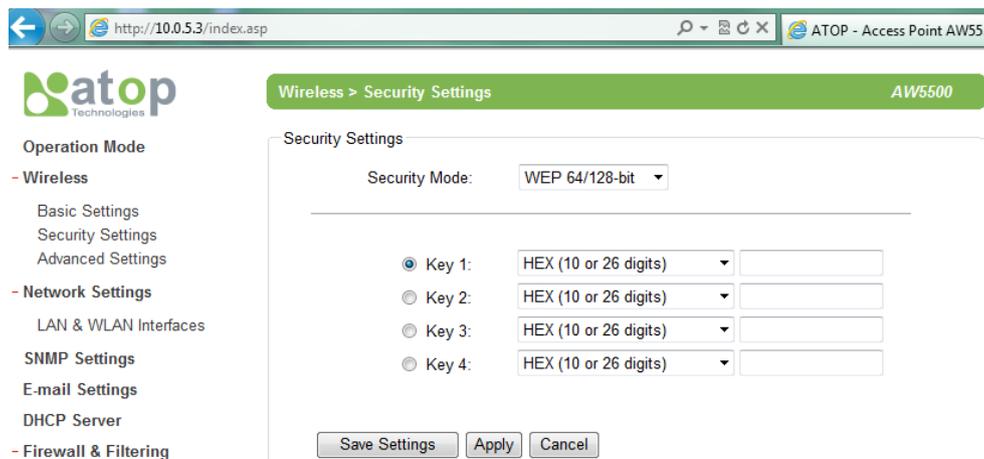


Fig.3. 12

- **WPA-PSK:** stands for **W**i-**F**i **P**rotected **A**ccess. Uses a passphrase generated and entered by the user; this passphrase can be between 8 and 63 characters long. We strongly recommend not to take a passphrase already in use within the network (nor use a variation of personal information publicly available), since this can compromise network's security, Fig. 3.13.

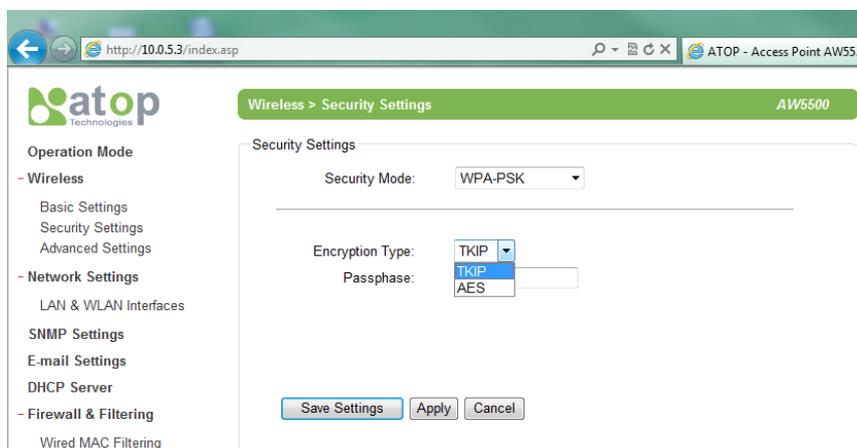


Fig.3. 13

- **WPA2-PSK:** stands for **Wi-Fi Protected Access II**. This is a highly recommended setting for the average user. You can select the encryption mode one of the following: TKIP (**T**emporal **K**ey Integrity Protocol), or AES (**A**dvanced **E**ncryption **S**tandard). Less prone to be hacked than the above one, Fig. 3.14

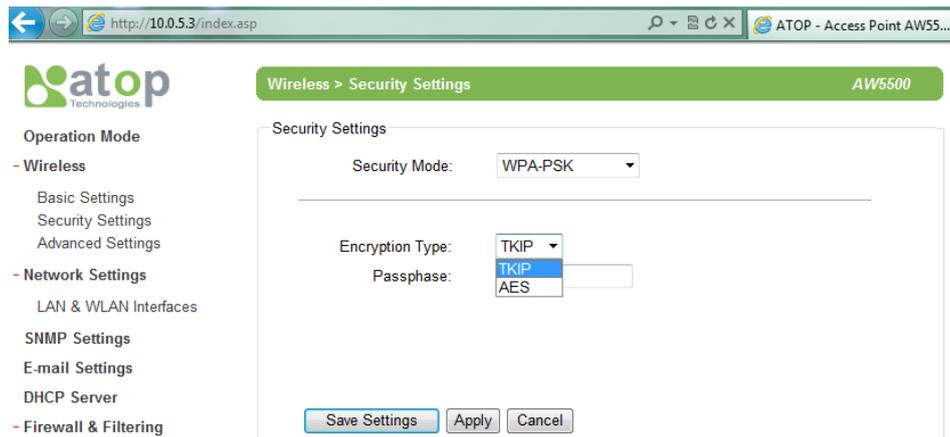


Fig.3. 14

- **WPA2(RADIUS):** designed for enterprise networks, it requires a RADIUS (**R**emote **A**uthentication **D**ial In **U**ser **S**ervice), authentication server. Although possessing a more complicated setup, security is optimized since passwords are not transmitted between the NAS (**N**etwork **A**uthentication **S**erver) and RADIUS (PEAP is supported over MSCHAP V2), Fig. 3.15.

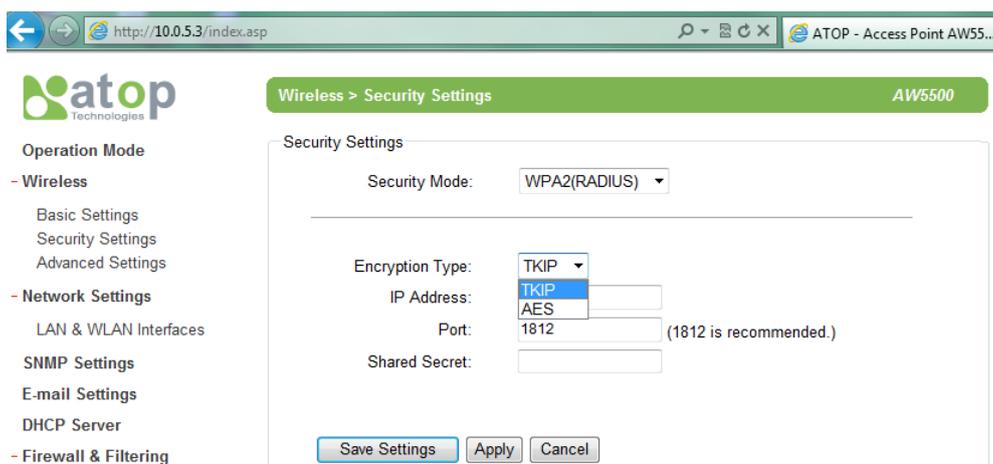


Fig.3. 15

- **Disabled:** no security settings are being used in the current device (comes as factory default), Fig. 3.16. **This option is highly discouraged since authentication as well as encryption is not performed in this mode.**

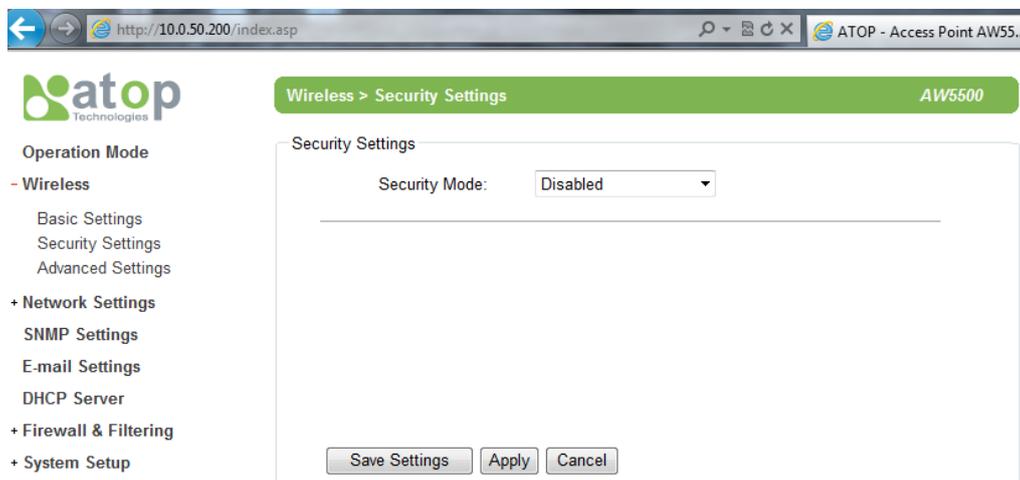


Fig.3. 16

### 3.3.3 WDS Settings

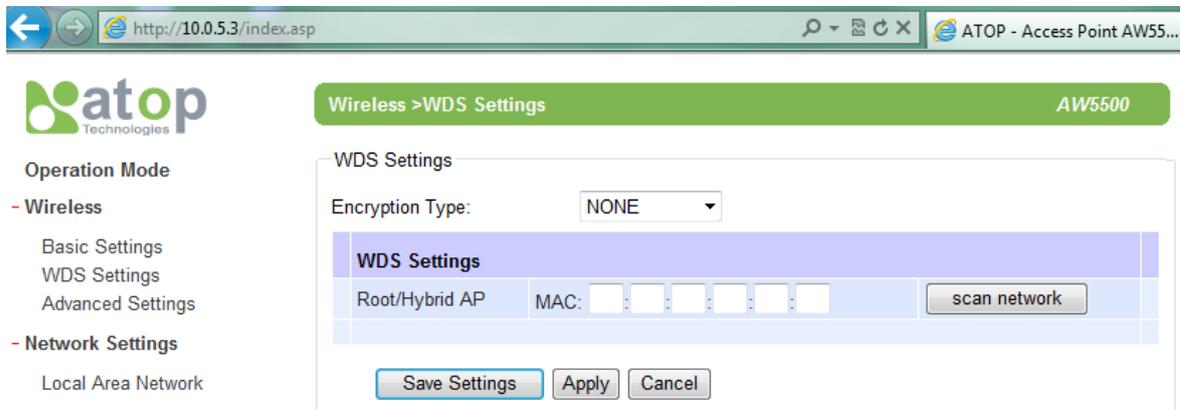


Fig.3. 17

This option is enabled only when **WDS Bridge** is enabled and AW5500 is running in **Hybrid** or **Station mode**, three different encryption types are available, WEP/TKIP/AES The configuration is relatively simple and straightforward; enter the WLAN MAC of the adjacent AW5500, the adjacent AW5500 could be a **Root AP** or a **Hybrid**, 3.17.

### 3.3.4 Advanced Settings

Provide details on wireless network parameters for performance tuning. Changes in this section may affect overall performance, so caution is recommended, if you are not clear of what you are doing please refrain from altering them, Fig. 3.18.

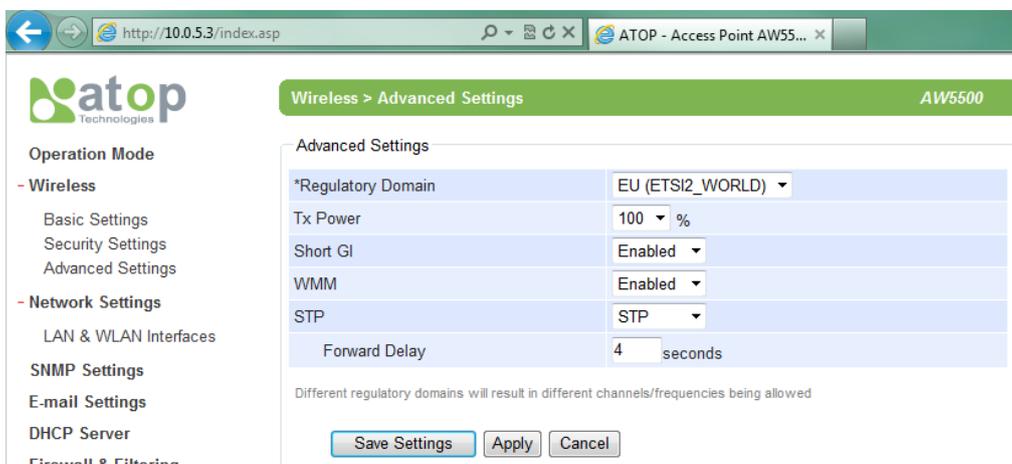


Fig.3. 18

- **Tx Power** is the **Transmission Power** of AW5500. The transmission power can be reduced to prevent wireless interference to other wireless networks.
- **Short GI** is recommended to leave it as enabled to maximize the throughput.
- **WMM** or **Wireless Multimedia Extension**, which is recommended to leave as enabled in order to comply with 802.11n standards and achieve link speeds higher than 54 Mbps.
- **STP** or **Spanning Tree Protocol** which is recommended to leave as enabled to prevent network loop.
- **Forward Delay** time in which the interface takes to converge from blocking state to forwarding state.

## 3.4 Network Settings

### 3.4.1 LAN Interface

AW5500 will get an IP address from a DHCP server connected on the LAN interface, just check **“Obtain an IP Address Automatically”** for it; or enter the values manually if known.

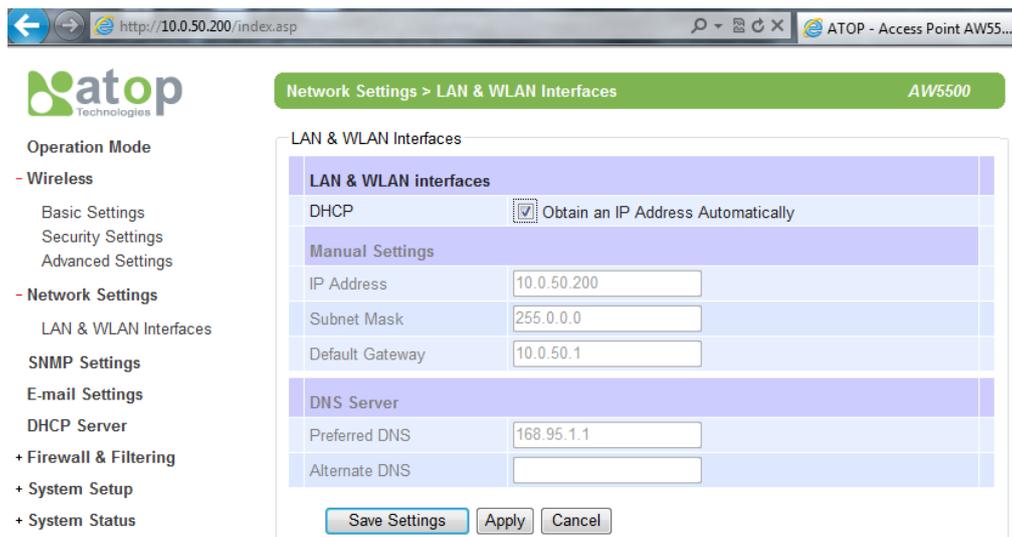


Fig.3. 19

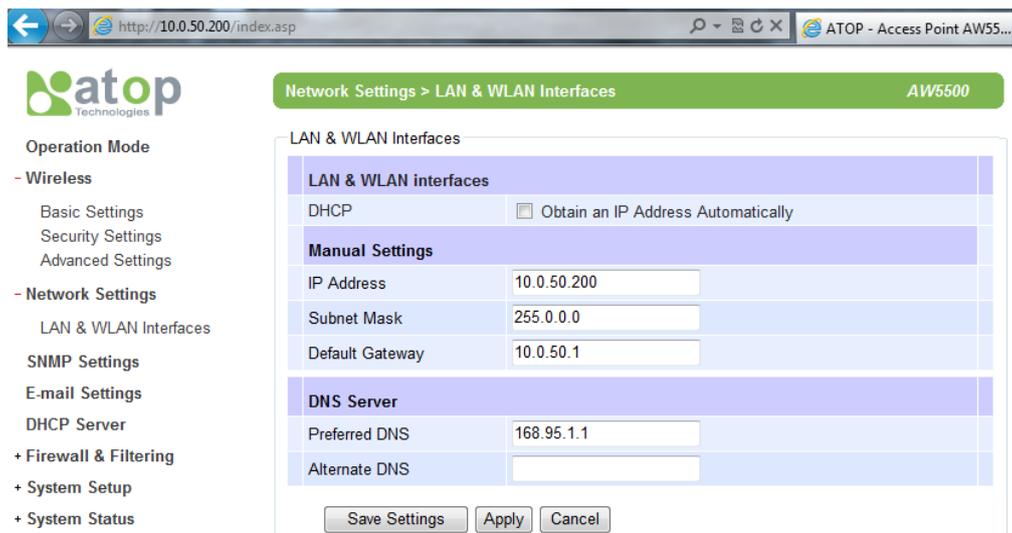
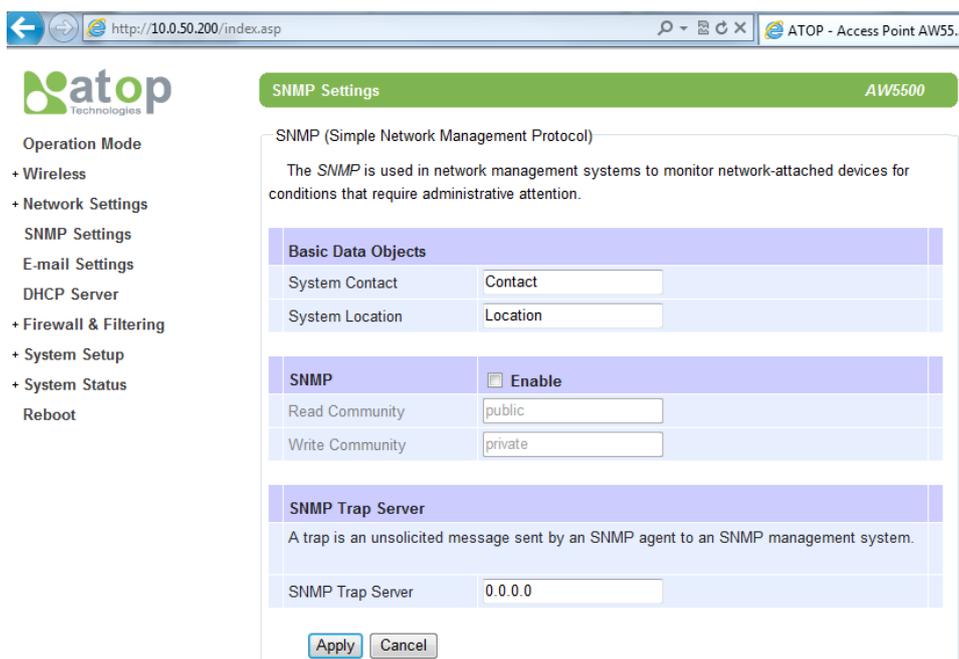


Fig.3. 20

## 3.5 SNMP Settings

The SNMP is used by network management software to monitor devices in a network to retrieve network status information and to configure network parameters. The SNMP Settings shows the configuration of this device so it can be viewed by third-party SNMP software as shown below, Fig. 3.21.



