



A.DUO

Dual Band High-Power
PoE AP Router

User's Manual





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Regulatory Information

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices) any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For product available in the USA/Canada market, only channel 1~11 can be operated.

Selection of other channels is not possible.

IMPORTANT NOTE

FCC Radiation Exposure Statement:

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

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

FCC NOTICE: To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.



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# 1

## Introduction

### 1.1 Overview

The A.DUO is a multi-functional dual band concurrent AP Router that can operate in 7 different wireless modes.. The AP features 2 Atheros 11a/b/g radios that run in 5GHz or 2.4GHz frequency band. Moreover, it provides hi-power at 11a mode for extra long distance application. There is an intergraded 802.3af POE port to let you run the AP at up to 100 meter distance away from the power source.

#### Feature Summary

- Dual Radio System
- 11a + 11a/b/g High Power Radios
- 802.3af 48V PoE Port
- 108Mbps Atheros Turbo Modes
- 7 Wireless Modes
- 26dBm\* Hi-Power with standard antennas. (2.4GHz limited to 23dBm in U.S. and 20dBm in EU)
- Support Atheros Super-A, Turbo-A, Super-G, Turbo-G modes.
- QoS and Bandwidth Control
- 802.11h Compliant
- Multiple SSID and VLAN
- Super Channel Support
- 5/10/20/40 Channel Width
- PPPoE Server
- DDNS and NTP Support
- Virtual Server and Multiple DMZ support
- Static Router and RIP support
- Disable NAT Support
- Syslog Support
- SNMP, HTTP, HTTPS, Telnet, SSH Managements

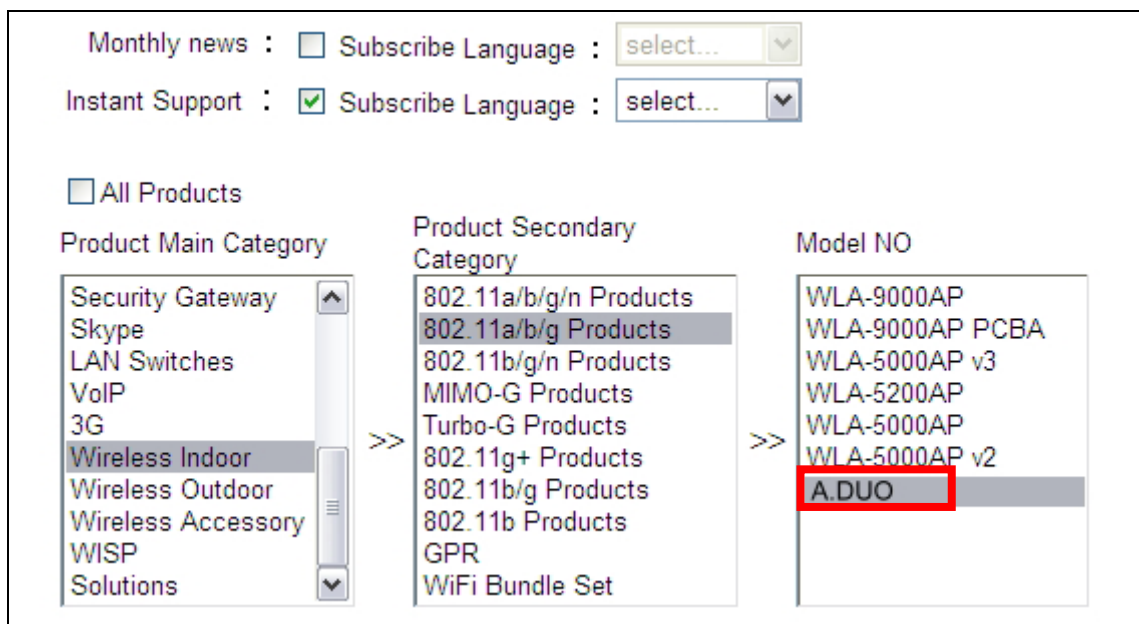
## 1.2 Firmware Upgrade and Tech Support

If you encounter a technical issue that can not be resolved by information on this guide, we recommend that you visit our comprehensive website support at [www.airlive.com](http://www.airlive.com). The tech support FAQ are frequently updated with latest information.

In addition, you might find new firmware that either increase software functions or provide bug fixes for A.DUO. You can reach our on-line support center at the following link:

[http://www.airlive.com/support/support\\_2.jsp](http://www.airlive.com/support/support_2.jsp)

Since 2009, AirLive has added the “Newsletter Instant Support System” on our website. AirLive Newsletter subscribers receives instant email notifications when there are new download or tech support FAQ updates for their subscribed AirLive models. To become an AirLive newsletter member, please visit: [http://www.airlive.com/member/member\\_3.jsp](http://www.airlive.com/member/member_3.jsp)



Monthly news :  Subscribe Language : select...  
 Instant Support :  Subscribe Language : select...

All Products

| Product Main Category | Product Secondary Category | Model NO        |
|-----------------------|----------------------------|-----------------|
| Security Gateway      | 802.11a/b/g/n Products     | WLA-9000AP      |
| Skype                 | 802.11a/b/g Products       | WLA-9000AP PCBA |
| LAN Switches          | 802.11b/g/n Products       | WLA-5000AP v3   |
| VoIP                  | MIMO-G Products            | WLA-5200AP      |
| 3G                    | Turbo-G Products           | WLA-5000AP      |
| Wireless Indoor       | 802.11g+ Products          | WLA-5000AP v2   |
| Wireless Outdoor      | 802.11b/g Products         | <b>A.DUO</b>    |
| Wireless Accessory    | 802.11b Products           |                 |
| WISP                  | GPR                        |                 |
| Solutions             | WiFi Bundle Set            |                 |

## 1.3 Wireless Operation Modes

The A.DUO can perform as a multi-function wireless device. Through the AirLogic web interface, users can easily select which wireless mode they wish the A.DUO to perform.

The A.DUO provides 7 modes of wireless operational applications. It can transform the A.DUO into different roles in the wireless infrastructure. Below is the example application table for A.DUO.

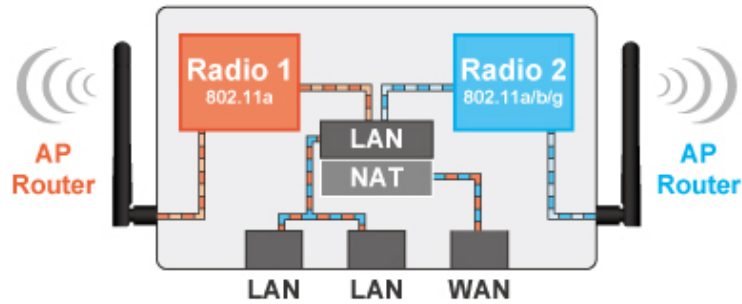
| Mode             | Radio 1(11a) | Radio2(11a/b/g) | Applications                                                  |
|------------------|--------------|-----------------|---------------------------------------------------------------|
| Dual Band Router | AP Router    | AP Router       | Dual Home Networks:<br>5GHz for Games/AV<br>and 2.4GHz for PC |
| Dual AP Mode     | Access Point | Access Point    | Dual Band Hotspots                                            |
| WISP + AP        | Client Mode  | AP Router       | Sharing WISP 5GHz<br>Broadband Wirelessly                     |
| Bridge + AP      | Bridge Mode  | Access Point    | WDS Wireless<br>Repeater                                      |
| Dual Bridge      | Bridge Mode  | Bridge Mode     | Long Distance<br>Wireless Relay<br>Station                    |
| Client + AP      | Client       | Access Point    | Universal Repeater                                            |
| Bridge + Gateway | Bridge       | AP Router       | Sharing remote<br>Internet bandwidth                          |

### 1.5.1 Dual Band Router Mode

In Dual Band Concurrent mode, the radio1 works in 5Ghz while radio2 works in 2.4GHz mode. That means the A.DUO can provide Internet service to both 5GHz (like game network) and 2.4GHz (like PC network) at the same time.

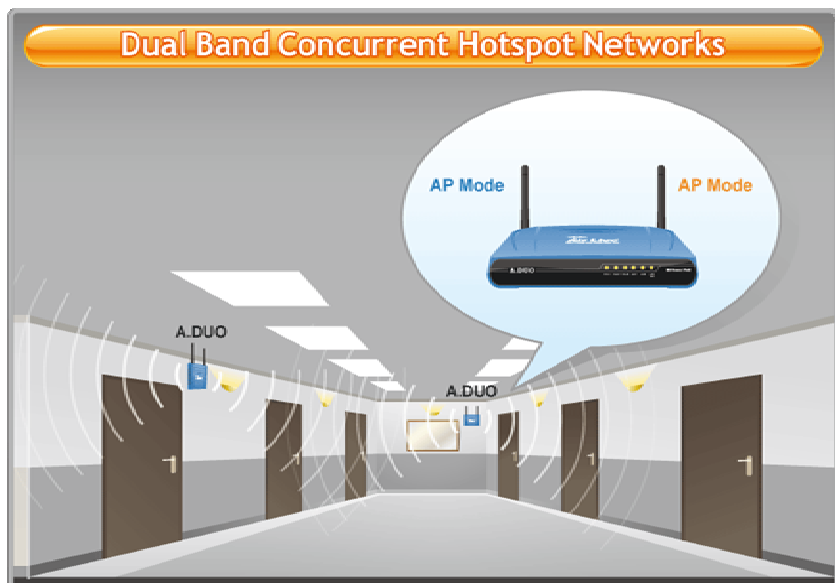


### Dual Band Router

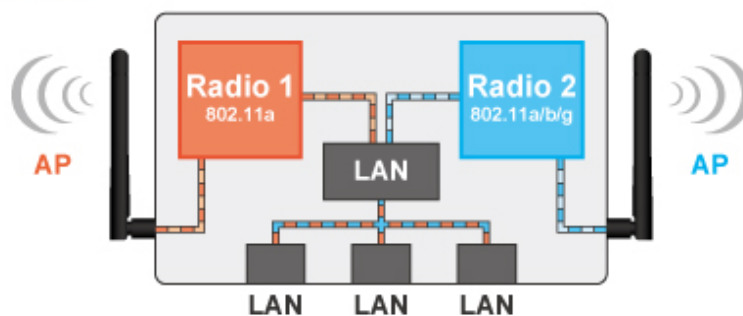


## 1.5.2 Dual AP Mode

In Dual AP mode, both wireless interface of A.DUO are set as AP and provide hotspot service on each interface. Radio1 is set to 11a mode while Radio2 is set to 11g/b Mode (changeable to 11a also). This mode is most useful for Dual Band Hotspot function such as in the hotels, shopping malls, or offices.

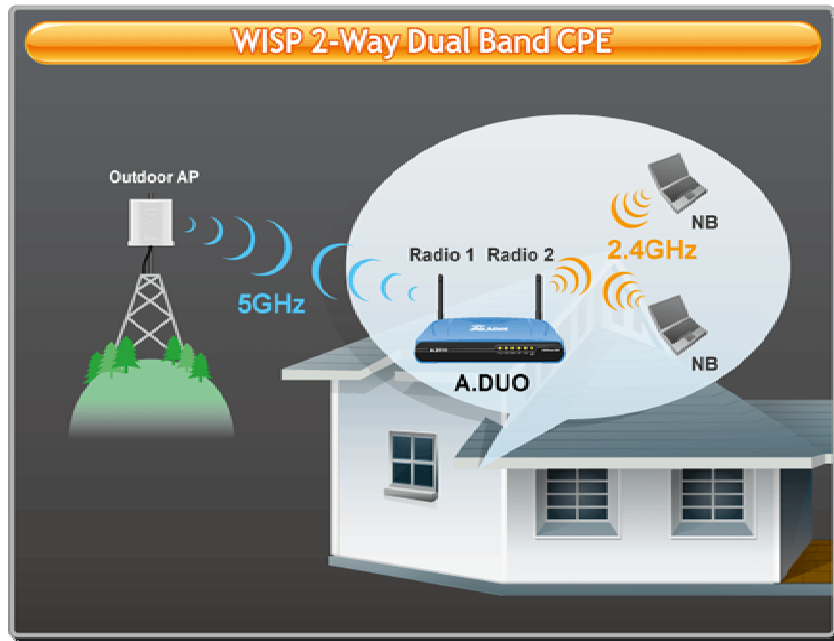


### Dual AP

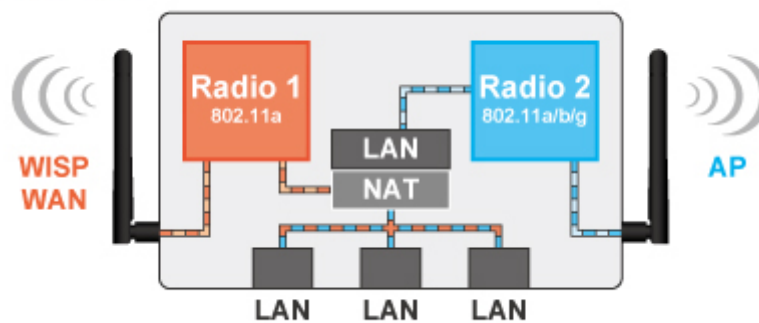


### 1.5.3 WISP + AP Mode

In this mode, Radio1 (in 11a mode) acts as a client to connect with remote WISP Base Station. Radio2 (in 11g/b mode) works as an AP router to allow subscriber to share the WISP connection wirelessly. Using the A.DUO, WISP no longer requires 2 AP/CPE to provide wireless access in subscriber's home or office.



#### WISP + AP

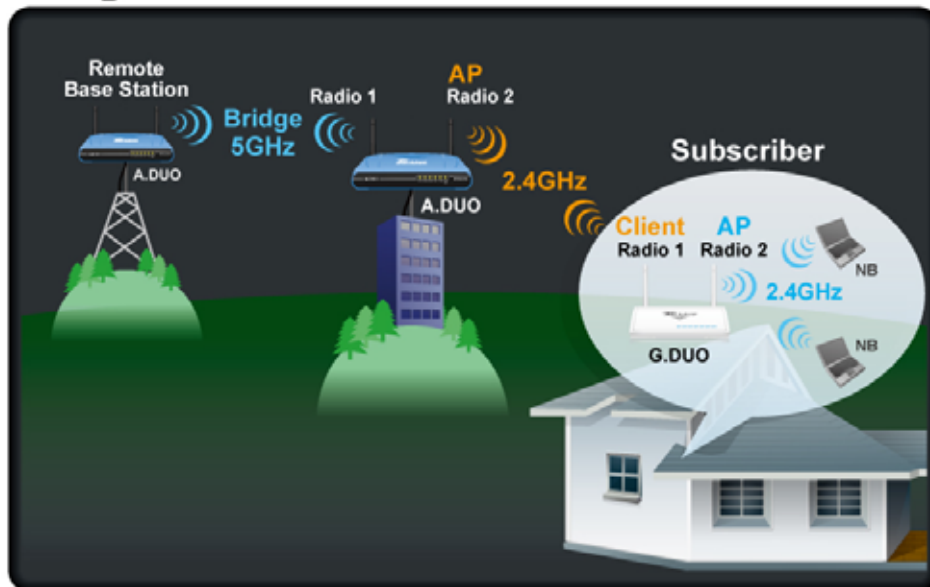


### 1.5.4 Bridge + AP Mode

In this mode, Radio1 is working as Bridge mode in 5GHz while Radio is working as AP mode in 2.4Ghz or 5GHz (selectable0). This mode is useful for WISP backbone application where Radio 1 is used for connection to another Base Station and Radio2 is used for service to subscribers. This mode can also be used as repeater in indoor environment.



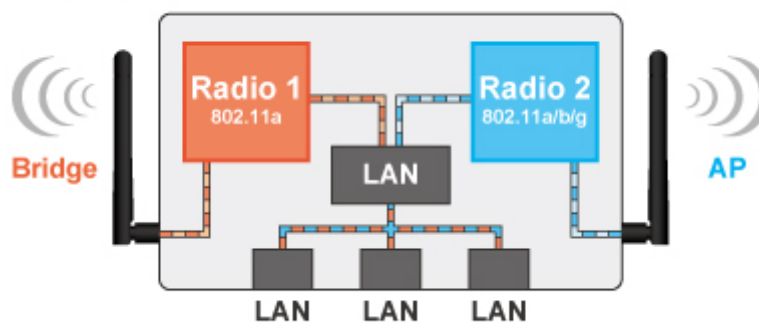
### Bridge + AP Backbone



The A.DUO's Bridge mode can be configured as "WDS Bridge" or "Bridge Infrastructure".

- In WDS Bridge, you must enter the remote AP's MAC Address. It can connect with another WDS Bridge.
- In Bridge Infrastructure, you do not need to enter remote AP's MAC address. It work like a client mode with MAC address transparency. Please note that this bridge type can only connect with Access Point. It can not connect with another Bridge.

### Bridge + AP

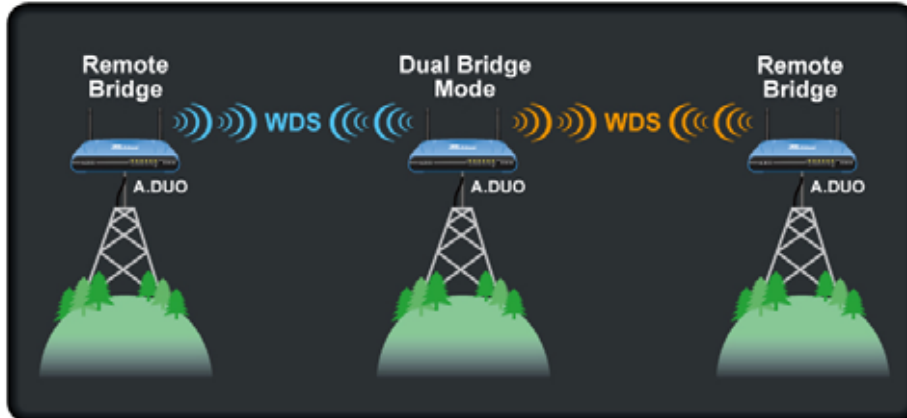


### 1.5.5 Dual Bridge Mode

In Dual WDS Bridge mode, both wireless interface of A.DUO are set as WDS Bridge and connect to remote network. This mode can be used to extend the distance of remote Bridge connection.

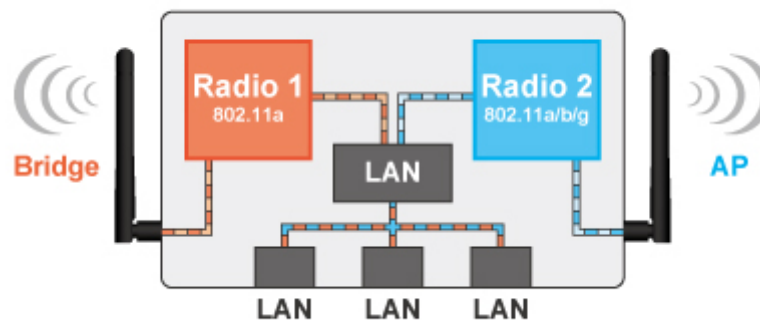
The A.DUO's Bridge mode can be configured as "WDS Bridge" or "Bridge Infrastructure".

### Bridge Relay Station



- In WDS Bridge, you must enter the remote AP's MAC Address. It can connect with another WDS Bridge.
- In Bridge Infrastructure, you do not need to enter remote AP's MAC address. It work like a client mode with MAC address transparency. Please note that this bridge type can only connect with Access Point. It can not connect with another Bridge.

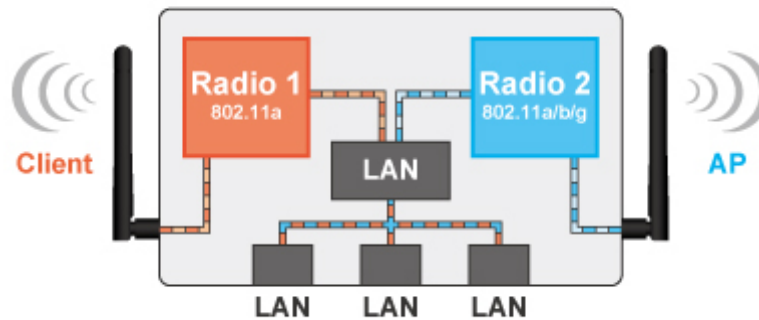
### Bridge + AP



### 1.5.6 Client + AP Mode

In this mode, it can work as a wireless repeater to extend the coverage of remote wireless router. It is also known as the universal repeater mode.

**Client + AP**



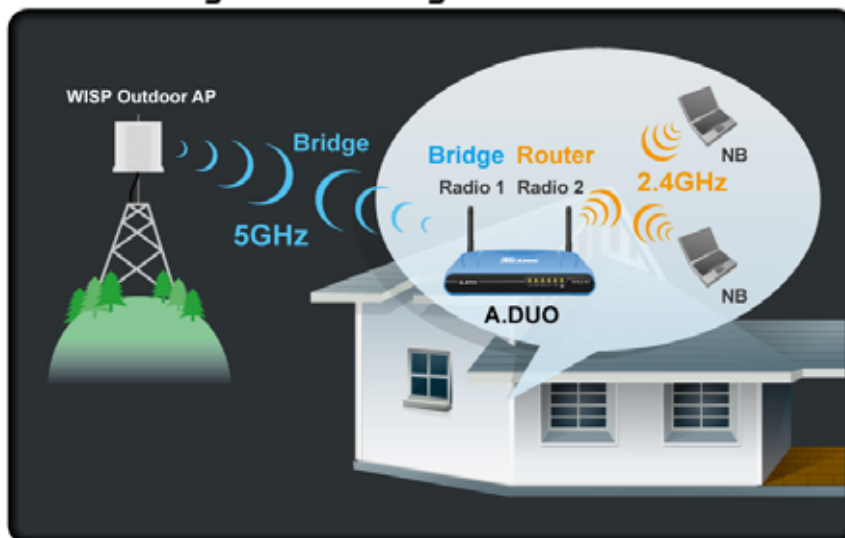
### 1.5.7 Bridge + Gateway

In this mode, the radio1 is configured as a 5GHz Bridge while Radio2 is configured as AP Router in 11a/b/g mode. This mode is useful if your remote Base Station is working in WDS Bridge mode to transmit Internet broadband.

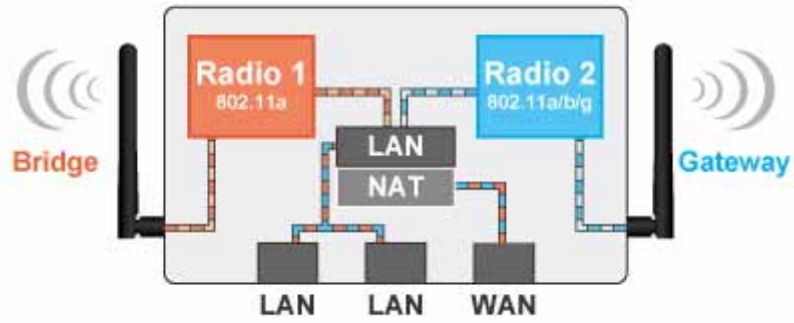
The A.DUO's Bridge mode can be configured as "WDS Bridge" or "Bridge Infrastructure".

- In WDS Bridge, you must enter the remote AP's MAC Address. It can connect with another WDS Bridge.
- In Bridge Infrastructure, you do not need to enter remote AP's MAC address. It work like a client mode with MAC address transparency. Please note that this bridge type can only connect with Access Point. It can not connect with another Bridge.

### WISP Bridge + Gateway



**Bridge + Gateway**



# 2

## Installing the A.DUO

This section describes the hardware features and the hardware installation procedure for the A.DUO. For software configuration, please go to chapter 3 for more details.

### 2.1 Before You Start

It is important to read through this section before you install the A.DUO.

- The A.DUO's PoE port is 48V 802.3af compliant. If you need to power the A.DUO by PoE, you need to purchase 802.3af compliant PoE kit (e.g. AirLive PoE-48PB) or PoE switch. It does not work with passive PoE system.
- The use of 5GHz spectrum, Turbo modes, and 5/10MHz channel bandwidth might be prohibited in some countries. Please consult with your country's telecom regulation first.
- Please install the antennas first before connecting the power. Connecting the power without installing the antennas may result in damage to the wireless radios which may void your warranty.
- You must set the distance parameter to make long distance connection work. Please refer to chapter 4 of this user's guide for details.

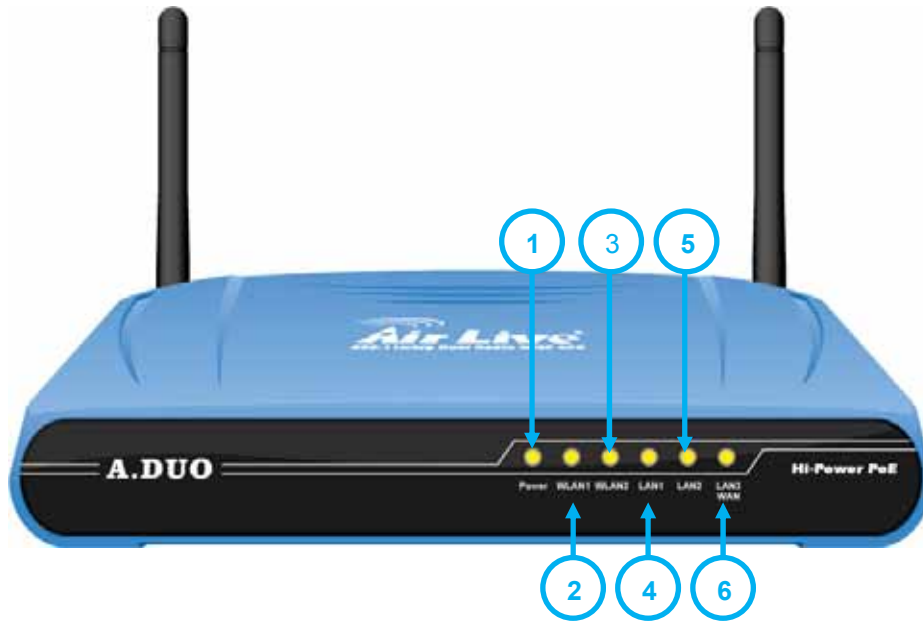
### 2.2 Installing A.DUO

The A.DUO package contains the following items:

- One A.DUO main unit
- One 5.5V 2.5A DC power adapter
- Indoor detachable Omni Antenna x 2
- Quick Start Guide
- User's Guide CD

## 2.3 Knowing Your A.DUO

### 2.3.1. Front side introduction



| LED # | Display | Description                                                                                                                                                                                     |
|-------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Power   | Solid Green LED while the device is powered on, either by power adaptor or PoE.                                                                                                                 |
| 2     | WLAN1   | Solid Green LED while the device is powered on. Blinking while there is Data transmission, dark when this interface is turn off.                                                                |
| 3     | WLAN2   |                                                                                                                                                                                                 |
| 4     | LAN 1   | LAN ports status LED, Solid Green LED shows when a port is actively connected, blinking while there is data transmission, turns into dark when this disconnected. LAN3 is also the PoE/WAN port |
| 5     | LAN 2   |                                                                                                                                                                                                 |
| 6     | LAN 3   |                                                                                                                                                                                                 |

### 2.3.2. Back side introduction

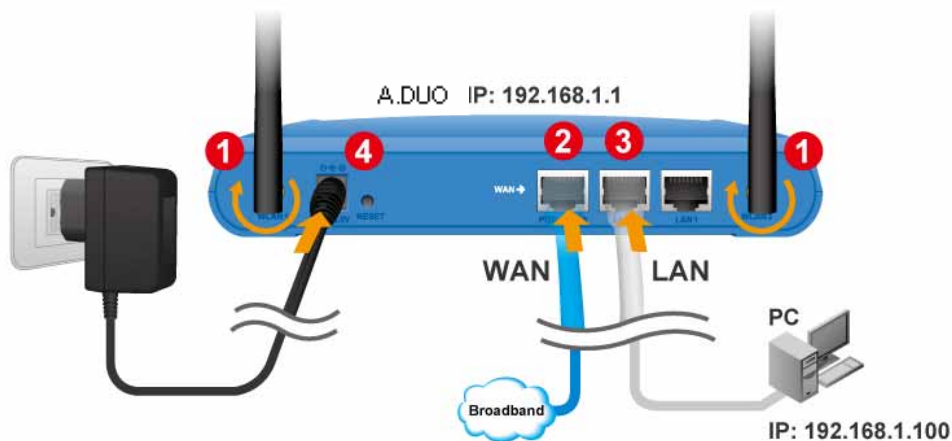


| Port # | Display                | Description                                                                                                                                           |
|--------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | WLAN1                  | Detachable antenna with R-SMA connector. 2 indoor 2dBi antennas are delivered.                                                                        |
| 2      | Power Adaptor          | 5.5V 2.5A power supply adaptor delivered with product.                                                                                                |
| 3      | RESET                  | Reset button for rebooting and reset device as default factory value.                                                                                 |
| 4      | LAN 3/PoE/<br>WAN Port | WAN, LAN and PoE port. When it is in Dual Band Router mode, it function as a WAN port. It can be plug 802.3af compliant PoE as power and data supply. |
| 5      | LAN 2                  | LAN port 2                                                                                                                                            |
| 6      | LAN 1                  | LAN port 1                                                                                                                                            |
| 7      | WLAN2                  | Detachable antenna with R-SMA connector.                                                                                                              |

## 2.4 Installation steps

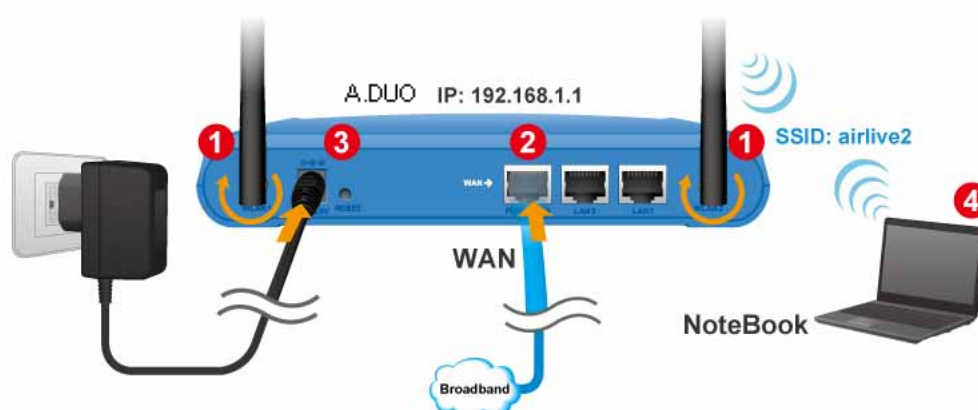
This section describes installation steps required for the A.DUO before it can work properly in your network.

### 2.4.1. Installation Steps by using LAN port



1. Install antennas into the A.DUO
2. Connect the broadband line into the LAN3/WAN port of the A.DUO
3. Connect your PC to LAN1 or LAN2 port.
4. Connect the power jack to the power port.
5. Wait for 5 minutes. Then open the browser on your PC and type in "192.168.1.1" to reach the web management
6. For software configuration, please go to chapter 3 for more details.

### 2.4.2. Wireless Installation Steps

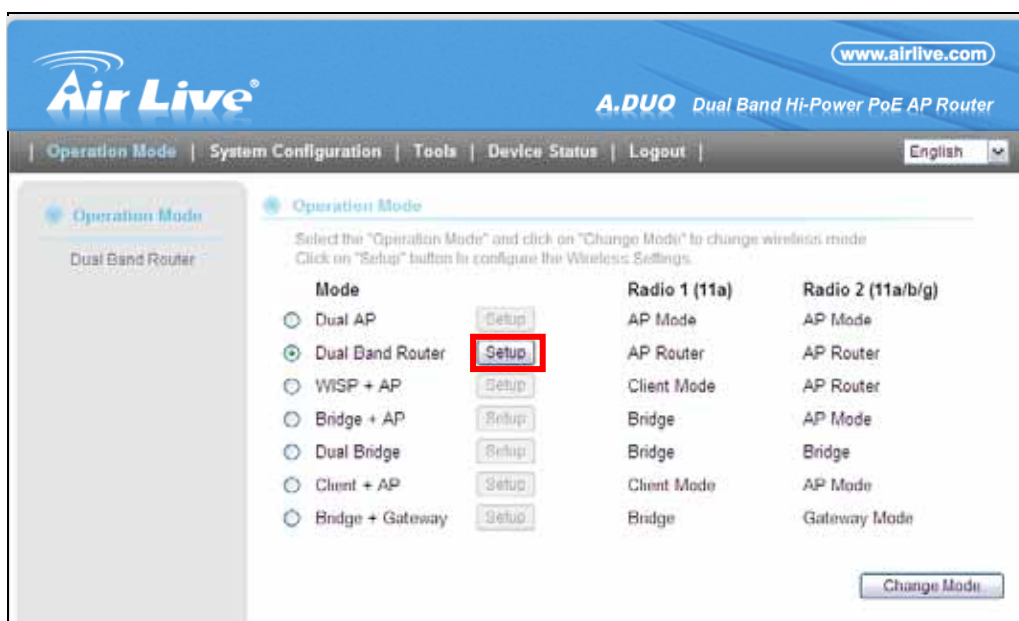




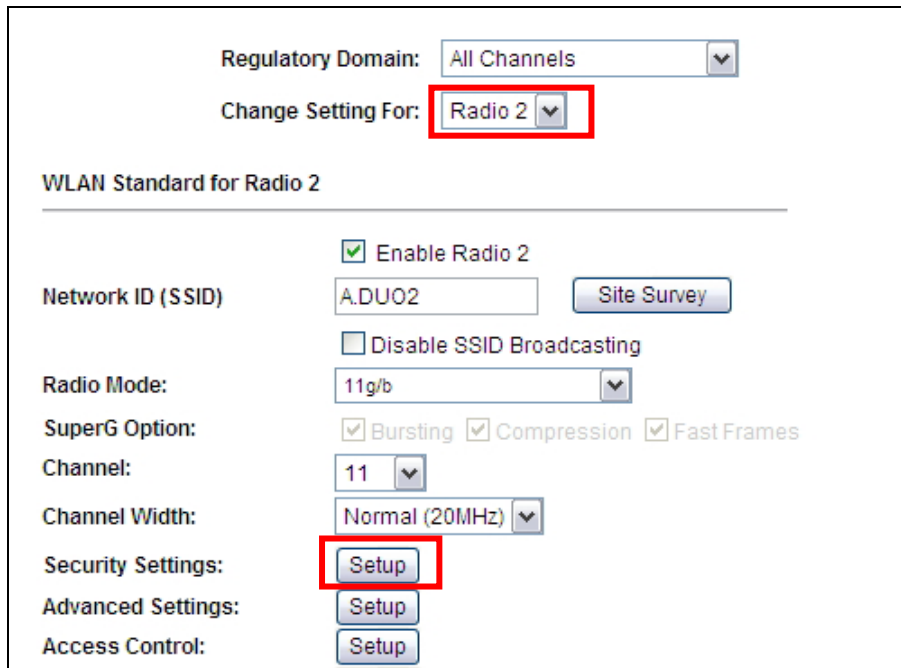
1. Install antennas into the A.DUO
2. Connect the broadband line into the LAN3/WAN port of the A.DUO
3. Connect the power jack to the power port.
4. Wait for 5 minutes. Then on your Notebook PC, scan and connect to “airlive2” wireless network
5. Open your web browser and type “192.168.1.1” to configure your A.DUO
6. When prompt for username/password, type “admin” as username and “airlive” as password
7. On the Welcome screen, select “Wireless Settings”.



8. When the following screen appears, click on “Setup” to configure wireless settings



9. Select “Change Settings for: Radio2”. Then click on “Security Settings”



Regulatory Domain: All Channels

Change Setting For: Radio 2

WLAN Standard for Radio 2

Enable Radio 2

Network ID (SSID): A.DUO2

Disable SSID Broadcasting

Radio Mode: 11g/b

SuperG Option:  Bursting  Compression  Fast Frames

Channel: 11

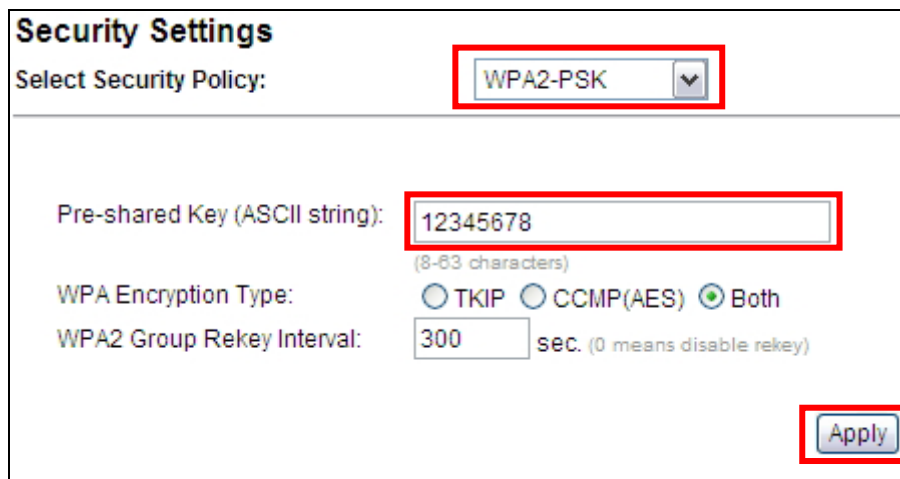
Channel Width: Normal (20MHz)

Security Settings:

Advanced Settings:

Access Control:

10. Choose WPA2-PSK and enter your own encryption key (please write down and do not forget it is case sensitive). Then click on “Apply” button



**Security Settings**

Select Security Policy: WPA2-PSK

Pre-shared Key (ASCII string): 12345678  
(8-63 characters)

WPA Encryption Type:  TKIP  CCMP(AES)  Both

WPA2 Group Rekey Interval: 300 sec. (0 means disable rekey)

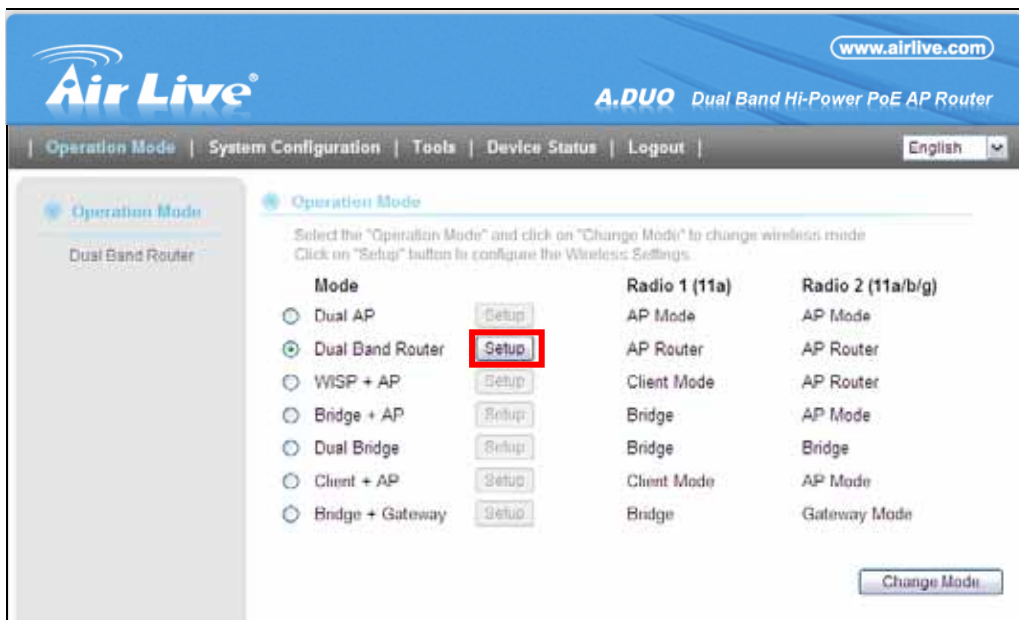
11. The A.DUO will reboot. After about 3 minutes, please try to access the network again. You will be prompted to enter your encryption key.

### 2.4.3. Internet Installation Steps

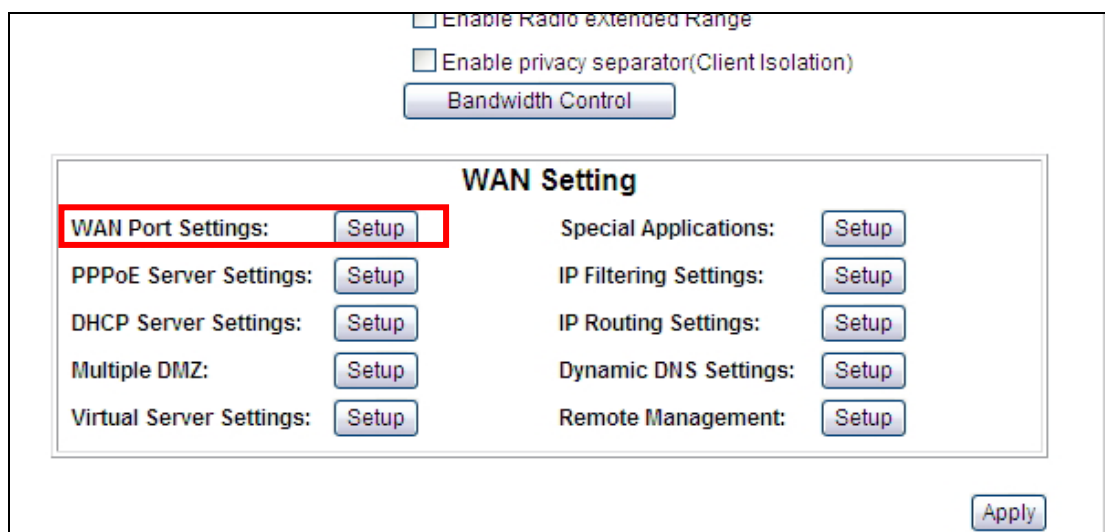
Please finish the LAN port and Wireless installations first in 2.4.1 and 2.4.2 before performing the following steps.

If you are using A.DUO as a router, please follow the steps below:

1. Please make sure the Internet line is connected to the WAN port.
2. Open your web browser and type 192.168.1.1
3. When prompt for password, enter “admin” for username and “airlive” for password.
4. Choose “Wireless Settings” on Welcome Screen and click on “Setup”



5. Choose “WAN Port Settings” on the bottom.



6. Please enter your ISP's authentication Information and Click on "Apply" button. Here are some guidelines.

- If your Internet connection is ADSL, it is most likely using the following option:  
**your ISP already provides you with PPPoE authentication information, select this button and enter the information below:**
- If your internet connection is Cable Modem, it is most likely to use the option:  
**If your ISP already provides you with a Host Name, select this button and enter the information below: (DHCP)**

However, please still consult with your ISP about the correct account information..

7. Click on "Apply" to finish.

# 3

## Configuring the A.DUO

The A.DUO offers many different types of management interface. You can configure through standard web browser (http), secured web (https), command line (telnet), secured command shell (SSH, SSH2), and SNMP management. In this chapter, we will explain A.DUO's available management interfaces and how to get into them. Then, we will provide the introduction on Web Management and recommended initial settings.

### 3.1 Important Information

The following information will help you to get start quickly. However, we recommend you to read through the entire manual before you start. Please note the password and SSID are case sensitive.

- The default IP address is: **192.168.1.1** Subnet Mask: **255.255.255.0**
- When using Web UI, the login as follow:
  - User name: **admin**
  - Password: **airlive**
- When using telnet, the password is: **airlive**
- When using SSH/SSH2, the login as follow:
  - Login : **root**
  - Password: **airlive**
- The default radio mode for Radio 1 is **802.11a**
- The default radio mode for Radio 2 is **802.11g/b**
- The default SSID for Radio 1 is: **AirLive1**
- The default SSID for Radio 2 is: **AirLive 2**
- The default wireless mode is : **Dual Band Router Mode**
- After power on, please wait for 2 minutes for A.DUO to finish boot up
- Please remember to click on "Apply" for new settings to take effect
- Please remember to enter the correct "Distance" parameter in wireless settings. Failure to do so can result in poor performance.
- The default country code is : **United Kingdom**  
If you are living outside of EU, please go to Operation Mode->Setup->Regulatory Domain to change country.

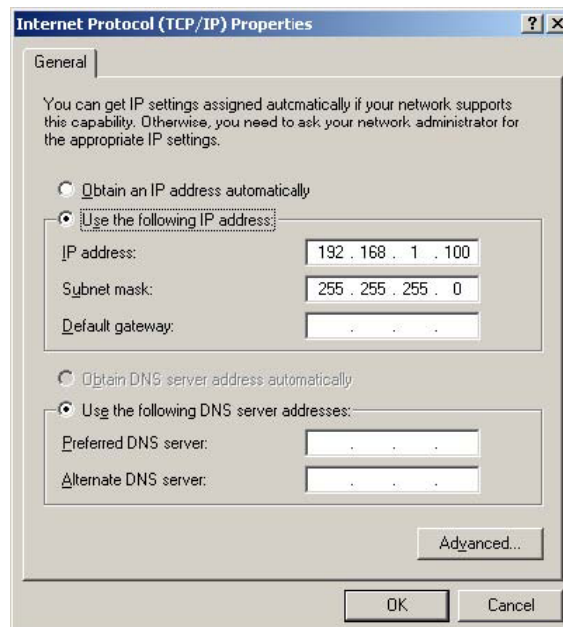
## 3.2 Prepare Your PC

The A.DUO can be managed remotely by a PC through either the wired or wireless network. The default IP address of the A.DUO is **192.168.1.1** with a *subnet mask* of 255.255.255.0. This means the IP address of the PC should be in the range of 192.168.1.2 to 192.168.1.254.

