



Atop Technologies, Inc.

AW5500C
Industrial Wireless Access Point

User Manual

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We have checked the contents of this manual for agreement with the hardware and the software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual is reviewed regularly and any necessary corrections will be included in subsequent editions.

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1 Preface

1.1 *Purpose of the Manual*

This manual supports you during the installation and configuration of Atop's AW5500C Industrial Wireless Access Point. It explains the technical features 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 necessary when reading it. Please refer to the Glossary for technical terms and abbreviations (if any).

1.2 *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. If they are unable to assist you, please redirect your inquiries to www.atop.com.tw or www.atoponline.com.

1.3 *Supported Platform*

This manual is designed for the AW5500C **Industrial Wireless Access Point** and that model only.

1.4 *Manufacturers FCC Declaration of Conformity Statement*

Model: AW5500C

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 use.
※ 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.

1.5 *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 a minimum distance of 20cm between the radiator and human body.

1.6 *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 (2011), EN 301 489-17 (2012), FCC Class A, CE Class A, NCC, BSMI
- Health & Safety: EN60950-1: 2011; EN 50385: 2002, UL60950-1, CNS 143336
- Radio: EN300 EN 300 328 v 1.7.1 (2006-10), EN 301.893 v 1.5.1 (2008-12)

The conformity assessment procedure referred to in Article 10.4 and Annex III of Directive 93/42/EEC has been followed. Product is currently under RED 2014/54/EU certification.

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).

1.7 *UL Notice for Power supplier*

The AW5500C Series 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".

2 Introduction

2.1 Product Overview

The AW5500C Industrial Wireless Access Point is Atop's line of wireless product for applications in harsh environment. It is robust enough to operate at temperatures ranging from -10°C to 60°C . The ease of installation makes it attractive because it utilizes a DIN-Rail for fixing itself to virtually any surface in workplace. Reliability is a key factor of AW5500C when wireless solution is needed. The small dimension of AW5500C casing is also ideal for small space while it can still provide real-time control and exceptional networking performance.

The AW5500C is designed to provide wireless connectivity to clients and mobile stations or other Atop's industrial networking products creating a complete solution for your industrial wireless networking. It can be operated as an access point (AP), a wireless distribution system (WDS) bridge, and an AP client. The AW5500C supports IEEE 802.11 b/g/n wireless connectivity standards. It can be operated in 2.4GHz bands.

As an example, user can connect serial devices to Atop's Wireless Serial Device Server (e.g. SE59XX series) and then connect the serial device server with the AW5500C Industrial Wireless Access Point. Therefore, this configuration allows the serial devices to be access over a wireless local area network (WLAN). Another example is depicted in Figure 2.1 where the AW5500C is operated in AP client mode and associated with another WLAN AP called AP1. In this example, the personal computer (PC) and the IP camera which are connected to Atop's industrial Managed Ethernet Switch (e.g. EH75XX Series) can be wirelessly connected the control room on the other side of the network.



Figure 2.1 An Application of Industrial Wireless Access Point in WLAN

2.2 Features

AW5500C is small in size but has a powerful architecture, thus it is a perfect choice for industrial/manufacturing needs in which size is a decisive factor. It rewards our customers with superb connectivity that can withstand all the harshness in customer's environment of choice.

The key features of AW5500C are as follows:

- Streaming input/output with maximum link speed of 300 Mbps and throughput of 100 Mbps (environment dependent).
- Supporting of the most popular wireless local area network standards IEEE 802.11b/g/n
- Supporting of 2.4 GHz Industrial, Scientific and Medical (ISM) band operating frequency
- Certified wireless equipment by FCC (United States) and ETSI (Europe)
- Different operating modes and topology options (Regular AP, WDS Bridge, and AP Client)
- Support WPS (Wi-Fi protected setup) and Wi-Fi Direct (Peer-to-Peer) and delivers an industry-wide peer-to-peer solution based on broadly deployed Wi-Fi technologies.
- Embedded PCB coating protection
- Easy configuration through embedded web server interface or Atop's Windows®-based configuration utility program called **Device Management Utility®**
- Firmware upgradable through embedded web server interface or Atop's **Device Management Utility®**

Caution

Beginning from here, extreme caution must be exercised.



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



Warning: HOT!

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

3 Getting Started

3.1 Packing List

Inside the purchased package, you will find the following items:

Table 3.1 Packing List

Item	Quantity	Description
AW5500C Series	1	Industrial Wireless Serial Device Server
Antenna	1	3~5 dBi antenna
Terminal Block	1	3-pin 5.08mm Lockable Terminal Block (TB3)
Mounting Kit	1	DIN-Rail Kit (Already mounted on the device's back plate)
Documentation	1	Hardware Installation Guide (Warranty Card is included)
CD (Utilities)	1	The CD contains: - User Manual - Installation Guide - Device Management Utility

Note:

- Notify your sales representative immediately if any of the above items is missing or damaged upon delivery.
- Atop's utility software Device View® and Serial Manager® are obsolete and replaced by Device Management Utility®.

Table 3.2 Description of Optional Accessories

Optional Accessories		
Model Name	Part Number (P/N)	Description
UN315-1212 (US-Y)	50500151120003G	Y-Type power adaptor, 100-240VAC input, 1.25A @ 12VDC output, US plug LV6
UNE315-1212 (EU-Y)	50500151120013G	Y-Type power adapter, 100~240VAC input, 1.25A @ 12VDC output, EU plug, LV6
UN315-2465 (US)	50500161240002G	Y-Type power adapter, 100~240VAC input, 0.65A @ 24VDC output, US plug, LV6
UNE315-2465 (EU)	50500161240012G	Y-Type power adapter, 100~240VAC input, 0.65A @ 24VDC output, EU plug, LV6
WMK-454-Black	70100000000043G	Black Aluminum Wall Mount Kit

3.2 Ordering Information

Please refer to the following product codes to place an order.

Table 3.3 Device Ordering Information

Model Name	P/N	Description
AW5500C	1P1AW5500C0001G	Industrial Wireless Access Point

3.3 *Appearance: front-power-side panels*

The front panel of AW5500C series is shown in Figure 3.1 and the power panel is shown in Figure 3.2.



Figure 3.1 Front Panel of AW5500C Series



Figure 3.2 Power Panel of AW5500C Series

The rear panel (where you can mount the device on a rail or to the wall) is shown in Figure 3.3. A simple mounting instruction is given in Figure 3.4. For more information on hardware installation, please refer to the product's Installation Guide.



Figure 3.3 Rear view of AW5500C Series

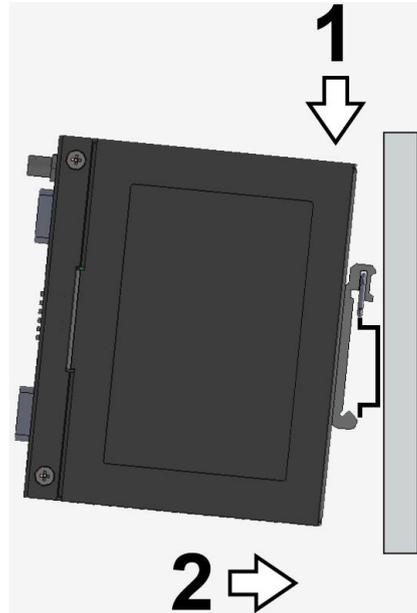


Figure 3.4 Din-Rail Mount of AW5500C

3.4 *First Time Installation*

Before installing the device, please follow strictly all safety procedures described in the Hardware installation guide supplied inside the product. Atop will not be 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 there. In such cases, please contact your dealer immediately.

- Prepare the necessary cables, DC adapter, power cord, LAN cable, etc. Do not connect the unit yet.
- Install the antenna to the SMA connector.
- Proceed then to plug the power source to the unit: starting from the ground and then the terminal block.
- Place the device in the desired location and connect it to the LAN via an Ethernet cable with an RJ45 connector.
- Connect your computer to the LAN network. Default configurations will be discussed later.

Specific installation instructions are not provided in this manual since they may differ considerably based on the hardware purchased.

3.5 *Factory Default Settings*

The AW5500C Industrial Wireless Access Point is equipped with one LAN interface and its network default setting is summarized in Table 3.4. Upon arrival, it will be set to work as Regular AP mode. Its factory default parameters are listed in Table 3.5.

Table 3.4 Network Default Setting

Interface	Device IP	Subnet Mask	Gateway IP	DNS
LAN	10.0.50.200	255.255.0.0	10.0.50.1	192.168.1.1

Table 3.5 Factory Default Setting

Mode	Regular AP	WDS Bridge	AP Client
Wireless			
Basic Settings			
AP Enabled	AP1		N.A.
SSID	AW5500C		
SSID Broadcast	Enabled		
Wireless Mode	802.11b/g/n		
Channel	1 (Automatic Channel Selection enabled)		
Bandwidth	Auto 20/40 MHz		
WDS Mode	N.A.	Root AP	
Profiles			
Wireless Profile	N.A.	N.A.	Enabled (Checked)
AP List	N.A.	N.A.	As input
Security Settings			
Security Mode	Disabled	N.A.	N.A.
WDS Settings			
Encryption Type	N.A.	TKIP	N.A.
PassPhrase Key		Password	
Root/Hybrid AP MAC		None	
WPS Settings			
WPS	Disabled	N.A.	
WPS BUTTON			
PIN Number			
Advanced Settings			
Radio Off	N.A.		Enable (Unchecked)
Regulatory Domain	US (United States)		
Tx Power	100%		
Short GI	Enabled		
WMM	Enabled		
WPA Group Rekey Interval	3600 Seconds		
STP	STP		
Forward Delay	4 Seconds		
Fast Handoff	Disabled		N.A.
Wireless Isolation	Disabled		N.A.
20/40 MHz Coexistence (Only be supported at 802.11n with 2.4 GHz)	Enabled (Unchecked)		N.A.
P2P Button	Enabled		
Mobile Station (Only available when Profile is disabled in AP Client Mode)			
SSID	N.A.		AW5500C
BSSID (MAC Address)			Disabled

Mode	Regular AP	WDS Bridge	AP Client			
WPS BUTTON			Clickable			
Topology			Infrastructure			
Band mode			Auto			
Bandwidth						
Channel						
Authentication Mode						
Encryption Type						
WEP Key			Disabled			
WPA-PSK/WPA2-PSK (Passphrase)						
WPA-PSK/WPA2-PSK (with RADIUS)						
User						
Password						
Scheduler Settings						
Number	1	N.A.	N.A.			
Name	Office					
Status	Enabled					
SSID	AW5500C					
Day(s)	Weekday Checked					
Time	07:30 – 17:00					
Network Settings						
DHCP	Obtain an IP Address Automatically (box unchecked)					
Gratuitous ARP	Disabled: 5 Minutes					
Manual Settings						
IP Address	10.0.50.200					
Subnet Mask	255.255.0.0					
Default Gateway	10.0.50.1					
DNS Server						
Preferred DNS	168.95.1.1					
Alternate DNS	None					
SNMP Settings						
System Contact	Contact					
System Location	Location					
Read Community	public (SNMP disabled)					
Write Community	private (SNMP disabled)					
SNMP Trap Server	0.0.0.0					
Email Settings						
Sender	Blank					
Receiver						
SMTP Server						
Authentication				Disabled		
User name				Blank		
Password						
DHCP Server						
DHCP	Disabled (unchecked)					
From IP Address	None (if above unchecked)					
To IP Address						
Netmask						
Lease Time (minutes)						

Mode	Regular AP	WDS Bridge	AP Client
Static Connection			
Firewall & Filtering (a total of 64 entries available per option)			
Wired MAC Filtering	Disabled MAC Filtering		N.A.
· Access Control List	None (if above checked)		
Ethernet Type Filtering	Disabled Ethernet Type Filtering		
· Ethernet Type Filtering List	None (if above checked)		
IP Filtering	Disabled IP Filtering		
· IP Filtering List	None (if above checked)		
Management List	Disabled Management List		
Log Settings			
System Log Settings			
Enable Log Event to Flash	Disabled		
Log Level	2: (LOG_CRIT)		
Enable Syslog Server	Disabled		
IP Address	0.0.0.0		
Syslog Server Service Port	514		
Event Log	"syslog.in"		
System Setup			
Username	admin		
Old Password	default		
New Password			
Repeat new password			
Web Mode	HTTP		
Device name	Device's MAC Address		
NTP	Disabled		
NTP Server	pool.ntp.org		
Time Zone	GMT		
Daylight Saving Time Settings	Disabled		
Manual Time Settings	01 Jan 2000 01:25:37		
Alert Event	All unchecked		
Firmware Upgrade	Path directed to Desktop		
Backup & Restore Configuration			
System Status			
System Information	As Shown		
Site Monitor	Default table according to connection		
Wireless client table			N.A.
Traffic Log & Statistics			
DHCP Status	No DHCP entry		
Ping	10.0.50.2		

Note: you can press the "Reset" button on the front panel for 5 seconds to restore the AW5500C Series to the factory default settings.

4 Configuration and Setup

It is strongly recommended for the user to set the Network Parameters through **Device Management Utility**® first. Other device-specific configurations can later be carried out via Atop’s user-friendly Web-Interface.

4.1 Configuration of Network Parameters through Device Management Utility

Note: Advanced settings are not possible via Device Management Utility. This can be used to locate, access, modify network parameters, change login credentials or update firmware. For device-specific settings, please use Web Interface, as described later in this chapter.

Please install Atop’s configuration utility program called **Device Management Utility**® that comes with the Product CD or can be downloaded from our websites (www.atop.com.tw or www.atoponline.com). For more information on how to install **Device Management Utility**®, please refer to the manual that comes in the Product CD.

After you start **Device Management Utility**®, if the AW5500C Industrial Wireless Access Point is already connected to the same subnet as your PC, the device can be accessed via broadcast packets. **Device Management Utility**® will automatically detect your AW5500C device and list it on **Device Management Utility**®’s window.

Alternatively, if you did not see your AW5500C device on your network, press “Rescan” icon, a list of devices, including your AW5500C device currently connected to the network will be shown in the window of **Device Management Utility**® as shown in

No.	Caution	Model	IP Address	MAC Address	Host Name	Kernel	AP Information
1		AW5500C	10.0.50.200	00:60:E9:14:4F:40		V3.13	AW5500C V3.16 ^-^AW SSID:AW5500C

Figure 4.1.

No.	Caution	Model	IP Address	MAC Address	Host Name	Kernel	AP Information
1		AW5500C	10.0.50.200	00:60:E9:14:4F:40		V3.13	AW5500C V3.16 ^-^AW SSID:AW5500C

Figure 4.1 List of AW5500C in Device Management Utility Window

Note: This figure is for illustration purpose only. Actual values/settings may vary between devices.

Sometime the AW5500C device might not be in the same subnet as your PC; therefore, you will have to use Atop's utility to locate it in your virtual environment. To configure each device, first click to select the desired AW5500C device (default IP: 10.0.50.100) in the list of **Device Management Utility**®, and then click “**Configuration** → **Network...**” (or Ctrl+N) menu on **Device Management Utility**® as shown in Figure 4.2 or click on the second icon called **Network** on the menu icon bar, and a pop-up window will appear as shown in Figure 4.3.

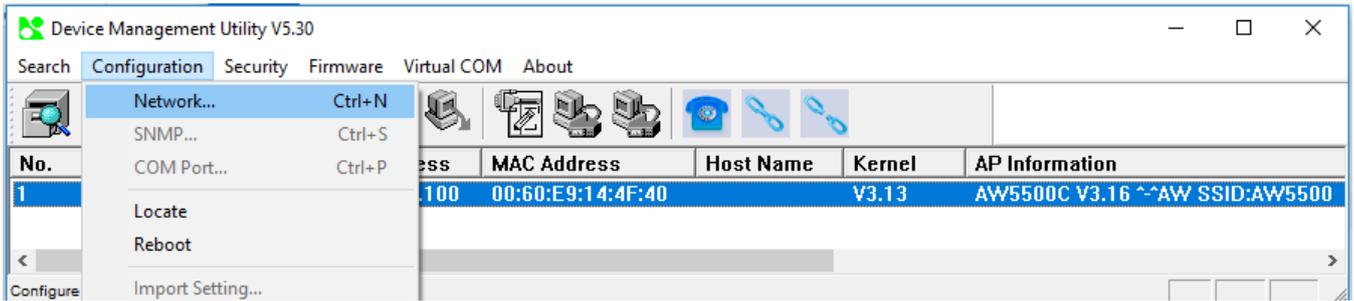


Figure 4.2 Pull-down Menu of Configuration and Network...

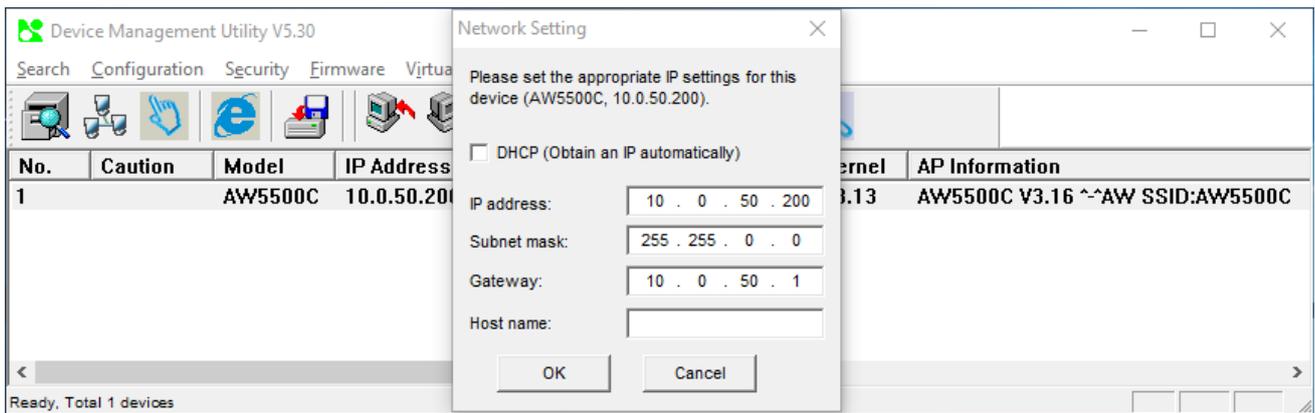


Figure 4.3 Pop-up Window of Network Setting

You may proceed then to change the IP address to avoid any IP address conflict with other hosts on your LAN or to connect the device to your existing LAN as shown in Figure 4.3. The system will prompt you for a credential to authorize the changes. It will ask you for the **Username** and the **Password** as shown in Figure 4.4. The default username is “**admin**”, while the default password is “**default**”. After clicking on the **Authorize** button, a notification window will pop-up as shown in Figure 4.5. and some device may be restarted. After the device is restarted (for some model), it will beep twice to indicate that the unit is running normally. Then, the AW5500C device can be found on a new IP address. It may be listed automatically by the **Device Management Utility**® or it can be found by clicking on the “**Rescan**” icon. Note that if you did not change the IP address but changed other parameter, you may encounter another notification window as shown in Figure 4.6.

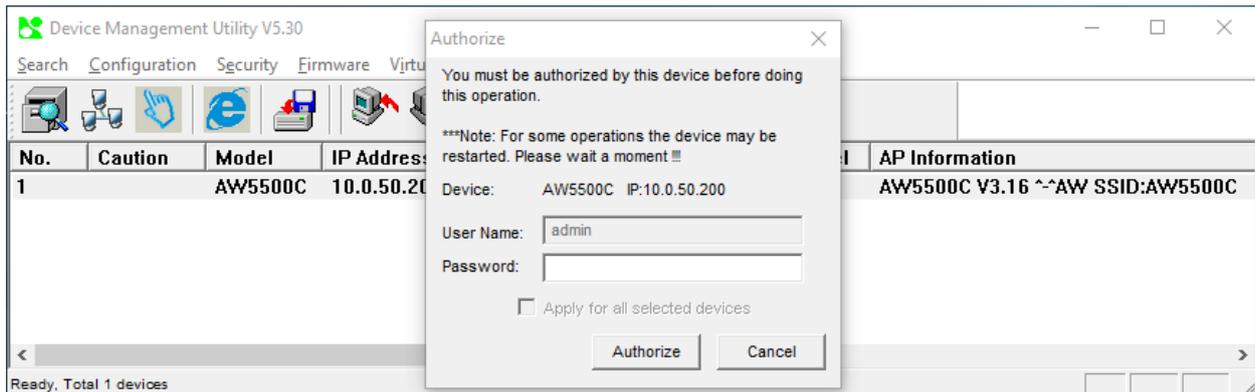


Figure 4.4 Authorization for Change of Network Settings

Note: Please consult your system administrator if you do not know your network's subnet mask and gateway address.

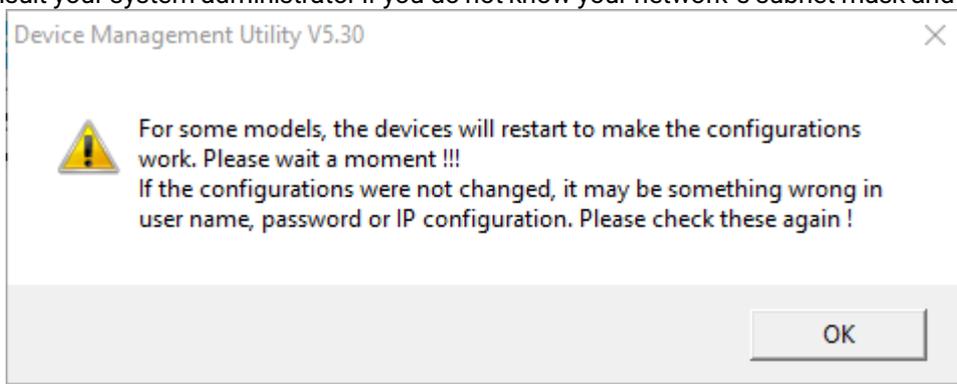


Figure 4.5 Pop-up Notification Window after Authorization

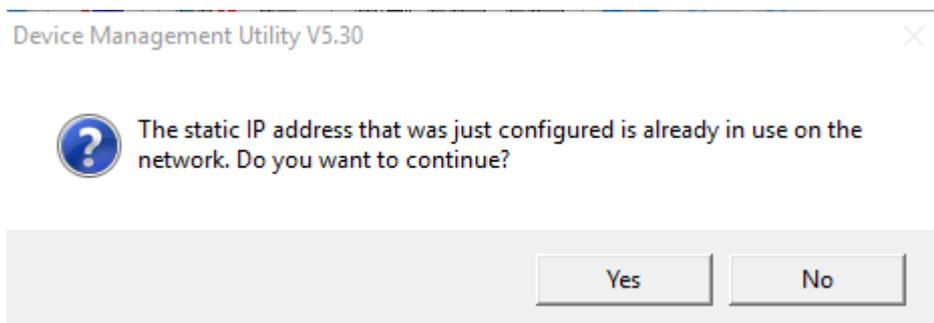


Figure 4.6 Pop-up Notification Window when there is the same IP address in the Network

4.2 Configuring through Web Interface

Each AW5500C Industrial Wireless Access Point is equipped with a built-in web server in the firmware. Therefore, the device can be accessed by using a web browser for configuring by entering the device's IP address (default IP address is 10.0.50.200) in the URL field of your web browser. An authentication will be required and you will have to enter the **username** (Default value is "admin") and **password** (Default value is "default") for accessing the web interface as shown in Figure 4.7. It is highly recommended to change the default password for your device to enhance its security.

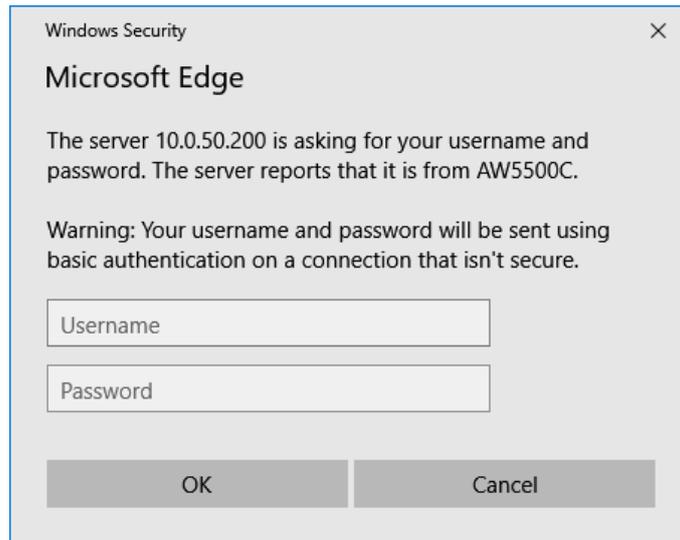


Figure 4.7 Authentication Required for Accessing Web Interface

Figure 4.8 illustrates the Operation Mode page of the web interface. This page is the first page that you will see after a successful login. The left side of the screen is a menu-tree in which you can click on each menu item for particular configuration of AW5500C. The right side of the display will change according to the selected menu on the left. For Operation Mode menu, you will see the Overview page that display the current Operation Mode of AW5500C.

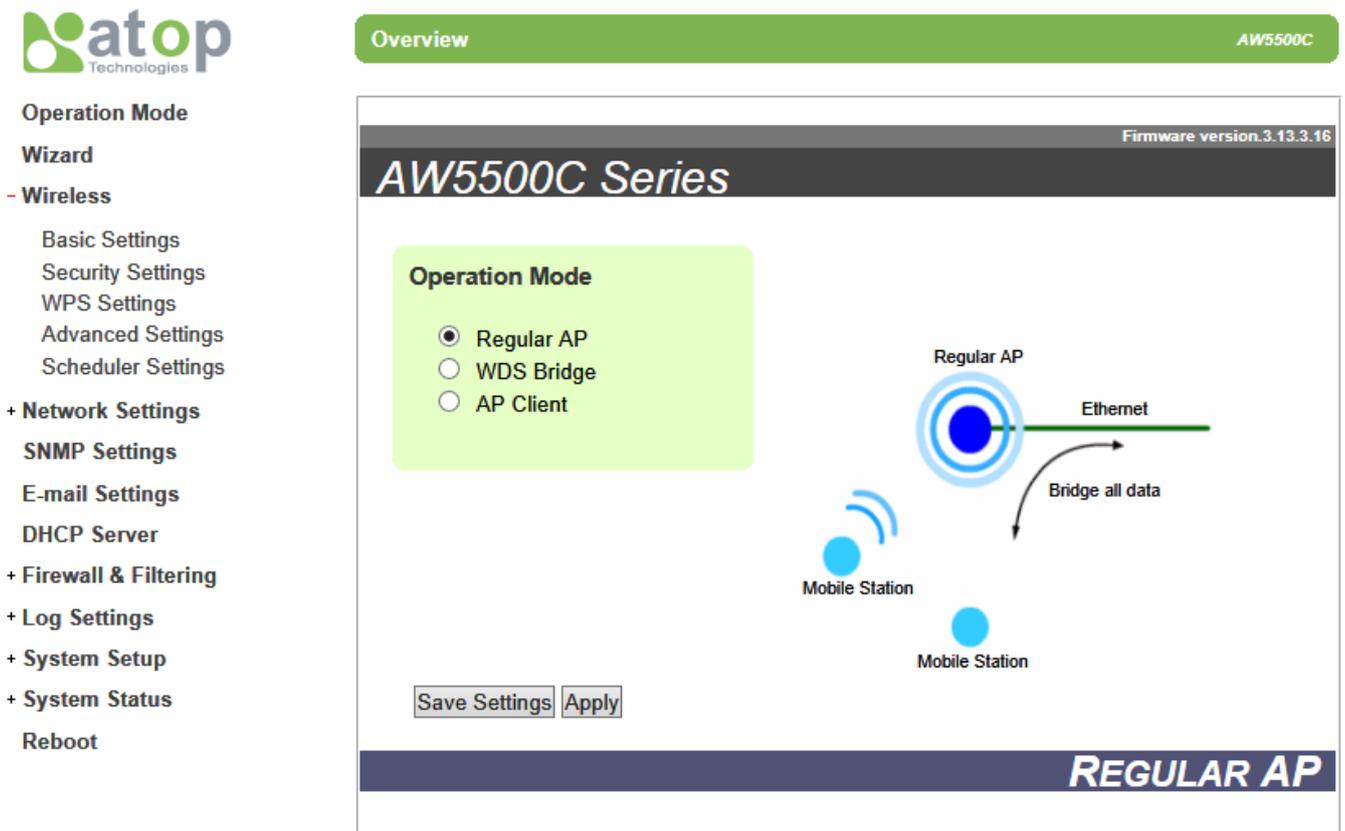


Figure 4.8 Operation Mode Web Page of AW5500C Industrial Wireless Access Point

Figure 4.9 lists all the menus and submenus for web configuration. Please see Section 3.5 for default values.

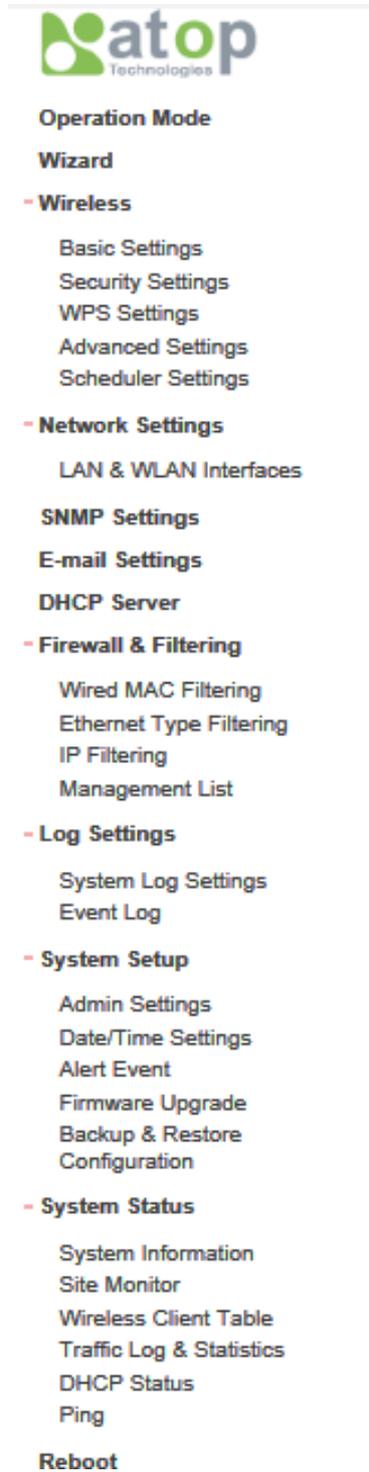
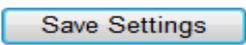


Figure 4.9 Map of Configuring Web Page on AW5500C Industrial Wireless Access Point

In general, there will be three buttons which will be present at the end of each configuration web page. Table 3.1 summarizes the function of each button.

