Wireless LAN Device Series

WLAN Outdoor AP

ZW-2200-IA/OD User's Manual

Version. 1.4.1 (2006.11.01)

TABLE OF CONTENTS

Notice

Warning： Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions： (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
The user’s manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

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

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

Changes or modifications not expressly approved by the party responsible for compliance could void the user‘s authority to operate the equipment.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Shielded interface cables must be used in order to comply with emission limits.

CAUTION：

1. The antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meters from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

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

3. This equipment is only allowed to be professionally installed.

Preface

This guide is for the networking professional who installs and manages the Zinwell

ZW-2200-IA/OD product hereafter referred to as the “device”. To use this guide, you should have experience working with the TCP/IP configuration and be familiar with the concepts and terminology of wireless local area networks.

Ch 1. ZW-2200 Installation

ZW-2200-IA

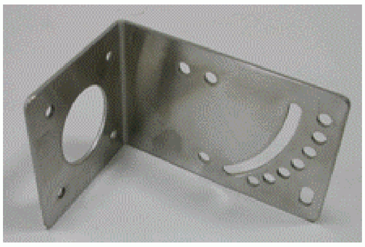
Packing List

Before you start to install the IA, make sure the package contains the following items：

- Wireless IA AP unit * 1
- Mounting Kit * 1
- Power Over Ethernet Kit * 1
- Ground Wire * 1
- 2.5” U bolts * 2
- Waterproof Connector * 1

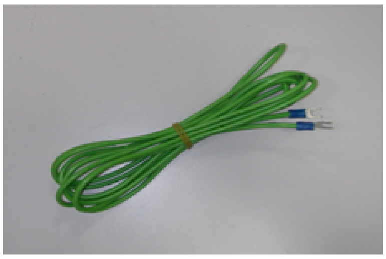
IA

Mounting Kit

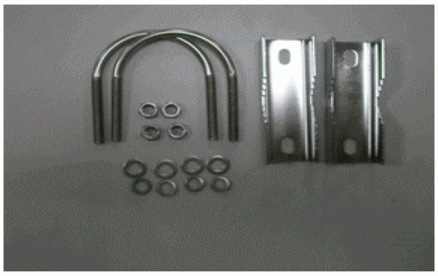


Power Over Ethernet Kit

Ground Wire



2.5” U bolts



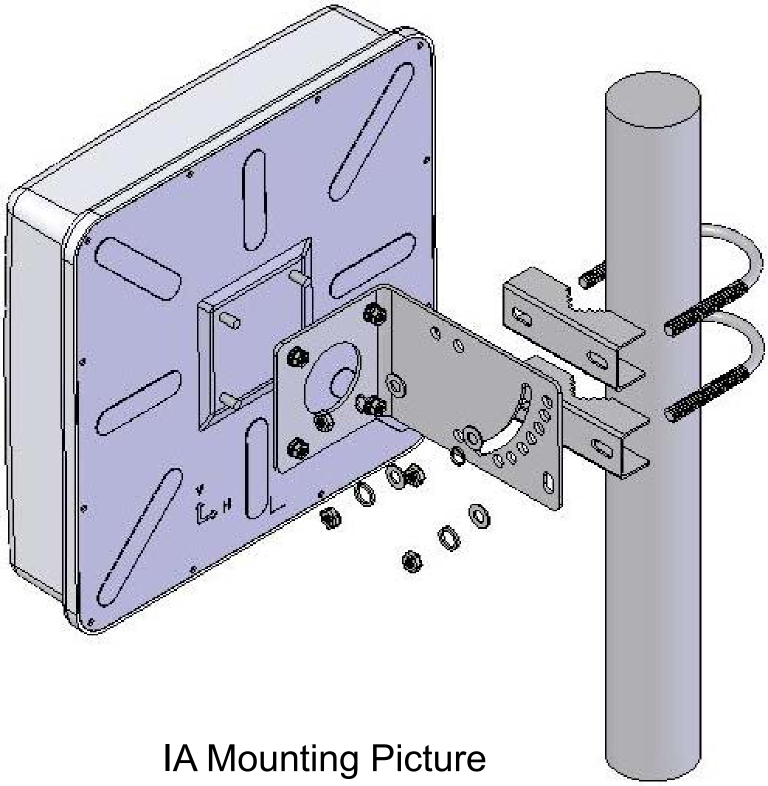
Waterproof Connector

Hardware Installation

Once you check off everything from the package, you can start to install the IA. You can mount to a pipe. The steps are showed in the following：