The default mode for A.DUO is “Dual Band Router” mode. In this mode, the A.DUO’s DHCP server is turned on; therefore, your PC can get IP automatically from A.DUO. You just need to set your PC to “Obtain IP address automatically” on the TCP/IP setting. By default, Windows already do this so you do not need to change.

However, if you are using A.DUO in non-router modes (Dual AP, Dual Bridge, Bridge+AP, Client+AP). You need to set your IP manually. To prepare your PC for management with the A.DUO, please do the following:

1. Connect your PC directly to the LAN port on the DC Injector of A.DUO
2. Set your PC’s IP address manually to 192.168.1.100 (or other address in the same subnet)



You are ready now to configure the A.DUO using your PC.

## 3.3 Management Interface

The A.DUO can be configured using one the management interfaces below:

### 3.3.1 Web Management (HTTP):

You can manage your A.DUO by simply typing its IP address in the web browser. Most functions of A.DUO can be accessed by web management interface. We recommend using this interface for initial configurations. To begin, simply enter A.DUO's IP address (default is 192.168.1.1) on the web browser. The default user name is "admin"; default password is "airlive".

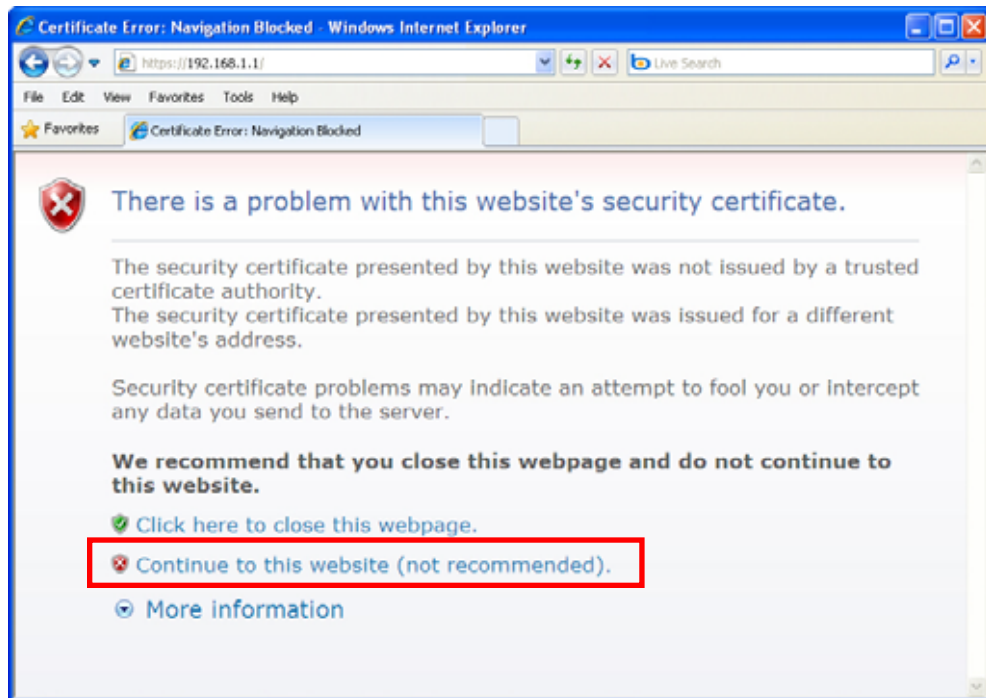


### 3.3.2 Secured Web Management (HTTPS):

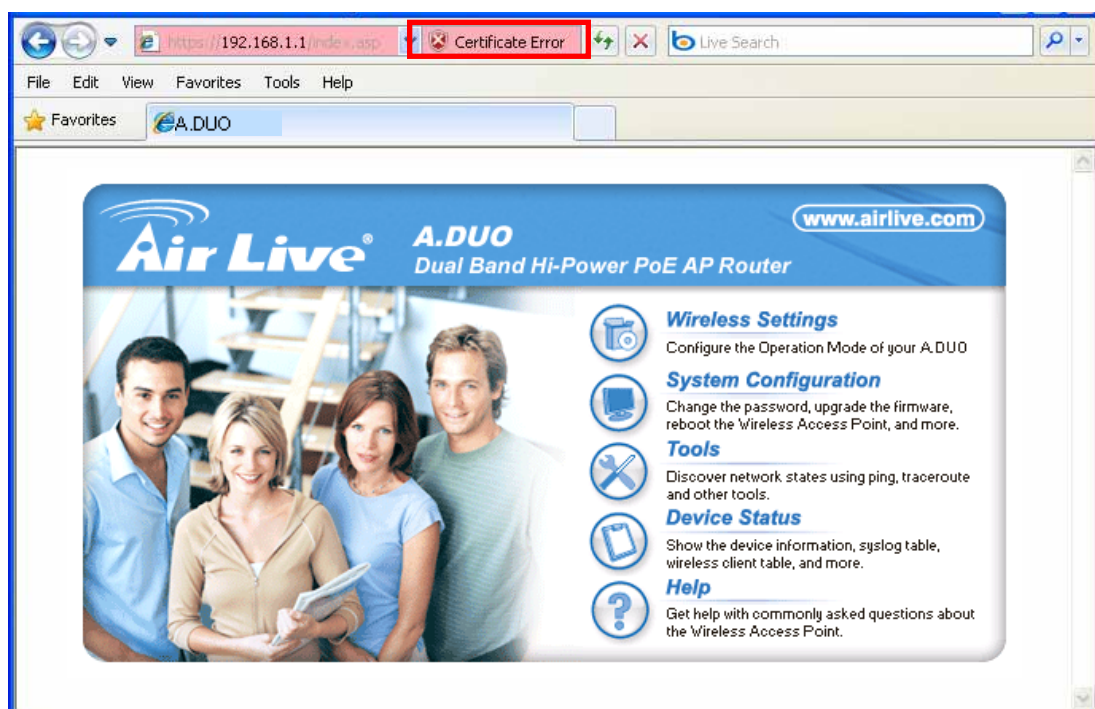
HTTPS is also using web browser for configuration. But all the data transactions are securely encrypted using SSL encryption. Therefore, it is a safe and easy way to manage your A.DUO. We highly recommend WISP and service provider to use HTTPS for management.

To begin, simply enter <https://192.168.1.1> on your web browser. A security alert screen from your browser will pop up. Please click "Continue to this website" to login A.DUO.





After you pass the security warning screen, you will enter the secured web management interface. The default password is "airlive". Please ignore the "Certificate Error" warning icon, it just notice you that you are in an un-certificated site, you still can configure the A.DUO without limitation.





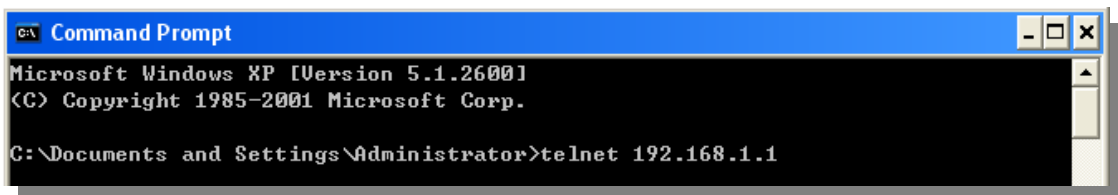


*For more information about Web Management and HTTPS, please make sure to read through “Introduction to Web Management” in this chapter, Chapter 4, and Chapter 5*

### 3.3.3 Command Line Interface (Telnet):

A.DUO can be managed through the command line interface (CLI). It is possible to write a text script file, and then paste it into the CLI to execute several commands at once. However, Telnet does not encrypt its message. Therefore, it is not secure. The default Telnet management port is TCP port 23.

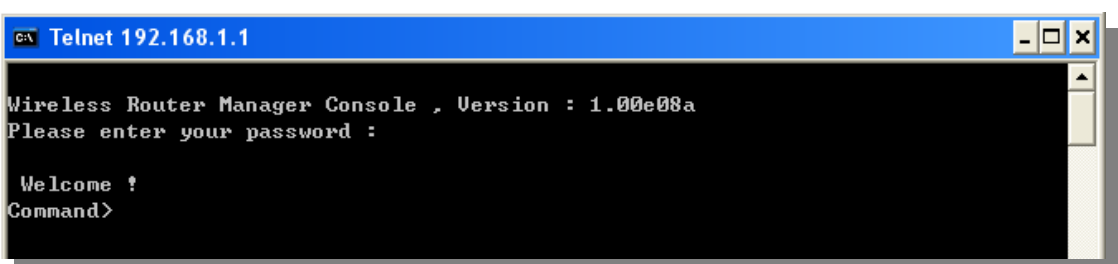
To use the CLI, please open the command line window. Then type “telnet 192.168.1.1” to start.



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Administrator>telnet 192.168.1.1
```

When asked for password, please enter “airlive”.



```
Telnet 192.168.1.1

Wireless Router Manager Console , Version : 1.00e08a
Please enter your password :