Table 4.1 Function of buttons on configuration web page

Button	Function
	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 settings.

This approach for configuring your device is the most user-friendly. It is the most recommended and the most common method used for AW5500C Industrial Wireless Access Point. Please go to its corresponding section for a detailed explanation of each menu option.

4.3 *Configuring Automatic IP Assignment with DHCP*

A DHCP server can automatically assign IP addresses, Subnet Mask and Network Gateway to LAN interface. You can simply check the "DHCP (Obtain an IP Automatically)" checkbox in the Network Setting dialog as shown in Figure 4.3 using Atop's **Device Management Utility**© and then restart the device. Once restarted, the IP address will be configured automatically.

4.4 Operation Mode

AW5500C Industrial Wireless Access Point can be set to operate in one of the three different **Operation Modes: Regular AP, WDS Bridge, and AP Client**. The mode of AW5500C can be set under the **Operation Mode** web page which is the first page after logging in to the web interface as shown in Figure 4.10. Explanation and how to configure each operation mode will be described in Section 4.5 and in Chapter 5.

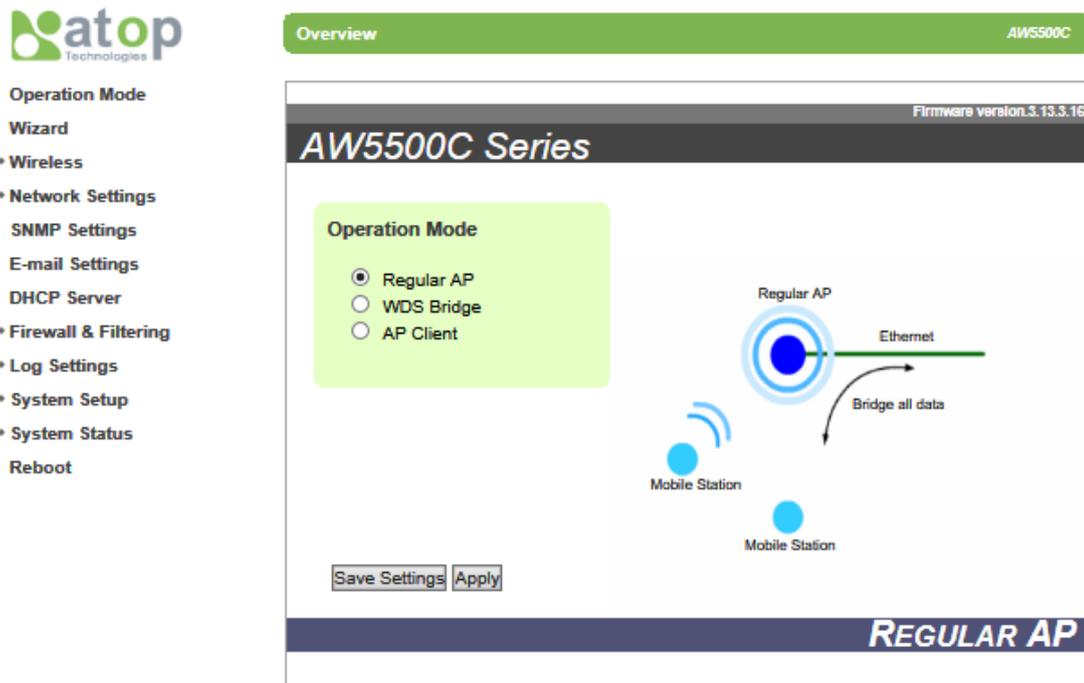


Figure 4.10 Operation Mode Web Page

When choosing different operation mode, the animated figure on the right side of the window will change according to the choice of your **Operation Mode**. The **Regular AP** mode is a typical wireless local area network (WLAN) operation of the access point where the AW5500C will accept the association of one or more **Mobile Stations** and will allow the mobile stations to access the wired local area network such as Ethernet. All the data will be relayed through the AW5500C. Figure 4.11 Illustrates the Regular AP operation mode.

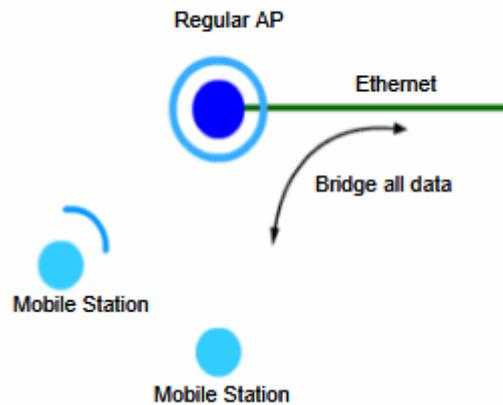


Figure 4.11 Animation of Regular AP Operation Mode

The **WDS** (Wireless Distribution System) **Bridge** operation mode is the second mode that AW5500C can be operated. In this mode, the AW5500C will help extend the coverage or range of the WLAN of its Peer AP as shown in Figure 4.12.

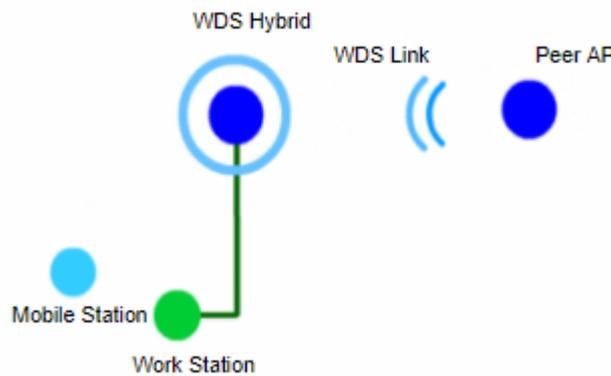


Figure 4.12 Animation of WDS Bridge Operation Mode

The **AP Client** operation mode is the third mode that AW5500C can be selected. In this mode, the AW5500C will act as a wireless client of another access point (AP). It will not extend the coverage of the WLAN but it will allow a wired device which is connected to its Ethernet port to access the wireless network of another AP as shown in Figure 4.13.

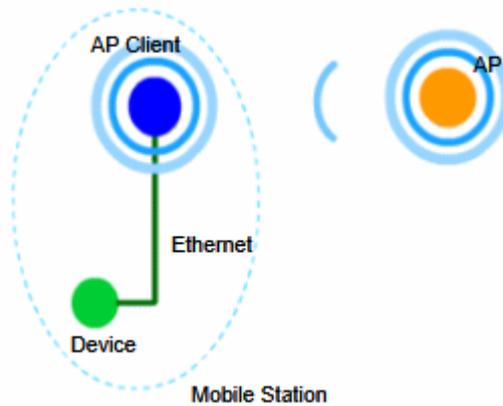


Figure 4.13 Animation of AP Client Operation Mode

Note that after selecting the desired operation mode, please click on the **Save Setting** button and then the **Apply** button.

4.5 Wizard

To simplify the configuration process of AW5500C Industrial Wireless Access Point, the web interface has the **Wizard** web page allocated for quick setup. The **Wizard** will help guide the user through most common settings of the AW5500C in each operation mode. Each option on each page of the **Quick Setup Wizard** will have a short description under its to help the user to decide the suitable configuration option. The user might find that it is sufficient to follow the Wizard and setup the AW5500C without going through the rest of this user manual. However, this setup is only applicable for most basic setups in each mode. The following subsections are the walk-through for each operation mode setup.

4.5.1 Regular AP

To use the **Quick Setup Wizard** to configure **Regular AP** operation mode, select the **Regular AP** radio button as shown in Figure 4.14. Then click **Next** button to proceed to the next configuration step.

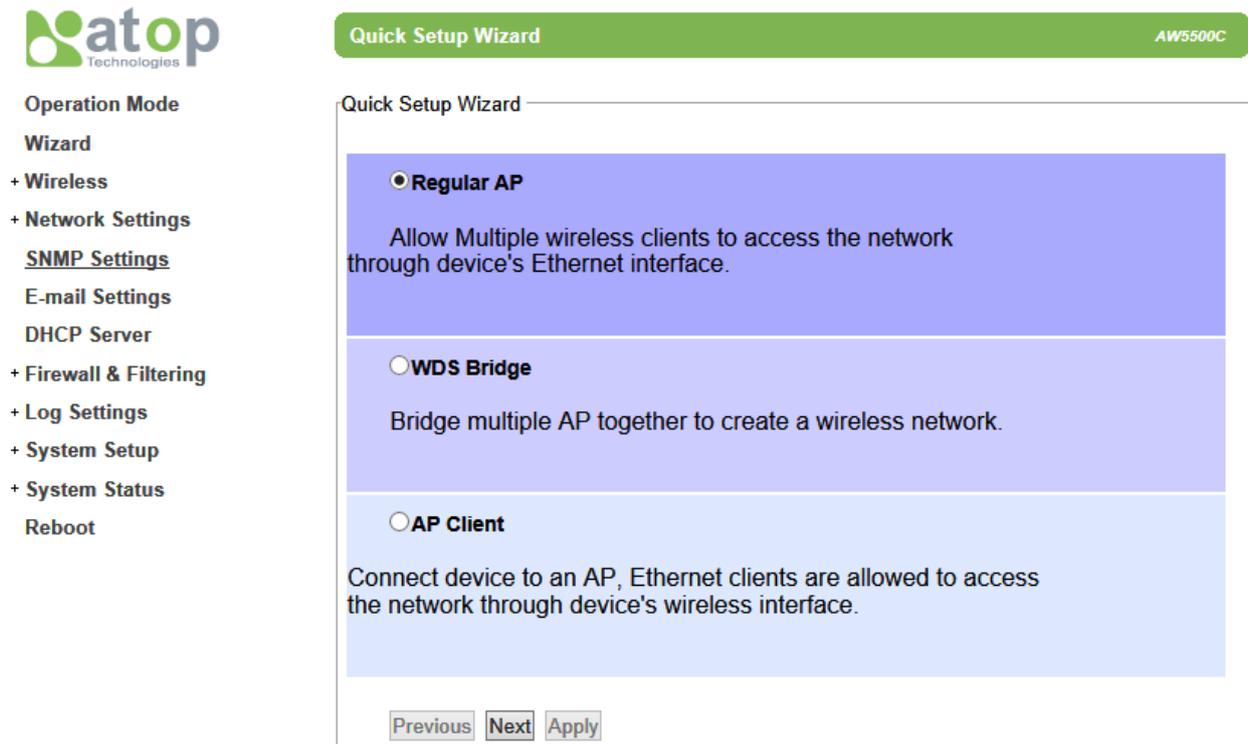


Figure 4.14 Selection of Regular AP Operation Mode Option in Wizard Web Page

The second wizard web page for **Regular AP** operation mode is shown in **Error! Reference source not found.** On this page, the user will have to configure **SSID**, **Regulatory Domain**, **Wireless Mode**, **Bandwidth**, and **Channel**. First, the **SSID** or Service Set Identifier is the name of the network that the user assigns to this AW5500C AP. Second, the **Regulatory Domain** is the region in which the AP will be operated. This will dictate the frequencies and radio channel that can be selected for the AP so that the AP will comply to the radio frequency standard of that particular region. Third, the **Wireless Mode** is the IEEE standard of WLAN in which the AP will be operated. This also includes the possibility of frequency range that the AP can support for your mobile client. Fourth, the **Bandwidth** is the occupied channel bandwidth or number of radio channels that the AP will be used for data communication. The wider the channel bandwidth, the faster the data rate or higher throughput. However, it may not be suitable for very crowded environment where multiple non-overlapping channels are required to reduce interference among multiple APs. Finally, the **Channel** is the channel number of the AP which depends on the selections of **Regulatory Domain** and **Wireless Mode**. Table 4.2 summarizes the description of each option on this second **Quick Setup Wizard** web page for **Regular AP** operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

Quick Setup Wizard
AW5500C

Quick Setup Wizard

SSID

SSID is also known as network name. It is the name that device will broadcast wirelessly and the name that your wireless client would see.

Regulatory Domain

Select the regulatory domain that AP should comply to. Different domains would result in different frequencies/channels being allowed.

Wireless Mode

Select 802.11b/g/n to maximize your Link Speed up to 300 Mbps. 802.11b/g/n operates in the 2.4Ghz frequency range and is often crowded and easily interfered by Bluetooth/Zigbee/Microwave.

BandWidth

802.11n allows an AP to occupy up to 40Mhz channel bandwidth. This means that if 40Mhz (HT40) is enabled, AW5500 would use two channels to transmit its data.

Channel

Figure 4.15 Second Wizard Web Page for Regular AP Operation Mode

Table 4.2 Description of Wireless Configuration in Second Quick Setup Wizard Web Page for Regular AP

Field Name	Description	Default Value
SSID	Network name for WLAN which is assigned by the network administrator.	AW5500C
Regulatory Domain	EU (ETSI2_WORLD), TW (APL3_FCCA), US (FCC5_FCCA), CN (APL1_WORLD)	EU(ETSI2_WORLD)
Wireless Mode	2.4 GHz: IEEE 802.11b only, IEEE 802.11b/g, or IEEE 802.11b/g/n,	802.11b/g/n
Bandwidth	20 MHz or Auto 20/40 MHz	Auto 20/40 MHz
Channel	2.4 GHz: channel 1 to 11 or channel 1 to 13 depending on the Regulatory Domain	1

The third wizard web page for **Regular AP** operation mode is shown in Figure 4.16. This page is dedicated for security mechanisms of the AP which consist of **Authentication** and **Encryption Type**. The authentication is the protocol in which the AP will be using to verify the authorized mobile client to connect to the AP. There are three possible options to choose from which are **OPEN**, **WPA-PSK**, and **WPA2-PSK**. The encryption is the mechanism or protocol used to

hide communicated data over the wireless channel from eavesdropping. If the **Authentication** protocol is chosen as **OPEN**, the **Encryption Type** will not be enabled. When the **Authentication** is either **WPA-PSK** or **WPA2-PSK**, the user can select the **Encryption Type** as either **TKIP** (Temporal Key Integrity Protocol) or **AES** (Advanced Encryption Standard). Note that it is highly recommended to select the highest security mechanism on the AP which are the **WPA2-PSK** with **AES**. Note that when **WPA-PSK** or **WPA2-PSK** are selected and the **Encryption Type** is already chosen, the user will also need to enter **WPA PassPhrase** which is a group of characters that must be either 8 to 63 ASCII characters or 64 digits of hexadecimal number as shown in Figure 4.17. Table 4.3 summarizes the security parameters for Regular AP operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

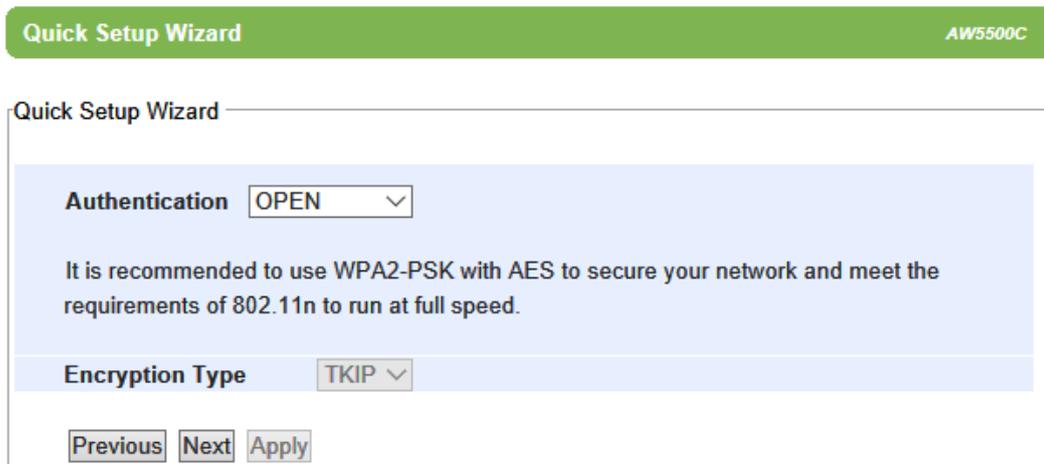


Figure 4.16 Third Wizard Web page for Regular AP Operation Mode

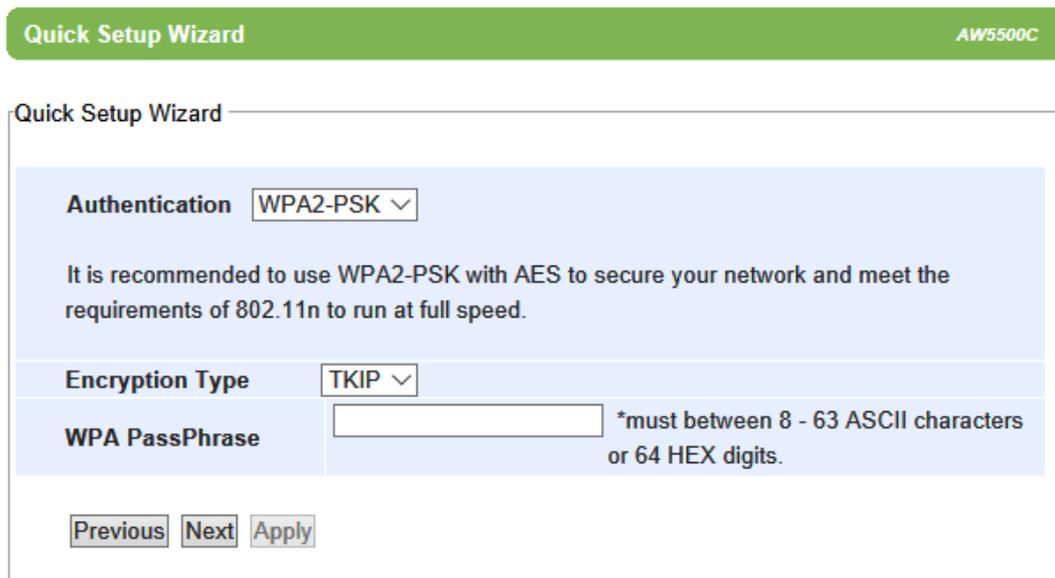


Figure 4.17 WPA Pass Phrase Field

Table 4.3 Description of Security Configuration in Third Quick Setup Wizard Web Page for Regular AP

Field Name	Description	Default Value
Authentication	Mode of authentication for WLAN which can be Open , WPA-PSK , or WPA2-PSK .	Open
Encryption Type	Only enabled for WPA-PSK and WPA2-PSK and has two options: TKIP (Temporal Key Integrity Protocol) or AES (Advanced Encryption Standard)	-
WPA PassPhrase	This is a user defined string which must be ASCII format between 8 and 63 characters or 64 digits of hexadecimal number.	-

The fourth wizard web page for **Regular AP** operation mode is for setting up the network interfaces of the AP. Figure 4.18 displays the interface options. The user can manually set the **IP Address**, **Subnet Mask** and **Default Gateway** for the LAN interface under the **Manual Settings** part. Alternatively, the LAN and WLAN interfaces can automatically set its **IP Address** and other parameters via **DHCP** (Dynamic Host Configuration Protocol) by checking the box behind the DHCP option under the **LAN & WLAN Interfaces** part.

Table 4.4 summarizes the network configuration for the **Regular AP** operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

LAN & WLAN Interfaces

DHCP Obtain an IP Address Automatically.

Manual Settings

IP Address

Subnet Mask

Default Gateway

Figure 4.18 Fourth Wizard Web Page for Regular AP Operation Mode

Table 4.4 Description of Network Configuration in Fourth Quick Setup Wizard Web Page for Regular AP

Field Name	Description	Default Value
DHCP	This option is used to enable or disable DHCP (Dynamic Host Configuration Protocol) client feature on the AP (AW5500C)	Disable
IP Address	This is the IP address on the LAN interface of the AP (AW5500C).	10.0.50.200
Subnet Mask	This is the subnet mask on the LAN interface of the AP (AW5500C).	255.255.0.0
Default Gateway	This is the default gateway of the LAN interface of the AP (AW5500C).	10.0.50.1

The last page for **Regular AP's Quick Setup Wizard** is shown in Figure 4.19. Here you will be informed that the configuration process is **Done**. Note that the **Apply** button is enabled. Please click on the **Apply** button if you finish configuring the AW5500C as **Regular AP**. Otherwise, click the **Previous** button to go back to previous step or web page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

Done

Apply and Reboot (if required).

Figure 4.19 Last Wizard Web Page for Regular AP Operation Mode

4.5.2 WDS Bridge

To use the **Quick Setup Wizard** to configure **WDS Bridge** operation mode, select the **WDS Bridge** radio button as shown in Figure 4.20. Then click **Next** button to proceed to the next configuration step.

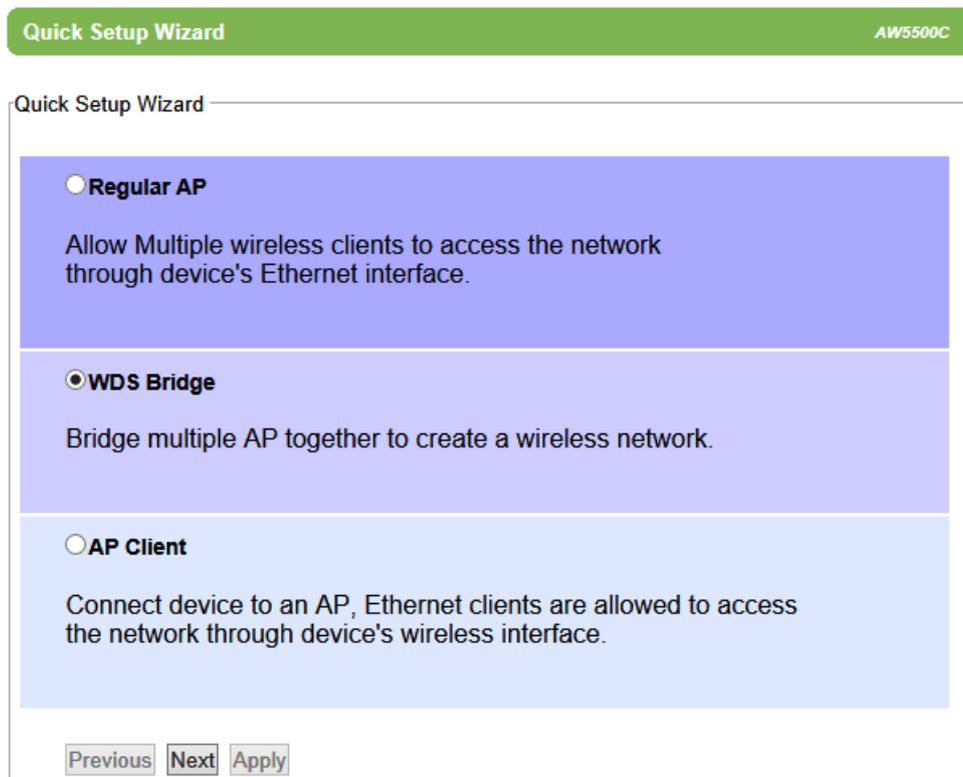


Figure 4.20 Selection of WDS Bridge Operation Mode Option in Wizard Web Page

The second wizard web page for **WDS Bridge** operation mode is shown in Figure 4.21 and Figure 4.22. On this page, the user will have to configure **SSID**, **WDS Mode**, **Regulatory Domain**, **Wireless Mode**, **Bandwidth**, and **Channel**. First, the **SSID** or Service Set Identifier is the name of the network that the user assigns to this AW5500C. Second, the **WDS Mode** is the option that defines how the AW5500C will take part in a WDS network. The AW5500C can be one of the following roles: **Root AP**, **Hybrid**, or **Station**. Note that there can only be one Root AP in the WDS network. When Hybrid mode or Station mode is selected, the Root/Hybrid AP's MAC's address must be filled in. Third, the **Regulatory Domain** is the region in which the AP will be operated. This will dictate the frequencies and radio channel that can be selected for the AP so that the AP will comply to the radio frequency standard of that particular region. Fourth, the **Wireless Mode** is the IEEE standard of WLAN in which the AP will be operated. This also includes the possibility of frequency range that the AP can support for your mobile client. Fifth, the **Bandwidth** is the occupied channel bandwidth or number of radio channels that the AP will be used for data communication. The wider the channel bandwidth, the faster the data rate or higher throughput. However, it may not be suitable for very crowded environment where multiple non-overlapping channels are required to reduce interference among multiple APs. Finally, the **Channel** is the channel number of the AP which depends on the selections of **Regulatory Domain** and **Wireless Mode**. Table 4.5 summarizes the description of each option on this second **Quick Setup Wizard** web page for **WDS Bridge** operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

SSID

SSID is also known as network name. It is the name that device will broadcast wirelessly and the name that your wireless client would see.

WDS Mode Root AP Hybrid Station

Select which role AP should play in the WDS network. Keep in mind that there should be one and only one Root AP in the WDS network, Repeaters and Stations all connect to the Root AP.

Root/Hybrid AP MAC: : : : : :

Regulatory Domain ▾

Select the regulatory domain that AP should comply to. Different domains would result in different frequencies/channels being allowed.

Wireless Mode ▾

Select 802.11b/g/n to maximize your Link Speed up to 300 Mbps. 802.11b/g/n operates in the 2.4Ghz frequency range and is often crowded and easily interfered by Bluetooth/Zigbee/Microwave.

BandWidth ▾

802.11n allows an AP to occupy up to 40Mhz channel bandwidth. This means that if 40Mhz (HT40) is enabled, AW5500 would use two channels to transmit its data.

Figure 4.21 Second Wizard Web Page for WDS Bridge Operation Mode (Upper Part)



Figure 4.22 Second Wizard Web Page for WDS Bridge Operation Mode (Lower Part)

Table 4.5 Description of Wireless Configuration in Second Quick Setup Wizard Web Page for WDS Bridge

Field Name	Description	Default Value
SSID	Network name for WLAN which is assigned by the network administrator.	AW55XX
WDS Mode	This defines the role that the AW5500C will assume in Wireless Distribution System, which it can be Root AP, Hybrid or, Station.	Root AP
Regulatory Domain	EU (ETSI2_WORLD), TW (APL3_FCCA), US (FCC5_FCCA), CN (APL1_WORLD)	EU (ETSI2_WORLD)
Wireless Mode	2.4 GHz: IEEE 802.11b only, IEEE 802.11b/g, or IEEE 802.11b/g/n	802.11b/g/n
Bandwidth	20 MHz or Auto 20/40 MHz	Auto 20/40 MHz
Channel	2.4 GHz: channel 1 to 11 or channel 1 to 13 depending on the Regulatory Domain	1

The third wizard web page for **WDS Bridge** operation mode is shown in Figure 4.23. This page is dedicated for security mechanisms of the AP which consist of **Authentication** and **Encryption Type**. The authentication is the protocol in which the AP will be using to verify the authorized mobile client to connect to the AP. There are three possible options to choose from which are **OPEN**, **WPA-PSK**, and **WPA2-PSK**. The encryption is the mechanism or protocol used to hide communicated data over the wireless channel from eavesdropping. If the **Authentication** protocol is chosen as **OPEN**, the **Encryption Type** will not be enabled. When the **Authentication** is either **WPA-PSK** or **WPA2-PSK**, the user can select the **Encryption Type** as either **TKIP** (Temporal Key Integrity Protocol) or **AES** (Advanced Encryption Standard). Note that it is highly recommended to select the highest security mechanism on the AP which are the **WPA2-PSK** with **AES**. Note that when **WPA-PSK** or **WPA2-PSK** are selected and the **Encryption Type** is already chosen, the user will also need to enter **WPA PassPhrase** which is a group of characters that must be either 8 to 63 ASCII characters or 64 digits of hexadecimal number as shown in Figure 4.17 (of previous subsection). Table 4.3 summarizes the security parameters which are also applicable for WDS Bridge operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

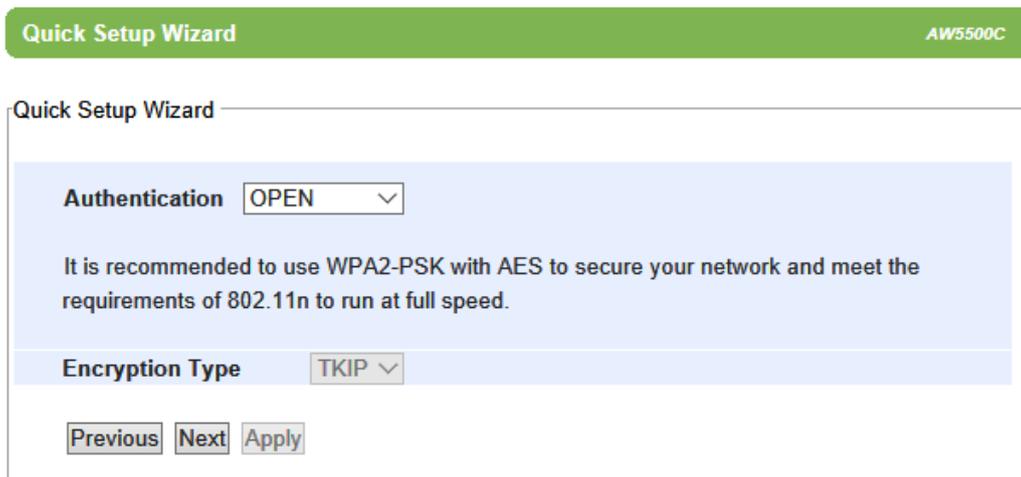


Figure 4.23 Third Wizard Web page for WDS Bridge Operation Mode

The fourth wizard web page for **WDS Bridge** operation mode is for setting up the network interfaces of the AP. Figure 4.24 displays the interface options. The user can manually set the **IP Address**, **Subnet Mask** and **Default Gateway** for the LAN interface under the **Manual Settings** part. Alternatively, the LAN and WLAN interfaces can automatically set its **IP Address** and other parameters via **DHCP** (Dynamic Host Configuration Protocol) by checking the box behind the DHCP option under the **LAN & WLAN Interfaces** part.

