Air Live®
www.airlive.com

WH-5000A

802.11a/b/g Wireless Outdoor AP

User's Manual

Declaration of Conformity

We, Manufacturer/Importer

OvisLink Corp.
5F., NO.6, Lane 130, Min-Chuan Rd.,
Hsin-Tien City, Taipei County, Taiwan

Declare that the product

AirGuard Wireless Access Point

WH-5000A

is in conformity with

In accordance with 89/336 EEC-EMC Directive and 1999/5 EC-R & TTE Directive

Clause	**Description**
■ **EN 301 893 v1.2.3 :2003**	Broadband Radio Access Network(BRAN); 5GHz high performance RLAN; Harmonized EN Covering essential requirements of Article 3.2 of the R&TTE Directive.
■ **EN 300 328 V1.6.1 :2004**	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission equipment operating in the 2.4GHz ISM band And using spread spectrum modulation techniques; Part 1：technical Characteristics and test conditions Part2：Harmonized EN covering Essential requirements under article 3.2 of the R&TTE Directive
■ **EN 301 489-1 V1.4.1 :2002** ■ **EN 301 489-17 V1.2.1 :2002**	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility(EMC) standard for radio equipment And services; Part 17：Specific conditions for wideband data and HIPERLAN equipment
■ **EN 55022: 1998/A1 :2000/A2:2003**	Limits and methods of measurement of radio disturbance characteristics of information technology equipment
■ **EN 55024:1998/A1 :2001/A2:2003**	Information Technology equipment-Immunity characteristics-Limits And methods of measurement
■ **EN 50385:2002**	Product standard to demonstrate the Compliance of radio base stations and Fixed terminal stations for wireless Telecommunication System with the Basic restrictions or the reference levels related to human exposure to radio Frequency electromagnetic fields (110 MHz – 40 GHz) - General public
■ **EN 60950-1:2001/ A11:2004**	Safety for information technology equipment including electrical business equipment
■ **CE marking**	CE (!)

Manufacturer/Importer

Albert Y

Signature：
Name ： **Albert Yeh**
Position/ Title ： **Vice President**

Date： **2007/2/9**

(Stamp)

WH-5000A CE Declaration Statement

Country	Declaration	Country	Declaration
cs Česky [Czech]	OvisLink Corp. tímto prohlašuje, že tento WH-5000A je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.	**lt** Lietuvių [Lithuanian]	Šiuo OvisLink Corp. deklaruoja, kad šis WH-5000A atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
da Dansk [Danish]	Undertegnede OvisLink Corp. erklærer herved, at følgende udstyr WH-5000Aoverholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.	**nl** Nederlands [Dutch	Hierbij verklaart OvisLink Corp. dat het toestel WH-5000A in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
de Deutsch [German]	Hiermit erklärt OvisLink Corp., dass sich das Gerät WH-5000Ain Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.	**mt** Malti [Maltese]	Hawnhekk, OvisLink Corp, jiddikjara li dan WH-5000A jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
et Eesti [Estonian]	Käesolevaga kinnitab OvisLink Corp. seadme WH-5000A vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.	**hu** Magyar [Hungarian]	Alulírott, OvisLink Corp nyilatkozom, hogy a WH-5000A megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
en English	Hereby, OvisLink Corp., declares that this WH-5000A is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.	**pl** Polski [Polish]	Niniejszym OvisLink Corp oświadcza, że WH-5000A jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
es Español [Spanish]	Por medio de la presente OvisLink Corp. declara que el WH-5000Acumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.	**pt** Português [Portuguese]	OvisLink Corp declara que este WH-5000Aestá conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ OvisLink Corp. ΔΗΛΩΝΕΙ ΟΤΙ WH-5000A ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.	**sl** Slovensko [Slovenian]	OvisLink Corp izjavlja, da je ta WH-5000A v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
fr Français [French]	Par la présente OvisLink Corp. déclare que l'appareil WH-5000A est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE	**sk** Slovensky [Slovak]	OvisLink Corp týmto vyhlasuje, že WH-5000A spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
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lv Latviski [Latvian]	Ar šo OvisLink Corp. deklarē, ka WH-5000A atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.	Íslenska [Icelandic]	Hér með lýsir OvisLink Corp yfir því að WH-5000A er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 1999/5/EC.
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A copy of the full CE report can be obtained from the following address:

OvisLink Corp.
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WH-5000A Serials User Guide

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WH-5000A Serials User Guide

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Chapter 1: Introduce

1.1 Introduce

The AirLive WH-5000A is a Secure IEEE 802.11 a/b/g Wireless LAN device and supports three different operating modes:

- Wireless Access Point (WAP)
- Wireless Client (STA), and
- Wireless Bridge (WDS)

The WH-5000A is designed as a high security wireless network device. They are with the following cryptographic modules: **WEP (64,128or 152 bits)**, **WPA (TKIP)** or **WPA2 (AES)** in AP mode, and **AES-CCMP (128 bits)**

for the bridging mode; and HTTPS/TLS for secure web communication. Moreover, the WH-5000A provides the wireless client MAC address filtering, Rogue AP detection to protect your wireless network.

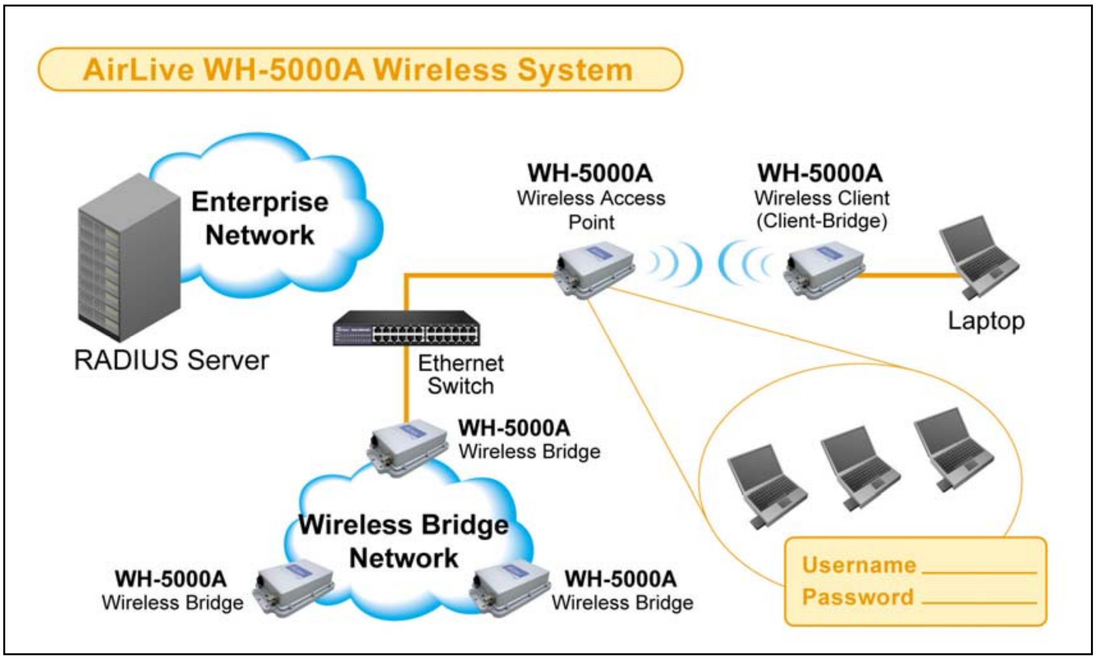
With support of 802.11 a/b/g standards, the WH-5000A works at 2.4GHz (802.11b/g) and 5GHz (802.11a). Besides with 54Mbps transmit data rate of 802.11 a/g and 11Mbps transmit data rate of 802.11b, the WH-5000A also provides **Super G / Turbo A** function. (Turbo A mode doesn't support at ETSI domain region.) the

802.11g Super and 802.11a Turbo technologies provide speed and throughput of more than double standard wireless LAN technologies in networking products. The Maximum link speed available is 108Mbps and the typical maximum end-user throughput ranges from approximately 40Mbps to 60+Mbps, depending on application demand and network environment.

The others features are AP load balance, AP layer 2 isolation and Bridge Site Map.

The following figure illustrates a wireless system using the WH-5000A in al three

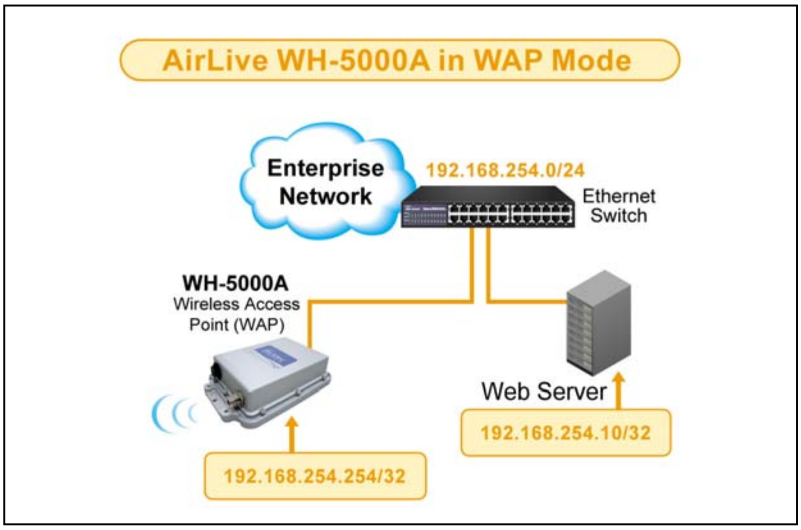
modes.



1.2 Wireless Access Point Mode (WAP)

In the wireless access point mode, you can use the AirLive WH-5000A to connect wireless communication devices together to create a wireless network. The AirLive WH-5000A is usually connected to a wired network and can relay data between devices on each side. In Wireless Access Point (WAP) mode the WAN interface has to con- nect to a backbone Ethernet switch in order to operate normally. It bridges the backbone Ethernet network and wireless interface. The following diagram is an example of WAP mode network topology.

There is numerous security methods provided in this mode, including WEP, WPA (TKIP and AES-CCM) and WPA2 (TKIP and AES-CCM) are available. The AirLive WH-5000A also supports EAP-MD5, EAP-TTLS, EAP-TLS, PEAP, EAP-SIM protocols.



1.3 Wireless Bridging Mode (WDS)

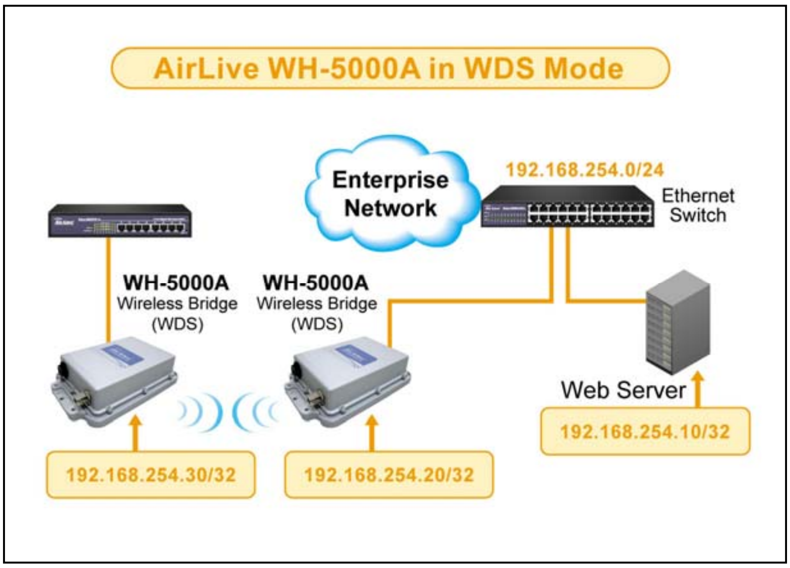
In Wireless Bridging (WDS) mode the WAN interface may or may not need to connect to a backbone Ethernet switch. It depends on needs of infrastructure network. The Wireless Bridging Mode function extends the network from an existing wired network easily without altering the network topology.

The following diagram is an example of WDS mode network topology.

This type of infrastructure is decentralized. As each node needs only transmit as far as the next node. Nodes act as repeaters to transmit data from nearby nodes to peers that are too far away to reach, resulting in a network that can span large distances.

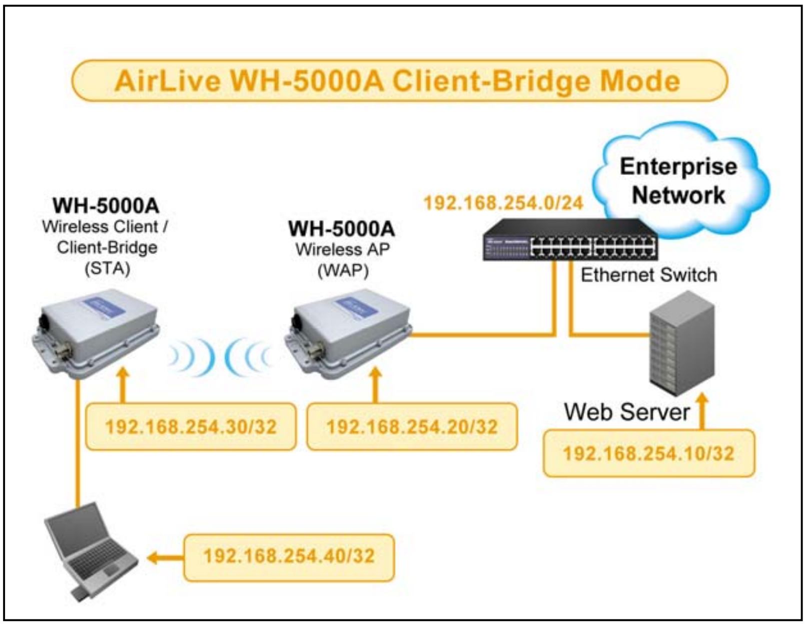
In bridging mode,
the AirLive WH-5000A

supports AES-CCM for security



1.4 Wireless Client Mode (STA)

The AirLive WH-5000A can operate as a client device that communicates with a wireless access point. It supports 802.11a/b/g bands. In Wireless Client mode, the WAN interface is NOT design for a backbone network connection. It is the interface for computer connected to it. The following diagram an example of WDS mode network topology.



There is numerous security methods provided in this mode, including WEP, WPA (TKIP and AES-CCM) and WPA2 (TKIP and AES-CCM) are available.

1.5 Product Features

1.5.1 Basic Features

- Single Radio Module
  - Support 802.11 a/b/g (2.4GHz / 5GHz Band)
  - Support Super G and Turbo A mode
- Multifunction functions:
  - Wireless Access Point (WAP)
  - Wireless Bride (WDS)
    - Point to Point
    - Point to Multi-Point
  - Wireless Client (STA) (default mode)

1.5.2 Wireless Features

- AP
  - Disable SSID broadcast
  - MAC address filtering (MAC address Authentication)
  - Wireless client information (MAC address, Signal Strength, Transmit rate) list
  - Adjacent AP list
  - Rogue AP detection
  - Load Balancing
  - Layer 2 isolation
  - Support SNMP V1/ V2/ V3
- Bridge
  - Point-to-Point and Point-to-Multi Point Bridge
  - Bridge site map
  - Adjustable ACK timing
- Radio
  - Support IEEE 802.11a/b/g
  - Adjustable Radio Power
  - Automatically optimal channel selection in 2.4GHz frequency band

1.5.3 Security Features

- Configuration through HTTPS/TLS secure web
- AP
  - WEP: (64-bit, 128-bit and 152-bit)
  - WPA
    - ❶ Pre-shared key
    - ❶ TKIP/AES-CCMP
  - WPA2 (802.11i)
  - MAC based authentication (MAC address filtering)
  - In band Rouge AP detection
- Bridge
  - AES-CCMP for wireless (128 bits)
- Client
  - WEP: (64-bit, 128-bit and 152-bit)
  - WPA
    - ❶ Pre-shared key
    - ❶ TKIP/AES-CCMP
  - WPA2 (802.11i)

1.6 Radio Characteristic

- **802.11b**
  - Frequency band:
    - American (FCC): 2.412 ~ 2.462GHz (11 channels)
    - Europe (ETSI): 2.412 ~ 2.472GHz (13 channels)
  - Data Rate:
    - 1, 2, 5.5, 11Mbps
  - Modulation:
    - Direct Sequence Spread Spectrum (DSSS)
    - Differential Binary Phase Shift Keying (DBPSK) at 1 Mbps
    - Differential Quadrature Phase Shift Keying (DQPSK) at 2Mbps
    - Complementary Code Keying (CCK) at 5.5 and 11 Mbps
  - Transmit Output Power (Typical):
    - 18 dBm for all rates

    ⚠ **Note:** Maximum power setting will vary according to individual country regulations.
  - Receive Sensitivity (Typical):
    - -93dBm at 1Mbps
    - -88dBm at 11Mbps
- **802.11g**
  - Frequency band:
    - American (FCC): 2.412 ~ 2.462GHz (11 channels)
    - Europe (ETSI): 2.412 ~ 2.462GHz (13 channels)
  - Data rate:
    - 6, 9, 12, 18, 24, 36,48, 54 Mbps
    - 72, 96, 108 Mbps (Super G mode)
  - Modulation:
    - Orthogonal Frequency Divisional Multiplexing (OFDM)
    - BPSK at 6 and 9 Mbps
    - QPSK at 12 and 18 Mbps
    - 16-quadrature amplitude modulation (QAM) at 24 and 36Mbps
    - 64-QAM at 48 and 54Mbps
  - Transmit Output Power (Typical):
    - 18 dBm at 6 ~ 24Mbps
    - 18 dBm at 36Mbps
    - 17 dBm at 48Mbps
    - 16 dBm at 54Mbps

    ⚠ **Note:** Maximum power setting will vary according to individual country regulations.
  - Receive Sensitivity (Typical):
    - -89dBm at 6Mbps
    - -73dBm at 48Mbps
    - -70dBm at 54Mbps

- **802.11a**
  - Frequency band
    - 5.25 ~ 5.35GHz/5.725 ~ 5.825GHz

    ⚠ **Note:** Frequency band setting will vary according to individual country regulations.
  - Data rate:
    - 6, 9, 12, 18, 24, 36,48, 54 Mbps
    - 72, 96, 108 Mbps (Super A mode)
  - Modulation:
    - Orthogonal Frequency Divisional Multiplexing (OFDM)
    - BPSK at 6 and 9 Mbps
    - QPSK at 12 and 18 Mbps
    - 16-quadrature amplitude modulation (QAM) at 24 and 36Mbps
    - 64-QAM at 48 and 54Mbps
  - Transmit Output Power (Typical):
    - 18 dBm at 6 ~ 24Mbps
    - 16 dBm at 36Mbps
    - 15 dBm at 48Mbps
    - 14 dBm at 54Mbps

    ⚠ **Note:** Maximum power setting will vary according to individual country regulations.
  - Receive Sensitivity (Typical):
    - -84dBm at 6Mbps
    - -70dBm at 48Mbps
    - -68dBm at 54Mbps

1.7 LED indicator definition

LED	Description
Power	If this light is on, the unit is on; If it is not on, the unit is off
WAN	If this light is on, the unit is connected to network If it is off, the unit does not have an active connection to network
WLAN	The light is on for indicate the WLAN is active. The light is blinking to indicates data transmission 1. LED blink slowly (every 1 second): there is a connection and signal quality is poor 2. LED blink fast: there is a connection, and the signal quality is good 3. LED steady: there is connection, and the signal quality is excellent

1.8 Operation Temperature

- 0 degree ~ 50 degree C

1.9 Appearance

- RJ45 x1
- SMA antenna connector x1
- Reset Button
- LED indictor x3 – Power, WAN, WLAN
- DC IN jack

Chapter 2 Start to Configuration

The manual deals only and specifically with the single WH-5000A device as a unit. The purpose of this chapter is the description of the device and its identifiable parts so that the user is sufficiently familiar to interact with the physical unit. Preliminary setup information provided below is intended for information and instruction of the wireless LAN system administration personnel.

It is intended, and is the philosophy of the manufacturer, that the user not be required to open the individual unit. Any maintenance required is limited to the external enclosure surface, cable connections and to the management software only. A failed unit should be returned to the manufacturer for maintenance.

2.1 Before Configuration

The WH-5000A is designed to be attached to the wall at appropriate locations. To complete the configuration, you should have at least the following components:

- PCs with one of the following operation systems installed: Windows NT 4.0, Windows 2000 or Windows XP;
- A compatible IEEE 802.11a/b/g PC card or device for each computer that you wish to wirelessly connect to your wireless network;
- Access to one laptop or PC with an Ethernet card and cable that can be used to complete the initial configuration of the unit;
- A Web browser program, such as Microsoft Internet Explorer 5.5 or later, or Netscape 6.2 or later, installed on the PC or laptop you will be using to configure the Access Point

After prepare above components, you may need the following information to login configure web pages:

- Default IP address of the AirLive WH-5000A (192.168.254.254)
- Default Username and Password are:
  - Username: airlive
  - Password: airlive
- The appropriate encryption key.