The screenshot shows the web interface for the Atop AW5500. The browser address bar displays `http://10.0.50.200/index.asp`. The page title is "SNMP Settings" for the "AW5500" device. On the left, a navigation menu lists various settings categories, with "SNMP Settings" selected. The main content area is titled "SNMP (Simple Network Management Protocol)" and includes a descriptive paragraph. Below this, there are three main sections: "Basic Data Objects", "SNMP", and "SNMP Trap Server".

Basic Data Objects	
System Contact	Contact
System Location	Location

SNMP	
	<input type="checkbox"/> Enable
Read Community	public
Write Community	private

SNMP Trap Server	
A trap is an unsolicited message sent by an SNMP agent to an SNMP management system.	
SNMP Trap Server	0.0.0.0

At the bottom of the form are "Apply" and "Cancel" buttons.

Fig.3. 21

“**System Location**” refers to the physical location of the device, whereas “**System Contact**” is the name of the person in charge of administering the device, usually the device’s administrator name, Fig. 3.22.

If you wish to make the device status information available for public viewing/reading by a “**Read Community**”, you simply check the SNMP “**Enable**”. Fill in “**public**” in “**Read Community**”. If you wish to allow a group to change the device parameters, enter “**private**” in “**Write Community**”; **in this last case, the community is granted access for reading and writing**. By default AW5500 comes in **public** for **Read Community** and **private** for **Write Community**; you can change these values anytime you wish. In case the device raises an alert due to any unexpected incident, a message will be sent by the SNMP Agent to the SNMP trap server. To set up a “**SNMP Trap Server**”, fill in the **IP Address** of the trap server designed to collect all alert messages; any changes made will take effect after the device is restarted.

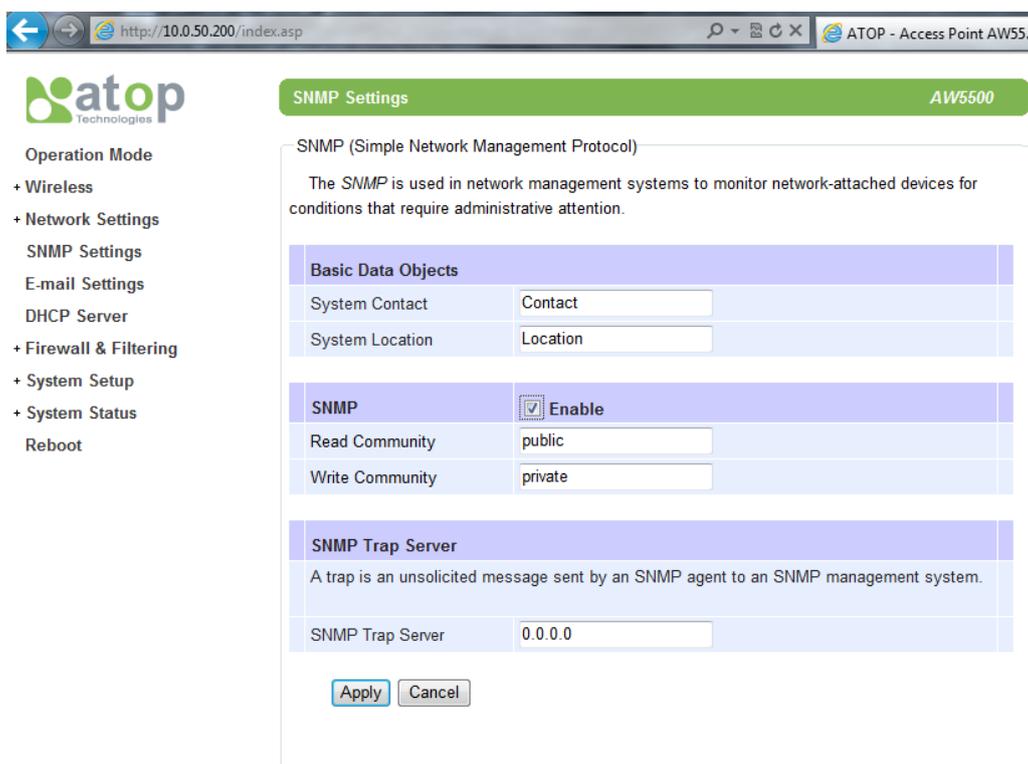


Fig.3. 22

## 3.6 Email Settings

In case the device raises an alert and/or warning message, it will send an email to the administrator's mailbox. **Email Settings** allows you to set up the device to be able to send an email. To set up the email sending, you need to put a **"Sender"** email address which will be the **"From"** on the email. Then, you fill in **"Receiver"** email address to which the email is sent. You can send the email to several recipients using Semicolon (;) to separate each email address. Next step is to set the **Email Server**. First, you fill in the **IP address** of a **Mail Server** in your local network. If the **Mail Server** needs a user authentication, you need to enable **"SMTP server authentication required"**, and fill in **Username** and **Password**. Please contact your network administrator for **Mail Server IP address** and the **Username** and **Password**, Fig. 3.23.

The screenshot shows the ATOP web interface for the AW5500 device. The browser address bar shows 'http://10.0.50.200/index.asp'. The page title is 'E-mail Settings' and the device name is 'AW5500'. On the left, there is a navigation menu with 'E-mail Settings' selected. The main content area is titled 'SMTP Server & Client (Simple Mail Transfer Protocol)'. It contains two sections: 'E-mail Address Settings' and 'E-mail Server'. In the 'E-mail Address Settings' section, there are input fields for 'Sender' and 'Receiver'. Below the 'Receiver' field, it says 'Use a semicolon (;) for each e-mail address.' In the 'E-mail Server' section, there is an input field for 'SMTP Server', a checkbox for 'SMTP server authentication required' which is currently unchecked, and input fields for 'User name' and 'Password'. At the bottom, there are three buttons: 'Apply', 'Send Test Mail', and 'Cancel'.

Fig.3. 23

This screenshot is identical to Fig. 3.23, but the 'SMTP server authentication required' checkbox in the 'E-mail Server' section is now checked. The rest of the interface, including the navigation menu and the 'E-mail Address Settings' section, remains the same.

Fig.3. 24

## 3.7 DHCP Server

DHCP configurations are here, Fig. 3. In local networks, if there is no workstation or server to act as the DHCP Server and assign an IP address to each client automatically. AW5500 can serve as the DHCP Server to statically or dynamically assign an IP address to mobile clients or any computer. To enable such functionality, you check **“DHCP Enabled”**; proceed then to fill in the **IP Address Range** including the **“From IP Address”** and **“To IP Address”**, fill in the IP address’ **Netmask** (or **Subnet Mask**). **“Lease Time”** is the duration in minutes that the assigned IP Address to a device will belong to the device; once expired, the IP address may be assigned to any other device in the vicinity (with connection of course). A maximum of 21600 minutes is set by default.

You can also assign a static IP address to a mobile client, meaning that this Static IP Address will never expire. To statically assign an IP address, check on the small box in front of each line, and then fill in the **“Host Name”**, the **IP Address** that you want to assign, and the device’s corresponding **MAC address**.

The screenshot shows the DHCP Server configuration interface for an Atop AW5500. The page title is "DHCP Server" and the device name is "AW5500". The "DHCP Server Settings" section includes a "DHCP" checkbox that is checked and labeled "Enabled". Below this is the "IP Address Range" section with fields for "From IP Address", "To IP Address", "Netmask", and "Lease Time (Minutes)" which is set to "21600". The "Static Connection" section is a table with the following structure:

	Host Name	IP Address	MAC	Status
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

At the bottom of the page, there are navigation buttons: "Save Settings", "Apply", and "Cancel". A page indicator "Page 1/6" is also visible.

Fig.3.25a

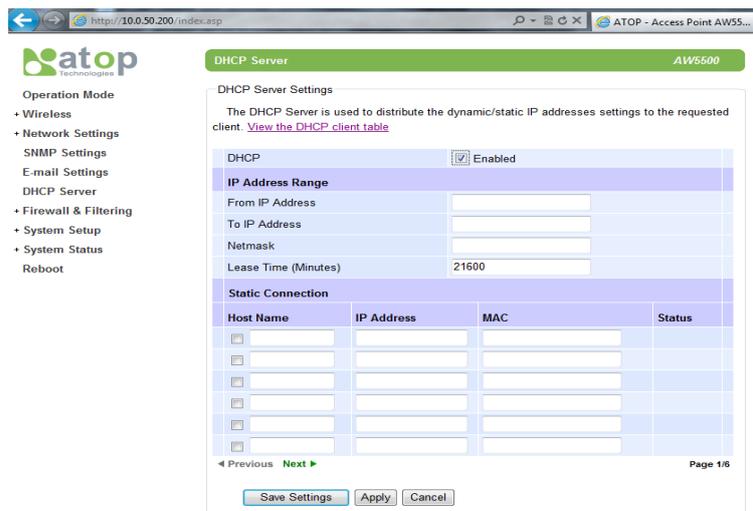


Fig.3. 25b

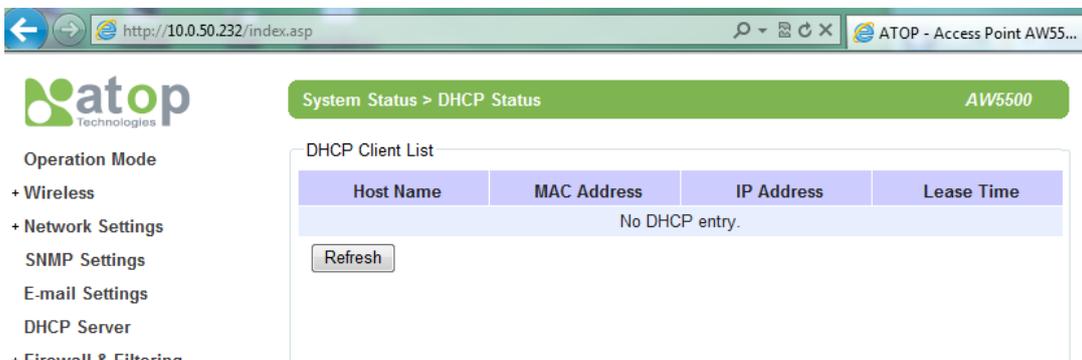


Fig.3. 26

When DHCP is enabled, up to 32 different static IP/MAC can be set, Fig. 3.25a~3.25b; for a look at the current DHCP client table, just click where it says “**View the DHCP client table**”, if no clients are present there would be a message specifying so, Fig.3.26.

## 3.8 Firewall & Filtering

The following section deals with configuration for the network's **firewall** as well as its **packet filtering**. Available criteria for packet filtering are based on MAC address (Wired or Wireless), Ethernet packet, and IP address. These filtering methods provide security, preventing unauthorized or malicious packets an entrance to your network.

Data packets will be filtered (classified) as either “**allowed packets**” or “**denied packets**”; we highly encourage you to be extremely careful on this section as data that doesn't fit into any of those criteria will be discarded with the potential outcome of letting the AW5500 as inaccessible if not configured properly. If the latter happens, you will need to reset the device back to its default by any of the methods described on [Sec. 3.11](#).

### 3.8.1 Wired MAC Filtering

When connected to the LAN/Ethernet interface, filtering can be done using this option. The setting is simple, intuitive and straight-forward; just choose whether to **Allow** or **Deny packets** and proceed to fill in the blanks with the corresponding MAC addresses. Up to 64 different MAC addresses can be set for allowing as well as for denying packets, Fig. 3.27; as a default, **Wired MAC Filtering** is disabled. For changes to take effect, press **Apply**, for saving those changes just press **Save Settings**.

The screenshot shows the ATOP web interface for configuring Wired MAC Filtering. The breadcrumb trail is "Firewall & Filtering > Wired MAC Filtering". The main configuration area has three radio buttons: "Disable MAC Filtering" (selected), "Allow packets with MAC addresses listed below", and "Deny packets with MAC addresses listed below". Below these is a table with 10 rows for MAC Address 1 through 10, each with an input field. At the bottom are "Save Settings", "Apply", and "Cancel" buttons.

Access Control List	
MAC Address 1	<input type="text"/>
MAC Address 2	<input type="text"/>
MAC Address 3	<input type="text"/>
MAC Address 4	<input type="text"/>
MAC Address 5	<input type="text"/>
MAC Address 6	<input type="text"/>
MAC Address 7	<input type="text"/>
MAC Address 8	<input type="text"/>
MAC Address 9	<input type="text"/>
MAC Address 10	<input type="text"/>

Fig.3. 27

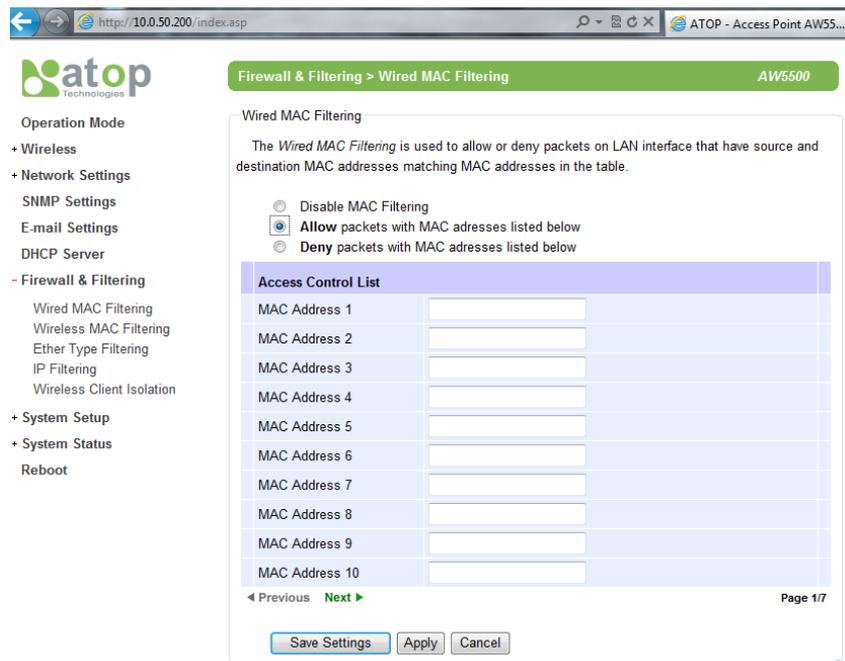


Fig.3. 28

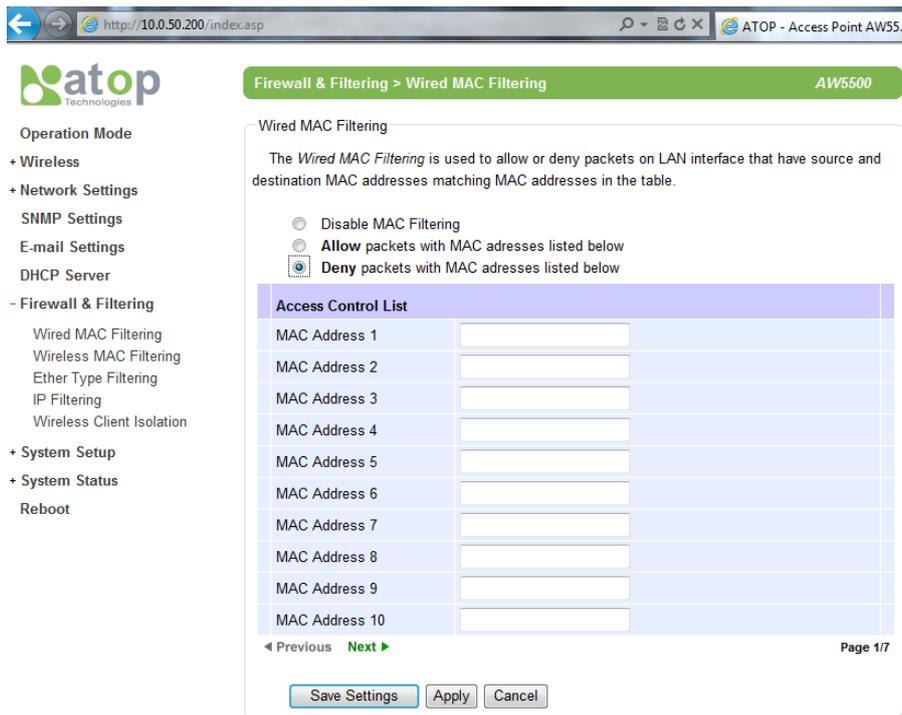


Fig.3. 29

### 3.8.2 Wireless MAC Filtering

Packet filtering in a Wireless environment can be done in an analogous way as the Wired MAC Filtering. In the same way, connection is ensured by allowing or denying packets according to their respective MAC addresses; again, a maximum of 64 different MAC addresses are available as an option, Fig. 3.30.