Table 4.4 (in previous subsection) summarizes the network configuration which is also applicable for the **WDS Bridge** operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

LAN & WLAN Interfaces

DHCP Obtain an IP Address Automatically.

Manual Settings

IP Address	10.0.50.200
Subnet Mask	255.255.0.0
Default Gateway	10.0.50.1

Figure 4.24 Fourth Wizard Web Page for WDS Bridge Operation Mode

The last page for **WDS Bridge's Quick Setup Wizard** is shown in Figure 4.25. Here you will be informed that the configuration process is **Done**. Note that the **Apply** button is enabled. Please click on the **Apply** button if you finish configuring the AW5500C as **WDS Bridge**. Otherwise, click the **Previous** button to go back to previous step or web page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

Done

Apply and Reboot (if required).

Figure 4.25 Last Wizard Web Page for WDS Bridge Operation Mode

4.5.3 AP Client

To use the **Quick Setup Wizard** to configure **AP Client** operation mode, select the **AP Client** radio button as shown in Figure 4.20. Then click **Next** button to proceed to the next configuration step.

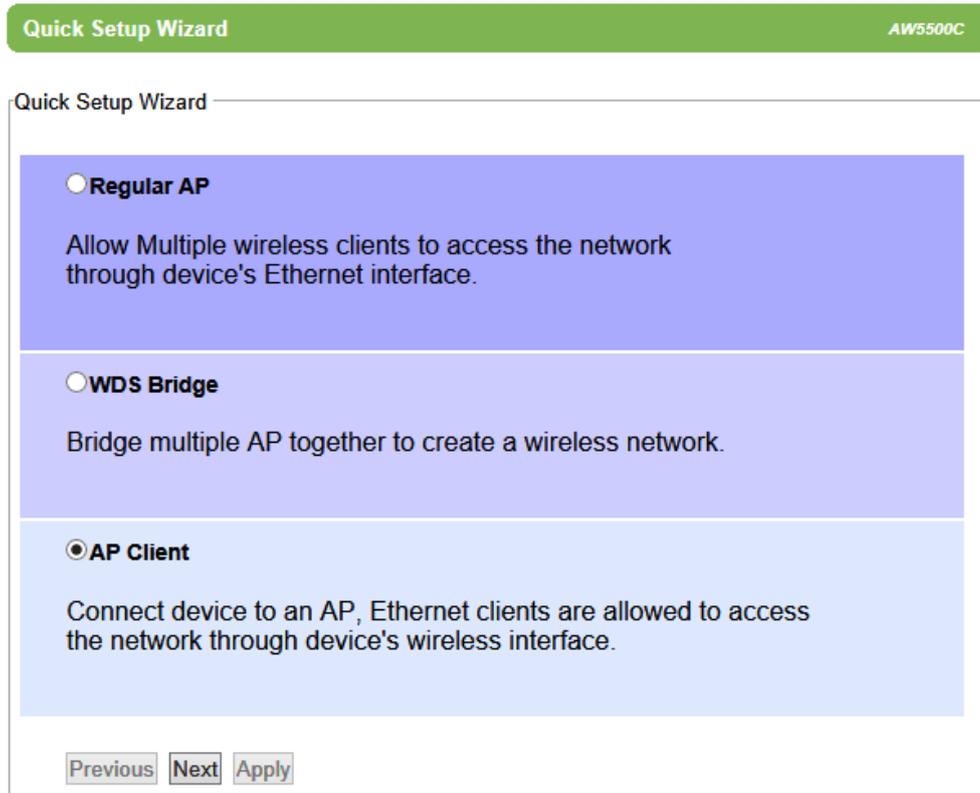


Figure 4.26 Selection of AP Client Operation Mode Option in Wizard Web Page

The second wizard web page for **AP Client** operation mode is shown in Figure 4.27. On this page, the user will have to configure **SSID**, and **Regulatory Domain**. First, the **SSID** or Service Set Identifier is the name of the network that this **AP Client** will join. Second, the **Regulatory Domain** is the region in which this **AP Client** will be operated. This will dictate the frequencies and radio channel that can be selected for the **AP Client** so that the **AP Client** will comply to the radio frequency standard of that particular region. Note that for available options of Regulatory Domain, please see the information in Table 4.5. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

The screenshot shows the 'Quick Setup Wizard' interface for the AW5500C. The title bar is green with 'Quick Setup Wizard' on the left and 'AW5500C' on the right. The main content area is light blue and contains the following elements:

- SSID:** A text input field containing 'AW5500C' and a 'scan network' button to its right.
- Text:** 'SSID is also known as network name. It is the name that device will broadcast wirelessly and the name that your wireless client would see.'
- Regulatory Domain:** A dropdown menu currently set to 'EU (ETSI2_WORLD)'.
- Text:** 'Select the regulatory domain that AP should comply to. Different domains would result in different frequencies/channels being allowed.'
- Buttons:** 'Previous', 'Next', and 'Apply' buttons at the bottom.

Figure 4.27 Second Wizard Web Page for AP Client Operation Mode

The third wizard web page for **AP Client** operation mode is shown in Figure 4.28. This page is dedicated for security mechanisms of the **AP Client**, which consist of **Authentication** and **Encryption Type**. The authentication is the protocol in which the AP will be using to verify the authorized **AP Client** to connect to that AP. There are three possible options to choose from which are **OPEN**, **WPA-PSK**, and **WPA2-PSK**. The encryption is the mechanism or protocol used to hide communicated data over the wireless channel from eavesdropping. If the **Authentication** protocol is chosen as **OPEN**, the **Encryption Type** will not be enabled. When the **Authentication** is either **WPA-PSK** or **WPA2-PSK**, the user can select the **Encryption Type** as either **TKIP** (Temporal Key Integrity Protocol) or **AES** (Advanced Encryption Standard). Note that it is highly recommended to select the highest security mechanism on the **AP Client** which are the **WPA2-PSK** with **AES**. Note that when **WPA-PSK** or **WPA2-PSK** are selected and the **Encryption Type** is already chosen, the user will also need to enter **WPA PassPhrase** which is a group of characters that must be either 8 to 63 ASCII characters or 64 digits of hexadecimal number as shown in Figure 4.17 (of previous subsection). Table 4.3 summarizes the security parameters which are also applicable for AP Client operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

The screenshot shows the 'Quick Setup Wizard' interface for the AW5500C. The title bar is green with 'Quick Setup Wizard' on the left and 'AW5500C' on the right. The main content area is light blue and contains the following elements:

- Authentication:** A dropdown menu currently set to 'OPEN'.
- Text:** 'It is recommended to use WPA2-PSK with AES to secure your network and meet the requirements of 802.11n to run at full speed.'
- Encryption Type:** A dropdown menu currently set to 'TKIP'.
- Buttons:** 'Previous', 'Next', and 'Apply' buttons at the bottom.

Figure 4.28 Third Wizard Web page for AP Client Operation Mode

The fourth wizard web page for **AP Client** operation mode is for setting up the network interfaces of the **AP Client**. Figure 4.29 displays the interface options. The user can manually set the **IP Address**, **Subnet Mask** and **Default Gateway** for the LAN interface under the **Manual Settings** part. Alternatively, the LAN and WLAN interfaces can automatically set its **IP Address** and other parameters via **DHCP** (Dynamic Host Configuration Protocol) by checking the box behind the DHCP option under the **LAN & WLAN Interfaces** part.

Table 4.4 (in previous subsection) summarizes the network configuration which is also applicable for the **AP Client** operation mode. When you finish setting up all options on this page, click on the **Next** button to proceed to the next step. Otherwise, click the **Previous** button to go back to previous step or web page. Note that the **Apply** button is still not active on this page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

LAN & WLAN Interfaces

DHCP Obtain an IP Address Automatically.

Manual Settings

IP Address	10.0.50.200
Subnet Mask	255.255.0.0
Default Gateway	10.0.50.1

Figure 4.29 Fourth Wizard Web Page for AP Client Operation Mode

The last page for **AP Client's Quick Setup Wizard** is shown in Figure 4.30. Here you will be informed that the configuration process is **Done**. Note that the **Apply** button is enabled. Please click on the **Apply** button if you finish configuring the AW5500C as **AP Client**. Otherwise, click the **Previous** button to go back to previous step or web page.

Quick Setup Wizard AW5500C

Quick Setup Wizard

Done

Apply and Reboot (if required).

Figure 4.30 Last Wizard Web Page for AP Client Operation Mode

4.6 Wireless

AW5500C Industrial Wireless Access Point supports a set of IEEE 802.11 standards for Wireless Local Area Network (WLAN) communication only at 2.4 GHz ISM band. It complies with the following standards:

- IEEE 802.11b is actually the first WLAN standards created before the IEEE 802.11a. It supports the maximum data rate of 11 Mbps (actual throughput is approximately 4~5 Mbps) at 2.4 GHz ISM band. It provides wireless networking that can replace traditional wired network such Ethernet without having to connect a cable. However, the IEEE 802.11b has less throughput performance and very crowded environment when compared to IEEE 802.11a which is a newer standard at 5 GHz ISM band. Note that AW5500C does not support IEEE 802.11a which can operate at 5GHz ISM band.
- IEEE 802.11g is another standard that operates at 2.4GHz using newer modulation technique called Orthogonal Frequency Division Multiplexing (OFDM) which allows it to transmit more data through the same radio channel or bandwidth used by the IEEE 802.11b. The maximum data rate is 54 Mbps (actual throughput is approximately 20 Mbps).
- IEEE 802.11n is the standard that improves the throughput of the WLAN system by utilizing multiple wireless signals and antennas (called Multiple Input Multiple Output (MIMO) Technology).

The user can use **Wireless** menu described in this section to configure various configuration of the wireless local area network. Under the Wireless menu as listed in Figure 4.31, there are five configurable web pages which are **Basic Settings**, **Security Settings**, **WPS Settings**, **Advanced Settings**, and **Scheduler Settings**. When the **Operation Mode** is changed to **WDS Bridge or AP Client**, the **Wireless** menu will be reduced to the menu listed in Figure 4.32 and Figure 4.33, respectively. Note that the new web pages are **WDS Settings**, **Profiles** and **Mobile Station**. The following subsections will describe each web page in details.

```
- Wireless
  Basic Settings
  Security Settings
  WPS Settings
  Advanced Settings
  Scheduler Settings
```

Figure 4.31 Wireless Menu for Regular AP Operation Mode

```
- Wireless
  Basic Settings
  WDS Settings
  Advanced Settings
```

Figure 4.32 Wireless Menu for WDS Bridge Operation Mode

```
- Wireless
  Profiles
  Mobile Station
  Advanced Settings
```

Figure 4.33 Wireless Menu for AP Client Operation Mode

4.6.1 Basic Settings

Under the **Basic Settings** web page, you can configure basic parameters for setting up a wireless network using AW5500C Industrial Wireless Access Point. Figure 4.34 depicts the **Basic Settings** web page under the **Wireless** menu. Table 4.6 briefly describes each option under the **Basic Settings**. Additionally, each option will be described in details as follows.

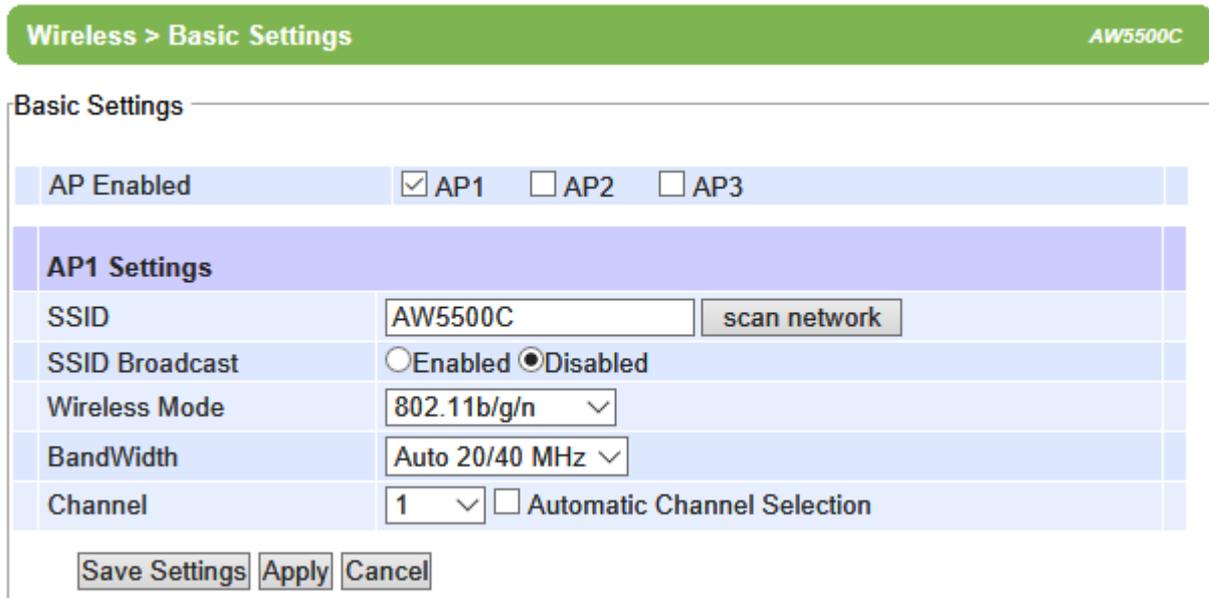


Figure 4.34 Basic Settings Web Page under Wireless Menu

Table 4.6 Brief Description of Each Options in Basic Settings

Field Name	Description	Default Value
AP Enabled	Logical APs that can be enabled: AP1, AP2, and AP3.	AP1 is enabled
SSID	Network name	AW5500C
SSID Broadcast	AW5500C can enable or disable the broadcasting of SSID	Enable
Wireless Mode	Selection of IEEE 802.11 standards that AW5500C will operate	802.11b/g/n
Bandwidth	The width of the bandwidth used by the AP	Auto 20/40 MHz
Channel	The channel number in 2.4 GHz ISM band according to the Wireless Mode selection.	1 (Automatic Channel Selection box checked)

AP Enabled (Radio On): AW5500C can support up to three simultaneous logical networks from one physical hardware. There are **AP1**, **AP2**, and **AP3** which can be setup by checking the corresponding box for each logical AP behind the **AP Enabled** option. However, **AP2** and **AP3** can be enabled only when **AP1** is enabled. Figure 4.34 shows that only **AP1** is enabled. Under the **AP1 Settings** section, there is a list of basic parameters that can be set for **AP1** which are **SSID**, **SSID Broadcast**, **Wireless Mode**, **Bandwidth**, and **Channel**. Figure 4.35 displays an example when all three APs are enabled. Note that only SSID and SSID Broadcast can be set for **AP2** and **AP3**. All three logical APs will share the same **Wireless Mode**, **Bandwidth**, and **Channel** parameters. When all three APs are disabled, wireless radio will be turned off completely.

Wireless > Basic Settings AW5500C

Basic Settings

AP Enabled	<input checked="" type="checkbox"/> AP1	<input checked="" type="checkbox"/> AP2	<input checked="" type="checkbox"/> AP3
AP1 Settings			
SSID	<input type="text" value="AW5500C"/>	<input type="button" value="scan network"/>	
SSID Broadcast	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled		
Wireless Mode	<input type="text" value="802.11b/g/n"/>		
BandWidth	<input type="text" value="Auto 20/40 MHz"/>		
Channel	<input type="text" value="1"/>	<input type="checkbox"/> Automatic Channel Selection	
AP2 Settings			
SSID	<input type="text" value="AW5500C_2"/>		
SSID Broadcast	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled		
AP3 Settings			
SSID	<input type="text" value="AW5500C_3"/>		
SSID Broadcast	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled		

Figure 4.35 Basic Settings with All Three APs Enabled

SSID: SSID specifies the AW5500C device’s wireless network name that other wireless devices should use in order to associate with this AP (AW5500C). Each AP (**AP1**, **AP2**, and **AP3**) can have their own SSID for better wireless network management. You can use the “**Scan network**” function to learn about the different SSIDs and channel numbers in the device’s surroundings, please be patient as this process might take as long as 10 seconds as shown in

Figure 4.36. Once it has finished scanning, names and basic properties of neighboring networks will be shown as listed in Figure 4.37. When no neighbors have been found, the web page will show as in Figure 4.38. Keep in mind that the SSID should be unique unless wireless roaming is required.



Figure 4.36 Message and animation while AW5500C performs wireless network scanning.

	SSID	MAC Address	*T	Mode	Channel	Authentication	Encryption	Mbps	Signal%
<input checked="" type="radio"/>	Bar	00:09:0F:	Infra	b/g/n	1	WPA-PSK	AES	130	4
<input type="radio"/>	ATOP-S-Link	00:80:E9	Infra	b/g/n	6	WPA2-PSK	AES	300	42
<input type="radio"/>	Bar	22:09:0F:	Infra	b/g/n	1	WPA-PSK	AES	130	2
<input type="radio"/>	Bar	12:09:0F	Infra	b/g/n	1	OPEN	NONE	130	4

T is Topology (Infra = Infrastructure, Adhoc)

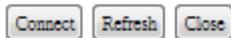


Figure 4.37 List of Neighboring Wireless Network as a Result of Wireless Network Scanning

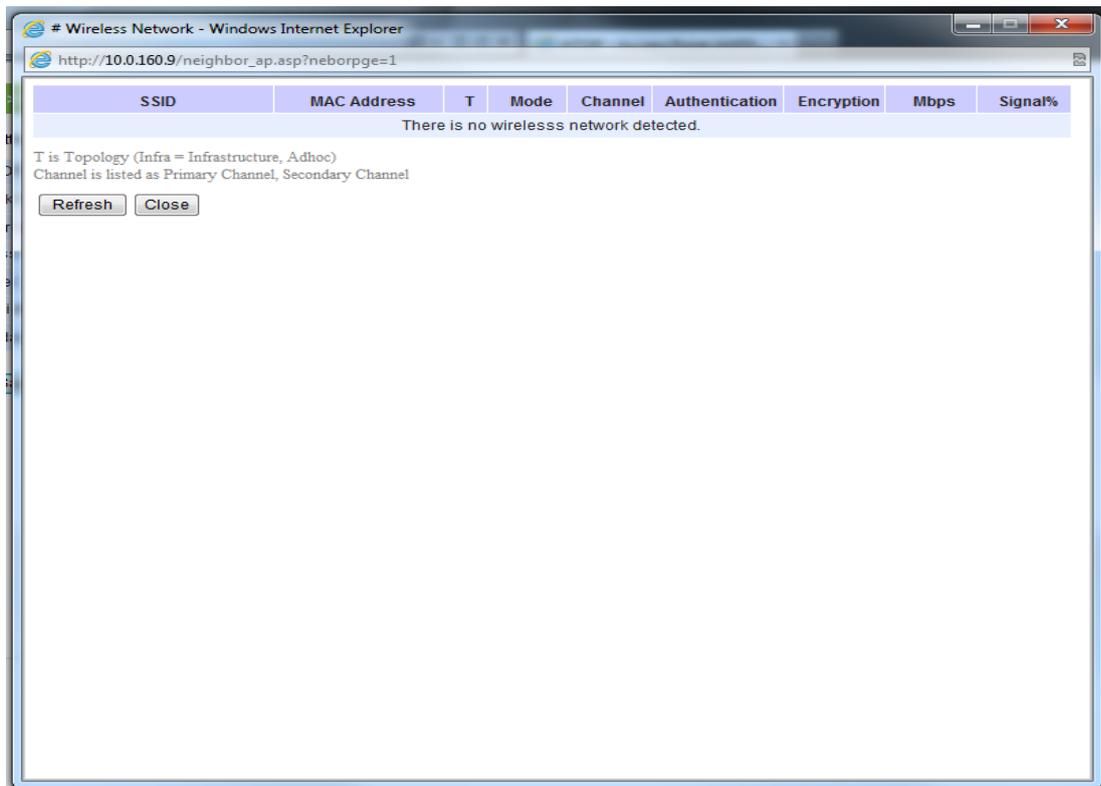


Figure 4.38 Empty Result of Wireless Network Scanning

SSID Broadcast: This option allows any wireless client to search for this access point (AW5500C) 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.

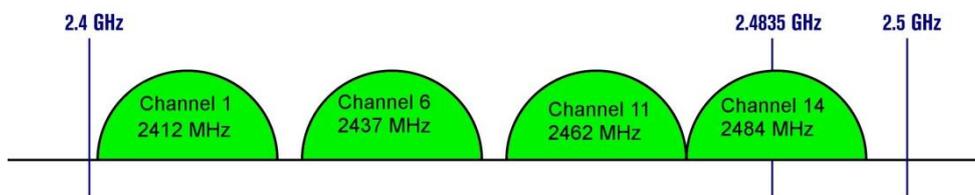
Wireless Mode: The modes in the drop-down list are separated into two parts by two different colors. The modes colored in green denote the modes that run on the 2.4 GHz frequency. Please note that the 2.4 GHz frequency is very crowded and usually does not reflect the real performance of the device, please consider using the 5 GHz frequency when possible. The IEEE standards from the list are **802.11b only**, **802.11b/g**, and **802.11b/g/n**. It is recommended to leave this option to **802.11b/g/n** for AW5500C to sense the best available mode.

Bandwidth: The option can be selected as either **20MHz** or **Auto 20/40MHz** only when the IEEE 802.11b/g/n is selected. When 40- MHz bandwidth is used, AW5500C will double the channel width to 40 MHz as compared to the standard 20 MHz to transmit its data. This is not recommended for IEEE 802.11b/g/n mode since it will leave only one non-overlapping channel for other APs.

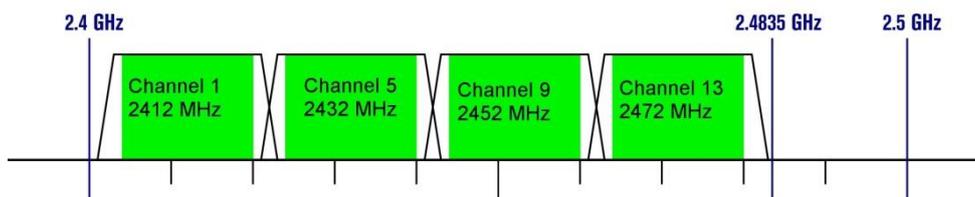
Channel: Select the “Automatic Channel Selection” option to let the AW5500C device automatically assign the best available channel number. When setting the channels manually, bear in mind that channels 1, 6, and 11 are the non-overlapping channels for 2.4 GHz as illustrated in Figure 4.39. Once again, you can use “Scan network” function to see which channels are already occupied in your environment. Channel numbers for 2.4 GHz bands are summarized in Table 4.7.

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

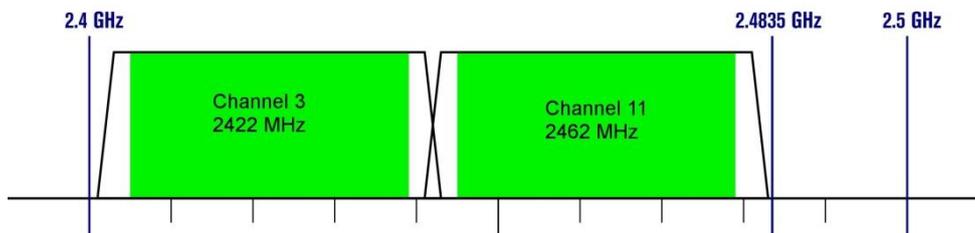


Figure 4.39 Non-overlapping Channel at 2.4GHz for IEEE 802.11b, 802.11g/n, and 802.11n

Table 4.7 Channel Number and Bandwidth in 2.4 GHz Band

2.4 GHz Primary Channel	20 MHz	40MHz Upper			40 MHz Lower		
	Blocks	2 nd ch.	Center	Blocks	2 nd ch.	Center	Blocks
1	1-3	5	3	1-7	Not Available		
2	1-4	6	4	1-8			
3	1-5	7	5	1-9			
4	2-6	8	6	2-10			
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				7	9	5-13
12	10-13				8	10	6-13
13	11-13				9	11	7-13

Table 4.8 Modulation Type and Maximum Data Rate of IEEE 802.11n Standard

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

Note that the link speed of the wireless network can be optimized up to 300Mbps by choosing IEEE 802.11b/g/n standards. Table 4.8 summarizes the maximum data rate for IEEE 802.11n based on various modulation type and channel bandwidth.

4.6.2 Security Settings

AW5500C is designed to provide you security support when building a network. The **Security Settings** in this subsection can provide authentication and encryption mechanisms for your wireless network. By default, the wireless security of AW5500C is **Disabled** as shown in Figure 4.40. Each AP (SSID) enabled in previous subsection can have its own wireless security. For example, you can create a temporary SSID with OPEN security for guess access. The available security modes are **Disabled, WEP 64/128-bit, WPA-PSK, WPA2-PSK, and WPA2(RADIUS)**. Note that WEP mode will not be available if you have enabled more than one AP (SSID). We recommend using WPA2-PSK with AES as a minimum when securing your network and also remember to set Wireless Mode at 802.11n for a full speed performance.

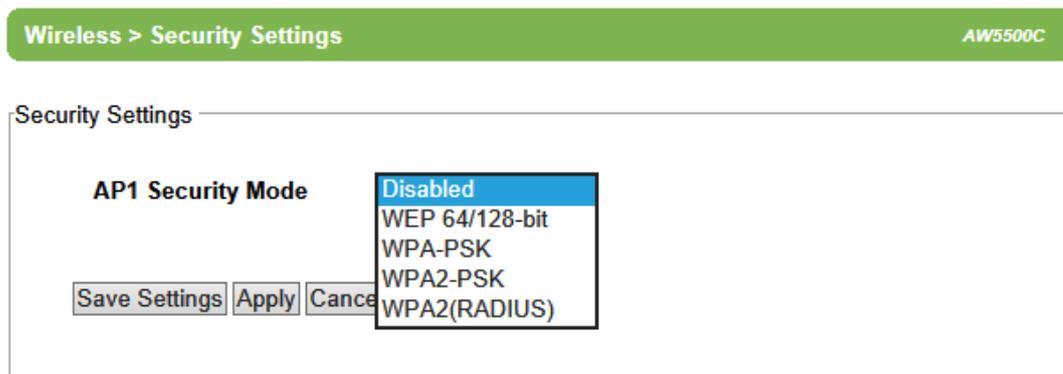


Figure 4.40 Security Mode for AP1 under Security Settings Web Page

Detailed description of each security mode is as follows:

- **Disabled:** No security settings are being used in the current device (comes as factory default setting) as shown in Figure 4.41. This option is highly discouraged since authentication as well as encryption are not performed in this mode which leaves your wireless network vulnerable to eavesdropping and other security attacks.

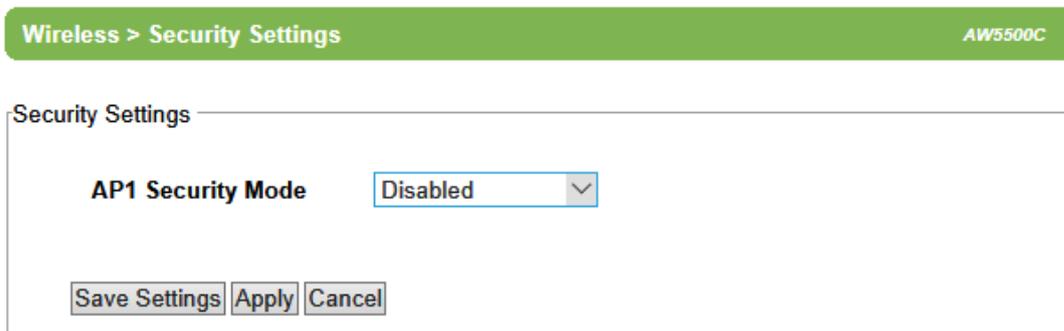


Figure 4.41 Security Mode is disabled by default.

- **WEP 64/128-bit:** WEP stands for Wired Equivalent Privacy. It is a moderately weak security algorithm. Although it implies a security that is similar to a wired connection, it is weaker than WPA protocols (described next). This security mode is not recommended unless a really large network is being administered. Up to four different hexadecimal or ASCII keys can be entered in this section as shown in Figure 4.42. The length of hexadecimal (HEX) keys is 10 or 26 digits while the length of ASCII keys is 5 or 13 characters.

- Note that **Disabled Security Mode** and **WEP 64/128-bit** are not recommended and are greyed out from the dropdown list. The user cannot select them when selecting a **Security Mode** from the list.