If you need to change WH-5000A IP later, you may need following information:

- IP address – a list of IP addresses available on the organization's LAN that are available to be used
- IP address – a list of IP addresses available on the organization's LAN that are available to be used for assignment to the AirLive WH-5000A
- Subnet Mask for the LAN
- DNS IP address

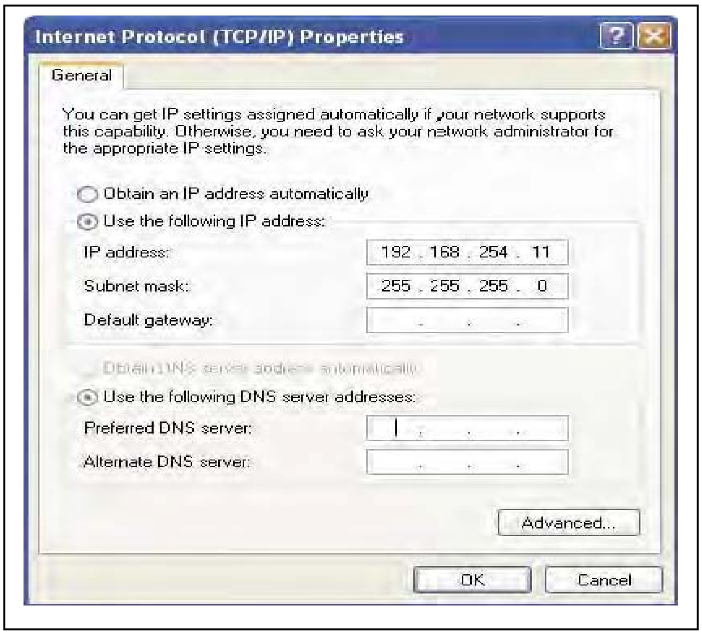
If you need to use bridge mode or MAC address filtering function, you may need following information:

- The MAC addresses of all the wireless cards that will be used to access the AirLive WH-5000A network of access points

2.2 Computer's IP setting

Plug one end of a CAT5 Ethernet cable to the RJ45 connector of the WH-5000A and the other end to the Ethernet port on your computer. In order to connect properly to the AirLive WH-5000A on the WAN port, the TCP/IP parameters on your laptop/PC must be set to a static IP address. Go to your network connection settings and modify your laptop/PC's LAN connection TCP/IP properties.

Set the IP address and subnet mask. The IP address can be in the range of 192.168.254.xxx, where xxx can be from 2 to 199.



Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 254 . 11

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

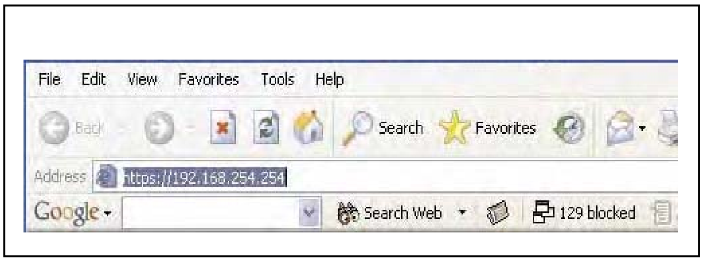
Preferred DNS server: . . .

Alternate DNS server: . . .

Now you can open a browser and connect to the AirLive WH-5000A to begin configuring the unit.

2.3 Login

On your computer, pull up a browser window and put the default URL **https://192.168.254.254** for the WH-5000A in the address line.



Address https://192.168.254.254

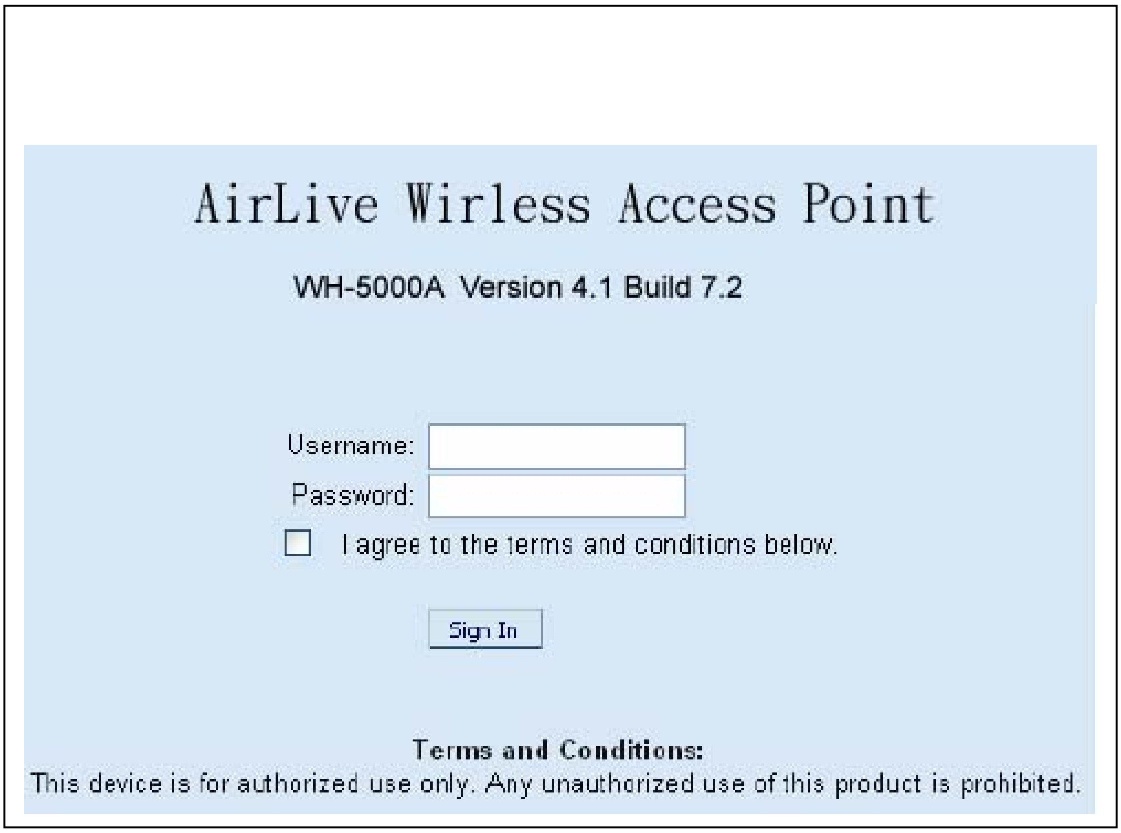
⚠ **Note:**

Be sure that you use the **https** prefix, not **http**

The Login window appears.

It will be asked for your User Name and Password. The default User Name is "**airlive**" with the password "**airlive**" to give full access for setup configuration. The ID and Password are case sensitive.

The default ID and Password initially installs and configures the AirLive WH-5000A after which the password should be changed from the default password.



AirLive Wirless Access Point

WH-5000A Version 4.1 Build 7.2

Username:

Password:

□ I agree to the terms and conditions below.

Sign In

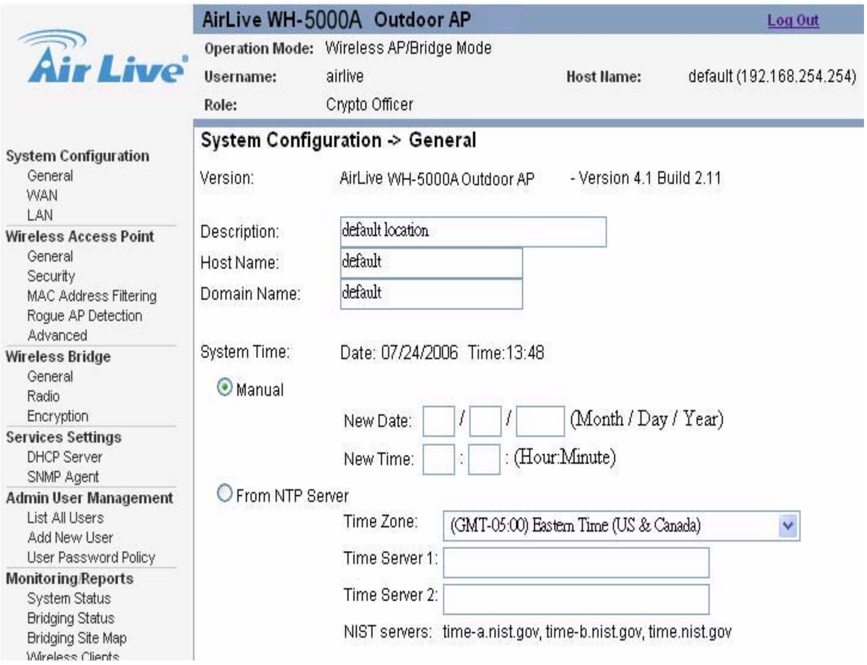
Terms and Conditions:

This device is for authorized use only. Any unauthorized use of this product is prohibited.

⚠ **Note:**

1. If your login session is in-active for more than 10 minutes, then you will have to re-authenticate your identity.
2. If the login username does not list in Crypto Officer Role group and then three times you fail to re-authenticate, your account will be locked.
3. There are two kind of user roles for WH-5000A, crypto officer and administrator. Please refer to Chapter 8 to get more detail information. The username list in Crypto Officer Role group is the only role that can unlock locked account. Once the account has been locked, use the username and password of Crypto Officer Role to log in configuration web page. Clicking Admin **User Management—List**, all Users screen displays account status. If an account is locked, it will show a status of "**Locked**" and a reason of "**bad passwd**". Then, click the “**unlock** “button at the end of the user entry to unlock it. Other none-lock accounts show status as "**Active**" and reason "**Norma**l".

If the login username and password are correct, the following figure will be showed.



Operation Mode: Wireless AP/Bridge Mode

Username: airlive   Host Name: default (192.168.254.254)

Role: Crypto Officer

System Configuration -> General

Version: AirLive WH-5000A Outdoor AP - Version 4.1 Build 2.11

Description: default location

Host Name: default

Domain Name: default

System Time: Date: 07/24/2006 Time:13:48

● Manual

New Date: □ / □ / □ (Month / Day / Year)

New Time: □ : □ : (Hour:Minute)

○ From NTP Server

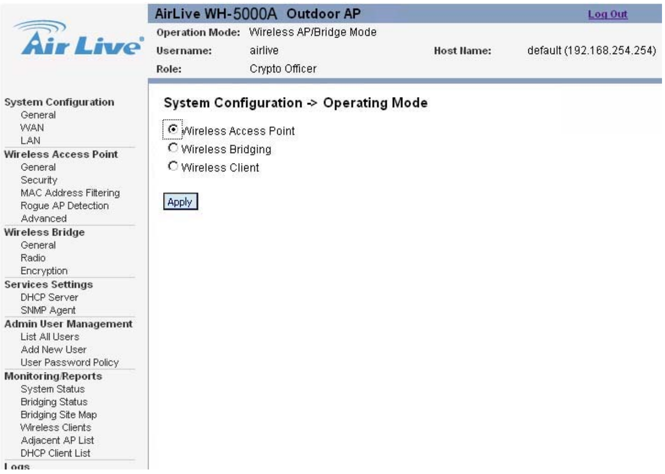
Time Zone: (GMT-05:00) Eastern Time (US & Canada)

Time Server 1: □

Time Server 2: □

NIST servers: time-a.nist.gov, time-b.nist.gov, time.nist.gov

The default operation mode is Client mode. You can select Wireless Access Point or Wireless Bridge mode at **System Configuration – Operation mode** to switch to AP or Bridge mode



Operation Mode: Wireless AP/Bridge Mode

Username: airlive   Host Name: default (192.168.254.254)

Role: Crypto Officer

System Configuration -> Operating Mode

● Wireless Access Point

○ Wireless Bridging

○ Wireless Client

2.4 Forget username, password and IP

How can you do if you had changed username, password and IP but you forget it? You can find there is a Reset button at front plane. Press this button over 8 seconds, the unit will go back as factory default setting. The username and password will back to "**airlive**" and "**airlive**", and the IP will be back to 192.168.254.254 and operation mode as Client Mode.

Chapter 3: System Configuration

The chapter describes how to do System Configuration. If you don't know how to enter configuration screen, chapter 2 describes how to do it.

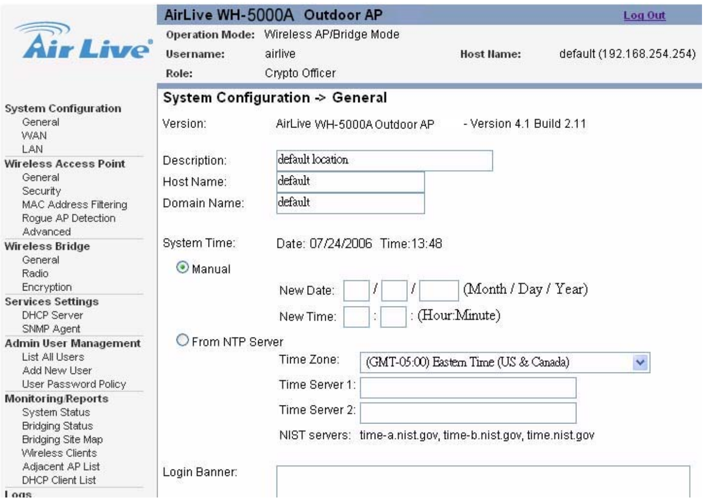
There are three options under System Configuration:

- General
- Operating Mode
- WAN

Each screen is described in detail in the following subsections.

3.1 System Configuration – General

Click the entry on the left hand navigation panel for enter **System Configuration -General**. This directs you to the System Configuration – General page.



Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

System Configuration -> General

Version: AirLive WH-5000A Outdoor AP - Version 4.1 Build 2.11

Description: default location
Host Name: default
Domain Name: default

System Time: Date: 07/24/2006 Time:13:48

● Manual
New Date: / / (Month / Day / Year)
New Time: : (Hour:Minute)

○ From NTP Server
Time Zone: (GMT-05:00) Eastern Time (US & Canada)
Time Server 1:
Time Server 2:
NIST servers: time-a.nist.gov, time-b.nist.gov, time.nist.gov

Login Banner:

This screen lists the software version number for your WH-5000A and allows you to set the Host Name and Domain Name as well as establish system date and time.

□ **Description:**

□ **Host and Domain Name:** Both set at the

□ **System Time:** You can manual key in the WH-5000A is with RTC chip to keep date and time data. It can keep system date and time data for 5 days.

⚠ **Note:** The Crypto Officer is the only user who can set the date and time. The system date must be set to a date after 01/01/2005.

□ **Login Banner:** You can modify the terms and conditions login banner on the login screen. The default is "This device is for authorized use only. Any unauthorized use of this product is prohibited."

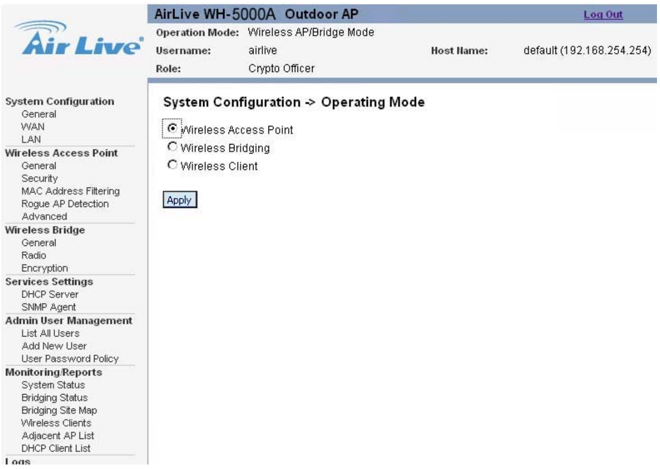
When you are satisfied with your changes, click **Apply.**

3.2 System Configuration – Operating Mode

Click the entry on the left hand navigation panel for **System Configuration – Operating Mode**. This directs you to the System Configuration – Operating page.

Select the radio of Wireless Access Point, Wireless Bridging or Wireless Client to switch
WH-5000A to AP, Bridge or Client mode and press **Apply** button.

This screen allows you to set the operating mode to Wireless Access Point, Wireless Bridge or Wireless Client mode. You only need to visit this page if you will be changing modes. Note that if you change modes your configuration will be lost.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive Host Name: default (192.168.254.254)
Role: Crypto Officer

System Configuration -> Operating Mode

● Wireless Access Point
○ Wireless Bridging
○ Wireless Client

3.3 System Configuration – WAN

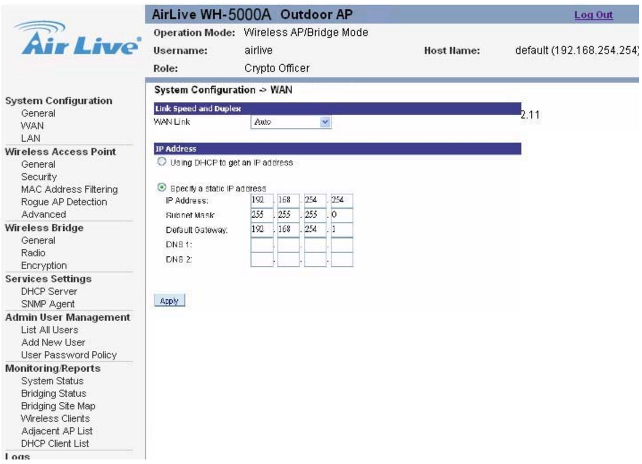
Click the entry on the left hand navigation panel for **System Configuration – WAN**. This directs you to the System Configuration – WAN page.

- **Static IP**

The default setting of WAN port IP is “Specify a static IP address”. You need input the information that the AP requires in order to allow the WH-5000A access to the wired LAN. This will be the IP address, Subnet Mask, Default Gateway, and, where needed, DNS1 and 2. The default WAN port value is

IP Address: 192.168.254.254,
Subnet Mask: 255.255.255.0,
Default Gateway: 192.168.254.1.

Static IP



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive Host Name: default (192.168.254.254)
Role: Crypto Officer

System Configuration -> WAN

Link Speed and Duplex
WAN Link: Auto

IP Address
○ Using DHCP to get an IP address
● Specify a static IP address
IP Address: 192 . 168 . 254 . 254
Subnet Mask: 255 . 255 . 255 . 0
Default Gateway: 192 . 168 . 254 . 1
DNS 1: . . .
DNS 2: . . .

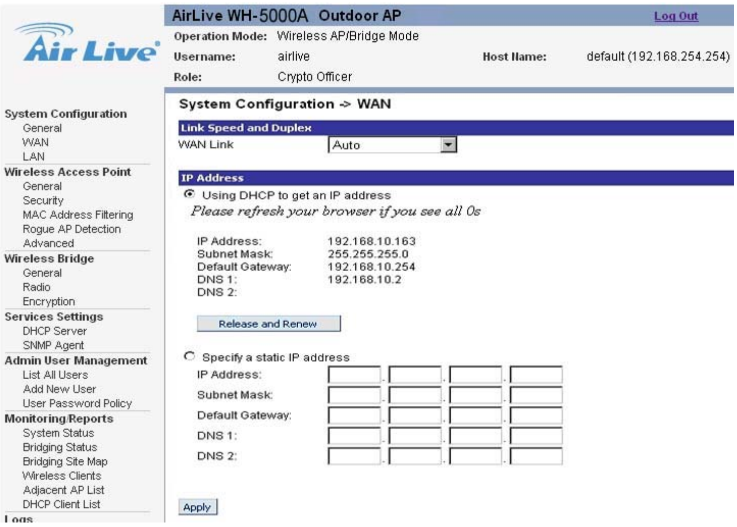
⚠ **Note:** After changing the network address you will no longer be able to access the above configuration page with the default IP address. You will have to change the browser URL to reflect the new IP address and log in again.

Dynamic IP

You also can choose “Using DHCP to get an IP address”. By this way, the WH-5000A will get an IP address from

DHCP server.

Dynamic IP



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

System Configuration -> WAN

Link Speed and Duplex
WAN Link: Auto

IP Address
● Using DHCP to get an IP address
Please refresh your browser if you see all 0s

IP Address: 192.168.10.163
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.10.254
DNS 1: 192.168.10.2
DNS 2:

○ Specify a static IP address
IP Address: ___ . ___ . ___ . ___
Subnet Mask: ___ . ___ . ___ . ___
Default Gateway: ___ . ___ . ___ . ___
DNS 1: ___ . ___ . ___ . ___
DNS 2: ___ . ___ . ___ . ___

⚠ **Note:** If DHCP is selected, a new IP address would be given to the AirLive WH-5000A unit after clicking Apply. To

log into to unit and keep setting it up, the new IP address needs to be obtained from your

Network Administrator. There are two ways to obtain the new IP address:

1. Using WH-5000A embedded Remote Logging function. Set up “Remote Logging” before setting up WAN using DHCP to obtain new IP address. Remote logging allows you to forward the syslog data from each machine to a central remote logging server. Thus, you can get new IP from logging server. Please refer to Chapter 11.3 to get more detail information.
2. Using “Wireless Node Discovering Tool” that is provided by Ovislink and put in CD-ROM. This program will discover the IP of Ovislink AP products. Please refer to Appendix B to understand how to install it.

Click **Apply** to accept changes.

Chapter 4: Wireless Access Point Configuration

This chapter describes the items about set up AP function. Those items are under the Wireless Access Point Configuration menu. If you don't know how to enter configuration screen, chapter 2 describes how to do it. Please keep in mind that you need click Apply to save all settings.