Welcome !
Command>
```

To get a list of available command and their usage, please type “help” on the command prompt.

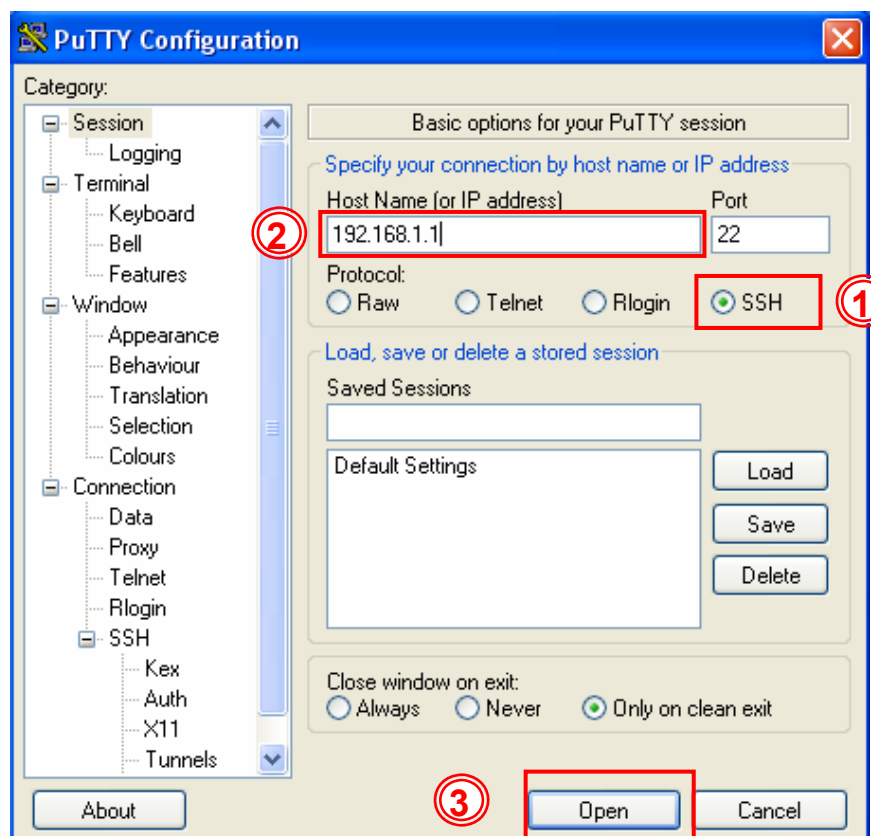
### 3.3.4 Secure Shell (SSH, SSH2):

SSH is an encrypted Command Line Interface that allow user to send text commands through SSL encryption. Therefore, it provides the added advantage of security comparing to Telnet. As with Telnet, the SSH and SSH2 provide the possibility to write a text script and paste into the CLI interface for multiple command execution. It also makes configuration change across many A.DUOs easier. The default management port for SSH/SSH2 is TCP/UDP port 22.

To manage via the SSH/SSH2 protocol, you would need a SSH client. Free SSH clients are widely available on the Internet. You can find where to download them by using Internet search engine such as Google. In this guide, we will use a popular SSH/Telnet utility call Putty.

Once you have download and install Putty. Please follow the figure below to make a connection with A.DUO:

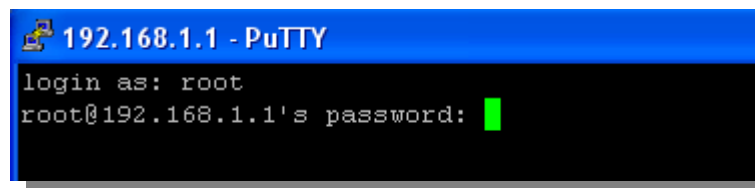
1. Choose “SSH” as indicated in the diagram
2. Enter the IP address of A.DUO
3. Click on “Open” to start the SSH session.



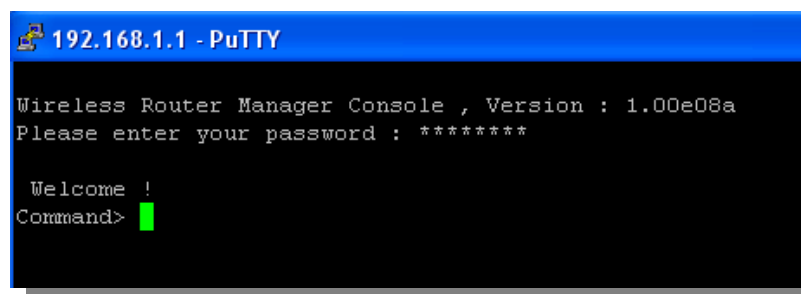
When the following screen appear, click on “Yes” to continue



When the following screen appears, please enter “root” for login. Then keyin the “airlive” as default password.



Now you are ready to enter commands



To get a list of available command and their usage, please type “help” on the command prompt.



### 3.3.5 SNMP Management:

The A.DUO support SNMPv1/v2 management. If you have SNMP management software, it can manage the A.DUO. The A.DUO's SNMP support is as followed:

- SNMP v1/v2 support
- SNMP Read/Write Community String
- SNMP Trap support
- MIB and MIB II Support
- Ether-like MIB
- IEEE802dot11 MIB
- Private MIB

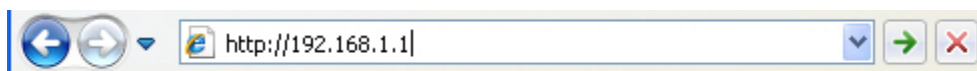
## 3.4 Introduction to Web Management

The A.DUO offers both normal (http) and secured (https) Web Management interfaces. Their share the same interface and functions, and they can both be accessed through web browsers. The only difference is HTTPS are encrypted for extra security. Therefore, we will discuss them together as "Web Management" on this guide.

### 3.4.1 Getting into Web Management

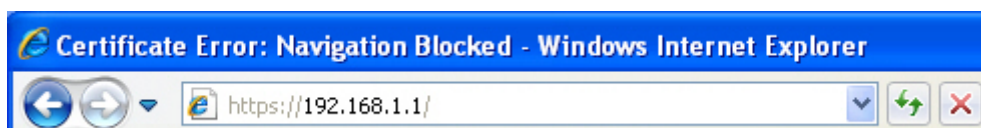
#### Normal Web Management (HTTP)

To get into the Normal Web Management, simply type in the A.DUO's IP address (default IP is 192.168.1.1) into the web browser's address field.



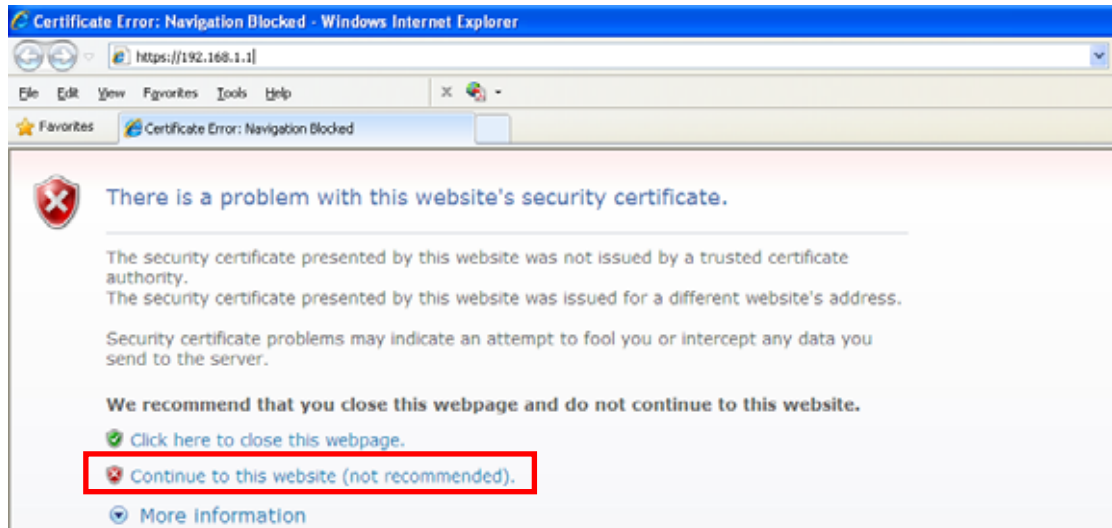
#### Secured Web Management (HTTPS)

To get into the Secured Web Management, just type "https://192.168.1.1" into the web browser's address field. The "192.168.1.1" is A.DUO's default IP address. If the IP address is changed, the address entered in the browser should change also.



A security warning screen from your browser will then pop-up depending on the browser you use. Please follow step below to clear the security screen.

- Internet Explorer: Select “Continue to this website” to proceed



- Firefox:
  - Select “or you can add an exception”



- Click on “Add Exception”



- Click on “Get Certificate”. Then, please enter A.DUO’s IP address. Finally, please click on “Confirm Security Exception.”



### 3.4.2 Welcome Screen and Login

After the procedure above, the Welcome Screen will appear. Welcome Screen gives a brief introduction of the A.DUO's main function category. By clicking on the function category, it will direct you to the corresponding web management menu.

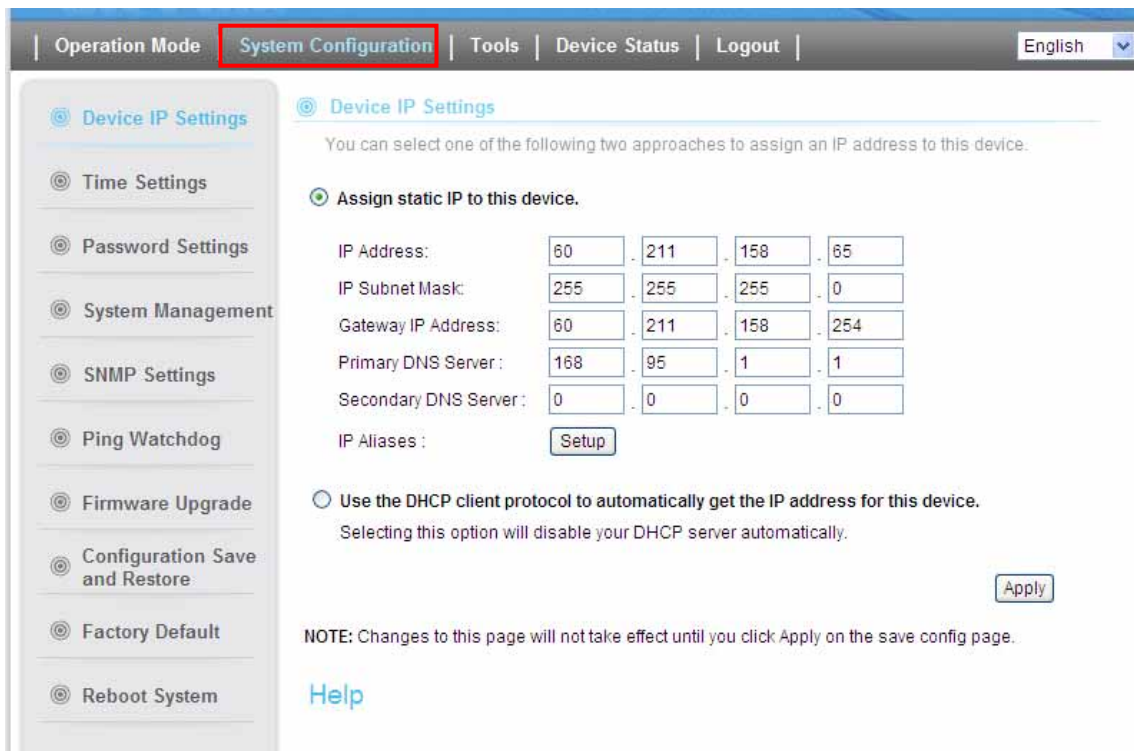


- **Wireless Settings:** Click on this part will bring you to the wireless operation mode menu. The A.DUO's wireless settings are different between wireless modes. Only functions that are applicable to the wireless mode will show to simplify configuration. For example, multiple SSID option is only workable for Access Point and AP Router mode. Therefore, the function will only appear in these 2 modes. For this reason, the first step to configure the A.DUO is to select the wireless mode. The router mode specific functions are also in this menu category. For explanation of different wireless modes, please refer to Chapter 1.
- **System Configuration:** All non-wireless and router mode settings are in this category. The system configurations including changing password, upload firmware, backup configuration, settings PING watchdog, and setting management interface. The default management timeout is 10 minutes; we recommend you should change password and management timeout during the first time login.
- **Tools:** Discover network status using ping, trace route tools.
- **Device Status:** This section for monitoring the status of A.DUO. It provides information on device status, Ethernet status, wireless status, wireless client table, and system log.
- **Help:** This is the online help system for quick reference. We still recommend you to read this user's guide for more information.



**TIPS:** You can choose any menu categories to begin; you can switch to other menu later

After you click on the function category, the following screen will appear corresponding to the menu category you selected. The following example is when you selected the “System Configuration”.



If you are placing the A.DUO behind router or firewall, you might need to open virtual server ports to A.DUO on your firewall/router

- HTTP: TCP Port 80
- HTTPS: TCP/UDP Port 443

This procedure is not necessary in most cases unless there is a router/firewall between your PC and A.DUO.



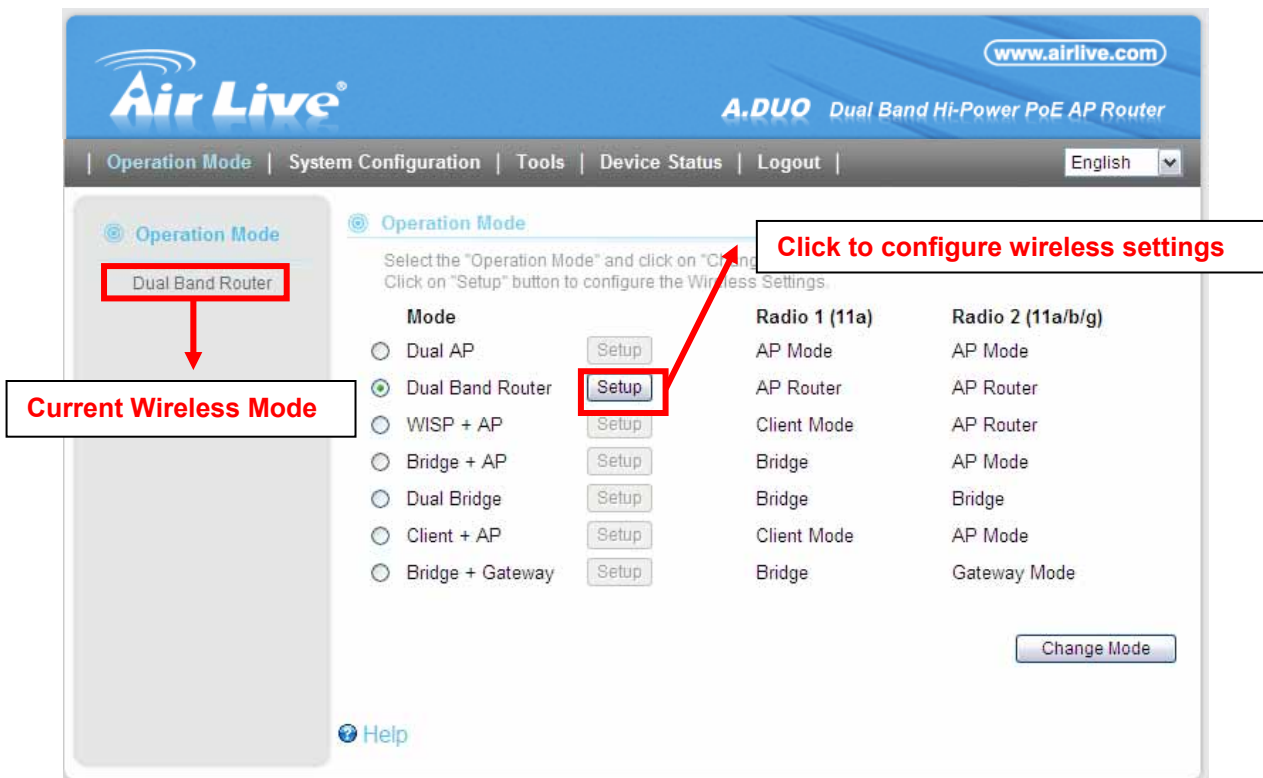
## 3.5 Initial Configuration

We recommend users to browse through A.DUO's web management interface to get an overall picture of the functions and interface. Below are the recommended initial configurations for first time login:

### 3.5.1 Choose the wireless Operation Modes

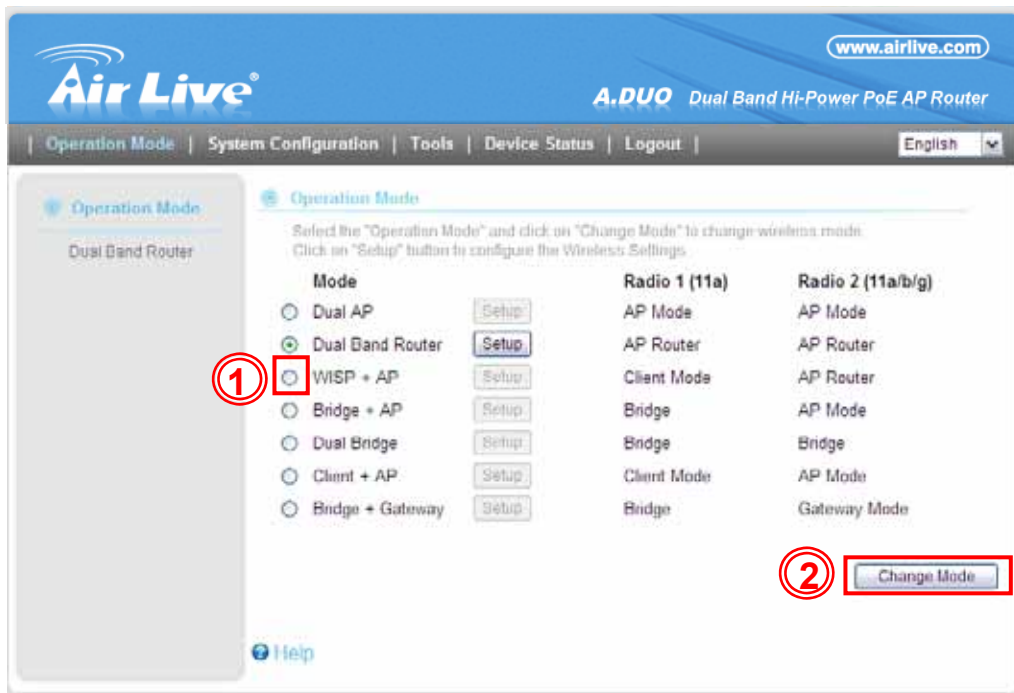
The wireless settings of A.DUO are dependant on the wireless operation mode you choose. Therefore, the first step is to choose the operation mode. For explanation on when to use what operation mode, please refer to Chapter 1.

When you click on the "Wireless Settings" on the welcome screen or the "Operation Mode" on the top menu bar, the following screen will appear.



Follow the example below to change to "WISP + AP" mode

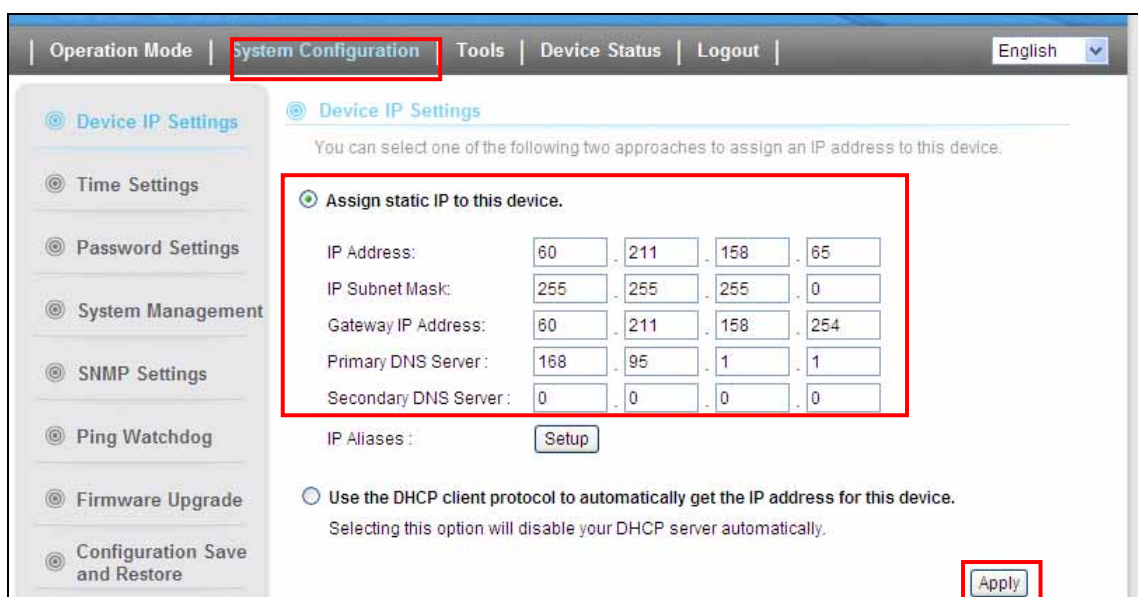
1. Select "WISP + AP" mode
2. Click on "change mode" button
3. The AP will reboot, wait for about one minute



### 3.5.2 Change the Device's IP Address

The default IP address is at 192.168.1.1. You should change it to the same subnet as your network. Also, if you want to manage A.DUO remotely, you have to set the Gateway and DNS server information.

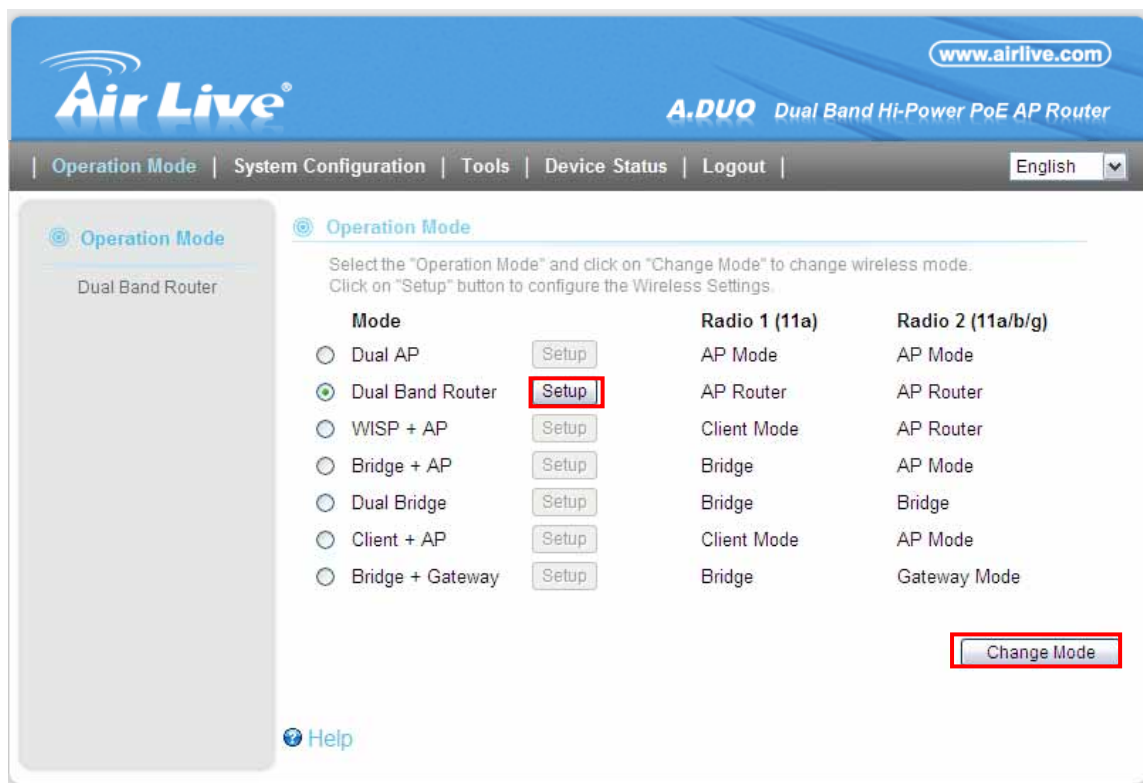
To setup the IP settings for A.DUO, please select "System Configuration" -> Device IP Settings". After entering the IP information, click on "Apply" to finish.



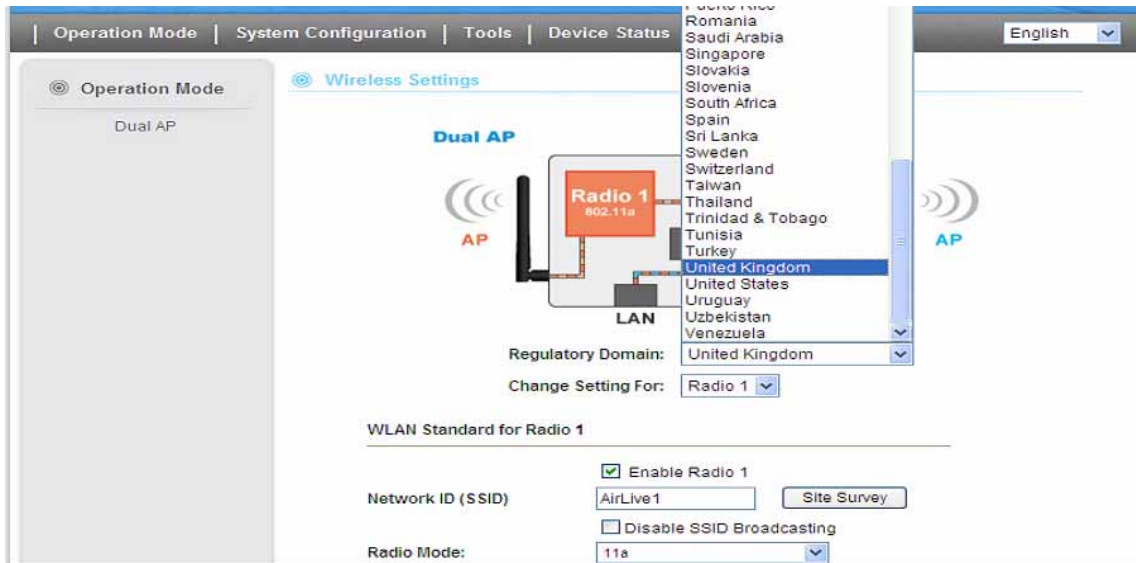
### 3.5.3 Change the Country Code

The legal frequency and channels in 5GHz spectrum varies between countries. The default country code is United Kingdom which should require no changes If you are living in Europe. If you are living outside EU, you should change the country code accordingly. In the example below, we will change the country code to United States which enables the use of 5.8GHz spectrum.

**Step 1.** Select “Operation Mode” -> “Setup”

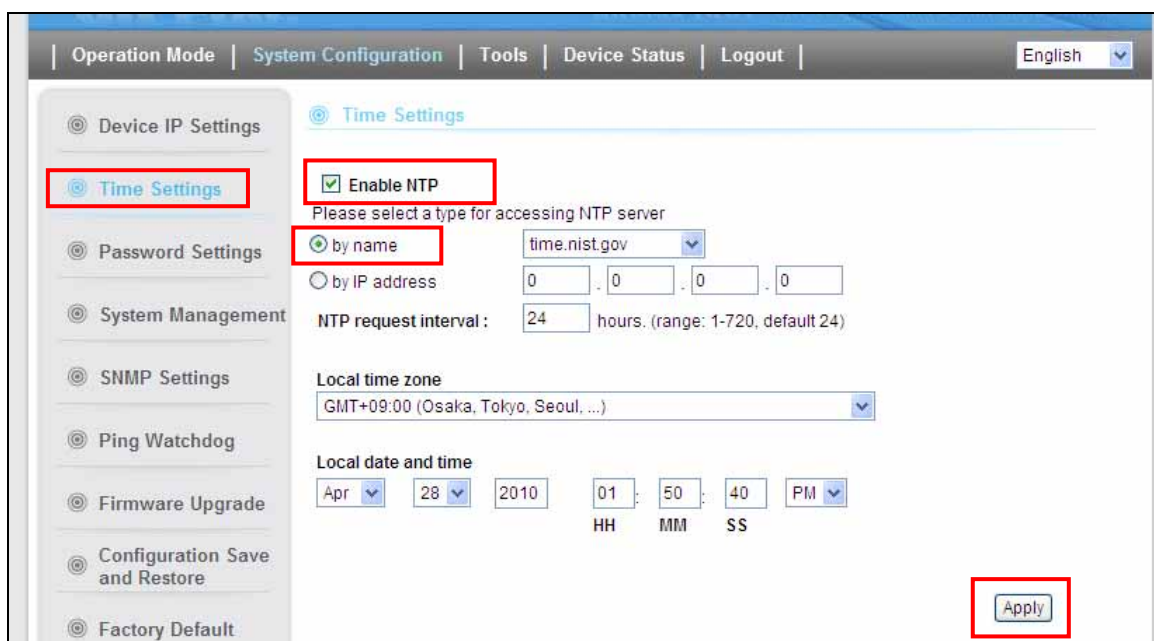


**Step 2.** From the Regulatory Domain, please select your country and click on “Apply” to finish.



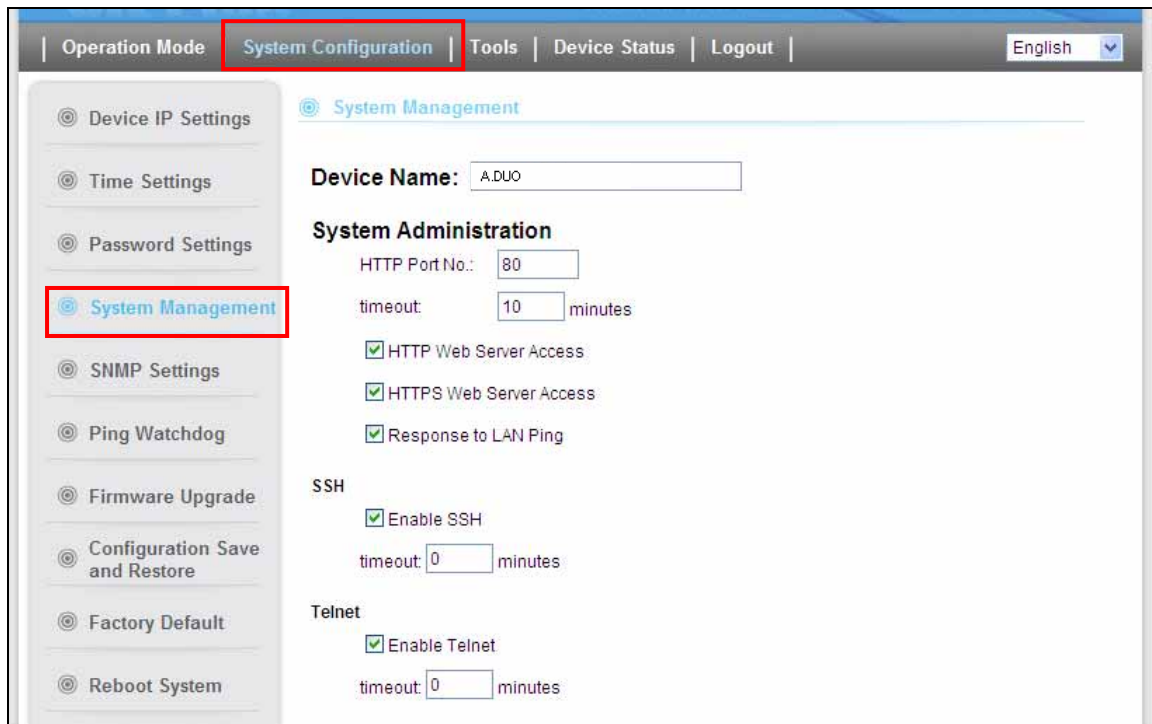
### 3.5.4 Set the Time and Date

It is important that you set the date and time for your A.DUO so that the system log will record the correct date and time information. Please go to “*System Configuration*” -> *Time Settings*. We recommend you choose “Enable NTP” so the time will be keep even after reboot. If your A.DUO is not connected to Internet, please enter the time manually. Please remember to select your local time zone and click “Apply” to finish.



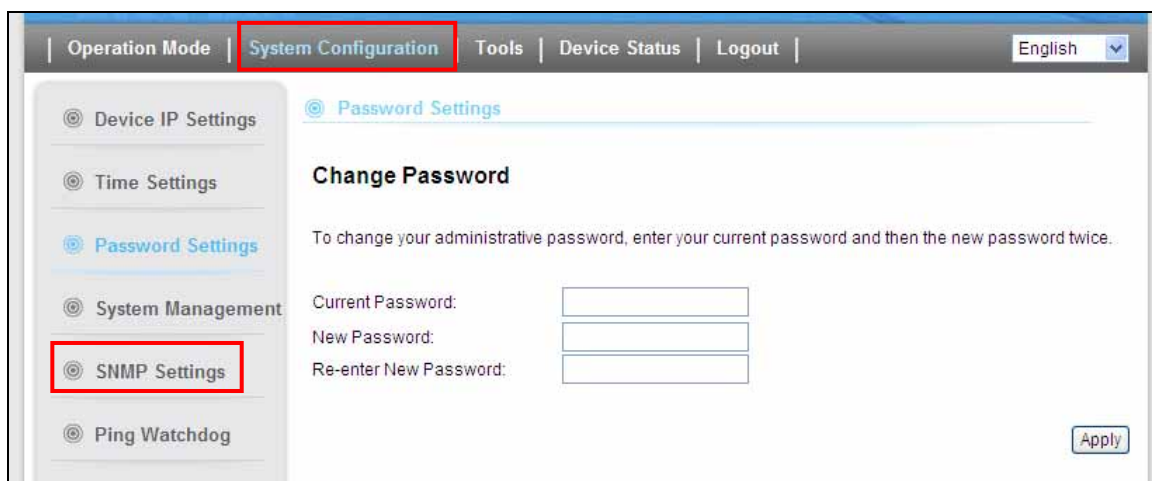
### 3.5.5 Change System Management

It is recommended that you change the system management settings first. Please go to “System Configuration”-> “System Management”. For WISP administrators, you can consider turning off HTTP and Telnet for security purpose.



### 3.5.6 Change Password

You should change the password for A.DUO at the first login. To change password, please go to “System Configuration” -> “Password Settings” menu.





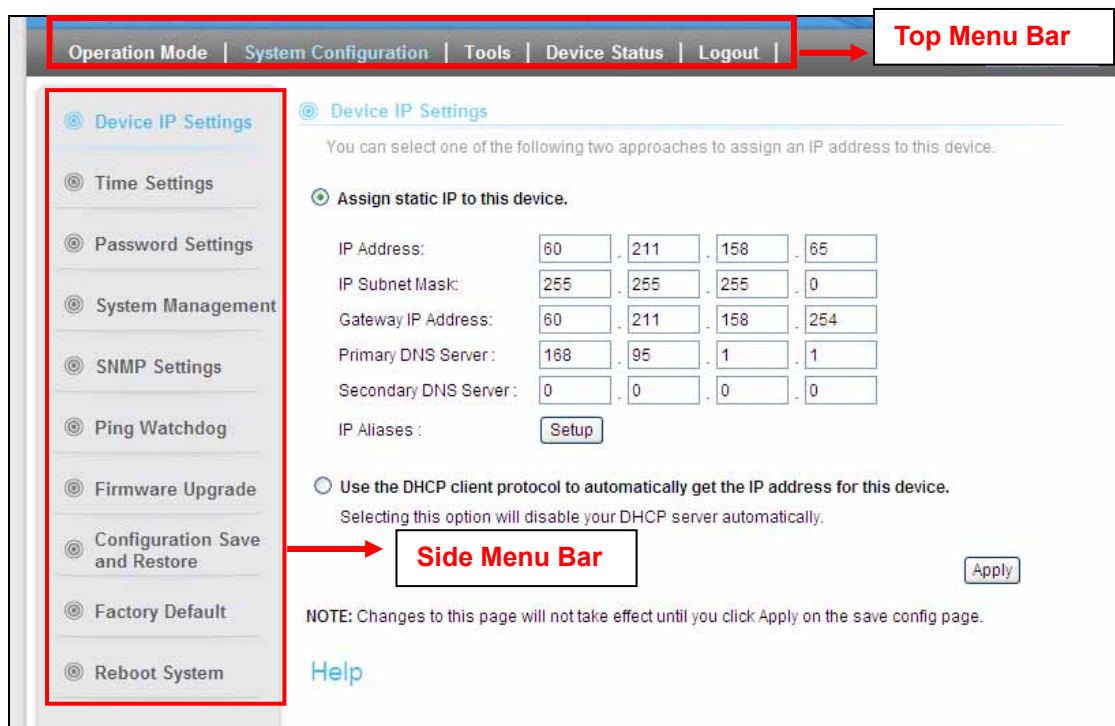
# 4

## Wireless and WAN Settings

In this chapter, we will explain about the wireless settings and router mode settings in web management interface. Please be sure to read through Chapter 3’s “Introduction to Web Management” and “Initial Configurations” first. For system configurations, device status, and other non-wireless related settings; please go to Chapter 5.

### 4.1 About A.DUO Menu Structure

The A.DUO’s web management menu is divided into 4 main sections: **Operation Modes**, **System Configurations**, **Tools** and **Device Status**. The main menus’ options are always displayed on the top of the web management page. Within each main menu category, there are sub-menu options which are displayed on the side of the web management page.

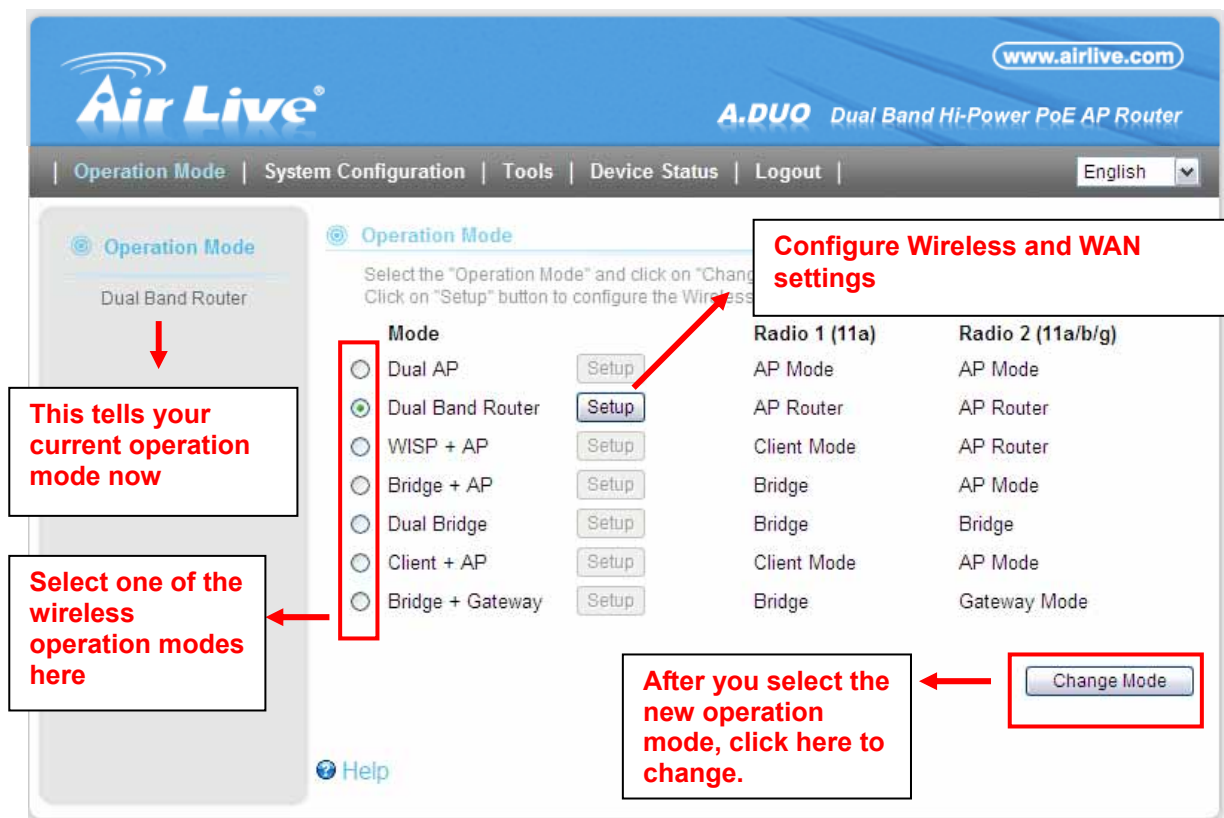


- **Operation Mode:** This menu is where you will find wireless and WAN settings. The A.DUO's wireless settings are dependant on the wireless operation mode you choose; only the applicable wireless settings for selected operation mode are shown. For example; WAN port setting is available only for AP Router and WISP Router mode, it will only be shown in those modes. To access wireless settings, click on the "Setup" button within each operation mode. For explanation on different wireless modes, please refer to Chapter 1. We will talk about functions in this menu for this chapter.
- **System Configuration:** All settings besides Wireless and WAN functions are in this category. The system configuration including changing password, upload firmware, backup configuration, settings PING watchdog, and setting management interface. We will talk about this menu's function in Chapter 5.
- **Tools:** Discover network status using ping, trace route and other tools
- **Device Status:** This section for monitoring the status of A.DUO. It provides information on device status, Ethernet status, wireless status, wireless client table, and system log.
- **Logout:** Please make sure to Logout after you finish all settings.

## 4.2 General Wireless Settings

The wireless settings of A.DUO are dependant on the wireless operation mode you choose. Therefore, the first step is to choose the operation mode. For explanation on when to use what operation mode, please refer to Chapter 1.

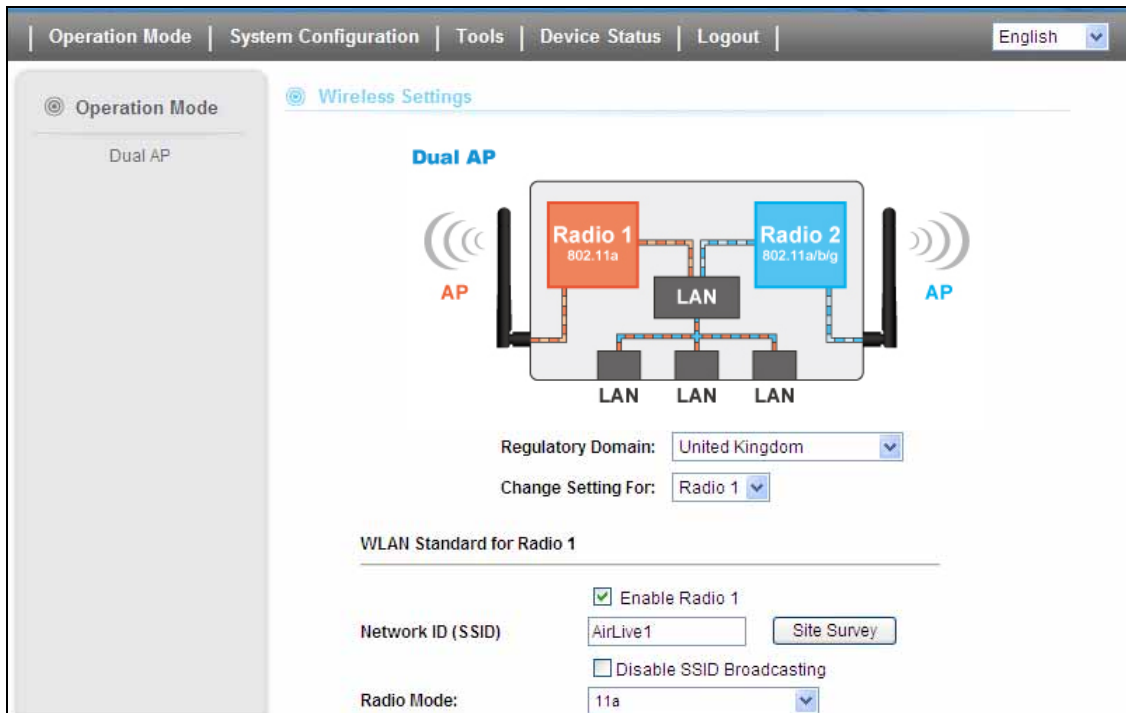
When you select “Wireless Settings” in the welcome screen, or click on the “Operation Mode” on the top menu; the following screen will appear:



- **Mode:** The available wireless operation modes for A.DUO. Select one and click on “Change Mode” button to switch between modes.
- **Setup:** Click here to configure the Wireless and WAN (in router mode) settings.

Once you click on the “Setup” page, the wireless settings will appear





The A.DUO device provides all 14 modes of wireless operational applications with:

| Mode             | Radio 1(11a) | Radio2(11a/b/g) | Applications                                            |
|------------------|--------------|-----------------|---------------------------------------------------------|
| Dual Band Router | AP Router    | AP Router       | Dual Home Networks: 5GHz for Games/AV and 2.4GHz for PC |
| Dual AP Mode     | Access Point | Access Point    | Dual Band Hotspots                                      |
| WISP + AP        | Client Mode  | AP Router       | Sharing WISP 5GHz Broadband Wirelessly                  |
| Bridge + AP      | Bridge Mode  | Access Point    | WDS Wireless Repeater                                   |
| Dual Bridge      | Bridge Mode  | Bridge Mode     | Long Distance Wireless Relay Station                    |
| Client + AP      | Client       | Access Point    | Universal Repeater                                      |
| Bridge + Gateway | Bridge       | AP Router       | Sharing remote Internet bandwidth                       |

### 4.2.1 Regulatory Domain

#### *Operation Mode -> Setup -> Regulatory Domain*

The legal frequency and channels in 5GHz spectrum varies between countries. Please select your country from here. There is a special domain called “Test Domain” which will show all the channels. It is for compatibility testing only. Please make sure the channel you used is allowed in your country when select this special domain.

### 4.2.2 Network SSID

#### *Operation Mode -> Setup -> Network SSID*

The SSID is the network name used to identify a wireless network. The SSID must be the same for all devices in the same wireless network. In A.DUO, it is possible to create more than one SSID in AP and AP Router mode, please check the “Multiple SSID & VLAN” section in this chapter. Conversely, several access points on a network can have the same SSID. The SSID length is up to 32 characters. The default SSID is “**airlive**”.

- **Enable Radio 1/2:** The default wireless is on. You can uncheck this box to disable wireless interface.
- **Disable SSID Broadcasting:** If you check this box, the SSID will be hidden; only users who know the SSID can associate with this network.

### 4.2.3 Site Survey

#### *Operation Mode -> Setup -> Site Survey*

The Site Survey function in A.DUO provides 4 important functions

- In Client and Bridge Infrastructure mode, site survey will scan for available AP network. Then allow user to select and connect to the AP. These greatly simplify the installation.
- Once Site Survey displays the available AP or Bridge networks, you can select a particular SSID to display its RSSI value continuously. This function is called “Signal Survey”. Signal Survey can be used for antenna alignment.

- For WDS Bridge mode, the Site Survey will scan for available AP and Bridge networks. User can then find the MAC address (BSSID) of the remote Bridges.
- For AP and AP router mode, the Site Survey allows administrator to check what channels are already occupied for choosing a cleaner channel.

When you click on Site Survey, the following screen will appear. It might take a few minutes to scan all the channels in the 5GHz spectrum.

**Site Survey**

Site survey list :

| Select                | ESSID   | MAC Address       | Radio | Conn Mode | Channel | Turb | Super | XR | WME | Signal Strength(dbm) | Security | Network |
|-----------------------|---------|-------------------|-------|-----------|---------|------|-------|----|-----|----------------------|----------|---------|
| <input type="radio"/> | WN-200R | 00:c0:02:ff:c7:ce | 2     | G         | 11      | -    | -     | -  | *   | -94                  | WEP      | AP      |
| <input type="radio"/> | WT2K    | 00:4f:67:00:61:ba | 2     | G         | 3       | -    | -     | -  | -   | -83                  | WPA PSK  | AP      |

NOTE: The sitesurvey will show both AP and Bridge connections. Device without ESSID is more likely to be a Bridge device.

Click here to select SSID for Association or Signal Survey

For antenna alignment, it will display and update RSSI value once a second

To connect with the selected SSID, this function is available only in Client Infrastructure or Bridge Infrastructure

- **Associate:** Please choose a SSID before click on this button. This button is available only in Client Infrastructure or Bridge Infrastructure modes. Once you click on this button, A.DUO will attempt to make a connection with the selected ESSID. If there is encryption needed, the A.DUO will prompt you to enter the encryption key. Please make sure you enter the correct encryption key, the A.DUO will not check whether the encryption key is correct.
- **RSSI:** RSSI is a value to show the Receiver Sensitivity of the A.DUO. In general, remote APs with stronger signal will display higher RSSI values. For RSSI value, the smaller the absolute value is, the stronger the signal. For example, “-50db” has stronger signal than “-80dB”. For outdoor connection, signal stronger than -60dB is considered as a good connection.

### 4.2.4 Signal Survey

**Operation Mode -> Setup -> Site Survey -> Signal Survey**

The Signal Survey will continuously display the RSSI value of the selected SSID for antenna alignment purpose. To use Signal Survey function, please enter the “Site Survey” function first; please refer to the instruction in the above section. Once you select the ESSID and click on the “Signal Survey” button, the following screen will appear.

|                  |                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio:           | Radio 2                                                                                                                                                                                                   |
| BSSID:           | <input type="text" value="00"/> - <input type="text" value="4F"/> - <input type="text" value="67"/> - <input type="text" value="00"/> - <input type="text" value="61"/> - <input type="text" value="BA"/> |
| Channel:         | <input type="text" value="3"/>                                                                                                                                                                            |
| Signal Strength: | <input type="text" value="-82"/> dbm                                                                                                                                                                      |

- **BSSID:** This is the remote AP’s MAC address.
- **Channel:** The current scanned channel
- **Signal Strength:** This is the RSSI value. It will refresh itself every second. The smaller the absolute value of the RSSI, the stronger the signal. For example -38dbm is stronger than -70dBm.

### 4.2.5 Radio Mode (11a, SuperA, TurboA) *\*Super Channel is NOT available in EU countries*

**Operation Mode -> Setup -> Radio Mode**

A.DUO has 4 different options for WLAN transmission. All devices in the same network should use the same WLAN mode.

- **11a mode (normal-A):** This is the IEEE standard for WiFi operating in 5GHz frequency band. 11a is the most stable mode. If you are getting packet loss or disconnection using Super-A or Turbo-A mode. Please use 11a mode instead.
- **SuperA without Turbo:** Super-A add Bursting, Compression, and Fast Frames to increase the speed over 11a mode. If you live in countries that prohibit the channel binding technology (i.e. Europe), you should choose “Super-A” If you need more speed than 11a mode. However, this mode is not as stable as 11a mode.

- **Super-A with Static Turbo:** Turbo mode uses channel binding technology to increase the speed further over Super-A mode. This mode might not be allowed in countries that prohibit channel binding (i.e. some EU countries). This mode will always turn on the turbo mode in all conditions
- **Super-A with Dynamic Turbo:** Dynamic Turbo mode will be turn on only when adjacent channel is not used. It is also know as intelligent turbo mode. This mode might not be allowed in countries that prohibit channel binding (i.e. some EU countries). In addition, this mode does not work in WDS Bridge mode.

#### 4.2.6 SuperA Option *\*Super Channel is NOT available in EU countries*

##### **Operation Mode -> Setup -> SuperA Option**

When you select Radio Mode with “Super-A”, the SuperA Options will be available.

- **Bursting:** Allow more data frame to be sent over given period of time by overhead reduction.
- **Compression:** Increasing throughput by compressing data frame in real time
- **Fast Frame:** Utilizing frame aggregation and removing interframe pauses to increase the throughput.

It is recommended to select all 3 options except for compatibility reasons with remote AP.

#### 4.2.7 Channel

##### **Operation Mode -> Setup -> Channel**

The channel is the frequency range used by radio. In 802.11a standard, each channel occupies 20MHz width. For 2 wireless devices to connect, they must use the same channel. The number of available legal channels might be different between countries. For example, Channel 149 to 161 are available only to United States and a few other countries. If you are living outside EU, please change the country from the “Regulatory Domain” option in this page. Below is the table list of channels and frequency.

| Frequency Domain                                   | Channel | Frequency (MHz) |
|----------------------------------------------------|---------|-----------------|
| 5.15 to 5.25GHz<br>U-NII Low<br>ETSI Band1         | 36      | 5180            |
|                                                    | 40      | 5200            |
|                                                    | 44      | 5220            |
|                                                    | 48      | 5240            |
| 5.25 to 5.35GHz<br>U-NII Mid<br>ETSI Band1         | 52      | 5260            |
|                                                    | 56      | 5280            |
|                                                    | 60      | 5300            |
|                                                    | 64      | 5320            |
| 5.47 to 5.725GHz<br>U-NII World Wide<br>ETSI Band3 | 100     | 5500            |
|                                                    | 104     | 5520            |
|                                                    | 108     | 5540            |
|                                                    | 112     | 5560            |
|                                                    | 116     | 5580            |
|                                                    | 120     | 5600            |
|                                                    | 124     | 5620            |
|                                                    | 128     | 5640            |
|                                                    | 132     | 5660            |
|                                                    | 136     | 5680            |
| 140                                                | 5700    |                 |

- Every 5MHz:** Check this option will display all the channel numbers regardless of what channel width is elected. For example, when you select “20MHz” for channel width, check this option will display channels “36, 37, 38, 39, 40....” Instead of “36, 40, 44...etc). This allow you to use a non-standard channel to avoid interference or for privacy purpose.

## 4.2.8 Channel Width

### *Operation Mode -> Setup -> Channel Width*

In 802.11a spec, each channel occupies 20MHz channel width. Therefore, each channel will jump by number of 4 (i.e. 36, 40, 44...etc). You can change the Channel Width to 40MHz (Turbo), 10MHz (Half) or 5MHz (Quarter) to either increase performance or reduce the interference problem.

- **Turbo (40MHz):** Each channel will use 40MHz, double the normal size, to increase the performance by channel binding. This option is not allowed in countries inside EU
- **Normal (20MHz):** This is the default channel width specified by IEEE 802.11a specification
- **Half (10MHz):** Using this option would double the available channels for deployment in congested areas. However, the performance will also drop by half when using this option.
- **Quarter (5MHz):** Using this option will increase the available channels by 4 times. It is a good choice for deployment in very congested areas. However, the performance will also drop greatly when using this option.

## 4.2.9 Security Settings

### *Operation Mode -> Setup -> Security Settings*

Security settings allow you to use encryption to secure your data from eavesdropping. You can select different security policy to provide association authentication and/or data encryption. The A.DUO features various security policies including WEP, 802.1x, WPA, WPA-PSK, WPA2, WPA2-PSK, WPA-Auto, and WPA-PSK-Auto. Please note not all security policies are available in all operation modes. For example, only WEP is available currently in WDS Bridge mode and Client Ad hoc mode. All wireless devices on the same network must use the same security policy. We recommend using WPA-PSK or WPA2-PSK whenever possible. For WDS Bridge and Client Ad hoc mode, we recommend using WEP-152 encryption.

**WEP:** WEP Encryption is the oldest and most available encryption method. However, it is also the least secure. Due to the limitation of the chipset, only WEP encryption is available for WDS Bridge Pure MAC mode and Client Ad-hoc mode.

### Security Settings

Select Security Policy: WEP

---

Authentication type  Open  Shared

Select one of the WEP keys for the wireless network:

Encrypt data transmitting with WEP Key 1

|           |                                              |                                          |
|-----------|----------------------------------------------|------------------------------------------|
| WEP Key 1 | WEP64-ASCII <input type="button" value="v"/> | <input style="width: 95%;" type="text"/> |
| WEP Key 2 | WEP64-ASCII <input type="button" value="v"/> | <input style="width: 95%;" type="text"/> |
| WEP Key 3 | WEP64-ASCII <input type="button" value="v"/> | <input style="width: 95%;" type="text"/> |
| WEP Key 4 | WEP64-ASCII <input type="button" value="v"/> | <input style="width: 95%;" type="text"/> |

- **Select one of the WEP key for wireless network:** There are total of 4 possible keys for WEP encryption. You need to choose which key will be used for encryption. All wireless devices on the same network have to use the same settings. We recommend using WEP Key 1 as in default setting.
  
- **WEP Keys:** Please enter the WEP keys used for encryption. You need to fill at least the “Select WEP Key”. For example; if you choose “Encrypt Data with WEP Key 1” in the previous field, then it is necessary to fill WEP Key 1. The length of key is dependant on the Key Length and Key type you choose.

**Key Length:** The A.DUO offers 64bit, 128 bit, and 152 bit for WEP key length. The longer the Key Length, the more secure the encryption is.

**Key Type:** 2 types are available: ASCII and HEX. ASCII is a string of ASCII code including alphabetical characters, space, signs and numbers (i.e. “airlivepass12”). HEX is a string of 16-bit hexadecimal digits (0..9, a, b, c, d, e, f). All wireless devices on the network must match the exact key length and Key type. Some Wireless clients only allow HEX type for WEP.



**ASCII-64:** This is a key with 64-bit key length of ASCII type. Please enter 5 ASCII Characters if you choose this option. For example, “passw”

**HEX-64:** This is a key with 64-bit key length of HEX type. Please enter 10 Hexadecimal digits if you choose this option. For example, “12345abcdef”

**ASCII-128:** This is a key with 64-bit key length of ASCII type. Please enter 13 ASCII Characters if you choose this option. For example, “airlivewepkey”

**HEX-128:** This is a key with 128-bit key length of HEX type. Please enter 26 Hexadecimal digits if you choose this option. For example, “1234567890abcdef1234567890”

**ASCII-152:** This is a key with 64-bit key length of ASCII type. Please enter 16 ASCII Characters if you choose this option. For example, “airlivewepkey123”

**HEX-152:** This is a key with 128-bit key length of HEX type. Please enter 32 Hexadecimal digits if you choose this option. For example, “1234567890abcdef1234567890abcdef”

**802.1x:** 802.1x allows users to leverage a RADIUS server to do association authentications. You can also enable dynamic WEP key (128 bit) to have data encryption. You do not have to enter the WEP key manually because it will be generated automatically and dynamically.

### Security Settings

Select Security Policy: 802.1x ▼

---

Select Key Length for WEP Rekeying: 128 bit ▼

Rekey interval: 0 sec. (0 means keying once)

Enable RADIUS Server

Server IP: 0 . 0 . 0 . 0

Port Number: 1812

Shared Secret:

Apply

- **Rekey interval** is time period that the system will change the key periodically. The shorter the interval is, the better the security is.

#### To Enable RADIUS Server:

- **Server IP:** The IP address of the RADIUS server.
- **Port Number:** The port number that your RADIUS server uses for authentication. The default setting is 1812.
- **Shared Secret:** This is used by your RADIUS server in the Shared Secret field in RADIUS protocol messages. The shared secret configured in the A.DUO must match the shared secret configured in the RADIUS server. The shared secret can contain up to 64 alphanumeric characters.

**WPA, WPA2, WPA-AUTO:** Wi-Fi Protected Access (WPA) introduces the Temporal Key Integrity Protocol (TKIP) that provides added security. WPA2 adds full support for 802.11i standard and the CCMP (AES Encryption). The WPA-AUTO tries to authenticate wireless clients using WPA or WPA2. All 3 requires a RADIUS server available in order to do authentication (same as 802.1x), thus there is no shared key required.

### Security Settings

Select Security Policy: WPA-AUTO

---

WPA-AUTO Encryption Type:  TKIP  CCMP(AES)  Both

WPA-AUTO Group Rekey Interval:  sec. (0 means disable rekey)

Enable RADIUS Server

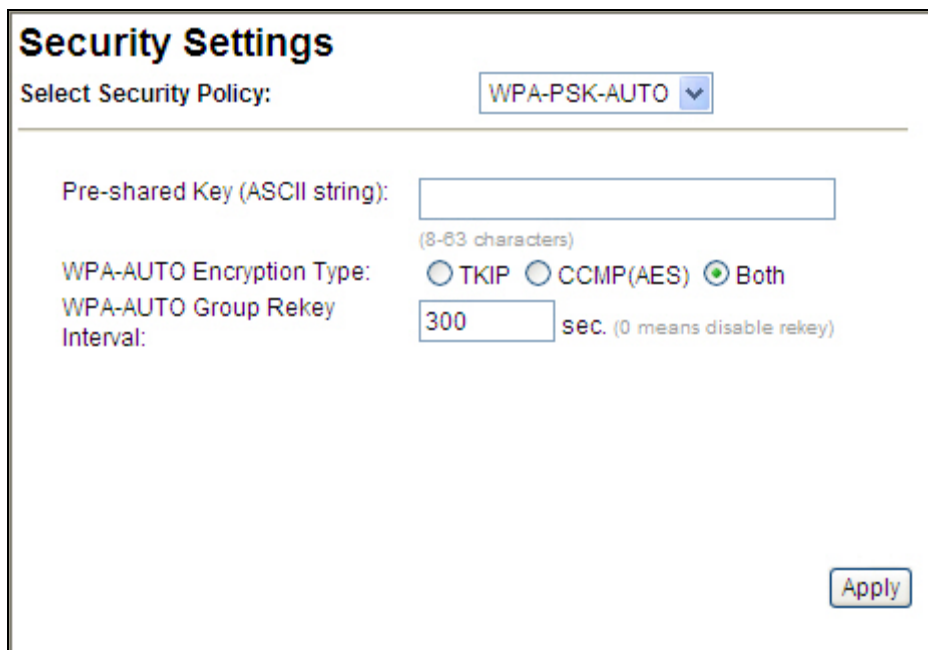
Server IP:

Port Number:

Shared Secret:

- **Encryption Type:** There are two encryption types **TKIP** and **CCMP (AES)**. While CCMP provides better security than TKIP, some wireless client stations may not be equipped with the hardware to support it. You can select “Both” to allow TKIP clients and CCMP clients to connect to the Access Point at the same time.
- **Group Rekey Interval:** A group key is used for multicast/broadcast data, and the re-key interval is time period that the system will change the group key periodically. The shorter the interval is, the better the security is. The default is 300 sec.

**WPA-PSK, WPA2-PSK, WPA-PSK-Auto:** Wi-Fi Protected Access (WPA) with Pre-Shared Key (PSK) provides better security than WEP keys. It does not require a RADIUS server in order to provide association authentication, but you do have to enter a shared key for the authentication purpose. The encryption key is generated automatically and dynamically. WPA2-PSK adds CCMP and AES encryption for even better security. WPA-PSK-AUTO tries to authenticate wireless clients using WPA-PSK or WPA2-PSK.



The screenshot shows the 'Security Settings' configuration page. At the top, there is a dropdown menu for 'Select Security Policy' set to 'WPA-PSK-AUTO'. Below this, there are three main settings:

- Pre-shared Key (ASCII string):** A text input field with a note '(8-63 characters)' below it.
- WPA-AUTO Encryption Type:** Three radio buttons are present: 'TKIP', 'CCMP(AES)', and 'Both'. The 'Both' option is selected.
- WPA-AUTO Group Rekey Interval:** A text input field containing '300' followed by the text 'SEC. (0 means disable rekey)'.

An 'Apply' button is located at the bottom right of the configuration area.