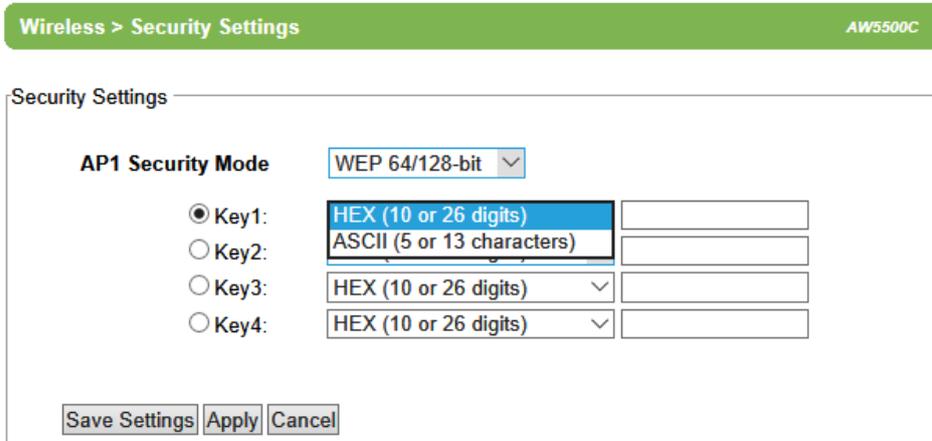


Figure 4.42 WEP 64/128-bit Security Mode

- WPA-PSK:** WPA stands for Wi-Fi Protected Access. This security mode uses a passphrase generated and entered by the user. The **Passphrase** can be between 8 and 63 characters long. We strongly recommend that the passphrase should not be taken from the one already in use within the network or used a variation of personal information publicly available. Such practice can compromise the wireless network's security. There are two **Encryption Types** for WPA-PSK which are TKIP (Temporal Key Integrity Protocol) and AES (Advanced Encryption Standard) to be selected under this mode as shown in Figure 4.43.

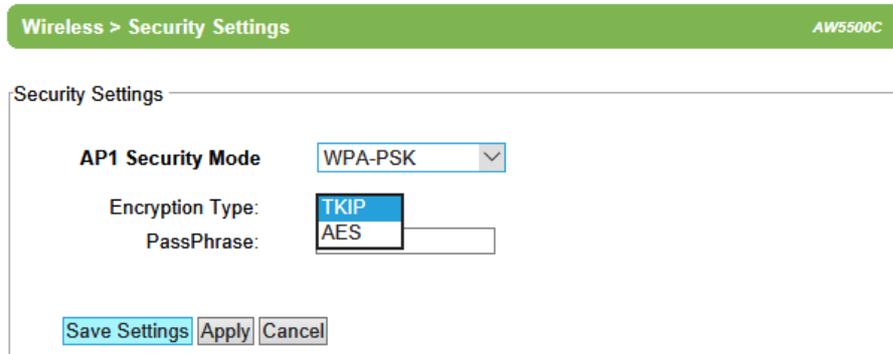


Figure 4.43 WPA-PSK Security Mode

- WPA2-PSK:** WPA2 stands for Wi-Fi Protected Access 2 – Pre-Shared Key. This is a highly recommended setting for the average user. It uses the optional Pre-Shared Key (PSK) authentication for network that does not have an enterprise authentication server. You can select the encryption mode type of the following: TKIP (Temporal Key Integrity Protocol), or AES (Advanced Encryption Standard). This security mode is less vulnerable to attacked than the above one.
- Figure 4.44 shows the WPA2-PSK security mode.

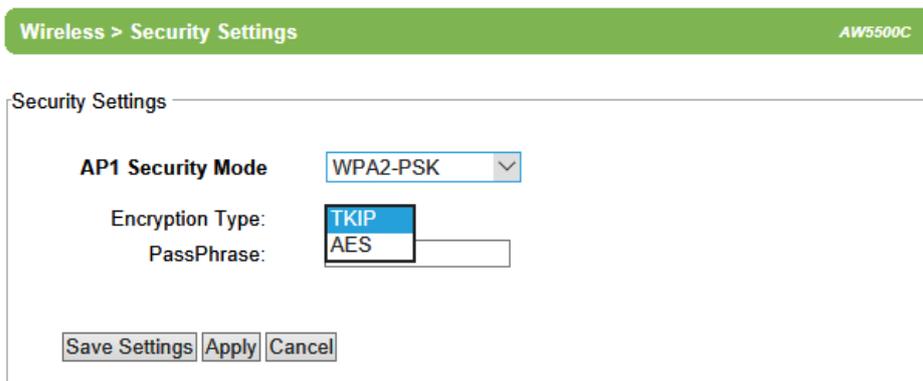


Figure 4.44 WPA2-PSK Security Mode

- **WPA2 (RADIUS):** This security mode designed for enterprise networks. It requires a RADIUS (Remote Authentication Dial In User Service) server which is an authentication server. Although setting up and possessing are more complicated, the wireless network security is highly enhanced since passwords are not transmitted between the wireless clients and RADIUS server. Figure 4.45 shows the WPA2 (RADIUS) setting web page. The user needs to specify **IP Address** and **Port** number (port 1812 is recommended) of the RADIUS server. Finally, the user also need to specify the **Shared Secret** key.

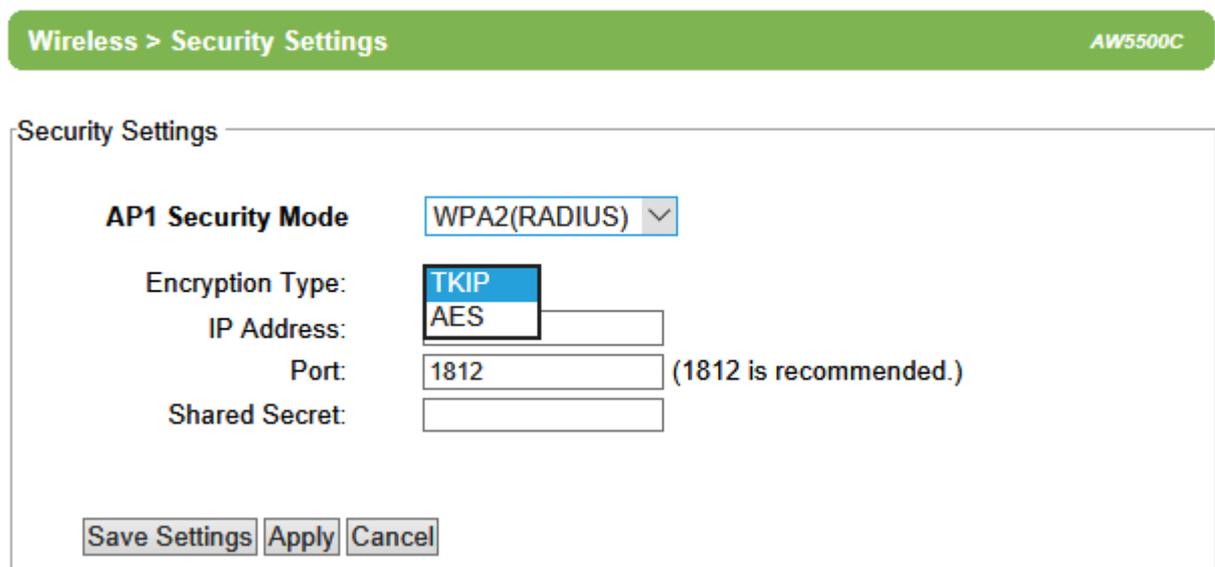


Figure 4.45 WPA2 (RADIUS) Security Mode

After setting up the desired security setting, please click on the **Save Settings** button. A notification pop-up windows will show up as displayed in

Figure 4.46. Then, click on the **Apply** button to activate the settings. Another pop-up window as shown in Figure 4.47 will show up to indicate the application of the setting to the device. Then, another pop-up window will be displayed as shown in Figure 4.48 to notify the last step of setting. Finally, the web interface will be redirected to the first web page which is the Overview page as shown in Figure 4.8.

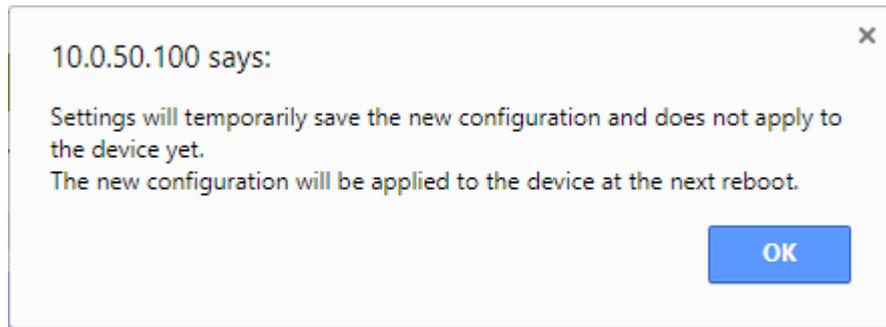


Figure 4.46 Pop-up Window for Save Settings

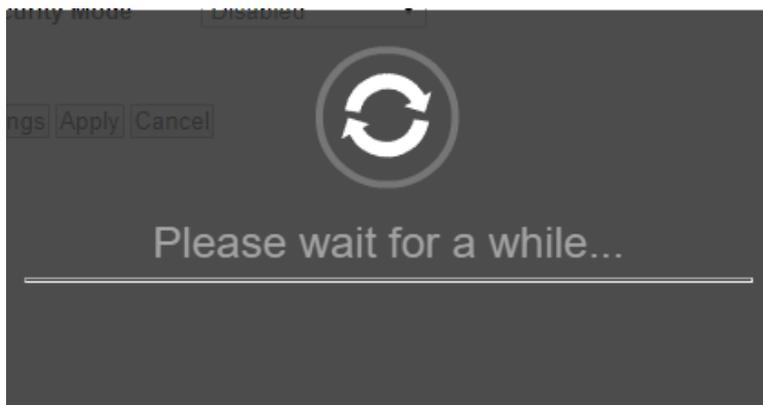


Figure 4.47 Notification after clicking on the Apply button

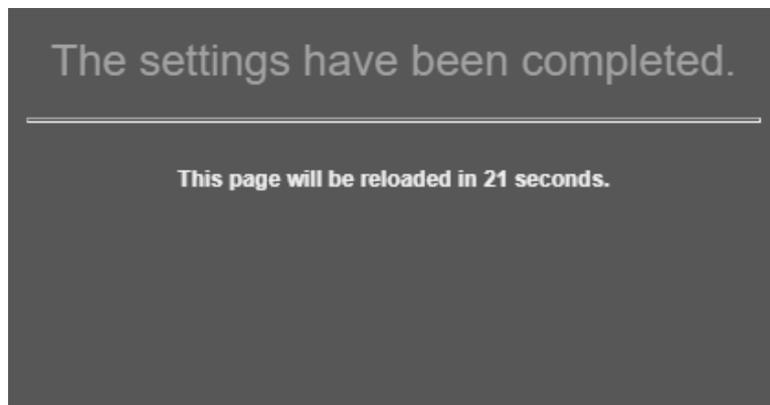


Figure 4.48 Notification that the application of the settings have been completed

4.6.3 WPS Settings

WPS refers to Wi-Fi Protected Setup which is a network security standard used to create a secure wireless home network. It is aimed to ease the security setup for the wireless network such as adding new client to an existing network without entering long passphrases. This option is only available when AW5500C is running in the **Regular AP** operation mode. By default, WPS is **Disabled** as shown in

Figure 4.49. To enable WPS, please click on the **Enabled** option. Then, the WPS Button (**Start WPS PBC**) will become active. Note that PBC stands for Push Button Configuration.

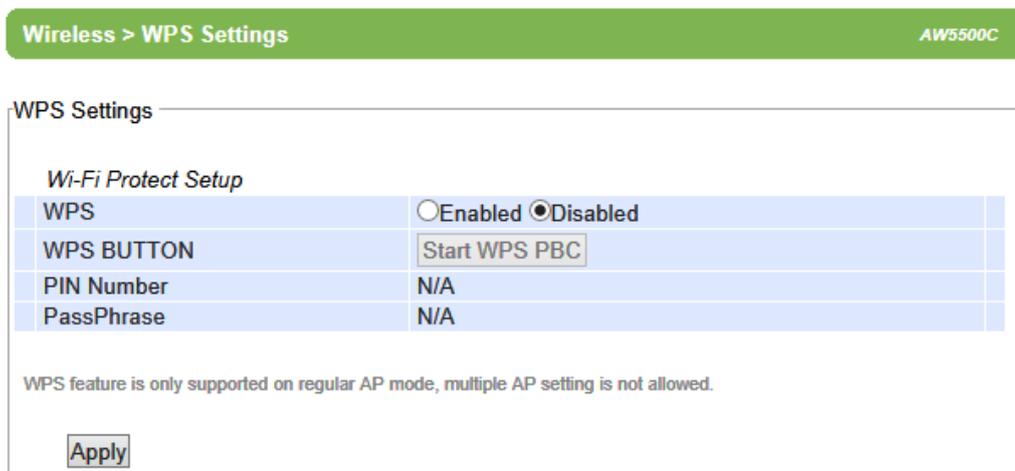


Figure 4.49 WPS Settings Web Page

To use this feature, first trigger the WPS process in AW5500C by pressing the WPS PBC button as shown in Figure 4.50 and click on the WPS PBC button on AW5500C’s UI (Atop’s Wireless Serial Server device) or other WPS methods designated by a WPS compatible device. After the **Start WPS PBC** button is pressed, WPS would be triggered and the AW5500C will wait for 120 seconds for a WPS compatible device to associate with it automatically. Note that the user need to set **security mode** to be either *WPA-PSK* or *WPA2-PSK* and fill in the **PassPhrase** in the **Wireless > Security Settings** web page. **PIN Number** will be automatically set afterwards.

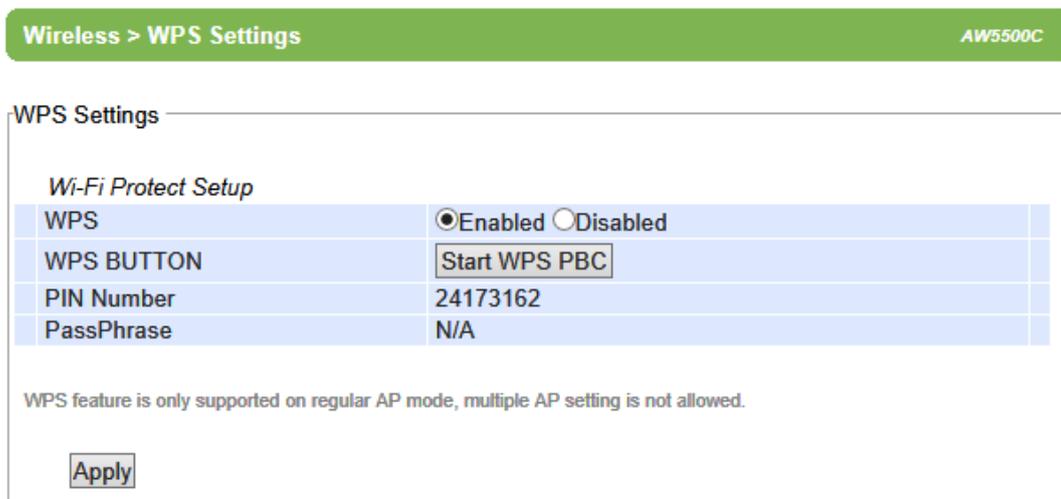


Figure 4.50 An Example of WPS Settings

Note that since AW5500C only supports the “Configured” mode of WPS, the following wireless settings in Table 4.9 need to be set manually before the device would enter the WPS state.

Table 4.9 Prerequisite Wireless Settings for WPS Settings

Operation Mode		Regular AP
Basic Settings	SSID	User Define
	Wireless Mode	User Define
Security Settings	Authentication	WPA-PSK or WPA2-PSK
	Encryption	TKIP or AES

	Passphrase	User Define
--	------------	-------------

*Again, TKIP is not covered in the 802.11n standard and the wireless rate would be limited to 54 Mbps.

4.6.4 WDS Settings

This option is only available when AW5500C is running in the **WDS Bridge** operation mode and AW5500C is configured as a **WDS Hybrid** or a **WDS Station**. Three different **Encryption Types** are available: **WEP**, **TKIP**, or **AES**. The configuration is relatively simple and straightforward as shown in Figure 4.51. After selecting the **Encryption Type** from the drop-down list, enter the Second MAC of the adjacent AW5500C. The adjacent AW5500C could be a **Root AP** or a **Hybrid AP**.

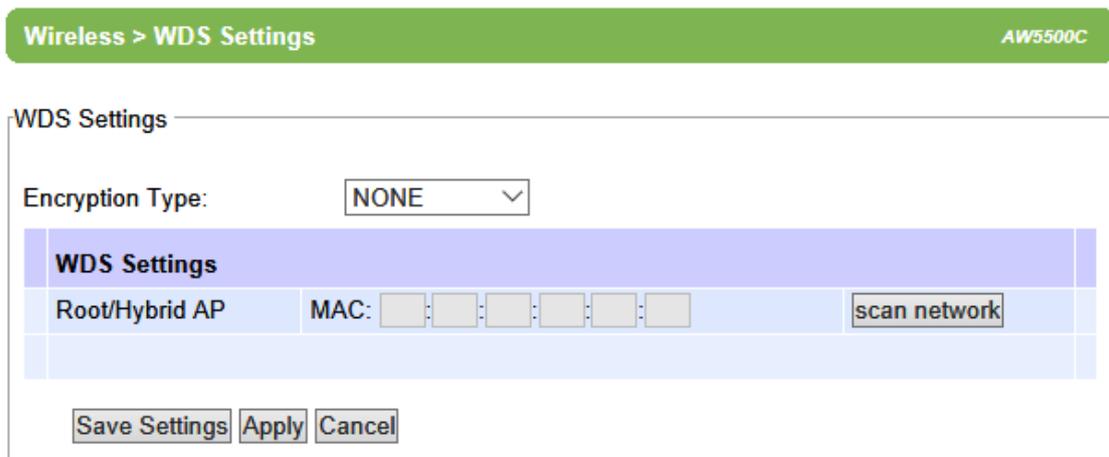


Figure 4.51 WDS Settings Web Page

Note that the **Encryption Type** here would also be used by the wireless clients connecting to AW5500C if you are a WDS Root or WDS Hybrid. When TKIP or CCMP (AES) is selected, AW5500C would use WPA2-PSK authentication for the connecting wireless clients.

4.6.5 Profiles

This menu option is only available when AW5500C is running in the **AP Client** operation mode. A wireless **Profile** is a set of pre-configured wireless setting for the **AP Client**. There can be multiple wireless Profiles for AP Client. Each wireless profile can be directly set from the profile webpage. When the wireless **Profile** is enabled by checking the **Enabled** box and clicking **Apply** button behind the **Wireless Profile** option, there will be an **Add** button under the **AP List** for adding new wireless profile as shown in Figure 4.52. Note that **Enabled** checkbox can only be applied if P2P Button checkbox in **Wireless > Advanced Settings** is unchecked.

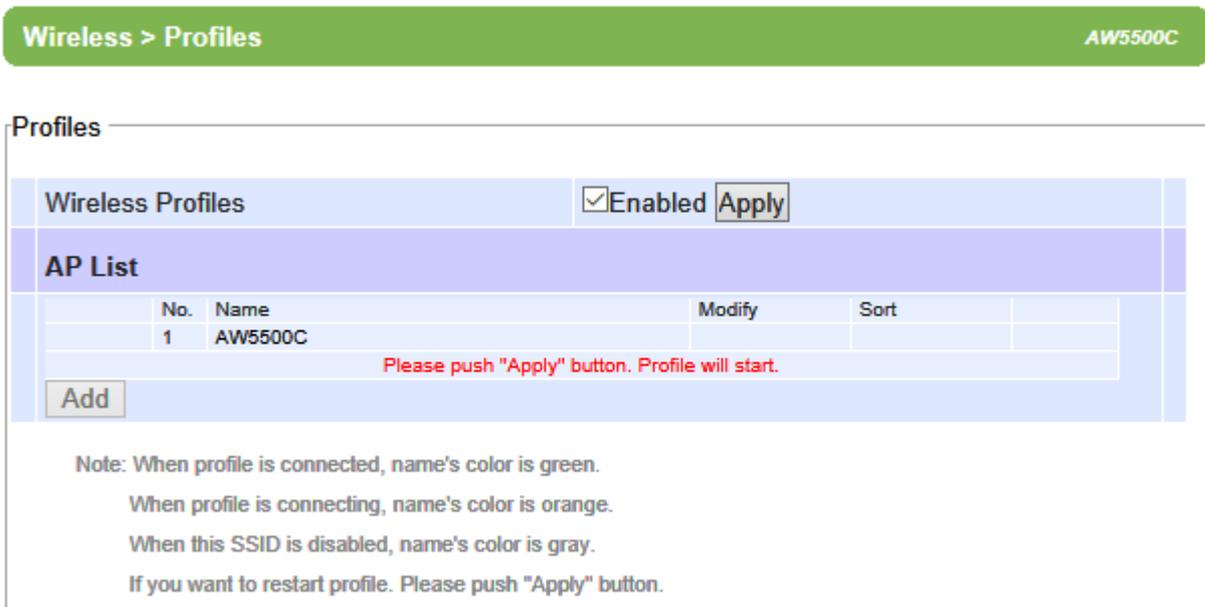


Figure 4.52 Wireless Profiles Web Page for AP Client Operation Mode

When the **Add** button in Figure 4.52 is clicked, this will bring up the **Mobile Station Mode** webpage as shown in Figure 4.53 for entering the necessary information of each wireless profile. Description of each field can be found in the next subsection. When entering all necessary information of the wireless profile, click **Apply** button at the bottom. Users are allowed to save up to ten wireless connection profiles or list of network names or SSIDs (called **AP List**) inside AW5500C as shown in Figure 4.54 . The AW5500C in **AP Client** operation mode will retry each and every enabled profile (network name or SSID) for one minute before continuing to the next profile if the current profile failed to connect.

You can use the **Sort** column to adjust the precedence of the profiles. However, this function is disabled by default.

Wireless >
AW5500C

Mobile Station MODE

Enable	<input checked="" type="checkbox"/>
SSID	<input type="text"/> scan network
BSSID(MAC Address)	<input type="text" value="00:60:E9:06:E5:FC"/> <input type="checkbox"/> Enable
Topology	<input type="text" value="Infrastructure"/>
Band mode	<input type="text" value="802.11b"/> <input checked="" type="checkbox"/> Auto
Channel	<input type="text" value="1"/>
BandWidth	<input type="text" value="20MHz"/>
Authentication Mode	<input type="text" value="OPEN"/>
Encryption Type	<input type="text" value="NONE"/>
WEP Key	
<input checked="" type="radio"/> Key 1:	<input type="text" value="HEX (10 or 26 digits)"/> <input type="text"/>
<input type="radio"/> Key 2:	<input type="text" value="HEX (10 or 26 digits)"/> <input type="text"/>
<input type="radio"/> Key 3:	<input type="text" value="HEX (10 or 26 digits)"/> <input type="text"/>
<input type="radio"/> Key 4:	<input type="text" value="HEX (10 or 26 digits)"/> <input type="text"/>
WPA-P SK/WPA2-P SK	
PassPhrase	<input type="text" value="0"/>
WPA2(with Radius)	
User	<input type="text" value="AW55XX"/>
Password	<input type="text" value="*****"/>
Certificates	<input type="text"/> Browse... <input type="button" value="Upload CA Certificate"/> <input type="button" value="Upload Client Certificate"/> <input type="button" value="Show Certificates Information"/>
Private key password	<input type="text" value="*****"/>

Figure 4.53 Profile of a Mobile Station Mode

Figure 4.54 shows an example of enabled Wireless Profile in which an **AP List** consists of ten available entries for network names or SSIDs. Each entry will have its number (**No.**) on the list and **Name**. Color of the **Name** is used to indicate the current status of the SSID or profile on the list. When the color of the **Name** is green, the profile is connected. When the color of the **Name** is orange, the profile is connecting. When the color of the **Name** is grey, the profile is disabled. Under the **Modify** column, there are two options: **Edit** and **Delete**. If the user clicks on **Edit**, this will bring up the **Mobile Station Mode** webpage as shown in Figure 4.53. On the other hand, if the user clicks on **Delete**, this will remove the profile from the list. The last column in the list is the **Sort** column which has arrow button(s) to allow changing the order of the profiles (access points) on the list.

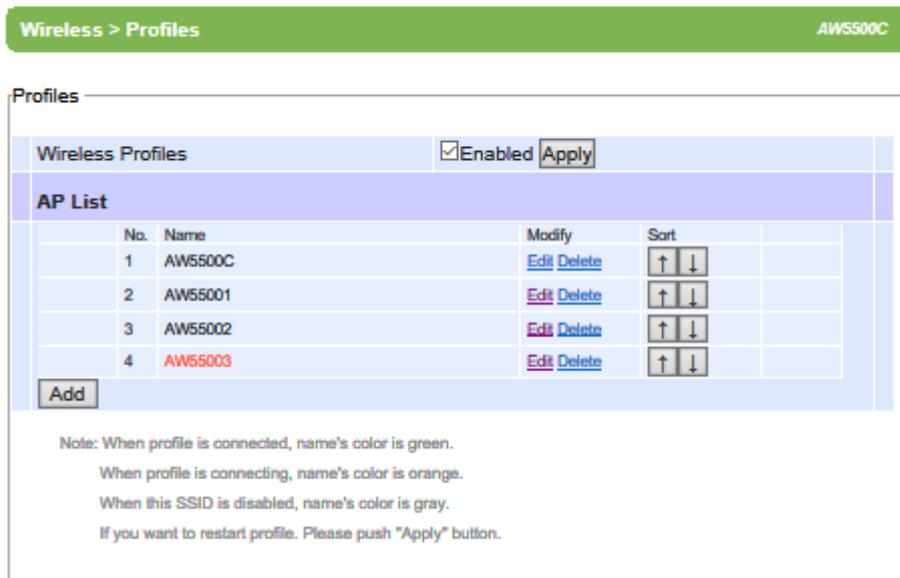


Figure 4.54 AP List under Wireless Profiles Web Page

4.6.6 Mobile Station

This menu option is also only available when AW5500C is running in the **AP Client** operation mode. To set up a wireless connection for AW5500C in **AP Client** operation mode, a number of parameters are needed to be configured in this section. However, the user will have two different **Mobile Station Mode** configuring web pages when **Wireless Profiles** (see previous subsection) is enabled as shown in Figure 4.55 and when **Wireless Profile** is disabled as shown in Figure 4.56.

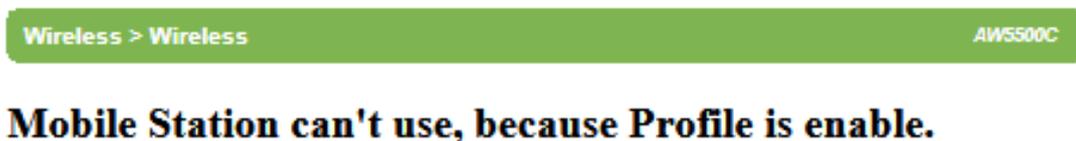


Figure 4.55 Mobile Station Mode Web Page when Wireless Profile is enabled.

Figure 4.56 Mobile Station Mode web page when Wireless Profile is disabled.

When **Wireless Profile** is disabled, the **Mobile Station** web page can be used. The default settings in **Mobile Station** web page can be in one of the two **Topology** modes: **Infrastructure Mode** or **Ad Hoc Mode**. The user will have both modes to choose from. Table 4.10 and Table 4.11 summarize the default settings for **Infrastructure mode** and **Ad Hoc mode**, respectively.

Table 4.10 Default Settings in Infrastructure Mode

Caption	Default
SSID	Null
BSSID (MAC Address)	Any (unless enabled)
Topology	Infrastructure
Band Mode	Automatic Detection
Channel	Automatic Detection
Bandwidth ¹	Automatic Detection
Secondary Channel	Automatic Detection
Authentication Mode	OPEN
Encryption Type	NONE

Table 4.11 Default Settings in Ad Hoc Mode

Caption	Default
Radio Off	Disabled (box not checked)
SSID	Null
BSSID (MAC Address)	Any (unless enabled)
Topology	Ad-Hoc
Band Mode	802.11b
Channel	13
Bandwidth ¹	20 MHz
Secondary Channel	Disabled
Authentication Mode	OPEN
Encryption Type	NONE

After the user finished setting the **Mobile Station Mode** as shown above, please click the **Apply** button to save the new wireless configuration on the AW5500C in AP Client operation mode and allow the configuration to take effect. Then, the page will be reloaded and redirected to the Overview page. If the user wants to discard any changes on the configuration, please click **Cancel** button.

Each configurable option under the **Mobile Station Mode** is described as follows:

- **SSID:** This specifies the SSID (or network name) that AW5500C (AP Client mode) should connect to wirelessly. There is a **"Scan Network"** button on the right of the empty text box. This button makes it possible to look for nearby available wireless networks to attach to. Once clicked, it will start a scanning process and prompt a window with a list of available wireless networks. Detailed steps for setting the **SSID** or using **Scan Network** button will be explained after this list.
- **BSSID (MAC Address):** This refers to access point's MAC address on which the AW5500C (AP Client mode) should connect to. Enabling this option by checking the box behind it will lock AW5500C to that access point. Therefore, AW5500C would not roam to another access point with the same SSID.
- **WPS BUTTON:** The **WPS** acronym stands for **Wi-Fi Protected Setup** and the **PBC** stands for **Push Button Configuration**. To use this feature, first trigger the WPS process in a WPS supported access point (AP) and click on the **Start WPS PBC** button on AW5500C's UI. The AP and the AW5500C should connect automatically. Note that the **Topology** setting (next option) in this case should be **Infrastructure** and the **Band Mode** (option after the next) should be **Auto** so that the **WPS** can work. Note that this button is unavailable when the **Wireless Profiles** is enabled.
- **Topology:** There are two types of wireless network topologies which are **Infrastructure** (for connecting to an Access Point) or **Ad Hoc** (for connecting to a wireless client). Note that the **Ad Hoc** mode is unavailable when the **Wireless Profiles** is enabled.
- **Band Mode:** This option allows user to select the radio frequency band which are supported by IEEE 802.11b only, 802.11b/g, and 802.11b/g/n standards. It is recommended to leave this option to **Auto** for AW5500C (AP Client mode) to sense for the best available mode automatically by checking the **Auto** box.
- **Channel:** This option allows the user to specify the radio channel number for AW5500C to operate on. However, the available channels would depend on the **Band Mode** and the regulatory domain (CN, EU, TW, or US) selected in the **Wireless Advanced Settings** (discussed next section). This option is disabled when the **Band Mode** is set to **Auto**.
- **Bandwidth:** This option allows AW5500C to select between 20 MHz or 40 MHz radio bandwidth usage. The latter fills a larger spectrum; hence, it provides a better throughput if it is allowed by the Access Point. However, it is not recommended to use 40 MHz at 2.4 GHz band for IEEE 802.11b/g/n standards.