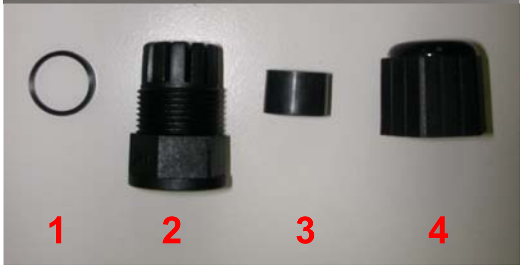
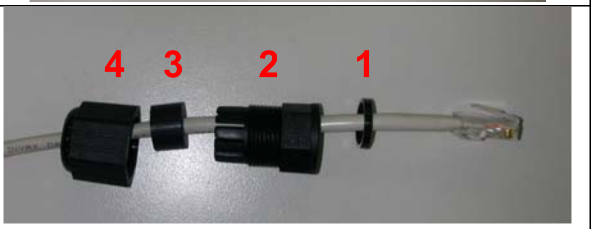
1. You must mount the IA into the bracket first.

2. You can use the 2.5 inches U bolt to mount on the pipe. The two U bolts must be mounted tightly. Be aware of not over-tighten the U bolt.

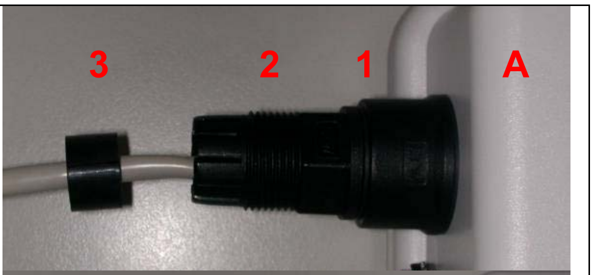


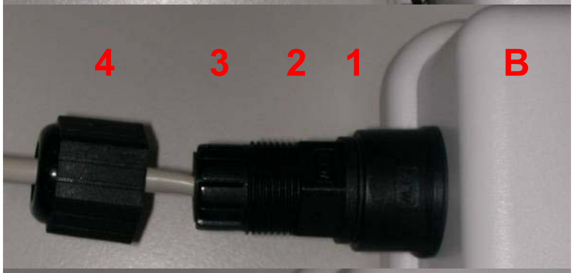
IA Mounting Picture

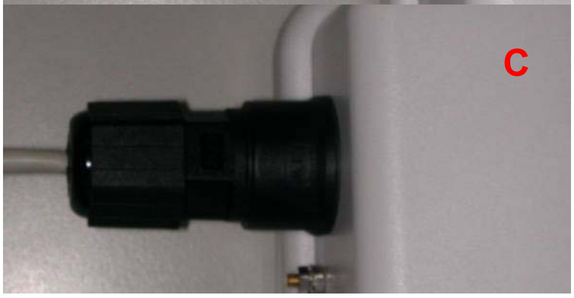
3. After checking the IA is mounted well, you can connect the RJ-45 network cable to Ethernet port of IA. The steps are showing as below:

Steps	Pictures
1. Separate the waterproof connector into four parts.	
2. Put these parts of waterproof connector on the RJ-45 network cable.	

3. Connect the RJ-45 network cable to Ethernet port of IA. And then install those parts of waterproof connector one by one.