The following screens are available in AP mode:

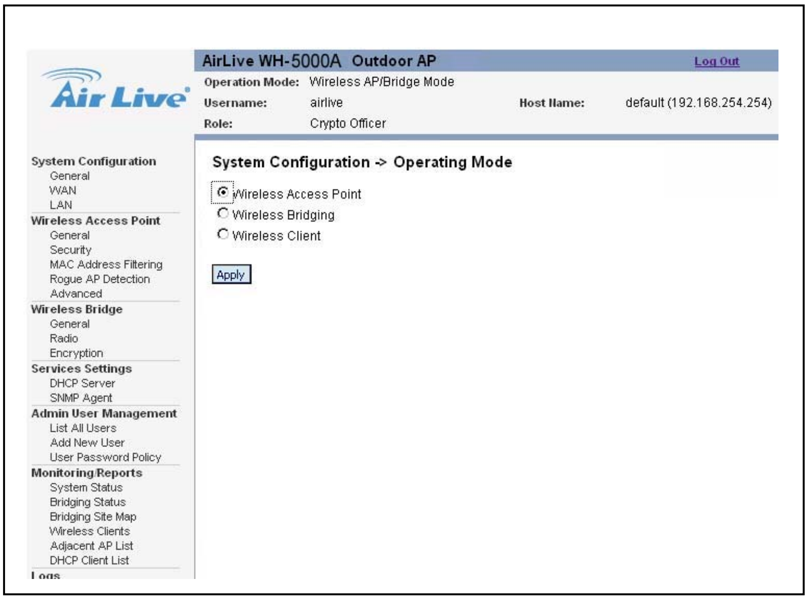
- Wireless Access Point
  - – General
  - – Security
  - – MAC Address Filtering
  - – Rogue AP Detection
  - – Advanced
- Service Settings
  - – DHCP Server
- Monitoring/Reports
  - – Wireless Clients
  - – Adjacent AP List
  - – DHCP Client List

4.1 Select Operation Mode

The default operation mode is Client mode. You can select Wireless Access Point mode at **System Configuration – Operation mode** to switch to AP mode.

Click the entry on the left hand navigation panel for **System Configuration – Operation Mode**. This directs you to the System Configuration – Operation Mode. Select the radio of Wireless Access Point and press **Apply** button. The device will Be reboot and then change the operation mode as AP function.

Note that if you change modes your configuration will be lost.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

System Configuration -> Operating Mode

● Wireless Access Point
○ Wireless Bridging
○ Wireless Client

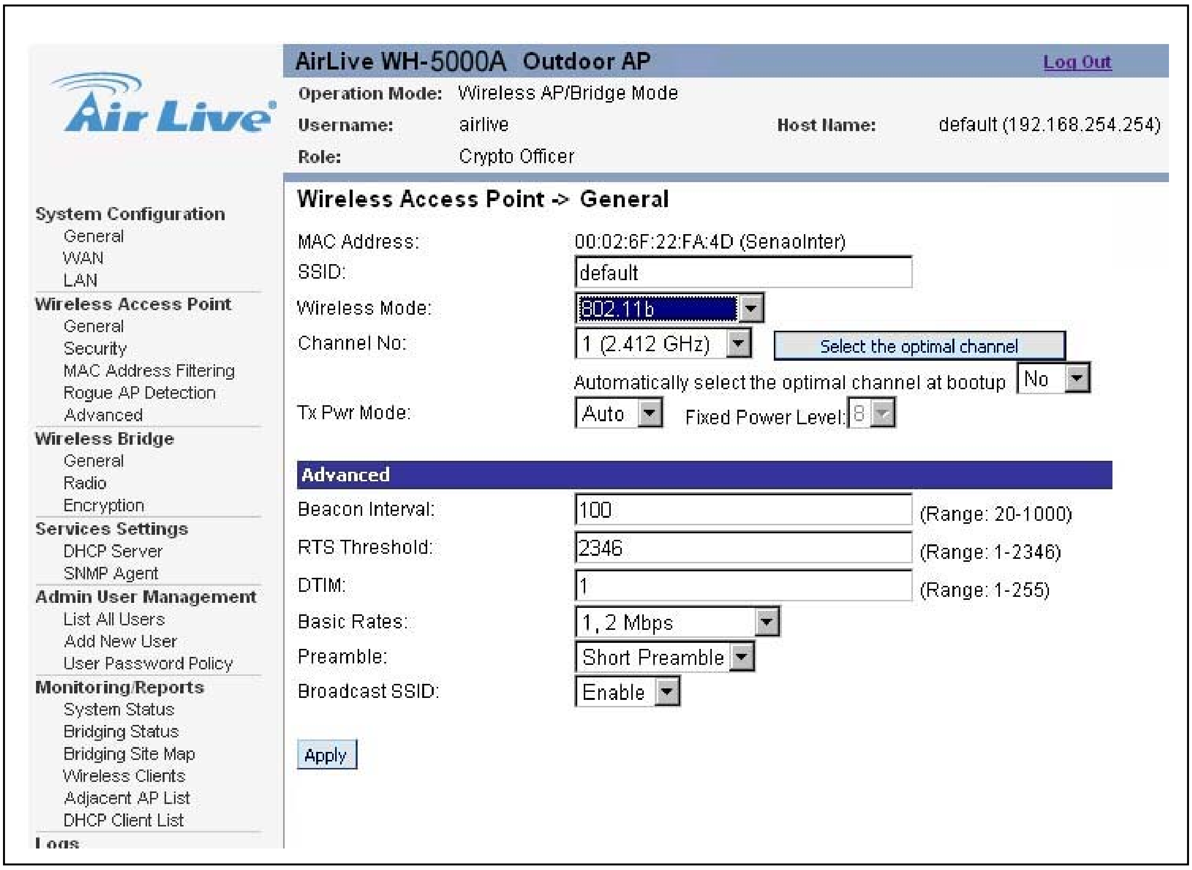
4.2 Wireless Access Point – General

Click the entry on the left hand navigation panel for **Wireless Access Point – General**. This directs you to the Wireless Access Point – General page.

There are five options under Wireless Access Point:

- General
- Security
- MAC Address Filtering
- Rogue AP Detection
- Advanced

Those setup items allow your computer’s WLAN Card to communicate with the access point.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

Wireless Access Point -> General

MAC Address: 00:02:6F:22:FA:4D (SenaoInter)

SSID: default

Wireless Mode: 802.11b

Channel No: 1 (2.412 GHz)

Automatically select the optimal channel at bootup: No

Tx Pwr Mode: Auto Fixed Power Level: 8

Advanced

Beacon Interval: 100 (Range: 20-1000)

RTS Threshold: 2346 (Range: 1-2346)

DTIM: 1 (Range: 1-255)

Basic Rates: 1, 2 Mbps

Preamble: Short Preamble

Broadcast SSID: Enable

4.2.1 MAC address

The MAC address list here is AP’s wireless interface.

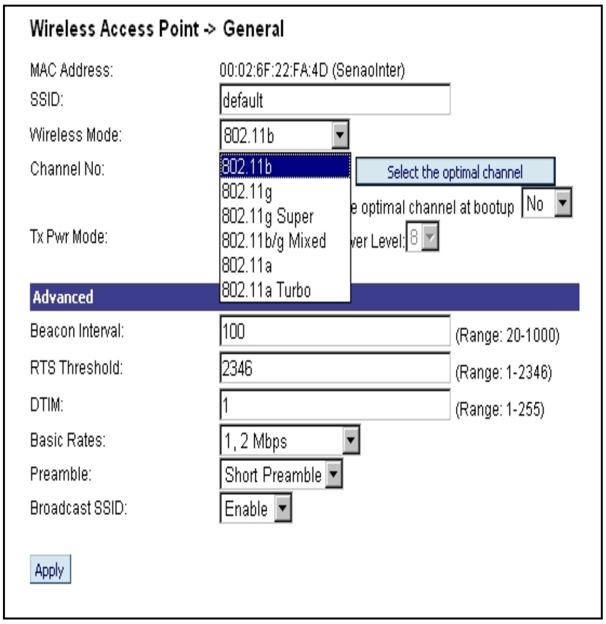
4.2.2 SSID

If you will be using an SSID for a wireless LAN, enter it here and in the setup of each wireless client. This nomenclature has to be set on the AP and each wireless device in order for them to communicate.

4.2.3 Wireless Mode

Select the wireless mode from the drop-down list. You can choose 802.11b, 802.11g, 802.11g Super,

802.11b/g Mixed, 802.11a or 802.11a Turbo



Wireless Access Point -> General

MAC Address: 00:02:6F:22:FA:4D (SenaoInter)
SSID: default
Wireless Mode: 802.11b
Channel No:
Tx Pwr Mode:

Advanced

Beacon Interval: 100 (Range: 20-1000)
RTS Threshold: 2346 (Range: 1-2346)
DTIM: 1 (Range: 1-255)
Basic Rates: 1, 2 Mbps
Preamble: Short Preamble
Broadcast SSID: Enable

- **802.11b:**

  The 802.11b will accommodate legacy system and support 1, 2, 5.5 and 11Mbps data rate.

- **802.11g:**

  The 802.11g support data rates up to 54Mbps (6, 9, 12, 18, 24, 36, 48, 54Mbps) at 2.4GHz frequency band by using the 802.11a OFDM techniques. This mode limits use to those WLANs that have only 802.11g clients. If you make sure all of WLAN devices are 802.11g clients, then you can chooses 802.11g mode to gain a higher performance.

- **802.11b/g Mixed**

  The 802.11b/g Mixed allows you to use both 802.11b and 802.11g clients. At this mode, all transmissions will be at the highest data rates available if the environment is with only 802.11g devices. However, if an 802.11b device links to this network, the header information needs to back down to

  802.11b rates for all of 802.11g and 802.11b devices. It will little slow down the network throughput.

- **802.11g Super**

  The 802.11g Super mode can support data rate up to 108Mbps (72, 96, 108 Mbps). Although you can gain a highest data rate, you need to use this function carefully because it occupies large bandwidth and may corrupt the adjacent channels' radio signal.

⚠ **Note:** Super G's channel bonding feature can significantly degrade the performance of neighboring 2.4GHz WLANs. Moreover, Super G doesn't check to see if 11b or 11g standard-compliant devices are in range before using its non-standard techniques.

- **802.11a**

  The 802.11a mode can support data rate up to 54Mbps (6, 9, 12, 18, 24, 36, 48, 54Mbps) at 5GHz frequency band. The use of 5-GHz frequency band provides some distinct advantages over the

  2.4GHz band. In addition to providing a greater amount of bandwidth and non-overlapping channels for transmission, the 5-GHz band has less potential interference because lots of wireless device working in the 2.4GHz band (Bluetooth, cordless telephone, microwave ovens, and so on)

- **802.11a Turbo**

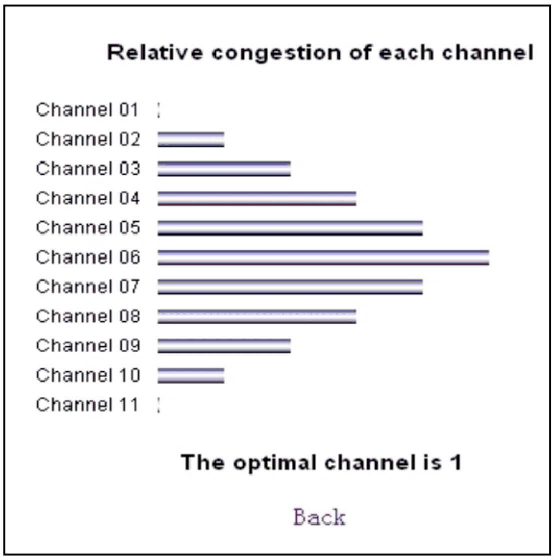
  The 802.11a Turbo mode can support data rate up to 108Mbps (72, 96, 108 Mbps).

4.2.4 Channel Number

The channel number is a means of assigning frequency that device uses it to transmit/receive data. Before you setting the channel in 2.4GHz band, you had better to use the optimal channel function to detect the environment’s radio signal and choose the best one for using.

 Optimal channel

When the device runs on 2.4GHz band, you can use the “optimal channel” to figure out which channel is the best one for using. Clicking on the button “**Select the optimal channel”**, a popup screen will display the choices. After enter this function, the WH-5000A detects the environment’s radio signal at each channel and show them at this screen. This action does not select the channel for you but shows you what will most probably be channel selected if you leave the following dropdown menu at Yes.



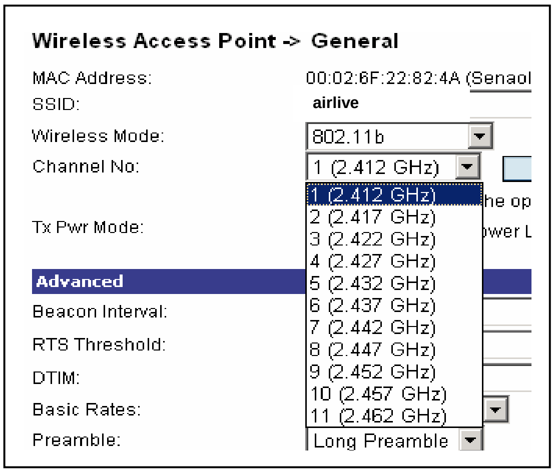
The optimal channel is 1

 Auto

When channel number set up as Auto, the WH-5000A will select the optimal channel at boot up

 802.11b, 802.11g and 802.11b/g Mixed mode

There are 11 (13 for ETSI) channel numbers that may be assigned. Because the 802.11b signal bandwidth is 22MHz, there are 3 non-overlapping channels for 802.11b at 2.4GHz ISM band. To reduce the interference problem, you may be able to establish up to 3 wireless networks at the same area. If you need establish 3 wireless networks, you may assign channel number 1 to the first wireless network. Then the channel 6 will be better for second wireless networks and channel 11 will be the third one.



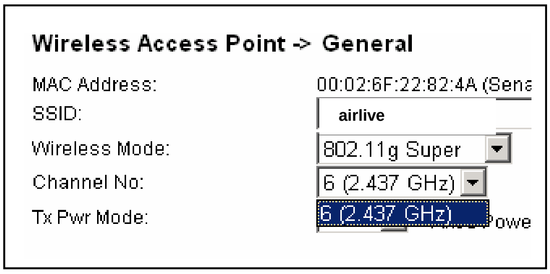
Wireless Access Point -> General

MAC Address: 00:02:6F:22:82:4A (Senaol
SSID: airlive
Wireless Mode: 802.11b
Channel No: 1 (2.412 GHz)
Tx Pwr Mode:

Advanced
Beacon Interval:
RTS Threshold:
DTIM:
Basic Rates:
Preamble: Long Preamble

- **802.11g Super**

The 802.11g Super mode occupies larger frequency bandwidth. To avoid interfere another wireless network operation; it is fixed at channel 6.



Wireless Access Point -> General

MAC Address: 00:02:6F:22:82:4A (Sena

SSID: airlive

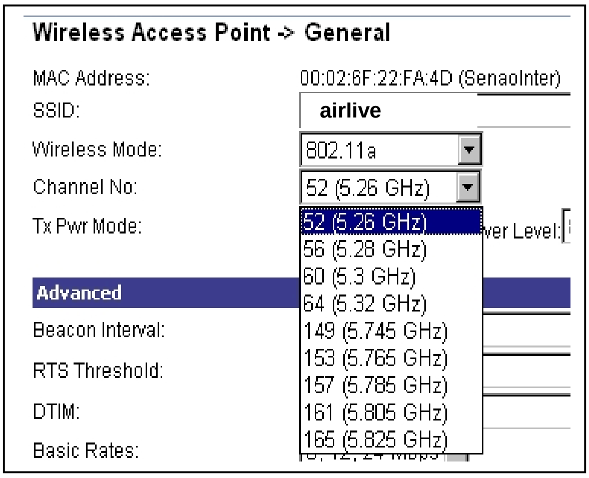
Wireless Mode: 802.11g Super

Channel No: 6 (2.437 GHz)

Tx Pwr Mode: 6 (2.437 GHz) owe

- **802.11a**

The frequency band of IEEE 802.11a will vary according to individual country regulations. The following picture shows the channel at 5GHz frequency band that WH-5000A supports at 802.11a mode.



Wireless Access Point -> General

MAC Address: 00:02:6F:22:FA:4D (SenaoInter)

SSID: airlive

Wireless Mode: 802.11a

Channel No: 52 (5.26 GHz)

Tx Pwr Mode: ver Level:

52 (5.26 GHz)
56 (5.28 GHz)
60 (5.3 GHz)
64 (5.32 GHz)
149 (5.745 GHz)
153 (5.765 GHz)
157 (5.785 GHz)
161 (5.805 GHz)
165 (5.825 GHz)

Advanced

Beacon Interval:

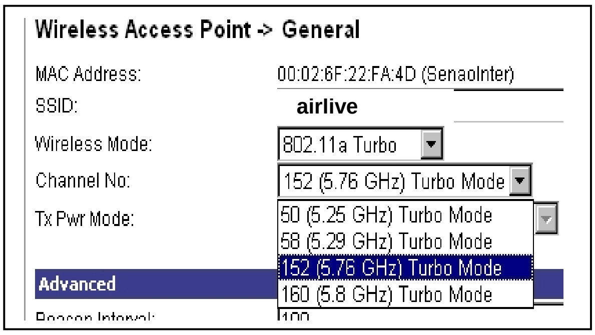
RTS Threshold:

DTIM:

Basic Rates:

- **802.11a Turbo**

The following picture shows the channel at 5GHz frequency band that WH-5000A supports at 802.11a Turbo mode.



Wireless Access Point -> General

MAC Address: 00:02:6F:22:FA:4D (SenaoInter)

SSID: airlive

Wireless Mode: 802.11a Turbo

Channel No: 152 (5.76 GHz) Turbo Mode

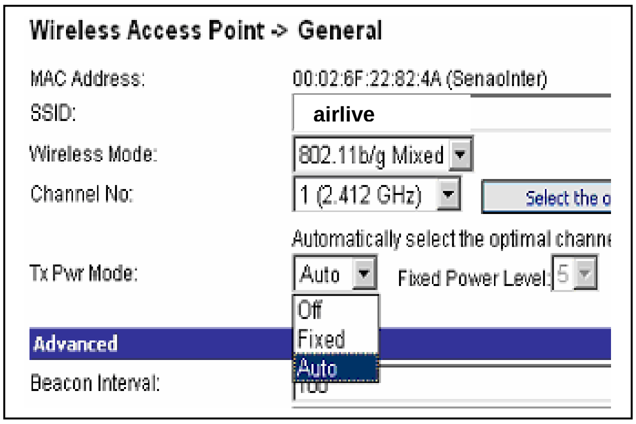
Tx Pwr Mode:

50 (5.25 GHz) Turbo Mode
58 (5.29 GHz) Turbo Mode
152 (5.76 GHz) Turbo Mode
160 (5.8 GHz) Turbo Mode

Advanced

4.2.5 TX Power Mode

The Tx Power Mode let you can set the radio power as you wanted. It defaults to Auto, giving the larger range of radio transmission available under normal conditions. As an option, the AP's cover range can be limited by setting the TX Power Mode to Fixed and choosing from 1~8 for fixed power level (1 being the shortest distance.) Finally, if you want to prevent any radio frequency transmission, set Tx Pwr Mode to off.



Wireless Access Point -> General

MAC Address: 00:02:6F:22:82:4A (SenaoInter)

SSID: airlive

Wireless Mode: 802.11b/g Mixed

Channel No: 1 (2.412 GHz)

Automatically select the optimal channe

Tx Pwr Mode: Auto

Fixed Power Level: 5

4.2.6 Advanced Option

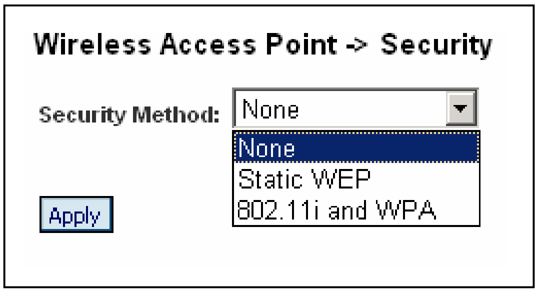
There are a number of advanced options described in the following chart:

Advanced Options

Item	Parameter	Description
Beacon interval beacon is	0 ~ 4095	The frequency in milliseconds in which the 802.11 transmitted by AP
RTS Threshold boundary.	0 ~ 3000	The number of bytes used for the RTS/CTS handshake When a packet size is greater than the RTS threshold, the RTS/CTS handshaking is performed
DTIM	1~65535	The number of beacon intervals between successive Delivery Traffic Identification Maps (DTIMs). This feature is used for Power Save Mode
Basic Rate	**802.11b**	
	1 and 2 Mbps 1, 2, 5.5 and 11Mbps	The basic rates used and reported by the AP. The highest rate specified is the rate that the AP uses when transmitting broadcast/multicast and management frames
	802.11a, 802.11g, 802.11b/g mixed	
	1 and 2 Mbps 1, 2, 5.5 , 6 , 11, 12, and 24 Mbps	The basic rates used and reported by the AP. The highest rate specified is the rate that the AP uses when transmitting broadcast/multicast and management frames
Preamble	Short/Long Preamble	Specifies whether frames are transmitted with the Short or Long Preamble.
Broadcast SSID	Enabled/Disabled	When disabled, the AP hides the SSID in outgoing beacon frames and client can not obtain the SSID through passive scanning. Also, when it is disable, the AP doesn't send probe responses to probe requests with unspecified SSIDs.

4.3 Wireless Access Point – Security

Click the entry on the left hand navigation panel for **Wireless Access Point – Security**. This directs you to the Wireless Access Point – Security page.



Wireless Access Point -> Security

Security Method: None

The WH-5000A will display a default factory setting of no encryption, but fore security reasons will not communicate to any clients unless the encryptions set by administrator. You must select the wireless encryption that you want to use and click **Apply**. If you want to leave the encryption set to No Encryption, chooses "None" and clicks **Apply**. A popup dialog box will ask "are you sure you want to proceed to BYPASS mode?" Click OK to enter BYPASS mode with no encryption setting.