- **Channel:** This option specifies the radio channel number that AW5500C (AP Client mode) will use which can be chosen from the drop-down list.
- **Authentication Mode:** This option allows the selection of wireless network authentication mechanisms which could be **OPEN**, **WPA-PSK**, **WPA2-PSK**, **WPA2 (PEAP)**, **WPA2 (EAP-TLS)**, and **WPA2 (EAP-TTLS)**.
- **Encryption Type:** This option specifies the encryption algorithm for wireless connection which could be **WEP**, **TKIP** and **AES**. However, please beware that **WEP** and **TKIP** are not supported by the IEEE 802.11n standard; therefore, the wireless link speed would be limited to 54Mbps.
- **WEP Key:** This option is enabled when **Authentication Mode** is set to **OPEN** and **Encryption Type** is set to **WEP**. Up to 4 different hexadecimal or ASCII keys can be entered in this option.
- **WPA-PSK/WPA2-PSK Passphrase:** This option is enabled when **Authentication Mode** is set to **WPA-PSK** or **WPA2-PSK**. The passphrase can be between 8 and 63 characters long.
- **WPA2 (with RADIUS):** Depending on selected **Authentication Mode**, different fields in this option will be enabled. **WPA2 (PEAP)** would require you to provide the user, password, and the certificates. **WPA2 (EAP-TLS)** would require you to provide the certificates and private key password. **WPA2 (EAP-TTLS)** would require you to provide the user, the password, and the certificates. Please note that only *.pem certificates are supported.

Please remember that 2.4 GHz frequency can be easily interfered by other wireless devices that operate in the same spectrum (namely, Bluetooth, ZigBee, microwave oven, etc.); therefore, it is better to choose the IEEE 802.11g/n which operates in the 2.4 GHz spectrum when the user's network allows.

Steps to Connect to an Access Point

You can manually enter the **SSID** of the connecting access point in the **SSID** option or use the “**scan network**” button to have AW5500C (AP Client mode) grab the necessary wireless information of surrounding access points in the device's coverage area. Please be patient as this process might take up to 10 seconds.

Once it has finished scanning, names and basic properties of available wireless networks will be shown as in Figure 4.57. You can then select an AP from the list by clicking on the radio button in front of the desired SSID. Then, click on the “**Connect**” button at the bottom of the page and its settings would be loaded automatically to the device's user interface (UI). If you would like the scanning process to run again, just click on the “**Refresh**” button. Otherwise, click on the “**Close**” button to close this window.

SSID	MAC Address	*T	Mode	Channel	Authentication	Encryption	Mbps	Signal%
<input checked="" type="radio"/> Bar	00:09:0F:	Infra	b/g/n	1	WPA-PSK	AES	130	4
<input type="radio"/> ATOP-S-Link	00:80:E9	Infra	b/g/n	6	WPA2-PSK	AES	300	42
<input type="radio"/> Ban ma	22:09:0F:	Infra	b/g/n	1	WPA-PSK	AES	130	2
<input type="radio"/> Ba	12:09:0F	Infra	b/g/n	1	OPEN	NONE	130	4

T is Topology (Infra = Infrastructure, Adhoc)

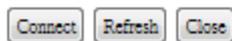


Figure 4.57 Results of Network Scanning for Automatic Connection

If no wireless networks have been found, the list would be empty as shown in Figure 4.58.

SSID	MAC Address	T	Mode	Channel	Authentication	Encryption	Mbps	Signal%
There is no wireless network detected.								

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

Figure 4.58 Empty Results of Network Scanning for Automatic Connection

After finish configuring the Mobile Station Mode, please click on **Apply** button to keep the change that you have made. A pop-up window with message **“Please wait for a while...”** will be displayed. When the saving is finished, the pop-up window will disappear and the web browser will be redirected to the Overview page. If you want to cancel the change and reset all changes back to their original values, just click the **Cancel** button.

4.6.7 Advanced Settings

The **Advanced Settings** web page as shown in Figure 4.59, Figure 4.60 and Figure 4.61 provides a set of configurable wireless parameters that can enable wireless network performance tuning for AW5500C in **Regular AP**, **WDS Bridge**, and **AP Client** operating modes, respectively. Any changes in this section may affect overall performance of the system; therefore, caution is recommended. If you are unclear of what you are doing, please refrain from altering these parameters. The parameters in this page will be changed according to the Operation Mode of the AW5500C. Description of each parameters are provided as follows.

Wireless> Advanced Settings AW5500C

Advanced Settings

*Regulatory Domain	EU (ETSI2_WORLD) ▾
Tx Power	100 ▾ %
Short GI	Enabled ▾
WMM	Enabled ▾
WPA Group Rekey Interval	3600 seconds
STP	STP ▾
Forward Delay	4 seconds
Fast Handoff	Disabled ▾
Wireless Isolation	Disabled ▾
20/40 MHz Coexistence (Only be supported at 802.11n with 2.4 GHz)	Disabled ▾
P2P Button	<input checked="" type="checkbox"/> Enabled

Different regulatory domains will result in different channels/frequencies being allowed.

Figure 4.59 Advanced Settings Web Page for Regular AP Operation Mode

Wireless> Advanced Settings
AW5500C

Advanced Settings

*Regulatory Domain	EU (ETSI2_WORLD) ▼
Tx Power	100 ▼ %
Short GI	Enabled ▼
WMM	Enabled ▼
WPA Group Rekey Interval	3600 seconds
STP	STP ▼
Forward Delay	4 seconds
Fast Handoff	Disabled ▼
Wireless Isolation	Disabled ▼
P2P Button	<input checked="" type="checkbox"/> Enabled

Different regulatory domains will result in different channels/frequencies being allowed.

Figure 4.60 Advanced Settings Web Page for WDS Bridge Operation Mode

Wireless> Advanced Settings
AW5500C

Advanced Settings

Radio Off	<input type="checkbox"/> Enable
*Regulatory Domain	EU (ETSI2_WORLD) ▼
Tx Power	100 ▼ %
Short GI	Enabled ▼
WMM	Enabled ▼
WPA Group Rekey Interval	3600 seconds
STP	STP ▼
Forward Delay	4 seconds
Fast Handoff	Disabled ▼
Fast Roaming	<input type="checkbox"/> Enabled
Roaming Threshold	<input type="radio"/> Low (25%) <input checked="" type="radio"/> Normal (50%) <input type="radio"/> High (75%)
P2P Button	<input checked="" type="checkbox"/> Enabled

Different regulatory domains will result in different channels/frequencies being allowed.

Figure 4.61 Advanced Settings Web Page for AP Client Operation Mode

- **Radio Off:** This option can turn off the wireless signal of AW5500C completely. This option only shows in the **AP Client** mode. To turn off the wireless signal completely under **Regular AP** mode and **WDS Bridge** mode, disable all APs in the **Basic Settings** web page.
- **Regulatory Domain:** This can be selected from 4 options in the drop-down list box: CN (APL1_WORLD), EU (ETSI2_WORLD), TW (APL3_FCCA), and US (FCC5_FCCA). Note that different Regulatory Domains will result in different radio channels/frequencies being allowed AW5500C to operate (see **Channel** setting in Section 4.6.1).
- **TX Power** is the percentage level of AW5500C's Transmission Power. 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:** This parameter is also recommended to leave as enabled in order to comply with 802.11n standards and achieve link speeds higher than 54 Mbps.
- **WPA Group ReKey Interval:** WPA automatically changes secret keys after certain period of time, which all devices on the wireless network share. Constantly rekeying the group key can protect your network against intrusion.
- **STP or Spanning Tree Protocol:** Please enable this option if STP is enabled in your network to prevent network loops. When disabled, AW5500C will not forward STP BPDUs.
- **Forward Delay:** This is the time in which the interface takes to converge from blocking stage to forwarding state. This option only shows in the AP Client mode.
- **Maximum Signal Distance** is used to determine how fast a wireless signal should be timed out. If AW5500C is equipped with an outdoor antenna to reach further distances, increase this value accordingly.
- **Fast Handoff** is the Atop's proprietary protocol to speed up roaming between AW5500Cs. Enable this option to allow AW5500C to share its neighboring AW5500C information to SW550X to further reduce its roaming time.
- **Wireless Isolation** creates a firewall between wireless clients connected to this AP. The isolation can be enabled to prevent data traffic flowing between clients to increase client security and to prevent unnecessary traffic between clients.
- **20/40 MHz Coexistence** allows AW5500C working in 40MHz to fall back to 20MHz when there are 20MHz only clients in the wireless network. The AP will also fall back to 20MHz when the channel within the +-40MHz frequency range has been occupied.
- **Fast Roaming:** Enable this option to allow AW5500C (AP Client mode) to scan for available access points in the background to speed up roaming when necessary.
- **Roaming Threshold:** This option set the threshold level used to determine when AW5500C (AP Client mode) should try to connect to another access point when the wireless signal drops below the selected range. The available thresholds are Low (25%), Normal (50%), and High (75%).
- **P2P Button:** This option is used to enable or disable the function of Push Button at the front panel of AW5500C. The default setting is "Enabled".

4.6.8 Scheduler Settings

In Regular AP mode, AW5500C can be configured to automatically start and stop wireless local area network according to the user defined schedule as shown in Figure 4.62. This function allows you to setup service schedule and to enable or disable SSIDs according to the time of a day of the week when necessary. You can have up to 10 schedules/rules.

Wireless > Scheduler Settings AW5500C

Scheduler Settings

Number: 1 2 3 4 5 6 7 8 9 10

Name:

Status: Enabled Disabled

SSID:

Day(s): Sun Mon Tue Wed Thu Fri Sat

Time (hour:minute): : - :

No.	Name	SSID	Day(s)	Start	Stop	Status
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Figure 4.62 Scheduler Settings Web Page

Descriptions of the fields in Scheduler Settings are described as follows:

- Number: This is the schedule number or rule number which can be selected from 1 to 10.
- Name: This is a user's defined name for each schedule/rule so that you can remember it.
- Status: This option is to enable or disable the current schedule/rule.
- SSID: This is the SSID which this schedule/rule will be applied to.
- Day(s): For each schedule/rule, you can check one or multiple boxes for the day(s) of the week that this schedule/rule should be in effect.
- Time (hour:minute): For each schedule/rule, select the start time (hour:minute) and stop time (hour:minute) from the drop-down list. If you want the schedule/rule to run for the whole data, set the start and stop time to 00:00 – 00:00.

After filling in all required fields, click on the **Add/Modify** button to add the schedule/rule into the schedule table. If you want to remove a schedule/rule, select the schedule/rule number and then click on the **Remove** button. If you want to discard any entered fields, click on the **Cancel** button. Finally, if you want all schedules/rules that you configured to take effect, click on the **Apply** button at the end of the web page.

Example of Scheduler Usage:

In a factory, there are two sites that are covered by the AW5500C AP and they have different working hours. The office would normally work from 8AM to 6PM, while the production line should run 24 hours. However, both sites will shut down on weekends. You can follow the steps below to configure these schedules/rules. Figure 4.63 Depicts an example of **Scheduler Settings** web page.

Steps:

- 1) Enable **AP2** in the **Wireless → Basic Settings**. Next, set **AP1**'s SSID to "**AW_Production**" and set **AP2**'s SSID to "**AW_Office**". Next, configure other wireless settings as necessary. Then, save the settings and apply the settings.
- 2) Go to **Wireless → Scheduler Settings** and select **Rule 1**. Give this rule a name called "**Production Line**" then change its status to **Enabled**. Next select the SSID (**AW_Production**) from the drop-down list. Then, check the **Day(s) (Monday ~ Friday)** and set **00:00 – 00:00** for **Time**. In case you have done something wrong and would like to discard the changes, press the **Cancel** button. Next, click on the **Add/Modify** button to add this rule or overwrite an existing rule.
- 3) Select **Rule 2**. Then, give this rule a name called "**Office**" then change its status to **Enabled** and select the SSID (**AW_Office**) from the drop-down list. Next, check the **Day(s) (Monday ~ Friday)** and set the **Time** range to **8:00 – 18:00**. Next, click on the **Add/Modify** button to add this rule or overwrite an existing rule.
- 4) In case that there are other rules present in the table, you can select that rule and press the **Remove** button so that it will be cleared.
- 5) Finally, click on the **Apply** button to make the new scheduler rules effective.

Note that under this scenario, the wireless function (radio signal) would be turned off completely on Saturday and Sunday.

Wireless > Scheduler Settings
AW5500C

Scheduler Settings

Number	<input type="radio"/> 1 <input type="radio"/> 2 <input checked="" type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10
Name	<input type="text"/>
Status	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
SSID	AW5500C ▼
Day(s)	<input type="checkbox"/> Sun <input type="checkbox"/> Mon <input type="checkbox"/> Tue <input type="checkbox"/> Wed <input type="checkbox"/> Thu <input type="checkbox"/> Fri <input type="checkbox"/> Sat
Time (hour:minute)	00 ▼ : 00 ▼ - 00 ▼ : 00 ▼

No.	Name	SSID	Day(s)	Start	Stop	Status
1	Office	AW5500C	Mon, Tue, Wed, Thu, Fri	07:30	17:00	Enable
2	Production Line	AW5500C	Sun, Mon, Tue, Wed, Thu, Fri, Sat	05:00	20:00	Enable
3						
4						
5						
6						
7						
8						
9						
10						

Figure 4.63 An Example of Scheduler Settings

4.7 Network Settings

This menu consists of one submenu called LAN & WLAN interface. This is where you can configure the network address, subnet mask, gateway, and the domain name server.

4.7.1 LAN & WLAN Interfaces

The local area network (LAN) and wireless local area network (WLAN) interfaces of AW5500C can be configured in this web page as shown in Figure 4.64. There are three sections on this page which are **LAN & WLAN Interfaces**, **Manual Settings**, and **DNS Server**.

The screenshot shows the configuration page for LAN & WLAN Interfaces on an AW5500C device. The page has a green header with the breadcrumb 'Network Settings > LAN & WLAN Interfaces' and the device model 'AW5500C'. The main content area is titled 'LAN & WLAN Interfaces' and contains several sections:

- LAN & WLAN Interfaces**: A section with a blue header containing a 'DHCP' option with an unchecked checkbox labeled 'Obtain an IP Address Automatically'.
- Gratuitous ARP**: A section with a blue header containing a dropdown menu set to 'Disabled' and a text box with the value '5' followed by the unit 'minutes'.
- Manual Settings**: A section with a blue header containing three text boxes: 'IP Address' (10.0.50.200), 'Subnet Mask' (255.255.0.0), and 'Default Gateway' (10.0.50.1).
- DNS Server**: A section with a blue header containing two text boxes: 'Preferred DNS' (168.95.1.1) and 'Alternate DNS' (empty).

At the bottom of the form are three buttons: 'Save Settings', 'Apply', and 'Cancel'.

Figure 4.64 LAN & WLAN Interfaces Web Page

Under the LAN & WLAN Interfaces part, you can enable **DHCP** (Dynamic Host Configuration Protocol) in the first option so that AW5500C can retrieve its network setting automatically from a DHCP server, which should be available in you LAN. (You may need to consult your local network administrator about DHCP server.) You can check the box in front of the **“Obtain an IP Address Automatically”** to get the necessary IP information through the DHCP. Note that the other two parts will become inactive. Otherwise, uncheck the box and enter the rest of the network information manually in the next two parts.

The second option under the **LAN & WLAN interfaces** part is the **Gratuitous ARP** (Address Resolution Protocol). This option enables AW5500C device to periodically send out an ARP response automatically to notify that AW5500C device is in the network. The frequency of transmission is in minutes which can be **Enabled** or **Disabled** from the pull-down menu and the period of transmission in the unit of minutes can be set in the followed textbox as shown in Figure 4.64.

If you did not enable the **DHCP** option in the first part, the **Manual Settings** and **DNS Server** parts will be active. You can enter the **IP Address**, **Subnet Mask**, and **Default Gateway** for you LAN interface of AW5500C under the **Manual Settings** part. Then, you can fill in the **Preferred DNS** and **Alternate DNS** addresses under the **DNS Server** part. After completing all IP network information on this web page, please click on **Save Settings** button and then click on the

Apply button to allow the configuration to take effect. Note that you will be redirected to the Overview page after clicking the **Apply** button.

4.8 SNMP Settings

The Simple Network Management Protocol (SNMP) is used by network management software to monitor devices in a network, to retrieve network status information of the devices, and to configure network parameters of the devices.

The SNMP Settings page showed in Figure 4.65 allows the user to configure AW5500C device so that it can be viewed by third-party SNMP software, and allows AW5500C to send alert events to administrator and SNMP trap server.

SNMP Settings AW5500C

SNMP (Simple Network Management Protocol)

The *SNMP* is used in network management systems to monitor network-attached devices for conditions that require administrative attention.

Basic Data Objects	
System Contact	Contact
System Location	Location

SNMP	<input type="checkbox"/> Enabled
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
------------------	---------

Figure 4.65 SNMP Settings Web Page

AW5500C provides two basic SNMP fields under the **Basic Data Objects** part which are: “**System Contact**” usually used to specify the device’s contact information in case of emergency (default value is “contact”), and “**System Location**” usually used to specify the device location (default value is “location”).

To make the device’s information available for public viewing/editing, you can enable the **SNMP** function by checking the **Enable** box and fill in the two passphrases (or SNMP Community Strings) below it. By filling in the passphrase for the **“Read Community”**, AW5500C device allows other network management software to read its information. By filling in the passphrase for the **“Write Community”**, AW5500C device allows other network management software to read/modify its information. The default AW5500C’s SNMP Community Strings (or passphrases) for **Read Community** and **Write Community** as shown in Figure 4.65 are **“public”** and **“private”**, respectively. Additionally, you can setup a **SNMP Trap Server** in the network to receive and collect all alert messages from AE5500. To configure AW5500C to dispatch alert messages originated from any unexpected incidents, you can fill in the IP Address of the **SNMP Trap Server** in the field shown in Figure 4.65. Note that any changes in these settings will take effect after the AW5500C device is restarted.

After finish configuring the **SNMP Settings**, please click on **Apply** button to apply your setting. A pop-up window with a message **“Please wait for a while...”** will be displayed first, then another pop-up window with a message **“The settings have been complete”** will show up. When the applying is finished, the pop-up window will disappear and the web browser will redirect you to the Overview web page. If you want to cancel the change and reset all changes back to their original values, just click on the **Cancel** button.

4.9 E-mail Settings

When AW5500C device raises an alert and/or a warning message, it can send an e-mail to an administrator’s mailbox. This **E-mail Settings** web page allows you to set up the AW5500C to be able to send an e-mail. Figure 4.66 shows the **E-mail Settings** web page in which there are two configurable parts: **E-mail Address Settings** and **E-mail Server**.

First for the **E-mail Address Settings** part, a **Sender’s** e-mail address is required to be filled in the **Sender’s** text box which will be used in the From field of the e-mail. Note that the maximum length of sender email address is 48 characters. Then, for the **Receiver’s** text box you can enter multiple recipients which will be used in the To field of the e-mail. Note that to fill in multiple receiver e-mail addresses in the **Receiver’s** text box, please separate each e-mail address with semicolon (;).

The screenshot shows the 'E-mail Settings' web page for an AW5500C device. The page is divided into two main sections: 'E-mail Address Settings' and 'E-mail Server'.
E-mail Address Settings: This section includes a 'Sender' text box and a 'Receiver' text box. Below the 'Receiver' text box, there is a note: 'Use a semicolon (;) for each e-mail address.'
E-mail Server: This section includes fields for 'SMTP Server', 'Authentication' (with checkboxes for 'SMTP server authentication required' and 'Enable TLS/SSL'), 'User name', and 'Password'.
 At the bottom of the form, there are three buttons: 'Apply', 'Send Test Mail', and 'Cancel'.

Figure 4.66 E-mail Settings Web Page

Second for the **E-mail Server** part, you must enter an IP address or Host Name of a Mail Server which is in your local network in the **SMTP Server's** text box. Note that the maximum length of **SMTP server** address is 31 characters. If your Mail Server (or Simple Mail Transfer Protocol (SMTP) Server) requires a user authentication, you must check the **"SMTP server authentication required"** box in the **Authentication** option. Additionally, if your Mail Server requires communication security such as TLS/SSL (Transport Layer Security/Secure Sockets Layer) which are cryptographic protocols, please enable them by checking the **TLS/SSL** box. After enabling this option, you can fill in the **Username** and the **Password** below. Please consult your local network administrator for the IP address of your Mail Server and the required Username and Password.

At the end of the page, there is a **Send Test Mail** button for you to click to verify whether the **E-mail Settings** are configured correctly. Note that after clicking the **Send Test Mail** button, a pop-up window with message "Please wait for a while..." will be displayed and will be followed with another pop-up window indicating the success or failure status of sending test e-mail. Figure 4.67 below shows a pop-up window indicating a failure of sending a test e-mail.



Figure 4.67 Sending Test E-mail Failed

	<p>Attention</p> <p>It is also important to setup Default Gateway and DNS Servers in the Network Settings properly so that AW5500C can lookup domain names and route the e-mails to the proper default gateway. Please see the Default Gateway and DNS Server Settings in Section 4.2 above.</p>
---	---

After finish configuring the **E-mail Settings**, please click on **Apply** button to apply your setting. A pop-up window with message **"Please wait for a while..."** will be displayed. When the saving and applying are finished, the pop-up windows will disappear and the web browser will remain on the **E-mail Settings** page. If you want to cancel the change and reset all changes back to their original values, just click the **Cancel** button.

4.10 DHCP Server

If there is no workstation or server to act as a DHCP (Dynamic Host Configuration Protocol) Server and assign IP addresses to each client automatically, AW5500C can serve as the **DHCP Server** to statically or dynamically assign an IP address to any network device. To enable such functionality, check **Enabled** to enable the **DHCP Server** in AW5500C as shown in Figure 4.68. Next proceed to fill in the **IP Address Range** part which includes the **"From IP Address"** and **"To IP Address"**. Then fill in the IP address' **Netmask** (or Subnet Mask). Next the **"Lease Time"** is the duration in minutes that an assigned IP Address will belong to that device. Once this **Lease Time** expired, the IP address will be recycled. A maximum of 21600 minutes is set by default.

You can also assign a static IP address to a network device using the **Static Connection** part as shown in Figure 4.68. This means that the network device would always get the same Static IP Address from the DHCP server. To statically assign an IP address, check on the small box in front of each line, and then fill in the **Host Name** and/or the **MAC**

Address that you want to assign a static IP Address to. When DHCP is enabled, up to 32 different static IP/MAC can be set.

DHCP Server
AW5500C

DHCP Server Settings

The DHCP Server is used to distribute the dynamic/static IP addresses settings to the requested client. [DHCP Client List](#)

DHCP	<input type="checkbox"/> Enabled		
IP Address Range			
From IP Address	<input type="text"/>		
To IP Address	<input type="text"/>		
Netmask	<input type="text"/>		
Lease Time(seconds)	<input type="text" value="21600"/>		
Static Connection			
Host Name	IP Address	MAC	Status
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	

Page 1/6

◀▶
Save Settings Apply Cancel

Figure 4.68 DHCP Server Web Page

To check the status of the current DHCP client table, you can click on the hyperlink (**DHCP Client List**) at top of the setting web page. If there is no client available, there would be a message specifying that there is “No DHCP entry” as shown in the table shown in Figure 4.69. To check for the list of DHCP Client again, click on the **Refresh** button.

System Status > DHCP Status
AW5500C

DHCP Client List

Host Name	MAC Address	IP Address	Lease Time
No DHCP entry.			

Figure 4.69 DHCP Client List Web Page

4.11 *Firewall & Filtering*

The following subsections explain how to configure the network's firewall in AW5500C as well as its packet filtering. Available criteria for packet filtering are based on MAC address (both Wired or Wireless), type of Ethernet packet, and IP address. These filtering methods provide security by preventing unauthorized or malicious packets to enter into your network.

Data packets will be filtered (or classified) as either "allowed packets" or "denied packets". The "allowed packets" mode is commonly known as the "whitelist" and the "denied packets" mode is known as the blacklist. We highly encourage you to be extremely careful on this section as data that doesn't fit into any of these criteria will be discarded with the potential outcome of letting the AW5500C as inaccessible if it was not configured properly. If the latter happens, you will need to reset the device back to its factory default setting by any of the methods described in Section Reboot4.15 (Reboot and Restore Default Settings).

4.11.1 Wired MAC Filtering

When AW5500C is connected to the LAN/Ethernet interface, packet filtering over the wired interface can be done using this option. The setting is simple, intuitive, and straight-forward. You just choose whether to **Allow** or **Deny** packets and proceed to fill in the blank slots of the **Access Control List** with the corresponding MAC addresses as shown in Figure 4.70. Up to 64 different MAC addresses can be set for allowing or denying packets. By default, Wired MAC Filtering is disabled (the radio button is selected for the “**Disable MAC Filtering**”). You can choose the corresponding radio button for either “**Allow packets with MAC addresses listed below**” option or “**Deny packets with MAC addresses listed below**” option. For changes to take effect, press the **Apply** button. To discard your setting, press the **Cancel** button.

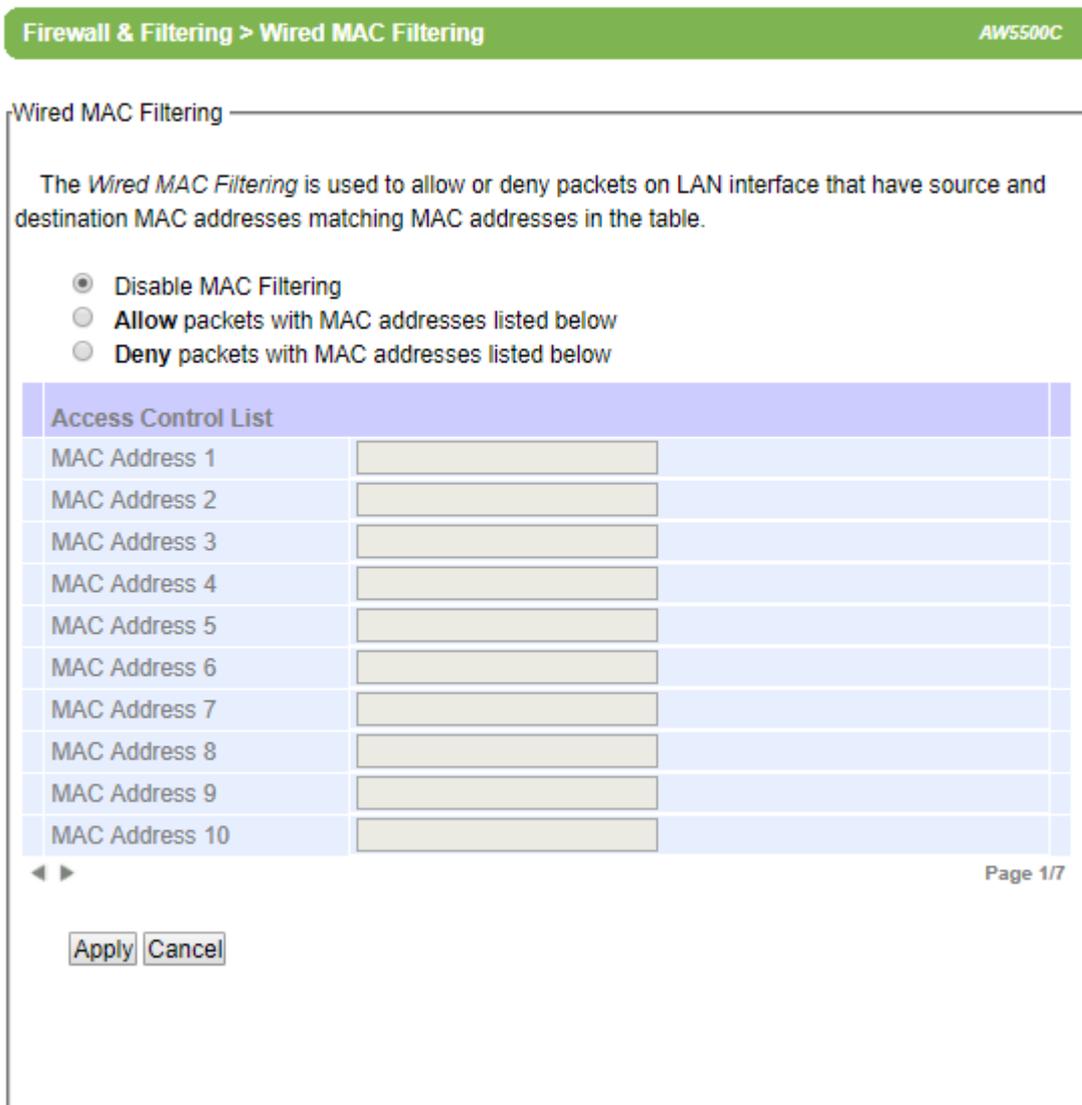


Figure 4.70 Wired MAC Filtering Web Page

4.11.2 Ethernet Type Filtering

Ethernet Type Filtering is done according to the packets' Ethernet type. This is also known as Layer 3 filtering. By default, the **Ethernet Type Filtering** is disabled as shown in Figure 4.71. To enable the Ethernet Type Filtering, you can select the corresponding radio button for either **"Allow packets that match specification below"** option or **"Deny packets that match specification below"** option. As in the two previous subsections, there is a maximum of 64 entries for packets' specification in the Ethernet Type Filtering List. There are five predefine filtering specifications inside the list. After enabling the filtering either by allowing or denying, you can check the packet's Ethernet Type box which is located to the left of Ethertype's code in the first column. Ethertype numbering usually starts with 0x.... in which corresponds to four digits of hexadecimal number, e.g., 0xF0F0 which is to filter NETBUI type messages or 0x8035 for RARP type messages.