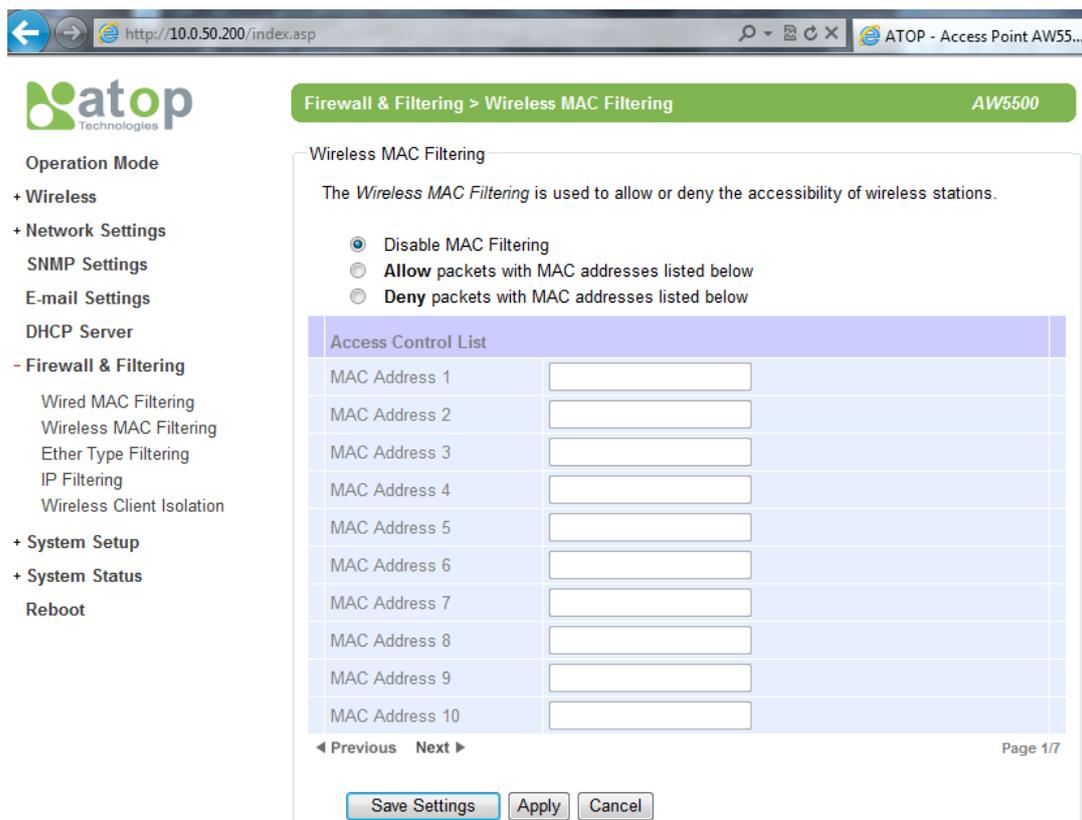


Fig.3. 30

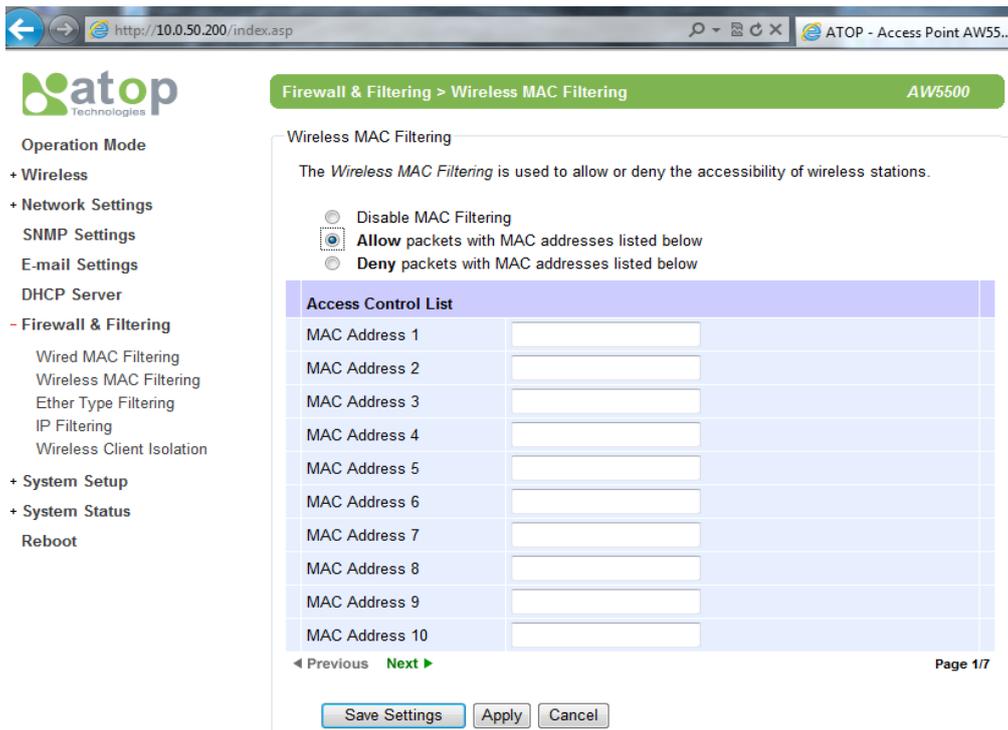


Fig.3. 31

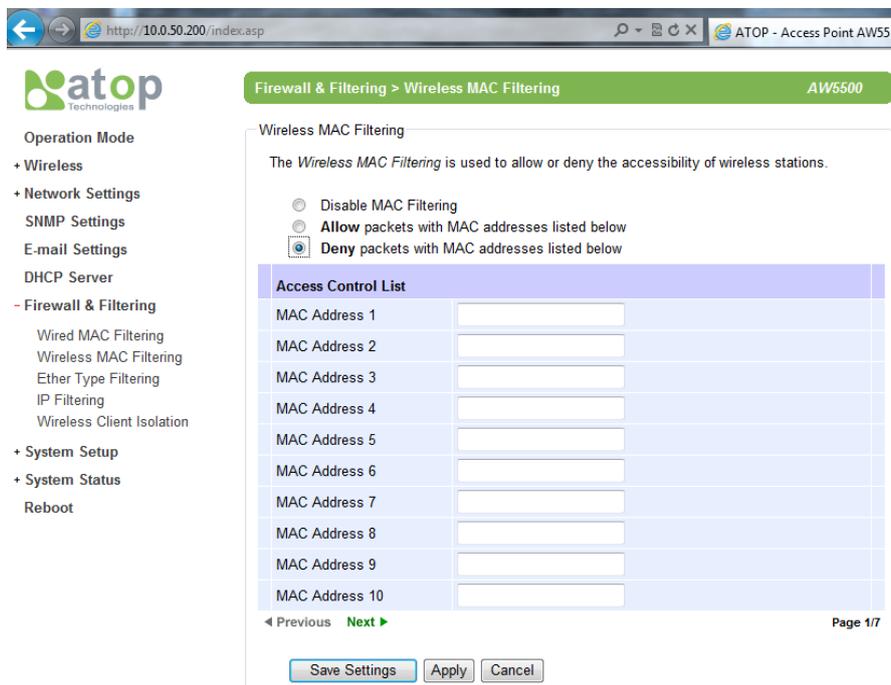


Fig.3. 32

### 3.8.3 Ethernet Type Filtering

**Ethernet Type Filtering** is done according to the packets' **type**; as in the two previous sections, there is a maximum of 64 entries for packets' specification. Enabling is simple (packets are set as disabled by default, Fig. 3.33), checking the packet's **Ethertype** box (located to the left of it, first column). **Ethertype** numbering usually starts with 0x□□□□, in which □□□□ corresponds to a hexadecimal number, e.g., 0xF0F0 which is to filter NETBUI type messages or 0x8035 for RARP type messages; Fig. 3.33.

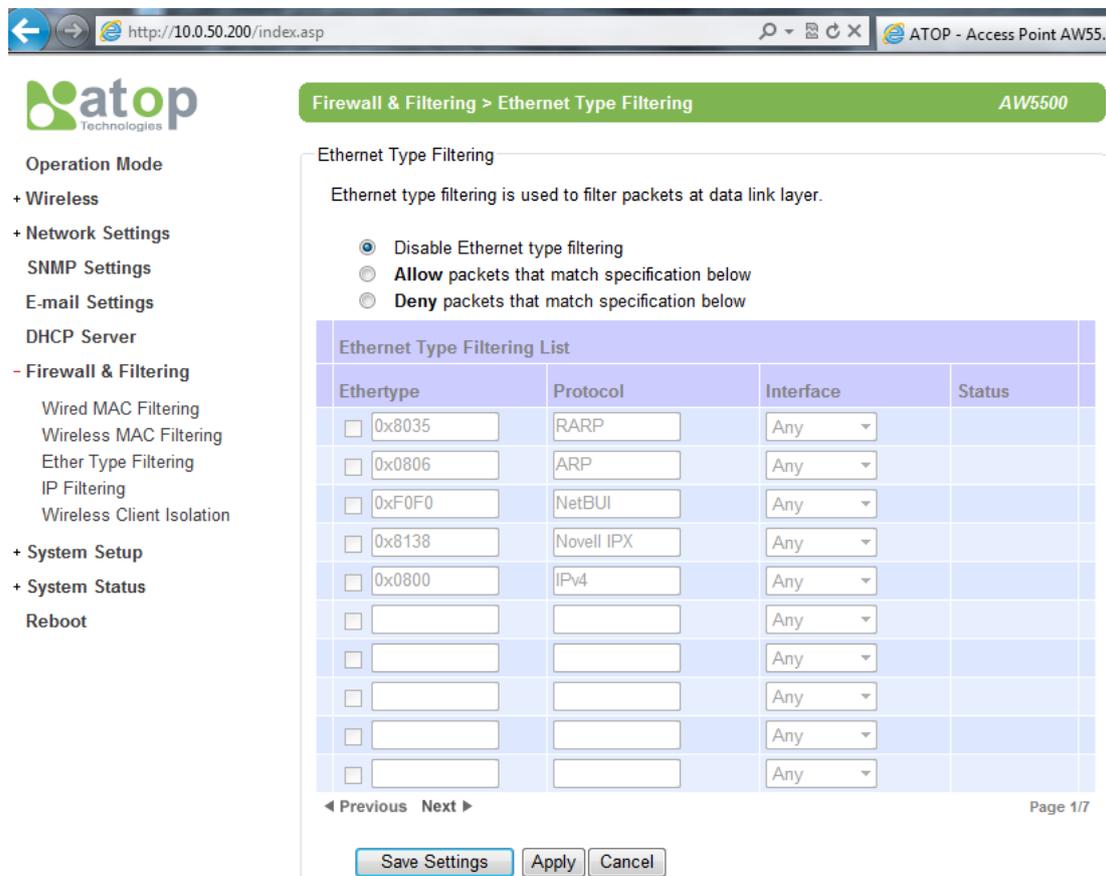


Fig.3. 33

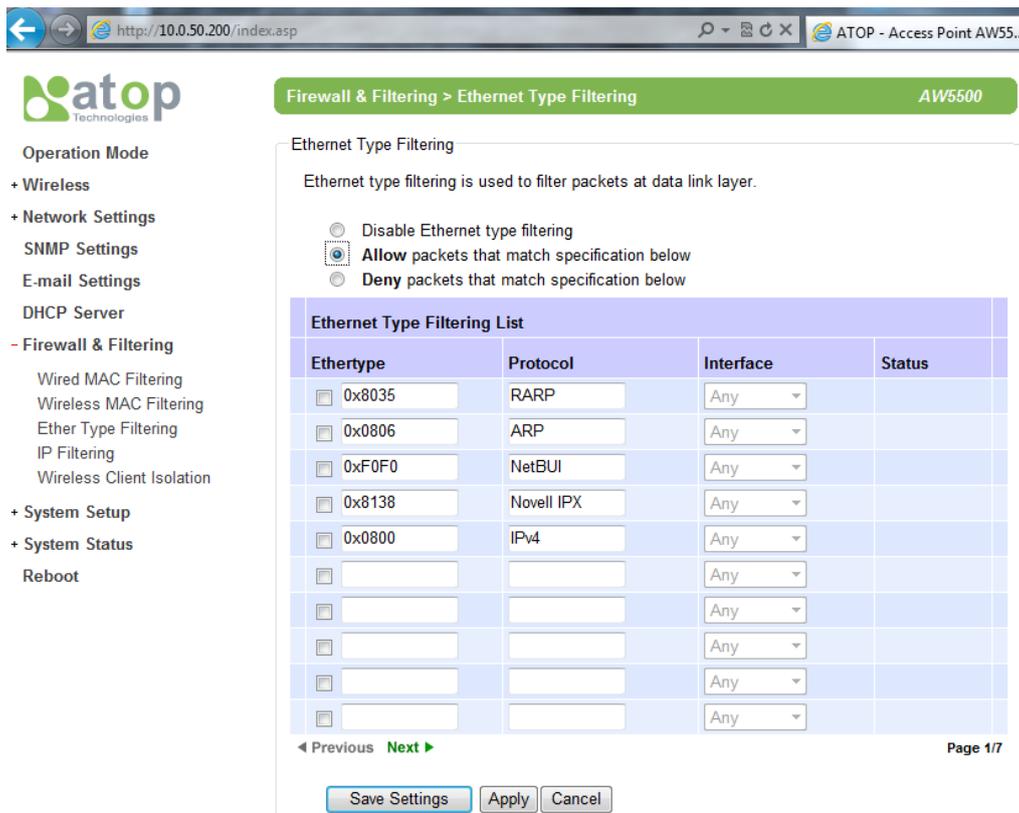


Fig.3. 34

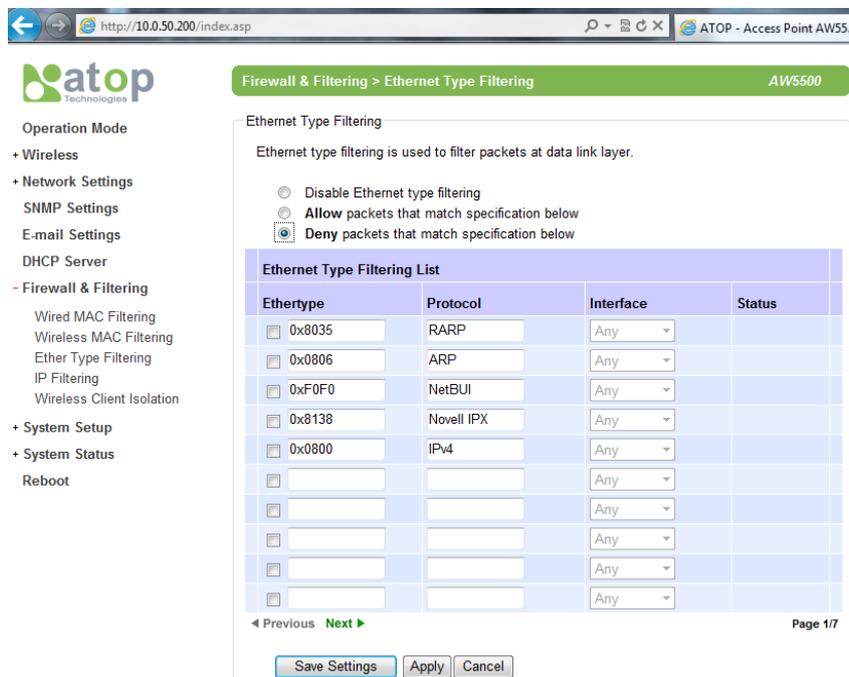


Fig.3. 35

### 3.8.4 IP Filtering

IP Filtering, as its name implies, is for filtering on the IP protocol, source address and the destination address. Continuing its simple design, **IP address** is added on the **Source** and **Destination Address** fields. Each filter only provides a one-way filtering, to create a 2-way filtering you need to add another entry that has the source and destination address reversed. The filters would be active once the checkbox in the first column is checked. A total of 64 different entries can be added to the list, Fig. 3.36.