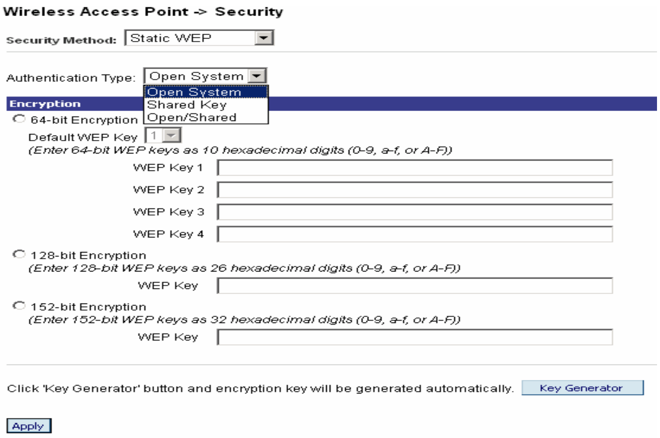
4.3.1 Static WEP

WEP (Wired Equivalent Privacy) was originally designed to provide the same level of security for wireless LANs as that of a wired LAN but is not now state-of-the-art. But the use of WEP encryption can still provides some measure of security. WEP relies on the use of identical static keys deployed on client stations and access points. In WEP, you can set the Authentication Type for **Open System**, **Shared Key**, or **Open/Shared**. Select 64.bit, 128bit or 152.bit encryption and enter the WEP key as appropriate. ".

That same WEP key must also be set on each wireless clients those are to become part of the wireless network. For greater security, set authentication type to "shared Key, and if "shared key" is accepted, then each wireless device must also be coded for "shared key".

- **Key Generator:**

  The "Key generator" function generates a randomized encryption key of the appropriate length automatically. The key is initially shown in plain text so the user has the opportunity to copy the key. Once the Key is applied, there is no longer displayed in plain text.



Wireless Access Point -> Security

Security Method: Static WEP

Authentication Type: Open System

Encryption

○ 64-bit Encryption

Default WEP Key 1

(Enter 64-bit WEP keys as 10 hexadecimal digits (0-9, a-f, or A-F))

WEP Key 1

WEP Key 2

WEP Key 3

WEP Key 4

○ 128-bit Encryption

(Enter 128-bit WEP keys as 26 hexadecimal digits (0-9, a-f, or A-F))

WEP Key

○ 152-bit Encryption

(Enter 152-bit WEP keys as 32 hexadecimal digits (0-9, a-f, or A-F))

WEP Key

Click 'Key Generator' button and encryption key will be generated automatically.

4.3.2 802.11i and WPA

 WPA

WPA (Wi-Fi Protected Access) was designed to enable use of wireless legacy systems employing WEP

while improving security. WPA uses improved data encryption through the Temporal Key Integrity Protocol (TKIP) ensures that the keys haven’t been tampered with. In addition, user authentication is enabled using the Extensible Authentication Protocol (EAP).

For enhanced security, you can enable IEEE 802.1x authentication, which provides authenticated access to 802.11 wireless networks. IEEE 802.1x authentication minimizes wireless network security risks, such as unauthorized access to network resources and eavesdropping. It provides user and computer identification, centralized authentication, and dynamic key management. The support that IEEE 802.1x provides for Extensible Authentication Protocol (EAP) security types allows you to use authentication methods such as smart cards and certificates .Using 802.1x function, you need to install a separate certification system, such

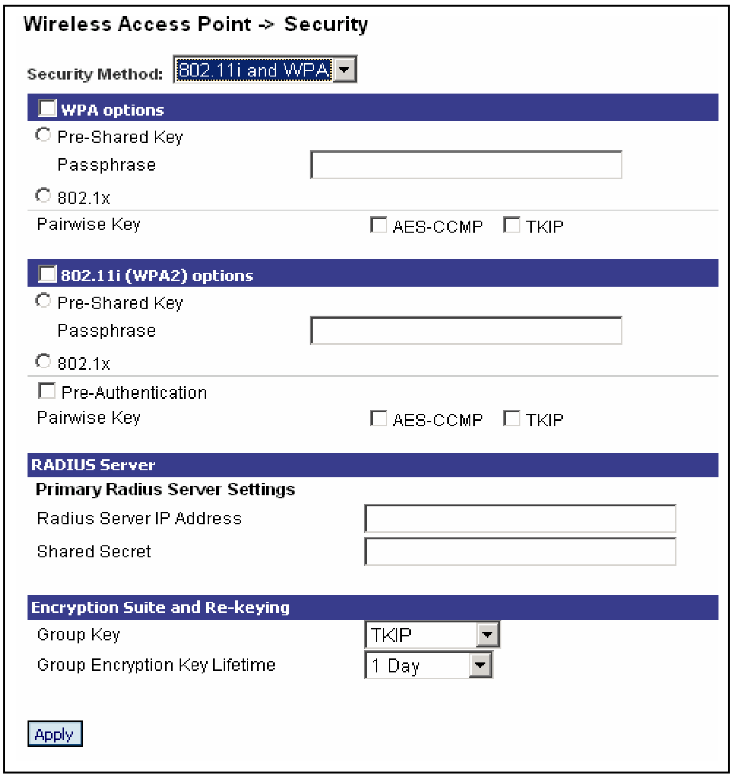
as Radius Server, for key management and authentication requires and each client must have been issued an authentication certificate.

- **Pre-Share Key or 802.1x:**

  If you don’t have Radius Server, selecting pre-shared key. Simply input up to 63 character

  /numeric /hexadecimals in the Passphrase field. If your clients use WPA-TKIP select TKIP as encryption type. If your clients use WPA-AES, select AES-CCMP.

  If you have installed Radius Servers, select WPA 802.1x and input the Radius Server setting.



Wireless Access Point -> Security

Security Method: 802.11i and WPA

☐ WPA options

○ Pre-Shared Key

Passphrase

○ 802.1x

Pairwise Key ☐ AES-CCMP ☐ TKIP

☐ 802.11i (WPA2) options

○ Pre-Shared Key

Passphrase

○ 802.1x

☐ Pre-Authentication

Pairwise Key ☐ AES-CCMP ☐ TKIP

RADIUS Server

Primary Radius Server Settings

Radius Server IP Address

Shared Secret

Encryption Suite and Re-keying

Group Key: TKIP

Group Encryption Key Lifetime: 1 Day

- **TKIP or AES-CCMP:**

TKIP scrambles keys using a hashing algorithm and, by adding an integrity-checking feature, ensures that the keys haven't been tampered with. The TKIP improves security especially for legacy hardware whose implement WEP encryption engine.

The AES-CCMP is a stronger encryption algorithm for newer hardware. If the clients support this new encryption algorithm, you can use it to enhance the security of wireless network.

- **802.11i (WPA2)**

The IEEE 802.11i is a new standard that enhances the 802.11 MAC security and authentication by stronger encryption, authentication, and key management. The WPA2 and 802.11i are virtually identical. The WPA2 is the Wi-Fi Alliance base on the IEEE 802.11i and runs a certification program that grants the WPA2 brand based on equipment's support of the important feature of 802.11i.

Besides the Pre-authentication function, setting WPA2 is most same as WPA,

- **Pre-authentication**

  Enable pre-authentication to allow a client to authenticate in advance with the AP before the client is associated with it. Allowing the AP to pre-authenticate a client decreases the transition time when a client roams between APs.

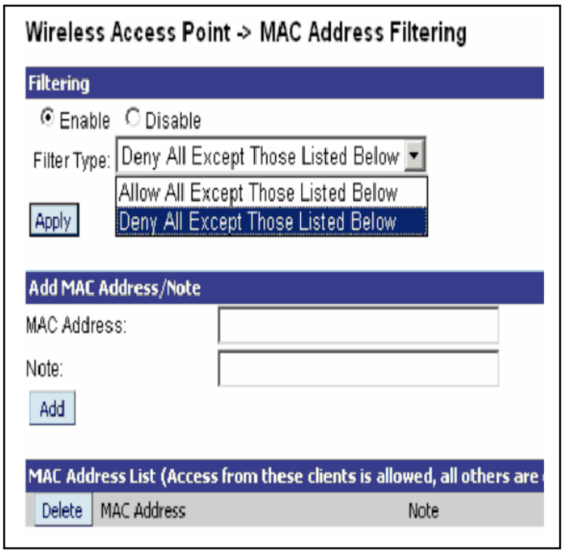
Once you have selected the options you will use, click **Apply** to save all setting.

4.4 MAC Address Filtering

Click the entry on the left hand navigation panel for **Wireless Access Point – MAC Address Filtering**. This directs you to the Wireless Access Point – MAC Address Filtering page.

The factory default for MAC Address filtering is **Disabled**. If you enable MAC Address filtering, you should also set the toggle for Filter Type. This works as follows:

- If Filtering is enabled and Filter Type is "**Deny All Except Those Listed Below**", only those devices equipped with the authorized MAC addresses will be able to communicate with the AP. In this case, input the MAC addresses of all the PC cards that will be authorized to access this AP.
- If Filtering is enabled and Filter Type is "**Allow All Except Those Listed Below**", those devices with a MAC address which has been entered in the MAC Address listing will NOT be able to communicate with the AP.In this case, navigate to the report: Wireless Clients and copy the MAC address of any wireless Client that you want to exclude from communication with the AP and input those MAC Addresses to the MAC Address list.



Wireless Access Point -> MAC Address Filtering

Filtering

● Enable ○ Disable

Filter Type: Deny All Except Those Listed Below ▾

Allow All Except Those Listed Below
Deny All Except Those Listed Below

Add MAC Address/Note

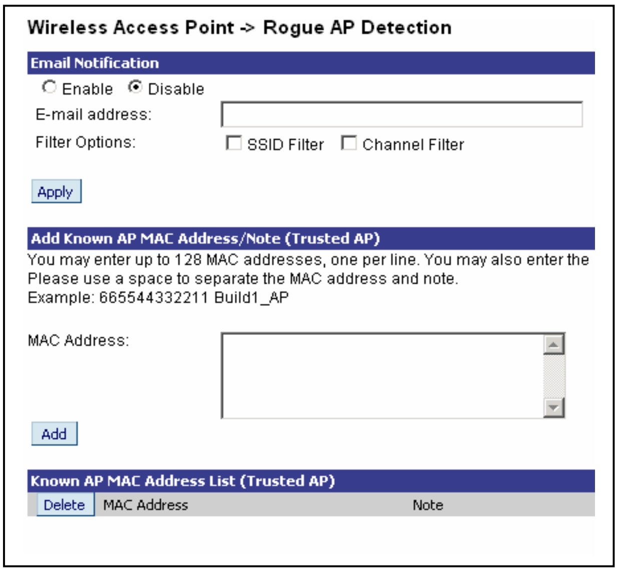
MAC Address:

Note:

MAC Address List (Access from these clients is allowed, all others are

4.5 Rogue AP Detection

Click the entry on the left hand navigation panel for **Wireless Access Point – Rouge AP Detection**. This directs you to the Wireless Access Point – Rouge AP Detection page.



Wireless Access Point -> Rogue AP Detection

Email Notification

○ Enable ● Disable

E-mail address:

Filter Options: □ SSID Filter □ Channel Filter

Apply

Add Known AP MAC Address/Note (Trusted AP)

You may enter up to 128 MAC addresses, one per line. You may also enter the Please use a space to separate the MAC address and note.
Example: 665544332211 Build1_AP

MAC Address:

Add

Known AP MAC Address List (Trusted AP)

Delete	MAC Address	Note

This function allows the network administrator to detect in band rogue AP. Enable rogue AP detection and enter the MAC Address of each AP in the network that you want the AP being configured to accept as trusted AP (You may add up to 20 APs). Enter an email address for notification of any rogue or non- trusted APs when WH-5000A find it. You can also select the following filter options.

- **SSID Filter:** Check the SSID option to only send rogue APs that match the AP's SSID or wireless bridge's SSID.
- **Channel Filter:** Check the channel filter option to only send rogue APs that match the AP's channel or the wireless bridge's channel.

- If both options are checked, only APs that match both the SSID and channel are sent.

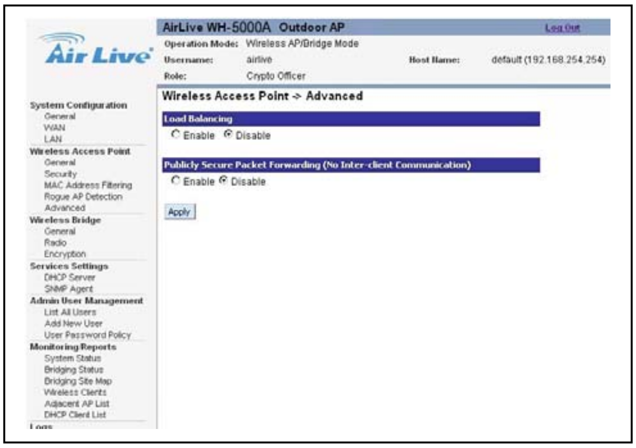
The Adjacent AP lists under Monitoring/Reports on the navigation menu, will detail any APs' information.

4.6 Wireless Access Point – Advanced

Click the entry on the left hand navigation panel for **Wireless Access Point – Advanced**. This directs you to the Wireless Access Point – Advanced page. The Advanced page allows you to enable or disable load balancing and Layer 2 Isolation.

4.6.1 Load Balancing

Load balancing is enabled by default to distribute traffic efficiently among network servers so that no individual server is overburdened. For example, if two APs with similar settings are in a conference room, depending on the location of the APs, all wireless clients could potentially associate with the same AP, leaving the other AP unused. Load balancing attempts to evenly distribute the wireless clients on both APs.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

Wireless Access Point -> Advanced

Load Balancing

○ Enable ● Disable

Publicly Secure Packet Forwarding (No Inter-client Communication)

○ Enable ● Disable

Apply

4.6.2 Publicly Secure Packet Forwarding

The Publicly Secure Packet Forwarding selection item is the Layer 2 Isolation function. Layer 2 isolation prevents wireless clients that associate with the same AP from communication with each other.

4.7 DHCP Server

If you will be suing DHCP Server function, click the entry on the left hand navigation panel for **Services Setting – SNMP Server**. This directs you to the Services Setting – SNMP page. The detail description of DHCP server writes at Section 7.1.

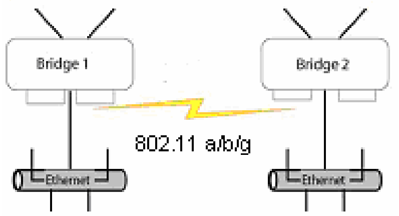
4.8 Monitoring Reports

If you want to understand some information about WLAN status, the entry on the left hand navigation panel for **Monitoring/Reports – Wireless Clients**, **Monitoring/Reports – Adjacent AP List** and **Monitoring/Reports – DHCP Client List** may provide that information to you. The detail description of DHCP server writes at Section 9.4 (Wireless Clients), Section 9.5 (Adjacent AP List) and Section 9.6 (DHCP Client List).

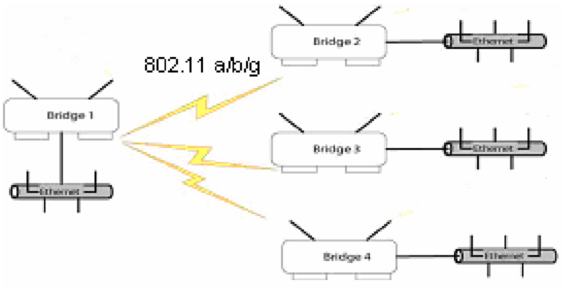
Chapter 5: Wireless Bridge Configuration

Wireless bridging is used to set up an independent wireless bridge connection. Since wireless bridging provides a mechanism for AP to collaborate, it is possible to extend the basic service set (BSS) of a standalone AP and to connect two separate LANs without installing my cabling. The WH-5000A model support manual bridge function. The manual bridging function in the WH-5000A allows you to set a number of alternate bridging configurations.

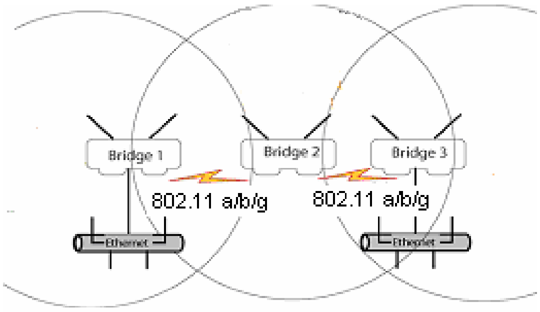
- Point-to-Point bridging of two Ethernet Links



- Point-to-Multipoint bridging of several Ethernet links



- Repeater mode

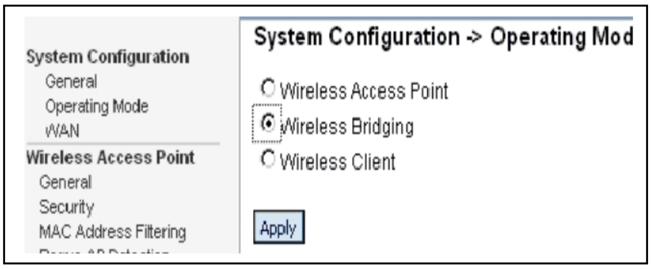


The following screens are available in Bridge mode:

- Wireless Bridge
  - – General
  - – Radio
  - – Encryption

5.1 Select Operation Mode

The default operation mode is Client mode. You can select Wireless Access Bridge mode at **System Configuration – Operation mode**.

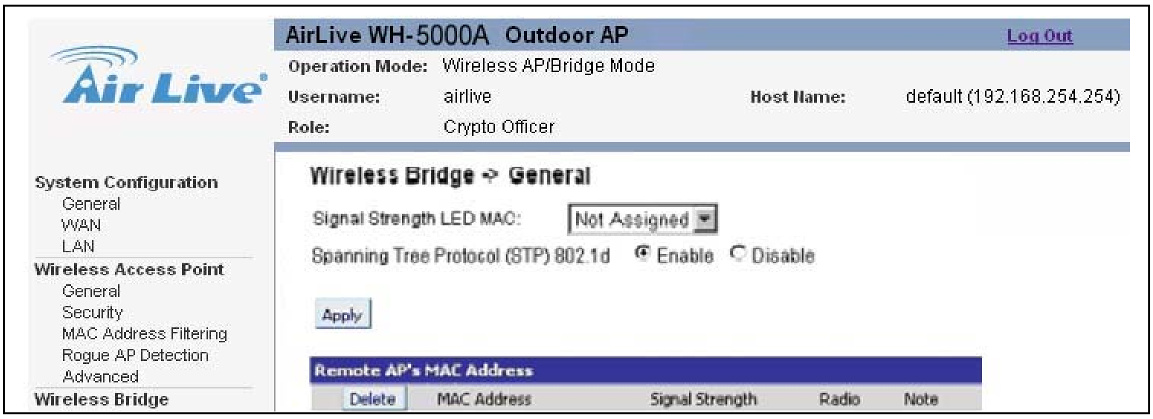


Click the entry on the left hand navigation panel for **System Configuration – Operation Mode**. Select the radio of **Wireless Bridgin**g and press **Apply** button. The device will be reboot and then change the operation mode as Bridge function.

Note that if you change modes your configuration will be lost.

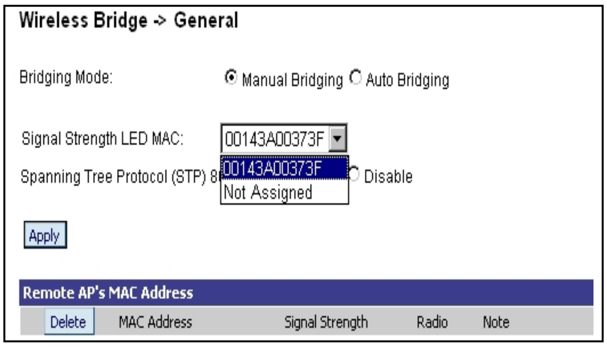
5.2 Wireless Bridge – General

Click the entry on the left hand navigation panel for **Wireless Bridge - General**. This directs you to the Wireless Access Point – Bridging page.



Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer
Signal Strength LED MAC: Not Assigned
Spanning Tree Protocol (STP) 802.1d ● Enable ○ Disable

- **Signal strength LED MAC:**



Bridging Mode: ● Manual Bridging ○ Auto Bridging
Signal Strength LED MAC: 00143A00373F (00143A00373F / Not Assigned)
Spanning Tree Protocol (STP) 8 ○ Disable

Signal strength LED MAC allows you set up the SS (Signal Strength) LED to indicate the received bridge signal strength (RSSI, Received Signal Strength Indication) of remote device the. When you key in the BSSID at "Add remote'sAP BSSID/Note" section and click "Add", this BSSID will be indicated here. Choosing the BSSID that you want to know the received signal strength, the SS LED will indicate the signal strength by different flicker frequency. If you don't wish to display any connection signal, select "**Not Assigned**". You need click "**Apply**" after you change this value.