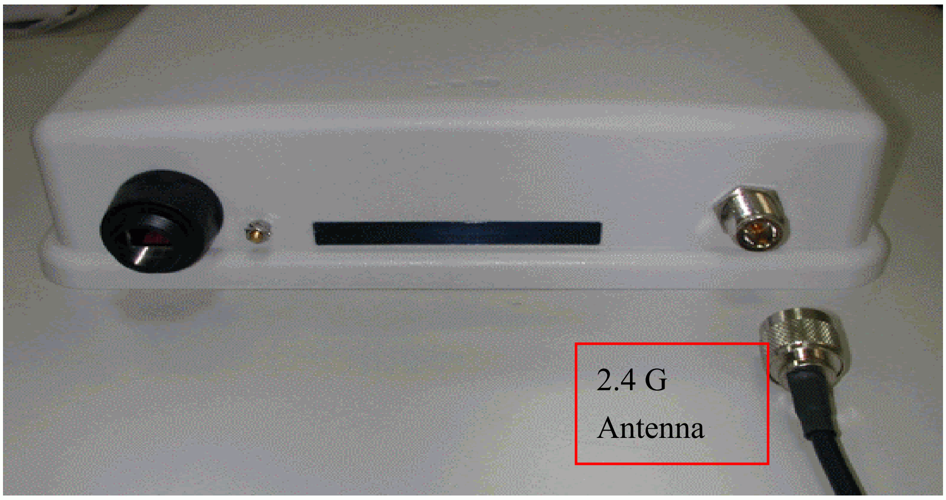




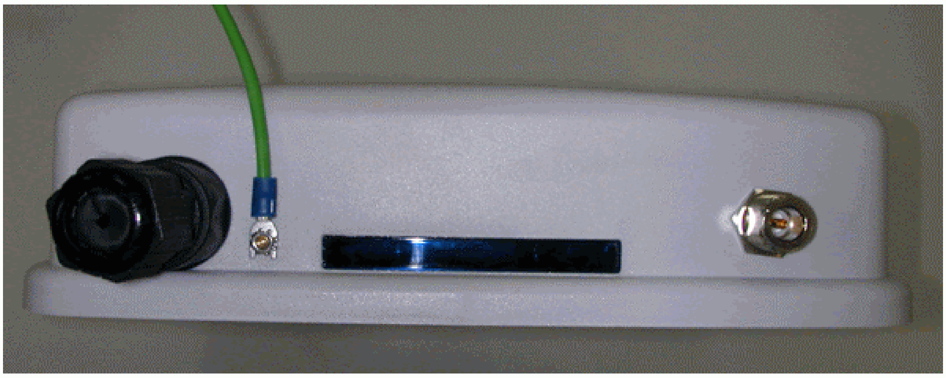
<u>Caution</u>: The diameter of network cable has to be round; otherwise the waterproof connector can't fasten down it.

Additional waterproof tool, such as waterproof tape, is recommended to use to enhance the waterproof function. It is suggested to have a lightening protector between antenna and antenna port. Connect the RF cable as the figure of "IA RF Cable Connection" and connect the ground wire as the figure of "IA Ground Wire Connection."

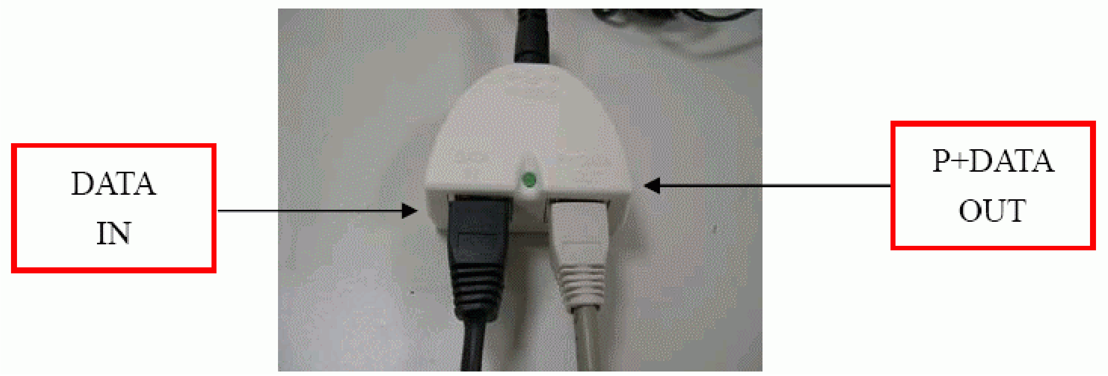
IA RF Cable Connection



IA Ground Wire Connection



4. Plug the other end of the RJ-45 network cable to “P+ DATA OUT” port of PoE device. The PoE device is guaranteed only in indoor environment.