- **Pre-shared Key:** This is an ASCII string with 8 to 63 characters. Please make sure that both the A.DUO and the wireless client stations use the same key.
- **Encryption Type:** There are two encryption types **TKIP** and **CCMP (AES)**. While CCMP provides better security than TKIP, some wireless client stations may not be equipped with the hardware to support it. You can select “Both” to

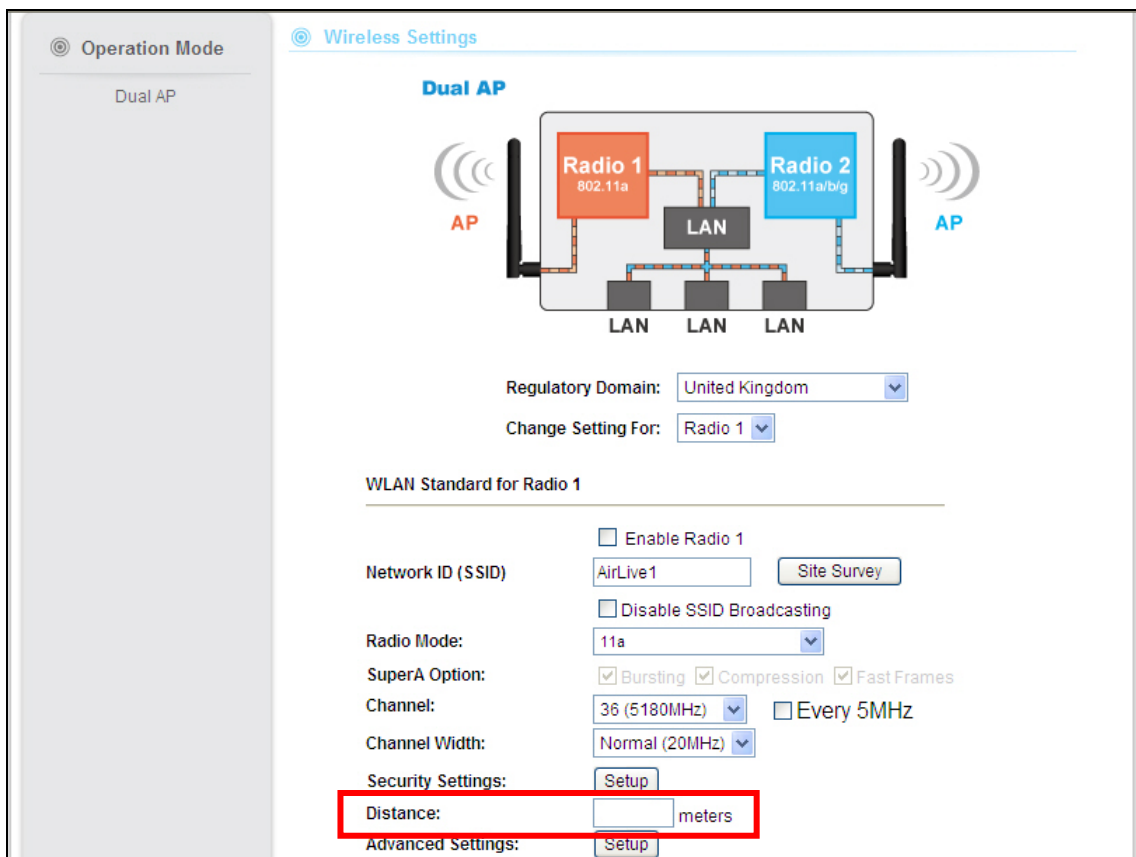
allow TKIP clients and CCMP clients to connect to the Access Point at the same time.

- Group Rekey Interval:** A group key is used for multicast/broadcast data, and the re-key interval is time period that the system will change the group key periodically. The shorter the interval is, the better the security is. The default is 300 sec.

### 4.2.10 Distance

#### Operation Mode -> Setup -> Distance

Please enter the distance to the remote wireless device here. The A.DUO will then calculate the appropriate ACK Timeout value automatically. It is very important that you enter the correct distance for long distance connection. Failure to do so will result in poor performance.



The screenshot shows the 'Wireless Settings' page for a Dual AP configuration. The interface includes a diagram of the AP with two radios (Radio 1: 802.11a, Radio 2: 802.11a/b/g) connected to a central LAN, which then branches into three separate LAN ports. Below the diagram, the 'Regulatory Domain' is set to 'United Kingdom' and 'Change Setting For' is set to 'Radio 1'. Under the 'WLAN Standard for Radio 1' section, the 'Distance' field is highlighted with a red box and contains the text 'meters'. Other visible settings include 'Network ID (SSID)' as 'AirLive1', 'Radio Mode' as '11a', and 'Channel' as '36 (5180MHz)'. The 'Distance' field is located at the bottom of the configuration options, with a 'Setup' button next to it.

## 4.2.11 Advance Settings

### Operation Mode -> Setup -> Advance Settings

This page includes all the wireless settings that change the RF behaviors of A.DUO. It is important to read through this section before attempting to make changes.

### Advanced Wireless Settings

Radio1

Beacon Interval :  msec (range: 20-1000, default 100)

RTS Threshold :  bytes (range: 0-2347, default 2347)

Fragmentation :  bytes (range: 256-2346, default 2346)

DTIM Interval :  (range 1-255, default 1)

User Limitation:  (range: 0-100, unlimited 0, default 100)

Age Out Timer :  min. (range: 1-1000, default 5)

Transmit Power:  (Reduce Tx Power between 0~14 dB)

Rate Control:  Mbps

AckTimeOut (11a/SuperA/Turbo-11a):  μs (range: 10-255, default 25)

Enable 802.11d global roaming

- **Beacon Interval:** The device broadcasts beacon frames regularly to announce its existence. The beacon Interval specifies how often beacon frames are transmitted in time unit of milliseconds. The default value is **100**, and a valid value should be between 1 and 65,535.
- **RTS Threshold:** RTS/CTS frames are used to gain control of the medium for transmission. Any unicast (data or control) frames larger than specified RTS threshold must be transmitted following the RTS/CTS handshake exchange mechanism. The RTS threshold should have a value between 256-2347 bytes, with a default of **2347**. It is recommended that this value does not deviate from the default too much.
- **Fragmentation:** When the size of a unicast frame exceeds the fragmentation threshold, it will be fragmented before the transmission. It should have a value of 256-2346 bytes, with a default of 2346. If you experience a high packet error rate, you should slightly decrease the Fragmentation Threshold.

- **DTIM Interval:** The A.DUO buffers packets for stations that operate in the power-saving mode. The Delivery Traffic Indication Message (DTIM) informs such power-conserving stations that there are packets waiting to be received by them. The DTIM interval specifies how often the beacon frame should contain DTIMs. It should have a value between 1 to 255, with a default value of 3.
- **User Limitation:** This limitation applies to number of wireless clients the device can associate. If you need to serve wireless connection to large number of users in one location. You can deploy many APs and limit the number of wireless clients, so any additional wireless connection attempt will be rejected (therefore, redirect to other AP). The range of user limitation is from 1 to 100.
- **Age Out Timer:** Set the age out timer for the wireless client. If there is no traffic from client for more than the timer, the wireless client will be dropped. The default is 300 sec. This function is available only for the Access Point and AP router mode.
- **Transmit Power:** You can adjust the transmit output power of the A.DUO's radio from 10dBm to 24dBm. The higher the output power, the more distance A.DUO can deliver. However, it is advised that you use just enough output power so it will not create excessive interference for the environment. Also, using too much power at close distance can create serious performance drop due to signal distortion. At less than 200meter distance, the best output power is about 14dBm. At 2km distance; the best output power setting is 18dBm for "11a" and "Super-A without Turbo", 24dBm for "Super-A with Static/Dynamic Turbo".
- **Rate Control:** Select here to change the Data Rate for the radio. Lower data rate sometimes provide longer distance. In most cases, however, we recommend to keep the setting at "Best".
- **AckTimeOut:** When a packet is sent out from one wireless station to the other, it will wait for an Acknowledgement frame from the remote station. The station will only wait for a certain amount of time; this time is called the ACK timeout. If the ACK is NOT received within that timeout period then the packet will be re-transmitted resulting in reduced throughput. If the ACK setting is too high, then throughput will be lost due to waiting for the ACK Window to timeout on lost packets. If the ACK setting is too low then the ACK window will have expired and the returning packet will be dropped, greatly lowering throughput. By having the ability to adjust the ACK setting we can effectively optimize the throughput over long distance links.

The easiest way to enter AckTimeOut value is by entering the distance in “*Operation Mode -> Setup -> Distance*”. The A.DUO will then calculate and enter the correct value for you. Press the “Apply” button to begin the calculation.

- **AckTimeOut Calculator:** Users may also use the ACK calculator to determine the AckTimeOut value before applying to A.DUO.
- **Enable Radio eXtended Range:** XR is Atheros eXtended technology to increase range. When XR is turned on, the radio can increase the receiver sensitivity greatly. However, performance may be reduced significantly also. Use this mode only if you can trade more distance for lower performance.
- **Enable privacy separator:** Select the check box to prohibit data transmission between client stations. This function is also known as “Client Isolation”.
- **Enable 802.1d STP:** Enable the Spanning Tree Protocol to prevent forming a network loop. This option is especially important for WDS Bridge mode.
- **Enable 802.11d:** Also known as “Global Roaming”. 802.11d is a standard for use in countries where systems using other standards in the 802.11 family are not allowed to operate.

## 4.2.12 Access Control (ACL)

**Operation Mode -> Setup -> Access Control**

The A.DUO allows you to define a list of MAC addresses that are allowed or denied to access the wireless network. This function is available only for Access Point and AP Router modes.

### Access Control Settings

This feature allows you to define a list of MAC addresses that are authorized to access or denied from accessing the wireless network.

**Disable MAC address control list**  
 No MAC address filtering is performed.

**Enable GRANT address control list**  
 Allow data traffic from devices listed in the table to access the network.

**Enable DENY address control list**  
 Deny/discard data traffic from devices listed in the table.

Mnemonic Name:

MAC Address:  (xx-xx-xx-xx-xx-xx)

| Select | Name | MAC Address |
|--------|------|-------------|
| -      | -    | -           |

- **Disable MAC address control list:** When selected, no MAC address filtering will be performed.
- **Enable GRANT address control list:** When selected, data traffic from only the specified devices in the table will be allowed in the network.
- **Enable DENY address control list:** When selected, data traffic from the devices specified in the table will be denied/discarded by the network.

To add a MAC address into the table, enter a Mnemonic Name and the MAC Address, and then click Add. The table lists all configured MAC Filter entries.

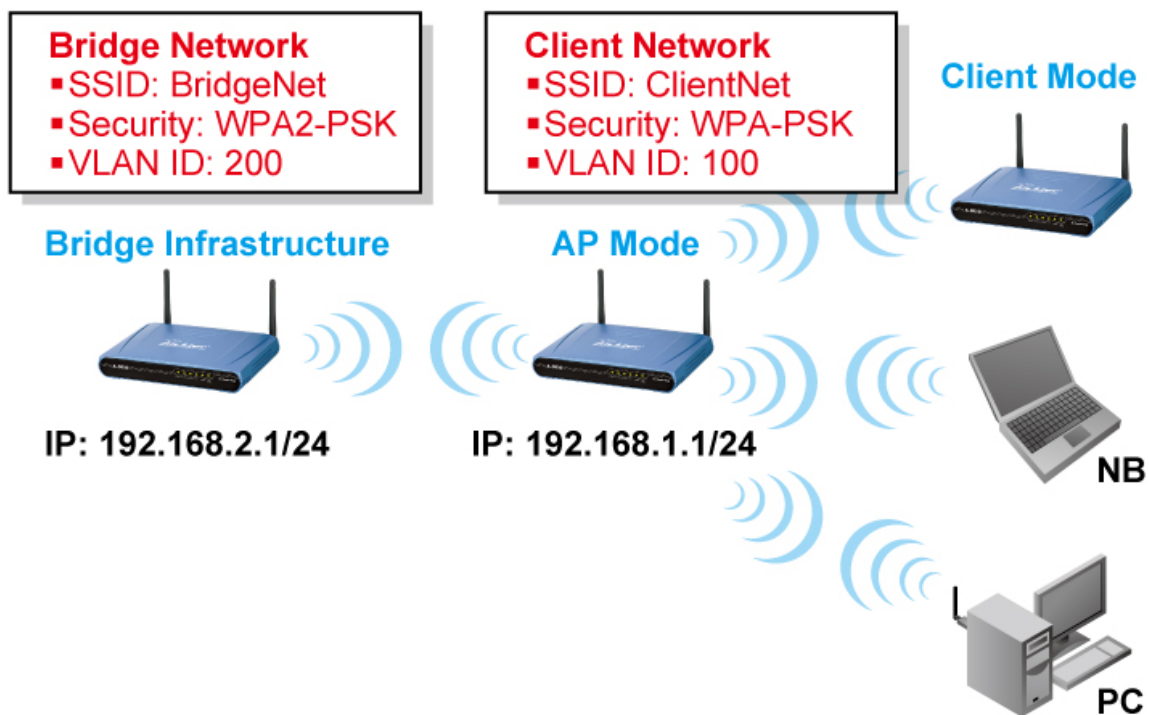
To delete entries, check the corresponding Select boxes and then press *Delete Selected*.



### 4.2.13 Multiple SSID

#### Operation Mode -> Setup -> Multiple SSID

This function is available only for Access Point and AP Router modes. Multiple SSID allows A.DUO to create up to 4 different wireless networks (SSID). It is also known as “Virtual AP” function. Each SSID can have its Encryption type, VLAN Tag, and TOS settings. In the following diagram, the A.DUO uses Multiple SSID function to create separate Bridge and Client network. Each has its own encryption policies.



### Configuring the Multiple SSID

When you click on the “Multiple SSID” button, the following screen will appear.



**SSID Settings**  
This page lets you configure multiple SSIDs and corresponding QoS settings if QoS is enabled.

Enable VLAN for all SSIDs (All packets are tagged with VLAN ID)  
 Enable DiffServ Marking

[Apply](#)

| SSID Name                                 | VLAN ID/Priority | Security | Radio |
|-------------------------------------------|------------------|----------|-------|
| <input checked="" type="radio"/> AirLive1 | -                | None     | 1     |
| <input type="radio"/> AirLive2            | -                | None     | 2     |

[Delete selected](#)

Radio:   
 SSID Name:   
 Disable SSID Broadcasting  
 Select Security Policy:

[Apply](#) [New](#)

[Help](#)

**Callouts:**  
 - Top right: Click here to Apply changes in “VLAN” and “DiffServe Marking” (points to the top Apply button)  
 - Middle left: This is the default SSID (points to the selected AirLive1 row)  
 - Bottom right: Click here to apply changes on adding or deleting SSID (points to the bottom Apply button)

### How to add a SSID

You can add up to 4 SSID in A.DUO. Please follow the procedure below:

1. Enter the SSID name (i.e. BridgeNet)
2. Select the Security Policy (i.e. WPA-PSK)
3. Enter the Security Key (i.e. BridgeNetKey).
4. Click on “Apply” to add SSID

**SSID Settings**  
 This page lets you configure multiple SSIDs and corresponding QoS settings if QoS is enabled.

Enable VLAN for all SSIDs (All packets are tagged with VLAN ID)  
 Enable DiffServ Marking

[Apply](#)

---

| SSID Name                                 | VLAN ID/Priority | Security | Radio |
|-------------------------------------------|------------------|----------|-------|
| <input checked="" type="radio"/> AirLive1 | -                | None     | 1     |
| <input type="radio"/> AirLive2            | -                | None     | 2     |

[Delete selected](#)

Radio: 1 Radio1

SSID Name: BridgeNet

Disable SSID Broadcasting

Select Security Policy: WPA-PSK 2

Pre-shared Key (ASCII string): BridgeNetKey 3  
(8-63 characters)

WPA Encryption Type:  TKIP  CCMP(AES)  Both

WPA Group Rekey Interval:  sec. (0 means disable rekey)

4 Apply New

[Help](#)

**How to Modify or Delete a SSID**

Please follow the procedure below:

1. Select the SSID you want to modify or delete
2. The SSID's settings will be displayed in the box area. Modify any settings.
3. Click on "Apply" to complete the modification
4. Or click on "Delete Selected" to delete the SSID

### SSID Settings

This page lets you configure multiple SSIDs and corresponding QoS settings if QoS is enabled.

Enable VLAN for all SSIDs (All packets are tagged with VLAN ID)  
 Enable DiffServ Marking

---

| SSID Name                                  | VLAN ID/Priority | Security | Radio |
|--------------------------------------------|------------------|----------|-------|
| <input type="radio"/> AirLive1             | -                | None     | 1     |
| <input checked="" type="radio"/> BridgeNet | -                | Wpa-Psk  | 1     |
| <input type="radio"/> AirLive2             | -                | None     | 2     |

Radio:

SSID Name:

Disable SSID Broadcasting

Select Security Policy:

(8-63 characters)

WPA Encryption Type:  TKIP  CCMP(AES)  Both

WPA Group Rekey Interval:  sec. (0 means disable rekey)

### Configure the VLAN and DiffServ Markings

When you check the Enable VLAN for All SSIDs and/or Enable DiffServ Marking, the following screen will appear:

### SSID Settings

This page lets you configure multiple SSIDs and corresponding settings. All settings are enabled.

Enable VLAN for all SSIDs (All packets are tagged with VLAN ID)

Enable DiffServ Marking

---

| SSID Name                                 | VLAN ID/Priority | Security | Radio |
|-------------------------------------------|------------------|----------|-------|
| <input checked="" type="radio"/> AirLive1 | 0/0              | None     | 1     |
| <input type="radio"/> AirLive2            | 0/0              | None     | 2     |

---

Radio:

SSID Name:

Disable SSID Broadcasting

VLAN ID:

VLAN IP:  .  .  .

VLAN NetMask:  .  .  .

802.1p priority:

Select DSCP type:

DSCP value:

Select Security Policy:

Click here to Apply changes in "VLAN" and "DiffServe Marking"

Default SSID and VLAN group

- **Enable VLAN for All SSIDs:** Once this function is enabled, you can specify an individual VLAN ID and priority tag for each SSID. The packets from a SSID will be forwarded to the Ethernet with the corresponding configured VLAN ID written. *You need to click on the top "APPLY" button after making changes.*
- **Enable DiffServ Marking:** When this function is enabled, you can configure a DSCP value for each SSID. Then a packet from a station using this SSID will be forwarded with the DSCP value labeled. *You need to click on the top "APPLY" button after making changes.*
- **VLAN ID:** Packets going out of this VLAN will be tagged with the VLAN ID. Packets coming into the AP will be dropped if the VLAN Tag does not match. The valid range is between 0 and 4095. The VLAN ID "0" is the default VLAN group.
- **VLAN IP:** Each SSID can be given with different VLAN IP group. Please notice that the management IP in the VLAN will also be changed. For example, if you define the VLAN IP to be 192.168.2.X subnet, then the A.DUO's management IP in the group will change to 192.168.2.1.

- **VLAN IP NetMask:** Define your VLAN IP scope here
- **802.1p Priority:** Define your 802.1p priority Tag here. Value from 0 to 7
- **Select DSCP TYPE:** Assign the 6-digit DifferServ Code (DSCP) for the packets in the SSID network for QoS purpose. There are 8 preset values. To assign your own value, please select “Best Effort”
- **DSCP Value:** When you select “Best Effort” DSCP Type, you can enter the 6-digit DSCP Value here.
- **Select Security Policy:** Select the encryption used for this SSID VLAN group. This policy can be different in each SSID VLAN group. For example, one SSID can be using WEP; the other policy can use WPA-PSK.

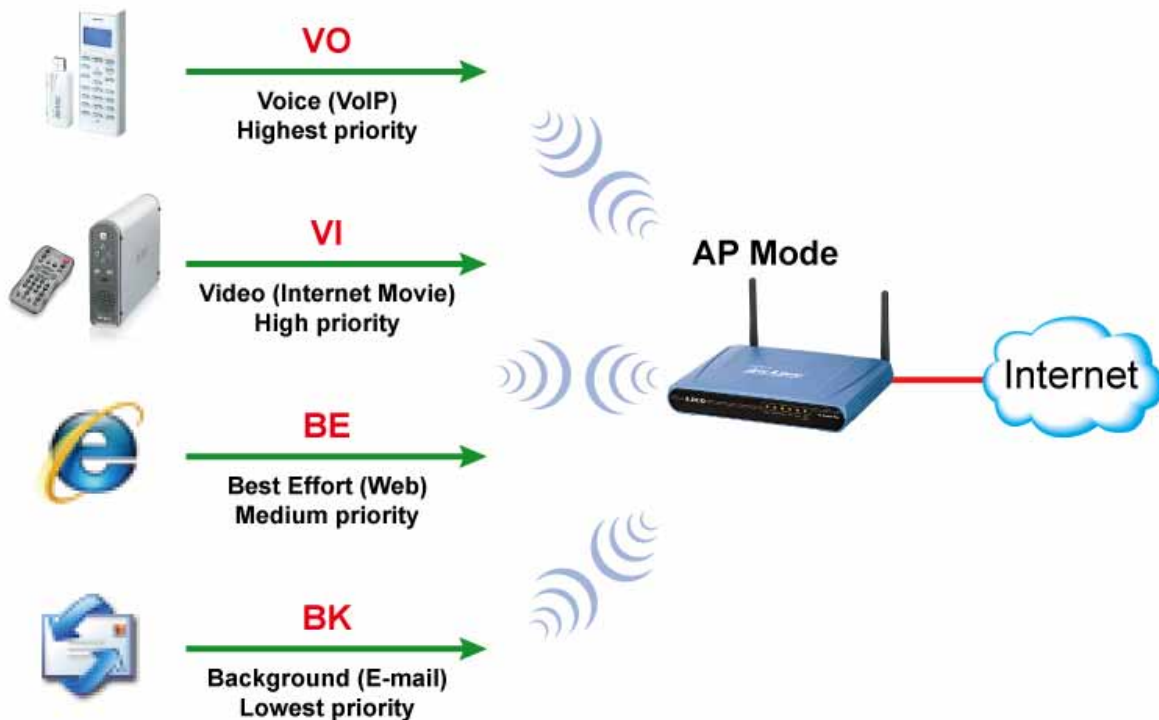


Once you enable the VLAN ID. The incoming packet from Ethernet port to your VLAN group must carry the same VLAN ID tag or the packet will be dropped.

## 4.2.14 WMM QoS Setting

**Operation Mode -> Setup -> WMM QoS Setting**

Wi-Fi Multimedia (WMM) is a standard to prioritize traffic for multimedia applications. The WMM Settings is to specify parameters on multiple data queue for better performance of differentiated wireless traffic like Voice-over-IP (VoIP), other types of audio, video, and streaming media as well as traditional IP data over the AP.



### Configure the WMM QoS Parameters

#### QoS Settings

Enable WMM

---

WMM Parameters of Access Point

| AC TYPE  | ECWMin                         | ECWMax                          | AIFS                           | TxopLimit-11a(μs)                 | ACM                      | Ack-policy               |
|----------|--------------------------------|---------------------------------|--------------------------------|-----------------------------------|--------------------------|--------------------------|
| AC_BE(0) | <input type="text" value="4"/> | <input type="text" value="6"/>  | <input type="text" value="3"/> | <input type="text" value="0"/>    | <input type="checkbox"/> | <input type="checkbox"/> |
| AC_BK(1) | <input type="text" value="4"/> | <input type="text" value="10"/> | <input type="text" value="7"/> | <input type="text" value="0"/>    | <input type="checkbox"/> | <input type="checkbox"/> |
| AC_VI(2) | <input type="text" value="3"/> | <input type="text" value="4"/>  | <input type="text" value="1"/> | <input type="text" value="3008"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| AC_VO(3) | <input type="text" value="2"/> | <input type="text" value="3"/>  | <input type="text" value="1"/> | <input type="text" value="1504"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

WMM Parameters of Station

| AC TYPE  | ECWMin                         | ECWMax                          | AIFS                           | TxopLimit-11a(μs)                 | ACM                      |
|----------|--------------------------------|---------------------------------|--------------------------------|-----------------------------------|--------------------------|
| AC_BE(0) | <input type="text" value="4"/> | <input type="text" value="10"/> | <input type="text" value="3"/> | <input type="text" value="0"/>    | <input type="checkbox"/> |
| AC_BK(1) | <input type="text" value="4"/> | <input type="text" value="10"/> | <input type="text" value="7"/> | <input type="text" value="0"/>    | <input type="checkbox"/> |
| AC_VI(2) | <input type="text" value="3"/> | <input type="text" value="4"/>  | <input type="text" value="2"/> | <input type="text" value="3008"/> | <input type="checkbox"/> |
| AC_VO(3) | <input type="text" value="2"/> | <input type="text" value="3"/>  | <input type="text" value="2"/> | <input type="text" value="1504"/> | <input type="checkbox"/> |

[Help](#)

#### ■ AC Type

The queue and associated priorities and parameters for transmission are as follows:

- **Data 0 (Best Effort, BE):** Medium priority queue, medium throughput and delay. Most traditional IP data is sent to this queue.
- **Data 1 (Background, BK):** Lowest priority queue, high throughput. Bulk data that requires maximum throughput and is not time-sensitive is sent to this queue (FTP data, for example):
- **Data 2 (Video, VI):** High priority queue, minimum delay. Time-sensitive data such as Video and other streaming media are automatically sent to this queue.



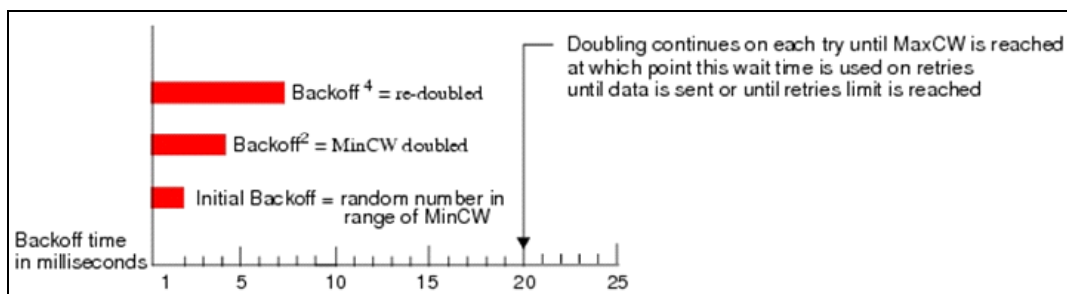
- **Data 3 (Voice, VO):** Highest priority queue, minimum delay. Time-sensitive data such as Voice over IP (VoIP) is automatically sent to this queue.

Packets in a higher priority queue will be transmitted before packets in a lower priority queue.

### ■ ECWmin and ECWmax

If an access point detects that the medium is in use, it uses the DCF random backoff timer to determine the amount of time to wait before attempting to access a given channel again. Each access point waits some random period of time between retries. The wait time (initially a random value within a range specified as the *Minimum Contention Window* increases exponentially up to a specified limit *Maximum Contention Window*.

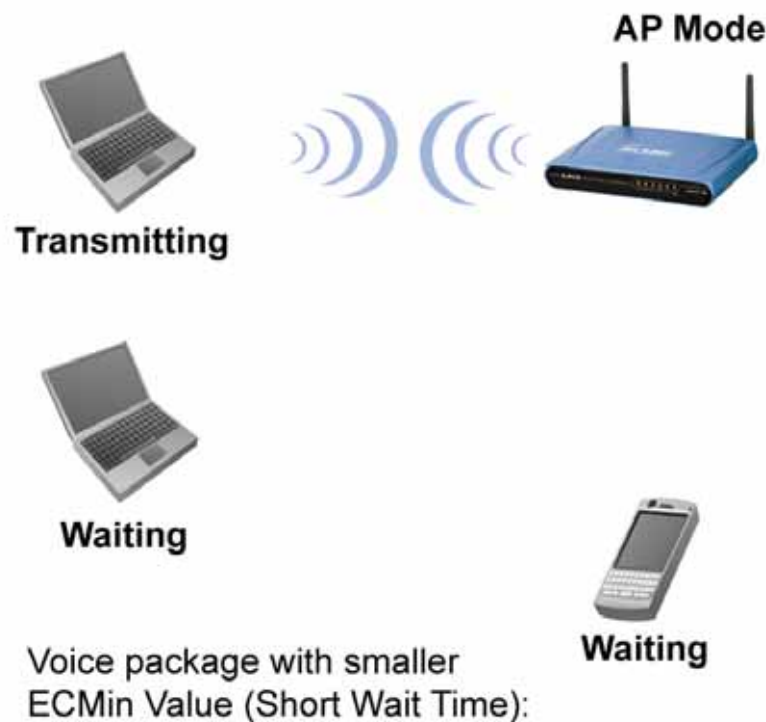
The random delay avoids most of the collisions that would occur if multiple APs got access to the medium at the same time and tried to transmit data simultaneously. The more active users you have on a network, the more significant the performance gains of the backoff timer will be in reducing the number of collisions and retransmissions.



The random backoff used by the access point is a configurable parameter. To describe the random delay, a "*Minimum Contention Window*" (*ECWMin*) and a "*Maximum Contention Window*" (*ECWMax*) is defined.

- **ECWmin:** The value specified for the Minimum Contention Window is the upper limit of a range for the initial random backoff wait time. The number used in the random backoff is initially a random number between 0 and the number defined for the Minimum Contention Window.

- ECWmax:** If the first random backoff time ends before successful transmission of the data frame, the access point increases a retry counter, and doubles the value of the random backoff window. The value specified in the Maximum Contention Window is the upper limit for this doubling of the random backoff. This doubling continues until either the data frame is sent or the Maximum Contention Window size is reached.



- AIFS**  
 The Arbitration Inter-Frame Spacing (AIFs) specifies a wait time (in milliseconds) for data frames. 802.11e uses interframe spaces to regulate which frames get access to available channels and to coordinate wait times for transmission of different types of data. The AIFs ensures that multiple access points do not try sending data at the same time but instead wait until a channel is free. Valid values for AIFs are 1 through 255.
- Transmission Opportunity**  
 The Transmission Opportunity (TXOP) is an interval of time when a WMM client station has the right to initiate transmissions onto the wireless medium. This value specifies (in milliseconds) the Transmission Opportunity (TXOP) for client stations; that is, the interval of time when a WMM client station has

the right to initiate transmissions on the wireless network.

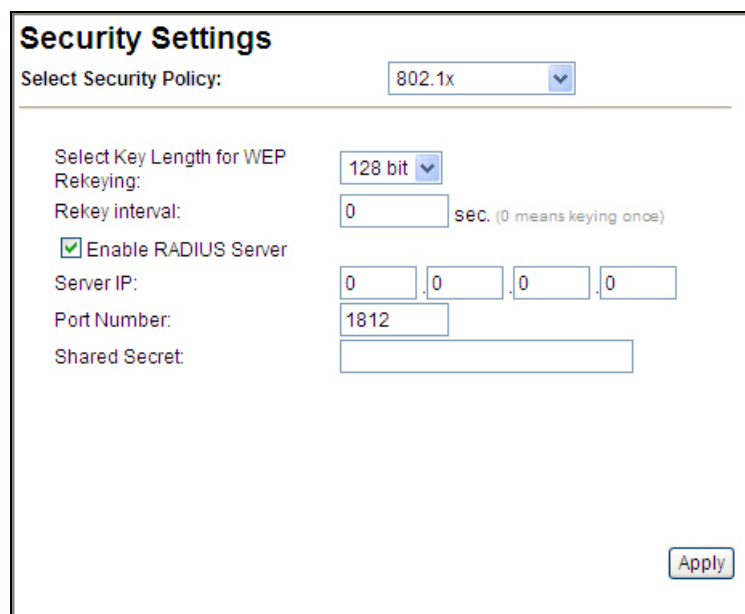


We recommend that you use the default settings on the WMM QoS page. Changing these values can lead to unexpected blockages of traffic on your wireless LAN, and the blockages might be difficult to diagnose.

## 4.2.15 RADIUS Settings

**Operation Mode -> Setup -> Security Settings -> RADIUS Setting**

RADIUS servers provide centralized authentication services to wireless clients. Two RADIUS servers can be defined: one acts as a primary, and the other acts as a secondary backup. If you choose to use 802.1x, WPA, or WPA2 as security policy, you might need to set the RADIUS server settings.



**Security Settings**

Select Security Policy: 802.1x

Select Key Length for WEP: 128 bit

Rekeying: 128 bit

Rekey interval: 0 sec. (0 means keying once)

Enable RADIUS Server

Server IP: 0 . 0 . 0 . 0

Port Number: 1812

Shared Secret: [Empty Field]

Apply

### To Enable RADIUS Server:

- **Server IP:** The IP address of the RADIUS server.
- **Port Number:** The port number that your RADIUS server uses for authentication. The default setting is 1812.

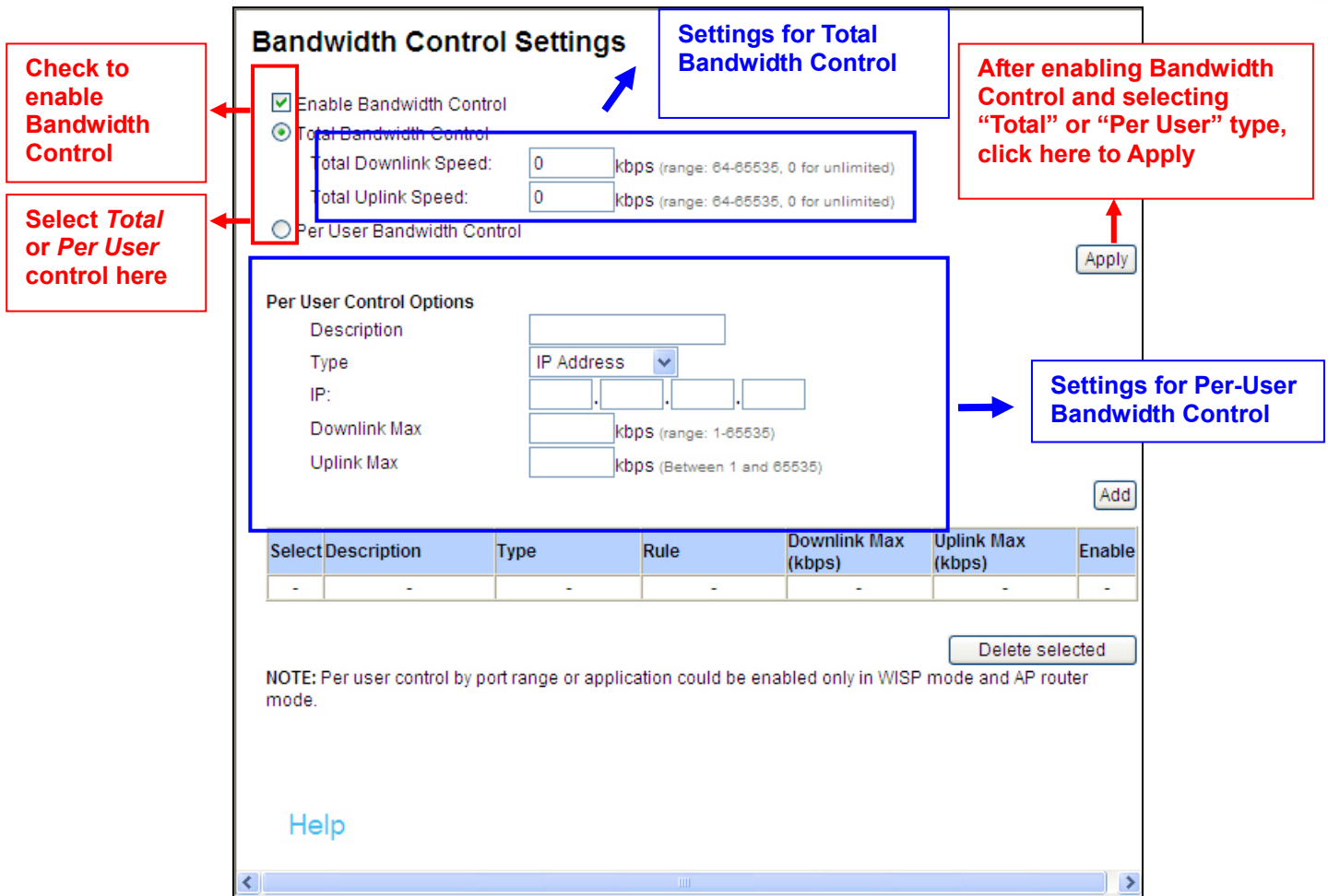
- **RADIUS Type:** RADIUS
- **Shared Secret:** This is used by your RADIUS server in the Shared Secret field in RADIUS protocol messages. The shared secret configured in the A.DUO must match the shared secret configured in the RADIUS server. The shared secret can contain up to 64 alphanumeric characters.
- **RADIUS Server Reattempt Period:** The number of times the A.DUO should attempt to contact the primary server before giving up

#### 4.2.16 Bandwidth Control

##### *Operation Mode -> Setup -> Bandwidth Control*

Bandwidth Control can limit the maximum speed of entire wireless interface or individual device. It is also known as Traffic Shaping. The A.DUO provides both Total Bandwidth and Per-User Bandwidth Control for both uplink and downlink speed. It controls the speed of both wireless and wired interface.

To configure, please click on the “Bandwidth Control” button under wireless settings. The following screen will appear:



**Bandwidth Control Settings**

Enable Bandwidth Control

Total Bandwidth Control

Total Downlink Speed:  kbps (range: 64-65535, 0 for unlimited)

Total Uplink Speed:  kbps (range: 64-65535, 0 for unlimited)

Per User Bandwidth Control

**Per User Control Options**

Description:

Type:  (dropdown)

IP:  .  .  .

Downlink Max:  kbps (range: 1-65535)

Uplink Max:  kbps (Between 1 and 65535)

| Select | Description | Type | Rule | Downlink Max (kbps) | Uplink Max (kbps) | Enable |
|--------|-------------|------|------|---------------------|-------------------|--------|
| -      | -           | -    | -    | -                   | -                 | -      |

NOTE: Per user control by port range or application could be enabled only in WISP mode and AP router mode.

Help

**Enable Bandwidth:** Check to enable Bandwidth Control. Uncheck to disable it. The default value is disabled.

You must select between Total Bandwidth and Per-User Bandwidth. They can not be enabled at the same time.

- Total Bandwidth:** Total Bandwidth control limit the bandwidth between Wireless and Ethernet interface. Therefore, it is most suitable for *Client Infrastructure Mode, Bridge Mode, and WISP Router Mode*. For WISP operator who use A.DUO as the client side device; setting the Total Bandwidth control on the A.DUO will ease the loading on the AP for bandwidth management. To begin, please enable the Bandwidth Management first. Then enter the downlink and uplink speed; click on Apply to finish.

- **Total Downlink Speed:** Enter speed you wish to limit the download traffic in Kbps units.
- **Total Uplink Speed:** Enter the speed you wish to limit the upload traffic in Kbps units.

**Per User Bandwidth Control:** Per user Bandwidth Control can limit speed of individual PC and network device. The A.DUO allows multiple Per-User bandwidth rules and can limit the bandwidth by IP address, MAC address, or IP segment. Please first enable the Bandwidth Control, then select “*Per User Bandwidth Control*” to begin. It is recommended to use this type of bandwidth control for Access Point and AP Router mode.

#### ■ **Per User Control Options**

- **Description:** Enter a description for the bandwidth policy. For example, “VIP” subscriber
- **Type:** A.DUO offers 3 types of Per-User Control

**IP Address:** To limit the bandwidth of one single IP address.

**IP Segment:** To limit the bandwidth the entire IP segment.

For example; if you enter the address of 192.168.1.20 with subnet mask of 255.255.255.248, the A.DUO will limit bandwidth of IP addresses from 192.168.1.17 to 192.168.1.22. Please use an online IP calculate if you are not familiar with IP segment calculation. Below is an example link: <http://www.subnet-calculator.com/>

Because the Ethernet interface is also controlled by the Bandwidth Manager, it is recommended that devices on the Ethernet side to use a wider IP subnet mask that will cover the IP range of the controlled IP segment. Therefore, the devices on Ethernet interface will not be limited by bandwidth control and still can communicate with the IP segment. For example, if your IP segment is set to 192.168.1.20 / 255.255.255.248, then the devices on the Ethernet side should be 192.168.1.X / 255.255.255.0.

- **MAC address:** To limit the bandwidth of one single MAC address
- **Port Range:** This is available only in WISP router and AP Router mode. It can limit the bandwidth by application ports.

- **Application:** This option is available only in WISP router and AP Router mode. It can limit the bandwidth of HTTP, FTP, BitTorrent, and eDonkey traffic.
- **Downlink Max:** Enter the speed you wish to limit the download traffic in kbps
- **Uplink Max:** Enter the speed you wish to limit the upload traffic in kbps

### Example 1: Total Bandwidth Control

In this example, the A.DUO is in Client Infrastructure mode connecting to a remote AP. We want to limit the Bandwidth of the link to 2048Kbps download and 512kbps Upload.



#### Step 1

From *Operation Mode* menu, select “Setup” -> “Bandwidth Control”

#### Step 2 ~ 5

Enable the Bandwidth Control and select the “Total Bandwidth Control”. Then enter the “2048” for *Total Downlink Speed* and “512”kbps for *Total Uplink Speed*. Click “Apply” to finish

### Bandwidth Control Settings

Enable Bandwidth Control 2

3  Total Bandwidth Control

Total Downlink Speed:  Kbps (range: 64-85535, 0 for unlimited)

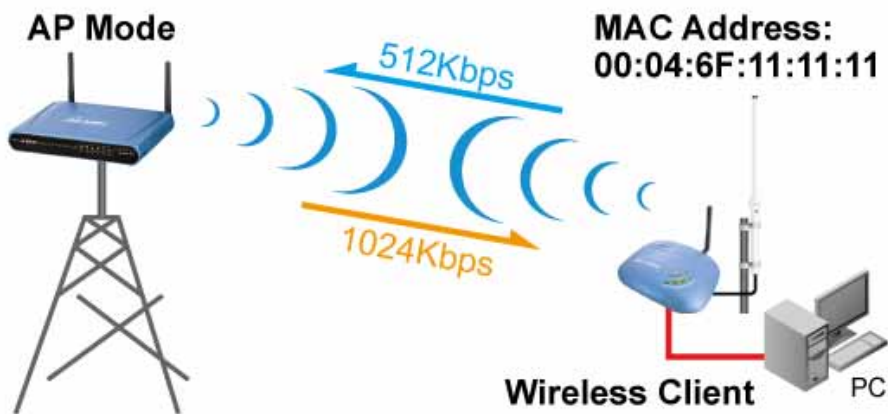
Total Uplink Speed:  Kbps (range: 64-85535, 0 for unlimited)

Per User Bandwidth Control 4

5

### Example 2: Per User Bandwidth Control

In this example, the A.DUO is Access Point mode. There is a wireless client connecting to A.DUO with MAC address of 00:04:6F:11:11:11. We want to limit the bandwidth of the wireless client to 1024 downstream and 512K upstream using A.DUO's Per-User Bandwidth Control.



#### Step 1

Enable Bandwidth Control and select "Per User Bandwidth Control"

#### Step 2

Enter Description for this policy (Wireless Client)



**Step 3**

Select “MAC Address”, and then enter the MAC address of the wireless client.

**Step 4**

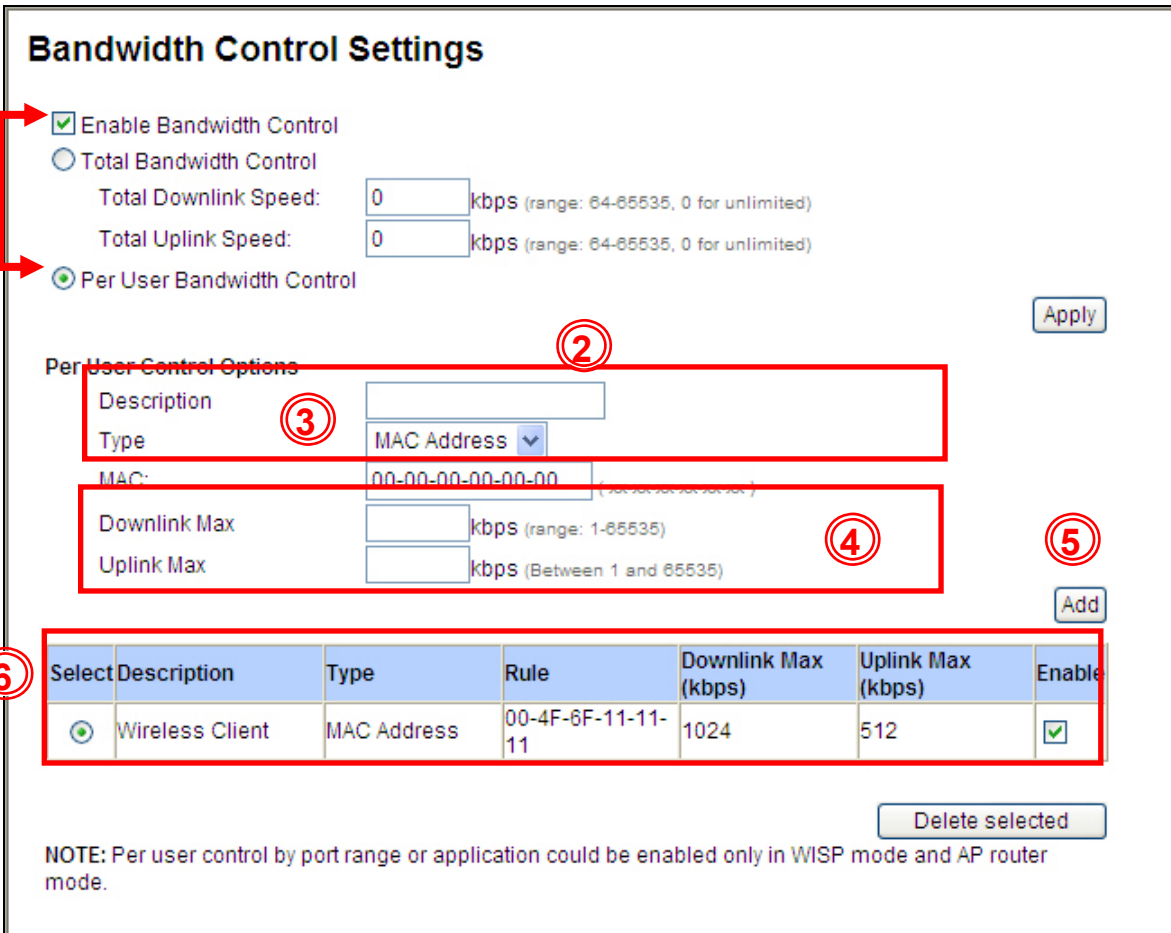
Enter the downlink speed as “1024” and uplink speed as “512”.

**Step 5**

Click on “Add” button to add the bandwidth policy

**Step 6**

This new policy should appear on the button. You can enable/disable it.



**Bandwidth Control Settings**

Enable Bandwidth Control  
 Total Bandwidth Control  
 Total Downlink Speed:  kbps (range: 64-65535, 0 for unlimited)  
 Total Uplink Speed:  kbps (range: 64-65535, 0 for unlimited)  
 Per User Bandwidth Control

**Per User Control Options**

Description:   
 Type:    
 MAC:  ( : : : : : : )  
 Downlink Max:  kbps (range: 1-65535)  
 Uplink Max:  kbps (Between 1 and 65535)

| Select                           | Description     | Type        | Rule              | Downlink Max (kbps) | Uplink Max (kbps) | Enable                              |
|----------------------------------|-----------------|-------------|-------------------|---------------------|-------------------|-------------------------------------|
| <input checked="" type="radio"/> | Wireless Client | MAC Address | 00-4F-6F-11-11-11 | 1024                | 512               | <input checked="" type="checkbox"/> |

NOTE: Per user control by port range or application could be enabled only in WISP mode and AP router mode.

### 4.3 AP Specific Settings

The Access Point mode is the most basic mode of multi-function Access Point. In this mode, the AP will act as a central hub for different Wireless LAN clients. Some hotspot Access Points requires 802.1x authenticator function to authenticate a user before providing internet service.



#### WLAN Standard for Radio 2

Enable Radio 2

Network ID (SSID):

Disable SSID Broadcasting

Radio Mode:

SuperG Option:  Bursting  Compression  Fast Frames

Channel:

Channel Width:

Security Settings:

Advanced Settings:

Access Control:

Multiple SSID:

QoS Settings:

Enable Radio eXtended Range

Enable privacy separator(Client Isolation)

NOTE: To access the wireless network, user must have correct SSID and encryption key, if enabled.

**Enable Radio:** Use this check box to turn on or turn off the radio.

- **Network ID (SSID):** This is to change your SSID.
- **Disable SSID Broadcasting:** Enable the check box if you want to hide your SSID in the network. This prevent an un-welcomed client survey your radio.