- **Spanning Tree Protocol (STP) 802.1d:**

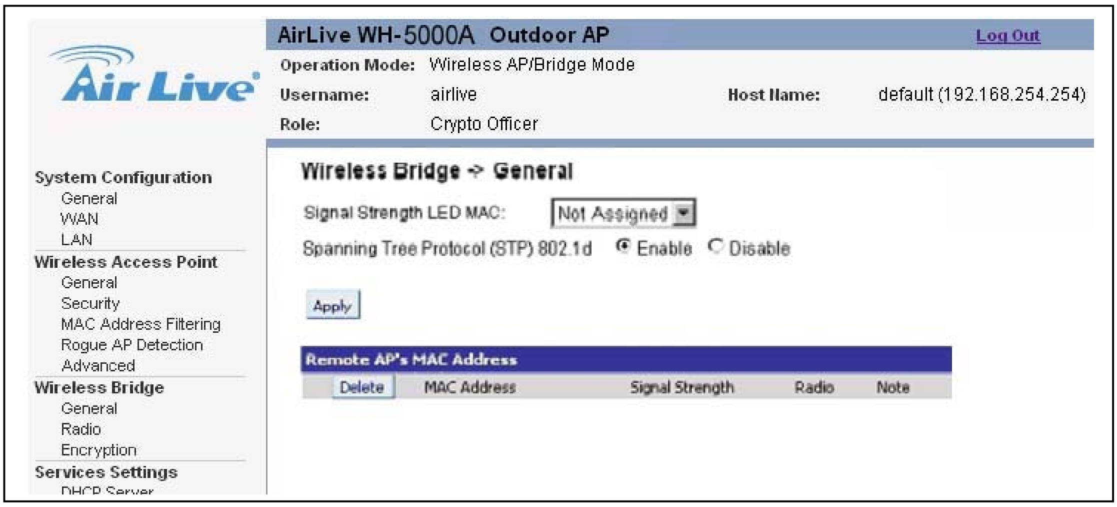
  It should be enabled if there is any possibility that a bridging loop could occur. If you are certain that there is no possibility that a bridging loop will occur, you can disable Spanning Tree Protocol, because the bridge will be more efficient (faster) without it. However, if not sure, the safest solution is to enable Spanning Tree Protocol.

- **Remote AP's MAC Address**

  This section list the remote bridge's information, port number, signal strength and note. Moreover, if you don't want to link with some remote bridges, click the check box at the left side of port number and confirm by clicking "Delete".

5.3 Wireless Bridge – Radio

Click the entry on the left hand navigation panel for **Wireless Bridge - Radio**. This directs you to the Wireless Access Point – Radio page.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

Wireless Bridge -> General

Signal Strength LED MAC: Not Assigned

Spanning Tree Protocol (STP) 802.1d ● Enable ○ Disable

Apply

Remote AP's MAC Address

Delete	MAC Address	Signal Strength	Radio	Note

- **MAC Address:**

  This is the MAC Address for WLAN card and as BSSID for the bridge devices at the other end that want to link with this unit. The Wireless Bridging uses the BSSID for purposes of establishing contact.

- **Wireless Mode:**

  Support 802.11 b/g Mixed, 802.11g Super, 802.11a and 802.11a turbo

- **Tx Rates:**

  When set to AUTO, the unit attempts to select the optimal rate for the channel. If a fixed rate is used, the unit will only transmit at that rate.

- **Channel No:**

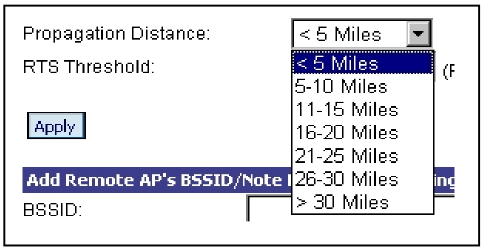
  The channel number is a means of an assigning frequency that device uses it to transmit/receive data. The channel number should be same as the one using on the devices those will be bridge together.

- **Tx Pwr Mode:**

  It is same as AP, support Off, Fix and Auto modes. At Fix mode, there are 5 signal levels you can select (1 being the smallest power level). If you want to prevent any radio frequency transmission, set Tx Pwr Mode to off.

- **Propagation Distance**

  This parameter relates to adjust the timing of WLAN MAC. To make sure the radio signal can reach to the device at other end, set the distance based on the distance between this bridge and furthest bridge that is connected to it



Propagation Distance: < 5 Miles

- **RTS Threshold**

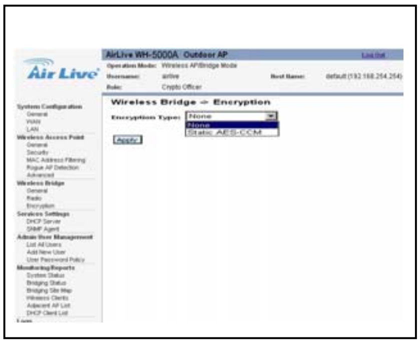
  This function uses for the RTS/CTS handshake boundary. When a packet size is greater than the RTS threshold, the RTS/CTS handshaking is performed

- **Add Remote's AP BSSID/Note for manual bridging**

  The BSSID corresponds to that bridge's MAC address. The Wireless Bridging uses the BSSID for purposes of establishing contact. You need to enter the BSSID of remote bridge, enter hexadecimal with colons. Data entry is not case sensitive. You may also enter a note that defines the location of the remote bridge. Then click **Add** to accept.

5.4 Wireless Bridge – Encryption

Click the entry on the left hand navigation panel for **Wireless Bridge - Encryption**. This directs you to the Wireless Access Point – Encryption page.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

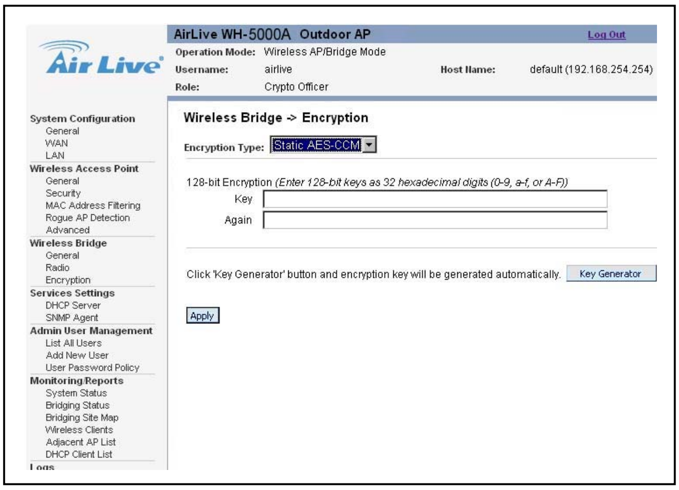
Host Name: default (192.168.254.254)

Role: Crypto Officer

Wireless Bridge -> Encryption

Encryption Type: None

This page is used to configure static encryption keys for the wireless bridge. On this screen, you can either select **None** (No Data Encryption) or **Static AES-CCM** (128 bit). The "Key generator" function generates a randomized encryption key of the appropriate length automatically. You can use this function to get a randomized key number from one device and use it to all of other devices those are on the same bridge network. The encryption key that you use on this screen must be the same for any bridge connect to yourbridging network in order for communication to occur.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

Wireless Bridge -> Encryption

Encryption Type: Static AES-CCM

128-bit Encryption *(Enter 128-bit keys as 32 hexadecimal digits (0-9, a-f, or A-F))*

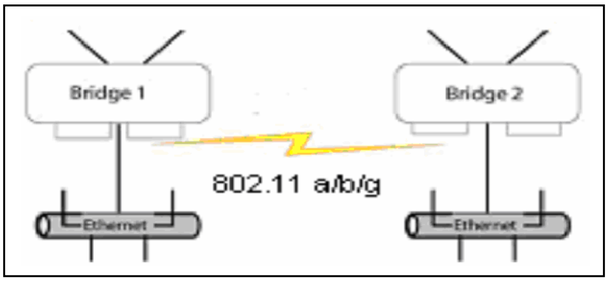
Key

Again

Click 'Key Generator' button and encryption key will be generated automatically.

5.5 Point-to-Point Bridge Setup Guide

A point-to-point link is a direct connection between tow, and only two, locations or nodes.



For the two bridges that are to be linked to communicate properly, they have to be set up with compatible commands in setup screens. Below is the list

- **Channel number:**
  - The bridges must have the same channel number.
  - The channel number doesn't be same as using for AP.
- **Wireless Mode:**
  - Choose 802.11g for high data rate
  - Choose 802.11b for high transmit distance
- **Spanning Tree Protocol (802.1d):**
  - Enable, if there is any possibility of a bridging loop, or
  - Disable, if there is no possibility of bridging loop to gain higher efficient
- **Bridge signal strength LED port:**
  - Set up the SS LED map to which remote bridge
- **BSSID:**
  - Entering remote bridge's MAC address at the BSSID field of "Add remote AP's BSSID/Note" section. Although it is option item, entering a note that defines the location of the remote bridge may be helpful for your management lots of remote bridges. After you key in BSSID and Note, clock the "Add" to list this item at "Remote AP's MAC Address" section.
- **Encryption:**
  - Setting Encryption type: Off or Static AES Key
  - Each bridge must have the same encryption type. And if using Static AES Key, the key of each bridge must be the same.

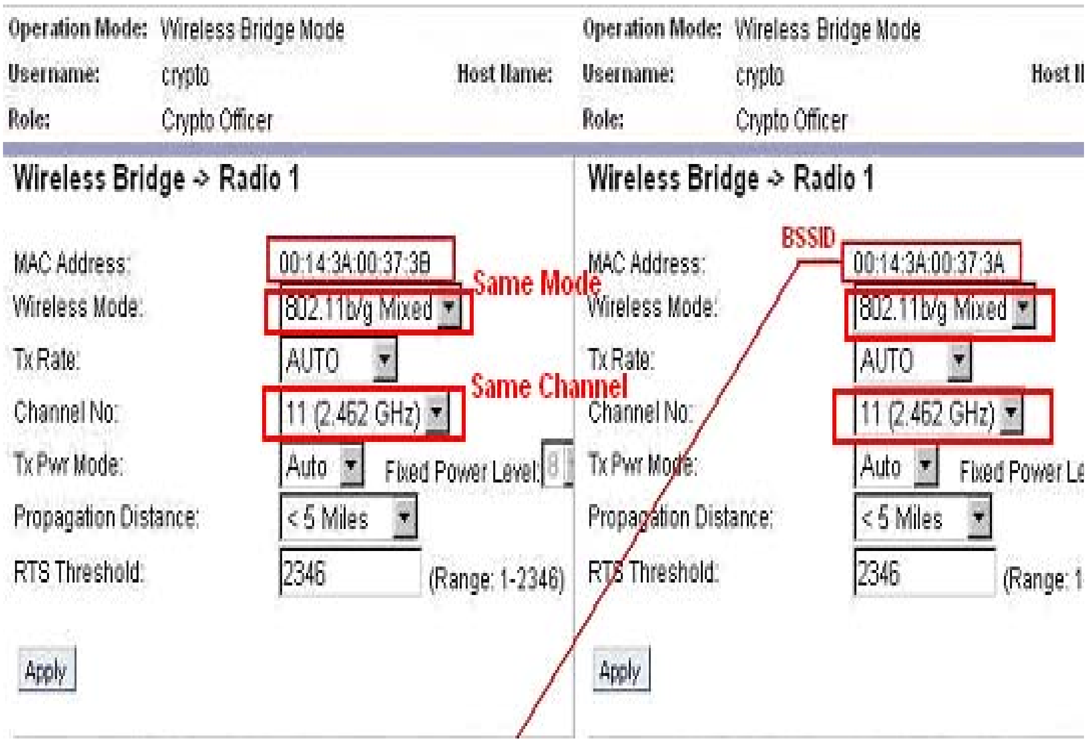
Click **Apply** to accept your changes

The following Table describes the basic attributes for the network topology illustrate at above picture.

Table: Point to Multi Point Configuration table

Direction	Bridge 1	Bridge 2
Wireless Bridge - General		
Bridge Mode	Manual Bridge	Manual Bridge
Spanning Tree Protocol	Enable (or Disable if no bridging loop)	Enable (or Disable if no bridging loop)
Wireless Bridge - Radio		
Channel	4	4
Wireless Mode	802.11g (for high data rate)	802.11g (for high data rate)
TX Power	Auto	Auto
Propagation distance	Select appropriate value	Select appropriate value
BSSID	Add Bridge 2 BSSID (MAC address)	Add Bridge 1 BSSID (MAC address)
Wireless Bridge – Encryption		
Encryption	Select appropriate Key type and Key. Must be the same key as Bridge 2	Select appropriate Key type and Key. Must be the same key as Bridge 1

Bridge 1 **Bridge 2**



Bridge 1:

Operation Mode: Wireless Bridge Mode
Username: crypto Host Name:
Role: Crypto Officer

Wireless Bridge -> Radio 1

MAC Address: 00:14:3A:00:37:3B
Wireless Mode: 802.11b/g Mixed
Tx Rate: AUTO
Channel No: 11 (2.462 GHz)
Tx Pwr Mode: Auto Fixed Power Level: 8
Propagation Distance: < 5 Miles
RTS Threshold: 2346 (Range: 1-2346)

Bridge 2:

Operation Mode: Wireless Bridge Mode
Username: crypto Host N
Role: Crypto Officer

Wireless Bridge -> Radio 1

MAC Address: 00:14:3A:00:37:3A
Wireless Mode: 802.11b/g Mixed
Tx Rate: AUTO
Channel No: 11 (2.462 GHz)
Tx Pwr Mode: Auto Fixed Power Le
Propagation Distance: < 5 Miles
RTS Threshold: 2346 (Range: 1

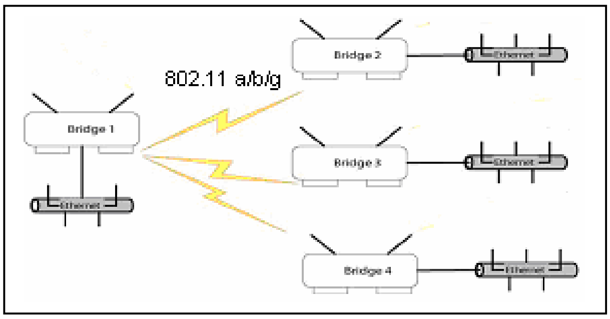
Same Mode

Same Channel

BSSID

5.6 Point-to-Multipoint Bridge Setup Guide

A Point-to-Multipoint configuration allows you to set up three or more WH-5000A in bridging mode and accomplish bridging between 3 or more locations wirelessly.



Same as Point-to-Point Bridge Setup procedure, you need to set up with compatible commands in setup screens. Using above picture as a example, Bridge 1 must contain all of the other's BSSID, while Bridge 2 and 3 must contain Bridge 1's BSSID.

The following Table describes the basic attributes for the network topology illustrate at above picture.

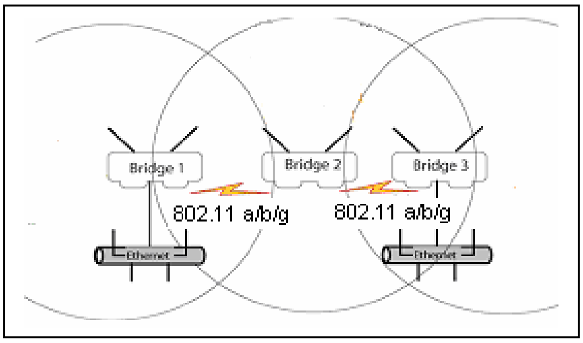
Table: Point to Multi Point Configuration table

Direction	Bridge 1	Bridge 2~3
Wireless Bridge - General		
Bridge Mode	Manual Bridge	Manual Bridge
Spanning Tree Protocol	Enable (or Disable if no bridging loop)	Enable (or Disable if no bridging loop)
Wireless Bridge - Radio		
Channel	4	4
Wireless Mode	802.11g (for high data rate)	802.11g (for high data rate)
TX Power	Auto	Auto
Propagation distance	Select appropriate value	Select appropriate value
BSSID	Add Bridge 2 BSSID (MAC address)	Add Bridge 1 BSSID (MAC address)
Wireless Bridge – Encryption		
Encryption	Select appropriate Key type and Key. Must be the same key as Bridge 2	Select appropriate Key type and Key. Must be the same key as Bridge 1

The above recommended setup requires only Bridge 1 to be set in point-to-multipoint mode. It is possible to set all bridges in point-to-multipoint mode, in which case, each bridge would have to contain the BSSID for each of the other bridges and Spanning Tree Protocol must be enabled.

5.7 Repeater Bridge Setup Guide

A repeater setup can be used to extend the wireless signal from one bridge connected to an Ethernet LAN wirelessly so that another bridge can control a wireless LAN at a distance.



The following Table describes the basic attributes for the network topology illustrate at above picture.

Table: Repeater Configuration table

Direction	Bridge 1	Bridge 2	Bridge 3
Wireless Configuration - General			
Bridge Mode	Manual Bridge	Manual Bridge	Manual Bridge
Spanning Tree Protocol	Enable (Disable if no loop)	Enable Disable if no loop)	Enable Disable if no loop)
Wireless Bridge - Radio			
Channel	4	4	4
Wireless Mode	802.11g (for high data rate)	802.11g (for high data rate)	802.11g (for high data rate)
TX Power	Auto	Auto	Auto
Propagation distance	Appropriate value	Appropriate value	Appropriate value
BSSID	Add Bridge2's BSSID (MAC address)	Add Bridge1's and 3's BSSID(MAC address)	Add Bridge2's BSSID (MAC address)
Wireless Configuration – Bridging Encryption			
Encryption	Select appropriate Key type and Key. Must be the same key as Bridge 2	Select appropriate Key type and Key. Must be the same key as Bridge 1	Select appropriate Key type and Key. Must be the same key as Bridge 1

Chapter 6: Wireless Access Client Configuration

This chapter describes the items about set up Wireless Access Client function. Those items are under the Wireless Access Point Configuration menu. If you don't know how to enter configuration screen, chapter 2 describes how to do it. Please keep in mind that you need click Apply to save all settings.

There are two options under System Configuration:

- General
- Encryption

6.1 Wireless Bridge – General

Click the entry on the left hand navigation panel for **Wireless Client – General**. This directs you to this page. The procedure of how to set up WH-5000A to link with AP lists as following.

1. Operation mode:

   Click the entry on the left hand navigation panel for **System Configuration – Operation mode**. Select the operation mode as "**Wireless Client**" and click **Apply** button.

2. SSID:

   This nomenclature of SSID has to be same as the one on the access point which WH-5000A want to link with. The bundle Site Survey function can help you discover the APs in your environment and choose a one to link with. To do Site Survey, click the **Scan** at Site Survey section.

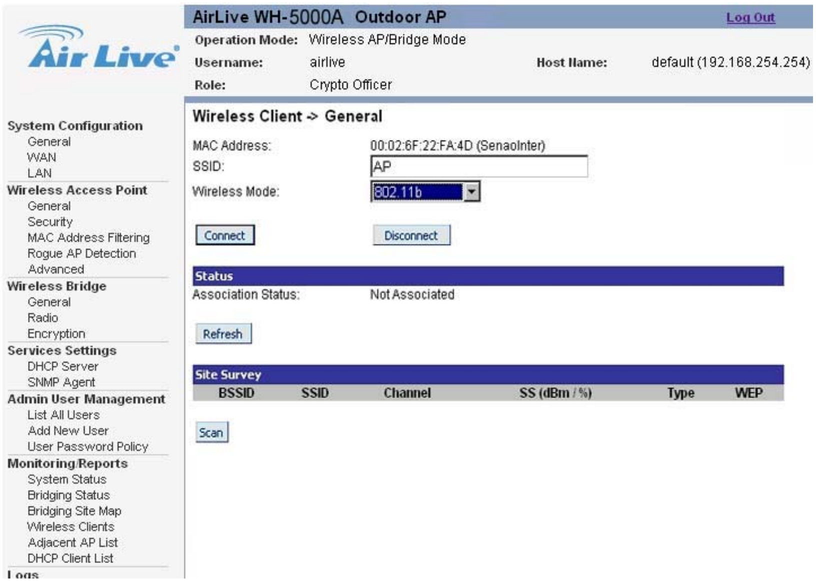
3. Wireless Mode:

   Select the wireless mode from the drop-down list. You can choose from the following options:

   - 802.11b
   - 802.11g
   - 802.11g Super
   - 802.11a
   - 802.11a Turbo

4. Click **Connect** button.

The bundle Status function let you easy to understand link status. You can click **Refresh** at Status Section after WH-5000A link with AP, and then you can get link status information.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

Wireless Client -> General

MAC Address: 00:02:6F:22:FA:4D (SenaoInter)

SSID: AP

Wireless Mode: 802.11b

Status

Association Status: Not Associated

Site Survey

BSSID	SSID	Channel	SS (dBm / %)	Type	WEP

6.2 Wireless Client – Encryption

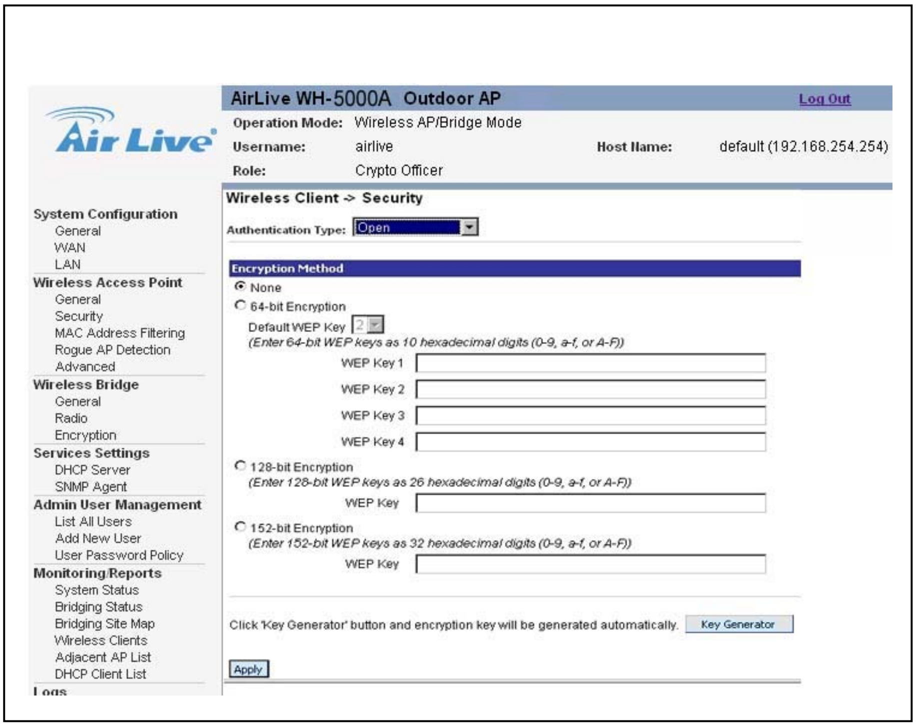
Click the entry on the left hand navigation panel for **Wireless Client – Encryption**. This directs you to the Wireless Client – Encryption page. This is used to configure the security for the wireless client. This is an important page to set up to ensure that your client is working correctly.