Caution: DON’T plug the power cord into PoE device before you finish install the antenna and Ground wire to ensure the safety.

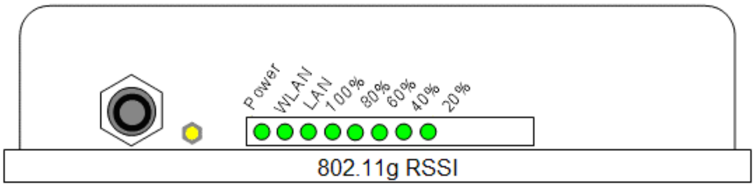
Make sure the maximum length of the RJ-45 cable is shorter than 100M (about 109 yards) for normal operation under IEEE 802.3 standards.

When you plug the regular RJ-45 cable into the PoE device, you should use the regular RJ-45 cable to plug into the “DATA IN” of “Power Over Ethernet Kit” to connect to hub/switch or use the crosslink RJ-45 cable (Not included in the Packing List) to connect with user’s PC.

The RJ-45 network cable must be connected to the “P+DATA OUT” port.

Caution: Be careful! Don’t plug the two cables inversely. It will damage the devices! And you have to use our PoE (included in the packing list) to guarantee that power supply is normal.

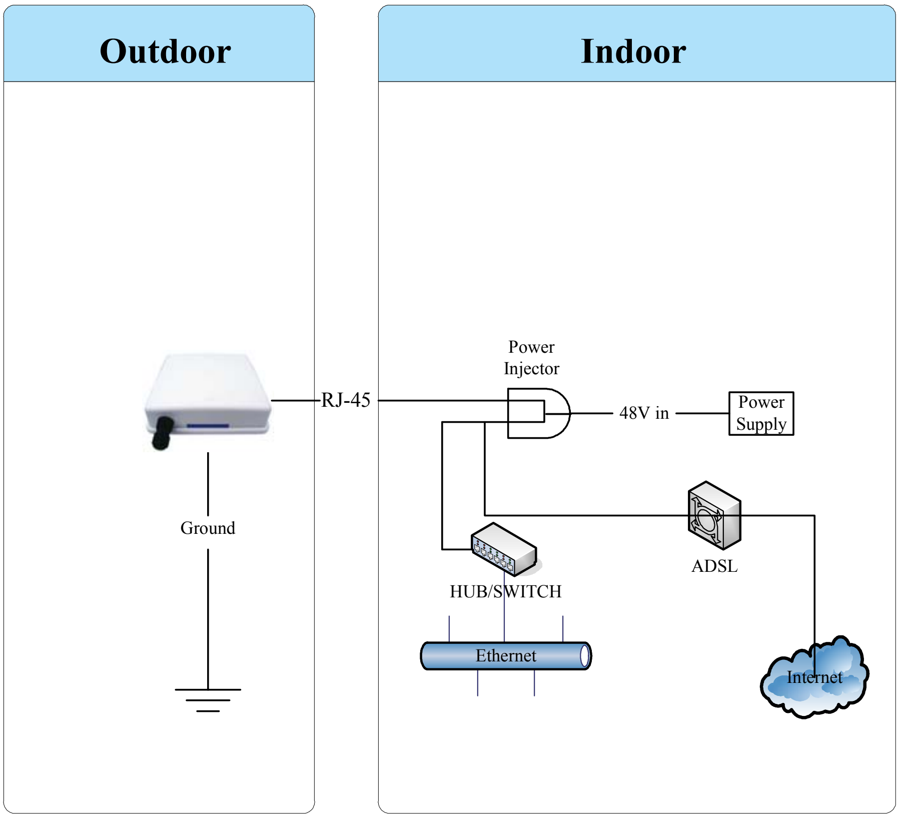
LED Panel



LED	State	Description
Power	Off	No Power
	On	System ready
WLAN	Off	No Power
	On	Wireless system ready
	Flashing	Transmitting data through WLAN
LAN	Off	No Power or connection
	On	Has physical connection to a Fast Ethernet (100 Mbps) network
	Flashing	Transmitting or receiving data thru Ethernet wire
RSSI 20%~100%	All On	Reset button triggered to Reboot this device
	All Flashing very quickly	Reset button triggered over 5 seconds to Reset to the default setting
	All Flashing (slower)	In AP Client mode and scanning Wireless signal
RSSI 20%	Off	Wireless signal strength is 0%
	On	Wireless signal strength is more than 0%
RSSI 40%	Off	Wireless signal strength less than 21%
	On	Wireless signal strength is more than 20%
RSSI 60%	Off	Wireless signal strength less than 41%
	On	Wireless signal strength is more than 40%
RSSI 80%	Off	Wireless signal strength less than 61%
	On	Wireless signal strength is more than 60%
RSSI 100%	Off	Wireless signal strength less than 81%
	On	Wireless signal strength is more than 80%

Note: While using Aiming Tool, the device will utilize the flashing frequency to display the signal strength. About the detail, please refer to Ch4. Advanced Configuration – Aiming tool.

We recommend you refer to the following illustration as a guideline for hardware installation.



ZW-2200-OD

Packing List

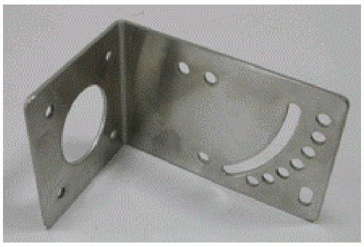
Before you start to install the OD, make sure the package contains the following items：

- Wireless OD AP unit * 1
- Mounting Kit * 1
- Power Over Ethernet Kit * 1
- Ground Wire * 1
- 2.5” U bolts * 2