- **Radio Mode:** Connection modes on A.DUO and its wireless client. Note that the client must support the same mode as A.DUO to connect.
- **Channel:** 11a supports channel 36 to 64 and channel 100 to 140. 11g depends on the country, USA/Canada supports channel 1 to 11, Europe supports channel 1 to 13, Japan supports channel 1 to 14, France supports channel 10 to 13, and Span supports channel 10 to 11.
- **Enable Radio eXtended Range:** Check this box to extend the wireless coverage range, this is provided by Atheros's eXtended Range (XR) technology.
- **Enable Client Isolation (Privacy Separator):** This is to prohibit data transmission between each wireless client stations.
- **Enable 802.11d:** This is to prevent network loop applying to the spanning tree standard. This option can be found under the "Advanced Wireless Settings"

## 4.4 Bridge Mode Specific Settings

The A.DUO supports Bridge connection through either “WDS” or “Bridge Infrastructure” settings. It is selectable under the Bridge mode settings as shown below:

**WLAN Standard for Radio 1**

---

Enable Radio 1

Radio Mode:

SuperA Option:  Bursting  Compression  Fast Frames

Channel:   Every 5MHz

Channel Width:

**Bridge Type:**  (highlighted with a red box)

WDS Settings:   
 (highlighted with a dotted box)

Distance:  meters

Advanced Settings:

RSSI LED Thresholds:

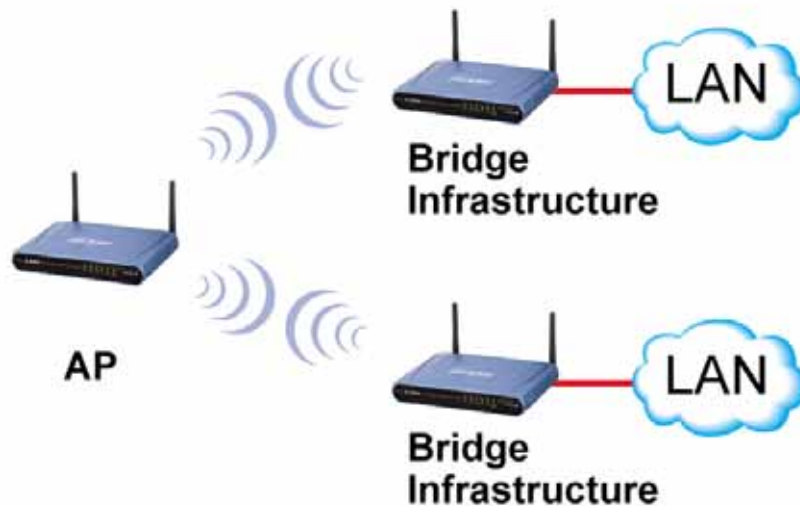
**WLAN1 Current WDS Nodes**

| Name | MAC Address | Security |
|------|-------------|----------|
| -    | -           | -        |

- ❑ **WDS Bridge (Pure MAC):** WDS Bridge mode can make Point-to-Point and Multi-Point connections. It also delivers faster performance than infrastructure networks. In a WDS network, each node can have up to 8 connections. Currently, the WDS Bridge mode can only use WEP encryptions policy.



- ❑ **Bridge Infrastructure:** Bridge Infrastructure mode connects to AP mode to form a star topology. Bridge Infrastructure mode can not make a Point-to-Point connection. However, it works with WPA-PSK and WPA2-PSK encryption. This mode is also unknown as Client Mode with MAC Address Transparency.



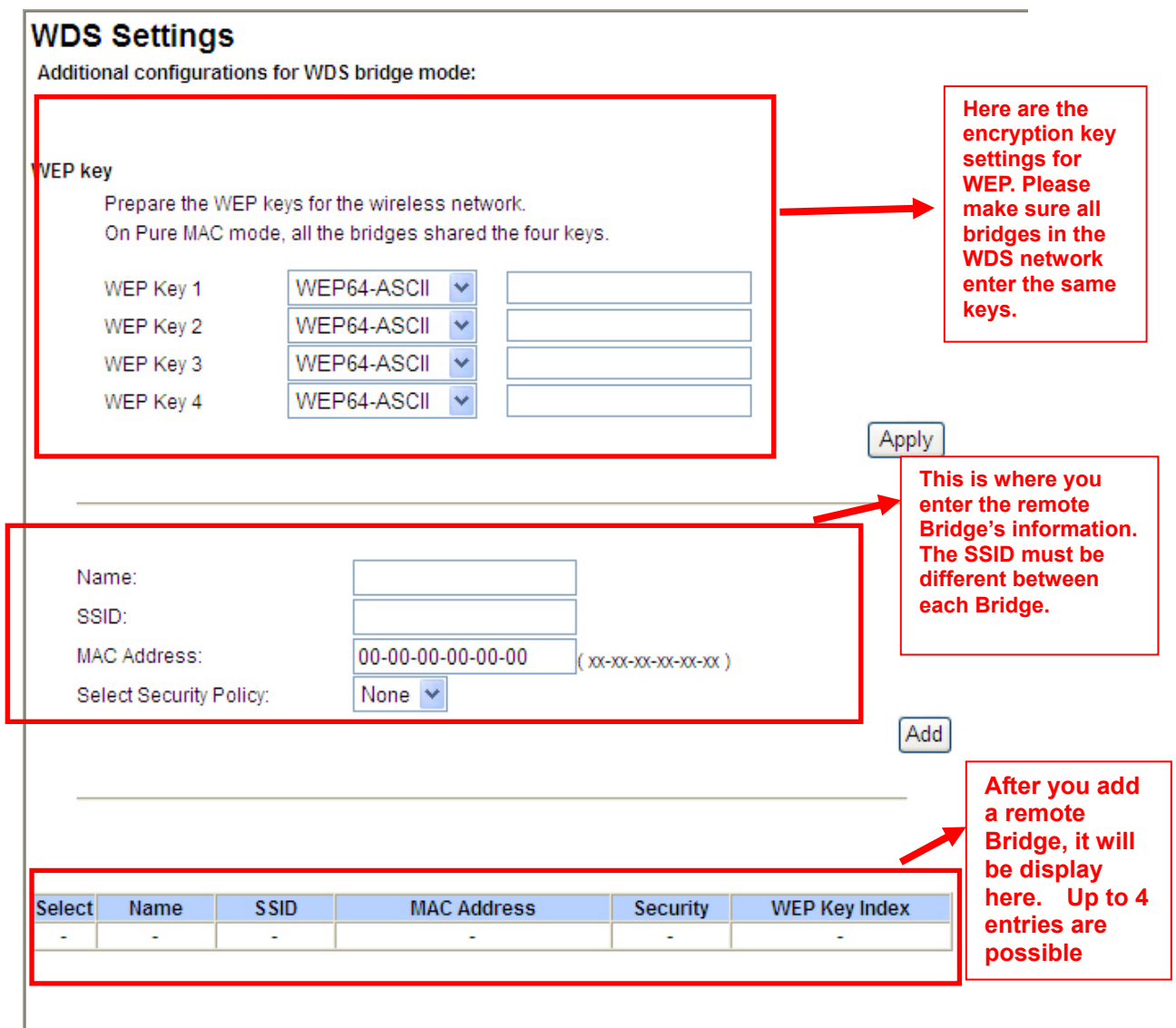
### When to use which bridge mode:

- ❑ **WDS Bridge Mode:**
  - When you making point-to-point connection. For example, when you build wireless bridge network between office and warehouse.
  - When you require fast performance
  - When you require multiple star topologies.
- ❑ **Bridge Infrastructure**
  - When you are connection both Bridge network and wireless client to the remote Access Point
  - When you require more advance security like WPA and WPA2

### 4.4.1 WDS Bridge Settings

In this section, we will talk about how to configure the WDS Settings. WDS Bridges are using BSSID (AP's Wireless MAC address) to authenticate each other. Therefore, it is necessary to know the remote Bridge's wireless MAC addresses. You can always do a "Site Survey" to find out the MAC Addresses.

When you click on WDS settings, the following screen will appear:



**WDS Settings**  
Additional configurations for WDS bridge mode:

**WEP key**  
Prepare the WEP keys for the wireless network.  
On Pure MAC mode, all the bridges shared the four keys.

|           |             |                      |
|-----------|-------------|----------------------|
| WEP Key 1 | WEP64-ASCII | <input type="text"/> |
| WEP Key 2 | WEP64-ASCII | <input type="text"/> |
| WEP Key 3 | WEP64-ASCII | <input type="text"/> |
| WEP Key 4 | WEP64-ASCII | <input type="text"/> |

**Apply**

Name:   
 SSID:   
 MAC Address:  (xx-xx-xx-xx-xx-xx)  
 Select Security Policy:

**Add**

| Select | Name | SSID | MAC Address | Security | WEP Key Index |
|--------|------|------|-------------|----------|---------------|
| -      | -    | -    | -           | -        | -             |

**Annotations:**

- Here are the encryption key settings for WEP. Please make sure all bridges in the WDS network enter the same keys.
- This is where you enter the remote Bridge's information. The SSID must be different between each Bridge.
- After you add a remote Bridge, it will be display here. Up to 4 entries are possible

**WEP Key:** You can set up to 4 keys; each key can have different Key Length and Key type. When you add an entry to the WDS setting and select WEP encryption, the system will ask you which key to use. All devices on the network must have the same sets of keys, but each

link can have use different key. We recommend using WEP-152 whenever possible for better security.

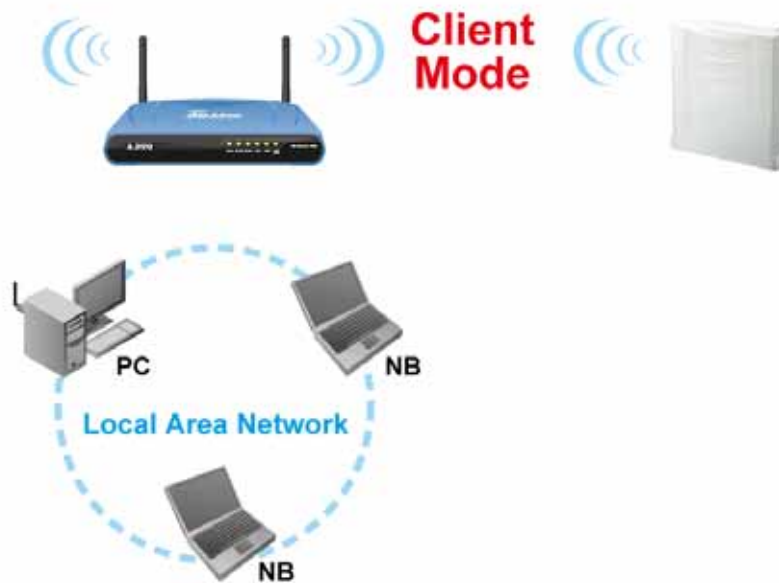
### Adding a new WDS link

The WDS links are created by entering the remote Bridge's information. This process must be repeated on both side of the bridge.

- **Name:** This is the name for the WDS Link. You can enter any name for your own reference (i.e. WarehouseLink).
- **SSID:** SSID is the network ID for the wireless link. If you have more than one WDS link or if you want to make WDS connection with Mikrotik devices, this field is required. Each WDS Link must have a different SSID name. If you only have one WDS link, you can leave this field empty.
- **MAC Address:** Please enter the remote bridge's wireless MAC address in this field. This wireless SSID can be found on the device label. You can also use Site Survey function to assist you.
- **Select Security Settings:** You can choose to use WEP encryption for better security. It is necessary to enter the same set of keys in the same WDS network. When you select WEP, the A.DUO will ask you to select from one of the 4 keys. Please be sure to select the same key on both side of the link.
- Press **Add** to finish

## 4.5 Client Mode Specific Settings

Client mode is also known as Ethernet Client. In this mode, the AP will act as a WLAN card to connect with the remote AP. Users can connect PC or local LAN to the Ethernet port of local LAN to the Ethernet port of the client mode AP. This mode is mostly used as a CPE device for WISP subscriber.



1. To connect to an access point, use the “**Site Survey**” button to find the Access Point.

**WLAN Standard for Radio 2**

---

Enable Radio 2

Network ID (SSID):  Site Survey

Radio Mode:

SuperG Option:  Bursting  Compression  Fast Frames

Channel:

Local Area Network:

Security Settings:

Advanced Settings:

RSSI LED Thresholds:

NOTE: To access the wireless network, user must have correct SSID and encryption key, if enabled.



- The Site Survey pop up window then shows up and lists available access point with relative information.

**Site Survey**

Site survey list :

| Select                           | ESSID    | MAC Address       | Radio | Conn Mode | Channel | Turb o | Super | XR | WM E | Signal Strength(dbm) | Security | Network |
|----------------------------------|----------|-------------------|-------|-----------|---------|--------|-------|----|------|----------------------|----------|---------|
| <input checked="" type="radio"/> | wireless | 00:c0:02:ff:c7:e4 | 2     | G         | 13      | -      | -     | -  | *    | -88                  | WPA2 PSK | AP      |
| <input type="radio"/>            | WT2K     | 00:4f:67:00:61:ba | 2     | G         | 3       | -      | -     | -  | -    | -83                  | WPA PSK  | AP      |

NOTE: The sitesurvey will show both AP and Bridge connections. Device without ESSID is more likely to be a Bridge device.

REFRESH    SIGNAL SURVEY    ASSOCIATE

Click here to show the signal strength of the selected access point.

Select the access point you want to connect and then click the "ASSOCIATE" button.

- The Signal Survey pop up windows shows as following:

Radio: Radio 2

BSSID: 00 - C0 - 02 - FF - C7 - E4

Channel: 13

Signal Strength: -87 dbm

4. After the access point is selected, its SSID shows automatically in the Network ID (SSID) field.

WLAN Standard for Radio 2

---

Enable Radio 2

Network ID (SSID)

Radio Mode:

SuperG Option:  Bursting  Compression  Fast Frames

Channel:

Channel Width:

Security Settings:

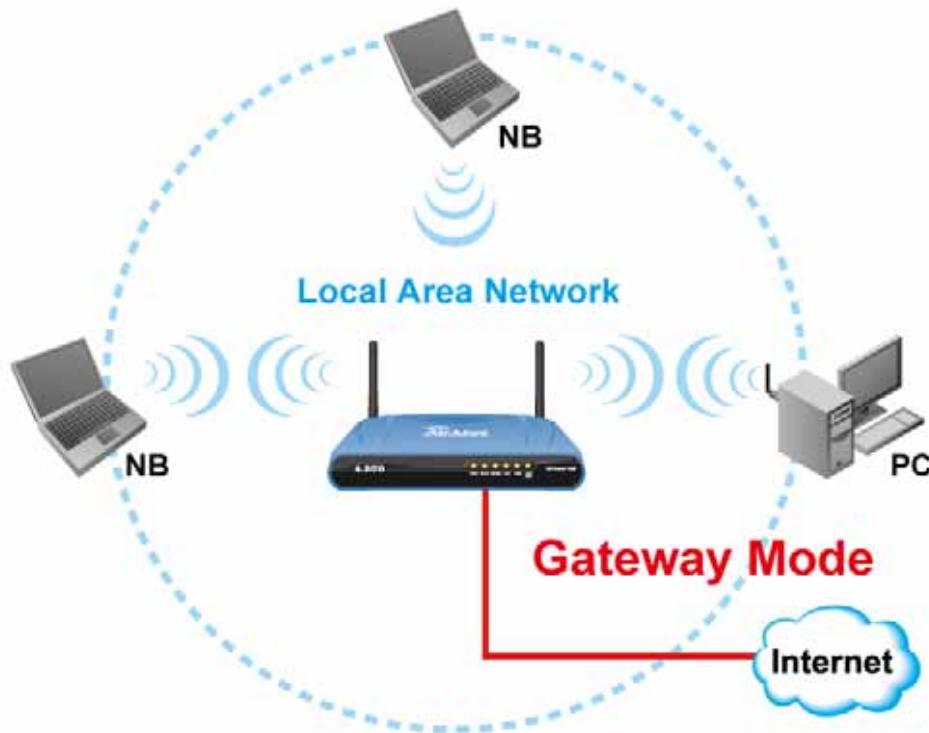
Advanced Settings:

RSSI LED Thresholds:

**NOTE:** To access the wireless network, user must have correct SSID and encryption key, if enabled.

## 4.6 Gateway Mode Specific Settings

In Gateway mode, router functions are added between one Ethernet port and other network interfaces. Therefore, the ISP subscriber can share the ISP connection without need for extra router.



| WAN Setting              |                                      |
|--------------------------|--------------------------------------|
| WAN Port Settings:       | <input type="button" value="Setup"/> |
| PPPoE Server Settings:   | <input type="button" value="Setup"/> |
| DHCP Server Settings:    | <input type="button" value="Setup"/> |
| Multiple DMZ:            | <input type="button" value="Setup"/> |
| Virtual Server Settings: | <input type="button" value="Setup"/> |
| Special Applications:    | <input type="button" value="Setup"/> |
| IP Filtering Settings:   | <input type="button" value="Setup"/> |
| IP Routing Settings:     | <input type="button" value="Setup"/> |
| Dynamic DNS Settings:    | <input type="button" value="Setup"/> |
| Remote Management:       | <input type="button" value="Setup"/> |

### 4.6.1 WAN Port Settings

#### Operation Mode -> Setup -> WAN Port Settings

The A.DUO support different authentication and IP assignment standards for the WAN port. It includes fixed IP, DHCP, PPPoE and PPTP protocols. Please consult with your ISP about what authentication type is used for the WAN port connection.

#### WAN Port Settings:

If your ISP has assigned you a static IP address, select this button and enter the information below:

IP Address Assigned by Your ISP:  .  .  .

IP Subnet Mask:  .  .  .

ISP Gateway IP Address:  .  .  .

Primary DNS Server:  .  .  .

Secondary DNS Server:  .  .  .

If your ISP already provides you with PPPoE authentication information,select this button and enter the information below:

User Name:

Password:

Service name:

Connection Type:  ▼

MTU:  Bytes (128-1500)

MRU:  Bytes (1-1500)

Session Type:  ▼

- Clone MAC Address:** Some service provider (Cable Modem provider) lock to certain MAC address. In this situation, the WAN port of A.DUO needs to clone the MAC address. Please check the “Clone MAC address” box and enter the address that need to be cloned.

- If your ISP already provides you with a Host Name, select this button and enter the information below: (DHCP)

Host Name:

- If your ISP already provides you with PPTP authentication information, select this button and enter the information below:

PPTP Local IP Address:  .  .  .

PPTP IP Netmask:  .  .  .

PPTP Remote IP Address:  .  .  .

User Name:

Password:

Idle Time:  Minutes (0 means always on)

**Cloned MAC Address :**

If your ISP requires you to use a specific WAN Ethernet MAC address, check this box and enter the MAC address here.

MAC Address:  in xx-xx-xx-xx-xx-xx format)

**NOTE:** Changes to this page will not take effect until you click Apply on the save config page.

### 4.6.2 PPPoE Server Settings

The PPPoE server setting is only available when the A.DUO is in Dual Band Router mode. The maximum number of concurrent accounts is 14.

**PPPoE Server Settings:**

---

Enable
  Disable

**Authentication:**
 Local Account
  Radius

**One User Per Account:**
 Enable
  Disable

**Local IP Address:**
 .  .  .

**Remote Start IP:**
 .  .  .

**Remote End IP:**
 .  .  .

**Authentication Type:**

**MPPE Encryption:**

**Compression:**
 BSD
  Deflate

---

**Local Account Management:**

**User Name:**

**Password:**

**Assigned IP:**  .  .  .

| Select | User Name | Password | Assigned IP | Enable |
|--------|-----------|----------|-------------|--------|
| -      | -         | -        | -           | -      |

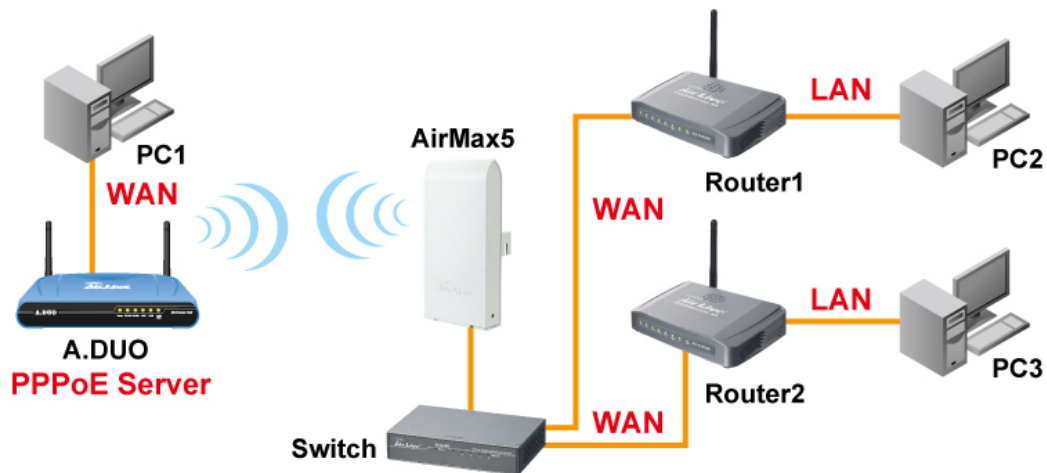
Operation Mode -> Setup -> PPPoE Server Settings

- **Enable/Disable:** Used to enable or disable PPPoE server.
- **Authentication:** Choose to use “**Local Account**” or “**Radius**” as authentication mechanism. If choosing “**Local Account**”, you have to configure “**Local Account Management**”. If choosing “**Radius**”, you have to configure Radius server.
- **Local IP Address:** Assign IP address to the interface of PPPoE server.
- **Remote Start/Remote End IP:** Define IP address pool that is used to assign address to the connected PPPoE clients.

- **MPPE Encryption:** Used to enable or disable special MPPE encryption function.
- **Compression:** Used to enable compression function.
- **Local Account Management**
  - **User Name:** Specify authentication username.
  - **Password:** Specify authentication password.
  - **Assign IP:** Specify the IP address of PPPoE client. If 0.0.0.0 is specified, then PPPoE client will get an IP address between remote start IP and remote end IP.

### 4.6.3 PPPoE Server Setup Example

In this exercise, we will setup 2 PPPoE Server Accounts in A.DUO according to the Topology Diagram below.



- **PC1**
  - **IP address:** 192.168.20.2
  - **Subnet mask:** 255.255.255.0
  - **Default gateway:** 192.168.20.1
  - **DNS server:** 192.168.20.1
- **A.DUO**
  - **SSID:** pppoe
  - **WAN IP address:** 192.168.20.1
  - **LAN IP address:** 192.168.1.20

- **PPPoE Server Local IP Address:** 192.168.1.20
- **PPPoE Server Remote Starting IP:** 192.168.1.100
- **PPPoE Server Remote End IP:** 192.168.1.200
- **PPPoE Server One User Per Account:** Disable
- **PPPoE Account1**
  - ◆ **Username:** user1
  - ◆ **Password:** user1
  - ◆ **Assign IP:** 0.0.0.0
- **PPPoE Account2**
  - ◆ **Username:** user2
  - ◆ **Password:** user2
  - ◆ **Assign IP:** 192.168.1.30
- AirMax5**
  - **Bridge Infrastructure Mode**
  - **IP:** 192.168.1.50
- Router1**
  - **Gateway Mode**
  - **WAN:** PPPoE, **Account:** user1, **Password:** user1
  - **LAN IP:** 192.168.100.252
- Router2**
  - **Gateway Mode**
  - **WAN:** PPPoE, **Account:** user2, **Password:** user2
  - **LAN IP:** 192.168.100.252
- PC1 IP:** DHCP
- PC2 IP:** DHCP

#### **Important Characteristic about PPPoE server**

- If you do not specify the IP address (0.0.0.0), each account can get up to 3 IP addresses from the Remote IP Pool.
- If you specify IP address, only one IP is provided per account
- The routers will get a IP with subnet mask of 255.255.255.255. As a result, PPPoE clients (PC1 and PC2) can not see any device between the router and the PPPoE server's WAN port, even if they are in the same subnet. This provides security and privacy for the network environment.

#### **Exercise:**

1. Connect all devices according to the IP address and topology on the Topology Diagram
2. Go to A.DUO and set the operation mode to "Dual Band Router"
3. From the wireless settings, please choose the "PPPoE" Server"



QoS Settings:

Enable Radio eXtended Range

Enable privacy separator(Client Isolation)

**WAN Setting**

WAN Port Settings:

**PPPoE Server Settings:**

DHCP Server Settings:

Multiple DMZ:

Virtual Server Settings:

Special Applications:

IP Filtering Settings:

IP Routing Settings:

Dynamic DNS Settings:

Remote Management:

4. setup the PPPoE server according to the information:

**PPPoE Server Settings:**

Enable  Disable

Authentication:  Local Account  Radius

One User Per Account:  Enable  Disable

Local IP Address: 192 . 168 . 1 . 20

Remote Start IP: 192 . 168 . 1 . 100

Remote End IP: 192 . 168 . 1 . 200

Authentication Type: PAP

MPPE Encryption: 128-bit

Compression:  BSD  Deflate

---

**Local Account Management:**

User Name:

Password:

Assigned IP: 0 . 0 . 0 . 0

| Select                | User Name | Password | Assigned IP  | Enable                              |
|-----------------------|-----------|----------|--------------|-------------------------------------|
| <input type="radio"/> | user1     | user1    | 0.0.0.0      | <input checked="" type="checkbox"/> |
| <input type="radio"/> | user2     | user2    | 192.168.1.30 | <input checked="" type="checkbox"/> |

5. Configure the WAN PPPoE client account on Router 1 and Router2.

6. Check the IP addresses obtain from PPPoE server for Router1 and Router2 are correct.
7. Do a PING command from PC2 to PC1 and from PC3 to PC1. The PING should response.

### 4.6.3 DHCP Server Settings

**Operation Mode -> Setup -> DHCP Server Settings**

DHCP Server Settings is to assign private IP address to the devices in your local area network (LAN). Note that A.DUO keeps the IP address of 192.168.1.1 and act as the default gateway of the LAN.

You can assign IP address to MAC address; the DHCP server will keep the IP for the MAC address.

### DHCP Server Settings

Enable DHCP Server

Assigns IP addresses to wired and wireless clients from the following range:

Lease Time:  seconds

From:  .  .  .

To:  .  .  .

Assigns the following IP address to the client with the following MAC address:

MAC Address:   
(in xx-xx-xx-xx-xx-xx format)

IP Address:  .  .  .

| Select | IP Address | MAC Address |
|--------|------------|-------------|
| -      | -          | -           |

**Change IP range and IP Lease Time here**

**Manually assign MAC address to IP here**

### 4.6.4 Multiple DMZ

**Operation Mode -> Setup -> Multiple DMZ**

Multiple DMZ opens all TCP/UDP ports to particular IP address on the LAN side. It allows setting up servers behind the A.DUO.

#### Multiple DMZ

Select a DMZ type:  Default DMZ  Multiple DMZ

Local DMZ IP address:  .  .  .

| Select | Name | Public WAN IP | Local DMZ IP |
|--------|------|---------------|--------------|
| -      | -    | -             | -            |

**NOTE:** A DMZ server is a common term used to describe the default virtual server. If the DMZ server is selected, Internet traffic not destined for a valid virtual server is redirected to this privately-addressed LAN client. This can be used together with a separate firewall device to perform additional security functions.

[Help](#)

Select a DMZ type and then enter the local DMZ IP address

Note: A DMZ server is a common term used to describe the default virtual server. If the DMZ server is selected, Internet traffic not destined for a valid virtual server is redirected to this privately addressed LAN client. This can be used together with a separate firewall device to perform additional security functions.

### 4.6.5 Virtual Server Settings

**Operation Mode -> Setup -> Virtual Setting**

This allows you to specify one or more applications running on server computers on the LAN that may be accessed by any Internet user. Internet data destined for the specified public port will be directed to the specified private port number on the LAN client with the specified private IP address.

### Virtual Server Settings

This allows you to specify one or more applications running on server computers on the LAN that may be accessed by any Internet user. Internet data destined for the specified public port will be directed to the specified private port number on the LAN client with the specified private IP address.

Service Name:

Public Port No.:  Single   
 Range  ~

Local IP Address:  .  .  .

Local Port No. Starts From:

| Select | Service | Public Port No(s) | Local IP Address | Local Port No(s) |
|--------|---------|-------------------|------------------|------------------|
| -      | -       | -                 | -                | -                |

[Help](#)

### 4.6.6 Special Applications

**Operation Mode -> Setup -> Special Applications**

Some Internet application such as Instant Messaging or games use groups of ports, and are not easy to work behind a firewall. To work well with these special applications we will open ports to let traffic pass through.

Note: You can use up to 3 sets of opened ports for a specific application. The opened ports can be separated by a comma and no spaces are allowed (e.g. 2300-2305, 4300-4305, 5300-5305).

### Special Applications

Some Internet applications such as Instant Messaging or Games in particular use groups of ports, and are not easy to work behind a firewall. To work well with these special applications we will open ports to let traffic pass through. Before you set up special application, please see your applications' help for such information.

Select an Application:

Name:

Trigger Ports:

Trigger Protocol:

Opened Ports:  ~

Opened Protocol:

| Select | Name | Trigger Port | Trigger Protocol | Opened Ports | Opened Protocol |
|--------|------|--------------|------------------|--------------|-----------------|
| -      | -    | -            | -                | -            | -               |

**NOTE:** You can use up to 3 sets of opened ports for a specific application. The opened ports can be separated by a comma and no spaces are allowed (e.g. 2300-2305,4300-4305,5300-5305).

## 4.6.7 IP Filtering Settings

**Operation Mode -> Setup -> IP Filtering Settings**

IP filtering is simply a mechanism that decides which types of IP datagram will be processed normally and which will be discarded.

### IP Filtering Settings

This allows you to define rules for allowing / denying access from / to the Internet.

- Disable IP filtering**  
No IP filtering is performed.
- Grant IP access**  
Data traffic satisfying rules below are allowed/forwarded.
- Deny IP access**  
Data traffic satisfying rules below are denied/filtered.

Define an IP filtering rule:

Name:

IP Protocol:

Apply to :  Outbound to the Internet       Inbound from the Internet

Source IP Address:  Any

Single IP       .  .  .

Network

IP:  .  .  .

Netmask:  .  .  .

This allows you to define rules for allowing / denying access from / to the Internet. Please do set both inbound/outbound in order to get complete connection. Only inbound or outbound will not allow to get response from the destination IP.

- **Disable IP filtering:** No IP filtering is performed.
- **Grant IP access:** Data traffic satisfying rules below are allowed / forwarded.
- **Deny IP access:** Data traffic satisfying rules below are denied / filtered.

You can also define IP filtering rule, such as:

Name; IP Protocol; Apply to either Outbound to the Internet or Inbound from the Internet; Source IP Address and Dest. (Destination) IP Address.

To grant or deny IP address, select **ADD** or **Delete Selected**.

## 4.6.8 IP Routing Settings

**Operation Mode -> Setup -> IP Routing Settings**

The IP Routing Settings allows you to configure routing feature in the gateway

### IP Routing Settings

Dynamic Routing

Select the routing protocol scheme used for the router's LAN / WAN port.

**Disable**

**RIP**

Apply

Static Routing

This allows you to manually configure static network routes. Static routes will override routes learned by standard routing protocol discover methods.

Destination IP Address:

Subnet Mask:

Gateway IP Address:

Interface:

Metric Count:

Add

To add a static route, enter the information above and click ADD.

IP Routing Table

| Select | Destination IP Address | Subnet Mask   | Gateway IP Address< | Interface | Flag | Metric |
|--------|------------------------|---------------|---------------------|-----------|------|--------|
| -      | 192.168.2.0            | 255.255.255.0 | -                   | eth1      | U    | 0      |
| -      | 192.168.1.0            | 255.255.255.0 | -                   | lan       | U    | 0      |
| -      | 0.0.0.0                | 0.0.0.0       | 192.168.2.254       | eth1      | UG   | 0      |

To delete a static route from the table, select the route and click Delete selected.

NOTE: Changes to the routing table will take effect immediately.

[Help](#)

- **Dynamic Routing:** Select the routing protocol scheme used for the router's LAN / WAN port.
- **Static Routing:** This allows you to manually configure static network routes. Static routes will override routes learned by standard routing protocol discover methods.
- **IP Routing Table:** To delete a static route from the table, select the route and click DELETE SELECTED.

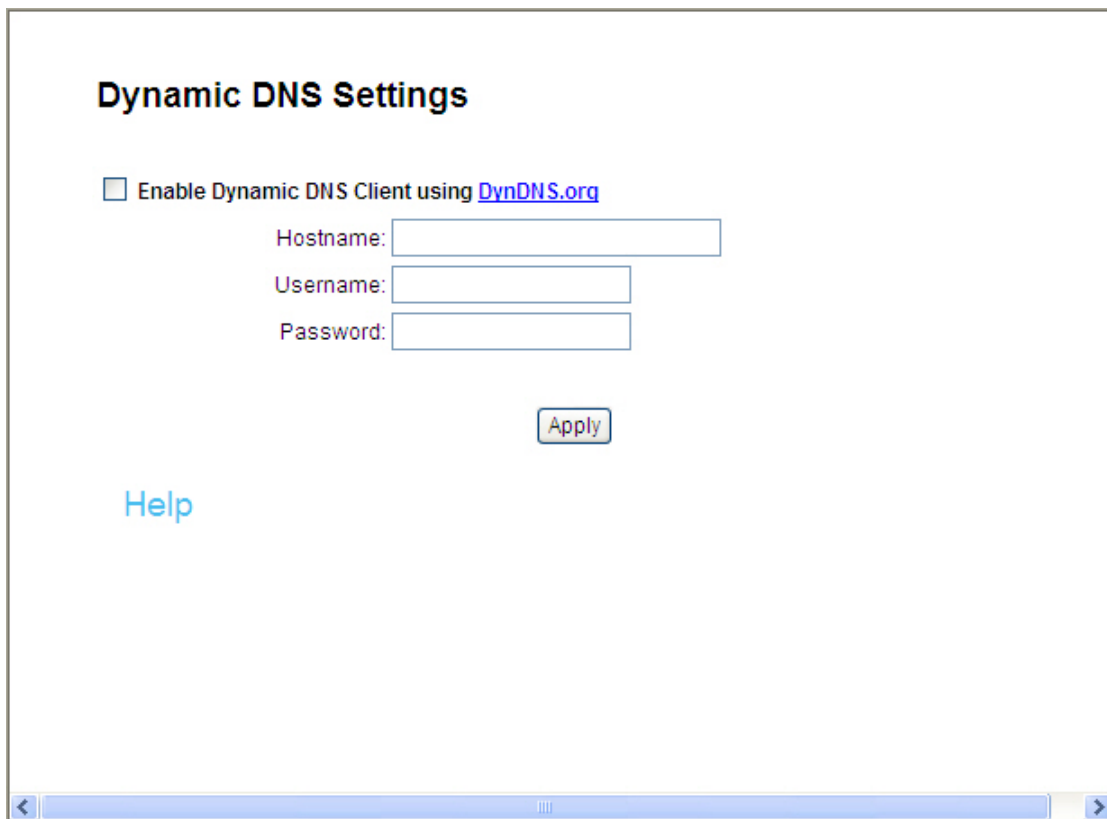
**Note:** Changes to the routing table will take effect immediately.



## 4.6.9 Dynamic DNS Settings

### *Operation Mode -> Setup -> Dynamic DNS Settings*

Dynamic DNS (DDNS) allows you to create a hostname that points to your dynamic IP or static IP address or URL. A.DUO provide Dynamic DNS client using DynDNS, please visit <http://www.dyndns.org> for detail.



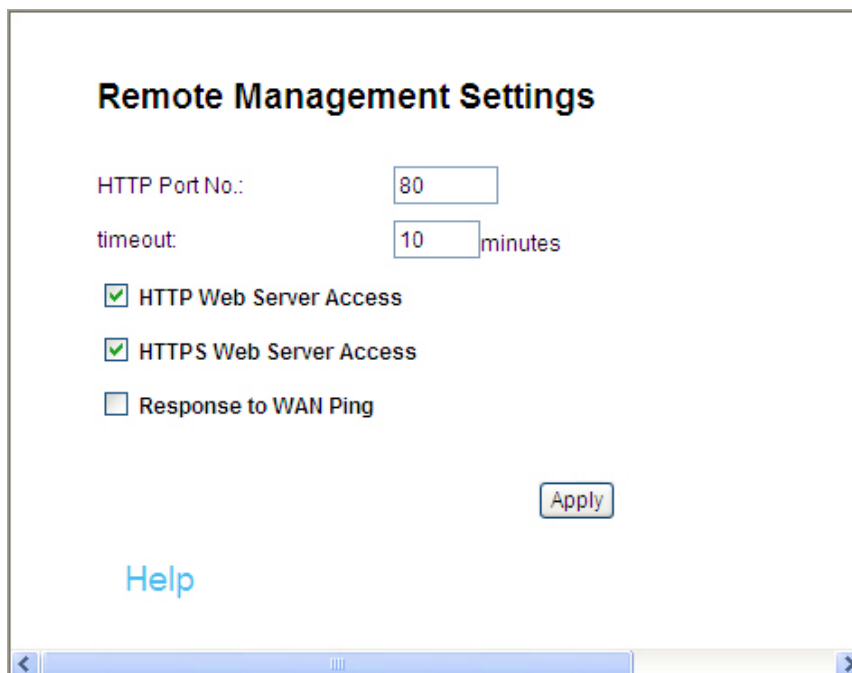
The screenshot shows a web browser window with the title "Dynamic DNS Settings". The page content includes a checkbox labeled "Enable Dynamic DNS Client using [DynDNS.org](http://www.dyndns.org)". Below this are three input fields: "Hostname:", "Username:", and "Password:". An "Apply" button is positioned below the input fields. A "Help" link is located to the left of the "Apply" button. At the bottom of the browser window, a horizontal scrollbar is visible.

## 4.6.10 Remote Management Settings

### *Operation Mode -> Setup -> Remote Management*

Remote Management allows administrator to manage the A.DUO from WAN side. You can also change the management port and other settings here.

- **HTTP Port No:** The default port for HTTP is Port 80, you can change the value here
- **Timeout:** The default management timeout is 10 minutes. After timeout, the A.DUO will ask you to login again. You can change the timeout value here.
- **HTTP Web Server Access:** You can enable or disable HTTP service from WAN side
- **HTTPS Web server Access:** You can enable or disable HTTPS Web Server Access from WAN side
- **Response to WAN ping:** You can disable or enable whether A.DUO will response to PING command.



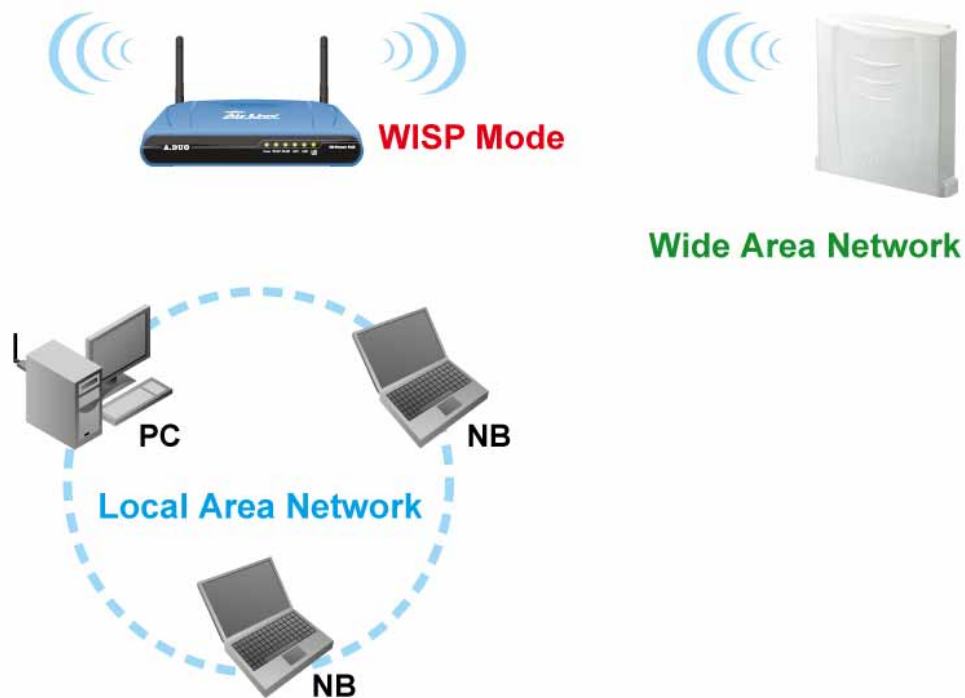
The screenshot shows a web interface titled "Remote Management Settings". It contains the following elements:

- HTTP Port No.:** A text input field containing the value "80".
- timeout:** A text input field containing the value "10", followed by the text "minutes".
- HTTP Web Server Access**
- HTTPS Web Server Access**
- Response to WAN Ping**
- 
- [Help](#)

At the bottom of the interface is a horizontal scrollbar.

## 4.7 WISP Specific Settings

In WISP mode, the AP will behave just the same as the Client mode for wireless function. However, router functions are added between the wireless WAN side and the Ethernet LAN side. Therefore, the WISP subscriber can share the WISP connection without need for extra router.



WISP mode acts both in AP and Router which included in these operation modes: AP + WISP and WISP + AP.

In WISP + AP mode, the Radio 1 is actually a wireless client of the WISP wireless node and also the gateway of the local area network.

Gateway mode acts both in AP and Router which included in these operation modes: AP + Gateway and Gateway + AP.

### WAN Setting

|                                                               |                                                             |
|---------------------------------------------------------------|-------------------------------------------------------------|
| WAN Port Settings: <input type="button" value="Setup"/>       | Special Applications: <input type="button" value="Setup"/>  |
| DHCP Server Settings: <input type="button" value="Setup"/>    | IP Filtering Settings: <input type="button" value="Setup"/> |
| Multiple DMZ: <input type="button" value="Setup"/>            | IP Routing Settings: <input type="button" value="Setup"/>   |
| Virtual Server Settings: <input type="button" value="Setup"/> | Dynamic DNS Settings: <input type="button" value="Setup"/>  |
|                                                               | Remote Management: <input type="button" value="Setup"/>     |

NOTE: To access the wireless network, user must have correct SSID and encryption key, if enabled.

## 4.7.1 WAN Port Settings

### *Operation Mode -> Setup -> WAN Port Settings*

The A.DUO support different authentication and IP assignment standards for the WAN port. It includes fixed IP, DHCP, PPPoE and PPTP protocols. Please consult with your ISP about what authentication type is used for the WAN port connection.

### WAN Port Settings:

- If your ISP has assigned you a static IP address, select this button and enter the information below:

IP Address Assigned by Your ISP:  .  .  .

IP Subnet Mask:  .  .  .

ISP Gateway IP Address:  .  .  .

Primary DNS Server:  .  .  .

Secondary DNS Server:  .  .  .

- If your ISP already provides you with PPPoE authentication information, select this button and enter the information below:

User Name:

Password:

Service name:

Connection Type:  ▼

MTU:  Bytes (128-1500)

MRU:  Bytes (1-1500)

Session Type:  ▼

- **Clone MAC Address:** Some service provider (Cable Modem provider) lock to certain MAC address. In this situation, the WAN port of A.DUO needs to clone the MAC address. Please check the “Clone MAC address” box and enter the address that need to be cloned.

- If your ISP already provides you with a Host Name, select this button and enter the information below: (DHCP)

Host Name:

- If your ISP already provides you with PPTP authentication information, select this button and enter the information below:

PPTP Local IP Address:  .  .  .

PPTP IP Netmask:  .  .  .

PPTP Remote IP Address:  .  .  .

User Name:

Password:

Idle Time:  Minutes (0 means always on)

**Cloned MAC Address :**

If your ISP requires you to use a specific WAN Ethernet MAC address, check this box and enter the MAC address here.

MAC Address:  (in xx-xx-xx-xx-xx-xx format)

NOTE: Changes to this page will not take effect until you click Apply on the save config page.

## 4.7.2 DHCP Server Settings

### Operation Mode -> Setup -> DHCP Server Settings

DHCP Server Settings is to assign private IP address to the devices in your local area network (LAN). Note that A.DUO keeps the IP address of 192.168.1.1 and act as the default gateway of the LAN.

You can assign IP address to MAC address; the DHCP server will keep the IP for the MAC address.

### DHCP Server Settings

Enable DHCP Server

Assigns IP addresses to wired and wireless clients from the following range:

Lease Time:  seconds

From:  .  .  .

To:  .  .  .

Assigns the following IP address to the client with the following MAC address:

MAC Address:   
(in xx-xx-xx-xx-xx-xx format)

IP Address:  .  .  .

| Select | IP Address | MAC Address |
|--------|------------|-------------|
| -      | -          | -           |

Change IP range and IP Lease Time here

Manually assign MAC address to IP here

### 4.7.3 Multiple DMZ

**Operation Mode -> Setup -> Multiple DMZ**

Multiple DMZ opens all TCP/UDP ports to particular IP address on the LAN side. It allows setting up servers behind the A.DUO.

#### Multiple DMZ

Select a DMZ type:  Default DMZ  Multiple DMZ

Local DMZ IP address:  .  .  .

| Select | Name | Public WAN IP | Local DMZ IP |
|--------|------|---------------|--------------|
| -      | -    | -             | -            |

**NOTE:** A DMZ server is a common term used to describe the default virtual server. If the DMZ server is selected, Internet traffic not destined for a valid virtual server is redirected to this privately-addressed LAN client. This can be used together with a separate firewall device to perform additional security functions.

[Help](#)

Select a DMZ type and then enter the local DMZ IP address