There are six options under System Configuration:

- Open (WEP)
- Shared (WEP)
- WPA-PSK
- WPA-EAP-TLS
- WPA2-PSK
- WPA2-EAP-TLS

6.2.1 Open

This is one of WEP Authentication Type. Select None, 64-bit, 128-bit or 152 - it encryption and enter the WEP key. That same WEP key must also be set on each wireless clients/AP those are to become part of the wireless network.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

Wireless Client -> Security

Authentication Type: Open

Encryption Method

● None

○ 64-bit Encryption
Default WEP Key 2
(Enter 64-bit WEP keys as 10 hexadecimal digits (0-9, a-f, or A-F))
WEP Key 1
WEP Key 2
WEP Key 3
WEP Key 4

○ 128-bit Encryption
(Enter 128-bit WEP keys as 26 hexadecimal digits (0-9, a-f, or A-F))
WEP Key

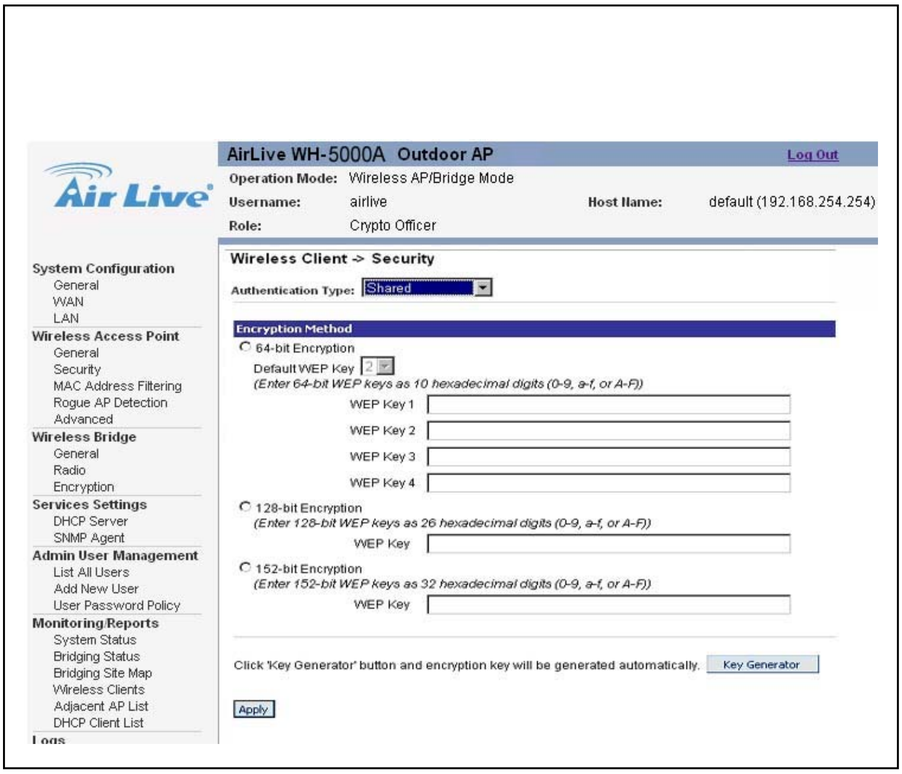
○ 152-bit Encryption
(Enter 152-bit WEP keys as 32 hexadecimal digits (0-9, a-f, or A-F))
WEP Key

Click 'Key Generator' button and encryption key will be generated automatically.

- **Key Generator:** The “Key generator” function generates a randomized encryption key of the appropriate length automatically. The key is initially shown in plain text so the user has the opportunity to copy the key. Once the Key is applied, there is no longer displayed in plain text.

6.2.1 Shared

This is one of WEP Authentication Type. Select 64.bit, 128bit or 152.bit encryption and enter the WEP key. That same WEP key must also be set on each wireless clients/AP those are to become part of the wireless network. If the "shared" mode is selected, each wireless device must also be as "shared" mode.



AirLive WH-5000A Outdoor AP Log Out

Operation Mode: Wireless AP/Bridge Mode
Username: airlive Host Name: default (192.168.254.254)
Role: Crypto Officer

Wireless Client -> Security

Authentication Type: Shared

Encryption Method

○ 64-bit Encryption
Default WEP Key 2
(Enter 64-bit WEP keys as 10 hexadecimal digits (0-9, a-f, or A-F))
WEP Key 1
WEP Key 2
WEP Key 3
WEP Key 4

○ 128-bit Encryption
(Enter 128-bit WEP keys as 26 hexadecimal digits (0-9, a-f, or A-F))
WEP Key

○ 152-bit Encryption
(Enter 152-bit WEP keys as 32 hexadecimal digits (0-9, a-f, or A-F))
WEP Key

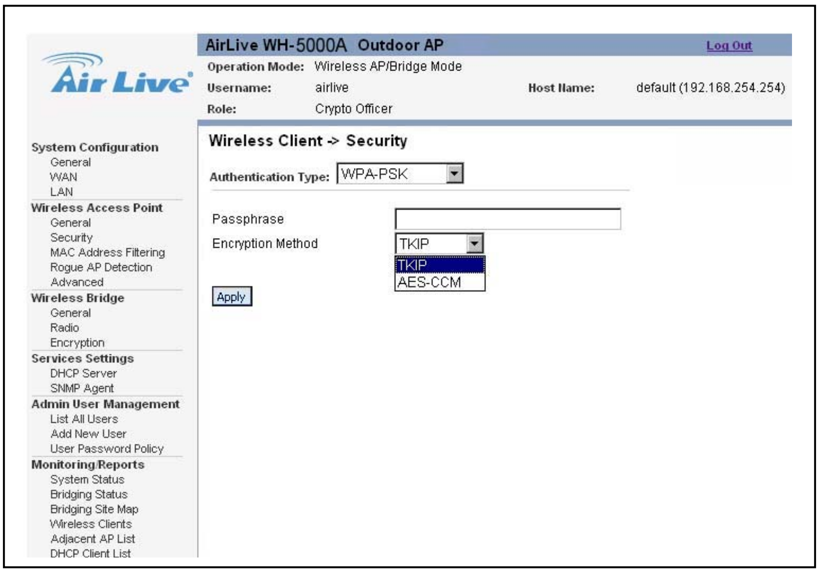
Click 'Key Generator' button and encryption key will be generated automatically. Key Generator

Apply

6.2.2 WPA-PSK/WPA2-PSK

If the AP that WH-5000A client mode will link with uses WPA PSK or WPA2 PSK function and your wireless network hasn't installed Radius Server, you need to select WPA-PSK or WPA2-PSK mode.

Simply input up to 63 character/numeric/hexadecimals in the Passphrase field. If the AP uses WPA-TKIP select TKIP as encryption type. If the AP uses WPA-AES, select AES-CCM.



AirLive WH-5000A Outdoor AP Log Out

Operation Mode: Wireless AP/Bridge Mode
Username: airlive Host Name: default (192.168.254.254)
Role: Crypto Officer

Wireless Client -> Security

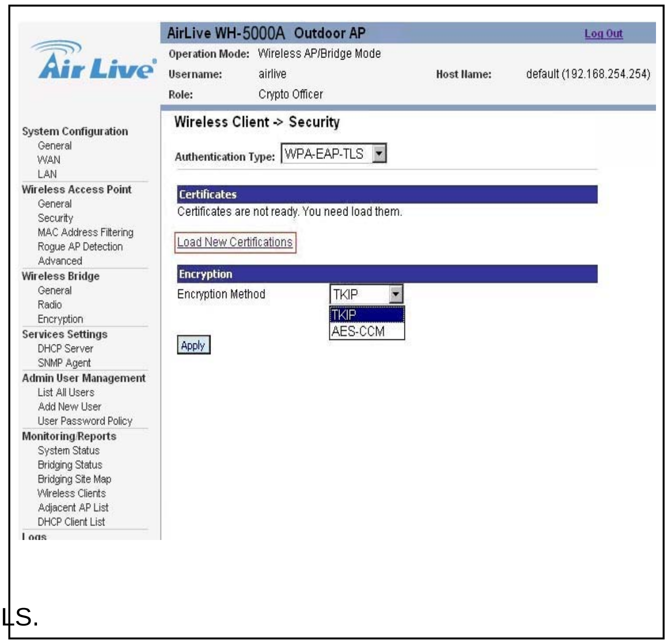
Authentication Type: WPA-PSK

Passphrase
Encryption Method TKIP

6.2.3 WPA-EAP-TLS/WPA2-EAP-TLS

The 802.1x system uses a Radius Server for key management and a separate certification system for authentication. The IEEE 802.1x provides Extensible Authentication Protocol (EAP) security types allows you to use authentication methods such as smart cards and certificates. WH-5000A provides EAP-TLS security types.

If your wireless network have installed Radius Servers and the AP that WH-5000A client mode will link with uses WPA 802.1x or WPA2 802.1x function, you need to select WPA-EAP-TLS or WPA2-EAP-TLS.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

Wireless Client -> Security

Authentication Type: WPA-EAP-TLS

Certificates

Certificates are not ready. You need load them.

Load New Certifications

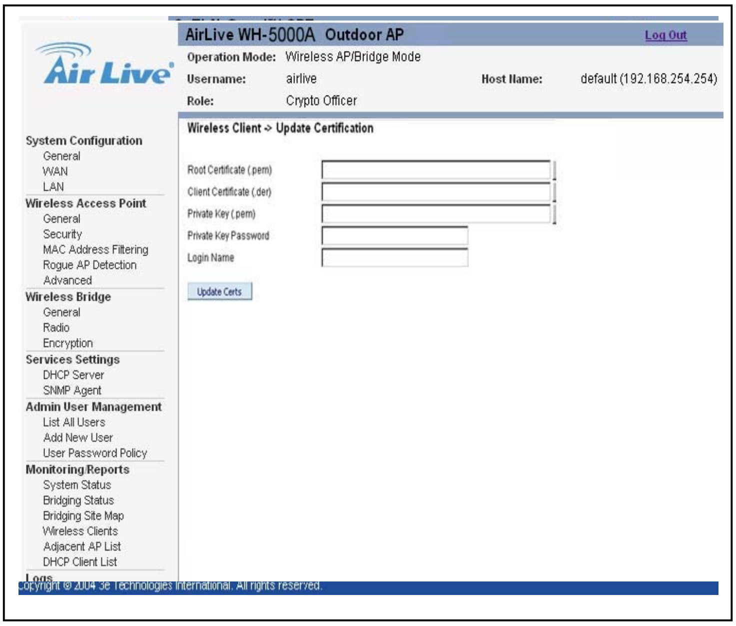
Encryption

Encryption Method: TKIP

There are two items, Certificates and Encryption, have to be selected in order to have successful 802.1x authentication. They are listed as following:

③ **Certificates:**

To set up WPA-EAP-TLS/WPA2-EAP-TLS function, you need to get "Certification file" from certification system. If you have it, then click "**Load New Certification**" to load it. The following picture appears after you click "Load New Certification".



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

Wireless Client -> Update Certification

Root Certificate (.pem)
Client Certificate (.der)
Private Key (.pem)
Private Key Password
Login Name

–

unsigned public key certificate and is part of a public key infrastructure scheme. The most common commercial variety is based on the ISO X.509 standard. Normally an X.509 certificate includes a digital signature from a certificate authority (CA) which vouches for correctness of the data contained in a certificate. This file should have a ***pem*** extension.

- **Client Certificate**: The user certificate is generated by a trusted certificate authority (CA). This file should have a ***der*** extension.
- **Private Key:** A private key is an encryption/decryption key known only to the party or parties that exchange secret messages. In traditional secret key cryptography, a key would be shared by the users so that each could encrypt and decrypt messages. This file should have a ***pem*** extension.
- **Private Key Password:** Private key password encrypts your certificate's private key.
- **Login Name:** Enter your user name into the Login name field. This is the name that is presented to the network when you authenticate. If you authenticate against a Windows Active Directory, use the form, ***domain\user_name***. Otherwise, use a login name that matches the form of the user name as it is stored in the authentication database. See your network administrator for the required format.

Click “**Update Certs**” button after assigning all information.

- **Encryption:**
  Select one of encryption methods: TKIP and AES-CCM for encryption of wireless communication between wireless client and wireless access point

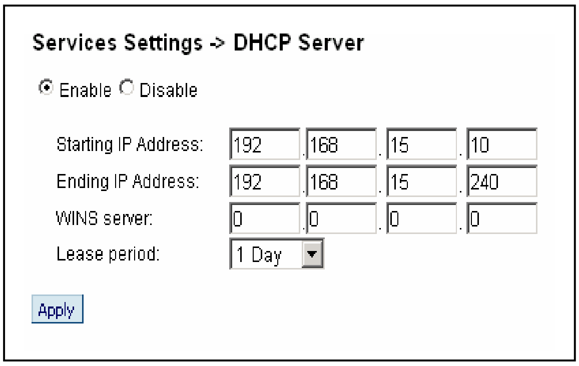
Chapter 7: Service Settings Menu

This chapter describes the items about Service Setting. If you don’t know how to enter configuration screen, chapter 2 describes how to do it. Please keep in mind that you need click Apply to save all settings. Please keep in mind that you need click Apply to save all settings.

Click the entry on the left hand navigation panel for **Service Setting**. This directs you to this page.

7.1 DHCP server

Click the entry on the left hand navigation panel for **Service Setting – DHCP Server**. This directs you to the DHCP server page.



Services Settings -> DHCP Server

● Enable ○ Disable

Starting IP Address: 192 . 168 . 15 . 10

Ending IP Address: 192 . 168 . 15 . 240

WINS server: 0 . 0 . 0 . 0

Lease period: 1 Day

This page allows configuration of the DHCP server function. The DHCP server function, accessible only from the Local LAN port, is used for initial configuration of the management function.

The default factory setting for the DHCP server function is enabled. You can disable the DHCP server function, if you wish. You can also set the range of address to be assigned.

WNS server: The WNS (Windows Internet Naming Service) server is used for name resolution. It is similar in function to DNS. It allows you to search for resources by computer name instead of IP address

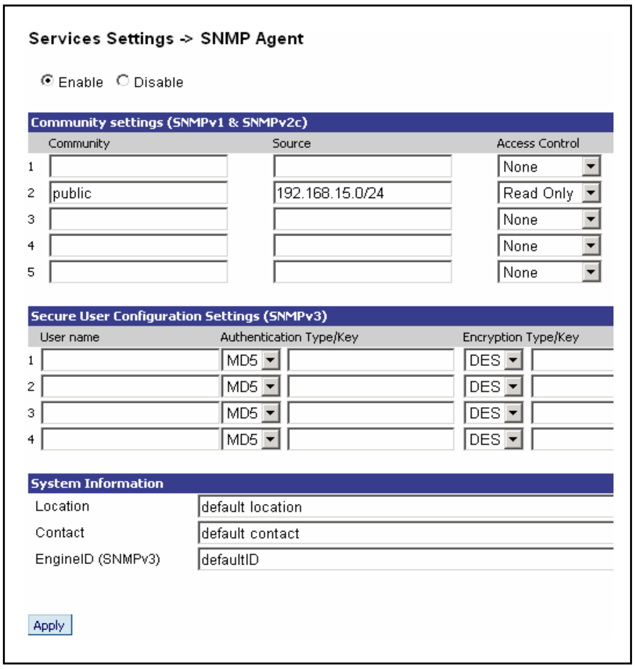
Lease period is for the DHCP server function. The lease times you can select are: 1 hour, 2 hours, 1 day, 2 days, or 1 week.

7.2 SNMP Agent

Click the entry on the left hand navigation panel for **Service Setting – SNMP Agent**. This directs you to the SNMP Agent page.

The SNMP collects and stores management information for use in a network management system. The WH-5000A integrated SNMP agent software module translates the device management information into a common form for interpretation by the SNMP manager, which usually resides on a network administrator's computer.

In the current release, the SNMP agent module support SNMPv1, SNMPv2C and SNMPv3. It also implements warmStart, linkDown, linkUp, and authentication. The SNMP configuration consists of several fields, which are explained below:



Services Settings -> SNMP Agent

● Enable ○ Disable

Community settings (SNMPv1 & SNMPv2c)

	Community	Source	Access Control
1			None
2	public	192.168.15.0/24	Read Only
3			None
4			None
5			None

Secure User Configuration Settings (SNMPv3)

	User name	Authentication Type/Key		Encryption Type/Key	
1		MD5		DES	
2		MD5		DES	
3		MD5		DES	
4		MD5		DES	

System Information

Location	default location
Contact	default contact
EngineID (SNMPv3)	defaultID

- **Community:**

  The Community field for Get (Read Only), Set (Read & Write), and Trap is simply the SNMP

  terminology for "password" for those functions.

- **Source:**

  The IP address or name where the information is obtained.

- **Access Control:**

  Define the level of management interaction permitted.

If using SNMPv3, enter a username (minimum of eight characters), authentication type with key and data encryption type with a key. This configuration information will also need to be entered in your MIB manager setup.

Chapter 8: User Management Menu

This chapter describes the items about User Management page. If you don't know how to enter configuration screen, chapter 2 describes how to do it.

There are two user roles for WH-5000A, crypto officer and administrator.

- **Crypto Officer:** The user of crypto officer role has the highest authority to set up all of functions of WH-5000A.
- **Administrator:** The user of administrator role has most of right to set up WH-5000A; however, they can not set up the encryption function.

The WH-5000A default username is **airlive** (password is **airlive**) and its role is crypto officer role to allow you initial the configuration job.

There are two options under Admin User Management:

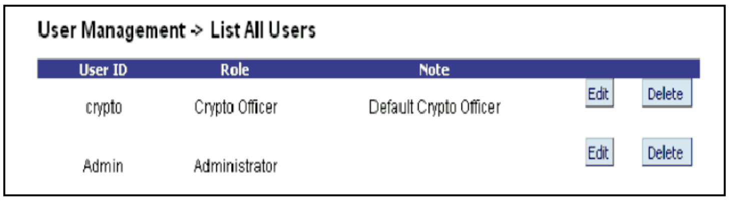
- List All Users
  - Edit User
- Add New Users

Each screen is described in detail in the following subsections.

8.1 List All Users

Click the entry on the left hand navigation panel for **User Management – List All Users**. This directs you to this page.

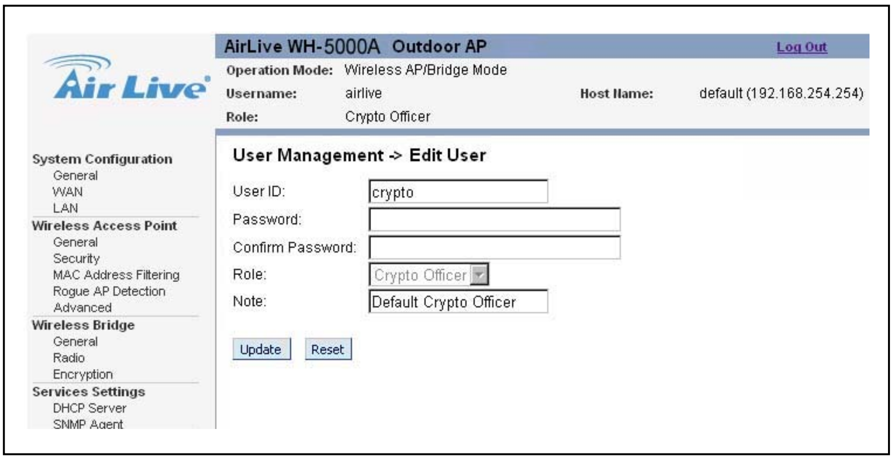
The List All Users page simply lists all Cyrpto Officer and Administrator accounts configured for the unit. You can edit or delete users from this screen.



User Management -> List All Users

User ID	Role	Note		
crypto	Crypto Officer	Default Crypto Officer	Edit	Delete
Admin	Administrator		Edit	Delete

If you click on **Edit**, the Admin User Management – Edit User Screen appears. On this screen you can edit the user ID, Password, role and note fields.



Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

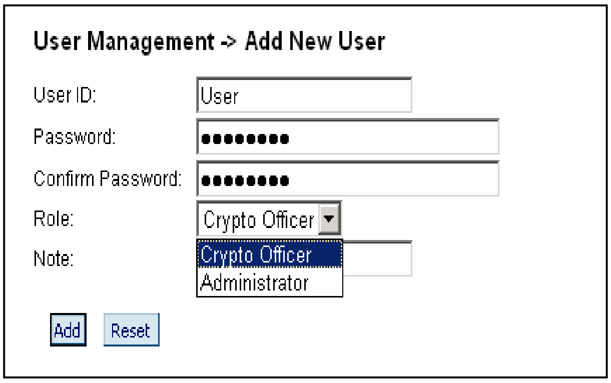
User Management -> Edit User

User ID: crypto
Password:
Confirm Password:
Role: Crypto Officer
Note: Default Crypto Officer

8.2 Add New User

Click the entry on the left hand navigation panel for **User Management – Add New User**. This directs you to this page.