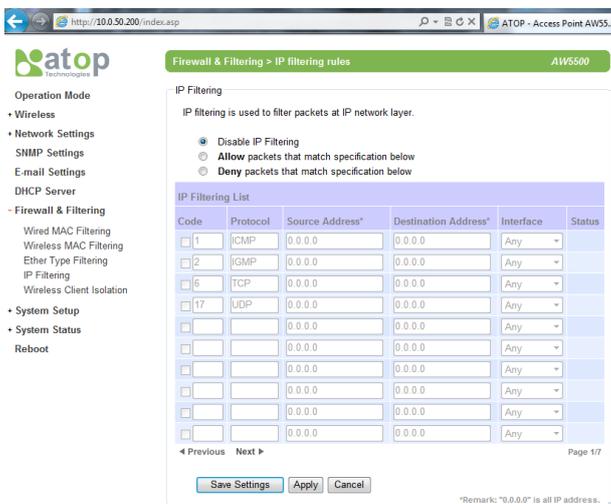


Fig.3. 36

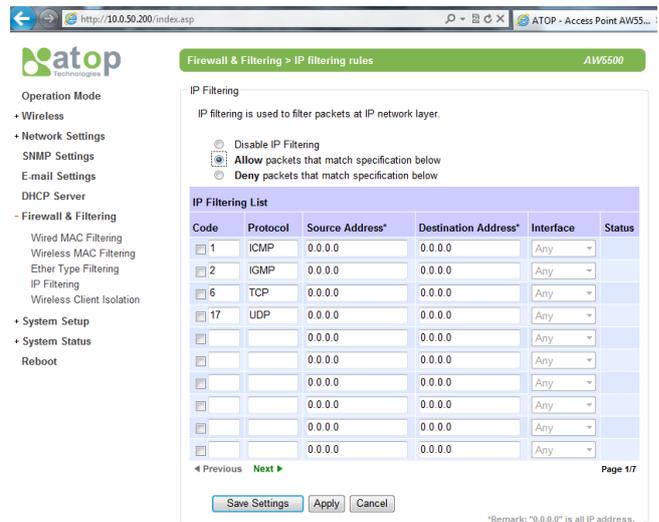


Fig.3. 37

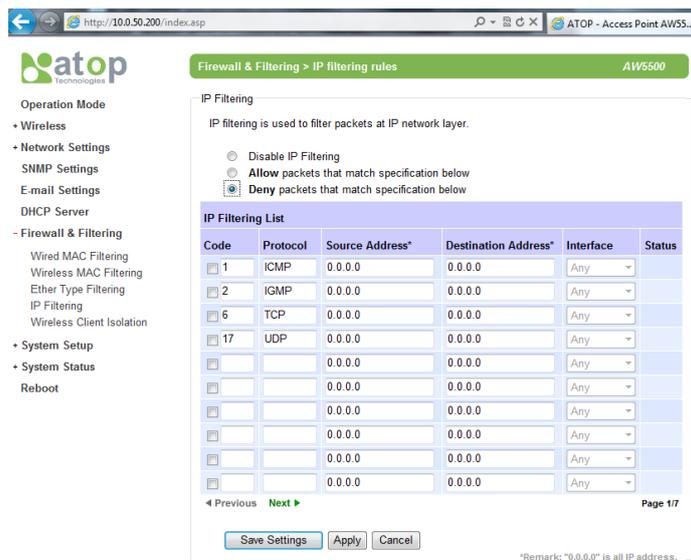


Fig.3. 38

### 3.8.5 Wireless Client Isolation

**Wireless Client Isolation** feature uses an advanced filtering technique to create a firewall for wireless interfaces between wireless clients. The isolation is enabled to prevent data traffic flowing between clients to increase client security and to prevent unnecessary traffic between clients. This feature allows operators to integrate wireless field devices and wireless-enabled computer using the same wireless network where our AW5500 acts as the wireless access point; it offers the operator two modes for operation according to his needs.

- **No blocking:** which does not isolate wireless clients; hence, it allows communications between all wireless clients and the device, Fig. 3.39.
- **Block same AP:** although wireless clients from other APs are still able to connect to connect with wireless clients from this AP, wireless clients from this AP will not be able to communicate with one another, Fig. 3.40.

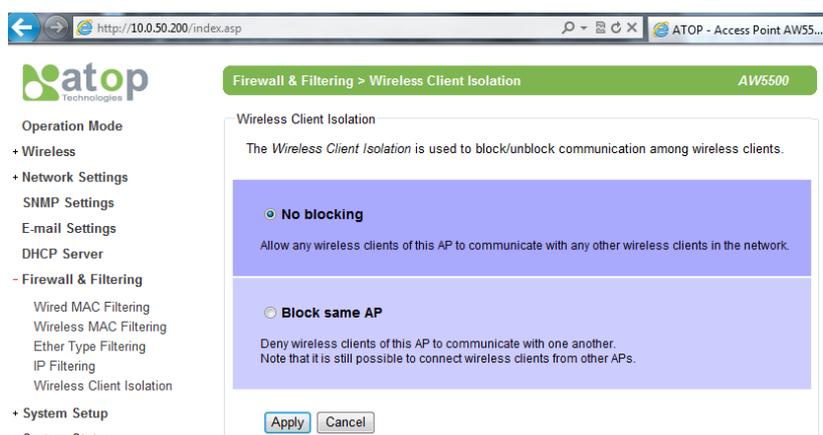


Fig.3. 39

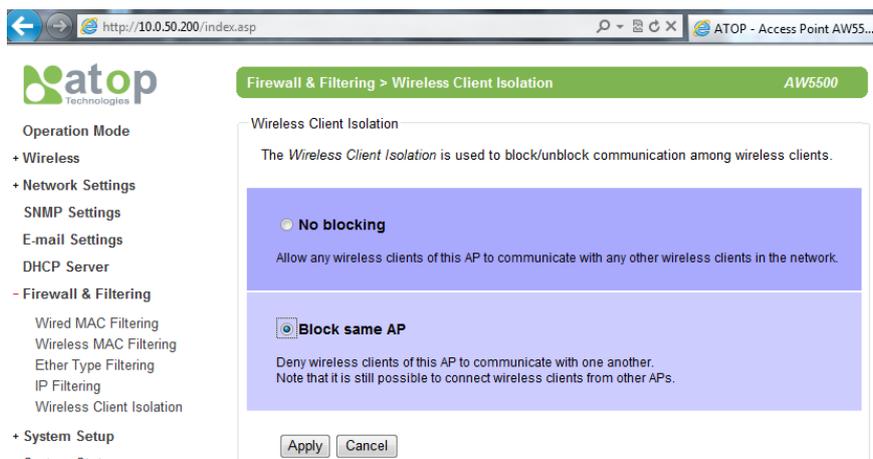


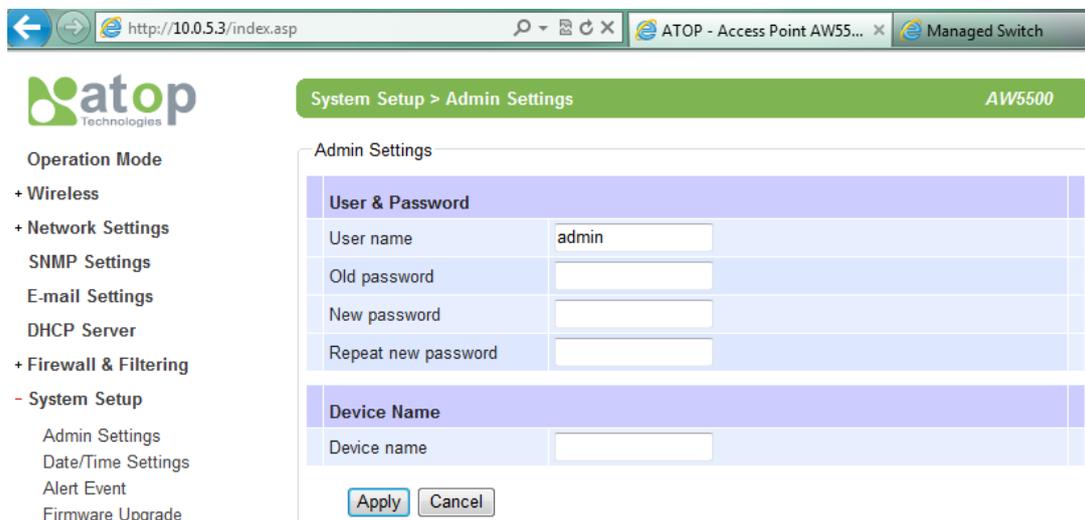
Fig.3. 40

## 3.9 System Setup

The following section describes some critical settings for the AW5500; take care when changing the values here as they will greatly influence your network performance.

### 3.9.1 Admin Settings

The AW5500 allows **User** and **password management**, the user's default is as "admin" and the password will be in blank as default. The **Device name** entry can be changed as well; to set/change their value just follow the steps filling in the corresponding blanks and choose **Apply** in the end, Fig. 3.41.



The screenshot shows a web browser window with the URL `http://10.0.5.3/index.asp`. The browser tabs are labeled "ATOP - Access Point AW55..." and "Managed Switch". The ATOP logo is visible in the top left corner. The page title is "System Setup > Admin Settings" and the device model is "AW5500".

The left sidebar menu includes:

- Operation Mode
- + Wireless
- + Network Settings
  - SNMP Settings
  - E-mail Settings
  - DHCP Server
- + Firewall & Filtering
- System Setup
  - Admin Settings
  - Date/Time Settings
  - Alert Event
  - Firmware Upgrade

The main content area is titled "Admin Settings" and contains two sections:

- User & Password**

User name	<input type="text" value="admin"/>
Old password	<input type="text"/>
New password	<input type="text"/>
Repeat new password	<input type="text"/>
- Device Name**

Device name	<input type="text"/>
-------------	----------------------

At the bottom of the form are "Apply" and "Cancel" buttons.

Fig.3. 41

### 3.9.2 Date/Time Settings

Date and time can be set manually, or using **Network Time Protocol (NTP)** to automatically synchronizes with a Time Server. For auto-synching check the box below **NTP Server Settings “Obtain date/time automatically”** proceeding then to fill the IP address or hostname for it. If a hostname is entered, the DNS server must be configured properly; a Time Zone can be selected as well, Fig. 3.42.

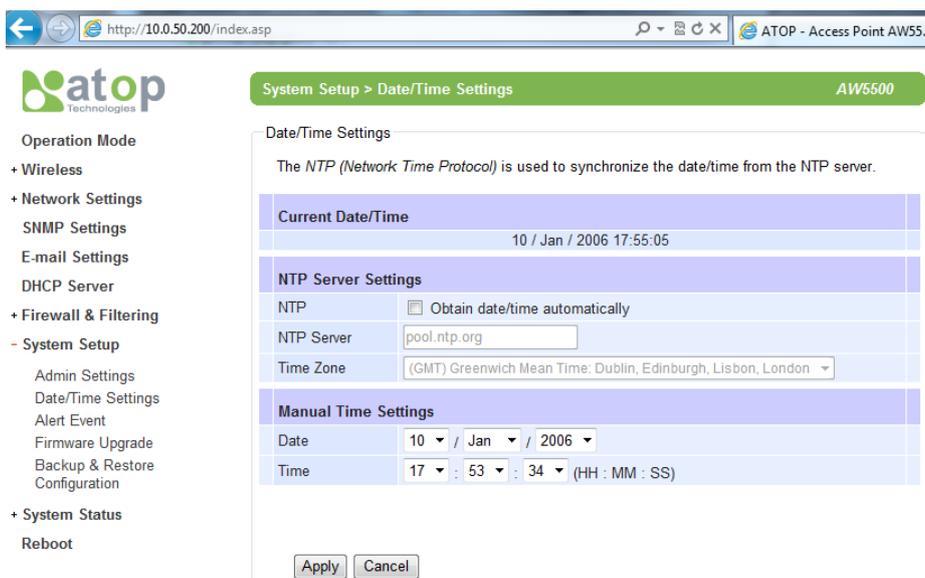


Fig.3. 42

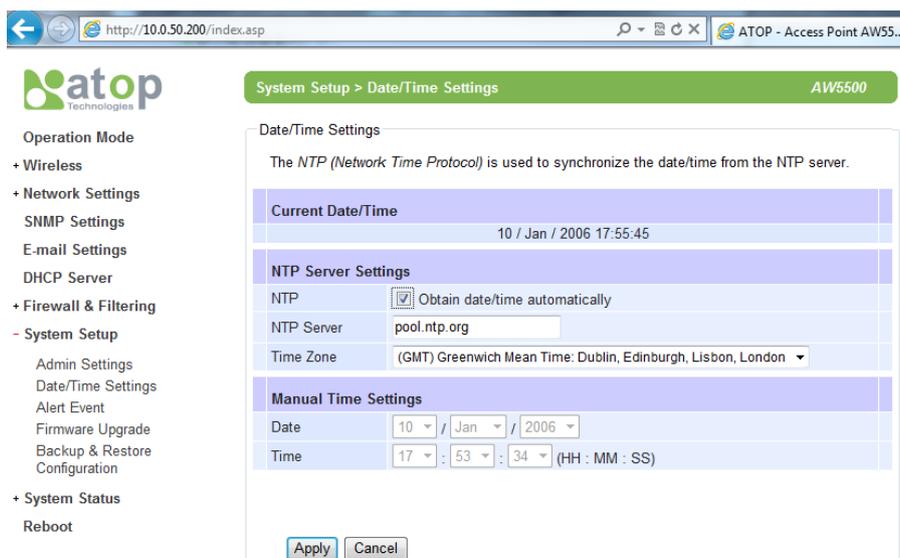


Fig.3. 43

### 3.9.3 Alert Event

There are five events that will trigger the alarm; these alerts are useful for security control or security monitoring, Fig. 3.44.

- **Cold Start** when there is a power interruption.
- **Warm Start** when the device resets.
- **Authentication Failure** when an incorrect username or password is entered.
- **IP Address Changed** when the device's IP is changed.
- **Password Changed** when the administrator password is changed.

Any of the five events would trigger an alert. When enabled, an E-mail alert would be sent to the designated E-mail address in the E-Mail Settings. A Trap alert would be sent to the designated Trap server in the SNMP Settings.

See "[Email Settings](#)" section, to set up the email addresses to which the alert message is sent. See "SNMP Settings" section to set up a SNMP trap server.

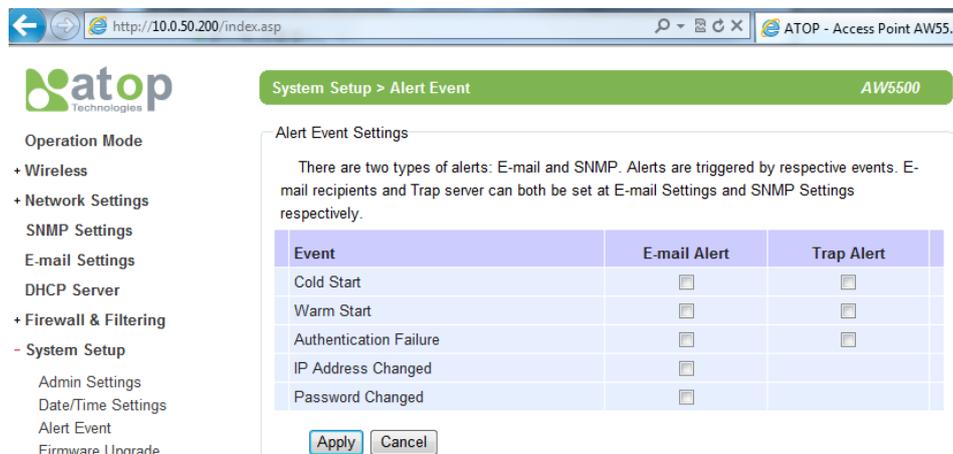


Fig.3. 44

### 3.9.4 Firmware Upgrade

Firmware is provided by our company from time to time (for more information visit our News & Events webpage), to fix bugs and optimize performance. It is very important that the device must **NOT be turned off or powered off during the firmware upgrading, (please be patient as this whole process might take up to 7 minutes)**. Before upgrading the firmware, please make sure that the device has a reliable power source that will not be powered off or restarted during the upgrading process. To upgrade a new firmware, once downloaded, copy the new firmware file to your computer, and then click “**Browse**” to find the new firmware file as shown in Fig. 3.45, then click “**Upload**”. The program will show the upload status, please wait until the uploading process is finished (the amount of time varies depending on the equipment used); the device will then proceed to restart itself, (captions are provided on Fig. 3.45~3.53).