Note: A DMZ server is a common term used to describe the default virtual server. If the DMZ server is selected, Internet traffic not destined for a valid virtual server is redirected to this privately addressed LAN client. This can be used together with a separate firewall device to perform additional security functions.



### 4.7.4 Virtual Server Settings

**Operation Mode -> Setup -> Virtual Setting**

This allows you to specify one or more applications running on server computers on the LAN that may be accessed by any Internet user. Internet data destined for the specified public port will be directed to the specified private port number on the LAN client with the specified private IP address.

### Virtual Server Settings

This allows you to specify one or more applications running on server computers on the LAN that may be accessed by any Internet user. Internet data destined for the specified public port will be directed to the specified private port number on the LAN client with the specified private IP address.

Service Name:

Public Port No.:  Single   Range  ~

Local IP Address:  .  .  .

Local Port No. Starts From:

| Select | Service | Public Port No(s) | Local IP Address | Local Port No(s) |
|--------|---------|-------------------|------------------|------------------|
| -      | -       | -                 | -                | -                |

[Help](#)

## 4.7.5 Special Applications

### Operation Mode -> Setup -> Special Applications

Some Internet application such as Instant Messaging or games use groups of ports, and are not easy to work behind a firewall. To work well with these special applications we will open ports to let traffic pass through.

Note: You can use up to 3 sets of opened ports for a specific application. The opened ports can be separated by a comma and no spaces are allowed (e.g. 2300-2305, 4300-4305, 5300-5305).

### Special Applications

Some Internet applications such as Instant Messaging or Games in particular use groups of ports, and are not easy to work behind a firewall. To work well with these special applications we will open ports to let traffic pass through. Before you set up special application, please see your applications' help for such information.

Select an Application:

Name:

Trigger Ports:

Trigger Protocol:

Opened Ports:  ~

Opened Protocol:

| Select | Name | Trigger Port | Trigger Protocol | Opened Ports | Opened Protocol |
|--------|------|--------------|------------------|--------------|-----------------|
| -      | -    | -            | -                | -            | -               |

**NOTE:** You can use up to 3 sets of opened ports for a specific application. The opened ports can be separated by a comma and no spaces are allowed (e.g. 2300-2305,4300-4305,5300-5305).

## 4.7.6 IP Filtering Settings

**Operation Mode -> Setup -> IP Filtering Settings**

IP filtering is simply a mechanism that decides which types of IP datagram will be processed normally and which will be discarded.

### IP Filtering Settings

This allows you to define rules for allowing / denying access from / to the Internet.

- Disable IP filtering**  
No IP filtering is performed.
- Grant IP access**  
Data traffic satisfying rules below are allowed/forwarded.
- Deny IP access**  
Data traffic satisfying rules below are denied/filtered.

Define an IP filtering rule:

Name:

IP Protocol:

Apply to :  Outbound to the Internet       Inbound from the Internet

Source IP Address:  Any

Single IP       .  .  .

Network

IP:  .  .  .

Netmask:  .  .  .

This allows you to define rules for allowing / denying access from / to the Internet. Please do set both inbound/outbound in order to get complete connection. Only inbound or outbound will not allow to get response from the destination IP.

- **Disable IP filtering:** No IP filtering is performed.
- **Grant IP access:** Data traffic satisfying rules below are allowed / forwarded.
- **Deny IP access:** Data traffic satisfying rules below are denied / filtered.

You can also define IP filtering rule, such as:

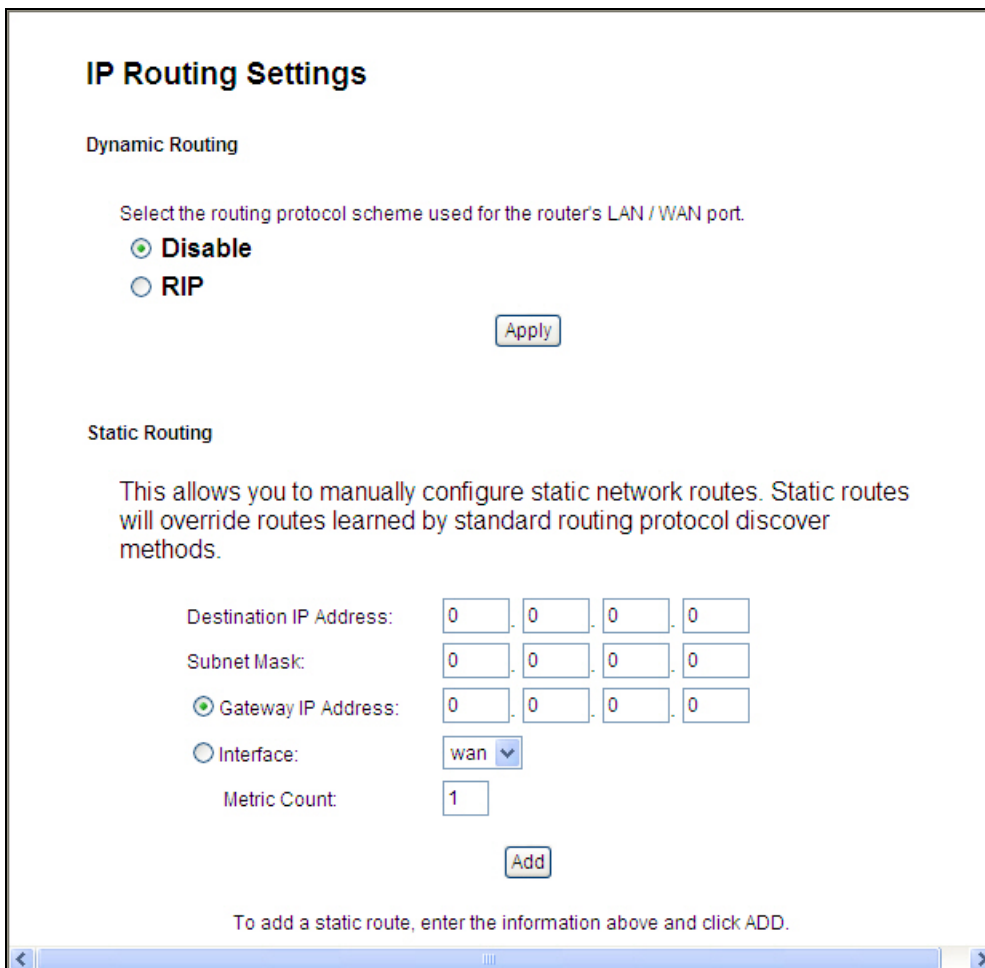
Name; IP Protocol; Apply to either Outbound to the Internet or Inbound from the Internet; Source IP Address and Dest. (Destination) IP Address.

To grant or deny IP address, select **ADD** or **Delete Selected**.

### 4.7.7 IP Routing Settings

**Operation Mode -> Setup -> IP Routing Settings**

The IP Routing Settings allows you to configure routing feature in the gateway



**IP Routing Settings**

Dynamic Routing

Select the routing protocol scheme used for the router's LAN / WAN port.

**Disable**

**RIP**

Apply

Static Routing

This allows you to manually configure static network routes. Static routes will override routes learned by standard routing protocol discover methods.

Destination IP Address:

Subnet Mask:

Gateway IP Address:

Interface: wan

Metric Count:

Add

To add a static route, enter the information above and click ADD.

IP Routing Table

| Select | Destination IP Address | Subnet Mask   | Gateway IP Address< | Interface | Flag | Metric |
|--------|------------------------|---------------|---------------------|-----------|------|--------|
| -      | 192.168.2.0            | 255.255.255.0 | -                   | eth1      | U    | 0      |
| -      | 192.168.1.0            | 255.255.255.0 | -                   | lan       | U    | 0      |
| -      | 0.0.0.0                | 0.0.0.0       | 192.168.2.254       | eth1      | UG   | 0      |

To delete a static route from the table, select the route and click Delete selected.

NOTE: Changes to the routing table will take effect immediately.

[Help](#)

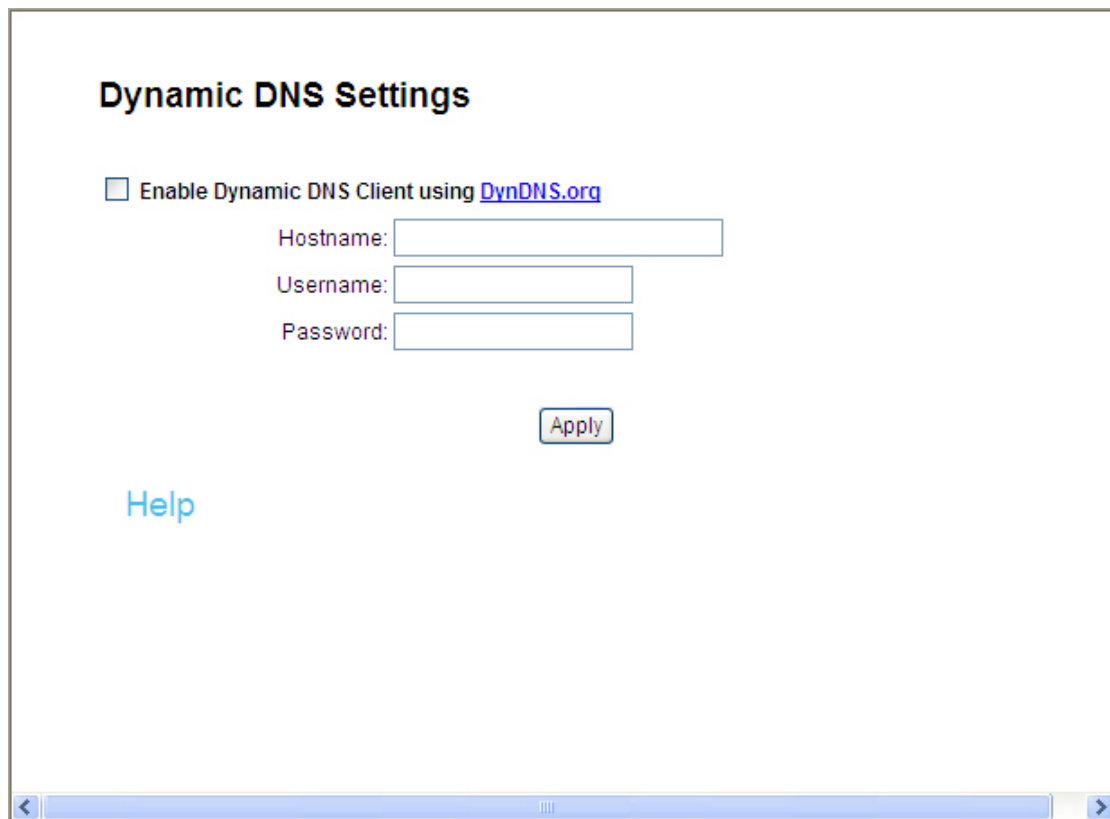
- **Dynamic Routing:** Select the routing protocol scheme used for the router's LAN / WAN port.
- **Static Routing:** This allows you to manually configure static network routes. Static routes will override routes learned by standard routing protocol discover methods.
- **IP Routing Table:** To delete a static route from the table, select the route and click DELETE SELECTED.

**Note:** Changes to the routing table will take effect immediately.

## 4.7.8 Dynamic DNS Settings

### *Operation Mode -> Setup -> Dynamic DNS Settings*

Dynamic DNS (DDNS) allows you to create a hostname that points to your dynamic IP or static IP address or URL. A.DUO provide Dynamic DNS client using DynDNS, please visit <http://www.dyndns.org> for detail.



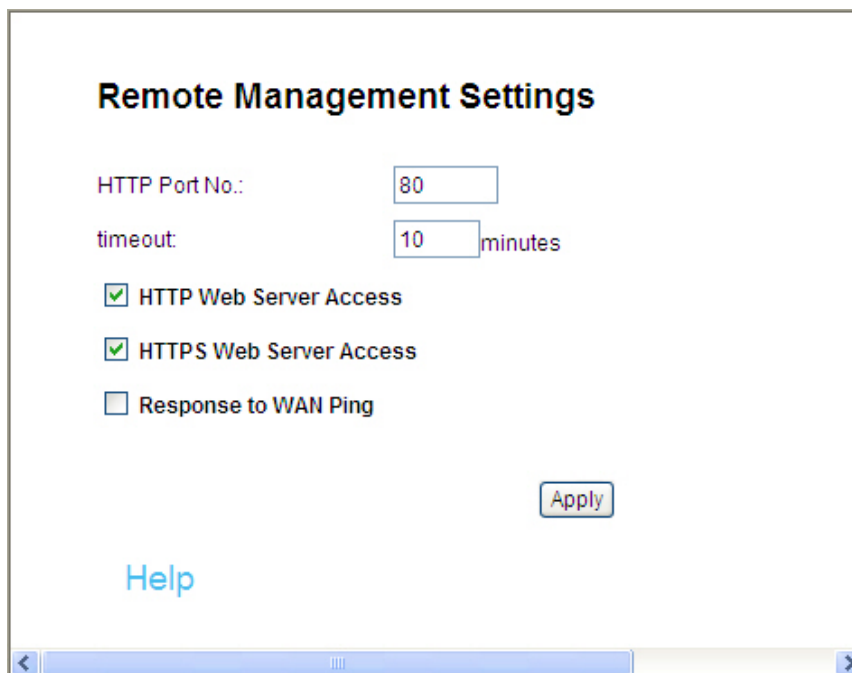
The screenshot shows a web browser window with the title "Dynamic DNS Settings". The page content includes a checkbox labeled "Enable Dynamic DNS Client using [DynDNS.org](http://www.dyndns.org)". Below this are three input fields: "Hostname:", "Username:", and "Password:". An "Apply" button is positioned below the input fields. A "Help" link is located to the left of the "Apply" button. At the bottom of the browser window, a horizontal scrollbar is visible.

## 4.7.9 Remote Management Settings

### *Operation Mode -> Setup -> Remote Management*

Remote Management allows administrator to manage the A.DUO from WAN side. You can also change the management port and other settings here.

- **HTTP Port No:** The default port for HTTP is Port 80, you can change the value here
- **Timeout:** The default management timeout is 10 minutes. After timeout, the A.DUO will ask you to login again. You can change the timeout value here.
- **HTTP Web Server Access:** You can enable or disable HTTP service from WAN side
- **HTTPS Web server Access:** You can enable or disable HTTPS Web Server Access from WAN side
- **Response to WAN ping:** You can disable or enable whether A.DUO will response to PING command.



The screenshot shows a web interface titled "Remote Management Settings". It contains the following fields and options:

- HTTP Port No.: 80
- timeout: 10 minutes
- HTTP Web Server Access
- HTTPS Web Server Access
- Response to WAN Ping

At the bottom right, there is an "Apply" button. At the bottom left, there is a "Help" link. A scrollbar is visible at the bottom of the page.

# 5

## System Configuration

In this chapter, we will explain about System Configurations in web management interface. Please be sure to read through Chapter 3's "Introduction to Web Management" and "Initial Configurations" first.

### 5.1 System Configuration

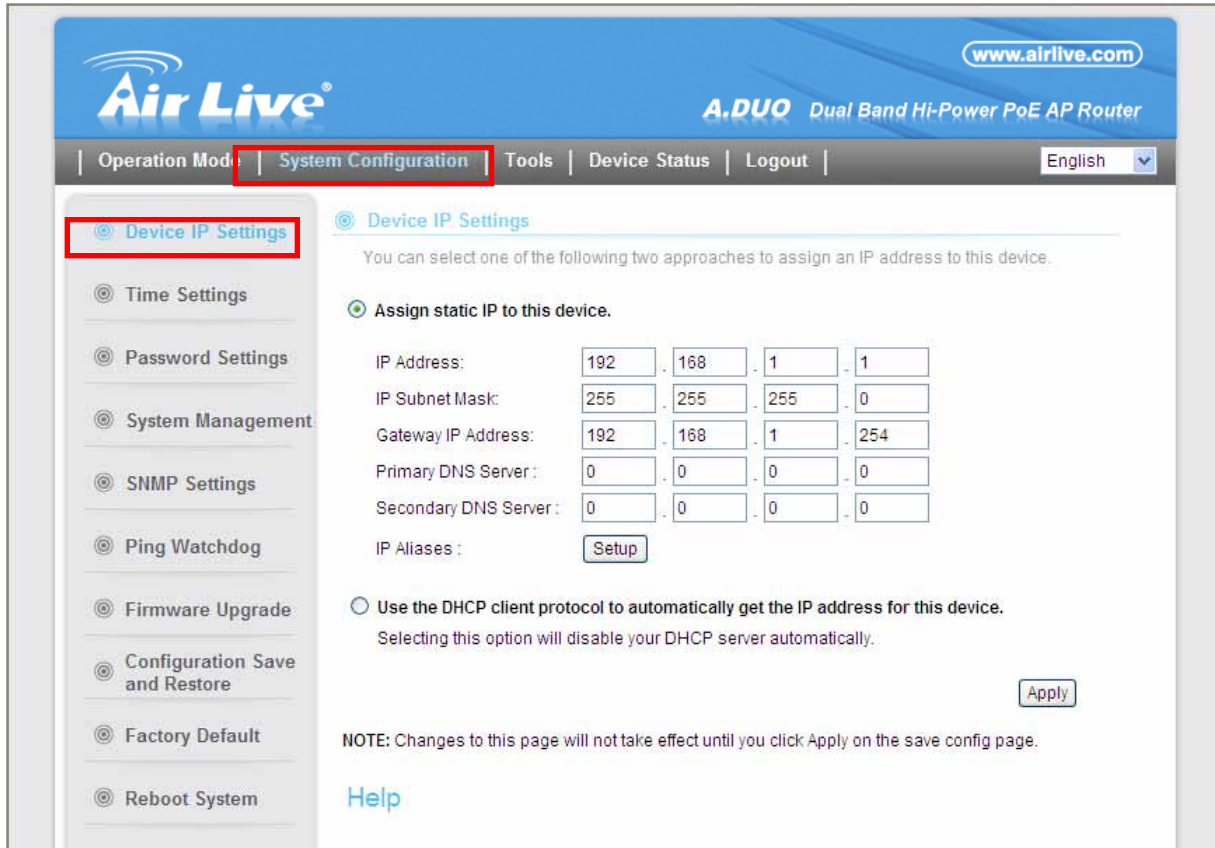
When you click on the "System Configuration" menu on the top menu bar, the following screen will appear. The system configuration includes all non-wireless settings. We will explain their functions here.

#### 5.1.1 Device IP Settings

##### *System Configurations>> Device IP Settings*

The Device IP Settings screen allows you to configure the IP address and subnet of the device. Although you can rely on a DHCP server to assign an IP address to the A.DUO automatically, it is recommended that you configure a static IP address manually in most applications.





### ■ Assign Static IP to the Device

If you choose to assign the IP address manually, enable the checkbox of “Assign static IP to this device” and then fill in the following fields

- IP Address and IP Subnet Mask: Default values are 192.168.1.1 and 255.255.255.0 respectively. It is important to note that there are similar addresses falling in the standard private IP address range and it is an essential security feature of the device. Because of this private IP address, the device can no longer be accessed (seen) from the Internet.
- Gateway IP Address: Enter the IP address of your default gateway.
- DNS Server: The Domain Name System (DNS) is a server on the Internet that translates logical names such as “www.yahoo.com” to IP addresses like 66.218.71.80. In order to do this, a query is made by the requesting device to a DNS server to provide the necessary information. If your system administrator requires you to manually enter the DNS Server addresses, you should enter them here.
- Click APPLY to go to the next screen.

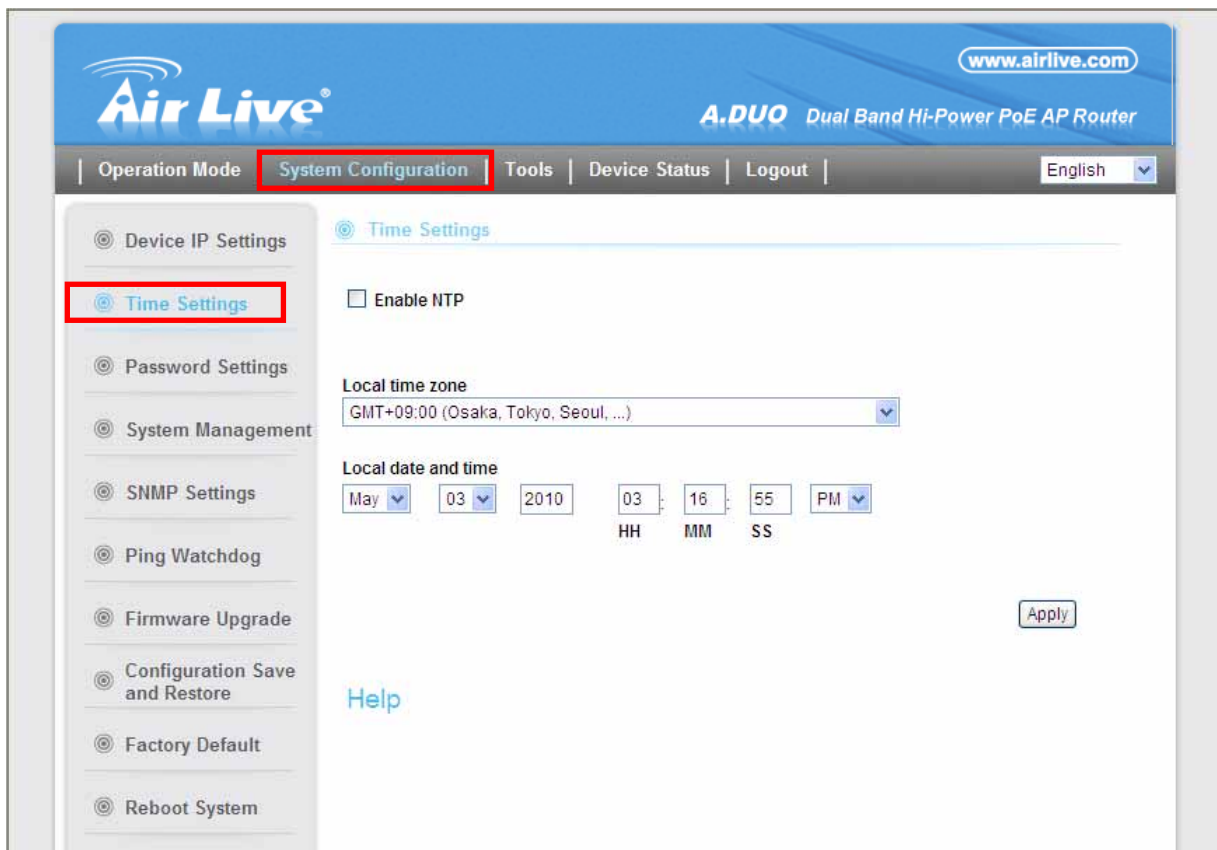
■ **Use DHCP Client Protocol to Get IP automatically**

If you choose to use a DHCP Server to acquire an IP address for the A.DUO automatically, enable the check box “Use the DHCP client protocol to automatically get the IP address for this device”. Then click “Next” to go to the next screen. As a reminder, you might lose the IP address of A.DUO when IP is assigned dynamically.

### 5.1.2 Time Settings

#### **System Configuration ->Time Settings**

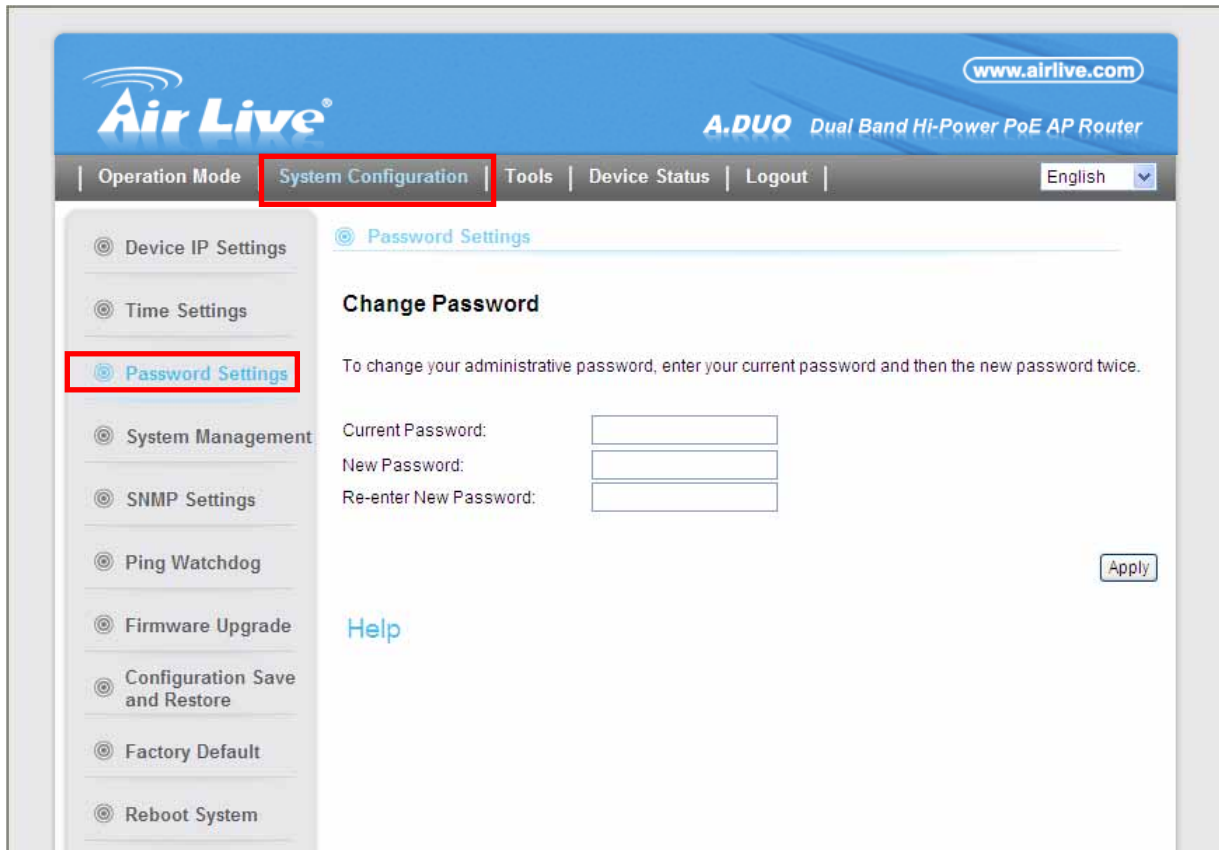
It is important that you set the date and time for your A.DUO so that the system log will record the correct date and time information. We recommend you choose “Enable NTP” so the time will be kept even after reboot. If your A.DUO is not connected to Internet, please enter the time manually. Please remember to select your local time zone and click “Apply” to finish.



### 5.1.3 Password Settings

#### *System Configuration -> Password Settings*

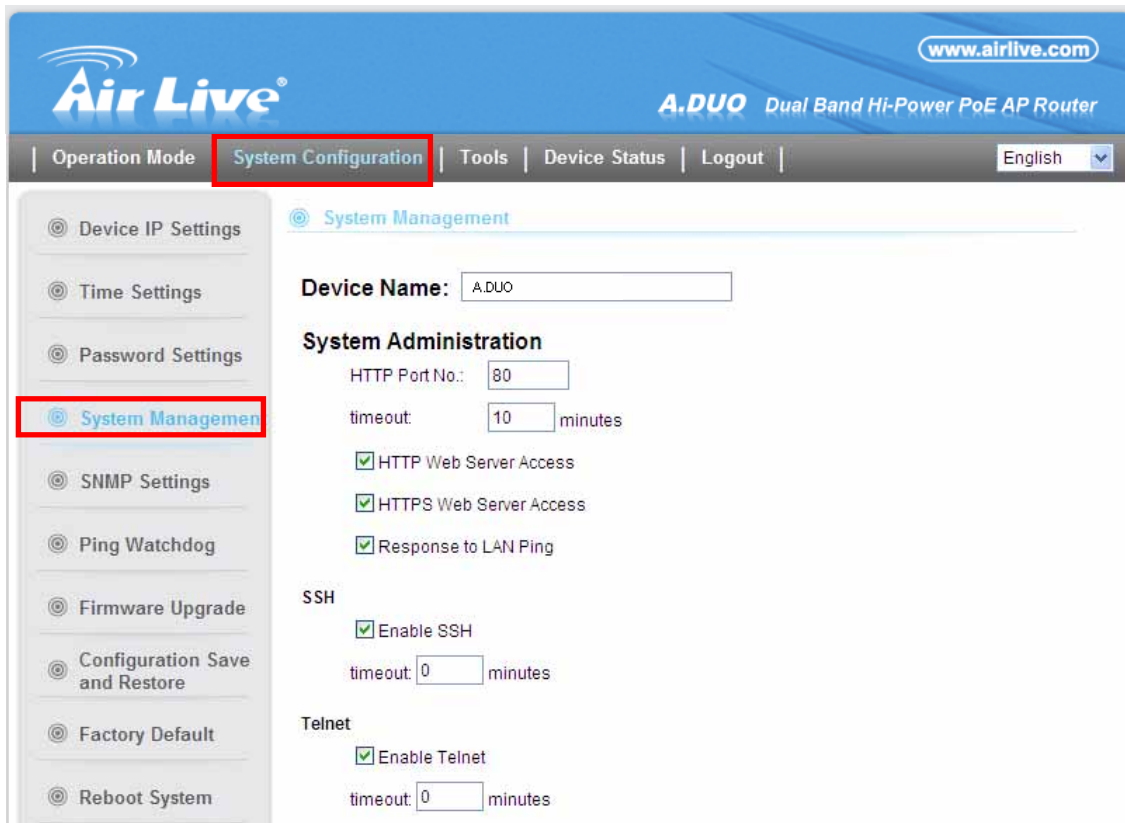
To change password, please go to “System Configuration” -> “Password Settings” menu.



### 5.1.4 System Management

#### *System Configuration -> System Management*

In this page, administrator can change the management parameters and disable/enable management interface.



The screenshot displays the web management interface for the Air Live A.DUO router. The top navigation bar includes 'Operation Mode', 'System Configuration' (highlighted), 'Tools', 'Device Status', and 'Logout'. A language dropdown is set to 'English'. The left sidebar contains various configuration options, with 'System Management' highlighted. The main content area is titled 'System Management' and includes a 'Device Name' field set to 'A.DUO'. Under 'System Administration', there are fields for 'HTTP Port No.' (80) and 'timeout' (10 minutes). Checkboxes for 'HTTP Web Server Access', 'HTTPS Web Server Access', and 'Response to LAN Ping' are all checked. The 'SSH' section has 'Enable SSH' checked and a 'timeout' of 0 minutes. The 'Telnet' section has 'Enable Telnet' checked and a 'timeout' of 0 minutes.

## ■ System Administration

- **HTTP Port No:** The default port for HTTP is Port 80, you can change the value here
- **Timeout:** The default management timeout is 10 minutes. After timeout, the A.DUO will ask you to login again. You can change the timeout value here.
- **Web Server Access:** You can enable or disable HTTP service from WAN side
- **Response to WAN ping:** You can disable or enable whether A.DUO will response to PING command.

**UPnP**

Enable UPnP

**Syslog**

Enable Syslog

Syslog server IP address:  .  .  .

[Apply](#)

**NOTE:** Syslog is a standard for logging system events (IETF RFC-3164). System event messages generated by the wireless access point will be sent to a Syslog daemon running on a server identified by this IP address.

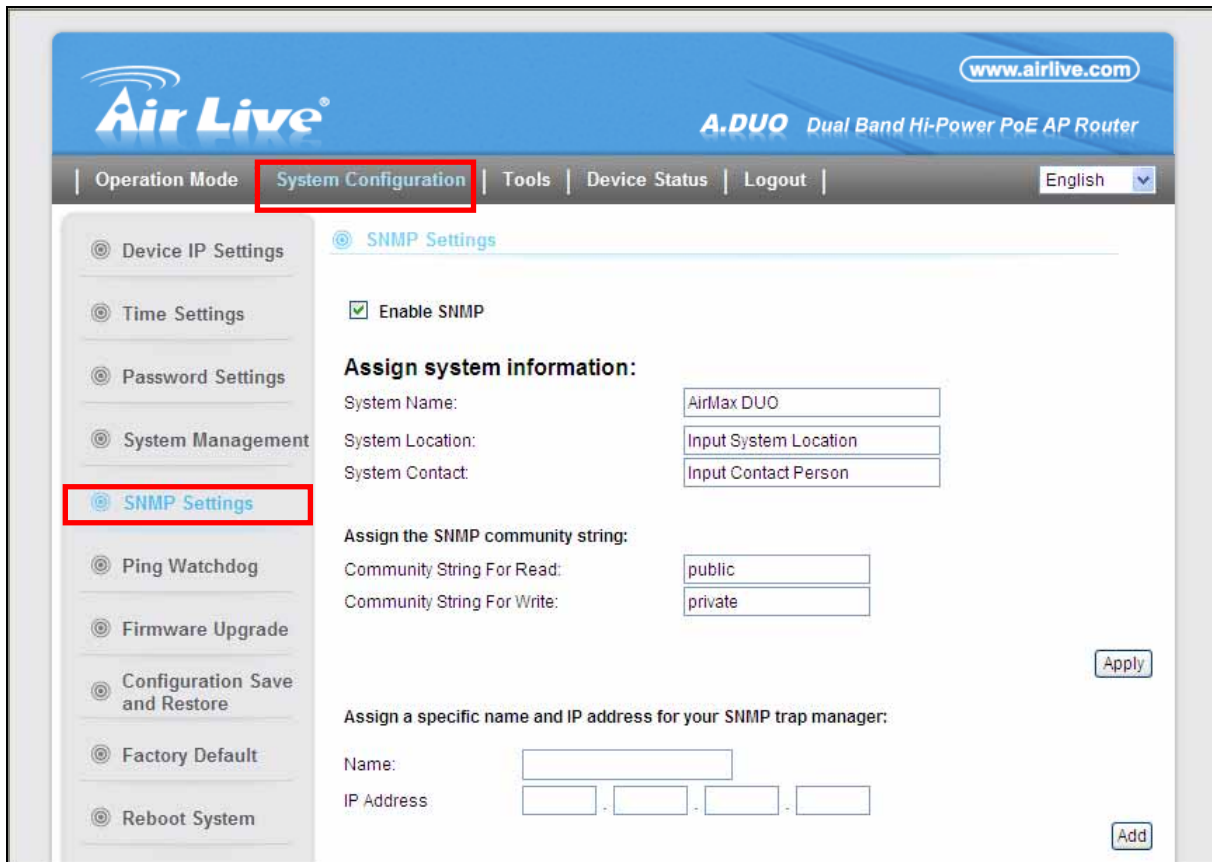
[Help](#)

- **UPnP:** Click here to enable UPnP. It is recommended not to open UPnP for security reason.
- **Syslog:** Syslog is an IETF (Internet Engineering Task Force - the Internet standards body)-conformant standard for logging system events (RFC-3164). When the A.DUO encounters an error or warning condition (ie., a log-in attempt with an invalid password), it will create a log in the system log table. To be able to remotely view such system log events, you need to check the *Enable Syslog* box and configure the IP address of a Syslog daemon. When doing so, the A.DUO will send logged events over network to the daemon for future reviewing.
- **Syslog server IP address:** System event messages generated by the wireless access point will be sent to a Syslog daemon running on a server identified by this IP address.

## 5.1.5 SNMP Settings

### **System Configuration -> SNMP Settings**

This screen allows you to configure SNMP parameters including the system name, the location and contact information.



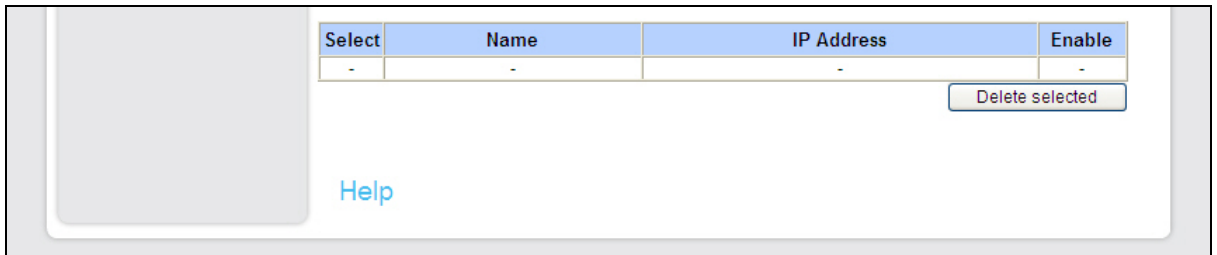
- **System Name:** A name that you assign to your A.DUO. It is an alphanumeric string of up to 30 characters.
- **System Location:** Enter a system location.
- **System Contact:** Contact information for the system administrator responsible for managing the A.DUO. It is an alphanumeric string of up to 60 characters.
- **Community String for Read:** If you intend the router to be managed from a remote SNMP management station, you need to configure a read-only “community string” for read-only operation. The community string is an alphanumeric string of up to 15 characters.
- **Community String for Write:** For read-write operation, you need to configure a write “community string”.
- **Assign a specific name and IP address for your SNMP trap manager:**

A trap manager is a remote SNMP management station where special SNMP trap

messages are generated (by the router) and sent to in the network.

You can define trap managers in the system.

You can add a trap manager by entering a *name*, an *IP address*, followed by pressing the *ADD* button.



You can delete a trap manager by selecting the corresponding entry and press the *DELETE SELECTED* button.

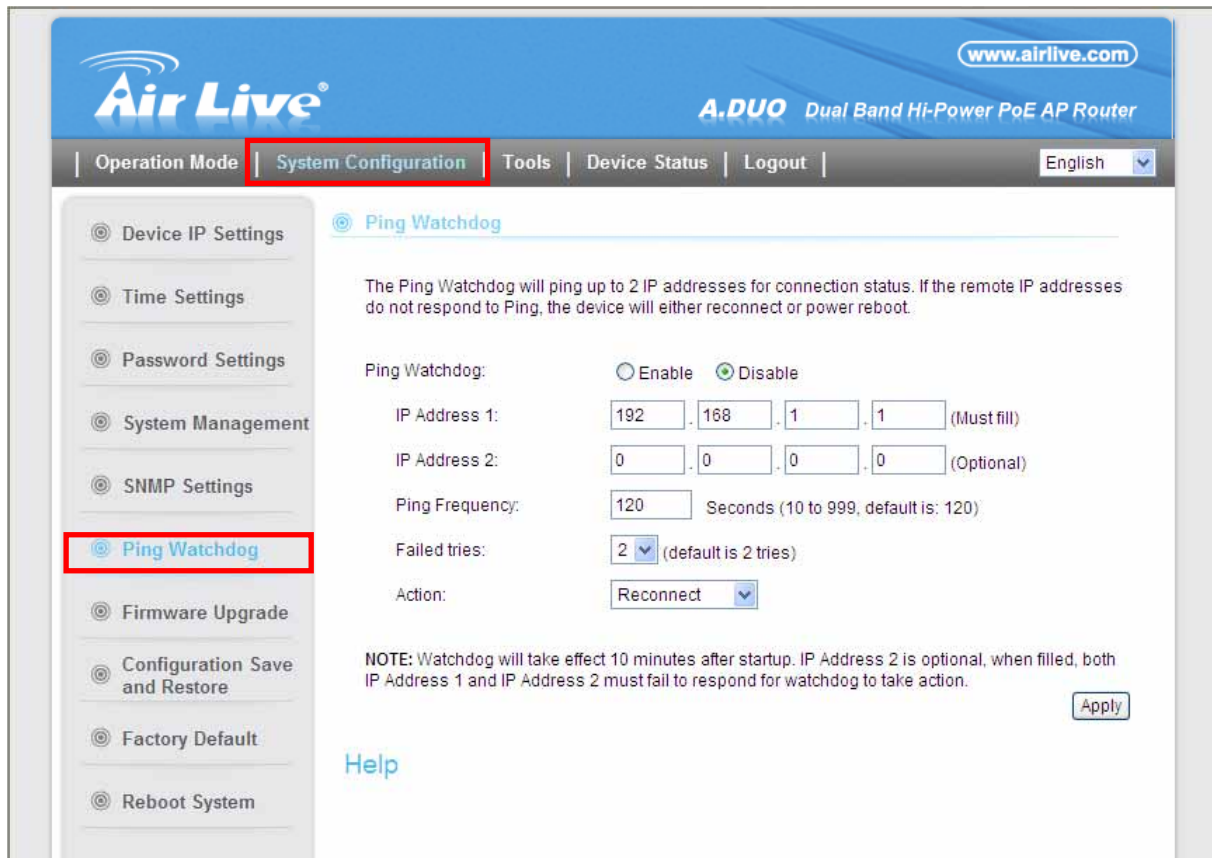
To enable a trap manager, check the *Enable* box in the corresponding entry; to disable it, un-check the *Enable* box.

### 5.1.6 Ping Watchdog

#### ***System Configuration -> Ping Watchdog***

The Ping Watchdog will ping remote IP addresses to make sure the wireless connection is active, if not, it can either reconnect or reboot. To prevent the AP from power recycling, the PING watchdog will start 10 minutes after power up to prevent power recycle problem.





- **PING Frequency** means: "How often the CPE will PING". For example, it will PING once every "1" minute.
- **Fail Tries** means "How many times fails before the CPE will judge the PING failed". For example "2" means the CPE will reconnect if the PING doesn't respond for 2 times.

When you set the Ping Frequency to every "2" minutes and Fail Tries to "2". It means the CPE will ping every 2 minutes, after the second failure, it will reconnect.

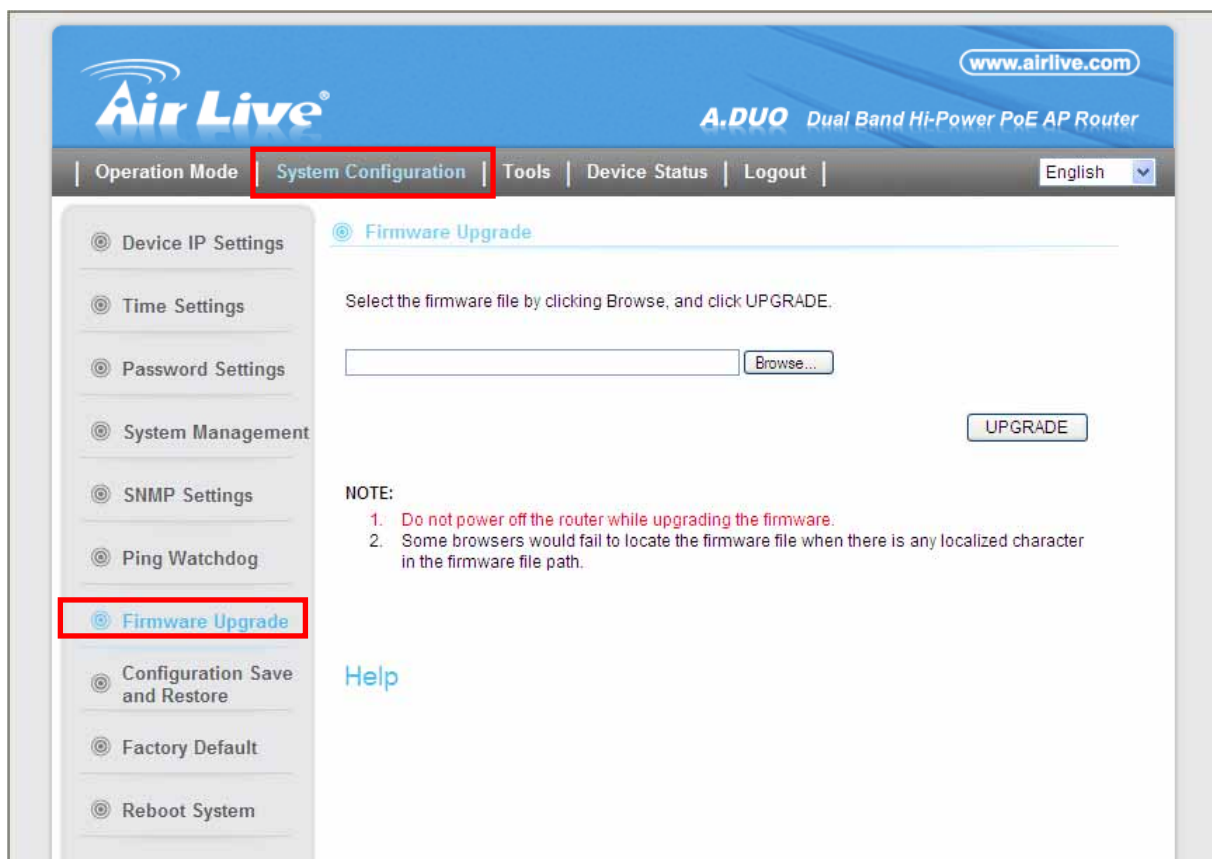
- **Actions:**
  - Reconnect: the A.DUO will attempt to re-establish the connection. It is recommend to use this option for WDS Bridge connection.
  - Power Reboot: the A.DUO will do a power recycle.



## 5.1.7 Firmware Upgrade

### *System Configuration -> Firmware Upgrade*

You can upgrade the firmware of your A.DUO (the software that controls your A.DUO's operation). Normally, this is done when a new version of firmware offers new features that you want, or solves problems that you have encountered with the current version.



#### ■ Upgrade Firmware:

To update the A.DUO firmware, first download the firmware from AirLive web site to your local disk, and then from the above screen enter the path and filename of the firmware file (or click **Browse** to locate the firmware file). Next, Click the **Upgrade** button to start.

The new firmware will be loaded to your A.DUO. After a message appears telling you that the operation is completed, you need to reset the system to have the new firmware take effect.



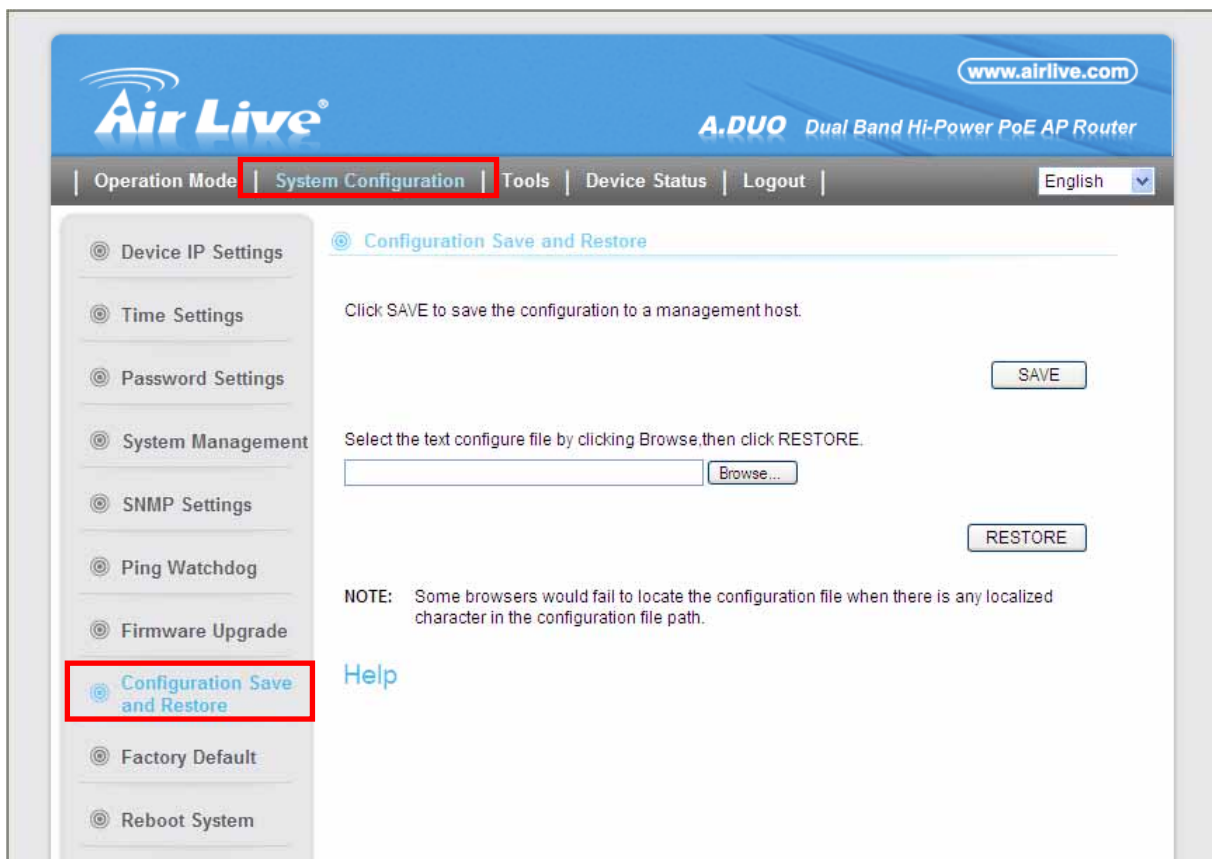
Do not power off the device while upgrading the firmware. It is recommended that you do not upgrade your A.DUO unless the new firmware has new features you need or if it has a fix to a problem that you've encountered.

## 5.1.8 Configuration Save and Restore

### *System Configuration -> Configuration Save and Restore*

You can save system configuration settings to a file, and later download it back to the A.DUO by following the steps.

**Step 1** Select *Configuration Save and Restore* from the *System Configurations* menu.



**Step 2** Enter the path of the configuration file to save-to/restore-from (or click the *Browse* button to locate the configuration file). Then click the *SAVE TO FILE* button to save the current configuration into the specified file, or click the *RESTORE FROM FILE* button to restore the system configuration from the specified file.

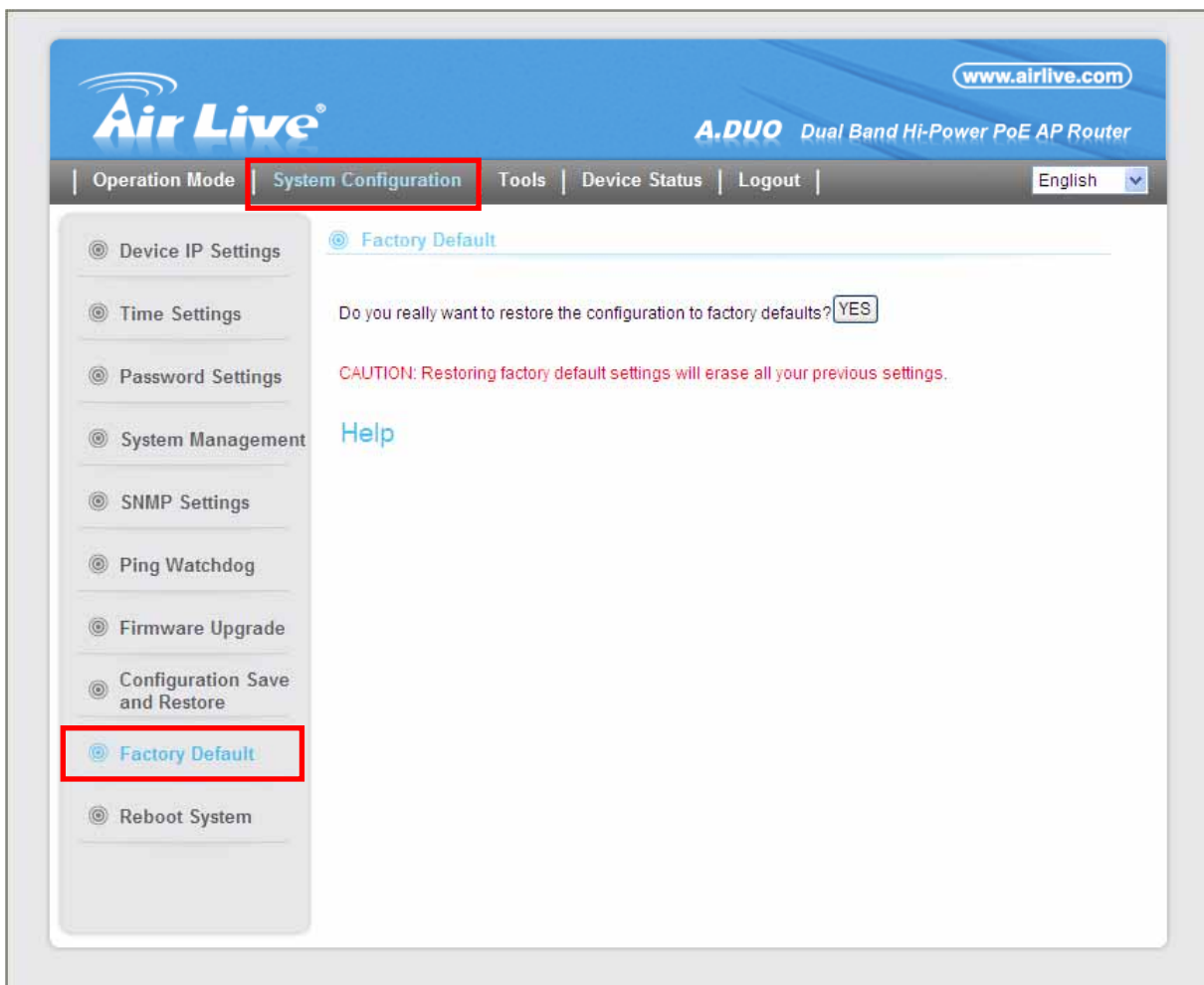
### 5.1.9 Factory Default

#### ***System Configuration -> Factory Default***

You can reset the configuration of your A.DUO to the factory default settings.

**Step 1** Select *Factory Default* from the *System Configuration* menu.

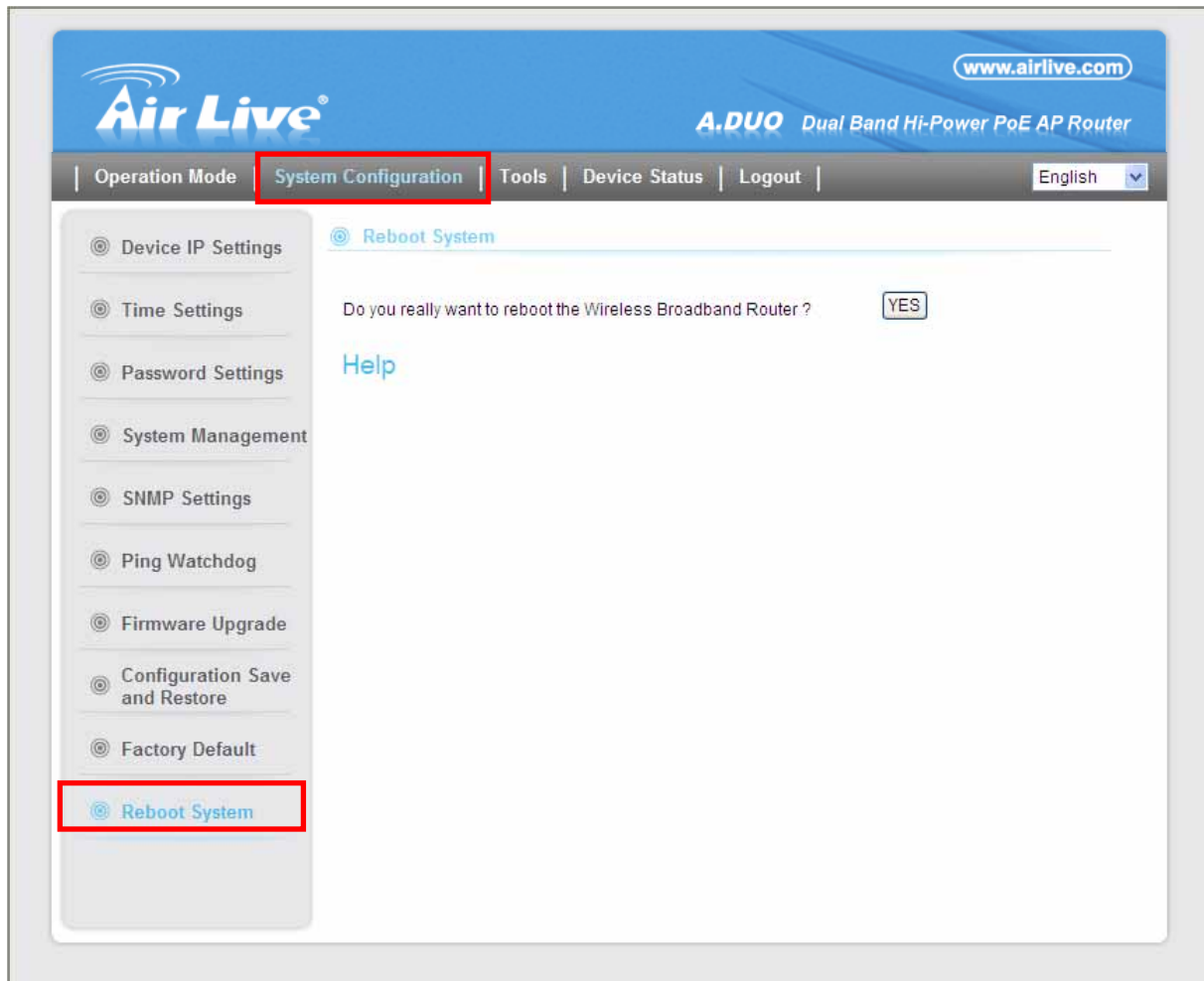
**Step 2** Click “YES” to go ahead and restore the configuration to the factory default.



### 5.1.10 Reboot System

#### ***System Configuration -> Reboot System***

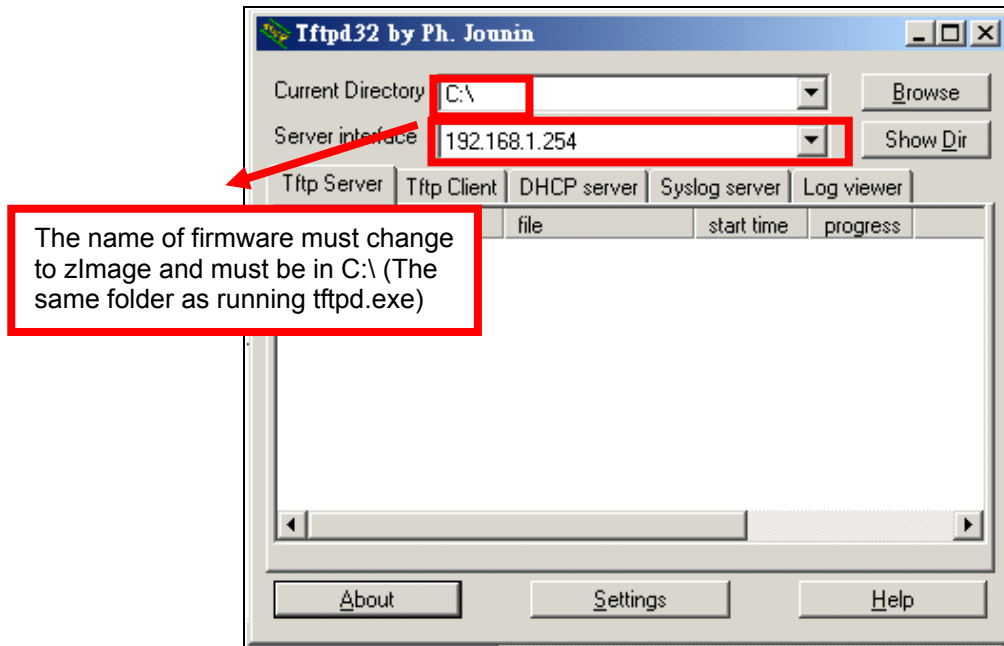
You can reboot A.DUO in this page.



### 5.1.11 A.DUO Emergency Recovery

This section guides to recover your A.DUO system if the firmware crashed.

1. Download the tftp server to your PC. In the following example, we use tftpd32:  
[http://tftpd32.jounin.net/tftpd32\\_download.html](http://tftpd32.jounin.net/tftpd32_download.html).
2. Copy the tftpd32.exe of the downloaded file to C:\.
3. Change the IP address of your PC to 192.168.1.254 / 255.255.255.0
4. Copy the A.DUO firmware to C:\ and rename the firmware to “**zImage**”. Note that the name must be zImage and no extension.
5. Connect A.DUO and PC with an Ethernet cable.
6. Run the tftpd32.exe. Note that the IP address must be 192.168.1.254.



7. Power on A.DUO, the “**Status**” LED will light on after 3 seconds.
8. Push the “**Reset**” button until the “**Status**” LED off and on again and release the “**Reset**” button.
9. If the above process success, the A.DUO LAN LED keep flashing and the tftp serve shows file download information.
10. It takes around 5 minutes to download firmware and around 5 minutes to update the firmware.
11. After a successful recovery, the A.DUO boots up automatically.
12. Try access 192.168.1.1, or the IP address you had changed before.

Repeat the processes again if failed.

# 6

## Device Status & Tools

### 6.1 Device Status

When you click on the “Device Status” on the top menu bar, the sub menu for device status will appear.

#### 6.1.1 Device Information

This page shows the general information about A.DUO such as firmware version, device IP/MAC, WAN IP/MAC (in router modes), Gateway IP (in router modes), DNS IP...etc. Below are some additional explanations on some status information of this page:

- **Firmware version:** In general, AirLive will refer to its firmware as exx (such as e2) version on the release note
- **Device IP:** It shows LAN IP.
- **Device MAC:** It shows MAC address of LAN.
- **Wan IP:** It shows WAN IP.
- **Wan MAC:** It shows MAC address of WAN.
- **Gateway IP:** It shows IP address of Gateway.
- **DNS IP:** It shows IP address of DNS.
- **Wireless MAC:** This is the wireless MAC address (BSSID) of this A.DUO. This is the address to enter on the remote WDS Bridge for the WDS link.
- **Uptime:** This is the time that the A.DUO has been running since last power up
- **CPU Loading:** Indicates the current CPU loading status
- **Memory Information:** Indicates the current memory status



**Air Live®** www.airlive.com

**A.DUO** Dual Band Hi-Power PoE AP Router

Operation Mode | System Configuration | Tools | **Device Status** | Logout | English

- Device Information**
- Wireless Information
- LAN Information
- Wireless Client Table
- System Log

**Device Information**

Firmware Version: 2.00e02  
 Device IP: 192.168.1.1  
 Device MAC: 00:4F:69:70:34:F7  
 Gateway IP: 192.168.1.254  
 Primary DNS IP: 0.0.0.0  
 Secondary DNS IP: 0.0.0.0  
 Wireless1 MAC: 00:4F:69:70:34:F4  
 Wireless2 MAC: 00:4F:69:70:34:F5  
 Uptime: (dd:hh:mm) 0:1:46  
 CPU Loading:  1%

**Memory Information**

|                  |                                                                                                                                               |                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Total Available: | <span style="display: inline-block; width: 100px; height: 10px; background: linear-gradient(to right, #007bff 87%, #6c757d 87%);"></span> 87% | 28624KB / 32768KB |
| Used:            | <span style="display: inline-block; width: 100px; height: 10px; background: linear-gradient(to right, #007bff 51%, #6c757d 51%);"></span> 51% | 14608KB / 28624KB |
| Free:            | <span style="display: inline-block; width: 100px; height: 10px; background: linear-gradient(to right, #007bff 49%, #6c757d 49%);"></span> 49% | 14016KB / 28624KB |
| Buffers:         | <span style="display: inline-block; width: 100px; height: 10px; background: linear-gradient(to right, #007bff 18%, #6c757d 18%);"></span> 18% | 2656KB / 14608KB  |
| Cached:          | <span style="display: inline-block; width: 100px; height: 10px; background: linear-gradient(to right, #007bff 46%, #6c757d 46%);"></span> 46% | 6732KB / 14608KB  |

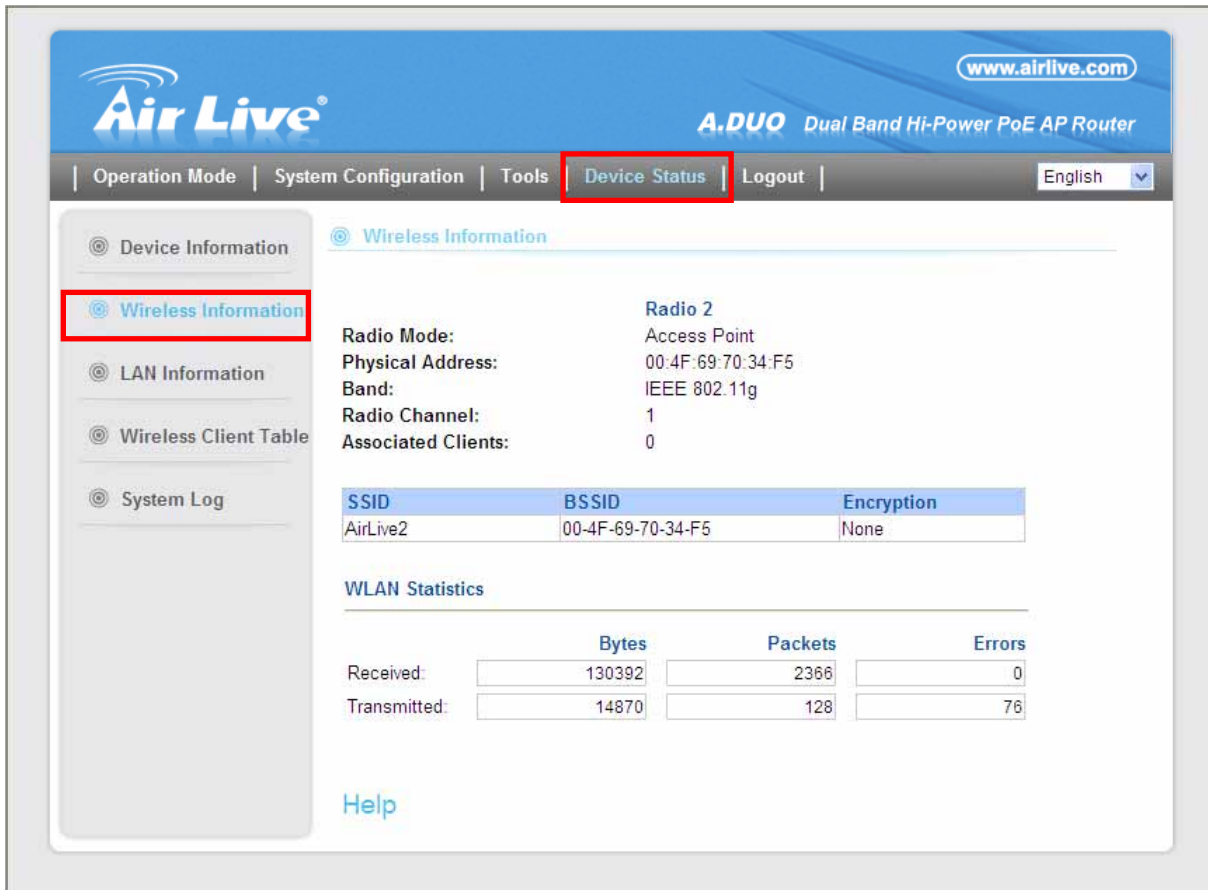
**ARP Table**

| IP Address   | MAC Address       | Interface |
|--------------|-------------------|-----------|
| 192.168.1.11 | 00-23-8B-FE-09-3B | lan       |

[Help](#)

### 6.1.2 Wireless Information

This page shows the information about wireless status such as current operation mode, wireless traffic, error packets, RSSI, Remote device's BSSD, connecting State, channel, and encryption used.



The screenshot shows the Air Live A.DUO web interface. The 'Device Status' menu item is highlighted in red. The 'Wireless Information' page is active, showing details for Radio 2. The page includes a sidebar with navigation options: Device Information, Wireless Information (highlighted), LAN Information, Wireless Client Table, and System Log. The main content area displays the following information:

**Radio 2**  
**Radio Mode:** Access Point  
**Physical Address:** 00:4F:69:70:34:F5  
**Band:** IEEE 802.11g  
**Radio Channel:** 1  
**Associated Clients:** 0

| SSID     | BSSID             | Encryption |
|----------|-------------------|------------|
| AirLive2 | 00-4F-69-70-34-F5 | None       |

**WLAN Statistics**

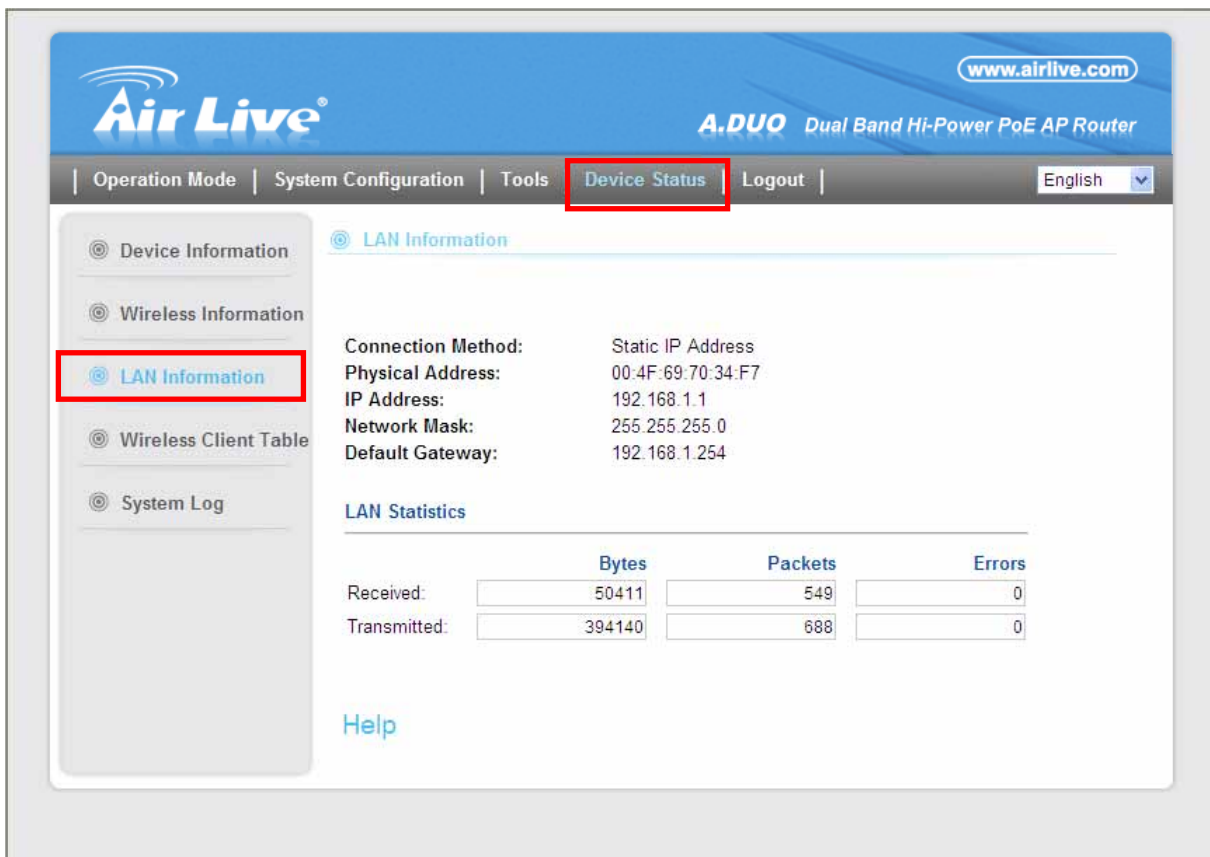
|              | Bytes  | Packets | Errors |
|--------------|--------|---------|--------|
| Received:    | 130392 | 2366    | 0      |
| Transmitted: | 14870  | 128     | 76     |

A 'Help' link is visible at the bottom left of the page.



### 6.1.3 LAN Information

This page shows the information about LAN port of the A.DUO. It includes the type of LAN port authentication used and the IP address information about the LAN port.



The screenshot displays the Air Live web interface for the A.DUO Dual Band Hi-Power PoE AP Router. The 'Device Status' menu item is highlighted in red. The 'LAN Information' section is also highlighted in red and contains the following details:

- Connection Method: Static IP Address
- Physical Address: 00:4F:69:70:34:F7
- IP Address: 192.168.1.1
- Network Mask: 255.255.255.0
- Default Gateway: 192.168.1.254

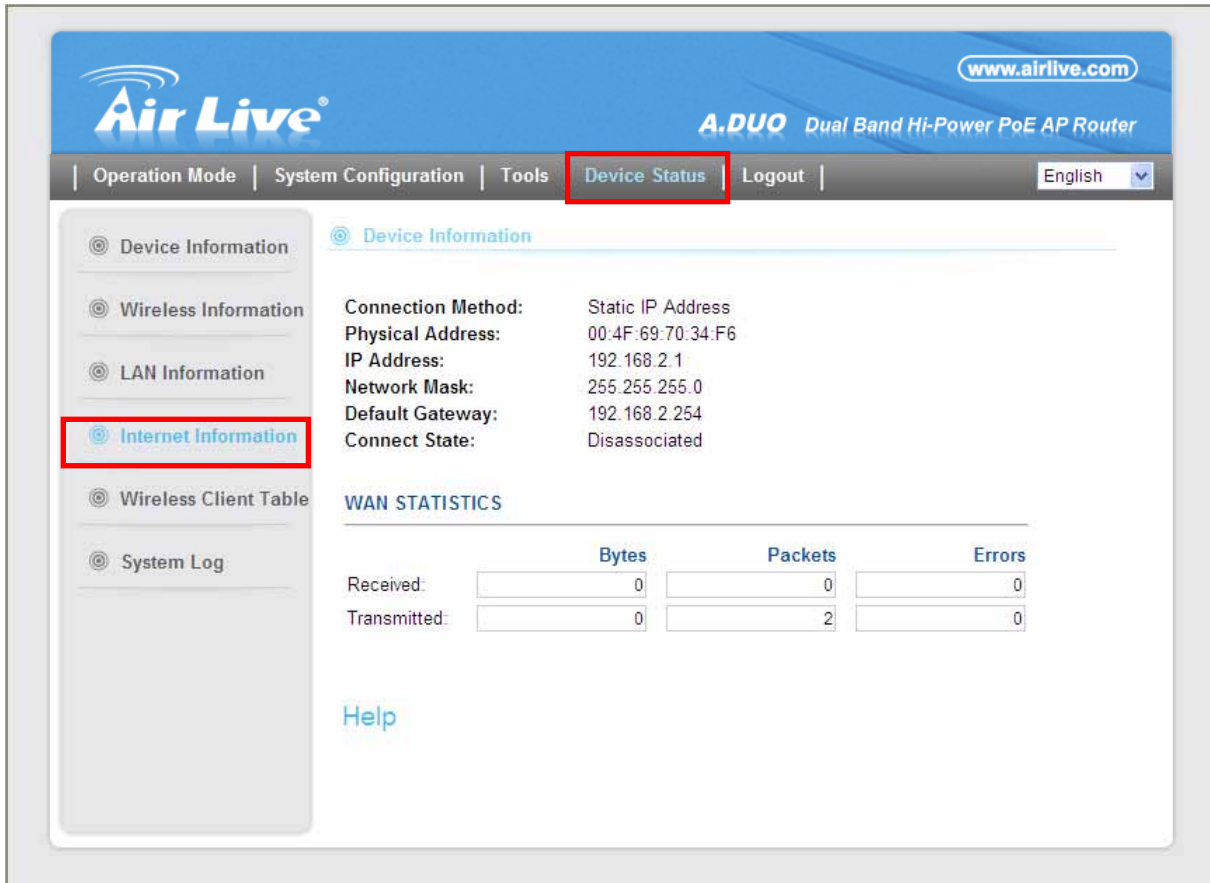
Below this information is a 'LAN Statistics' table:

|              | Bytes  | Packets | Errors |
|--------------|--------|---------|--------|
| Received:    | 50411  | 549     | 0      |
| Transmitted: | 394140 | 688     | 0      |

A 'Help' link is visible at the bottom left of the page.

## 6.1.4 Internet Information

This page shows the information about WAN port of the A.DUO. It includes the type of WAN port authentication used and the IP address information about the WAN port.



The screenshot displays the web management interface for the Air Live A.DUO Dual Band Hi-Power PoE AP Router. The top navigation bar includes 'Operation Mode', 'System Configuration', 'Tools', 'Device Status' (highlighted with a red box), and 'Logout'. A language dropdown menu is set to 'English'. The left sidebar contains a list of menu items: 'Device Information', 'Wireless Information', 'LAN Information', 'Internet Information' (highlighted with a red box), 'Wireless Client Table', and 'System Log'. The main content area is titled 'Device Information' and shows the following WAN configuration details:

- Connection Method: Static IP Address
- Physical Address: 00:4F:69:70:34:F6
- IP Address: 192.168.2.1
- Network Mask: 255.255.255.0
- Default Gateway: 192.168.2.254
- Connect State: Disassociated

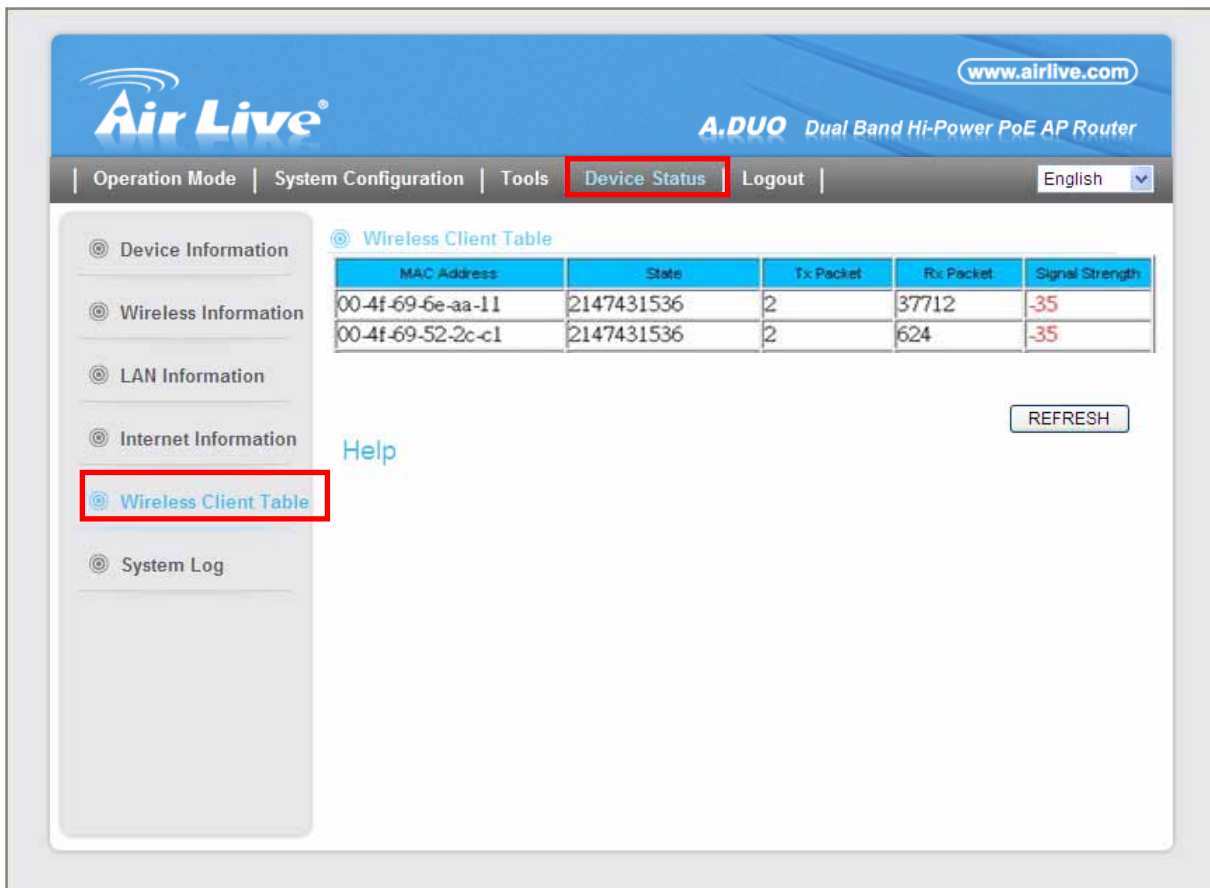
Below this information is a 'WAN STATISTICS' table:

|              | Bytes                          | Packets                        | Errors                         |
|--------------|--------------------------------|--------------------------------|--------------------------------|
| Received:    | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> |
| Transmitted: | <input type="text" value="0"/> | <input type="text" value="2"/> | <input type="text" value="0"/> |

A 'Help' link is located at the bottom of the page.

## 6.1.5 Wireless Client Table

This function is available in AP mode and AP Router mode only. It displays the information about wireless clients that are associated with A.DUO. It includes signal strength, TX and RX data rate, MAC address, and the state.



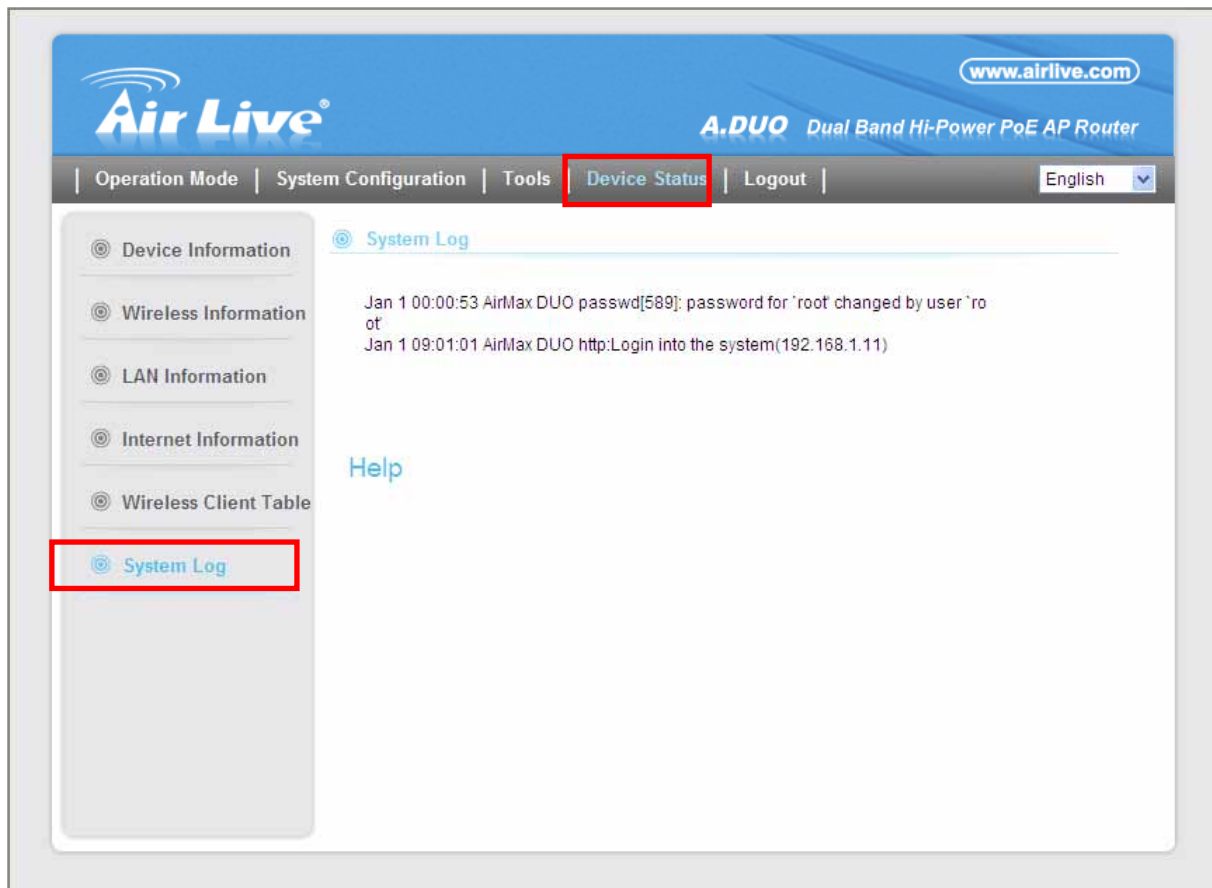
The screenshot shows the Air Live web interface for an A.DUO Dual Band Hi-Power PoE AP Router. The 'Device Status' menu item is highlighted in red. The 'Wireless Client Table' menu item in the sidebar is also highlighted in red. The table displays the following data:

| MAC Address       | State      | Tx Packet | Rx Packet | Signal Strength |
|-------------------|------------|-----------|-----------|-----------------|
| 00-4f-69-6e-aa-11 | 2147431536 | 2         | 37712     | -35             |
| 00-4f-69-52-2c-c1 | 2147431536 | 2         | 624       | -35             |

There is a 'REFRESH' button and a 'Help' link below the table.

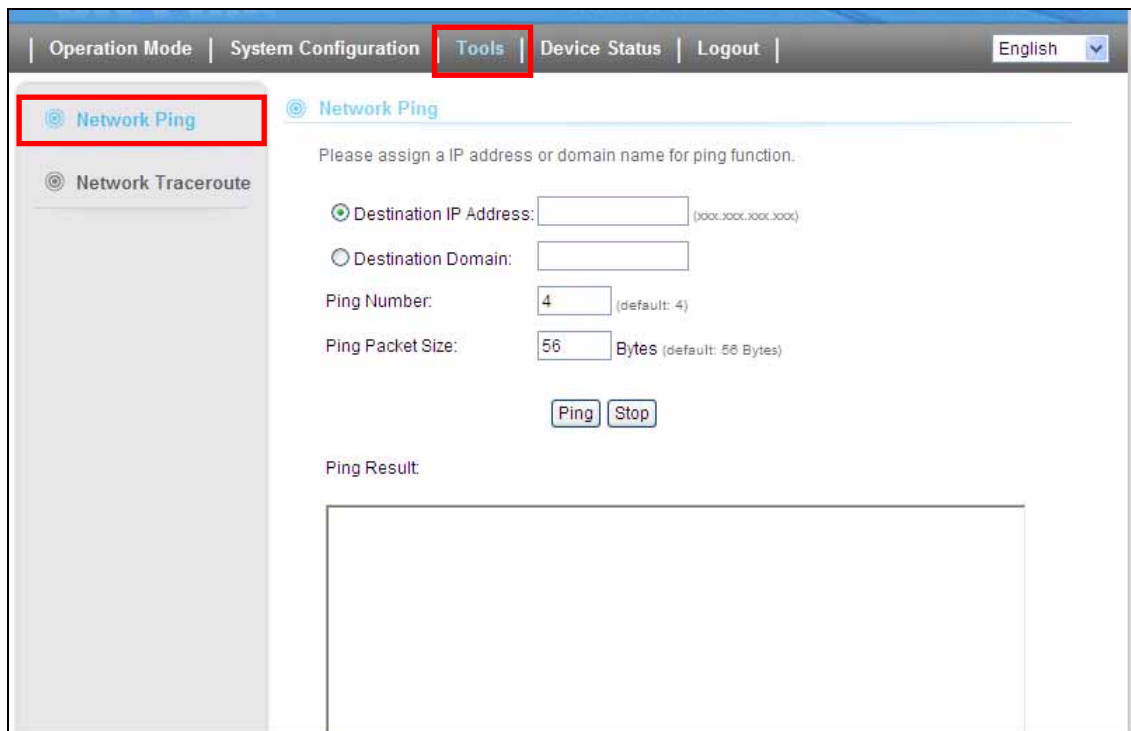
## 6.1.6 System Log

The System Log displays the system activities, login, and system error report. If you need to report a problem to Air Live, please be sure to send us the System Log information also.



### 6.1.7 Network Ping

Network Ping tool allows user to test whether a particular host is reachable across an Internet Protocol (IP) network.

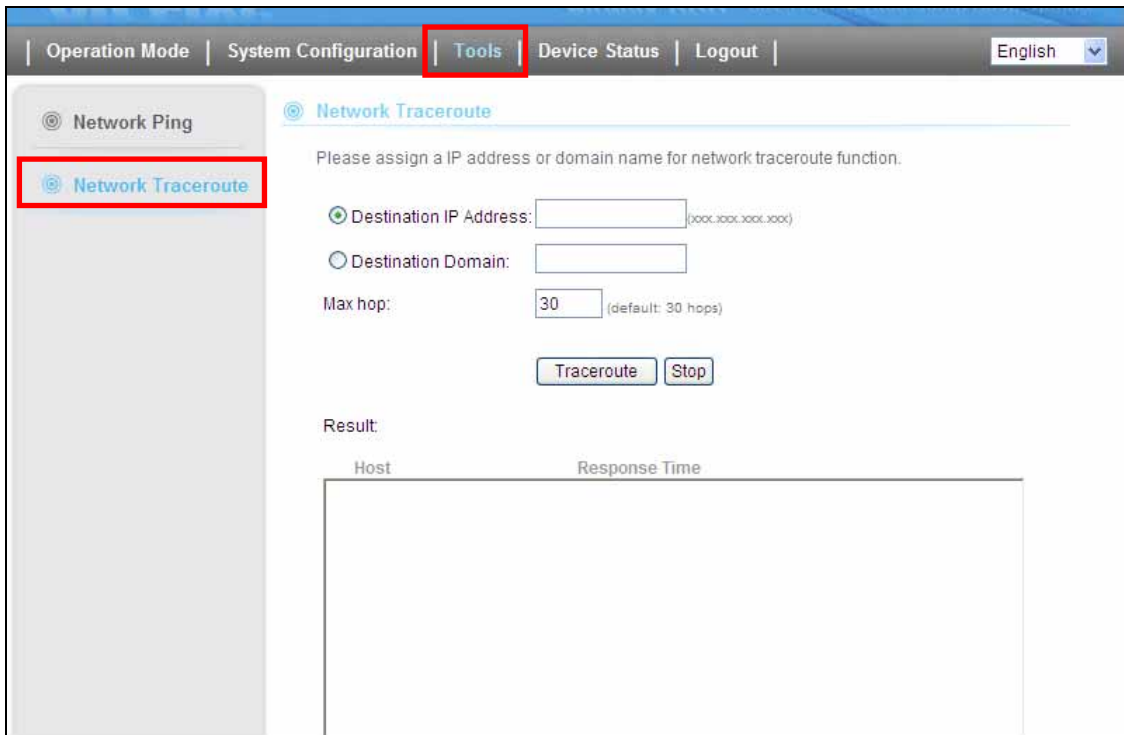


The screenshot shows the 'Tools' section of the AirLive management console. The 'Network Ping' tool is selected and highlighted with a red box. The interface includes a navigation menu on the left with 'Network Ping' and 'Network Traceroute' options. The main content area contains the following fields and controls:

- Destination IP Address:** A text input field with a placeholder '(xxx.xxx.xxx.xxx)' and a radio button selected.
- Destination Domain:** A text input field with a radio button unselected.
- Ping Number:** A text input field containing the value '4' with '(default: 4)' as a hint.
- Ping Packet Size:** A text input field containing the value '56' with 'Bytes (default: 56 Bytes)' as a hint.
- Buttons:** 'Ping' and 'Stop' buttons.
- Ping Result:** A large empty rectangular box for displaying the results of the ping test.

## 6.1.8 Network Traceroute

Network Traceroute tool is used to show the route taken by packets across an IP network.



The screenshot shows the web interface for the Network Traceroute tool. The top navigation bar includes 'Operation Mode', 'System Configuration', 'Tools' (highlighted with a red box), 'Device Status', and 'Logout'. A language dropdown menu is set to 'English'. On the left sidebar, 'Network Ping' and 'Network Traceroute' (highlighted with a red box) are listed. The main content area is titled 'Network Traceroute' and contains the following fields and controls:

- A prompt: "Please assign a IP address or domain name for network traceroute function."
- Radio buttons for 'Destination IP Address' (selected) and 'Destination Domain'.
- A text input field for 'Destination IP Address' with a placeholder '(xxx.xxx.xxx.xxx)'. The 'Destination Domain' field is empty.
- A 'Max hop:' label with a text input field containing '30' and '(default: 30 hops)'.
- 'Traceroute' and 'Stop' buttons.
- A 'Result:' section with a table header showing 'Host' and 'Response Time'.
- An empty table body for displaying results.

# 7

## Command Line Interface

In this chapter, we will explain commands that are available through Telnet or SSH interface. We will provide descriptions for the commands, example settings and the A.DUO's response. The purpose for this chapter is to introduce available CLI commands only. For detail descriptions on the concept and application of the settings, please refer to chapter 4 and chapter 5.

Before reading this chapter, please go through Section 3.3 of Chapter 3. It contains information on how to login Telnet or SSH/SSH2 interface. For quick reference, the login and password is as bellowed:

### ■ Telnet

- Password: airlive

### ■ SSH/SSH2

- First login  
Login: root  
Password: <nothing, just press enter>
- Second login:  
Password: airlive

When you change A.DUO's password, it will change the second login's password only. You can get a list of available commands by typing "help" at the command prompt.



You must remember to save the configurations by typing "**save config**" at the command prompt after making changes, otherwise, the configuration will be lost after reboot.

## 7.1 System Commands

- **ping <IP address>**

**This is the command**

- *Purpose:* to ping a remote IP address

**Here explains the usage of the command**

- *Example:*