The Add New User screen allows you to add new Crypto Officer or Administrators, assigning and confirming the password for each. The password can not be less than 8 characters. After you key in user ID, password, and choose Role, click **Add** to add this new user.



User Management -> Add New User

User ID: User

Password: ●●●●●●●●

Confirm Password: ●●●●●●●●

Role: Crypto Officer

Note:

Chapter 9: Monitoring/Reports Menu

This chapter describes the items about Monitor/Reports page. If you don't know how to enter configuration screen, chapter 2 describes how to do it.

There are three options under **Montioring/Reprots** when the operation mode is Wireless Bridging and

Wireless Client

- System Status
- Bridging Status
- Bridging Site Map

There are three options under **Montioring/Reprots** when the operation mode is Wireless Bridging and

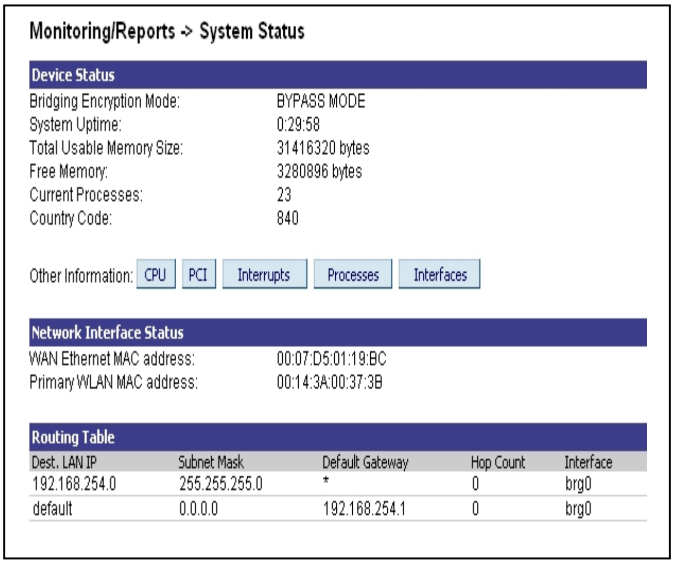
Wireless Client

- System Status
- Bridging Status
- Bridging Site Map
- Wireless Clients
- Adjacent AP List
- DHCP Client List

9.1 System Status

Click the entry on the left hand navigation panel for **Monitor/Reports – System status**. This directs you to this page. This screen displays the status of the WH-5000A device and network interface details and the routing table.

There are also some pop-up informational menus on this screen that give detailed information about CPU, PCI, Interrupts, Process and Interfaces.



Monitoring/Reports -> System Status

Device Status

Bridging Encryption Mode:	BYPASS MODE
System Uptime:	0:29:58
Total Usable Memory Size:	31416320 bytes
Free Memory:	3280896 bytes
Current Processes:	23
Country Code:	840

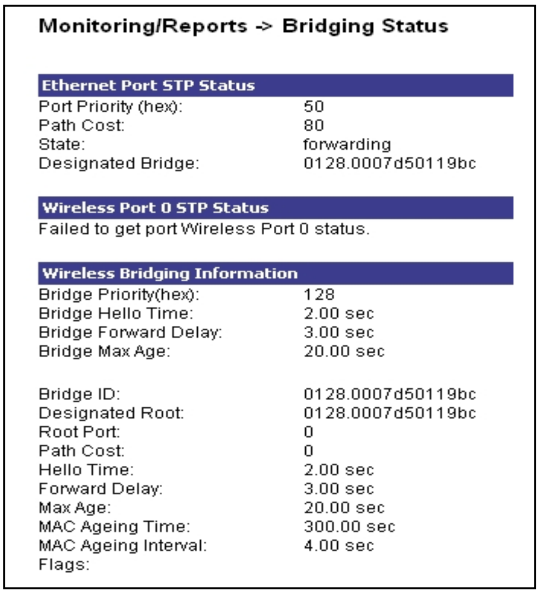
Network Interface Status

WAN Ethernet MAC address:	00:07:D5:01:19:BC
Primary WLAN MAC address:	00:14:3A:00:37:3B

Routing Table

Dest. LAN IP	Subnet Mask	Default Gateway	Hop Count	Interface
192.168.254.0	255.255.255.0	*	0	brg0
default	0.0.0.0	192.168.254.1	0	brg0

9.2 Bridging Status



Monitoring/Reports -> Bridging Status

Ethernet Port STP Status

Port Priority (hex):	50
Path Cost:	80
State:	forwarding
Designated Bridge:	0128.0007d50119bc

Wireless Port 0 STP Status

Failed to get port Wireless Port 0 status.

Wireless Bridging Information

Bridge Priority(hex):	128
Bridge Hello Time:	2.00 sec
Bridge Forward Delay:	3.00 sec
Bridge Max Age:	20.00 sec
Bridge ID:	0128.0007d50119bc
Designated Root:	0128.0007d50119bc
Root Port:	0
Path Cost:	0
Hello Time:	2.00 sec
Forward Delay:	3.00 sec
Max Age:	20.00 sec
MAC Ageing Time:	300.00 sec
MAC Ageing Interval:	4.00 sec
Flags:	

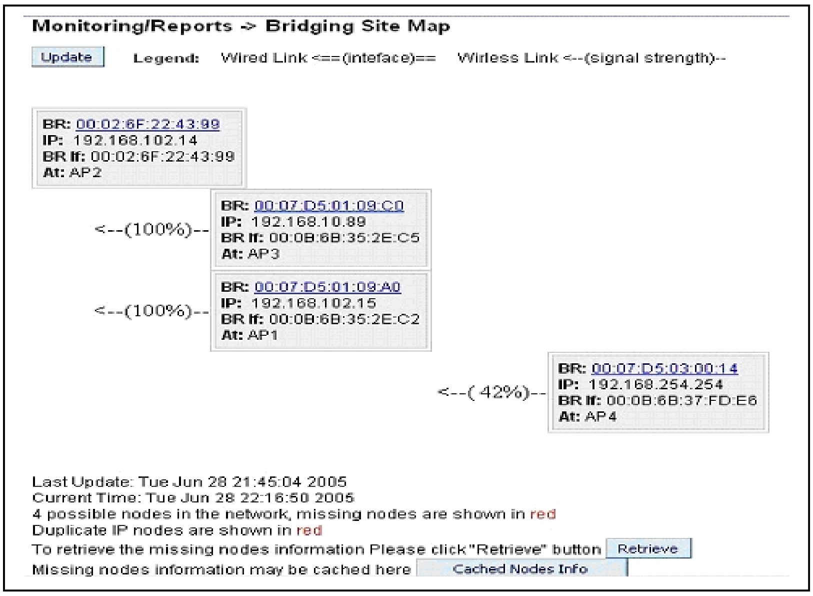
Click the entry on the left hand navigation panel for **Monitor/Reports –Bridging Status**. This screen displays the Ethernet Port STP status, wireless port STP status, and wireless bridging information.

9.3 Bridge Site Map

Click the entry on the left hand navigation panel for **Monitor/Reports – Bridge Site Map**.

This screen displays the graphology of Bridges Network topology with some useful information – IP, Signal Strength and so on.

The map shows the network layer-2 topology. APs that are part of another network are not displayed in the map. The root STP node is always on top and the nodes of the hierarchy are displayed below it. Wired links are double dotted lines and wireless links are single dotted lines. This map does not update dynamically. You must press the **Update** button to refresh the map.



Monitoring/Reports -> Bridging Site Map

Update
Legend: Wired Link <==(inteface)== Wirless Link <--(signal strength)--
<--(100%)--
<--(100%)--
<--(42%)--

BR: 00:02:6F:22:43:99
IP: 192.168.102.14
BR If: 00:02:6F:22:43:99
At: AP2

BR: 00:07:D5:01:09:C0
IP: 192.168.10.89
BR If: 00:0B:6B:35:2E:C5
At: AP3

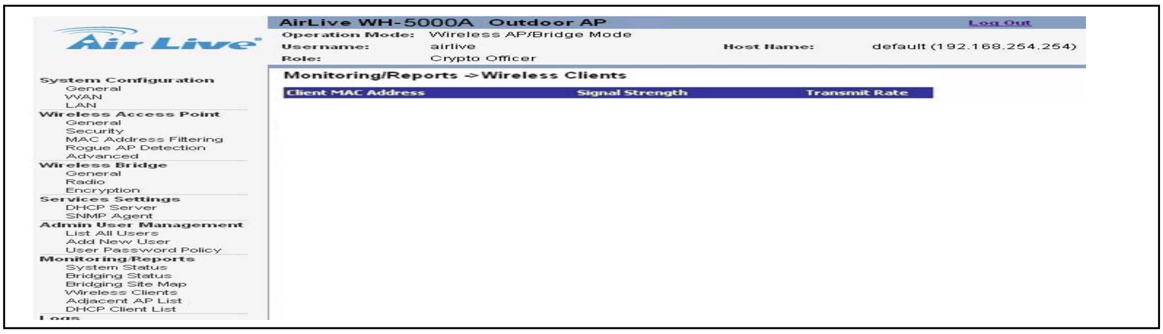
BR: 00:07:D5:01:09:A0
IP: 192.168.102.15
BR If: 00:0B:6B:35:2E:C2
At: AP1

BR: 00:07:D5:03:00:14
IP: 192.168.254.254
BR If: 00:0B:6B:37:FD:E6
At: AP4

Last Update: Tue Jun 28 21:45:04 2005
Current Time: Tue Jun 28 22:16:50 2005
4 possible nodes in the network, missing nodes are shown in red
Duplicate IP nodes are shown in red
To retrieve the missing nodes information Please click "Retrieve" button Retrieve
Missing nodes information may be cached here Cached Nodes Info

9.4 Wireless Clients

Click the entry on the left hand navigation panel for **Monitor/Reports – Wireless Client**. This screen displays the MAC address of all wireless clients and their signal strength and transmit rate.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

Monitoring/Reports -> Wireless Clients

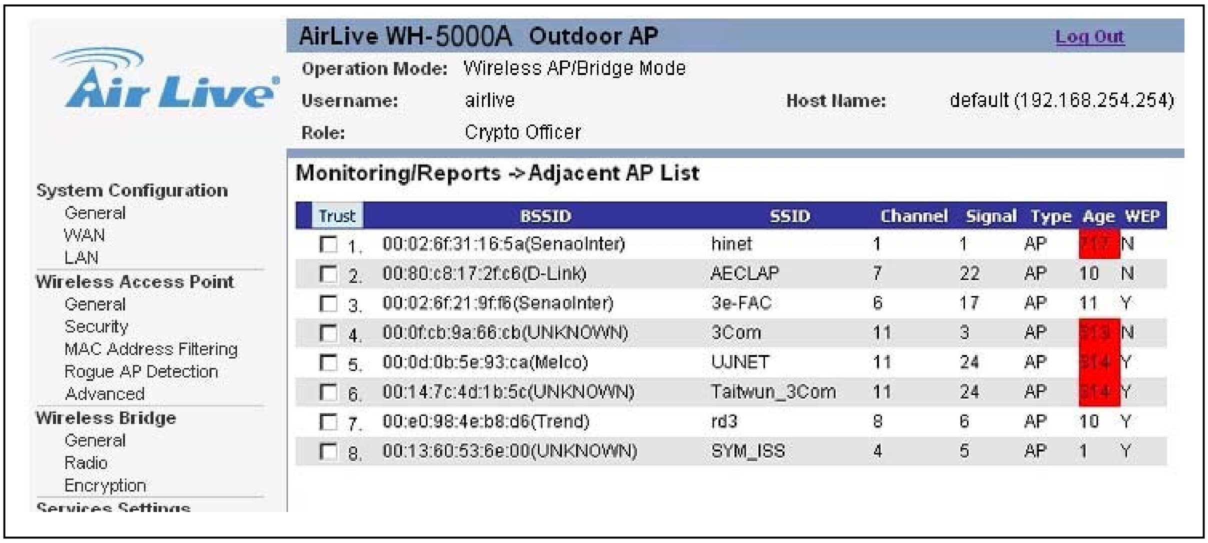
Client MAC Address	Signal Strength	Transmit Rate

9.5 Adjacent AP list

Click the entry on the left hand navigation panel for **Monitor/Reports – Adjacent AP List**. This screen displays the detected APs, BSSID(MAC address), SSID, Channel, Signal Strength, Operation Type, Age and WEP status.

These APs are detected by the AP's wireless card. The lists of APs are only within the band that can be seen from a particular channel. For example, if the AP is on channel 1, it will display APs on channels 1-3.

If you select the check box next to any AP shown, the AP will thereafter be accepted by the AirLive WH-5000A as a trusted AP.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

Monitoring/Reports -> Adjacent AP List

Trust	BSSID	SSID	Channel	Signal	Type	Age	WEP
□ 1.	00:02:6f:31:16:5a(SenaoInter)	hinet	1	1	AP	717	N
□ 2.	00:80:c8:17:2f:c6(D-Link)	AECLAP	7	22	AP	10	N
□ 3.	00:02:6f:21:9f:f6(SenaoInter)	3e-FAC	6	17	AP	11	Y
□ 4.	00:0f:cb:9a:66:cb(UNKNOWN)	3Com	11	3	AP	813	N
□ 5.	00:0d:0b:5e:93:ca(Melco)	UJNET	11	24	AP	814	Y
□ 6.	00:14:7c:4d:1b:5c(UNKNOWN)	Taitwun_3Com	11	24	AP	814	Y
□ 7.	00:e0:98:4e:b8:d6(Trend)	rd3	8	6	AP	10	Y
□ 8.	00:13:60:53:6e:00(UNKNOWN)	SYM_ISS	4	5	AP	1	Y

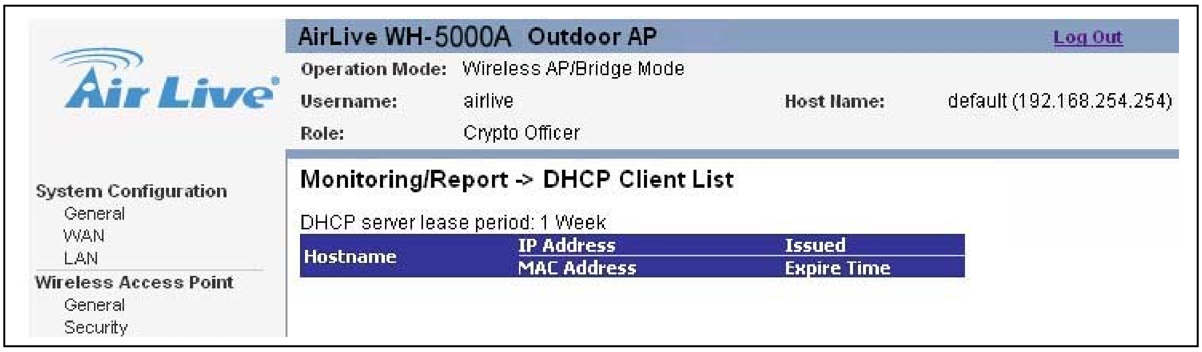
9.6 DHCP Client List

Click the entry on the left hand navigation panel for **Monitor/Reports – DHCP Client List**. This directs you to this page.

The DHCP client list displays all clients currently connected to the WH-5000A via DHCP server, including their

hostnames, IP addresses, and MAC addresses.

The DHCP Client list constantly collects entries. To remove entries from the list, check mark the Revoke Entry selection and click **Remove** to confirm the action.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

Monitoring/Report -> DHCP Client List

DHCP server lease period: 1 Week

Hostname	IP Address MAC Address	Issued Expire Time

Chapter 10: Logs

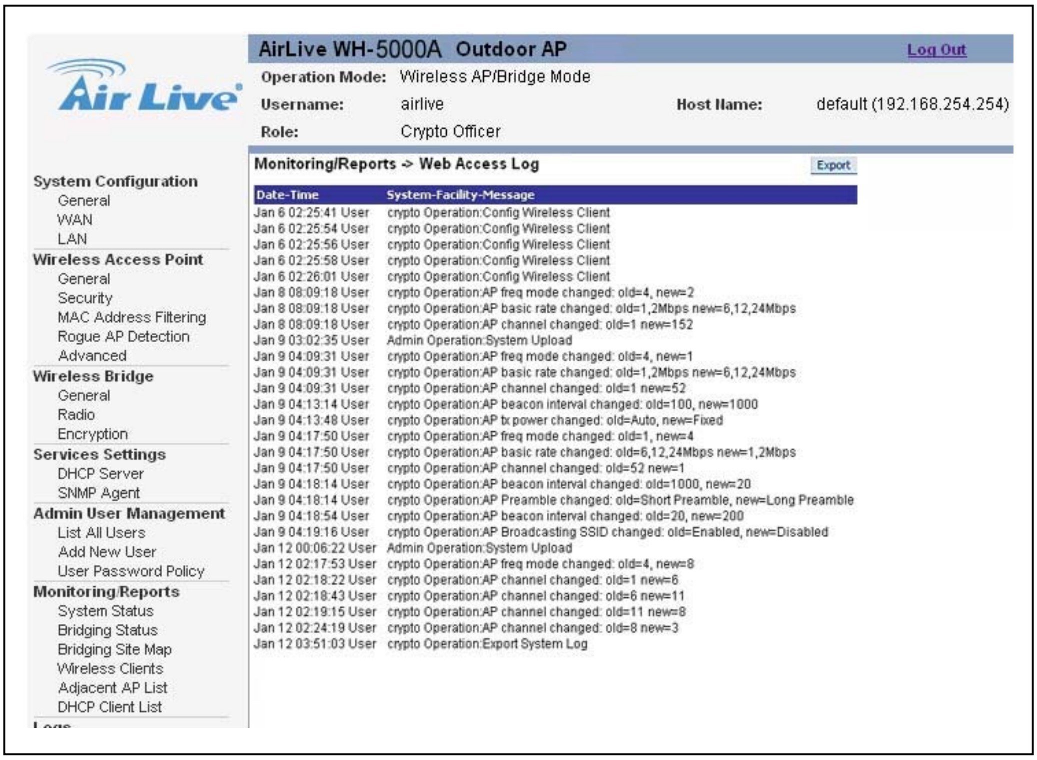
This chapter describes the items about Monitor/Reports page. If you don't know how to enter configuration screen, chapter 2 describes how to do it.

There are two logs, system log and web access log, available for viewing and exporting.

10.1 System Log

Click the entry on the left hand navigation panel for **Logs – System Log**. This directs you to this page.

The system log display system-facility-messages with date and time stamp. There are messages documenting functions performed internal to system, based on the system's functionality. Generally, the network administrator would only use this information if trained as or working with a field engineer or as information provide to technical support. The system log will continue to accumulate listing. If you wish to export listings, use the **Export** button.



Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

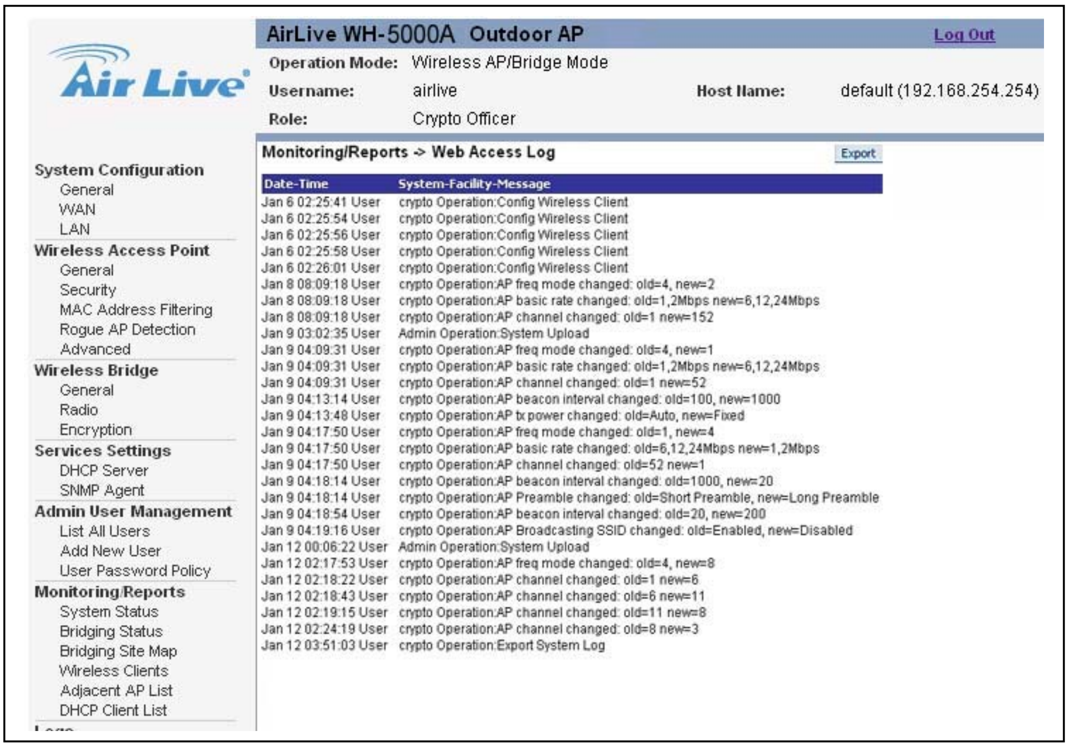
Monitoring/Reports -> Web Access Log

```
Date-Time             System-Facility-Message
Jan 6 02:25:41 User   crypto Operation:Config Wireless Client
Jan 6 02:25:54 User   crypto Operation:Config Wireless Client
Jan 6 02:25:56 User   crypto Operation:Config Wireless Client
Jan 6 02:25:58 User   crypto Operation:Config Wireless Client
Jan 6 02:26:01 User   crypto Operation:Config Wireless Client
Jan 8 08:09:18 User   crypto Operation:AP freq mode changed: old=4, new=2
Jan 8 08:09:18 User   crypto Operation:AP basic rate changed: old=1,2Mbps new=6,12,24Mbps
Jan 8 08:09:18 User   crypto Operation:AP channel changed: old=1 new=152
Jan 9 03:02:35 User   Admin Operation:System Upload
Jan 9 04:09:31 User   crypto Operation:AP freq mode changed: old=4, new=1
Jan 9 04:09:31 User   crypto Operation:AP basic rate changed: old=1,2Mbps new=6,12,24Mbps
Jan 9 04:09:31 User   crypto Operation:AP channel changed: old=1 new=52
Jan 9 04:13:14 User   crypto Operation:AP beacon interval changed: old=100, new=1000
Jan 9 04:13:48 User   crypto Operation:AP tx power changed: old=Auto, new=Fixed
Jan 9 04:17:50 User   crypto Operation:AP freq mode changed: old=1, new=4
Jan 9 04:17:50 User   crypto Operation:AP basic rate changed: old=6,12,24Mbps new=1,2Mbps
Jan 9 04:17:50 User   crypto Operation:AP channel changed: old=52 new=1
Jan 9 04:18:14 User   crypto Operation:AP beacon interval changed: old=1000, new=20
Jan 9 04:18:14 User   crypto Operation:AP Preamble changed: old=Short Preamble, new=Long Preamble
Jan 9 04:18:54 User   crypto Operation:AP beacon interval changed: old=20, new=200
Jan 9 04:19:16 User   crypto Operation:AP Broadcasting SSID changed: old=Enabled, new=Disabled
Jan 12 00:06:22 User  Admin Operation:System Upload
Jan 12 02:17:53 User  crypto Operation:AP freq mode changed: old=4, new=8
Jan 12 02:18:22 User  crypto Operation:AP channel changed: old=1 new=6
Jan 12 02:18:43 User  crypto Operation:AP channel changed: old=6 new=11
Jan 12 02:19:15 User  crypto Operation:AP channel changed: old=11 new=8
Jan 12 02:24:19 User  crypto Operation:AP channel changed: old=8 new=3
Jan 12 03:51:03 User  crypto Operation:Export System Log
```

10.2 Web Access Log

Click the entry on the left hand navigation panel for **Logs – Web Access Log** to enter this page.