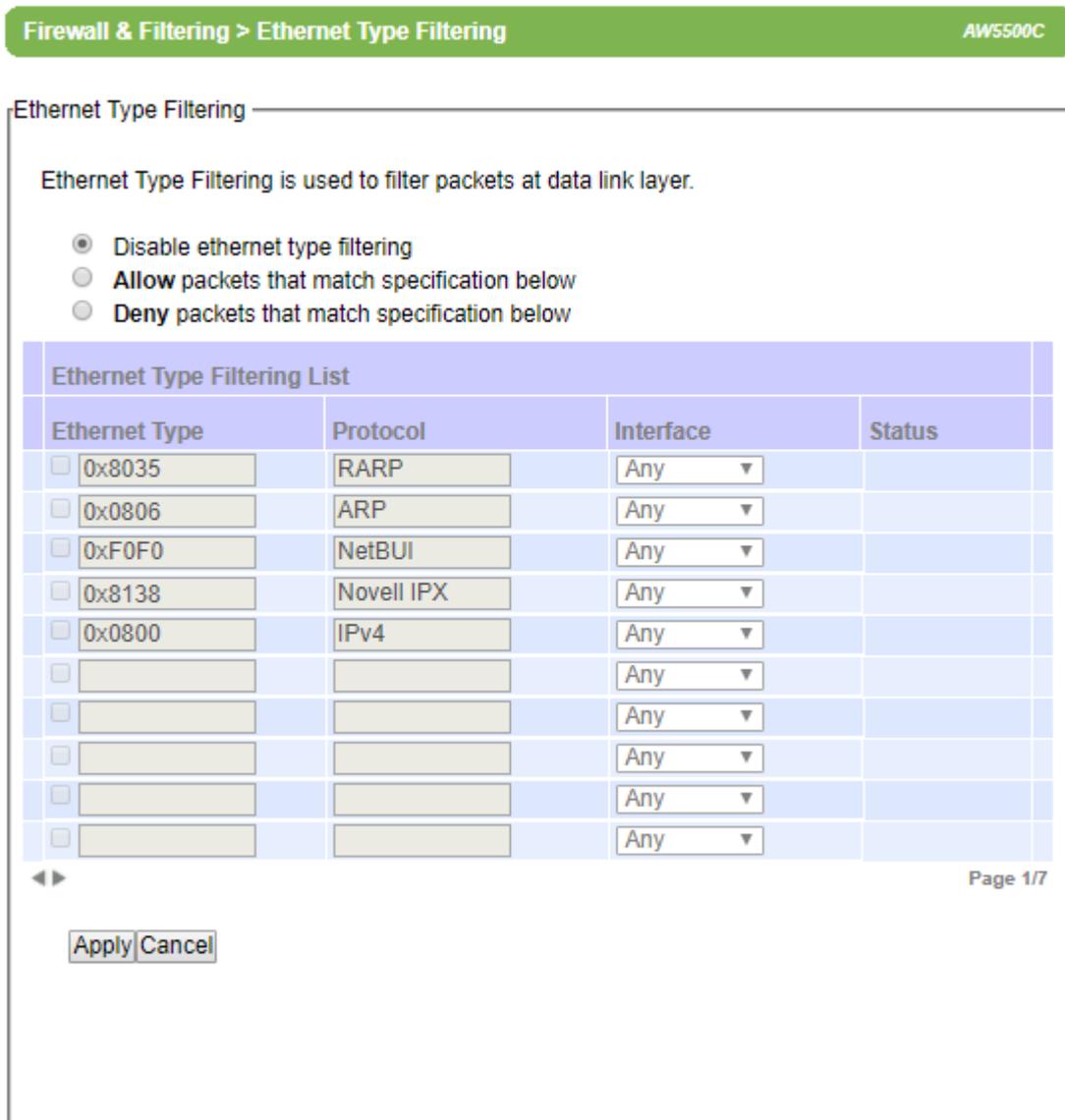


Figure 4.71 Ethernet Type Filtering Web Page

After finish configuring the **Ethernet Type Filtering**, please click on **Apply** button to apply your setting. A pop-up window with a message **"Please wait for a while..."** will be displayed first, then another pop-up window with a message **"The settings have been complete"** will show up. When the applying is finished, the pop-up window will disappear and the

web browser will redirect you to the Overview web page. If you want to cancel the change and reset all changes back to their original values, just click on the **Cancel** button.

4.11.3 IP Filtering

IP Filtering, as its name implies, is for filtering datagrams or packets on the IP protocol. This is also known as Layer 4 filtering. By default, IP Filtering is disable as shown in Figure 4.72. To enable the IP Filtering, you can select the corresponding radio button for either **“Allow packets that match specification below”** option or **“Deny packets that match specification below”** option. Once again, there is a maximum of 64 entries for packets’ specification in the IP Filtering List. For each entry in the **IP Filtering List**, you need to activate each one of them by checking the code box which is located to the left of the **Code** in the first column. Then, fill in the **Protocol**, **Source Address**, and **Destination Address**. Next select the **Interface** from the drop-down list. Note that each filter entry only provides a one-way filtering. To create a 2-way filtering, you need to add another entry that has the source address and destination address reversed.

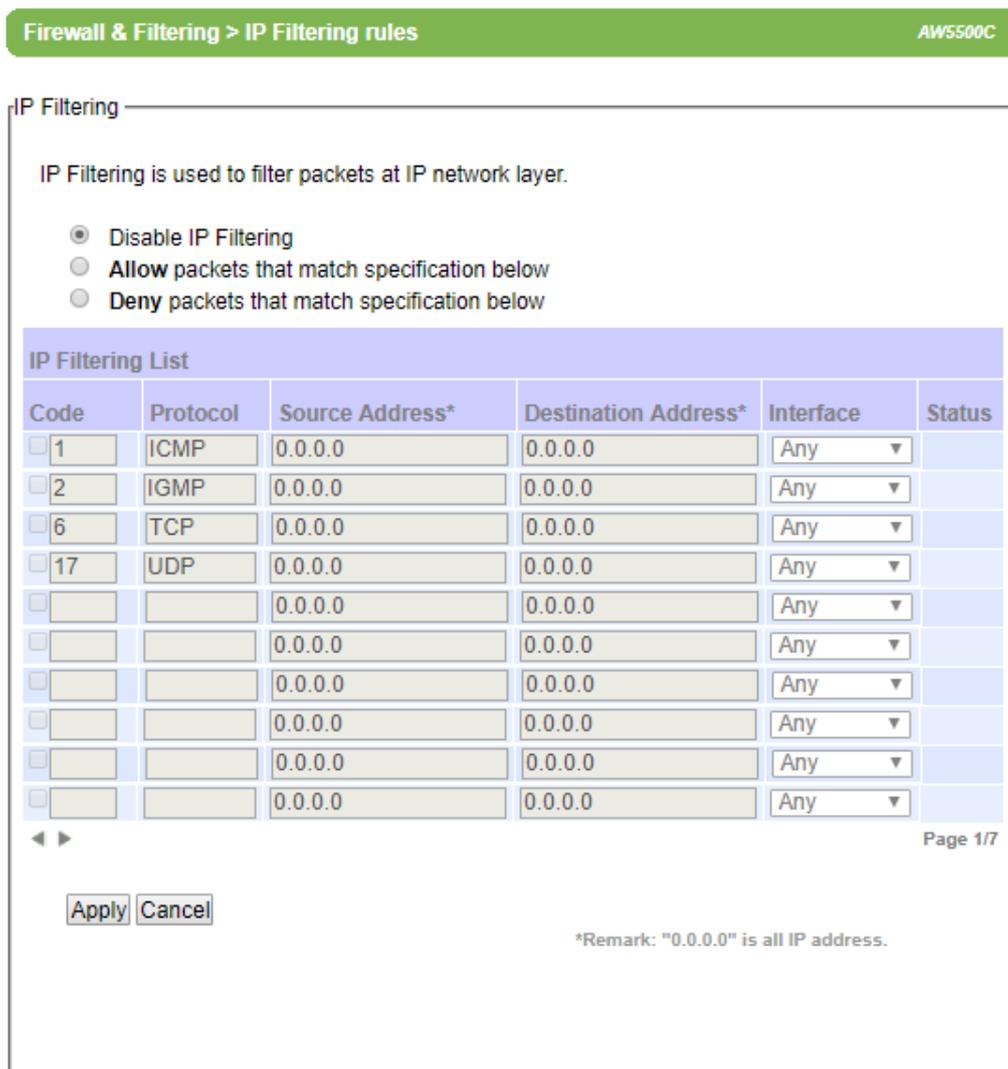


Figure 4.72 IP Filtering Web Page

After finish configuring the **IP Filtering**, please click on **Apply** button to apply your setting. A pop-up window with a message **“Please wait for a while...”** will be displayed first, then another pop-up window with a message **“The settings have been complete”** will show up. When the applying is finished, the pop-up window will disappear and the web

browser will redirect you to the Overview web page. If you want to cancel the change and reset all changes back to their original values, just click on the **Cancel** button.

4.11.4 Management List

The **Management List** is used to filter the MAC addresses that can have access to the Web management interface or Web UI. When **Management List** is enabled, only the MAC addresses entered in the list of allowed MAC address can gain access to the Web UI of AW5500C. Check the radio button in front of the “**Allow uses with MAC addresses listed below**” to enable the MAC address list as shown in Figure 4.73. Note that this Access Control List (**The list of allowed MAC address**) allows user to input up to 10 MAC addresses and must be entered in the XX:XX:XX:XX:XX:XX format (where XX are hexadecimal numbers).

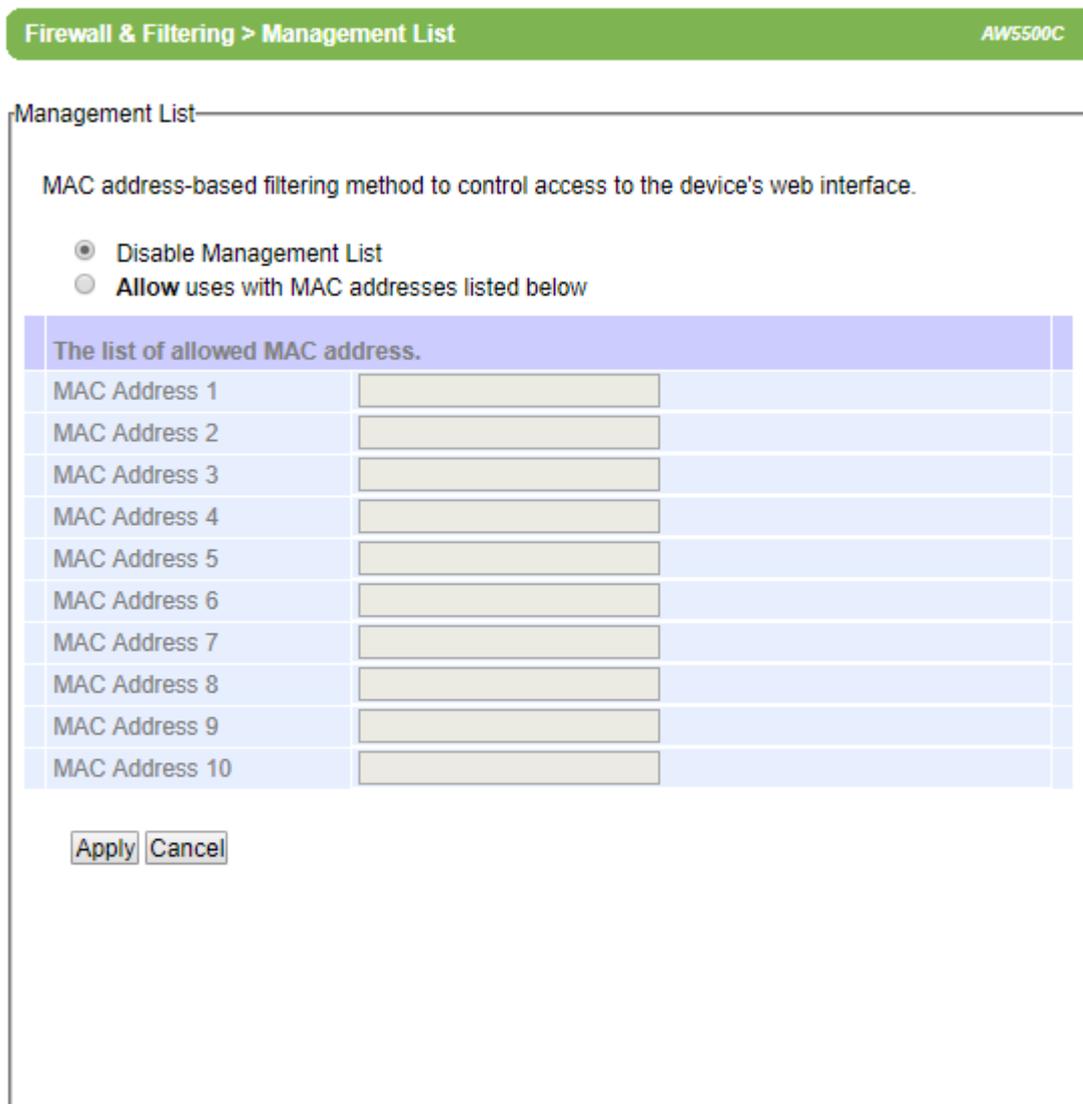


Figure 4.73 Management List Web Page

After finish configuring the **Management List**, please click on **Apply** button to apply your setting. A pop-up window with a message “**Please wait for a while...**” will be displayed first, then another pop-up window with a message “**The settings have been complete**” will show up. When the applying is finished, the pop-up window will disappear and the web

browser will redirect you to the Overview web page. If you want to cancel the change and reset all changes back to their original values, just click on the **Cancel** button.

4.12 Log Settings

AW5500C supports two types of log: System Log Settings and Event Log as shown in the Log Settings Menu below.

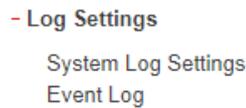


Figure 4.74 Log Settings Menu

4.12.1 System Log Settings

The Syslog function is turned on by default and cannot be turned off for AW5500C. It is used to keep log for system events and report to an external Syslog server if necessary. Figure below shows the System Log Settings page under the Log Settings menu. Description of each option is as follows.

System Log Settings	
Enable Log Event to Flash	<input checked="" type="checkbox"/> Enabled
Log Level	2: (LOG_CRIT) ▼
Enable Syslog Server	<input checked="" type="checkbox"/> Enabled
IP Address	0.0.0.0
Syslog Server Service Port	514 (1~65535, default=514)

Apply Cancel

Figure 4.75 System Log Settings Web Page

- **Enable Log Event to Flash:** When the check box is enabled, AW5500C will write log events to the local flash. Otherwise the log events would be cleared when the device restarts because they are stored in the RAM by default.
- **Log Level:** There is only one log level which is Level 2: (LOG_CRIT).
- **Enable Syslog Server:** When the check box is enabled, it will allow AW5500C to send Syslog events to the remote Syslog server with the specified IP address (next option). All the data sent/received from network interfaces will be logged and sent to Syslog Server.
- **IP Address:** The user must specify the IP address of a remote Syslog Server in this field.
- **Syslog Server Service Port:** This option allows user to specify the remote Syslog Server Port. Note that the default port number is 514.

After finish configuring the **System Log Settings**, please click on **Apply** button to apply your setting. A pop-up window with message **"Please wait for a while..."** will be displayed. When the applying is finished, the pop-up window will

disappear and the web browser will remain on the **System Log Settings** page. If you want to cancel the change and reset all changes back to their original values, just click the **Cancel** button.

4.12.2 Event Log

This page displays the current event log stored in the AW5500C device. Figure 4.76 shows an example of logged event. Each record of the log consists of **Index**, **Date**, **Time**, **Startup Time**, **Level** and **Event** description.

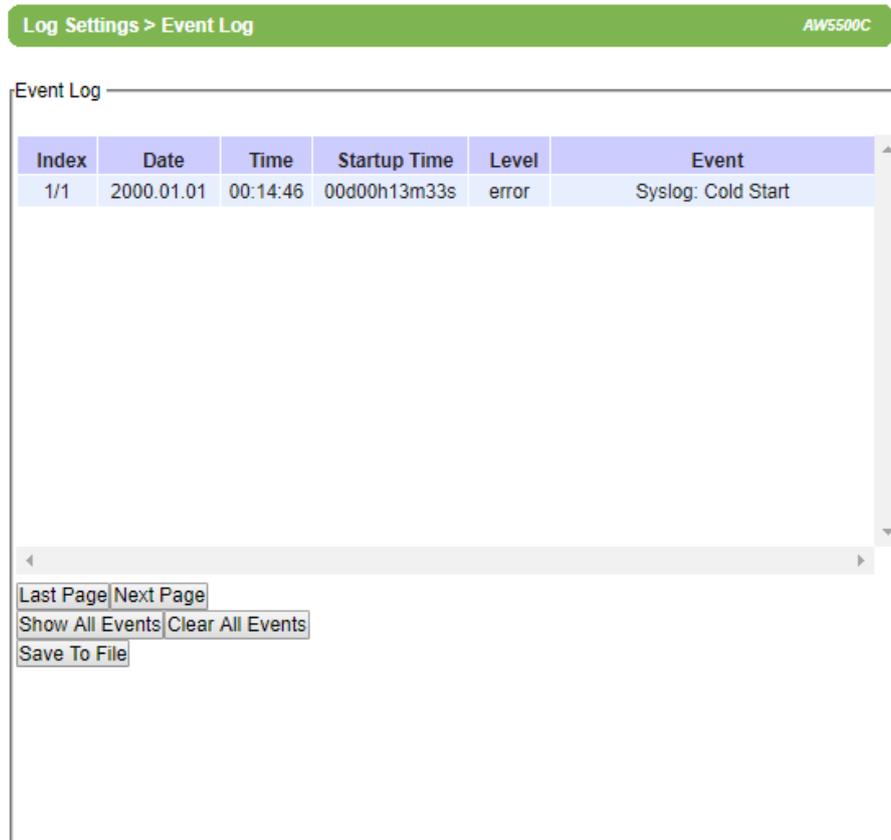


Figure 4.76 Event Log Web Page

At the end of the **Event Log** page, there are two buttons which can be used to navigate through all records. You can click on the **"Last Page"** button to go to the last page of the log and click on the **"Next Page"** button to go to the next page. To display all events in one page, you can click on **"Show All Events"** button. By clicking on **"Clear All Events"** button, you can clear all events stored in the device and the **Event Log** will be empty with a message "There is no event". To save all events to a local file (on your personal computer), you can click on **"Save To File"** button.

4.13 System Setup

The System Setup menu of AW5500C consists of Admin Settings, Date/Time Settings, Alert Event, Firmware Upgrade, Backup & Restore Configuration as shown in Figure 4.77.

- System Setup

- Admin Settings
- Date/Time Settings
- Alert Event
- Firmware Upgrade
- Backup & Restore
- Configuration

Figure 4.77 System Setup Menu

4.13.1 Admin Settings

The AW5500C allows user and password management through this **Admin Settings** page under **System Setup** menu. By default, the user name is “**admin**” and the password is “**default**”. To set or change their values, you can enter the information in the **User name**, the **Old password**, the **New password** and the **Repeat new password** fields as shown in Figure 4.78.

User & Password	
User name	admin
Old password	
New password	
Repeat new password	

Web mode	
Web mode	<input checked="" type="radio"/> HTTP <input type="radio"/> HTTPS

Device Name	
Device Name	

Apply Cancel

Figure 4.78 Admin Settings Web Page

There are two ways to access AW5500C’s Web User Interface (Web UI). The first one is via Hypertext Transfer Protocol (HTTP) and the other is via Hypertext Transfer Protocol Secure (HTTPS). For enhanced security, it is recommended to

use the encrypted HTTPS protocol. Note that HTTP uses port 80 while HTTPS uses port 433. You can configure whether to add security layer (or encryption) for Web UI configuration via the Web mode option by choosing between HTTP and HTTPS radio buttons. Finally, you can enter a preferred **Device Name** for your AW5500C. Note that the default device name is its MAC Address.

After finish configuring the **Admin Settings**, please click on **Apply** button to apply your setting. A pop-up window with message "Please wait for a while..." will be displayed. Another pop-up window will be displayed to re-authenticate the user to access the Web UI of AW55000 as shown in Figure 4.7. You must re-enter the username and the password to login to the AW5500C. When the applying and the re-authentication are finished, the pop-up windows will disappear and the web browser will remain on the **Admin Settings** page. If you want to cancel the change and reset all changes back to their original values, just click the **Cancel** button.

4.13.2 Date/Time Settings

Date and time can be set manually or using Network Time Protocol (NTP) to automatically synchronize date and time of AW5500C with a Time Server. Figure below shows the **Date/Time Settings** page. Note that the **Current Date/Time** will be updated automatically on this page. To enable automatic time synchronization, please check the "**Obtain date/time automatically**" box in the **NTP** option below **NTP Server Settings** part. Then proceed to enter the IP address or host name for the **NTP Server**. Note that if a host name is entered, the DNS server must be configured properly (see detail in Section 4.2 above above). Additionally, a **Time Zone** can be selected as well from the drop-down list. **Daylight Saving Time Setting** is enabled when **Enable Daylight Saving Time** box is checked. When it is enabled, the user can select the detailed setting, such as **Start Date** and **End Date** with **Offset**. **Manual Time Settings** can be set in the lower part where user can set Date and Time using corresponding drop-down lists.

System Setup > Date/Time Settings
AW5500C

Date/Time Settings

The NTP (Network Time Protocol) is used to synchronize the date/time from the NTP server.

Current Date/Time	
1 / Jan / 2000 00:53:36	
NTP Server Settings	
NTP	<input type="checkbox"/> Obtain date/time automatically
NTP Server	<input type="text" value="pool.ntp.org"/>
Time Zone	(GMT) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London ▼
Daylight Saving Time Settings	
<input type="checkbox"/> Enable Daylight Saving Time	
Start Date	<input type="text" value="--"/> / <input type="text" value="--"/> / <input type="text" value="Sun"/> / <input type="text" value="00"/> (Month / Week / Date / Hour)
End Date	<input type="text" value="--"/> / <input type="text" value="--"/> / <input type="text" value="Sun"/> / <input type="text" value="00"/> (Month / Week / Date / Hour)
Offset	<input type="text" value="0"/>
Manual Time Settings	
Date	<input type="text" value="01"/> / <input type="text" value="Jan"/> / <input type="text" value="2000"/>
Time	<input type="text" value="00"/> : <input type="text" value="53"/> : <input type="text" value="29"/> (HH : MM : SS)

Figure 4.79 Date/Time Settings Web Page



Attention

It is also important to setup **Default Gateway** and **DNS Servers** in the **Network Settings** properly (See Section 4.2 above), so AW5500C can lookup DNS names and point to the proper NTP server.

After finish configuring the **Date/Time Settings**, please click on **Apply** button to apply your setting. A pop-up window with message “**Please wait for a while...**” will be displayed. When the applying is finished, the pop-up window will disappear and the web browser will remain on the **Date/Time Settings** page. If you want to cancel the change and reset all changes back to their original values, just click the **Cancel** button.

4.13.3 Alert Event

On this Alert Even web page, there is a list of alert type under **Event** column as shown in Figure 4.80. There are two possible actions for each alert event: **Email Alert** and (SNMP) **Trap Alert**. You can enable the associated action(s) of each alert event by checking the box under the column of **E-mail Alert** and/or **Trap Alert**. When the **E-mail Alert** box is checked and the corresponding event occurs, it will trigger an action for AW5500C to send an e-mail alert to designated addresses configured in the **E-Mail Settings** (described in Section 4.9). When the **Trap Alert** box is checked and the corresponding event occurs, it will trigger an action for AW5500C to send a trap alert to the designated SNMP Trap server (described in Section 4.8).

System Setup > Alert Event
AW5500C

Alert Event Settings

There are two types of alerts: E-mail and SNMP. Alerts are triggered by respective events. E-mail recipients and Trap server can both be set at E-mail Settings and SNMP Settings respectively.

Event	E-mail Alert	Trap Alert
Cold Start	<input type="checkbox"/>	<input type="checkbox"/>
Warm Start	<input type="checkbox"/>	<input type="checkbox"/>
Authentication Failure	<input type="checkbox"/>	<input type="checkbox"/>
IP Address Changed	<input type="checkbox"/>	
Password Changed	<input type="checkbox"/>	

Figure 4.80 Alert Event Web Page

There are seven events that will trigger the alarm from AW5500C as listed in figure above. These alerts are useful for security control or security monitoring of the AW5500C device:

- **Cold Start:** This event occurs when there is a power interruption.
- **Warm Start:** This event occurs when the device resets.
- **Authentication Failure:** This event occurs when an incorrect username and/or password are entered which could indicate an unauthorized access to the AW5500C.
- **IP Address Changed:** This event occurs when the AW5500C device’s IP address is changed.

- **Password Changed:** This event occurs when the administrator password is changed.

After finish configuring the **Alert Event Settings**, please click on **Apply** button to apply your setting. A pop-up window with message “**Please wait for a while...**” will be displayed. When the applying is finished, the pop-up window will disappear and the web browser will remain on the **Alert Event** page. If you want to cancel the change and reset all changes back to their original values, just click the **Cancel** button.

4.13.4 Firmware Upgrade

Updated firmware for AW5500C is provided by Atop from time to time (for more information please visit Atop News & Events webpage) to fix bugs and optimize performance. It is very important that the device is **NOT turned off or powered off during the firmware upgrading**, (please be patient as this whole process might take up to 3 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 firmware upgrading process.

To upgrade a new firmware to AW5500C, please downloaded the latest firmware for your AW5500C model from the download tab on the AW5500C product page or from the Download page under the Support link on Atop’s main webpage. Then, copy the new firmware file to your local computer. Note that the firmware file is a binary file with “.**did**” extension. Next, open the Web UI and select **Firmware Upgrade** page under the **System Setup** menu as shown in Figure 4.81. Then, click “**Browse**” button as shown in below Figure to find and choose the new firmware file. Then, click “**Upload**” button to start the firmware upgrade process. 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). Finally, the AW5500C device will then proceed to restart itself. In some cases, you might require to re-configure your AW5500C device. To restore your backup configuration from a file, please see the procedure in the next subsection.

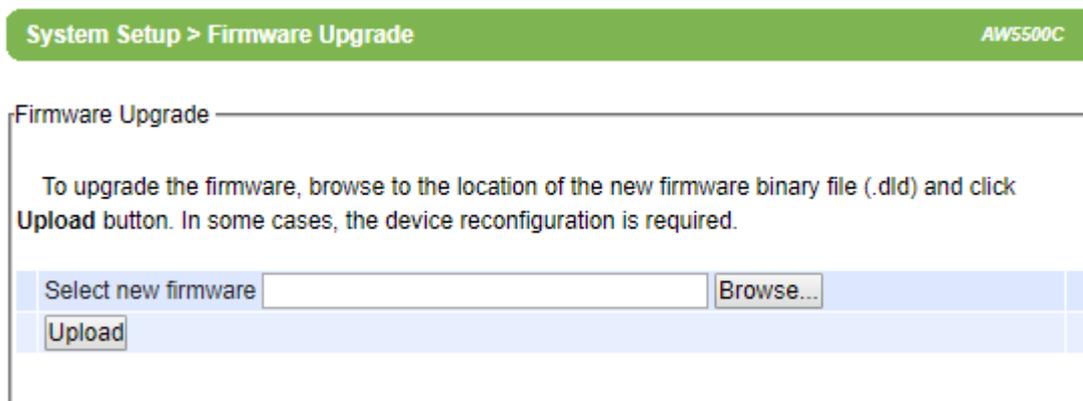


Figure 4.81 Firmware Upgrade Web Page

Note: if the firmware upgrade process fails and the device becomes unreachable, please follow the TFTP recovery procedure on the Emergency System Recovery.

4.13.5 Backup & Restore Configuration

Once all the configurations are set and the device is working properly, the user should back up the current configuration of AW5500C. The backup configuration file can be used when the new firmware is uploaded and the device is reset to factory default settings. This is done to prevent accidental loading of incompatible old settings. The backup

configuration file could also be used to efficiently deploy multiple AW5500C devices of similar settings by uploading these settings to all devices.

To back up configuration, click “**Backup**” button under the **Backup Configuration** part as shown in Figure 4.82, and a pop-up dialog will prompt the user for saving the backup file (station.ini) on user’s computer. **It is important NOT to manually modify the saved configuration file by any editor. Any modification to the file may corrupt the file and it may not be used for later restoration.**

Please contact Atop authorized distributors for more information on this subject.

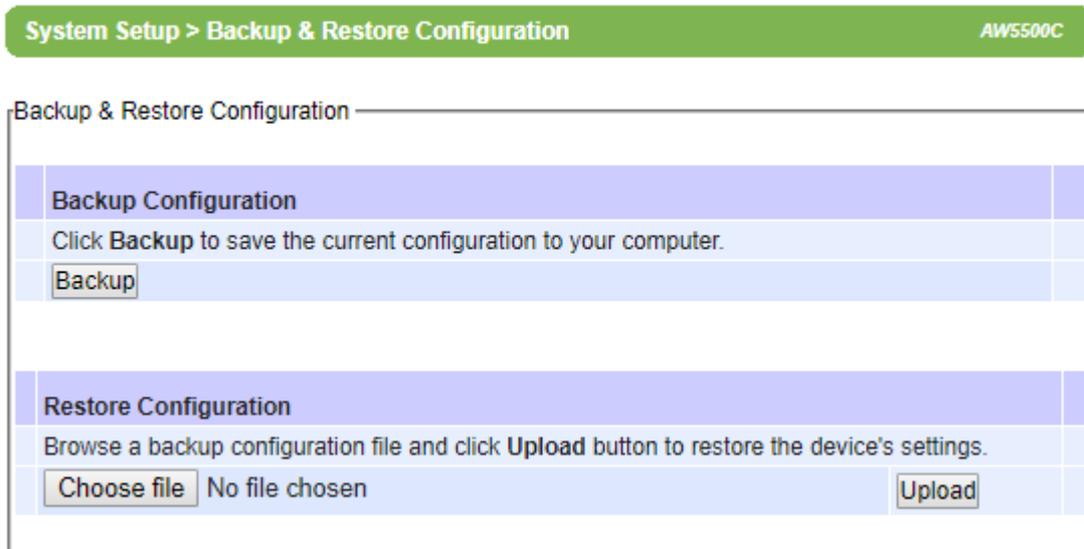


Figure 4.82 Backup & Restore Configuration Web Page

To restore the backup configuration, click “**Choose File**” button under the **Restore Configuration** part as shown in Figure 4.82 to locate the backup configuration file on user’s computer. Then, click on “**Upload**” button to upload the backup configuration file to the device. Once the backup configuration file is successfully uploaded, the device will restart. Note that the time needed for this process may vary on the equipment used.