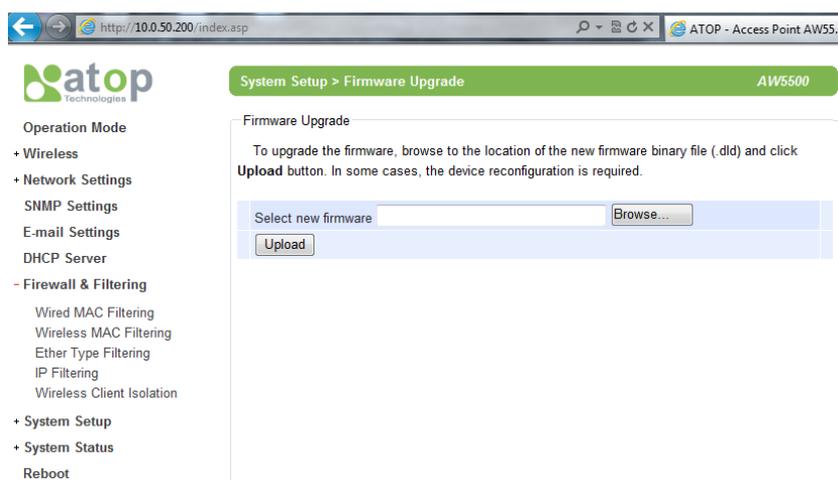


Fig.3. 45

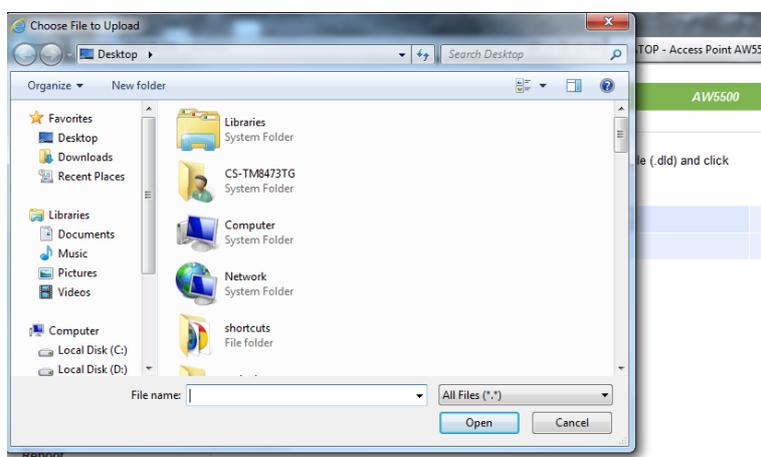


Fig.3. 46

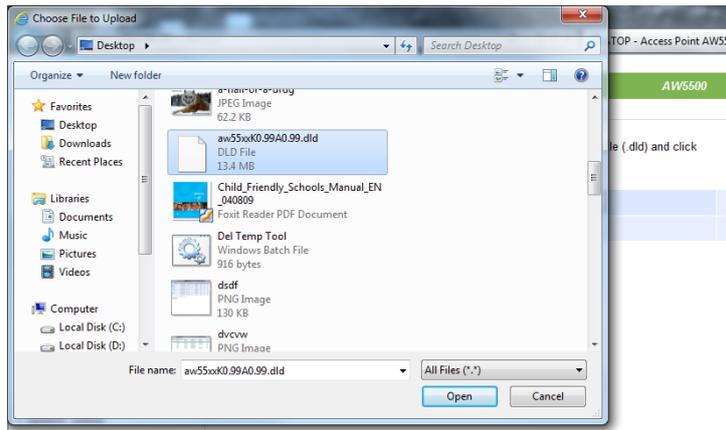


Fig.3. 47

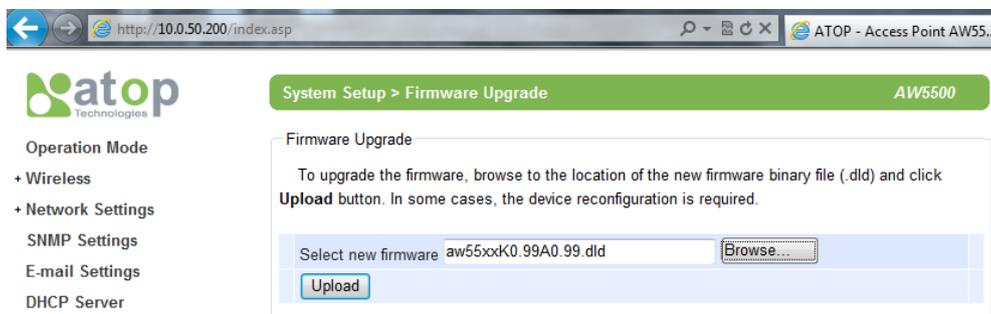


Fig.3. 48

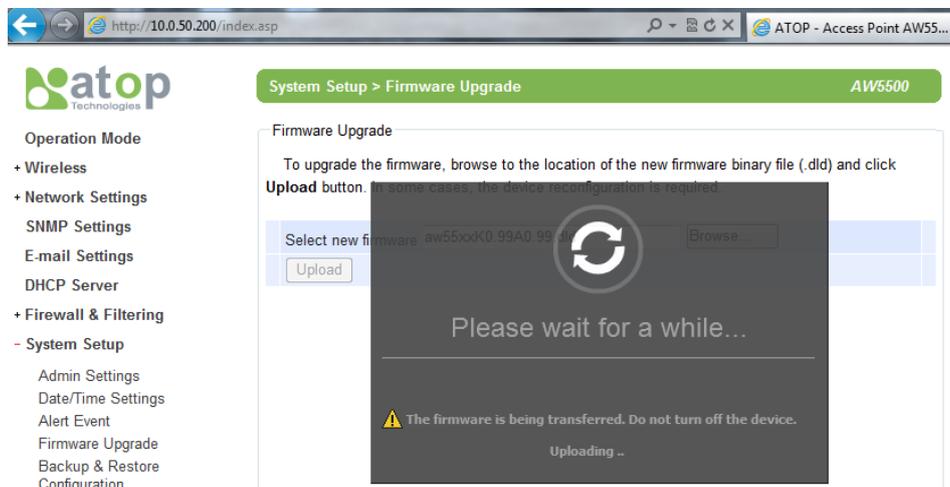


Fig.3. 49

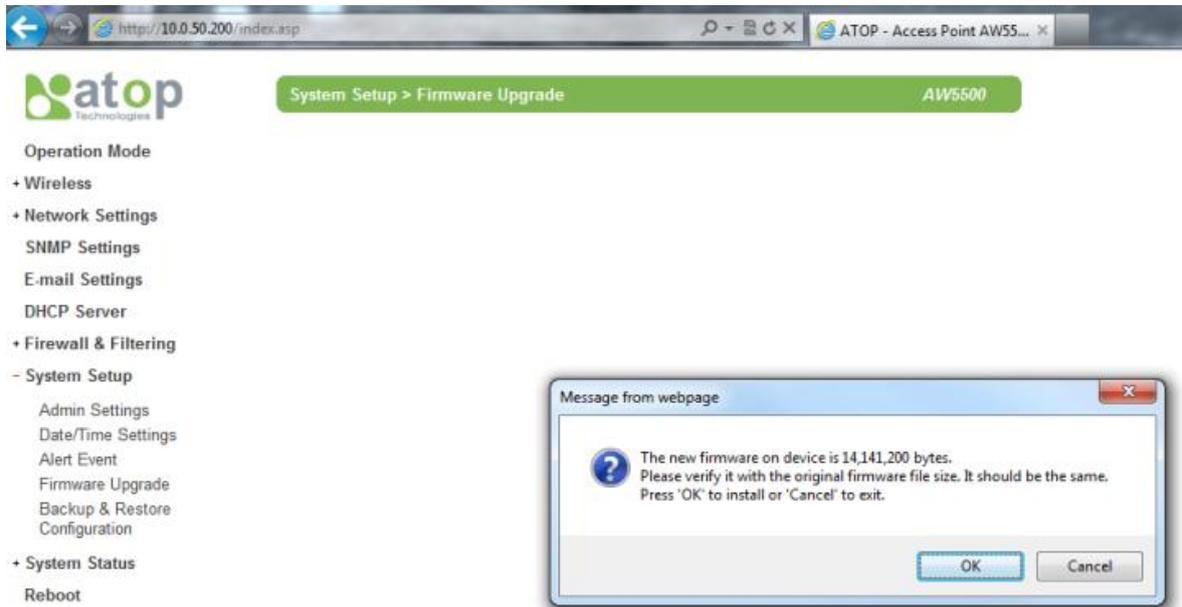


Fig.3. 50

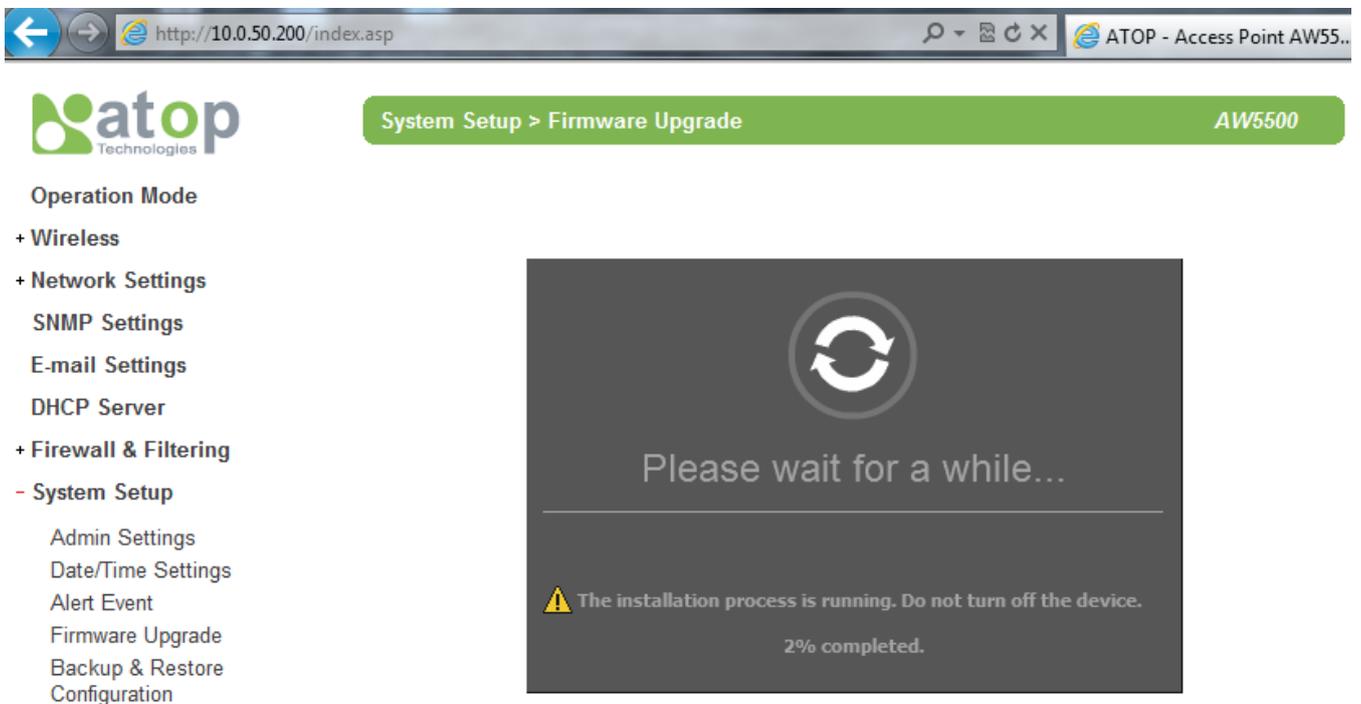


Fig.3. 51

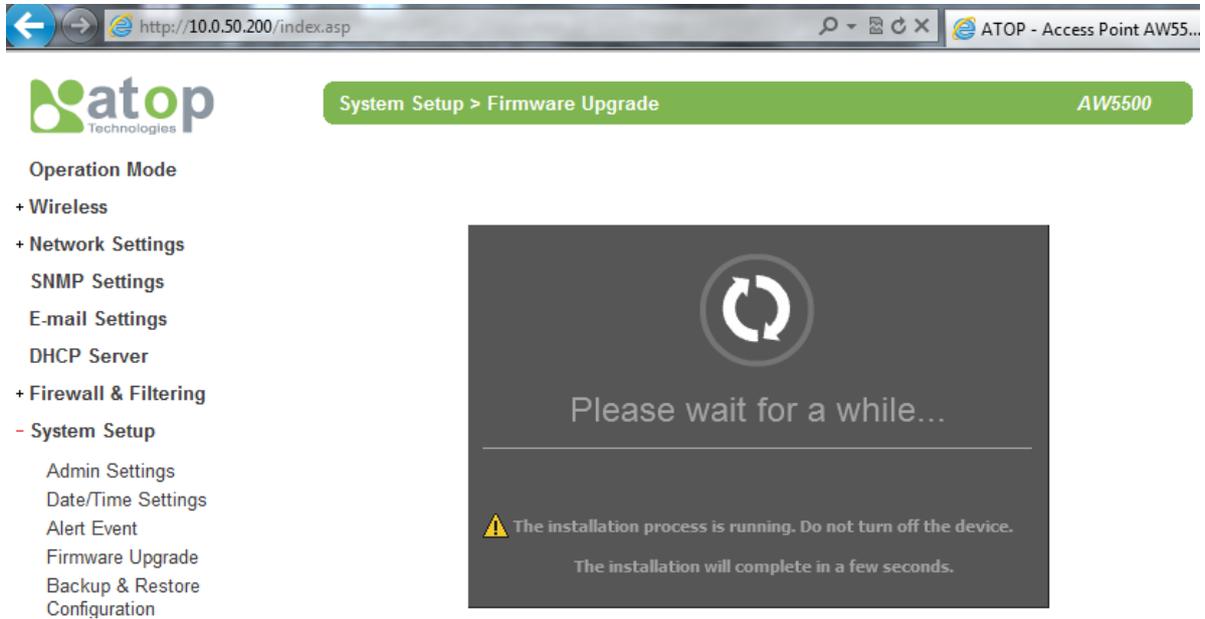


Fig.3. 52

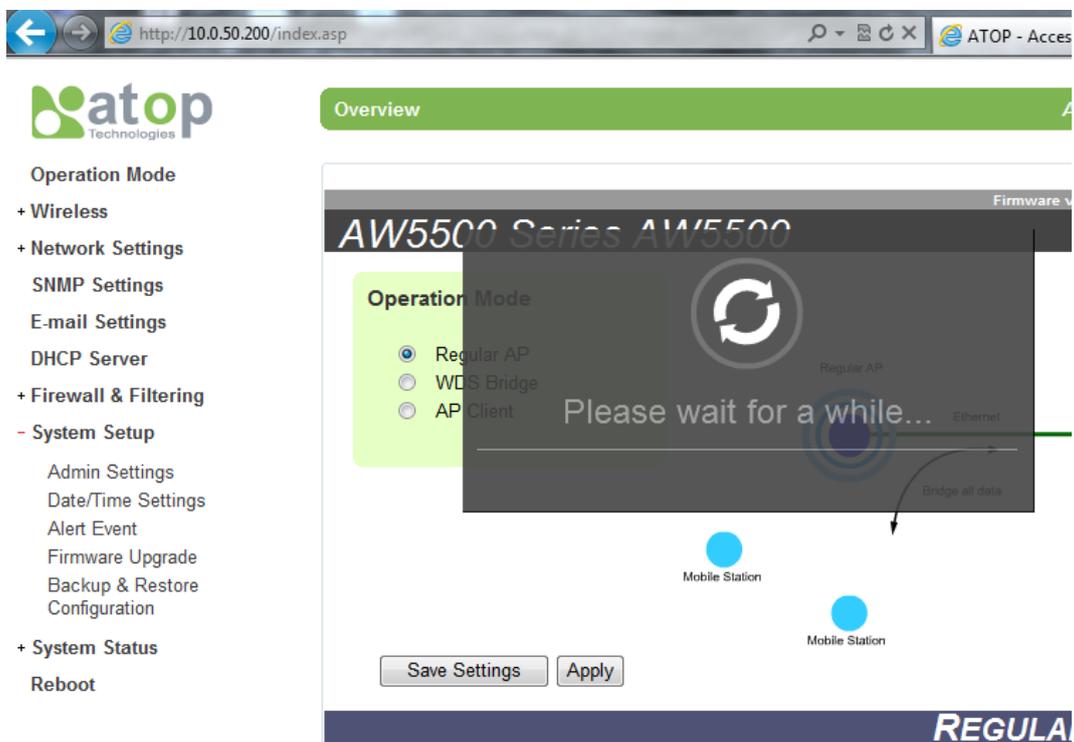


Fig.3. 53

### 3.9.5 Backup & Restore Configuration

Once all the configurations are set and the device is working properly, you may want to back up your configuration. Backup can be used when the new firmware is uploaded and it is reset to a factory default settings, it is done to prevent accidental loading of incompatible old settings. The backup file could also be used to efficiently deploy multiple AW5500s of similar settings by restoring the settings to the devices.