This screen displays system facility messages with date and time stamp for any actions involving web access. For example, this log records when you set encryption mode, change operating mode, etc., using the web browser. It establishes a running record regarding what actions were performed and by whom. The Web Access Log will continue to accumulate listing. If you wish to export listings, use the **Export** button.



Operation Mode: Wireless AP/Bridge Mode

Username: airlive   Host Name: default (192.168.254.254)

Role: Crypto Officer

Monitoring/Reports -> Web Access Log

```
Date-Time            System-Facility-Message
Jan 6 02:25:41 User  crypto Operation:Config Wireless Client
Jan 6 02:25:54 User  crypto Operation:Config Wireless Client
Jan 6 02:25:56 User  crypto Operation:Config Wireless Client
Jan 6 02:25:58 User  crypto Operation:Config Wireless Client
Jan 6 02:26:01 User  crypto Operation:Config Wireless Client
Jan 8 08:09:18 User  crypto Operation:AP freq mode changed: old=4, new=2
Jan 8 08:09:18 User  crypto Operation:AP basic rate changed: old=1,2Mbps new=6,12,24Mbps
Jan 8 08:09:18 User  crypto Operation:AP channel changed: old=1 new=152
Jan 9 03:02:35 User  Admin Operation:System Upload
Jan 9 04:09:31 User  crypto Operation:AP freq mode changed: old=4, new=1
Jan 9 04:09:31 User  crypto Operation:AP basic rate changed: old=1,2Mbps new=6,12,24Mbps
Jan 9 04:09:31 User  crypto Operation:AP channel changed: old=1 new=52
Jan 9 04:13:14 User  crypto Operation:AP beacon interval changed: old=100, new=1000
Jan 9 04:13:48 User  crypto Operation:AP tx power changed: old=Auto, new=Fixed
Jan 9 04:17:50 User  crypto Operation:AP freq mode changed: old=1, new=4
Jan 9 04:17:50 User  crypto Operation:AP basic rate changed: old=6,12,24Mbps new=1,2Mbps
Jan 9 04:17:50 User  crypto Operation:AP channel changed: old=52 new=1
Jan 9 04:18:14 User  crypto Operation:AP beacon interval changed: old=1000, new=20
Jan 9 04:18:14 User  crypto Operation:AP Preamble changed: old=Short Preamble, new=Long Preamble
Jan 9 04:18:54 User  crypto Operation:AP beacon interval changed: old=20, new=200
Jan 9 04:19:16 User  crypto Operation:AP Broadcasting SSID changed: old=Enabled, new=Disabled
Jan 12 00:06:22 User Admin Operation:System Upload
Jan 12 02:17:53 User crypto Operation:AP freq mode changed: old=4, new=8
Jan 12 02:18:22 User crypto Operation:AP channel changed: old=1 new=6
Jan 12 02:18:43 User crypto Operation:AP channel changed: old=6 new=11
Jan 12 02:19:15 User crypto Operation:AP channel changed: old=11 new=8
Jan 12 02:24:19 User crypto Operation:AP channel changed: old=8 new=3
Jan 12 03:51:03 User crypto Operation:Export System Log
```

Chapter 11: System Administration Menu

This chapter describes the items about System Administration page. If you don't know how to enter configuration screen, chapter 4 describes how to do it.

There are five options under **System Administration**:

- System Upgrade
  - Firmware Upgrade
  - Local Configuration Upgrade
- Factory Default
- Remote Logging
- Reboot
- Utilities

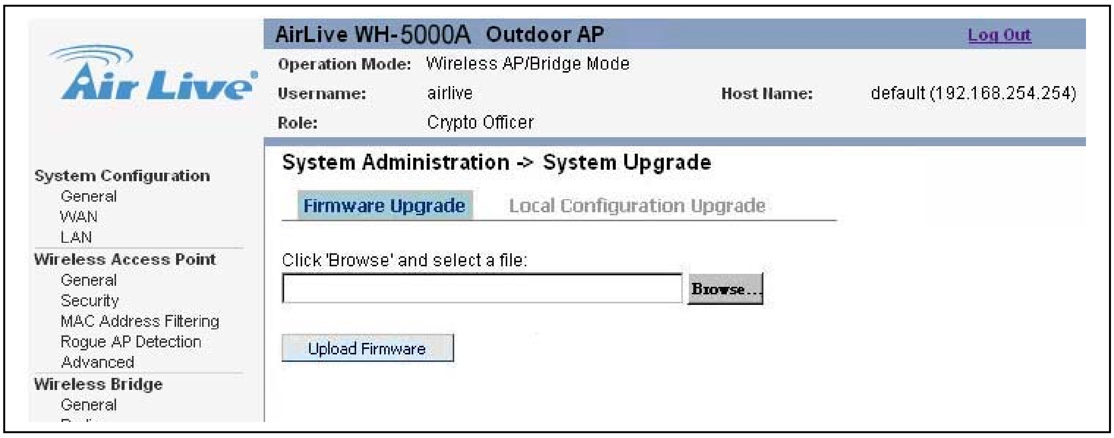
11.1 System Upgrade

Click the entry on the left hand navigation panel for **System Administration – System Upgrade** to enter this page. It provides the ability to upload to the WH-5000A device's firmware as they become available. When a new upgrade file becomes available, you can do a firmware upgrade from the **Firmware Upgrade** window.

There is also a configuration file transfer option which allows the system configuration file from one AP to be transferred to another AP, in order to minimize the administration of the APs. Only configuration parameters that can be shared between APs are downloaded in the configuration file. WAN IP address and hostname are not transferred in the configuration file. Click on the **Local Configuration Upgrade** tab to perform file transfers. Only the Crypto Officer role can access this function.

11.1.1 Firmware Upgrade

On the **System Administration – System Upgrade** screen, the Firmware Upgrade tab is the default view. Click **browse** and select the firmware file to be uploaded. Click on the **Upload Firmware** button.



Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

System Administration -> System Upgrade

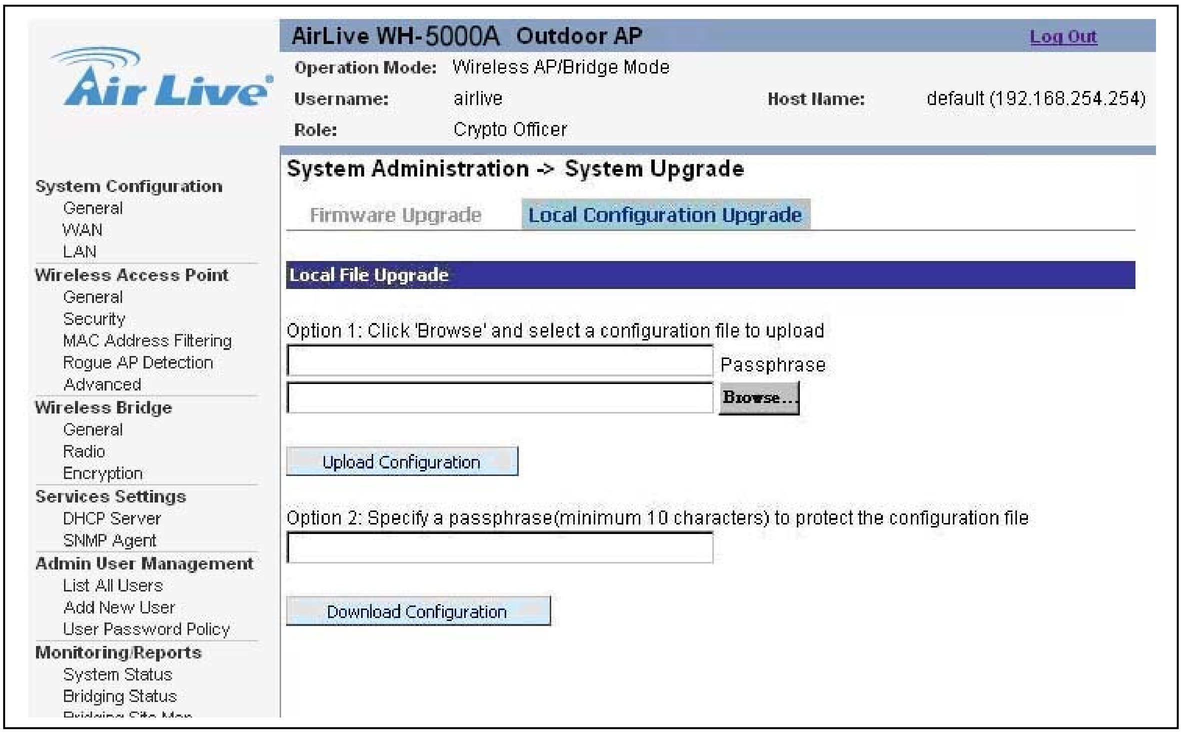
Click 'Browse' and select a file:

11.1.2 Location Configuration Upgrade

On the **System Administration – System Upgrade** screen, click on the **Local Configuration Upgrade** tab to upload and download configuration files to APs connected to the network.

To upload a configuration file, select the file using the browse button and enter the passphrase for that file. The passphrase protects the file from unauthorized users. It prevents unauthorized user from applying the system configuration file to an unauthorized AP to gain access to the network. Before downloading the system configuration file to a local computer, the use must enter a passphrase to protect the file. Before the system configuration file can be uploaded onto another WH-5000A, the passphrase must be entered on the remote WH-5000A.

The configuration file can be tagged with a 12 character tag to keep track of the configuration file as it is transfer to other AirLive WH-5000A devices.



Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

System Administration -> System Upgrade

Local File Upgrade

Option 1: Click 'Browse' and select a configuration file to upload

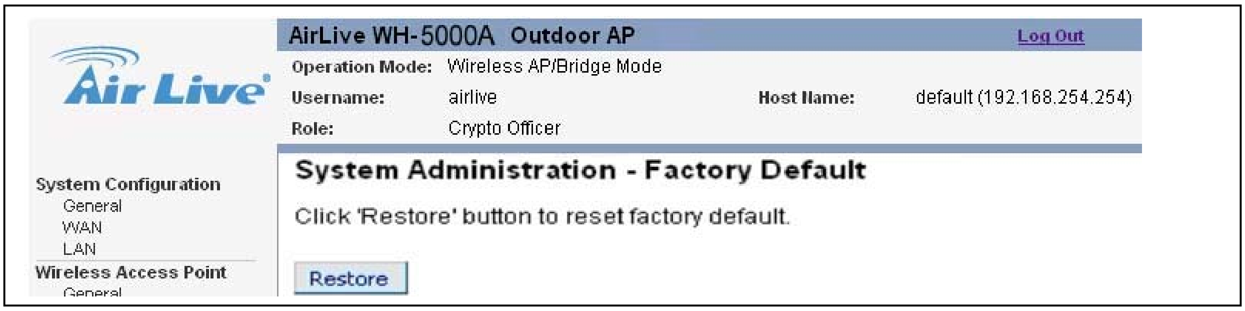
Passphrase

Option 2: Specify a passphrase(minimum 10 characters) to protect the configuration file

11.2 Factory Default

Click the entry on the left hand navigation panel for **System Administration – Factory Default** to enter this page.

The “**Restore**” button is a fallback troubleshooting function that should only be use to reset system to original settings. Only the Crypto Officer role has access to the Restore button.



AirLive WH-5000A Outdoor AP

Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

System Administration - Factory Default

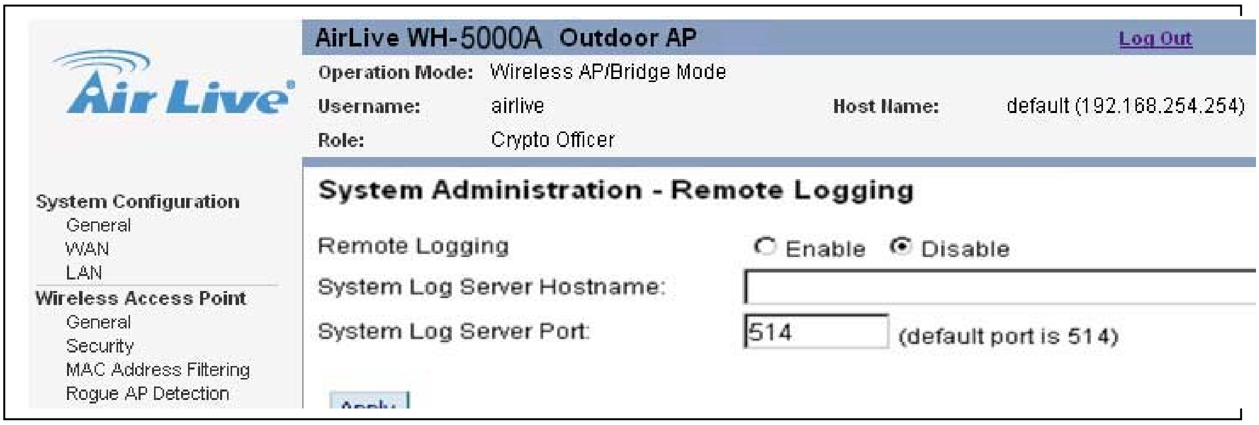
Click 'Restore' button to reset factory default.

11.3 Remote Logging

Click the entry on the left hand navigation panel for **System Administration – Remote Logging** to enter this page.

Remote logging allows you to forward the syslog data from each machine to a central remote logging server. In the WH-5000A, this function uses the syslogd daemon. You can find more information about syslogd by searching for “syslogd” in an Internet search engine (such as Google®) to find a versin compatible with your operation system.

If you enable Remote logging, input a System Log Server IP Address and System Log Server Port, click **Apply** to accept these values.



AirLive WH-5000A Outdoor AP

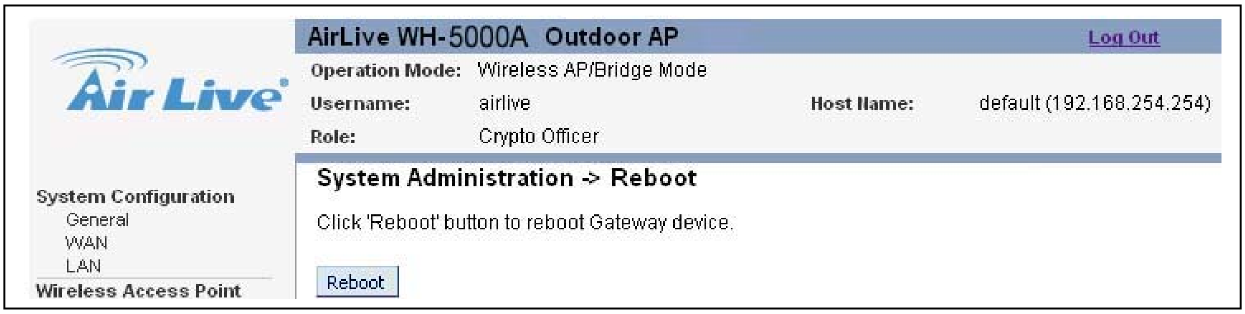
Operation Mode: Wireless AP/Bridge Mode
Username: airlive
Host Name: default (192.168.254.254)
Role: Crypto Officer

System Administration - Remote Logging

Remote Logging ○ Enable ● Disable
System Log Server Hostname:
System Log Server Port: 514 (default port is 514)

11.4 Reboot

Click the entry on the left hand navigation panel for **System Administration – Reboot** to enter this page. The Reboot utility allows you to reboot the WH-5000A without changing any preset functionality. Both Crypto Officer and Administrator roles have access to this function.



AirLive WH-5000A Outdoor AP

Log Out

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

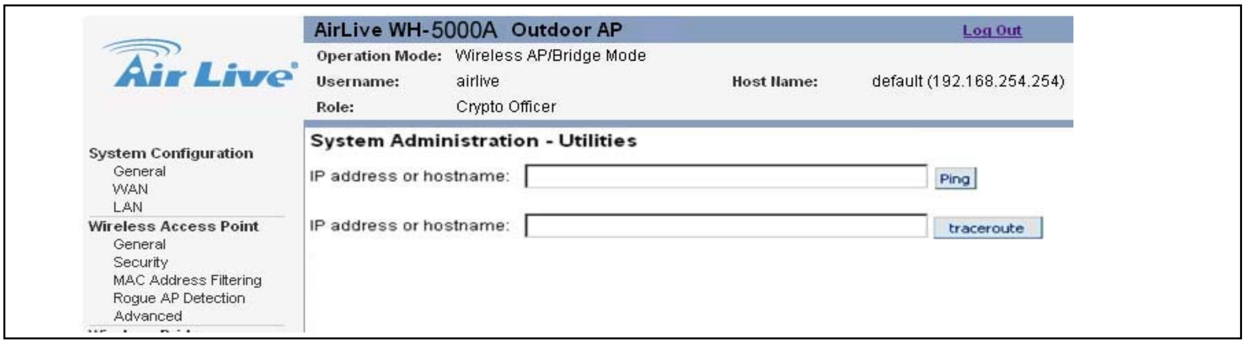
Role: Crypto Officer

System Administration -> Reboot

Click 'Reboot' button to reboot Gateway device.

11.5 Utilities

Click the entry on the left hand navigation panel for **System Administration – Utilities** to enter this page. This screen gives you ready access to two useful utilities: Ping and Trace route. Simply enter the IP address or hostname you wish to ping or trace route and click either the **Ping** or **Traceroute** button, as appropriate.



AirLive WH-5000A Outdoor AP

Log Out

Operation Mode: Wireless AP/Bridge Mode

Username: airlive

Host Name: default (192.168.254.254)

Role: Crypto Officer

System Administration - Utilities

IP address or hostname:

IP address or hostname:

Chapter 12: Reset and Rest to Factory Default Setting

The WH-5000A is with two kind of reset behavior. One is reset system without changing any preset functionality and the other one is reset system to factory default settings that will change any preset functionality. There are two ways to do reset function. One is by enter configure screen (introduce at chapter 11.2 and chapter 11.4) and another way is done by press reset button at the front panel of case. The behaviors of reset button are as below:

- No action: if press button less than 3 seconds
- Reset system: if press button between 3 ~ 8 seconds
- Reset to Factory Default setting: if press button longer than 8 seconds

Chapter 13: Technical Support

Manufacturer's Statement

The WH-5000A is provided with warranty. It is not desired or expected that the user open the device. If malfunction is experienced and all external causes are eliminated, the user should return the unit to the manufacturer and replace it with a functioning unit.

If you are experiencing trouble with this unit, the point of contact is: your manufacturer or sales representative.

Radio Frequency Interference Requirements

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the Federal Communications Commission's Rules and Regulations. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may came harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense-

Installation should be accomplished using the authorized cables and/or connectors provided with the device or available from the manufacturer/distributor for use with this device. Changes or modifications not expressly approved by the manufacturer or party responsible for this FCC compliance could void the user authority to operate thee equipment.

Channel Separation and WLAN Cards

There are two WLAN cards in this device. One is used for the Access Point function; the other is used for the Bridge. Channel Separation is required to reduce interference between the AP and Bridge WLAN cards. We have found that assigning 11 to the AP and 4to the Bridge has given the optimum channel separation in test installations.