4.14 System Status

Overall AW5500C's information as well as network information are available when browsing through this menu. The **System Status** menu consists of **System Information**, **Site Monitor**, **Wireless Client Table**, **Traffic Log & Statistics**, **DHCP Status**, and **Ping** web pages as shown in Figure 4.83.

- System Status
 - System Information
 - Site Monitor
 - Wireless Client Table
 - Traffic Log & Statistics
 - DHCP Status
 - Ping

Figure 4.83 System Status Menu

4.14.1 System Information

The System Information web page provides summary of device's Model Name, Device Name, Kernel Version, AP Version, Operating Mode, and all Network Information as shown in Figure 4.84. If the device is operated as Regular AP or any other operation mode, there will be information about the WLAN in the AP-Client Information

System Status > System Information AW5500C

System Information

Model Name:	AW5500C	Device Name:	
Kernel Version:	3.13	AP Version:	3.16
Operating Mode:	Regular AP		

Network Information:	
WLAN MAC	00:60:E9:14:4F:40
LAN MAC	00:60:E9:14:4F:40
IP Mode	Static
IP Address	10.0.50.200
Subnet Mask	255.255.0.0
Gateway	10.0.50.1
WIFI Mode	802.11b/g/n
Channel	1
BandWidth	Auto 20/40 MHz
Ethernet Link	ON

AP-Client Information:	
SSID	--
MAC	--
Topology	--
Channel	--
Encryption	--
Status	Disconnected

Figure 4.84 System Information Web Page

4.14.2 Site Monitor

Site Monitor is a utility tool provide in AW5500C that allows users to view other wireless networks in the neighborhood. It also provides information on other access points such as **SSID**, **Channel**, the RSSI (Received Signal Strength

Indicator) denoted as **Signal%**, Security (**Authentication & Encryption**) and Link Speed (in **Mbps**) of other access points. It can be helpful when setting up a new SSID and selecting a Channel for this new device to avoid using same SSID name and conflicting radio Channel. Configuring a unique SSID and less interfered radio channel for a new AP can prevent unexpected errors or degraded performance. Please bear in mind that it will take some time (approximately 10 seconds) for this option to gather information of the surrounding wireless networks. When you click on the Site Monitor link under the System Information menu, you will see an animation as shown in Figure 4.85. After the network scanning is finished, you will be presented with a table of Neighbor Wireless Network as shown in Figure 4.86.



Figure 4.85 Site Monitor Web Page



Neighbor Wireless Network

SSID	Mode	Channel	Authentication	Encryption	Mbps	Signal%
true_home2G_8B2	b/g	1	WPA-PSK	TKIP/AES	54	100
Wicky_2.4G	b/g/n	1	WPA-PSK	AES	144	1
MV32983806	a	6	OPEN	NONE	54	8
HeyHaParty_Donmueng	b/g/n	6	WPA-PSK	TKIP/AES	130	11
POR	b/g/n	5	WPA-PSK	TKIP/AES	270	22
TonThida2G	b/g/n	11	WPA-PSK	TKIP/AES	144	39
true_home2G_1eb	b/g/n	6	WPA-PSK	TKIP/AES	130	3
Keaw_Scotty	b/g/n	1	WPA-PSK	TKIP/AES	144	3
TON BANGYAI	b/g/n	1	WPA-PSK	TKIP/AES	270	0
SENT	b/g/n	11	OPEN	NONE	130	5
Station	b/g/n	11	OPEN	NONE	130	19
NUT@OOI	b/g/n	13	WPA-PSK	AES	144	5

Figure 4.86 Neighbor Wireless Network

4.14.3 Wireless Client Table

On this web page, you will be presented with a table for wireless client, which lists all wireless and WDS devices that are currently connected to this AW5500C. Figure 4.87 shows an empty **Wireless Client Table**. Note that for each entry in the table, there are **MAC Address**, Association ID (**AID**), **Channel**, **Tx Rate**, Received Signal Strength Indication (**RSSI**), **Idle** status, **Tx Sequence** and **Rx Sequence**, which are relevant information of each particular associated device.

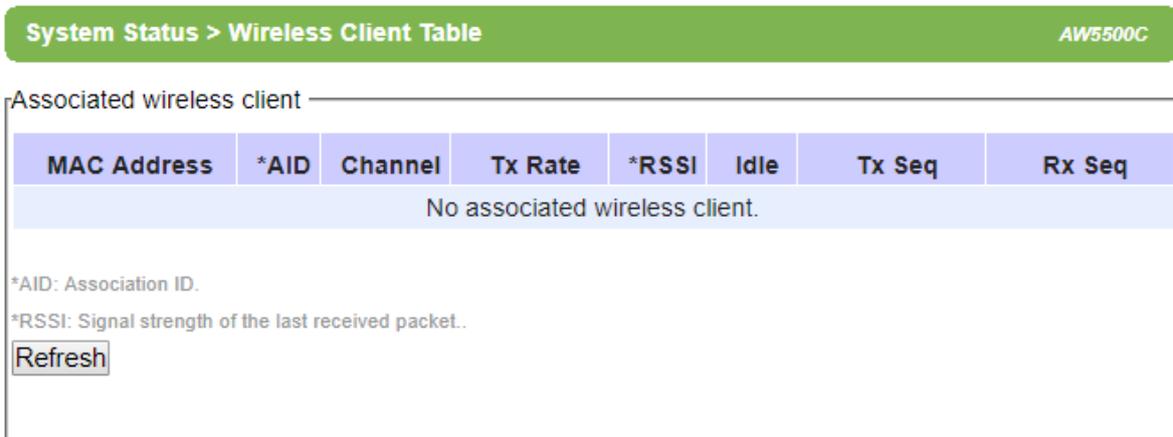


Figure 4.87 Wireless Client Table Web Page

4.14.4 Traffic Log & Statistics

Traffic Log & Statistics summarizes wireless network and status information as shown in Figure 4.88. It can be used to analyze the quality and quantity of transmit and receive frames over the wireless network. This could help diagnose the problem in wireless communication. The **Refresh Rate** can be changed to automatically reload/update the page by selecting the update rate from the drop-down list. The default refresh rate is “no refresh” option. However, the refresh can be done manually by clicking on the **Refresh** button. Note that please be careful when setting the value of refresh rate because it will increase the CPU load on the AW5500C device.

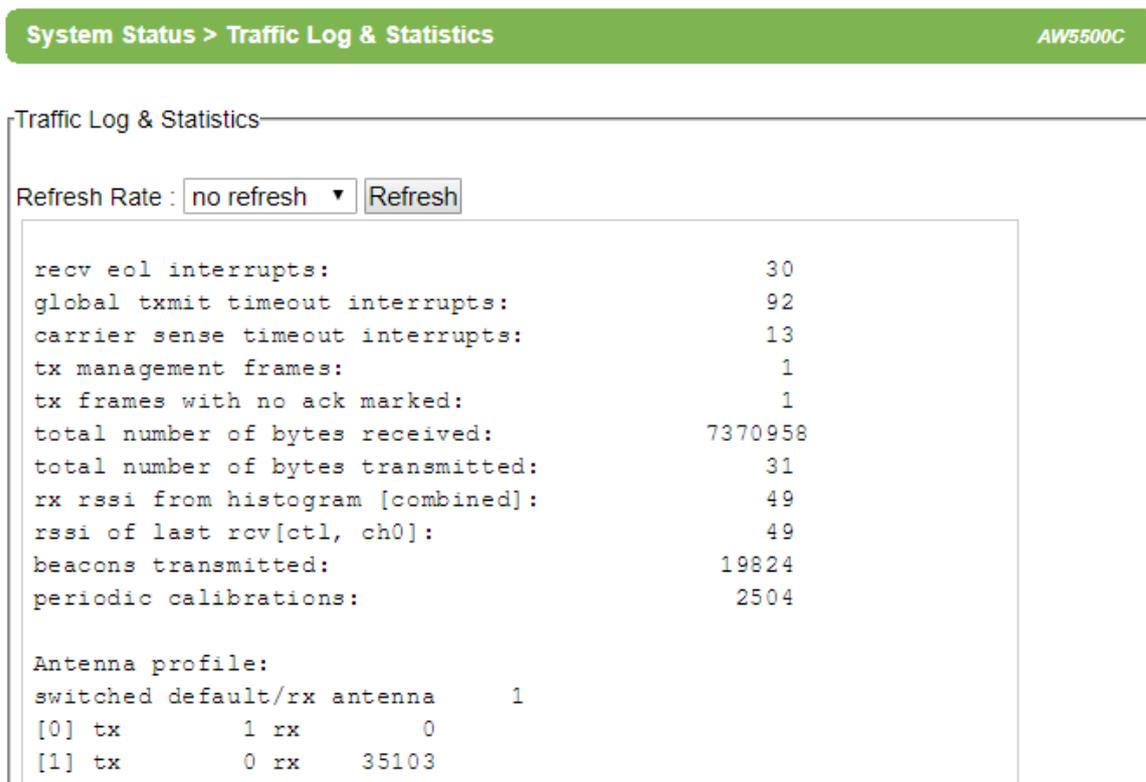


Figure 4.88 Traffic Log & Statistics Web Page

4.14.5 DHCP Status

When the DHCP server is enabled on AW5500C as described in Section 4.10, AW5500C can distribute or assign IP addresses to its clients using the DHCP protocol. Using this **DHCP Status** web page as shown in Figure 4.89, a list of clients currently receiving IPs can be viewed. DHCP Client's **MAC Address** as well as its **IP address**, **Host Name**, and **Lease Time** will be shown in the list.

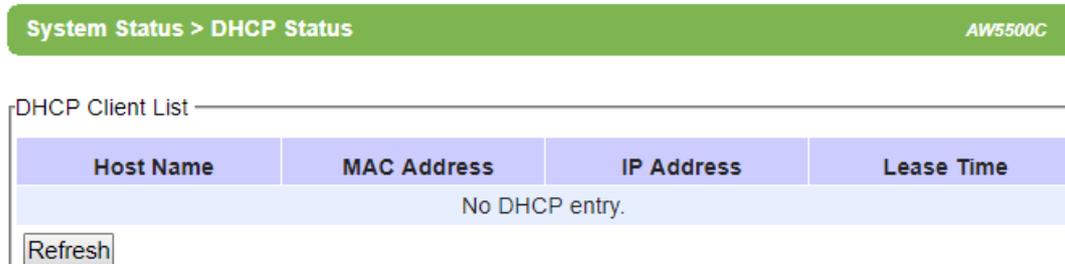


Figure 4.89 DHCP Status Web Page

4.14.6 Ping

The Web UI of AW5500C has an interface to call **Ping**, which is a network diagnostic utility for testing reachability. You can use the **Ping** function to determine whether AW5500C can reach the gateway or other devices in the network. To use the **Ping**, enter a destination IP address in the text box behind the **Ping To** and click **Start** button as shown in Figure 4.90. This process usually takes around 20 seconds. The two figures below represent a successful ping without packet loss from AW5500C to the address 10.0.50.100 and back, and the connecting device at the address 10.0.50.2 is unreachable in which no packets have returned from the transmitted ping packets.

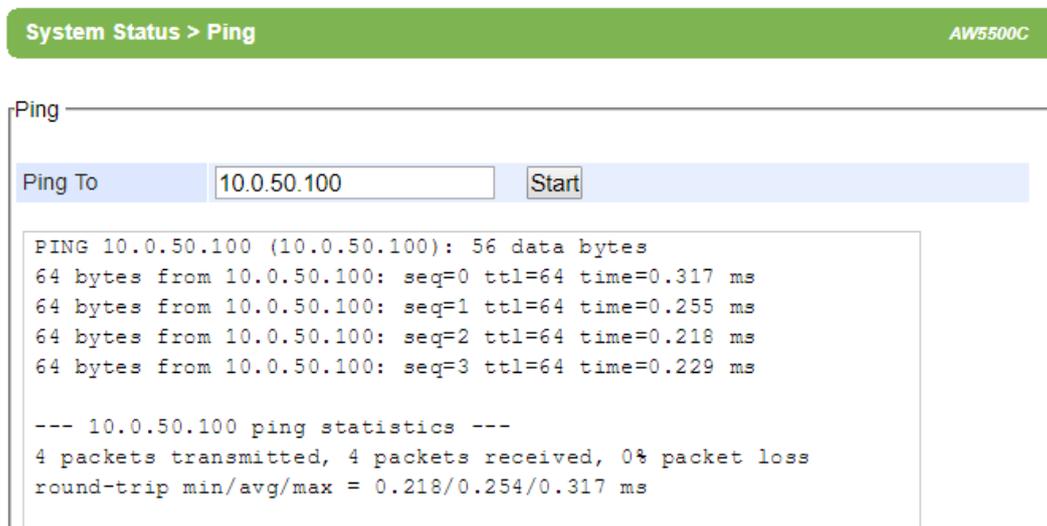


Figure 4.90 Successful Ping with No Packet Loss

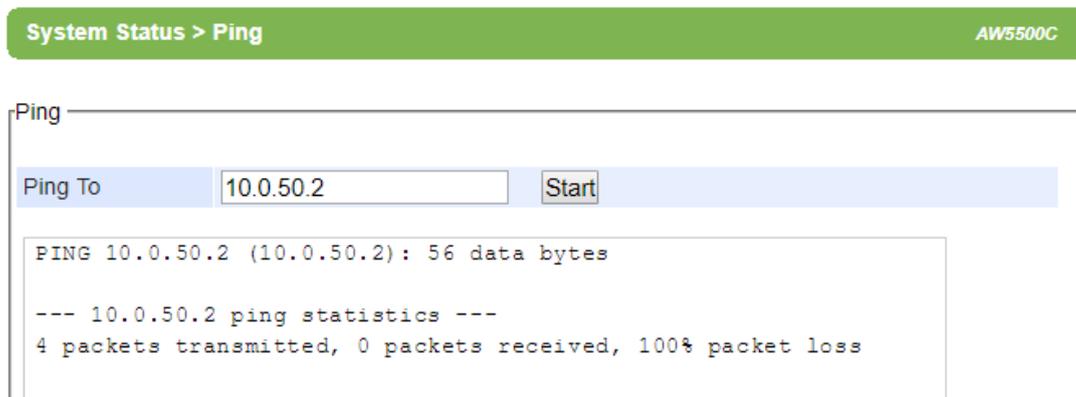


Figure 4.91 Unsuccessful Ping with 100% Packet Loss

4.15 Reboot

To manually reboot the AW5500C device, click on the **Reboot** button at the end of the **Reboot & Restore Default** page as shown in Figure 4.92. The device will then restart. A pop-up window with a message "Please wait for a while..." will be displayed with a countdown number in seconds. If a restoration to the factory default settings is needed, please check the **Reset** box before clicking on the **Reboot** button. When the rebooting process is finished, the pop-up window will disappear and the web browser will be redirected to the Operation Mode or Overview web page.

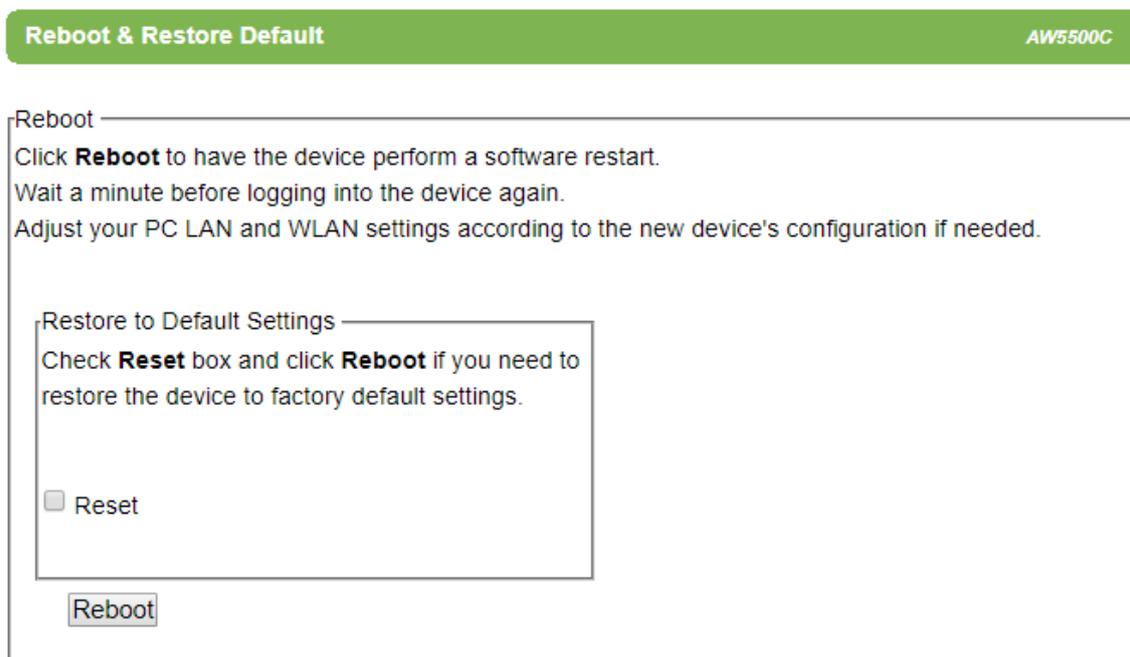


Figure 4.92 Reboot Web Page

Alternatively, you could use the reset button located on the front panel of AW5500C device which is close to the **ANT2**. The reset button can be found inside a small hole above the **Reset** maker. To restore the factory default settings, just insert the tip of a paper clip into the small hole and hold it long enough (approximately 5 seconds) until the device produces a long beep. Then, release the reset button and wait for the device to restart.

5 Operation Mode

This chapter provides description and summarizes the configuration steps of each operation mode of AW5500C Industrial Wireless Access Point. AW5500C can be set to operate as Regular AP,

5.1 Regular AP Mode

Regular AP mode, which is the factory default settings of the AW5500C, allows wireless clients to connect to a network and relays data between the wired and wireless devices in the network. It allows multiple wireless clients to access the network through AW5500C's Ethernet interface (physical/wired connection). This operation mode can be selected from the first radio button on the Operation Mode web page as shown in Figure 5.1.

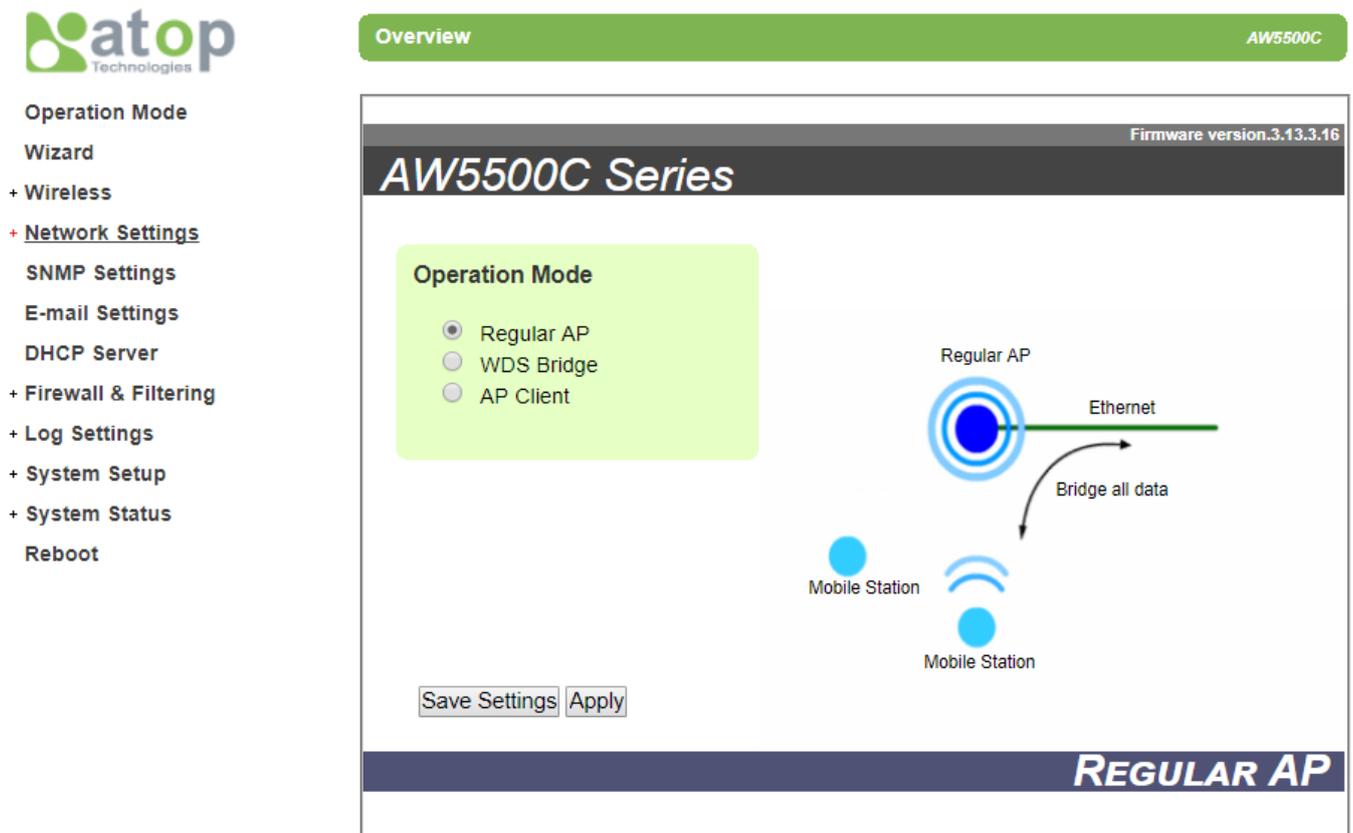


Figure 5.1 Regular AP Operation Mode

For a quick setup of AW5500C as a Regular AP, please follow these steps:

- On **Operation Mode** page, choose "**Regular AP**" option (if the device is not in factory default). Click **Save Settings** and **Apply** buttons.
- Go to **Wireless** menu → **Basic Settings** page. 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 any neighbours with a name matching with yours. This is done to prevent any conflict over the networks.
- At this point, you may decide to change other settings such as the **Wireless Mode** and whether to have **Automatic Channel Selection**.

- Next go to **Security Settings** and on **Security Mode** choose which security protocol will be used in the network. We strongly recommend that you do not leave this security section as disabled.
- On **LAN & WLAN Interfaces**, enter the **IP Address**, **Subnet Mask**, **Default Gateway**, and **DNS Servers** that your network will be using (if any) according to your network configuration. Finally, click on the **“Apply”** button, and wait for the changes to take effect.
- You may also want to back up your configuration afterwards just in case you need these configurations in the future. Please follow the step in Section 4.13.5.

The web interface menu tree for AW5500C in Regular AP operation mode is shown in Figure 5.2. Note that the menu tree will be slightly different for each operation mode.

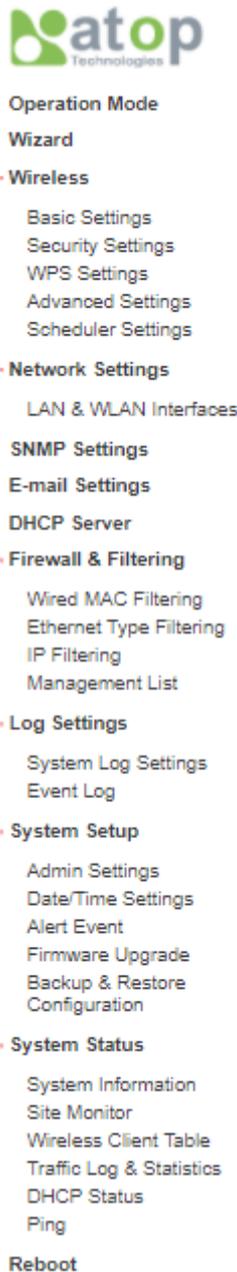


Figure 5.2 Complete Web Interface Menu Tree for AW5500C in Regular AP Operation Mode

5.2 WDS Bridge Mode

On this operation mode multiple AW5500C devices can be bridged together to create a Wireless Distribution System (WDS). Under this mode, the device uses its second MAC address as its wireless interface instead of the first one. The following explanations are the details of WDS structure. There are three roles that AW5500C 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 with either a 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 example of WDS's tree structure in Figure 5.3.

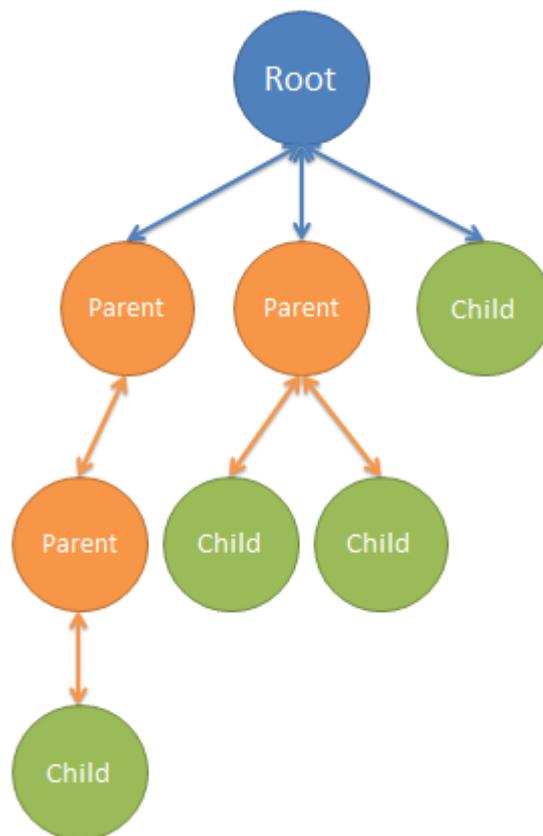


Figure 5.3 An Example of Wireless Distribution System

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.

This **WDS Bridge** mode can be selected from the second radio button on the **Operation Mode** web page as shown in Figure 5.4



Figure 5.4 WDS Bridge Operation Mode

For a quick setup of AW5500C as one of the three roles in WDS Mode, please follow these steps:

- On Operation Mode page, choose “**WDS Bridge**” option. Click **Save Settings** and **Apply** buttons.
- Go to **Wireless** menu → **Basic Settings** web page. On **WDS Mode** option, you can choose whether to use the AW5500C as a **Root AP**, **Hybrid**, or **Station**. On the same page, you can change the Network Name (**SSID**) to your preferred name. You might want to first click on “**Scan network**” button to find whether there are any neighbours with a name matching with yours. This is done to prevent any conflict over the networks. From here three different configurations are therefore possible:
 - **When on Root mode:**
 - ◆ **SSID Broadcast** can be disabled here for additional level of security.
 - ◆ On **Wireless Mode**, **Channel and transmission rate** can be chosen automatically by the AW5500C; however, feel free to change them to the settings that work for you.
 - ◆ On **WDS Settings** page → **Encryption Type** option, do not leave this option as NONE. Disabled encryption will result in an easy target for unauthorized access to your network.
 - ◆ For **Root/Hybrid AP**, the **MAC address** under **WDS Setting** is to be left empty.
 - ◆ Under the **Network Settings** menu → **Local Area Network** web page, all of the local area network fields should be entered with their corresponding values for the network being configured.
 - ◆ Finally, click on the **Save Settings** and the **Apply** buttons so that the settings can take effect.
 - **When on Hybrid mode:**
 - ◆ Please remember that the **SSID** here (under the **Basic Settings** page) should be the same as the **SSID** of the Root AP in WDS. This also means that roaming is possible between APs in the WDS.

- ◆ On **WDS Settings** web page → **Root/Hybrid AP** option, the **MAC address** entered here should be the **Root/Hybrid's (or Parent's) Second** MAC address of another device that is directly above this **Hybrid AP** in the WDS' tree structure as depicted in Figure 5.3. It might not be the **Root AP's** MAC address if the WDS setup has a multilayer architecture.
- ◆ Finally, click on the **Save Settings** and the **Apply** buttons so that the settings can take effect.

- **When on Station mode:**
 - ◆ Under the **Basic Settings** page, you can set the same **SSID** as the **SSID** of the Root AP in WDS.
 - ◆ On **WDS Settings** web page → **Root/Hybrid AP** option, the **MAC address** entered should be the **Root/Hybrid's (or Parent's) Second** MAC address that is directly above this Station AP. It might not be the **Root AP's** MAC address if the WDS setup has a multi-layer.
 - ◆ Finally, click on the **Save Settings** and the **Apply** buttons so that the settings can take effect.

The web interface menu tree for AW5500C in **WDS Bridge** operation mode is shown in Figure 5.5. Note that the menu tree will be slightly different for each operation mode.