```
Command> ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=64 time=1.8 ms
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=1.0 ms
```

**Example command and response**

- **change password**

- *Purpose:* Change login password

- *Example:*

```
Command> change password 123
password is set to: 123
```

- **ftptest <ssid> 11a <channel>**

- *Purpose:* Test if a SSID's connection is okay

- *Example:*

```
Command> ftptest airlive 11a 40
Set SSID: airlive, mode = 11a, channel = 40 ok!
```

- **save config**

- *Purpose:* save configuration file. Please remember to “save config” after making changes

- *Example:*

```
Command> save config
None
```

- **clear config**

- *Purpose:* Clear configuration to default

- *Example:*

```
Command> clear config
Are you sure? (y/n) : y
Write flash block [/dev/mtd3]
```



Write file is [/etc/defsconfig.conf]

Rebooting...

■ **webservice <lan | wan> <enable | disable>**

□ *Purpose:* Enable or Disable Web management interface on LAN or WAN

□ *Example:*

Command> webservice lan enable

webservice from lan enable

■ **site survey**

□ *Purpose:* Site Survey display

□ *Example:*

Command> site survey

Please wait a moment for site survey...

| ESSID    | MAC Address       | Conn Mode | Channel | Turbo | Super | XR | WME | Signal Strength(dbm) | Security | Network |
|----------|-------------------|-----------|---------|-------|-------|----|-----|----------------------|----------|---------|
| airlive  | 00:4f:79:90:00:27 | A         | 36      | -     | --    | *  |     | -49                  | None     | AP      |
| airlive  | 00:4f:69:52:a1:ca | A         | 36      | -     | --    | *  |     | -61                  | None     | AP      |
| A.DUO-ap | 00:4f:69:90:00:01 | A         | 36      | -     | --    | *  |     | -56                  | None     | AP      |

■ **signal survey <bssid> <channel>**

□ *Purpose:* Display continuous RSSI for the remote AP/Bridge

□ *Example:*

Command> signal survey 00-4f-69-52-a1-ed 36

| BSSID             | Channel | Signal Strength (dbm) |
|-------------------|---------|-----------------------|
| 00-4F-69-52-A1-ED | 36      | -40                   |

| BSSID             | Channel | Signal Strength (dbm) |
|-------------------|---------|-----------------------|
| 00-4F-69-52-A1-ED | 36      | -40                   |

...

.

## 7.2 Debugging Commands

Those debugging commands are commands used for manufacturing testing process. If a `z_debug` command looks similar to a Set command, please use the Set command instead.

### ■ `z_debug http logout`

□ *Purpose:* log out HTTP

□ *Example:*

```
Command> z_debug http logout
```

### ■ `z_debug signature <enable/disable>`

□ *Purpose:* Enable or disable signature check on firmware

□ *Example:*

```
Command> z_debug signature disable
```

```
Are you sure? ( y/n ) : y
```

```
Signature check is now DISABLED!!!
```

### ■ `z_debug add ssid <ssid>`

□ *Purpose:* This command will replace the default ssid with the new one. It will not add an additional SSID. We recommend to use the following commands instead:

■ `add ssid <ssidname> broadcast (enable/disable)` to add a new SSID

■ `set ssid <ssidname>` to replace the current ssid name with a new one

□ *Example:*

```
Command> z_debug add ssid air1
```

### ■ `z_debug reboot`

□ *Purpose:* reboot your A.DUO

□ *Example:*

```
Command> z_debug reboot
```

```
Rebooting...
```

- **z\_debug set port radio1 11a <ssid> <channel>**
- *Purpose:* Set SSID and Channel. We recommend using set commands instead;
  - **set ssid <ssid>** : to set the ssid name
  - **set rate mode <mode value>**: set radio mode to *11a* | *supera\_no\_turbo* | *supera\_static\_turbo.* | *supera\_dynamic\_turbo*
- *Example:*  
Command> z\_debug set port radio1 11a air2 64

## 7.3 Show Commands

Show Commands are command that show the settings and status of A.DUO

### ■ show arp table

*Purpose:* Show ARP Table

*Example:*

Command> show arp table

| IP address    | Flags | HWaddress         | Device |
|---------------|-------|-------------------|--------|
| 192.168.1.100 | C     | 00:1D:60:5E:AE:A0 | lan    |

### ■ show http

*Purpose:* Show HTTP service settings

*Example:*

Command> show http

HTTP service port: 80

HTTP session timeout: 10 minutes

### ■ show upnp

*Purpose:* Show UPnP information

*Example:*

Command> show upnp

UPnP is disabled

### ■ show mac

*Purpose:* show the MAC address table in MAC filter mode. *This might change to show the wireless MAC address of A.DUO in future firmware release*

*Example:*

Command> show mac

| Filter Name | MAC address       |
|-------------|-------------------|
| airlive     | 00-4f-62-24-12-34 |

**■ show mac filter**

*Purpose:* show mac address table in the Access Control List

*Example:*

```
Command> show mac filter
```

```
Filter Name      MAC address
```

```
-----  
hello           00-4f-62-24-12-34  
airlive        00-4f-62-24-11-11
```

**■ show mac filter mode**

*Purpose:* Show whether the current MAC address is enable or not

*Example:*

```
Command> show mac filter mode
```

```
MAC filter mode: disable
```

**■ show mac filter <string up to 16 characters>**

*Purpose:* show mac filter status with the filter name

*Example:*

```
Command> show mac filter hello
```

```
Filter Name      MAC address
```

```
-----  
hello           00-4f-62-24-12-34
```

**■ show community string read**

*Purpose:* Show SNMP community string

*Example:*

```
Command> show community string read
```

```
SNMP Community String (read-only): public
```

**■ show snmp**

*Purpose:* Show whether SNMP is enable or disabled

*Example:*

```
Command> show snmp
```

```
SNMP is enabled
```

**■ show trap manager**

*Purpose:* Show SNMP Trap manager status

*Example:*

```
Command> show trap manager
```

```
Trap Manager   IP Address      Status
```

```
-----
```

```
airlive        192.168.1.123  enabled
```

**■ show trap manager <string up to 16 characters>**

*Purpose:* Show SNMP Trap manager status with the assigned name

*Example:*

```
Command> show trap manager airtive
```

```
Trap Manager   IP Address      Status
```

```
-----
```

```
airlive        192.168.1.123  enabled
```

**■ show radius server**

*Purpose:* Show radius server settings

*Example:*

```
Command> show radius server
```

```
RADIUS Server           State           IP/Port
```

```
-----
```

```
Primary                 Disabled        0.0.0.0/1812
```

```
Secondary               Disabled        0.0.0.0/1812
```

```
RADIUS Server reattempt: 60 seconds
```

■ **show radius server <primary | secondary>**

□ *Purpose:* Show settings of primary or secondary radius server

□ *Example:*

Command> show radius server primary

RADIUS Server: primary

State: Disabled

Server IP: 0.0.0.0

Port Number: 1812

Shared Secret:

■ **show log level**

□ *Purpose:* show log level

□ *Example:*

Command> show log level

Log level is 8

■ **show telnet / system**

□ *Purpose:* show telnet management information and system status

□ *Example:*

Command> show telnet

Telnet session timeout: 0 minutes

Telnet port number: 23

Telnet state: enable

Command> show system

System Name: A.DUO

-----  
S/W Version:           1.00e09a  
H/W Version:           S0A  
System LAN MAC:        00-4F-79-90-00-16  
Wireless MAC:          00-4F-79-90-00-15  
WMAC-0:                00-4F-79-90-00-15

■ **show snmp statistics**

□ *Purpose:* Show SNMP statistics

□ *Example:*

Command> show snmp statistics

Timeout: No Response from 192.168.1.1

|                     | Received | Transmitted |
|---------------------|----------|-------------|
| -----               |          |             |
| Total Packets       | 1        | 1           |
| Request Variables   | 11       |             |
| SET Variables       | 0        |             |
| GET Requests        | 0        |             |
| GETNEXT Requests    | 15       |             |
| GET-RESPONSEs       | 0        | 25          |
| SET Requests        | 0        |             |
| Errors:             |          |             |
| Bad Versions        | 0        |             |
| Bad Community Uses: | 0        |             |
| ASN1 Parse Errors   | 0        |             |
| Packet Too Long     | 0        |             |
| NO-SUCH-NAME Errors | 0        |             |
| BAD-VALUE Errors    | 0        |             |
| READ-ONLY Errors    | 0        |             |
| GENERAL-ERR Errors  | 0        |             |

■ **show rssi**

□ *Purpose:* Show RSSI signal strength

□ *Example:*

Command> show rssi

Please wait a moment for site survey...

| ESSID    | MAC Address       | Signal Strength(dbm) |
|----------|-------------------|----------------------|
| =====    |                   |                      |
| airlive  | 0:4f:69:52:a1:ca  | -59                  |
| A.DUO-ap | 00:4f:69:90:00:01 | -47                  |



**■ show mode**

*Purpose:* Show what operation is A.DUO currently set to

*Example:*

```
Command> show mode
operation mode: access point
```

**■ show wireless setting**

*Purpose:* Show wireless settings

*Example:*

```
Command> show wireless setting
Radio[1] operation mode:  access point
ssid name                :  air2
wireless state           :  enable
ssid broadcast           :  enable
radio[1] mode            :  11a
radio[1] channel         :  64
```

**■ show wireless security**

*Purpose:* Show current wireless security policy

*Example:*

```
Command> show wireless security
Radio1 security policy: none
```

**■ show <wan | lan> settings**

*Purpose:* Show LAN or WAN port IP settings

*Example:*

```
Command> show lan settings
Lan ip type      :      static
Lan ip address  :  192.168.1.1
Lan ip netmask  :  255.255.255.0
Lan ip gateway  :  192.168.1.254
Lan ip dnsserv  :  0.0.0.0
```

show firmware version  
show vlan ssid list  
show wds settings  
show advanced wireless  
show syslogd

■ **show antenna**

□ *Purpose:* Check antenna polarization

□ *Example:*

Command> show antenna

Antenna setting is Vertical;

■ **show ratemode**

□ *Purpose:* Show whether the A.DUO is using 5MHz, 10MHz, or 20MHz channel width

□ *Example:*

Command> show ratemode

Ratemode is Full (20Mhz);

■ **show noise immunity**

□ *Purpose:* Show the noise immunity setting

□ *Example:*

Command> show noise immunity

Noise immunity is enable

## 7.4 Set Commands

The Set Commands are to make changes to the A.DUO's settings

- **set http timeout <timeout value in minutes, 1-999>**
  - *Purpose:* Set the timeout value for HTTP management
  - *Example:*  
Command> set http timeout 10  
HTTP timeout: 10 minutes
  
- **set system <contact |location> <string up to 60 characters>**
  - *Purpose:* Set the system's location and contact info
  - *Example:*  
Command> set system location 60  
System Location: 60
  
- **set system name <string up to 32 characters>**
  - *Purpose:* Set system's name
  - *Example:*  
Command> set system name airlive  
System Name: airlive
  
- **set mac filter mode <MAC filter mode, disabled/grant/deny>**
  - *Purpose:* Set MAC filter mode or disable MAC filtering.
  - *Example:*  
Command> set mac filter mode disabled  
mac filter mode is set to disabled
  
- **set community string <read |write> <string up to 32 characters>**
  - *Purpose:* Set SNMP community string
  - *Example:*  
Command> set community string write test  
community string for write: test  
Command> set community string read test  
community string for read: test

■ **set radius server reattempt <reattempt interval in minutes, now no limit in seconds>**

□ *Purpose:* set radius server reattempt interval in minutes

□ *Example:*