To backup your configuration, click “**Backup**”, and a pop-up dialog is prompted for saving the backup file on your computer. It is important **NOT to modify the saved configuration file by any editor. Any modification to the file may corrupt the file, and it may not be used for restore.** Please contact our authorized distributors for more information on this subject.

To restore the configuration backup, click “**Browse**” to locate the backup file, and then click “**Upload**” to upload the configuration backup file to the device. Once, the backup file is successfully uploaded; the device will restart, the time needed for this process may vary on the equipment used, Fig. 3.55.

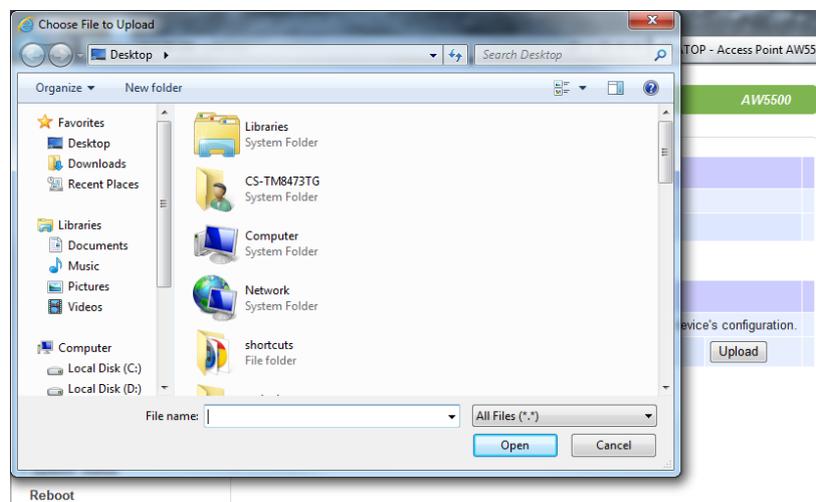


Fig.3. 54

## 3.10 System Status

Overall AW5500's info as well as network (and very possibly neighbors') information will be available when browsing this section. There will be some parameters available to modify as well, as before stated, exercise precaution when doing so.

### 3.10.1 System Information

This section illustrates AW5500's overall information Fig. 3.56.

The screenshot shows a web browser window with the URL `http://10.0.53/index.asp`. The page title is "ATOP - Access Point AW5500". The interface includes the ATOP Technologies logo and a navigation menu on the left with the following items: Operation Mode, + Wireless, + Network Settings, SNMP Settings, E-mail Settings, DHCP Server, + Firewall & Filtering, + System Setup, - System Status (expanded), System Information, Site Monitor, Wireless client table, and Traffic Log & Statistics. The main content area is titled "System Status > System Information" and "AW5500". It displays the following information:

System Information	
Model Name:	AW5500
Kernel Version:	1.12
Operating Mode:	Regular AP
Device Name:	
AP Version:	1.12

Network Information:	
MAC	
IP Mode	Static
IP Address	10.0.5.3
Subnet Mask	255.255.0.0
Gateway	10.0.0.201
WIFI mode	802.11a/n
Channel	36
Bandwidth	40MHz
Ethernet Link	ON

AP-Client Information:	
SSID	AW5500
BSSID	
Topology	Infrastrustion
TxRate	0 Mb/s
Channel	0
Encryption	NONE
Status	 100%

Fig.3. 55

### 3.10.2 Site Monitor

**Site Monitor** allows users to view the other wireless networks in the neighborhood, it also provides information on other access points such as SSID, Channel used, the RSSI (**R**eceived **S**ignal **S**trength **I**ndicator), Security and other parameters used by other access points. It can be helpful when setting SSID and Channel for this device to avoid SSID name and Channel conflict and prevent unexpected errors or degraded performance.

Bear in mind that it will take some time (approximately 10 seconds), for this option to gather information of the surrounding wireless networks, Fig. 3.57~3.58.

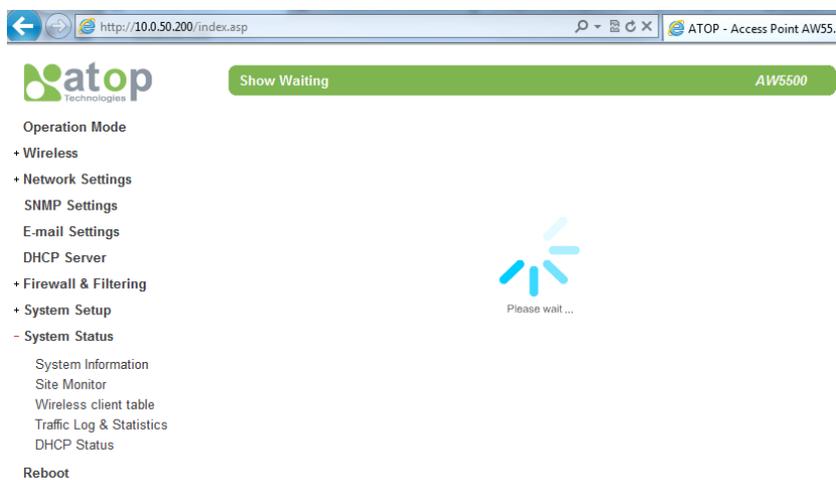


Fig.3. 56

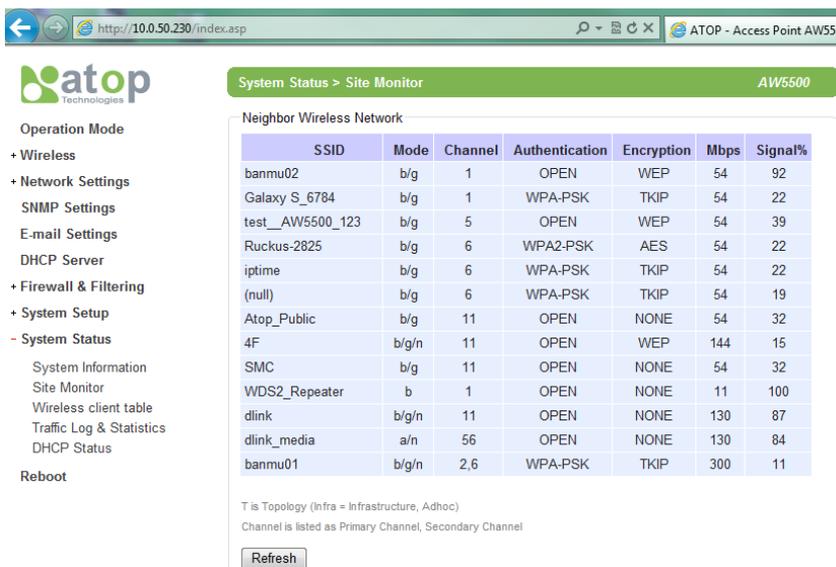


Fig.3. 57

### 3.10.3 Wireless Client Table

On this table you may be able to see all the Wireless and WDS devices on the vicinity of your AW5500, Fig. 3.59.

System Status > Wireless client table AW5500

Associated wireless client

MAC Address	*AID	Channel	Tx Rate	*RSSI	Idle	Tx Seq	Rx Seq
No associated wireless client.							

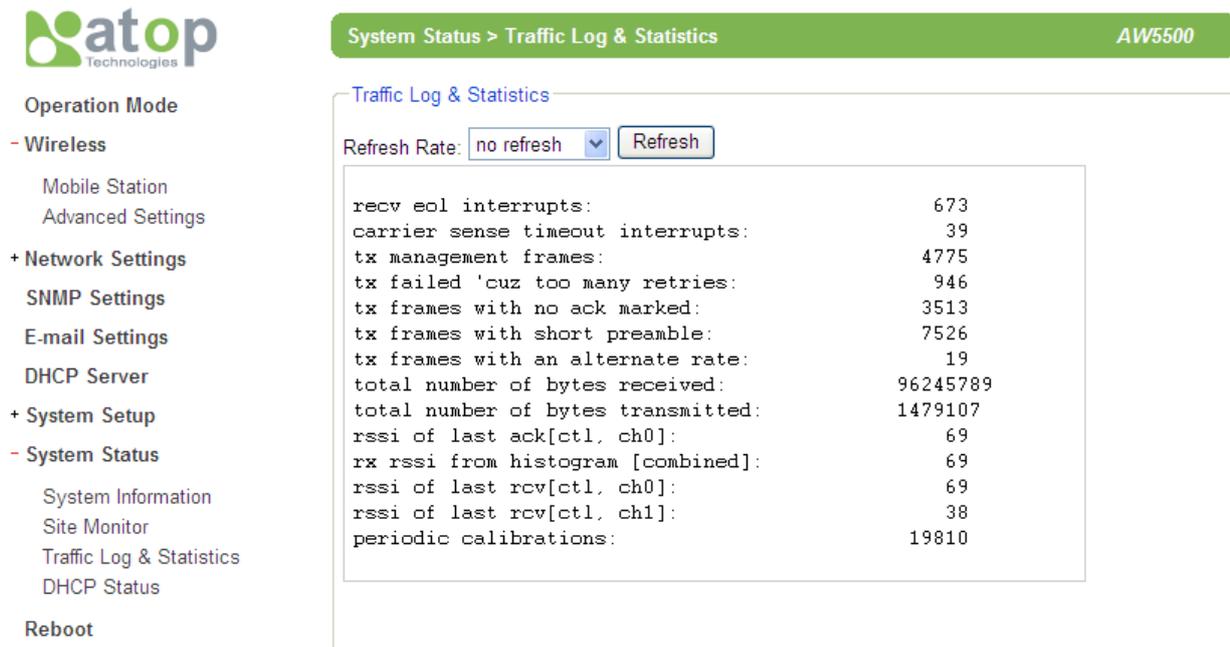
\*AID: Association ID.  
\*RSSI: Signal strength of the last received packet..

Refresh

Fig.3. 58

### 3.10.4 Traffic Log & Statistics

**Traffic Log & Statistics** shows wireless network and status information; “**Refresh Rate**” can be changed for traffic log viewing, the default being a “**no refresh**” option, but it can be done manually by pressing **Refresh**. Be careful when setting this value because it will increase CPU load on the device, Fig. 3.60.



The screenshot displays the Atop Technologies web interface. On the left is a navigation menu with the following items: Operation Mode, - Wireless (with sub-items Mobile Station and Advanced Settings), + Network Settings (with sub-items SNMP Settings, E-mail Settings, and DHCP Server), + System Setup, - System Status (with sub-items System Information, Site Monitor, Traffic Log & Statistics, and DHCP Status), and Reboot. The main content area is titled 'System Status > Traffic Log & Statistics' and 'AW5500'. Below the title is a 'Traffic Log & Statistics' section containing a 'Refresh Rate:' dropdown menu set to 'no refresh' and a 'Refresh' button. Below these controls is a table of statistics:

recv eol interrupts:	673
carrier sense timeout interrupts:	39
tx management frames:	4775
tx failed 'cuz too many retries:	946
tx frames with no ack marked:	3513
tx frames with short preamble:	7526
tx frames with an alternate rate:	19
total number of bytes received:	96245789
total number of bytes transmitted:	1479107
rssl of last ack[ctl, ch0]:	69
rx rssi from histogram [combined]:	69
rssl of last rcv[ctl, ch0]:	69
rssl of last rcv[ctl, chl]:	38
periodic calibrations:	19810

Fig.3. 59

### 3.10.5 DHCP Status

AW5500 distributes IP addresses using the DHCP protocol; a list of clients currently receiving an IP can be accessed by choosing the DHCP Status option. DHCP Client **MAC** as well as **IP addresses**, **Type** and **Status** will be shown in this list 3.61.

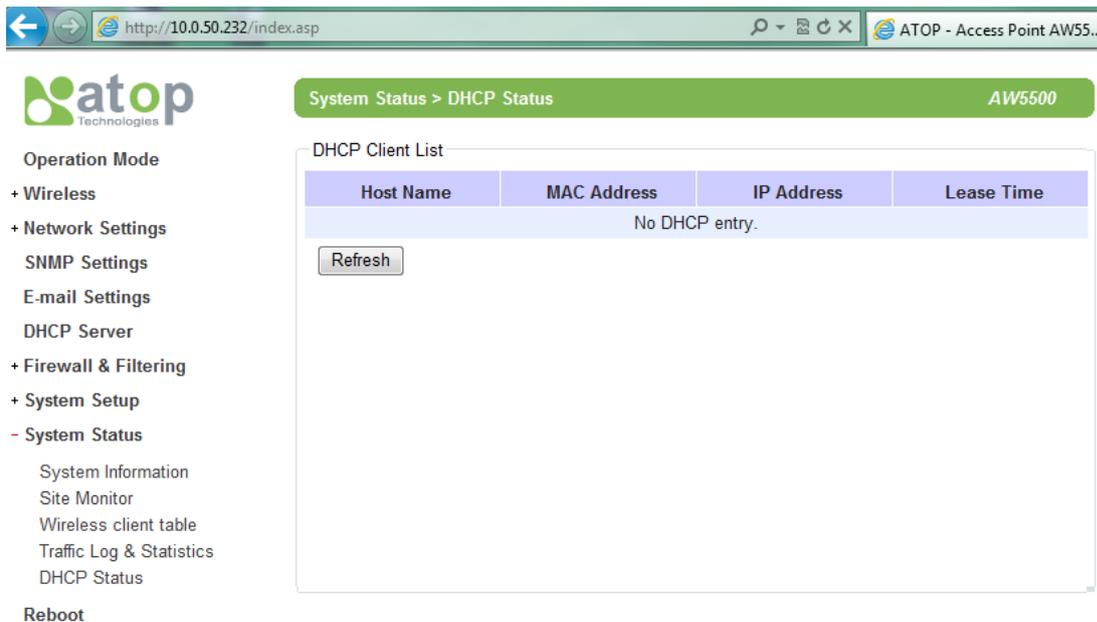


Fig.3. 60

## 3.11 Reboot and Restore Default Settings

To manually reboot the device, you may click “**Reboot**”, after the click the device will restart. If a factory default setting is needed, the “**Reset**” checking box can be chosen, and then click on **Reboot**, Fig. 3.62.

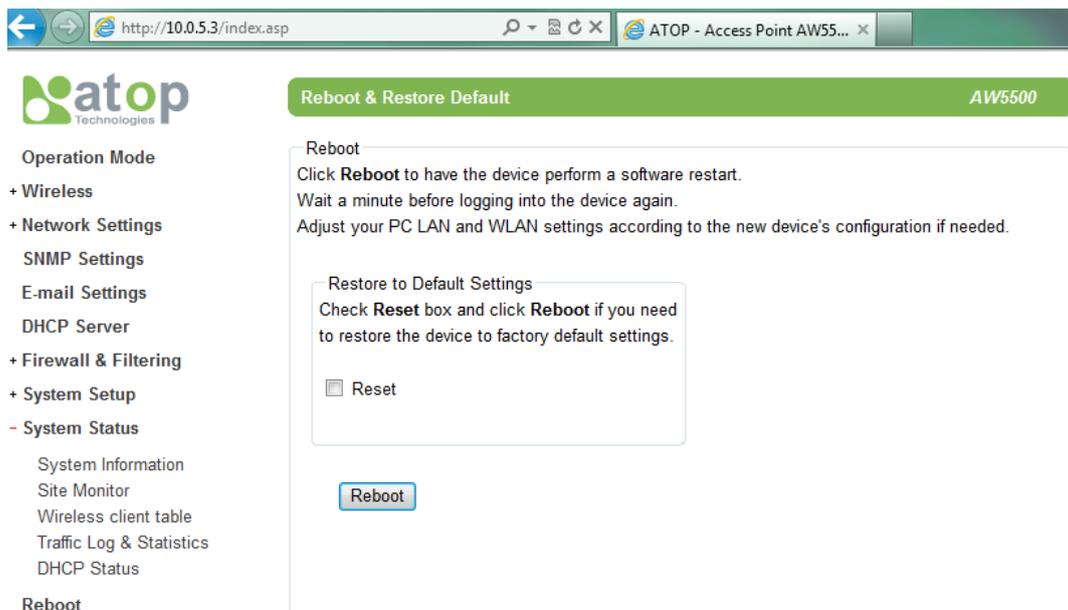


Fig.3. 61

# 4 Operation Modes

## 4.1 Regular AP Mode

Regular AP mode's welcoming screen is as shown below, Fig. 4.1.