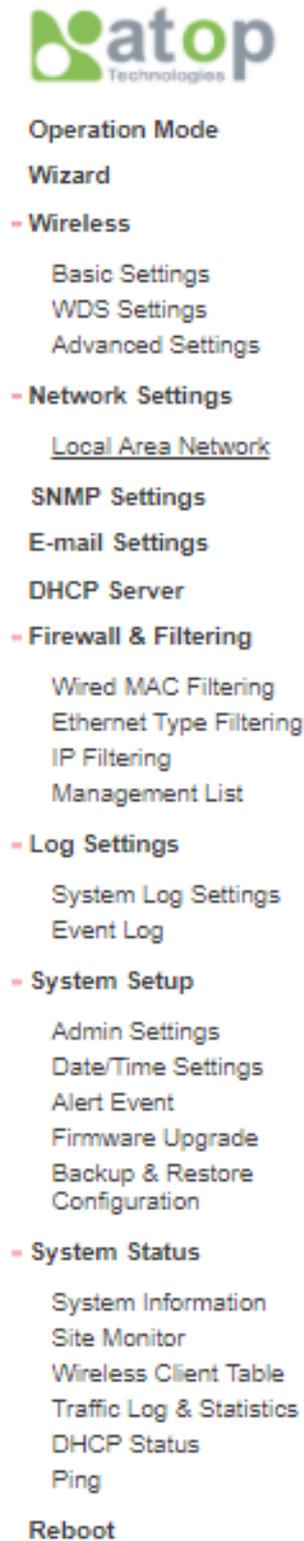


Figure 5.5 Complete Web Interface Menu Tree for AW5500C in WDS Bridge Operation Mode

5.3 AP Client Mode

This mode allows your AW5500C to act as a wireless client that connects to an AP (e.g. another AW5500C which is operated as Regular AP). Any Ethernet clients connected to your AW5500C over the Ethernet interface (LAN interface on AW5500C front panel) are allowed to access the network through AW5500C's wireless interface. Under this mode, the AW5500C device uses its second MAC address as its wireless interface instead of the first one. Figure 5.6 shows the Operation Mode web page with the AP Client option.

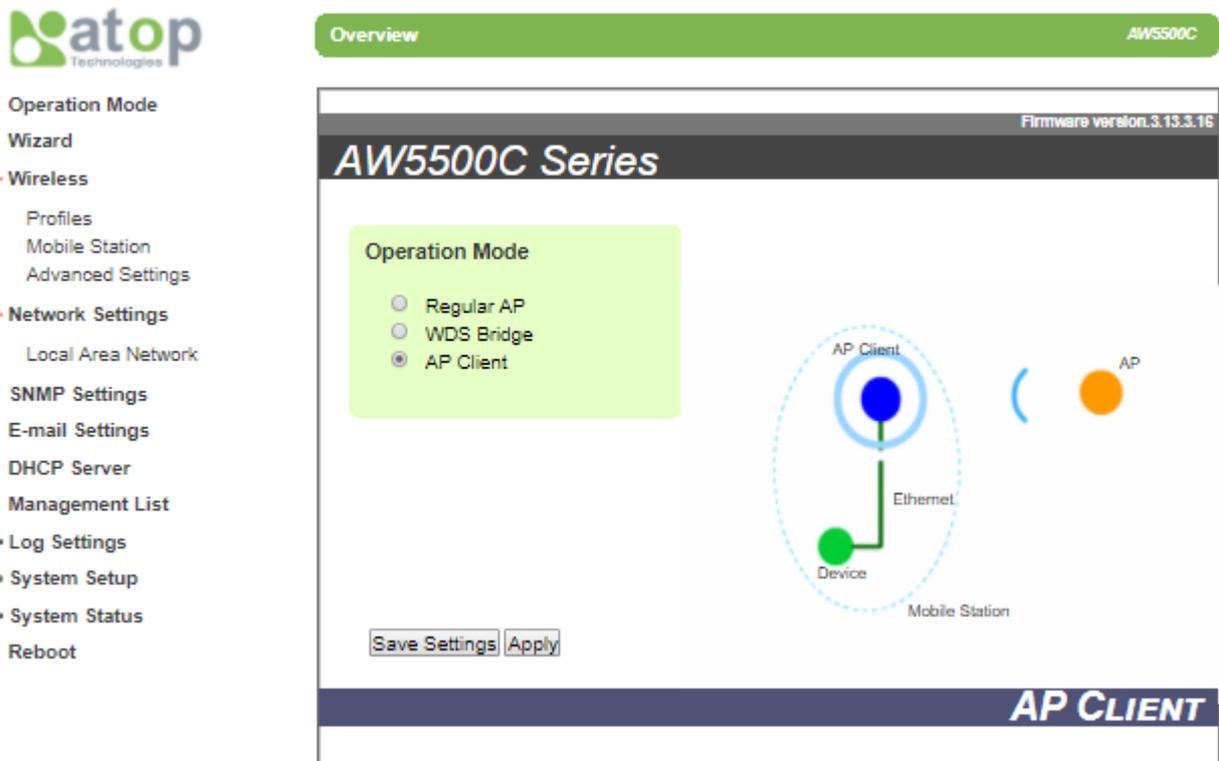


Figure 5.6 AP Client Operation Mode

Please note that your AW5500C can function as both a Regular AP and as an AP Client. You can configure one of two AW5500C device as a Regular AP and another AW5500C device as an AP Client. Then, you can connect the latter on to the first one). Supposing that we already have a wireless network physically installed, the steps to configure your AW5500C as an AP Client to connect to that network are as follows.

- On **Operation Mode** web page, choose **AP Client** option. Click **Save Settings** and **Apply** buttons.
- Then, go to the **Mobile Station** web page under the **Wireless** menu and click on **"Scan network"** button to choose an **SSID** to join.
- After the network scanning completed in previous step, a window/tab will pop up. In that new window/tab, there will be a list of names or **SSID** of the surrounding wireless networks. Choose the one that you already designated as your Regular AP by selecting its corresponding SSID by checking on the radio button in front of that particular **SSID**.
- Click **"Connect"** button at the end of the pop-up window, this will close the pop-up window/tab, and leave you with the settings of SSID that you selected on the previous page.
- Enter the WEP key or the WPA passphrase if necessary. (This depends on the security setting of the chosen AP.

- Then, scroll down to the end of the **Mobile Station Mode** page and press “**Apply**” button. Please wait for some time for the changes to apply.
- Then, proceed to **System Status** menu → **System Information** web page as shown in Figure 5.7. On the **AP-Client Information** section of the page, you can confirm that your AW5500C is connected to the selected network and you should be able see that the status field displays a signal percentage instead of disconnected. Additionally, you may want to double check the wireless connection status inside the client table of the connected AP.

System Status > System Information AW5500C

System Information

Model Name:	AW5500C	Device Name:	
Kernel Version:	3.13	AP Version:	3.16
Operating Mode:	AP Client		

Network Information:	
MAC	00:60:E9:0A:C4:E4
IP Mode	Static
IP Address	10.0.179.200
Subnet Mask	255.255.0.0
Gateway	10.0.50.1
WiFi mode	Auto
Channel	6
Bandwidth	40MHz
Ethernet Link	ON

AP-Client Information:	
SSID	RG
BSSID	Any
Topology	Infrastrustion
TxRate	Auto
Channel	6
Encryption	NONE
Status	 93%

Figure 5.7 Example of System Information Web Page for AP Client Operation Mode

The web interface menu tree for AW5500C in **AP Client** operation mode is shown in. Note that the menu tree will be slightly different for each operation mode.

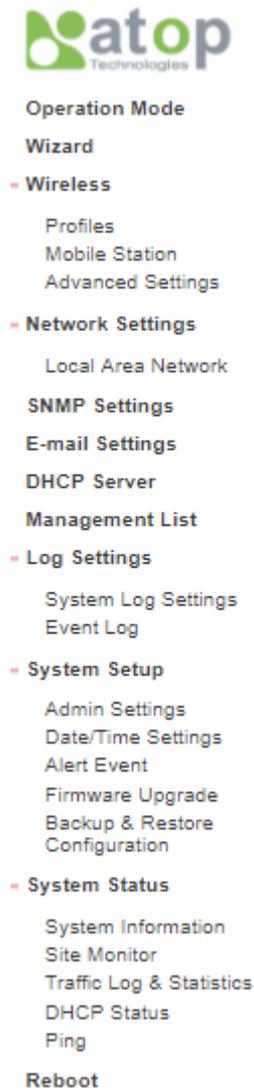


Figure 5.8 Complete Web Interface Menu Tree for AW5500C in AP Client Operation Mode

6 Applications

This chapter will show some use cases of the AW5500C Industrial Wireless Access Point.

6.1 Basic Access Point Setup

The following figure illustrates a standard access point (AP) use case serving multiple wireless clients within its signal coverage. In this case, the AW5500C is set as a Regular AP while its Ethernet interface (LAN) is connected to a network of a Control Room. There are two wireless clients in the figure which are a laptop and a SW5501.

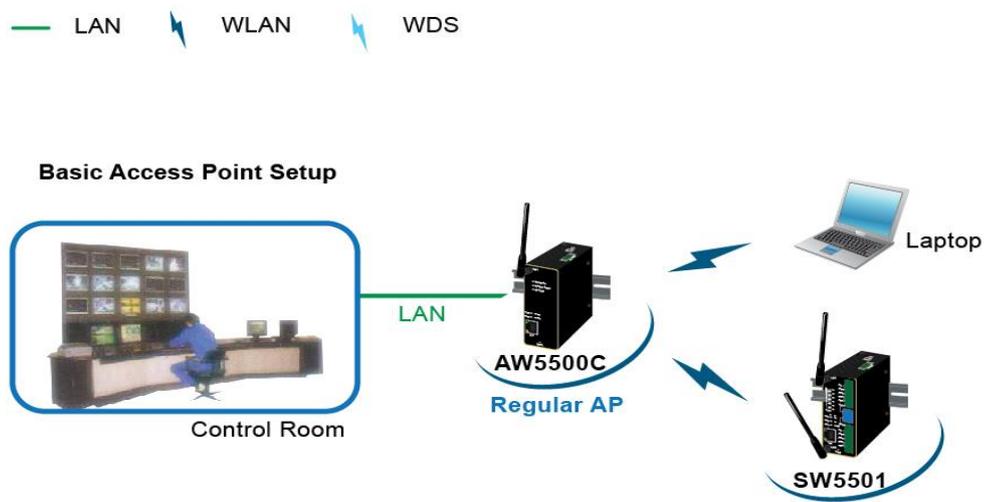


Figure 6.1 Basic Access Point Setup

For more information on how to configure your AW5500C as an Access Point please refer to and Section 4.5.1 and Section Regular AP Mode 5.1

Note: wireless coverage will depend on the environment.

6.2 Basic WDS Setup

The following figure illustrates two sites with some considerable distance apart. Ethernet cabling is impossible to the adjacent site. The adjacent site has both wireless clients and Ethernet clients. Therefore, we can use two AW5500C devices to setup a wireless distribution system (WDS). The first AW5500C is setup as a WDS Root which has an Ethernet interface (wired network) to the Control Room of the company. The second AW5500C is setup as a WDS Hybrid which can allow other wireless clients (both laptop and Atop's SW5501 Industrial Wireless Serial Server series) to connect to it while its LAN interface is connected to an Ethernet switch which is Atop's EH7510 Industrial Ethernet Switch series. 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.

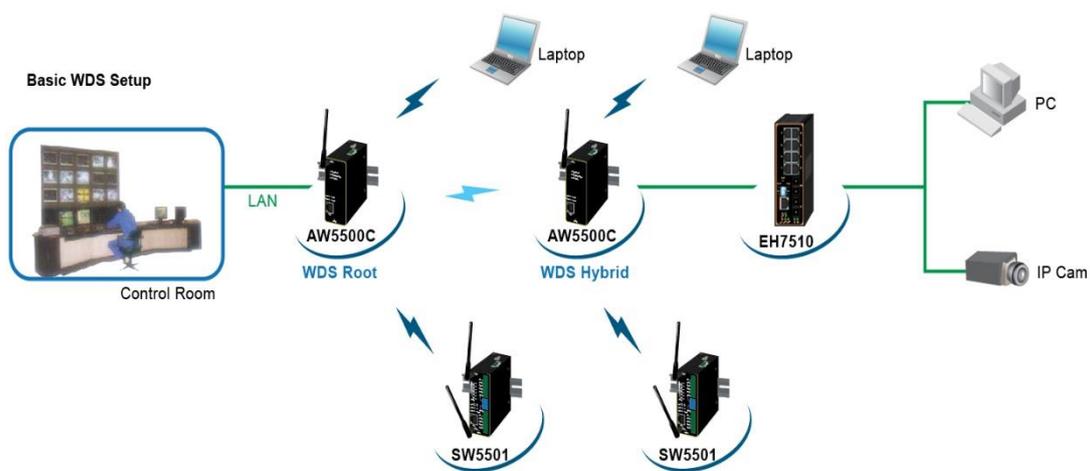


Figure 6.2 Basic WDS Setup

For more information on how to configure your AW5500C as WDS Bridge for this topology, please refer to Section 4.5.2 and Section 5.2.

Note: wireless coverage will depend on the environment.

6.3 Coverage Range Extender Setup

Extending from the previous scenario, if the distance needs to be further extended, it is always possible to add more AW5500C (in WDS Hybrid mode) in between the existing ones or to the edge of the network. The WDS MAC address of the newly added AW5500C (in WDS Hybrid mode) should be MAC address of the AW5500C that it is directly connecting to, not the MAC address of the AW5500C in WDS Root mode. Note that AW5500C in WDS Station mode does not allow both wireless client and AW5500C (in WDS Hybrid mode) to connect to. Normally it should be the last AW5500C device or the leaf of the network in the wireless topology if WDS station is utilized. Figure 6.3 illustrates an example of coverage range extender setup using multiple AW5500C devices. Note that between the two AW5500C devices which are WDS Hybrid mode can have any number (denoted by *n) of AW5500C devices in WDS Hybrid mode.

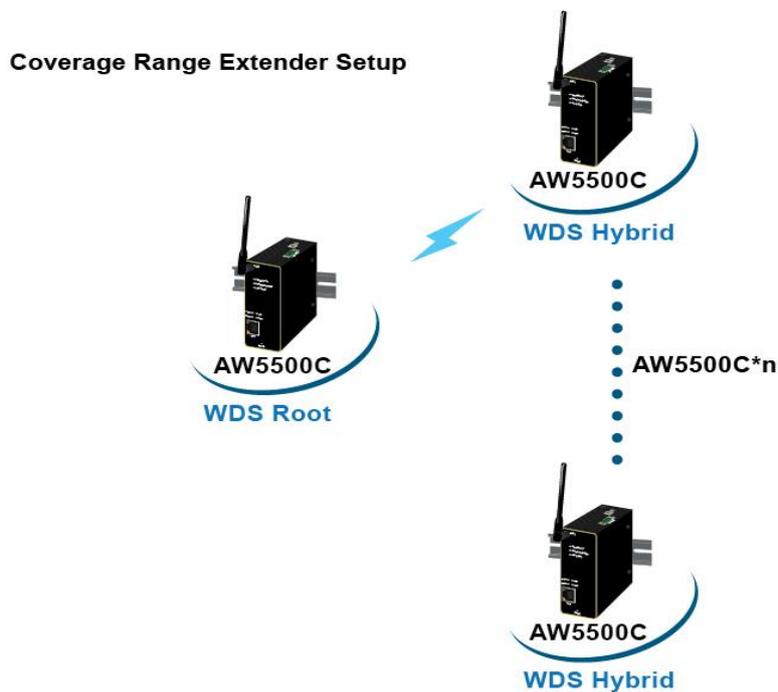


Figure 6.3 Coverage Range Extender Setup

For more information on how to configure your AW5500C as WDS Bridge for this topology, please refer to Section 4.5.2 and Section 5.2.

Note: wireless coverage will depend on the environment.

6.4 AP Client Setup

If AW5500C is being added to a wireless network where Access Points (AP1) from other vendors already existed, AW5500C could be set as AP Client mode to connect to that AP1 and bridge the Ethernet clients to AP1. This setup is similar to previous scenario of Basic WDS setup in Section 6.2 above, except that WDS is not used. This is because WDS from different vendors might not be compatible.



Figure 6.4 AP Client Setup

For more information on how to configure your AW5500C as AP Client for this topology, please refer to Section 6.1 above and Section 5.3.

Note: wireless coverage will depend on the environment.

6.5 P2P Button (External Physical WPS button)

AW5500C has an external physical WPS button – P2P Button, which can create a connection directly between two AW5500Cs. This can decrease the manual setting steps performed by the user. To use the P2P button with the WPS feature, please follow these steps.

1. You have enable the P2P button option on the AW5500C. This option can be found on the Advanced Settings webpage under the Wireless menu as shown in Figure 6.5. Note that the default setting is enabled.

The screenshot shows the 'Advanced Settings' page for the AW5500C. The page title is 'Wireless > Advanced Settings' and the device model is 'AW5500C'. The settings are as follows:

Setting	Value
*Regulatory Domain	US (FCC5_FCCA)
Tx Power	100 %
Short GI	Enabled
WMM	Enabled
WPA Group Rekey Interval	3600 seconds
STP	Disabled
Forward Delay	4 seconds
Fast Handoff	Disabled
Wireless Isolation	Disabled
20/40 MHz Coexistence (Only be supported at 802.11n with 2.4 GHz)	Enabled
P2P Button	<input checked="" type="checkbox"/> Enabled

Different regulatory domains will result in different channels/frequencies being allowed.

Buttons: Apply, Cancel

Figure 6.5 P2P Button Option under Advanced Setting Webpage

2. To successfully establish a connection, all AW5500C devices' IP address and subnet mask settings should be correct or consistent. This can be done using Atop's Device Management Utility software as described in Section 4.1 and depicted in Figure 6.6.

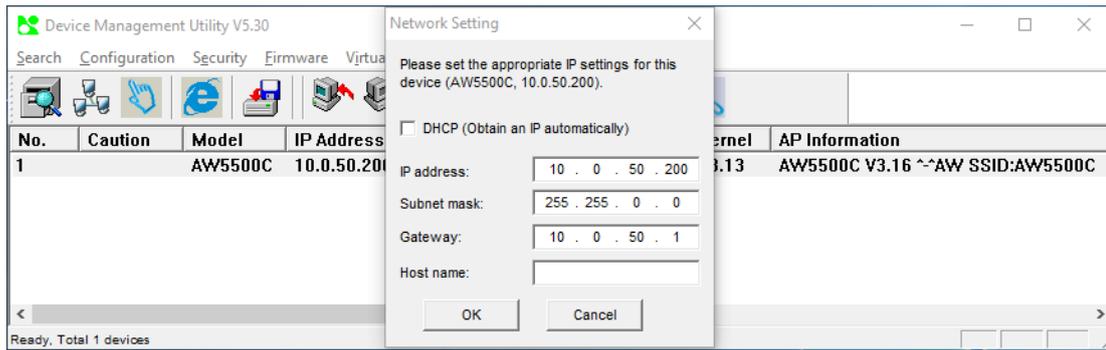


Figure 6.6 Network Setting Pop-up Window

- AW5500C can be assigned to different operation mode by pressing and holding P2P button differently. The following table shows how to configure AW5500C in each operation mode.

Table 6.1 Operation Mode Setting by P2P Button

Pressing seconds	1~3(s)	4~7(s)	8~(s)
Operation Mode	Restart connection	Regular AP	AP Client

- AW5500C can establish a Wi-Fi connection just by pressing P2P button. To set it into the Regular AP mode, press the P2P button for 4~7 seconds. To set it as an AP Client, press the P2P button over 8 seconds. If the user wants the AP to connect to other clients, just press the P2P button for 1~3 seconds to restart a connection.
- The user can check the connection status of AW5500C by observing the LED's activities on the front panel. The following table described the meaning of LED's colors and activities.

Table 6.2 LED's Colors and Activities for P2P Connection Status

LED Activities			
Color	Off	Blinking	On
Orange	P2P is not enabled	P2P is connecting in Regular AP Mode	Device's P2P mode is enabled in Regular AP Mode
Green	P2P is not enabled	P2P is connecting in AP Client Mode	Device's P2P mode is enabled in AP Client mode.

Note on Limitations:

- After pressing the P2P button, the whole pairing sequence is limited to 120 seconds. This means that the user has to set both devices within 120 seconds otherwise the pairing will not be successful.
- WDS protocol does not support establishing multiple AP-to-AP-client links at the same time. Therefore, pairing two or more devices at the same time might cause pairing failure.
- The pairing time might be influenced by environmental complexity such as wireless interference.

7 Specifications

7.1 Hardware Specifications

AW5500C's appearance is depicted in Figure 7.1.



Figure 7.1 AW5500C Front Panel with One Antenna

7.1.1 Wired Network Connectivity

AW5500C features one RJ-45 port that supports the following wired local area network standards.

- **Ethernet:** IEEE 802.3 10 BASE-T, 802.3U 100BASE-TX, 802.3ab 1000 BASE-T

7.1.2 Power Requirements

AW5500C requires the following power requirements to operate properly.

- **Input Voltage:** 9VDC-48VDC

- **Input Current:** (9VDC) 0.65 A
- **Power Consumption:** Approx. 5.85 W
- **Reverse Polarity Protection*:** Yes
- **Connection:** 3-pin Lockable, terminal block on top.

Note*: Although the device can withstand the reverse polarity, we strongly advice against this practice.

7.1.3 *Physical Characteristics*

AW5500C has the following physical characteristics:

- **Housing:** IP50 protection, metal case.
- **Weight:** 500 g
- **Dimensions:** 47 * 110 * 90 mm
- **Installation:** DIN-Rail, wall mount (optional kit)

7.1.4 *Environmental Limits*

AW5500C should be operated within the following 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)

7.1.5 *Wireless Specifications*

AW5500C has the following wireless connection specifications.

- **PCI-e Module:** Atheros AR9382
- **Tx/Rx:** 1T1R MIMO (1x1 with MCS 0-7)
- **Wireless Standard Conformance:** 802.11b, 802.11g, 802.11n
- **Antenna:** 3/5 dBi Dual antenna design, SMA(R) Female connector

7.1.6 *Frequency Range*

AW5500C can operate in 2.4GHz ISM bands for various regulatory regions.

Table 7.1 Frequency Range in Different Regions

Country/Region	2.4 GHz
Unites States (FCC)	2412-2462 (20 MHz)
	2422-2452 (40 MHz)
Europe (ETSI)	2412-2472 (20 MHz)
	2422-2462 (40 MHz)
Taiwan (NCC)	2412-2462 (20 MHz)
	2422-2452 (40 MHz)
China (CCC)	2412-2472 (20 MHz)
	2422-2462 (40 MHz)

7.1.7 Data Rate

Available data rates according to IEEE 802.11 Standards that AW5500C supports are summarized in Table 7.2.

Table 7.2 Data Rate for IEEE 802.11 Standards Supported by AW5500C

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.)

7.1.8 Output Power

Maximum radio frequency (RF) output power for each IEEE 802.11 standards that AW5500C will deliver are summarized in Table 7.3.

Table 7.3 Output Power of AW5500C for Each IEEE 802.11 Standard

IEEE Standards		Output Power @ Data Rate
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

*Note: Please bear in mind that this is the raw output power for the RF module and also note that the device has been

tested with one 3 dbi @2.4GHz antenna.

7.1.9 Receiver Sensitivity

Table 7.4 Receiver Sensitivity of AW5500C for Each IEEE 802.11 Standard

	Data Rate	IEEE Spec (1Rx dBm)	Typical/Maximum (2Rx dBm)
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
802.11b/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

7.1.10 Operation Distance

Table 7.5 Operation Distance of AW5500C at each IEEE 802.11 Standard

Standard	Outdoor	Indoor
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

Note that these distances are estimated and can be varied according to the actual operating environment.

7.1.11 Security

AW5500C supports the following security protocols:

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

7.1.12 Others

- **Reset Button:** Yes

7.1.13 Regulatory Requirements

AW5500C has been tested and complied with the following standards:

- **EMC:** EN 301489-1: 2008, EN301489-17: 2009 (Class A), FCC 15B (Class A), CNS 13438
- **Radio:** FCC 15C 15.247, FCC 15E 15.407, EN 301893: 2008, EN 300328: 2006, NCC LP00002
- **EMF:** EN 62311: 2008, EN 50385: 2002,
- **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 7.6 Compliant Test Items for AW5500C

Test	Item	Value	Level
IEC 61000-4-2	ESD	Contact Discharge	±8KV
		Air Discharge	±15KV
IEC 61000-4-3	RS	Radiated(Enclosure)	10(V/m)
IEC 61000-4-4	EFT	AC Power Port	±2.0 KV
		LAN Port	±2.0 KV
		COM Port	±2.0 KV
IEC 61000-4-5	Surge	AC Power Port	Line-to-Line±1.0 KV
		AC Power Port	Line-to-Earth±2.0 KV
		LAN Port	Line-to-Earth±2.0 KV
		COM Port	Line-to-Earth±2.0 KV
IEC 61000-4-6	CS	Conducted(Enclosure)	10 V rms
IEC 61000-4-8	PFMF	(Enclosure)	10(A/m)
IEC 61000-4-11	DIP	AC Power Port	-

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.

7.2 Software Specification

AW5500C supports the following software listed in Table 7.7.

Table 7.7 Supported Software

Configuration	<ul style="list-style-type: none"> ■ Browser (IE8+, Firefox 6+, and Chrome 13+) ■ Telnet ■ Device Management Utility© (Windows utility)
Protocol	<ul style="list-style-type: none"> <li style="width: 33%;">■ ICMP <li style="width: 33%;">■ DNS <li style="width: 33%;">■ HTTP <li style="width: 33%;">■ TCP <li style="width: 33%;">■ SNMP <li style="width: 33%;">■ HTTPS <li style="width: 33%;">■ RADIUS <li style="width: 33%;">■ UDP <li style="width: 33%;">■ NTP <li style="width: 33%;">■ IPv4 <li style="width: 33%;">■ Syslog <li style="width: 33%;">■ DHCP <li style="width: 33%;">■ SMTP <li style="width: 33%;">■ 802.1x
Alert Events	<ul style="list-style-type: none"> ■ E-mail ■ SNMP Trap
Radio OFF	Yes
Other	<ul style="list-style-type: none"> ■ Multiple SSID ■ Wireless Scheduler ■ Config Import / Export from Web ■ Firmware upgrade through Web or Device Management Utility© ■ Site Monitor / Site Survey ■ Wireless Isolation ■ Firewall/Filtering (Wired / Wireless MAC Filtering, Ethernet Type Filtering, IP Filtering, Management List)

7.3 LED Indicators

Table 7.8 Description of LED Status Indicators

Name	Color	Status	Description
Regular AP Mode	Green	On	The Access Point (AP) function is enabled and has more than one wireless client connected.
		Blinking	The AP function is enabled and does not have any wireless client connected.
		Off	The Access Point (AP) function is disabled.
WDS Bridge Mode	Green	On	The WDS Bridge function is enabled and the WDS is connected successfully.
		Blinking	The WDS Bridge function is enabled and the WDS is not connected successfully.
		Off	The WDS Bridge function is disabled.
AP Client Mode	Green	On	The AP Client function is enabled and connected to the remote AP successfully.
		Blinking	The AP Client function is enabled but not connected to the remote AP.
		Off	The AP Client function is disabled.
5GHz	Red	On	The AP is running on 5GHz band if WLAN LED is On.
		Off	The AP is running on 2.4GHz band if WLAN LED is On.
Locate	Green	Blinking	The AP is being located.
		Off	The AP is not being located.

Name	Color	Status	Description
LAN	Orange	Blinking	Ethernet is Connected on 10Mbps
		On	Ethernet is Connected on 10/100Mbps
		Off	Ethernet is Disconnected
	Green	Blinking	Data is transmitting on Ethernet
WLAN	Green	On	Wireless Radio is enabled
		Blinking	Wireless Radio is enabled and data is transmitting
		Off	Wireless Radio is disabled (Mode LEDs should also disable)
RUN	Green	Off	System is not powered on
		Blinking Rapidly	AP firmware is running normally
		Blinking Steadily	AP firmware is not running

8 Emergency System Recovery

If the device becomes inaccessible and the management utility cannot find the device, please use the following procedure to recover the devices over Trivial File Transfer Protocol (TFTP).

8.1 System Recovery Procedures

System recovery is based on the TFTP Client embedded in the device. It can recover the device from a bad firmware or other unknown reasons corrupting the firmware image inside the flash memory. Please follow the procedures below to force AW5500C to download a valid firmware from the TFTP Server to recover its operating system.

Default Settings	
TFTP Server	10.0.50.201
TFTP Server Subnet Mask	255.255.0.0
Name of firmware Image*	firmware.dld
*This firmware image can be obtained from Atop's website.	

- If the device is beeping continuously after power up, this means that the bootloader is damaged and there is no way to recover it. Please contact Atop directly to obtain RMA number for further solutions.
- Obtain and setup a **TFTP server** on your **PC**. Make sure that the **PC's network settings** are set properly according to the default setting in the above table.
- Rename the firmware image that you obtained from our website to "firmware.dld" and place it in the TFTP Server's root directory. For Solarwinds TFTP Server, it is usually **C:\TFTP-Root**.
- Make sure that the device is powered OFF and the Ethernet cable is plugged in.
- Press and hold the "reset-to-default" pin next to the Antenna 2 then power ON the device. If the bootloader is still functioning, the user will hear one long beep followed by two shorter beeps.
- Release the reset pin after hearing seven consecutive short beeps. Then, the device will automatically request files from TFTP Server. Please wait until the device shows up on the management utility. This process could take up to five minutes or even more.

Important Note

Free TFTP Servers can be downloaded from the following locations:

Solarwinds TFTP Server	http://www.solarwinds.com/products/freetools/free_tftp_server.aspx
Note: for Solarwinds, please remember to Start the TFTP Server Service, the default state of the TFTP is Stop.	
TFTPD32 TFTP Server	http://tftpd32.jounin.net/tftpd32.html

9 Warranty

Limited Warranty Conditions

Products supplied by Atop Technologies Inc. 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 Inc.'s 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-year maximum warranty for Industrial Wireless Access Point products.



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