```
Command> set radius server reattempt 20
/etc/wlan/ap_service: 17: uname: not found
killall: wpa_supplicant: no process killed
/etc/wlan/ap_service: 17: uname: not found
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_hal.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_rate_atheros.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_dfs.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_ahb.o
<mapping sub-ioctl turbo to cmd 0x8BE0-1>
<mapping sub-ioctl set_installmode to cmd 0x8BE0-75>
<mapping sub-ioctl set_threslower to cmd 0x8BE0-76>
<mapping sub-ioctl set_threslow to cmd 0x8BE0-77>
<mapping sub-ioctl set_thresbetter to cmd 0x8BE0-78>
<mapping sub-ioctl set_thresbest to cmd 0x8BE0-79>
<mapping sub-ioctl maccmd to cmd 0x8BE0-17>
RTNETLINK answers: No such file or directory
RADIUS Server Reattempt Period: 20 Seconds
```

■ **set telnet port <port number, 1-65535>**

□ *Purpose:* change the telnet port number

□ *Example:*

```
Command> set telnet port 23
Changing telnet port may cause current telnet connections to be lost.
Are you sure ? ( y/n ) : y
Telnet port number: 23
```

■ **set telnet timeout <timeout value in minutes, 0-999, 0 for no limit>**

□ *Purpose:* Set Telnet management timeout

□ *Example:*

Command> set telnet timeout 10

Changing telnet timeout may cause current telnet connections to be lost.

Are you sure ? ( y/n ) : y

Telnet session timeout: 10 minutes

■ **set wmm qos <enable | disable>**

□ *Purpose:* Enable or Disable WMM QoS

□ *Example:*

Command> set wmm qos disable

set wmm qos disable successful!

■ **set log level <1-7>**

□ *Purpose:* Set the log level

□ *Example:*

Command> set log level 7

set log level 7 successful

■ **set client isolation <enable | disable>**

□ *Purpose:* Enable or Disable client isolation / privacy separator

□ *Example:*

Command> set client isolation disable

Set client isolation disable successful!

■ **set operation mode <AP |repeater| client | ad-hoc |bridge\_infra| wds\_bridge | wisp | router>**

□ *Purpose:* set or change operation mode

□ *Example:*

Command> set operation mode AP

Operation mode is already setting!

Command> set operation mode wds\_bridge

System should be reboot...

Are you sure ? ( y/n ) : y

■ **set <wan | lan> <webservice | ping> <enable |disable>**

□ *Purpose:* enable/disable ping response or web server on the lan/wan side

□ *Example:*

Command> set lan ping enable  
set lan ping already enable

■ **set lan ip <ipaddress> sm <netmask> gw <gateway> dns <dns server>**

□ *Purpose:* set LAN IP address such as IP, Subnet mask, gateway, and DNS server

□ *Example:*

Command> set lan ip 192.168.1.1 sm 255.255.255.0 gw 192.168.1.254 dns 168.95.1.1

killall: dnsmasq: no process killed

LAN IP address : 192.168.1.1  
Netmask : 255.255.255.0  
Gateway : 192.168.1.254  
DNS server : 168.95.1.1

■ **set <enable | disable>**

□ *Purpose:* Enable or Disable the wireless interface

□ *Example:*

Command> set enable  
Radio1 enabled

■ **set ssid <ssidname>**

□ *Purpose:* Replace current main SSID name with a new one

□ *Example:*

Command> set ssid A.DUO

■ **set ssid remotessid <remote ssidname> **Repeater Mode Only****

□ *Purpose:* Set the remote SSID name for repeater mode

□ *Example:*

Command> set ssid remotessid airlive2

■ **set broadcast <enable | disable>**

□ *Purpose:* Enable or disable SSID broadcast

□ *Example:*

Command> set broadcast enable

Radio1 broadcast enabled

■ **set radio mode <radio mode value>**

□ *Purpose:* set radio mode to **11a** | **supera\_no\_turbo** | **supera\_static\_turbo** | **supera\_dynamic\_turbo**

□ *Example:*

Command> set radio mode supera\_no\_turbo

Radio1 radio mode: supera\_no\_turbo

■ **set channel <channel value>**

□ *Purpose:* set wireless channel

□ *Example:*

Command> set channel 36

Radio1 channel: 36

■ **set beacon interval <range:20-100>**

□ *Purpose:* set beacon interval for wireless interface. For explanation on advance wireless parameters, please refer to section 4.2.14

□ *Example:*

Command> set beacon interval 100

Radio1 beacon internal: 100

■ **set rts threshold <range:0-2347>**

□ *Purpose:* set rts threshold. For explanation on advance wireless parameters, please refer to section 4.2.14

□ *Example:*

Command> set rts threshold 2347

Radio1 RTS threshold: 2347

■ **set fragmentation <range:256-2346>**

- *Purpose:* set fragmentation value. For explanation on advance wireless parameters, please refer to section 4.2.14

- *Example:*

Command> set fragmentation 2346

Radio1 fragmentation: 2346

■ **set dtim interval <range:1-255>**

- *Purpose:* To set dtim interval value. For explanation on advance wireless parameters, please refer to section 4.2.14

- *Example:*

Command> set dtim interval 1

Radio1 DTIM interval: 1

■ **set user limitation <range:1-100>**

- *Purpose:* To set the user limit for wireless interface

- *Example:*

Command> set user limitation 100

Radio1 user limitation: 100

■ **set age out time <range:1-1000>**

- *Purpose:* To set the age timeout for wireless clients.

- *Example:*

Command> set age out time 5

Radio1 age out time: 5

■ **set transmit power <range: 0-24>**

- *Purpose:* To set the TX output power value of the radio

- *Example:*

Command> set transmit power 20

Radio1 transmit power: 20



■ **set data rate <best | 6~54>**

□ *Purpose:* To set the data rate. For example, 54mbps, 36mbps....etc

□ *Example:*

Command> set data rate 54

Radio1 data rate: 54

■ **set acktimeout <11A>**

□ *Purpose:* To set the ACK timeout value

□ *Example:*

Command> set acktimeout 25

AckTimeOut for radio1: 11A=25

■ **set vlan for ssid <enable | disable>**

□ *Purpose:* Enable VLAN function

□ *Example:*

Command> set vlan for ssid enable

■ **set diffserv marking <enable | disable>**

□ *Purpose:* To enable diffserv marking function in multiple SSID & VLAN configuration.

□ *Example:*

Command> set diffserv marking enable

■ **set security <ssid> none**

□ *Purpose:* To remove security policy from a SSID

□ *Example:*

Command> set security airlive none

Set Radio1 no security !

■ **set security <ssid> wep <key number> <64|128|152> <ascii | hex> <key string> <defaultkey>**

□ *Purpose:* To set the WEP security policy

□ *Example:*

Command> set security A.DUO wep 1 64 hex 1234567890

Radio1 authentication type : wep !

■ **set security <ssid> <wpa|wpa2> <tkip|aes|both> interval <0~300>**

□ *Purpose:* to set the WPA or WPA2 security policy

□ *Example:*

Command> set security A.DUO wpa2 tkip interval 300

Radio1 authentication type : wpa2 !

■ **set security <ssid> <wpa-psk|wpa2-psk> <tkip|aes|both> interval <0~300> <key string>**

□ *Purpose:* to set the WPA-PSK or WPA2-PSK security policy

□ *Example:*

Command> set security A.DUO wpa2-psk aes interval 300 12345678

Radio1 authentication type : wpa2-psk !

■ **set antenna <diversity | vertical | horizontal >**

□ *Purpose:* To set the antenna to use horizontal, vertical, diversity polarizations.

□ *Example:*

Command> set antenna horizontal

Antenna setting is Horizontal

■ **set ratemode <full | half | quarter>**

□ *Purpose:*

□ *Example:*

Command> set ratemode full

Rate mode is Full(20Mhz)

■ **set noise immunity <on | off>**

□ *Purpose:* To enable/disable the noise immunity level

□ *Example:*

Command> set noise immunity on

Noise immunity is enable

## 7.5 Enable/Disable Commands

Commands to enable or disable settings

■ **( enable/disable ):** **<enable | disable> upnp**

□ *Purpose:* To enable or disable UPnP

□ *Example:*

```
Command>enable upnp
```

```
(Upnp)descDocName: BD.xml
```

```
UPnP Daemon: Intializing UPnP with descDocUrl=http://192.168.1.1:80/BD.xml
```

```
UPnP Daemon: ipaddress=192.168.1.1 port=80
```

```
UPnP Daemon: conf_dir_path=/var/upnp
```

```
Initializing UPnP SDK ...
```

```
UPnP SDK Successfully Initialized.
```

```
Setting the Web Server Root Directory to /var/upnp
```

```
Successfully set the Web Server Root Directory.
```

```
UpnpGetServerPort(): 49152
```

```
Registering the root device with descDocUrl http://192.168.1.1:49152/BD.xml
```

```
IGD root device successfully registered.
```

```
Advertisements Sent. Listening for requests ...
```

```
Command> disable upnp
```

```
Shutting down on signal 15...
```

```
UPnP is disabled
```

■ **<enable | disable> snmp**

□ *Purpose:* To enable/disable SNMP

□ *Example:*

```
Command> enable snmp
```

```
SNMP is enabled
```

```
Command> disable snmp
```

```
SNMP is disabled
```

■ **<enable | disable> syslogd**

□ *Purpose:* To enable or disable syslog

□ *Example:*

Command> enable syslogd

Invalid configuration specified.

Command> disable syslogd

Syslogd is disabled

■ **<enable | disable> radius server <primary | secondary>**

□ *Purpose:* To enable or disable primary/secondary radius server

□ *Example:*

Command> enable radius server primary

Invalid configuration specified.

Command> enable radius server secondary

Invalid configuration specified.

## 7.6 Add/Delete Commands

Commands to add or delete settings

- **( add/delete ): add mac filter < Mnemonics Name> <MAC address, XX-XX-XX-XX-X-XX>**

- *Purpose:* to add an entry to the MAC address filter

- *Example:*

```

Command> add mac filter aaa 00-4f-62-24-12-34
/etc/wlan/ap_service: 17: uname: not found
killall: wpa_supplicant: no process killed
/etc/wlan/ap_service: 17: uname: not found
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_hal.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_rate_atheros.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_dfs.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_ahb.o
<mapping sub-ioctl turbo to cmd 0x8BE0-1>
<mapping sub-ioctl set_installmode to cmd 0x8BE0-75>
<mapping sub-ioctl set_threslower to cmd 0x8BE0-76>
<mapping sub-ioctl set_threslow to cmd 0x8BE0-77>
<mapping sub-ioctl set_thresbetter to cmd 0x8BE0-78>
<mapping sub-ioctl set_thresbest to cmd 0x8BE0-79>
<mapping sub-ioctl maccmd to cmd 0x8BE0-17>
<mapping sub-ioctl authmode to cmd 0x8BE0-3>
<mapping sub-ioctl cwmin to cmd 0x8BE3-1>
<mapping sub-ioctl cwmax to cmd 0x8BE3-2>
RTNETLINK answers: No such file or directory
RTNETLINK answers: No such file or directory
mac filter aaa(00-4F-62-24-12-34) is added
  
```

- **delete mac filter < Mnemonics Name>**

- *Purpose:* to delete a mac filter entry

- *Example:*

```

Command> delete mac filter aaa
/etc/wlan/ap_service: 17: uname: not found
  
```

```
killall: wpa_supplicant: no process killed
/etc/wlan/ap_service: 17: uname: not found
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_hal.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_rate_atheros.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_dfs.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_ahb.o
<mapping sub-ioctl turbo to cmd 0x8BE0-1>
<mapping sub-ioctl set_installmode to cmd 0x8BE0-75>
<mapping sub-ioctl set_threslower to cmd 0x8BE0-76>
<mapping sub-ioctl set_threslow to cmd 0x8BE0-77>
<mapping sub-ioctl set_thresbetter to cmd 0x8BE0-78>
<mapping sub-ioctl set_thresbest to cmd 0x8BE0-79>
<mapping sub-ioctl maccmd to cmd 0x8BE0-17>
<mapping sub-ioctl authmode to cmd 0x8BE0-3>
<mapping sub-ioctl cwmin to cmd 0x8BE3-1>
<mapping sub-ioctl cwmax to cmd 0x8BE3-2>
RTNETLINK answers: No such file or directory
RTNETLINK answers: No such file or directory
mac filter aaa is deleted
```

■ **delete wds <comment>**

□ *Purpose:* To delete a WDS link

□ *Example:*

```
Command> delete wds bridge
delete wds <comment> successful!
```

■ **add radius server primary**

□ *Purpose:* to add a primary radius server

□ *Example:*

```
Command> add radius server primary
enter server IP:
192.168.1.100
enter port number (1~65535):
655
```

```
enter shared secret:
123
enable server (yes/no):
yes
/etc/wlan/ap_service: 17: uname: not found
killall: wpa_supplicant: no process killed
/etc/wlan/ap_service: 17: uname: not found
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_hal.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_rate_atheros.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_dfs.o
Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath_ahb.o
<mapping sub-ioctl turbo to cmd 0x8BE0-1>
<mapping sub-ioctl set_installmode to cmd 0x8BE0-75>
<mapping sub-ioctl set_threslower to cmd 0x8BE0-76>
<mapping sub-ioctl set_threslow to cmd 0x8BE0-77>
<mapping sub-ioctl set_thresbetter to cmd 0x8BE0-78>
<mapping sub-ioctl set_thresbest to cmd 0x8BE0-79>
<mapping sub-ioctl maccmd to cmd 0x8BE0-17>
<mapping sub-ioctl authmode to cmd 0x8BE0-3>
<mapping sub-ioctl cwmin to cmd 0x8BE3-1>
<mapping sub-ioctl cwmax to cmd 0x8BE3-2>
RTNETLINK answers: No such file or directory
RTNETLINK answers: No such file or directory
add radius server primary successfully
```

■ **add radius server <primary | secondary>**

□ *Purpose:* to add a primary or secondary radius server

□ *Example:*

```
Command> add radius server secondary
enter server IP:
192.168.1.200
enter port number (1~65535):
766
enter shared secret:
```

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enable server (yes/no):

yes

/etc/wlan/ap\_service: 17: uname: not found

killall: wpa\_supplicant: no process killed

/etc/wlan/ap\_service: 17: uname: not found

Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath\_hal.o

Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath\_rate\_atheros.o

Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath\_dfs.o

Using /lib/modules/2.4.25-LSDK-5.1.0.42/wlan/ath\_ahb.o

<mapping sub-ioctl turbo to cmd 0x8BE0-1>

<mapping sub-ioctl set\_installmode to cmd 0x8BE0-75>

<mapping sub-ioctl set\_threslower to cmd 0x8BE0-76>

<mapping sub-ioctl set\_threslow to cmd 0x8BE0-77>

<mapping sub-ioctl set\_thresbetter to cmd 0x8BE0-78>

<mapping sub-ioctl set\_thresbest to cmd 0x8BE0-79>

<mapping sub-ioctl maccmd to cmd 0x8BE0-17>

<mapping sub-ioctl authmode to cmd 0x8BE0-3>

<mapping sub-ioctl cwmin to cmd 0x8BE3-1>

<mapping sub-ioctl cwmax to cmd 0x8BE3-2>

RTNETLINK answers: No such file or directory

RTNETLINK answers: No such file or directory

add radius server secondary successfully

■ **add wds <comment> <mac>**

□ *Purpose:* to add a WDS Link

□ *Example:*

Command> add wds bridge 00-4f-60-52-12-34

add wds <comment> <mac> successful!

■ **add ssid <ssid name> broadcast <enable | disable>**

□ *Purpose:* to add a new ssid (AP and AP Router mode) to the multiple SSID list.

□ *Example:*



Command> add ssid air03 broadcast enable

Add R1 ssid <air03> broadcast enable successful!

# 8

## Frequent Asked Questions

**Question:** I heard A.DUO can limit the bandwidth of BitTorrent and eDonkey traffic. But I don't see the option on the Bandwidth Control.

**Answer:** The option to limit bandwidth by application or port is available only on WISP and Gateway modes.

**Question:** Where is the signal survey function that displays the RSSI value continuously?

**Answer:** The "Signal Survey" function is inside the Site Survey function. You can access from "Operation Mode -> Setup -> Site Survey" menu.

**Site survey**

**Site survey list :**

| Select                | ESSID    | MAC Address       | Conn Mode | Channel | Turbo | Super | XR | WME | Signal Strength(dbm) | Security | Network |
|-----------------------|----------|-------------------|-----------|---------|-------|-------|----|-----|----------------------|----------|---------|
| <input type="radio"/> | AirLive2 | 00:4f:69:6f:ee:a5 | A         | 56      | -     | -     | -  | *   | -34                  | None     | AP      |
| <input type="radio"/> | test     | 00:4f:69:52:2b:89 | A         | 64      | -     | -     | -  | *   | -61                  | None     | AP      |
| <input type="radio"/> | AirLive1 | 00:4f:69:6f:ee:a4 | A         | 36      | -     | -     | -  | *   | -41                  | None     | AP      |

**NOTE:**  
The sitesurvey will show both Ap and Bridge connections. Device without ESSID is more likely to be a Bridge device.



**Question:** When do I use Per-User Bandwidth Control by IP, MAC, or IP segment?

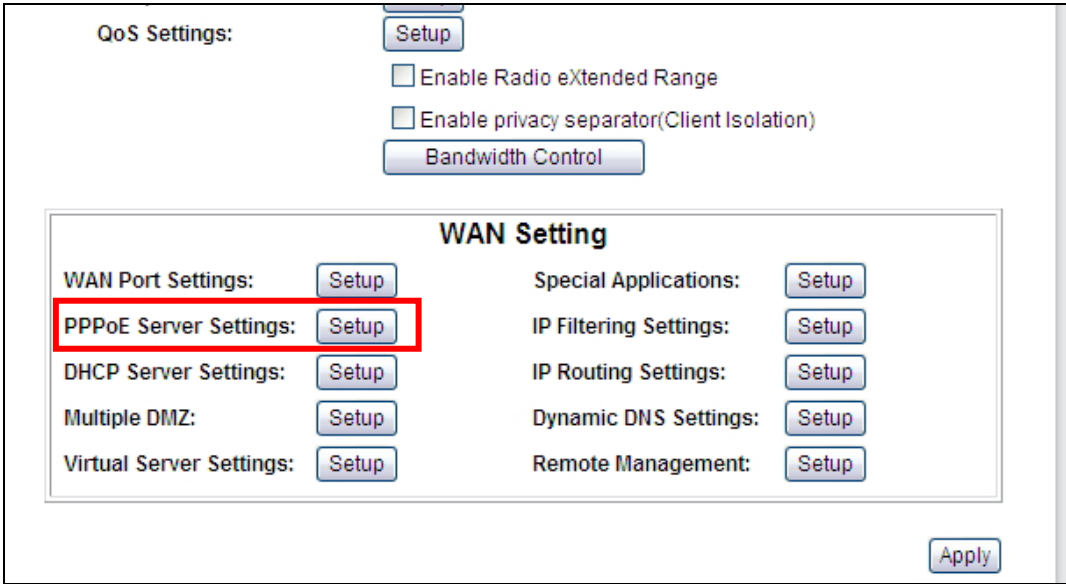
**Answer:** In general, IP address control limits the devices on the end node (i.e. PC and WISP router). MAC address control can limit the traffic of a AP/CPE in wireless client mode.

- IP address:** When you want to limit the bandwidth of a single notebook computer, PC, or WISP router.
- MAC address:** When you want to limit the bandwidth of a remote AP/CPE in Client mode. For example, another A.DUO in client mode
- IP Segment:** When you want to limit the bandwidth of an entire IP range. For example, all the PCs using the DHCP server to get IP addresses.

=====

**Question:** I thought A.DUO has PPPoE server function, where can I find it?

**Answer:** The A.DUO PPPoE function is available only in “Dual Band Router Mode”. The PPPoE function is inside the “Wireless Settings”->WAN Settings. Please see graphics below:



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# 9

## Specifications

The specification of A.DUO is subject to change without notice. Please use the information with caution.

### Hardware

- Atheros CPU
- High power design, up to 26dBm with included antennas (limit to 23dBm in U.S. and 20dBm in EU)
- 3 x 10/100Mbps LAN Ports
- 802.3af PoE Port
- Dual wireless interface 11a + 11a/b/g operation simultaneously.
- Super A/G mode support (Atheros Proprietary)
- Turbo A/G mode Support(Atheros Proprietary)
- RoHS compliant
- IEEE 802.3af (PoE) compliance
- 8MB Flash, 32MB SDRAM

### Antenna

- 2 x R-SMA antenna connectors

## Frequency Range

- WLAN1(Radio 1)
  - 802.11a : 5.15 to 5.825 GHz
  - Super Channels Support(4.9 to 6.1GHz) in specific domain
- WLAN2 (Radio 2)
  - 802.11b/g : 2.412 to 2.472 GHz
  - 802.11a : 5.15 to 5.825 GHz
  - Super Channels Support(4.9 to 6.1GHz) in specific domain

## Frequency Band

- **5.15 to 5.25GHz**: U-NII Low and ETSI Band1
- **5.25 to 5.35GHz**: U-NII Mid and ETSI Band2
- **5.47 to 5.725GHz**: U-NII World Wide and ETSI Band3
- **5.745 to 5.825GHz**, U-NII Upper Band

## Frequency Channel

- WLAN1(Radio 1)
  - 802.11a
    - ◆ USA (FCC) : 12
    - ◆ Europe (ETSI) : 19
- WLAN2(Radio 2)
  - 802.11b/g
    - ◆ USA (FCC) : 11
    - ◆ Europe (ETSI) : 13
  - 802.11a
    - ◆ USA (FCC) : 12
    - ◆ Europe (ETSI) : 19

### Power Supply

- 5.5V at 2.5A DC Power Adapter
- Optional 802.3af 48V Power over Ethernet Adapter + Injector (AirLive model: PoE-48PB)

### Modulation Technology

- IEEE802.11a 5GHz OFDM
- IEEE802.11b 2.4GHz CCK
- IEEE802.11g 2.4GHz OFDM
- Atheros Proprietary Super A/G mode 802.11a Orthogonal

### Wireless transfer Data Rate with Automatic Fallback

- 802.11b: 1, 2, 5.5, 11Mbps
- 802.11g: 1, 2, 5.5, 11, 6, 9, 12, 18, 24, 36, 48, 54Mbps
- 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps

### Supported WLAN Mode

- 11a mode
- SuperA without Turbo
- SuperA with Dynamic Turbo
- SuperA with Static Turbo

### Output Power (without antennas)

| 802.11a                        | 802.11g                        |
|--------------------------------|--------------------------------|
| 54 Mbps @ 17dBm                | 54 Mbps @ 19dBm                |
| 48 Mbps @ 18dBm                | 48 Mbps @ 20dBm                |
| 36 Mbps @ 19 dBm               | 36 Mbps @ 21 dBm               |
| 6, 9, 12, 18, 24 Mbps @ 23 dBm | 6, 9, 12, 18, 24 Mbps @ 23 dBm |

## RSSI

| 802.11a          | 802.11g          |
|------------------|------------------|
| 6Mbps @ -90 dBm  | 6Mbps @ -89 dBm  |
| 9Mbps @ -89 dBm  | 9Mbps @ -88 dBm  |
| 12Mbps @ -88 dBm | 12Mbps @ -88 dBm |
| 18Mbps @ -86 dBm | 18Mbps @ -86 dBm |
| 24Mbps @ -82 dBm | 24Mbps @ -82 dBm |
| 36Mbps @ -79 dBm | 36Mbps @ -79 dBm |
| 48Mbps @ -73 dBm | 48Mbps @ -75 dBm |
| 54Mbps @ -71 dBm | 54Mbps @ -73 dBm |

## Software

- Wi-Fi, WPA compatible interoperability
- Support WDS Bridge Mode, Client Mode, AP Mode on interface under each predefined operational mode
- Client Isolation supported
- Super Channel Support
- 5/10/20/40MHz Variable Channel Width
- SNMP v1/v2 support
- Support adjustable output power
- ACK Timeout setting
- User Limitation (Static Load Balancing)
- Multiple SSID, VLAN, QoS, WPA with PSK/TKIP/AES support ,WPA2 support
- 152-bit WEP support (Atheros Proprietary)
- Super A/G mode support (Atheros Proprietary)
- Bootloader Protection and Emergency Firmware Upload Code in bootloader
- Radius Support
- HTB QoS
- P2P Bandwidth Control

**Product Weight (g)**

- 341 g

**Product Size (L x W x H mm)**

- 191 x 145.5 x 29 mm



# 10

## Wireless Network Glossary

The wireless network glossary contains explanation or information about common terms used in wireless networking products. Some of information in this glossary might be outdated, please use with caution.

### **802.11a**

An IEEE specification for wireless networking that operates in the 5 GHz frequency range (5.15 GHz to 5.850 GHz) with a maximum of 54 Mbps data transfer rate. The 5 GHz frequency band is not as crowded as the 2.4 GHz band. In addition, the 802.11a have 12 non-overlapping channels, comparing to 802.11b/g's 3 non-overlapping channels. This means the possibility to build larger non-interfering networks. However, the 802.11a deliver shorter distance at the same output power when comparing to 802.11g.

### **802.3ad**

802.3ad is an IEEE standard for bonding or aggregating multiple Ethernet ports into one virtual port (also known as trunking) to increase the bandwidth.

### **802.3af**

This is the PoE (Power over Ethernet) standard by IEEE committee. 802.3af uses 48V POE standard that can deliver up to 100 meter distance over Ethernet cable.

**802.11b**

International standard for wireless networking that operates in the 2.4 GHz frequency band (2.4 GHz to 2.4835 GHz) and provides a throughput up to 11 Mbps.

**802.1d STP**

Spanning Tree Protocol. It is an algorithm to prevent network from forming. The STP protocol allows net work to provide a redundant link in the event of a link failure. It is advise to turn on this option for multi-link bridge network.

**802.11d**

Also known as “Global Roaming”. 802.11d is a standard for use in countries where systems using other standards in the 802.11 family are not allowed to operate.

**802.11e**

The IEEE QoS standard for prioritizing traffic of the VoIP and multimedia applications. The WMM is based on a subset of the 802.11e.

**802.11g**

A standard provides a throughput up to 54 Mbps using OFDM technology. It also operates in the 2.4 GHz frequency band as 802.11b. 802.11g devices are backward compatible with 802.11b devices.

**802.11h**

This IEEE standard define the TPC (transmission power control) and DFS(dynamic frequency selection) required to operate WiFi devices in 5GHz for EU.

### **802.11i**

The IEEE standard for wireless security. 802.11i standard includes TKIP, CCMP, and AES encryption to improve wireless security. It is also known as WPA2.

### **802.1Q Tag VLAN**

In 802.1Q VLAN, the VLAN information is written into the Ethernet packet itself. Each packet carries a VLAN ID (called Tag) as it traveled across the network. Therefore, the VLAN configuration can be configured across multiple switches. In 802.1Q spec, possible 4096 VLAN ID can be created. Although for some devices, they can only view in frames of 256 ID at a time.

### **802.1x**

802.1x is a security standard for wired and wireless LANs. In the 802.1x parlance, there are usually supplicants (client), authenticator (switch or AP), and authentication server (radius server) in the network. When a supplicant requests a service, the authenticator will pass the request and wait for the authentication server to grant access and register accounting. The 802.1x is the most widely used method of authentication by WISP.

### **Adhoc**

A Peer-to-Peer wireless network. An Adhoc wireless network does not use wireless AP or router as the central hub of the network. Instead, wireless clients are connected directly to each other. The disadvantage of Adhoc network is the lack of wired interface to Internet connections. It is not recommended for network more than 2 nodes.

### **Access Point (AP)**

The central hub of a wireless LAN network. Access Points have one or more Ethernet ports that can connect devices (such as Internet connection) for sharing. Multi-function Access Point can also function as an Ethernet client, wireless bridge, or repeat signals from other AP. Access Points typically have more wireless functions compared to wireless routers.

## **ACK Timeout**

Acknowledgement Timeout Windows. When a packet is sent out from one wireless station to the other, it will wait for an Acknowledgement frame from the remote station. The station will only wait for a certain amount of time; this time is called the ACK timeout. If the ACK is NOT received within that timeout period then the packet will be re-transmitted resulting in reduced throughput. If the ACK setting is too high then throughput will be lost due to waiting for the Ack Window to timeout on lost packets. If the ACK setting is too low then the ACK window will have expired and the returning packet will be dropped, greatly lowering throughput. By having the ability to adjust the ACK setting we can effectively optimize the throughput over long distance links. This is especially true for 802.11a and 802.11g networks. Setting the correct ACK timeout value needs to consider 3 factors: distance, AP response time, and interference. The A.DUO provides ACK adjustment capability in form of either distance or direct input. When you enter the distance parameter, the A.DUO will automatically calculate the correct ACK timeout value.

## **Bandwidth Management**

Bandwidth Management controls the transmission speed of a port, user, IP address, and application. Router can use bandwidth control to limit the Internet connection speed of individual IP or Application. It can also guarantee the speed of certain special application or privileged IP address - a crucial feature of QoS (Quality of Service) function. The A.DUO's features both "Per-user Bandwidth Control" and "Total Bandwidth Control". "Per-user Bandwidth Control" allow administrator to define the maximum bandwidth of each user by IP, IP Group, or MAC address. Total Bandwidth defines the maximum bandwidth of wireless or Ethernet interface.

## **Bootloader**

Bootloader is the under layering program that will start at the power-up before the device loads firmware. It is similar to BIOS on a personal computer. When a firmware crashed, you might be able to recover your device from bootloader.

## **Bridge**

A product that connects 2 different networks that uses the same protocol. Wireless bridges are commonly used to link network across remote buildings. For wireless application, there are 2 types of Bridges. WDS Bridge can be used in Point-to-Point or Point-to-Multipoint topology. Bridge Infrastructure works with AP mode to form a star topology.

## **Cable and Connector Loss**

During wireless design and deployment, it is important to factor in the cable and connector loss. Cable and connector loss will reduce the output power and receiver sensitivity of the radio at connector end. The longer the cable length is, the more the cable loss. Cable loss should be subtracted from the total output power during distance calculation. For example, if the cable and connector loss is 3dBm and the output power is 20dBm; the output power at the cable end is only 17dBm.

## **Client**

Client means a network device or utility that receives service from host or server. A client device means end user device such as wireless cards or wireless CPE.

## **CPE Devices**

CPE stands for Customer Premises Equipment. A CPE is a device installed on the end user's side to receive network services. For example, on an ADSL network, the ADSL modem/router on the subscriber's home is the CPE device. Wireless CPE means a complete Wireless (usually an AP with built-in Antenna) that receive wireless broadband access from the WISP. The opposite of CPE is CO.

## **CTS**

Clear To Send. A signal sent by a device to indicate that it is ready to receive data.

## **DDNS**

Dynamic Domain Name System. An algorithm that allows the use of dynamic IP address for hosting Internet Server. A DDNS service provides each user account with a domain name. A router with DDNS capability has a built-in DDNS client that updates the IP address information to DDNS service provider whenever there is a change. Therefore, users can build website or other Internet servers even if they don't have fixed IP connection.

## **DHCP**

Dynamic Hosting Configuration Protocol. A protocol that enables a server to dynamically assign IP addresses. When DHCP is used, whenever a computer logs onto the network, it automatically gets an IP address assigned to it by DHCP server. A DHCP server can either be a designated PC on the network or another network device, such as a router.

## **DMZ**

Demilitarized Zone. When a router opens a DMZ port to an internal network device, it opens all the TCP/UDP service ports to this particular device. The feature is used commonly for setting up H.323 VoIP or Multi-Media servers.

## **DNS**

A program that translates URLs to IP addresses by accessing a database maintained on a collection of Internet servers.

## **Domain Name**

The unique name that identifies an Internet site. Domain Names always have 2 or more parts, separated by dots. In [www.airlive.com](http://www.airlive.com), the "airlive.com" is the domain name.

### **DoS Attack**

Denial of Service. A type of network attack that floods the network with useless traffic. Many DoS attacks, such as the Ping of Death and Teardrop attacks, exploit limitations in the TCP/IP protocols.

### **Encryption**

Encoding data to prevent it from being read by unauthorized people. The common wireless encryption schemes are WEP, WPA, and WPA2.

### **ESSID (SSID)**

The identification name of an 802.11 wireless network. Since wireless network has no physical boundary like wired Ethernet network, wireless LAN needs an identifier to distinguish one network from the other. Wireless clients must know the SSID in order to associate with a WLAN network. Hide SSID feature disable SSID broadcast, so users must know the correct SSID in order to join a wireless network.

### **Firewall**

A system that secures a network and prevents access by unauthorized users. Firewalls can be software, router, or gateway. Firewalls can prevent unrestricted access into a network, as well as restricting data from flowing out of a network.

### **Firmware**

The program that runs inside embedded device such as router or AP. Many network devices are firmware upgradeable through web interface or utility program.

## **FTP**

File Transfer Protocol. A standard protocol for sending files between computers over a TCP/IP network and the Internet.

## **Fragment Threshold**

Frame Size larger than this will be divided into smaller fragment. If there are interferences in your area, lower this value can improve the performance. If there are not, keep this parameter at higher value. The default size is 2346. You can try 1500, 1000, or 500 when there are interference around your network.

## **Full Duplex**

The ability of a networking device to receive and transmit data simultaneously. In wireless environment, this is usually done with 2 or more radios doing load balancing.

## **Gateway**

In the global Internet network, the gateways are core routers that connect networks in different IP subnet together. In a LAN environment with an IP sharing router, the gateway is the router. In an office environment, gateway typically is a multi-function device that integrates NAT, firewall, bandwidth management, and other security functions.

## **Hotspot**

A place where you can access Wi-Fi service. The term hotspot has two meanings in wireless deployment. One is the wireless infrastructure deployment; the other is the Internet access billing system. In a hotspot system, a service provider typically need an authentication and account system for billing purposes, and a wireless AP network to



provide access for customers.

### **IGMP Snooping**

Internet Group Management Protocol (IGMP) is a Layer 3 protocol to report IP multicast memberships to neighboring multicast switches and routers. IGMP snooping is a feature that allows an Ethernet switch to "listen in" on the IGMP conversation between hosts and routers. A switch support IGMP snooping has the possibility to avoid multicast traffic being treated as broadcast traffic; therefore, reducing the overall traffic on the network.

### **Infrastructure Mode**

A wireless network that is built around one or more access points to provide wireless clients access to wired LAN / Internet service. The opposite of Infrastructure mode is Adhoc mode.

### **IP address**

IP (Internet Protocol) is a layer-3 network protocol that is the basis of all Internet communication. An IP address is 32-bit number that identifies each sender or receiver of information that is sent across the Internet. An IP address has two parts: an identifier of a particular network on the Internet and an identifier of the particular device (which can be a server or a workstation) within that network. The new IPv6 specification supports 128-bit IP address format.

### **IPsec**

IP Security. A set of protocols developed by the IETF to support secure exchange of packets at the IP layer. IPsec has been deployed widely to implement Virtual Private Networks (VPNs). IPsec supports two encryption modes: Transport and Tunnel. Transport mode encrypts only the data of each packet, but leaves the header untouched.

The more secure Tunnel mode encrypts both the header and the payload. On the receiving side, an IPSec-compliant device decrypts each packet.

### **LACP (802.3ad) Trunking**

The 802.3ad Link Aggregation standard defines how to combine the several Ethernet ports into one high-bandwidth port to increase the transmission speed. It is also known as port trunking. Both devices must set the trunking feature to work.

### **MAC**

Media Access Control. MAC address provides layer-2 identification for Networking Devices. Each Ethernet device has its own unique address. The first 6 digits are unique for each manufacturer. When a network device have MAC access control feature, only the devices with the approved MAC address can connect with the network.

### **Mbps**

Megabits per Second. One million bits per second; a unit of measurement for data transmission

### **MESH**

Mesh is an outdoor wireless technology that uses Spanning Tree Protocol (STP) and Wireless Distribution system to achieve self-forming, self-healing, and self-configuring outdoor network. MESH network are able to take the shortest path to a destination that does not have to be in the line of site.

### **MIMO**

Multi In Multi Out. A Smart Antenna technology designed to increase the coverage and performance of a WLAN network. In a MIMO device, 2 or more antennas are used to increase the receiver sensitivity and to focus available power at intended Rx.

**NAT**

Network Address Translation. A network algorithm used by Routers to enables several PCs to share single IP address provided by the ISP. The IP that a router gets from the ISP side is called Real IP, the IP assigned to PC under the NAT environment is called Private IP.

**Node**

A network connection end point, typically a computer.

**Packet**

A unit of data sent over a network.

**Passphrase**

Used much like a password, a passphrase simplifies the WEP encryption process by automatically generating the WEP encryption keys for the company products.

**POE**

Power over Ethernet. A standard to deliver both power and data through one single Ethernet cable (UTP/STP). It allows network device to be installed far away from power source. A POE system typically compose of 2 main component: DC Injector (Base Unit) and Splitter(Terminal Unit). The DC injector combines the power and data, and the splitter separates the data and power back. A PoE Access Point or CPE has the splitter built-in to the device. The IEEE 802.3af is a POE spec that uses 48 volt to deliver power up to 100 meter distance.

## Port

This word has 2 different meaning for networking.

- The hardware connection point on a computer or networking device used for plugging in a cable or an adapter.
- The virtual connection point through which a computer uses a specific application on a server.

## PPPoE

Point-to- Point Protocol over Ethernet. PPPoE relies on two widely accepted standards: PPP and Ethernet. PPPoE is a specification for connecting the users on an Ethernet to the Internet through a common broadband medium, such as a single DSL line, wireless device or cable modem.

## PPTP

Point-to-Point Tunneling Protocol: A VPN protocol developed by PPTP Forum. With PPTP, users can dial in to their corporate network via the Internet. If users require data encryption when using the Windows PPTP client, the remote VPN server must support MPPE (Microsoft Point-To-Point Encryption Protocol) encryption. PPTP is also used by some ISP for user authentication, particularly when pairing with legacy Alcatel / Thomson ADSL modem.

## Preamble Type

Preamble are sent with each wireless packet transmit for transmission status. Use the long preamble type for better compatibility. Use the short preamble type for better performance

## Rate Control

Ethernet switches' function to control the upstream and downstream speed of an individual port. Rate Control management uses "Flow Control" to limit the speed of a port. Therefore, the Ethernet adapter must also have the flow control enabled. One way to force the adapter's flow control on is to set a port to half-duplex mode.

## **RADIUS**

Remote Authentication Dial-In User Service. An authentication and accounting system used by many Internet Service Providers (ISPs). When you dial in to the ISP, you must enter your username and password. This information is passed to a RADIUS server, which checks that the information is correct, and then authorizes access to the ISP system. Radius typically uses port 1812 and port 1813 for authentication and accounting port. Though not an official standard, the RADIUS specification is maintained by a working group of the IETF.

## **Receiver Sensitivity**

Receiver sensitivity means how sensitive is the radio for receiving signal. In general; the slower the transmission speed, the more sensitive the radio is. The unit for Receiver Sensitivity is in dB; the lower the absolute value is, the higher the signal strength. For example, -50dB is higher than -80dB.

## **RJ-45**

Standard connectors for Twisted Pair copper cable used in Ethernet networks. Although they look similar to standard RJ-11 telephone connectors, RJ-45 connectors can have up to eight wires, whereas telephone connectors have only four.

## **Router**

An IP sharing router is a device that allows multiple PCs to share one single broadband connection using NAT technology. A wireless router is a device that combines the functions of wireless Access Point and the IP sharing router.

## **RSSI**

Receiver Sensitivity Index. RSSI is a value to show the Receiver Sensitivity of the remote wireless device. In general, remote APs with stronger signal will display higher RSSI values. For RSSI value, the smaller the absolute value is, the stronger the signal. For example, “-50db” has stronger signal than “-80dB”. For outdoor connection, signal stronger than -60dB is considered as a good connection.

## **RTS**

Request To Send. A packet sent when a computer has data to transmit. The computer will wait for a CTS (Clear To Send) message before sending data.

## **RTS Threshold**

RTS (Request to Send). The RTS/CTS(clear to send) packet will be send before a frame if the packet frame is larger than this value. Lower this value can improve the performance if there are many clients in your network. You can try 1500, 1000 or 500 when there are many clients in your AP's network.

## **SNMP**

Simple Network Management Protocol. A set of protocols for managing complex networks. The SNMP network contains 3 key elements: managed devices, agents, and network-management systems (NMSs). Managed devices are network devices that content SNMP agents. SNMP agents are programs that reside SNMP capable device's firmware to provide SNMP configuration service. The NMS typically is a PC based software such as HP Openview that can view and manage SNMP network device remotely.

## **SSH**

Developed by SSH Communications Security Ltd., Secure Shell is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another. It provides strong authentication and secure communications over insecure channels. It is a replacement for rlogin, rsh, rcp, and rdist.

## **SSL**

Secure Sockets Layer. It is a popular encryption scheme used by many online retail and banking sites to protect the financial integrity of transactions. When an SSL session begins, the server sends its public key to the browser. The browser then sends a randomly generated secret key back to the server in order to have a secret key exchange for that session. SSL VPN is also known as Web VPN. The HTTPS and SSH management interface use SSL for data encryption.

## **Subnet Mask**

An address code mask that determines the size of the network. An IP subnet are determined by performing a BIT-wise AND operation between the IP address and the subnet mask. By changing the subnet mask, you can change the scope and size of a network.

## **Subnetwork or Subnet**

Found in larger networks, these smaller networks are used to simplify addressing between numerous computers. Subnets connect to the central network through a router, hub or gateway. Each individual wireless LAN will probably use the same subnet for all the local computers it talks to.

## **Super A**

Super A is an Atheros proprietary turbo mode to increase speed over standard 802.11a mode. It adds Bursting and Compression to increase the speed. If you live in countries that prohibit the channel binding technology (i.e. Europe), you should choose "Super-A without Turbo) if you need more speed than 11a mode

## **TCP**

A layer-4 protocol used along with the IP to send data between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the packets that a message is divided into for efficient routing through the Internet.

## **Turbo A**

Turbo A is an Atheros proprietary turbo mode to increase speed over standard 802.11a mode. It uses channel binding technology to increase speed. There are 2 types of Turbo A modes: Dynamic Turbo and Static Turbo. In Dynamic Turbo, the channel binding will be used only if necessary. In Static Turbo, the channel binding is always on. This protocol may be combined with Super-A model to increase the performance even more. The used of channel binding might be prohibited in EU countries.

## **TX Output Power**

Transmit Output Power. The TX output power means the transmission output power of the radio. Normally, the TX output power level limit for 2.4GHz 11g/b is 20dBm at the antenna end. The output power limit for 5GHz 802.11a is 30dBm at the antenna end.

## **UDP**

User Datagram Protocol. A layer-4 network protocol for transmitting data that does not require acknowledgement from the recipient of the data.



## **Upgrade**

To replace existing software or firmware with a newer version.

## **Upload**

To send a file to the Internet or network device.

## **URL**

Uniform Resource Locator. The address of a file located on the Internet.

## **VPN**

Virtual Private Network. A type of technology designed to increase the security of information transferred over the Internet. VPN creates a private encrypted tunnel from the end user's computer, through the local wireless network, through the Internet, all the way to the corporate network.

## **Walled Garden**

On the Internet, a walled garden refers to a browsing environment that controls the information and Web sites the user is able to access. This is a popular method used by ISPs in order to keep the user navigating only specific areas of the Web

## **WAN**

Wide Area Network. A communication system of connecting PCs and other computing devices across a large local, regional, national or international geographic area. A WAN port on the network device means the port (or wireless connection) that is connected to the Internet side of the network topology.

**WEP**

Wired Equivalent Privacy. A wireless encryption protocol. WEP is available in 40-bit (64-bit), 108-bit (128-bit) or 152-bit (Atheros proprietary) encryption modes.

**Wi-Fi**

Wireless Fidelity. An interoperability certification for wireless local area network (LAN) products based on the IEEE 802.11 standards. The governing body for Wi-Fi is called Wi-Fi Alliance (also known as WECA).

**WiMAX**

Worldwide Interoperability for Microwave Access. A Wireless Metropolitan Network technology that complies with IEEE 802.16 and ETSI Hiperman standards. The original 802.16 standard call for operating frequency of 10 to 66Ghz spectrum. The 802.16a amendment extends the original standard into spectrum between 2 and 11 Ghz. 802.16d increase data rates to between 40 and 70 Mbps/s and add support for MIMO antennas, QoS, and multiple polling technologies. 802.16e adds mobility features, narrower bandwidth (a max of 5 mhz), slower speed and smaller antennas. Mobility is allowed up to 40 mph.

**WDS**

Wireless Distribution System. WDS defines how multiple wireless Access Point or Wireless Router can connect together to form one single wireless network without using wired uplinks. WDS associate each other by MAC address, each device

**WLAN**

Wireless Local Area Network. A type of local-area network that uses high-frequency radio waves rather than wires to communicate between nodes. The most popular standard for WLAN is the 802.11 standards.

**WMM**

Wi-Fi Multimedia (WMM) is a standard to prioritize traffic for multimedia applications. The WMM prioritize traffic on Voice-over-IP (VoIP), audio, video, and streaming media as well as traditional IP data over the AP.

**WMS**

Wireless Management System. An utility program to manage multiple wireless AP/Bridges.

**WPA**

Wi-Fi Protected Access. It is an encryption standard proposed by WiFi for advance protection by utilizing a password key (TKIP) or certificate. It is more secure than WEP encryption. The WPA-PSK utilizes pre-share key for encryption/authentication.

**WPA2**

Wi-Fi Protected Access 2. WPA2 is also known as 802.11i. It improves on the WPA security with CCMP and AES encryption. The WPA2 is backward compatible with WPA. WPA2-PSK utilizes pre-share key for encryption/authentication.