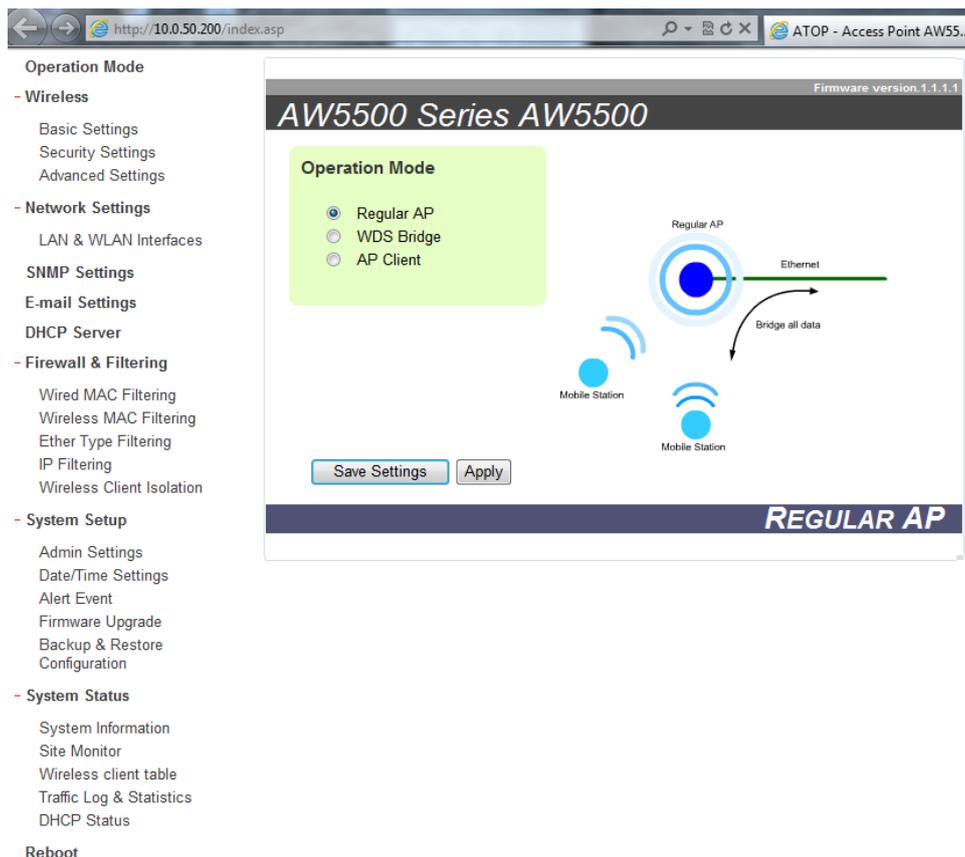


Fig. 4. 1

It is the factory default as well as the first option in the screen, works as your average industrial device that allows wireless clients to connect to a net, relaying data between the devices in the network. It allows multiple wireless clients to access the network through AW5500's Ethernet interface (physical/wired connection). Its corresponding complete tree-menu is as follows in Fig. 4.2.

- Operation Mode
- Wireless
  - Basic Settings
  - Security Settings
  - Advanced Settings
- Network Settings
  - LAN & WLAN Interfaces
- SNMP Settings
- E-mail Settings
- DHCP Server
- Firewall & Filtering
  - Wired MAC Filtering
  - Wireless MAC Filtering
  - Ether Type Filtering
  - IP Filtering
  - Wireless Client Isolation
- System Setup
  - Admin Settings
  - Date/Time Settings
  - Alert Event
  - Firmware Upgrade
  - Backup & Restore Configuration
- System Status
  - System Information
  - Site Monitor
  - Wireless client table
  - Traffic Log & Statistics
  - DHCP Status
- Reboot

Fig. 4. 2

Steps for a quick setting for the AW5500 as a Regular AP are:

1. On operation mode choose “**Regular AP**” (if the device is not in factory default).
2. Go to **Wireless** → **Basic Settings**; here you can change the **Network Name** (SSID) to your preferred name, you might want to first click on “**Scan network**” to find whether there are neighbors with a name matching yours (this is done for preventing any conflict over networks).
3. At this point you may decide to change other settings as the **Wireless Mode**, whether to have an **Automatic Channel Selection**, the **Bandwidth**, **Transmission Rate** and the **Secondary Channel** (only available when on **802.11a/n** and **802.11b/g/n** modes).

4. Next go to **Security Settings**, and on **Security Mode** choose which security protocol will be used in the network. We strongly recommend not leaving this section as disabled.
5. On **LAN & WLAN Interfaces**, enter the **IP Address**, **Subnet Mask**, **Default Gateway**, and **DNS servers** used (if any), according to your network configuration.
6. Click "**Apply**", and wait for the changes to take effect. You may also want to **Save Settings** afterwards just in case you need these configurations in the future.

## 4.2 WDS Bridge Mode

On this mode multiple AW5500 can bridge together to create a **wireless network**. The following details WDS structure; there are three roles that AW5500 can play in a WDS network:

- **Root AP (or Root)**
- **Hybrid (or Parent)**
- **Station (or Child)**

Please keep in mind that there should be one and only one **Root AP** in the WDS network. **Hybrids** can connect to a **Root AP** or connect with each other and **Stations** can connect either with **Root AP** or a **Hybrid**. Connecting multiple WDS nodes to a **Root AP** or a **Hybrid** is allowed as well. Please take a look at the following tree structure, Fig. 4.3.

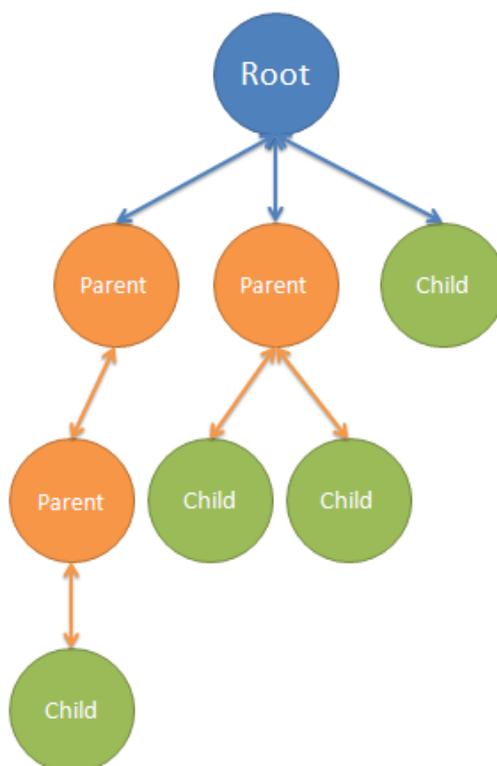


Fig. 4. 3

---

**Note:** it is possible to setup a Hybrid (Parent) without a Station (Child). The difference between a Hybrid and a Station is that the Station does not allow wireless clients to associate to it.

---

For AW5500 quick steps to work as in WDS Mode, the procedure is as follows:

- 1 On operation mode choose **“WDS Bridge”**.
- 2 Go to **Wireless** → **Basic Settings**; on **WDS Mode** you can choose whether to use the AW5500 as a **Root AP, Hybrid**, or **Station**. Also as before, you can change the **Network Name** (SSID) to your preferred name; you might want to first click on **“Scan network”** to find whether there are neighbors with a name matching yours (this is done for preventing any conflict over networks). From here three different configurations are therefore possible:

### 2.1 When on Root mode:

- 2.1.1 **SSID Broadcast** can be disabled here for an additional level of security.
- 2.1.2 On **Wireless Mode**, we recommend using **802.11a/n** since it is not as crowded as **802.11b/g/n**; however this is only possible if it is supported by your device. **Channel, Transmit rate** can be left to be chosen automatically by AW5500, however feel free to change them to the setting that works for you.
- 2.1.3 On **WDS Settings** → **Encryption Type**, do not let this option as NONE, non-existent encryption will result in an easy target for undesired access to your network
- 2.1.4 On **Root AP**, the **MAC** address is to be left empty; again the Local Area Network fields should be entered with their corresponding values for the network being configured.
- 2.1.5 Repeat [step 6](#) on the above section (**Regular AP Mode** section).

### 2.2 When on Hybrid mode:

- 2.2.1 Please remember that the SSID here should be the same as the Root AP. This also means roaming is possible between APs.
- 2.2.2 On **WDS Settings** → **Root AP**, the **MAC** address entered should be the **Root/Hybrid’s (Parent’s)** MAC address that is directly above this **Hybrid AP**. It might not be the **Root AP’s** MAC address if the WDS setup has a multi-layer.
- 2.2.3 Repeat [step 6](#) on the above section (**Regular AP Mode** section).

## 2.3 When on Station mode

2.3.1 SSID is not present here as there is no AP function.

2.3.2 On **WDS Settings** → **Root AP**, the **MAC** address entered should be the **Root/Hybrid's (Parent's)** MAC address that is directly above the Station AP. It might not be the **Root AP's** MAC address if the WDS setup has a multi-layer.

2.3.3 Repeat [step 6](#) on the above section (**Regular AP Mode** section).

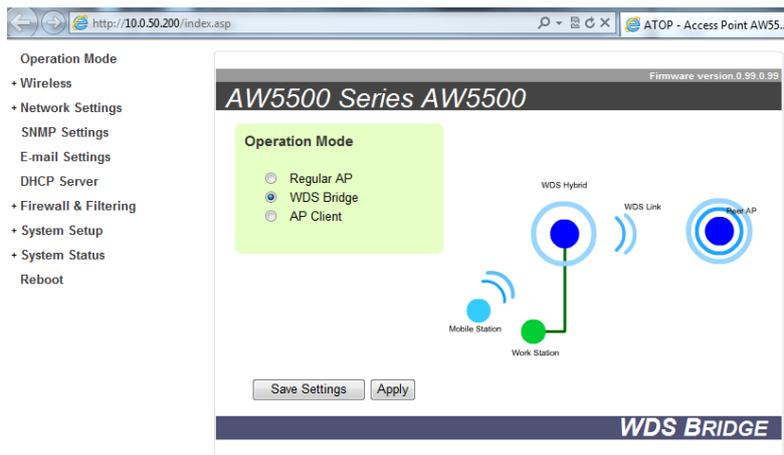


Fig. 4. 4

Its corresponding tree-menu has slight differences compared to **Regular AP**, Fig. 4.5.

- Operation Mode
- Wireless
  - Basic Settings
  - WDS Settings
  - Advanced Settings
- Network Settings
  - Local Area Network
- SNMP Settings
- E-mail Settings
- DHCP Server
- Firewall & Filtering
  - Wired MAC Filtering
  - Wireless MAC Filtering
  - Ether Type Filtering
  - IP Filtering
- System Setup
  - Admin Settings
  - Date/Time Settings
  - Alert Event
  - Firmware Upgrade
  - Backup & Restore Configuration
- System Status
  - System Information
  - Site Monitor
  - Wireless client table
  - Traffic Log & Statistics
  - DHCP Status
- Reboot

Fig. 4. 5

## 4.3 AP Client Mode

This mode allows your AW5500 to connect to an **AP, Ethernet clients** connected to AW5500 over the Ethernet interface are allowed to access the network through AW5500's wireless interface.

Remembering that your AW5500 can function as both a **Regular AP** and as an **AP Client** (the latter connected to the first one).

Supposing we already have the network physically installed, the steps for configuring your AW5500 as an **AP Client** are as follows:

1. On Operation Mode choose AP Client.
2. Press **“Save Settings”**, and click on “scan network”
3. A window/tab will pop out; in that new window/tab, there will be the names of the surrounding Wireless Networks. Choose the one that has you already designated as your **Regular AP** by selecting its corresponding SSID.
4. Press **“Connect”**, this will make you close the pop out window/tab, and leave you with the settings selected on the previous page.
5. Scroll to the end of the page and press **“Apply”**, please wait for some time for the changes to apply.
6. You can then proceed to go to System Information, on the **AP Client** Information you can confirm your AW5500 as connected to the Network selected. On the **Regular AP** side, you can confirm the AW5500 is connected to its Network as an **AP Client** in **Regular AP's** wireless client table.

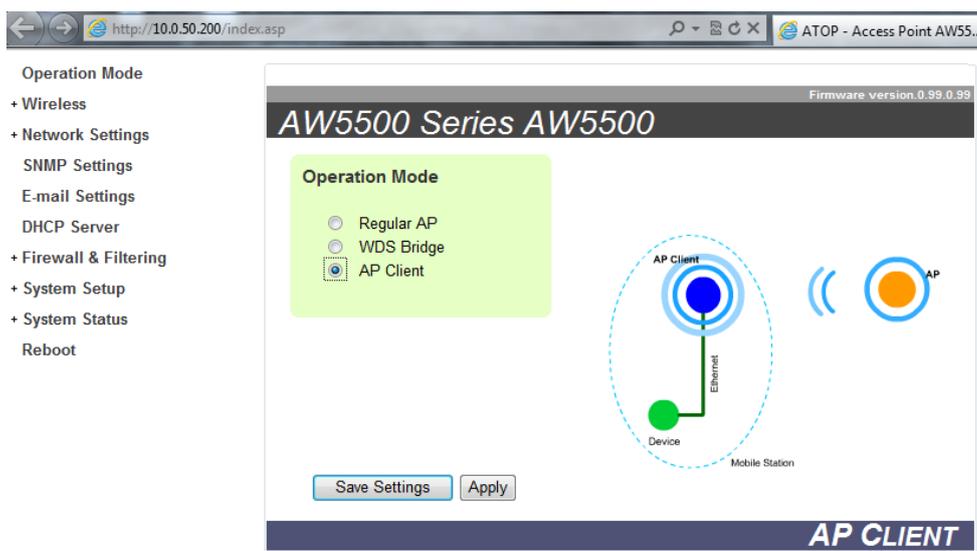


Fig. 4. 6

- Operation Mode**
- **Wireless**
  - Mobile Station
  - Advanced Settings
- **Network Settings**
  - Local Area Network
- SNMP Settings**
- E-mail Settings**
- DHCP Server**
- **System Setup**
  - Admin Settings
  - Date/Time Settings
  - Alert Event
  - Firmware Upgrade
  - Backup & Restore
  - Configuration
- **System Status**
  - System Information
  - Site Monitor
  - Traffic Log & Statistics
  - DHCP Status
- Reboot**

Fig. 4. 7

# 5 Applications

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## 5.1 Basic Access Point Setup

The following figure illustrates a standard **Access Point** serving multiple wireless clients within its signal coverage.

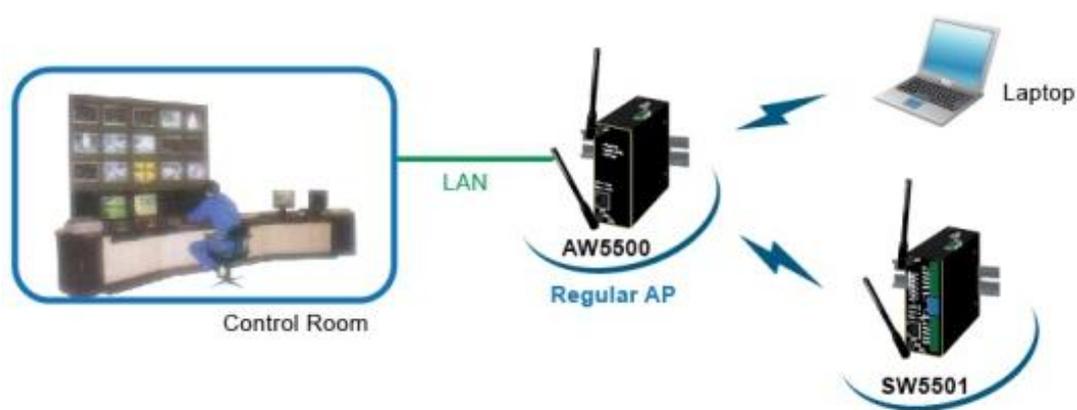


Fig. 5. 1

For more information on how to configure your AW5500 as an **Access Point** please refer to [Sec. 4.1.](#)

---

**Note:** wireless coverage is dependent on the environment.

---

## 5.2 Basic WDS Setup

Two sites with at some considerable distance apart. Ethernet cabling is impossible to the adjacent site. The adjacent site has both wireless clients and Ethernet clients. Note that if the **Access Point** function is not required at the adjacent site (no wireless clients), **WDS Hybrid** can be changed to **WDS Station**.

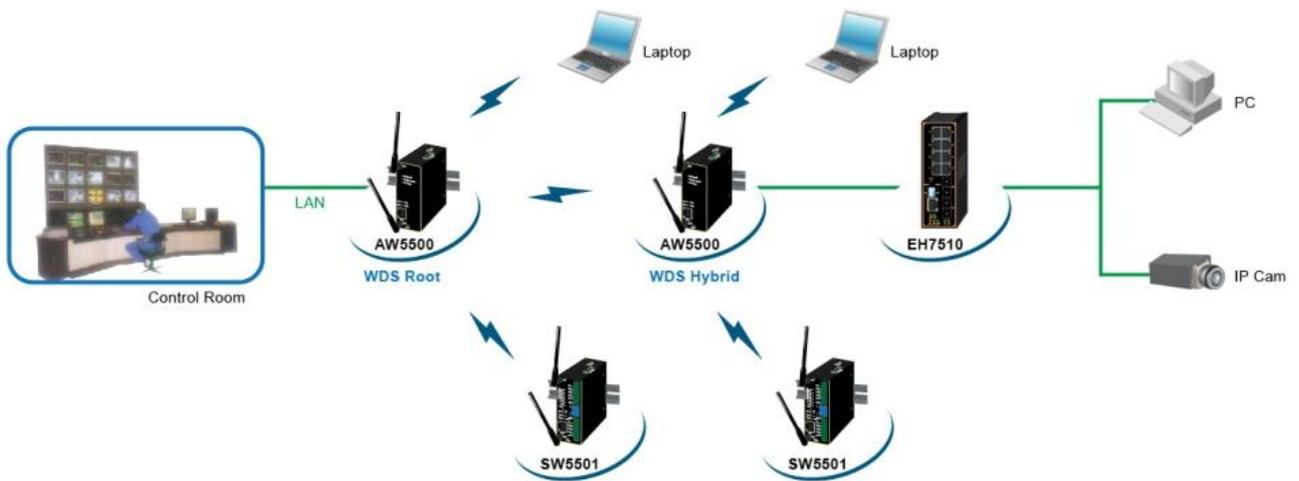


Fig. 5. 2

For more information on how to configure your AW5500 for this topology, please refer to [Sec. 4.2](#).

---

**Note:** wireless coverage is dependent on the environment.

---

### 5.3 Coverage Range Extender Setup

Extending from the above scenario, if the distance needs to be further extended, it is always possible to add more AW5500 (in **WDS Hybrid** mode) in between the existing one. The **WDS MAC address** of the newly added AW5500 (in **WDS Hybrid** mode) should be **MAC address** of the AW5500 that it is directly connecting to, not the **MAC address** of the AW5500 in **WDS Root** mode. Note that AW5500 in **WDS Station** mode does not allow both wireless client and AW5500 (in **WDS Hybrid** mode) to connect in. Normally it should be the last AW5500 in the wireless topology if utilized.

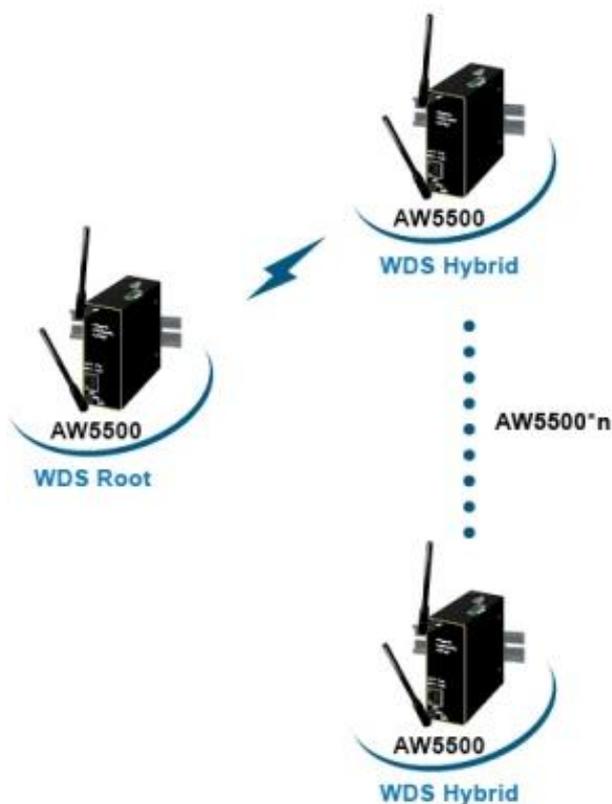


Fig. 5. 3

For more information on how to configure your AW5500 for this topology, please refer to [Sec. 4.2](#).

---

**Note:** wireless coverage is dependent on the environment.

---

## 5.4 AP Client Setup

AW5500 is being added to a wireless network where **Access Points** (AP1) from other vendors already existed. AW5500 could be set to AP Client mode to connect to that AP1 and bridge the Ethernet clients to AP1. This setup is similar to Scenario #2, except that WDS is not used. This is because WDS from different vendors might not be compatible.



Fig. 5. 4

For more information on how to configure your AW5500 for this topology, please refer to [Sec. 4.3](#).

---

**Note:** wireless coverage is dependent on the environment.

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# 6 Specifications

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## 6.1 Hardware Specification

The device's appearance is as follows, Fig. 5.1



Fig. 6. 1

- **Flash:** 32 MB
- **DRAM:** DDR2-266 MHz, 128 MB SDRAM
- **EEPROM:** 8k bytes
- **Watchdog:** Hardware built-in
- **Ethernet Switch & PHY:** IEEE802.3ab 1000 Base-T
- **Antenna:** 3/5 dBi Dual antenna design, SMA(R) Female connector

## Power Requirements

- **Input Voltage:** 9VDC~48VDC
- **Input Current(12VDC):** 0.35A→(TBD)
- **Power Consumption:** Approx. 4.5W (standby)
- **Reverse Polarity Protection<sup>1</sup>:** Yes
- **Connection:** 3-pin Lockable, Terminal Block on Top

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**Note<sup>1</sup>:** We strongly advice against this practice.

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## Physical Characteristics:

- **Housing:** IP50 protection, metal case
- **Front-panel:** Common ID design
- **Weight:** 500 g (estimate)
- **Dimensions:** 47 \* 110 \* 90 mm
- **Installation:** DIN-Rail, wall mount (optional kit)

## Environmental Limits

- **Operating Temperature:** -10°C~60°C (14°F~140°F)
- **Storage Temperature:** -40°C~85°C (-40°F~185°F)
- **Ambient Relative Humidity:** 5~95% RH, (non-condensing)

## Wireless Specifications

- **PCI-e Module:** Atheros AR9382
- **Tx/Rx:** 2T2RMIMO (2x2 with MCS 0-15)
- **Wireless Standard Conformance:** 802.11a, 802.11b, 802.11g, and 802.11n
- **Antenna:** 3/5 dBi Dual antenna design, SMA(R) Female connector

## Frequency Range

Table 6. 1

Country/Region	2.4 GHz	5GHz
United States (FCC)	2412-2462 (20 MHz) 2422-2452 (40 MHz)	5180-5240, 5745-5825 (20 MHz) 5190-5230, 5755-5795 (40 MHz)
Europe (ETSI)	2412-2472 (20 MHz) 2422-2462 (40 MHz)	5180-5240 (20 MHz) 5190-5230 (40 MHz)
Taiwan (NCC)	2412-2462 (20 MHz) 2422-2452 (40 MHz)	5280-5320, 5745-5825 (20 MHz) 5310, 5755-5795 (40 MHz)

## Data Rate

Table 6. 2

802.11a	6, 9, 12, 18, 24, 36, 48, 54 Mbps	
802.11b	1, 2, 5.5 and 11 Mbps	
802.11g	6, 9, 12, 18, 24, 36, 48, 54 Mbps	
802.11n	20 MHz	1Nss: 65Mbps @ 800GI, 72.2Mbps @ 400GI (Max.)
		2Nss: 130Mbps @ 800GI, 144.4Mbps @ 400GI (Max.)
	40 MHz	1Nss: 135Mbps @ 800GI, 150Mbps @ 400GI (Max.)
		2Nss: 270Mbps @ 800GI, 300Mbps @ 400GI (Max.)

## Output Power

Table 6. 3

802.11a		+15dBm @ 6, 9, 12, 18, 24Mbps +15dBm @ 36Mbps +12dBm @ 54Mbps +14dBm @ 48Mbps
802.11b		+14dBm
802.11g		+17dBm @ 6, 9, 12, 18, 24Mbps +17dBm @ 36Mbps +16dBm @ 48Mbps +16dBm @ 54Mbps
802.11n	2.4GHz/HT20	+16dBm @ MCS 0/8 +16dBm @ MCS 1/9 +16dBm @ MCS 2/10 +16dBm @ MCS 3/11 +16dBm @ MCS 4/12 +16dBm @ MCS 5/13 +16dBm @ MCS 6/14 +15dBm @ MCS 7/15
	2.4GHz/HT40	+15dBm @ MCS 0/8 +15dBm @ MCS 1/9 +15dBm @ MCS 2/10 +15dBm @ MCS 3/11 +15dBm @ MCS 4/12 +15dBm @ MCS 5/13 +15dBm @ MCS 6/14 +14dBm @ MCS 7/15
	5GHz/HT20	+15dBm @ MCS 0/8, +15dBm @ MCS 1/9 +15dBm @ MCS 2/10 +15dBm @ MCS 3/11 +15dBm @ MCS 4/12 +11 - 14dBm @ MCS 5/13 +9 - 12dBm @ MCS 6/14

		+7 - 10dBm @ MCS 7/15
	5GHz/HT40	+14dBm @ MCS 0/8, +14dBm @ MCS 1/9 +14dBm @ MCS 2/10 +14dBm @ MCS 3/11 +14dBm @ MCS 4/12 +10- 13dBm @ MCS 5/13 +8 - 11dBm @ MCS 6/14 +6 - 9dBm @ MCS 7/15

**\*Note:** please bear in mind that this is the raw output power for the RF module; note that the device has been tested with two 3dbi @2.4 GHz and 5dbi @ 5GHz antenna.

## Receiver Sensitivity

Table 6. 4

	Data Rate	IEEE Spec (1Rx dBm)	Typical/Maximum (2Rx dBm)
802.11a	6M	-82	-95/-85
	9M	-81	-94/-84
	12M	-79	-93/+82
	18M	-77	-90/-80
	24M	-74	-88/-77
	36M	-70	-84/-73
	48M	-66	-82/-69
	54M	-65	-81/-68
802.11b	1M	Not specified	-98/-85
	5.5M	Not specified	-98/-85
	11M	Not specified	-94/-85
802.11g	6M	-82	-96/-85
	9M	-81	-96/-84
	12M	-79	-95/-82
	18M	-77	-93/-80
	24M	-74	-90/-77

	36M	-70	-87/-73
	48M	-66	-83/-69
	54M	s-65	-82/-68
802.11a/n HT20	MCS0	-82	-94/-85
	MCS1	-79	-92/-82
	MCS2	-77	-90/-80
	MCS3	-74	-87/-77
	MCS4	-70	-84/-73
	MCS5	-66	-79/-69
	MCS6	-65	-78/-68
	MCS7	-64	-76/-67
802.11a/n HT40	MCS0	-79	-92/-82
	MCS1	-76	-90/-79
	MCS2	-74	-87/-77
	MCS3	-71	-84/-74
	MCS4	-67	-80/-70
	MCS5	-63	-76/-66
	MCS6	-62	-74/-65
	MCS7	-61	-72/-64
802.11b/g/n HT20	MCS0	-82	-95/-85
	MCS1	-79	-94/-82
	MCS2	-77	-92/-80
	MCS3	-74	-89/-77
	MCS4	-70	-86/-73
	MCS5	-66	-82/-69
	MCS6	-65	-80/-68
	MCS7	-64	-78/-67
802.11b/g/n HT40	MCS0	-79	-92/-82
	MCS1	-76	-92/-79
	MCS2	-74	-89/-77
	MCS3	-71	-86/-74
	MCS4	-67	-83/-70
	MCS5	-63	-77/-66
	MCS6	-62	-76/-65
	MCS7	-61	-75/-64

## Operation Distance

Table 6. 5

Standard	Outdoor	Indoor
802.11a	50m @ 54Mbps 300m @ 6Mbps	30m @ 54Mbps 100m @ 6Mbps
802.11b	150m @ 11Mbps 300m @ 1Mbps	30m @ 11Mbps 100m @ 1Mbps
802.11g	50m @ 54Mbps 300m @ 6Mbps	30m @ 54Mbps 100m @ 6Mbps
802.11n	30m @ 300Mbps 30m @ 130Mbps 250m @ 6.5Mbps	20m @ 300Mbps 20m @ 130Mbps 100m @ 6.5Mbps

## Security

- 64-bit and 128-bit WEP encryption
- 802.1x authentication
- AES and TKIP, WPA/WPA2

## Others

- **Standards:** IEEE 802.3 for 1000Base T
- **Reset Button:** Yes
- 10/100/1000M Auto-detection

### Regulatory requirements

- **EMC:** EN 301489-1/17 (Class A), FCC 15 Subpart B (Class A), CNS 13438
- **Radio:** FCC 15 Subpart C, FCC 15 Subpart E, EN 301893, EN 300328, NCC LP00002
- **EMS:**
  - EN55024
  - EN55022
- **Safety:** UL60950-1, EN60950-1, CNS 14336
- **Shock:** IEC 60068-2-27
- **Freefall:** IEC 60068-2-32
- **Vibration:** IEC 60068-2-6

- **MTB\*F:** 20 years
- **RoHS:** Yes
- **Maritime:** N/A
- **Hazardous location:** IEC 62368-1

Table 6. 6

Test	Item		Value	Level
IEC 61000-4-2	ESD	Enclosure Contact	6 kV	3
		Enclosure Air	8 kV	
IEC 61000-4-3	RS	Enclosure Ports	10 V/m	3
IEC 61000-4-4	EFT	Signal Ports	1 kV	3
		DC Ports *	2 kV	
IEC 61000-4-5	Surge	DC Ports *	2 kV line-to-earth, 1 kV line-line	3
		Earth Ground Ports	2 kV line-to-earth, 1 kV line-line	
IEC 61000-4-6	CS	Signal Ports	10 V	3
		DC Ports *	10 V	
		Earth Ground Ports	10 V	
IEC 61000-4-8	PFMF	Enclosure Ports	10 A/m continuous	3

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**Note:** Above certifications are subject to change depending on product's final destination. DC Ports are tested through a power adaptor available in the accessories kit.

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## 6.2 Software Specifications

- **Configuration:** Webpage/Telnet/**Device View**© (Windows utility)
- **Browser Compatibility:** IE8+, Firefox6+, Chrome13+
- **Supported Protocols:** ICMP, TCP, UDP, DHCP Server/Client, DNS, SNMP, NTP, SMTP, HTTP, Telnet, IPv4, 802.1x, RADIUS, STP/RSTP
- **Client Isolation**
- **Radio Off Option:** Yes
- **Firewall/Filtering:**
  - A. Wireless MAC Filtering
  - B. Wired MAC Filtering
  - C. Ethernet Type Filtering
  - D. IP Filtering

- **Config Import/Export from Web with Wireless settings**
- **Update:** Online Firmware (or from **Device View**©)
- **Site Monitor/Site Survey**
- **Alert Events (E-mail/SNMP Trap)**

## 6.3 LED Indicators

Table 6. 7

Name	Color	Status	Description
AP Mode	Green	On	Access Point (AP) function enabled
		Off	Access Point (AP) function disabled
Wireless Bridge Mode	Green	On	Wireless Bridge function enabled
		Off	Wireless Bridge function disabled
AP Client Mode	Green	On	AP running on Client Mode
		Off	AP not running on Client Mode
5GHz	Green	On	AP running on 5GHz band if WLAN LED On
		Off	AP running on 2.4GHz band if WLAN LED On
Locate	Green	Blinking	If: <ul style="list-style-type: none"> <li>◆ AP Mode: more than one wireless client is associated</li> <li>◆ Wireless Bridge Mode: All WDS nodes are connected</li> <li>◆ AP Client: Successful connection to a remote AP</li> </ul>
		Off	No wireless connection/association
LAN	Orange	On	Ethernet is connected
		Off	Ethernet is disconnected
	Green	Blinking	Data transmitting on Ethernet
WLAN	Green	Off	Wireless Radio disabled
		On	Wireless Radio enabled

RUN	Green	Off	System is not ready or Halt
		Blinking	AP firmware running normally

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**Note:**

- In Wireless + **AP Mode**, AP LED and Wireless Bridge LED will go on together.
- If WLAN (radio) is turned off, mode LEDs (**AP, Wireless Bridge, and AP Client**) should all go off.

# Warranty

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## Limited Warranty Conditions

Products supplied by us are covered in this warranty for undesired performance or defects resulting from shipping, or any other event deemed to be the result of Atop Technologies' mishandling. The warranty does not cover however, equipment which has been damaged due to accident, misuse, abuse, such as:

- Use of incorrect power supply, connectors, or maintenance procedures
- Use of accessories not sanctioned by us
- Improper or insufficient ventilation
- Improper or unauthorized repair
- Replacement with unauthorized parts
- Failure to follow Our operating Instructions
- Fire, flood, "Act of God", or any other contingencies beyond our control.

## RMA and Shipping Reimbursement

- Customers must always obtain an authorized "RMA" number from us before shipping the goods to be repaired.
- When in normal use, a sold product shall be replaced with a new one within 3 months upon purchase. The shipping cost from the customer to us will be reimbursed.
- After 3 months and still within the warranty period, it is up to us whether to replace the unit with a new one; normally, as long as a product is under warranty, all parts and labor are free of charge to the customers.
- After the warranty period, the customer shall cover the cost for parts and labor.
- Three months after purchase, the shipping cost from you to us will not be reimbursed, but the shipping costs from us to the customer will be paid by us.

## Limited Liability

Atop Technologies Inc., shall not be held responsible for any consequential losses from using our products.

## **Warranty**

Atop Technologies Inc., gives a 5 years max for Wireless Access Point products.