- Waterproof Connector * 1

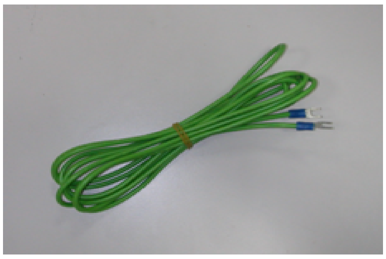
OD

Mounting Kit

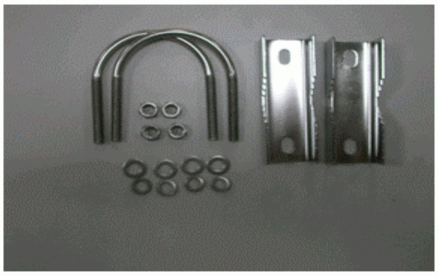


Power Over Ethernet Kit

Ground Wire



2.5” U bolts



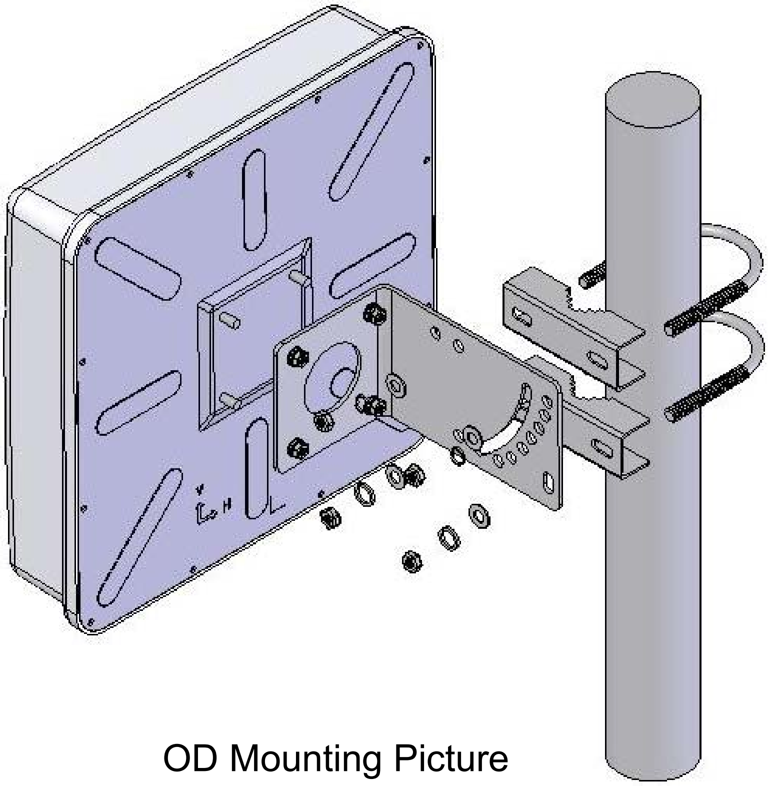
Waterproof Connector

Hardware Installation

Once you check off everything from the package, you can start to install the OD. You can mount to a pipe, a pole or to the side of a building. The steps are showed in the following：

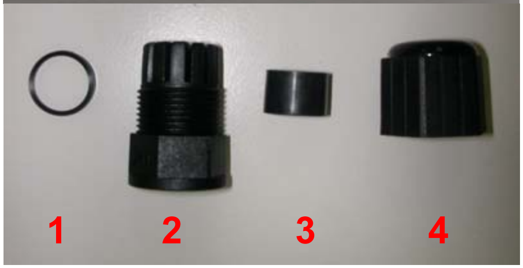
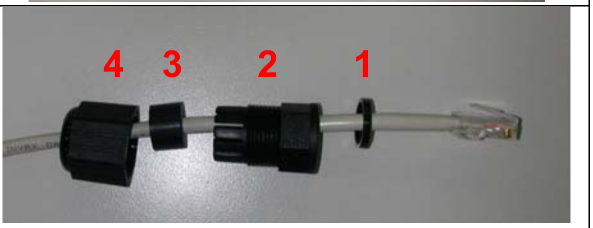
1. You must mount the OD into the bracket first.

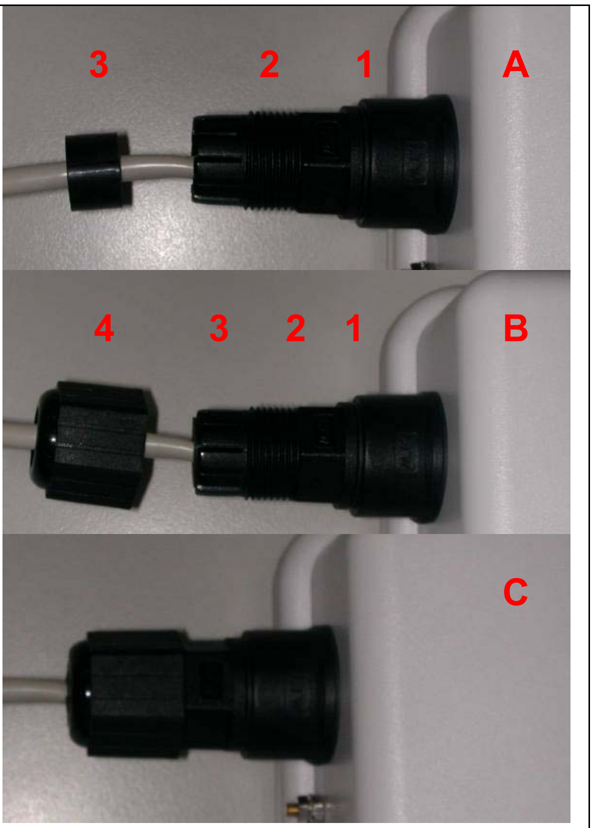
2. You can use the 2.5 inches U bolt to mount on the pipe. The two U bolts must be mounted tightly. Be aware of not over-tighten the U bolt.



OD Mounting Picture

3. After checking the OD is mounted well, you can connect the following two cables: the RJ-45 network cable to Ethernet port of OD and the RF cable to antenna port. The RJ-45 network connects steps are showing as below:

Steps	Pictures
1. Separate the waterproof connector into four parts.	 
2. Put these parts of waterproof connector on the RJ-45 network cable.	

3. Connect the RJ-45 network cable to Ethernet port of IA. And then install those parts of waterproof connector one by one.	

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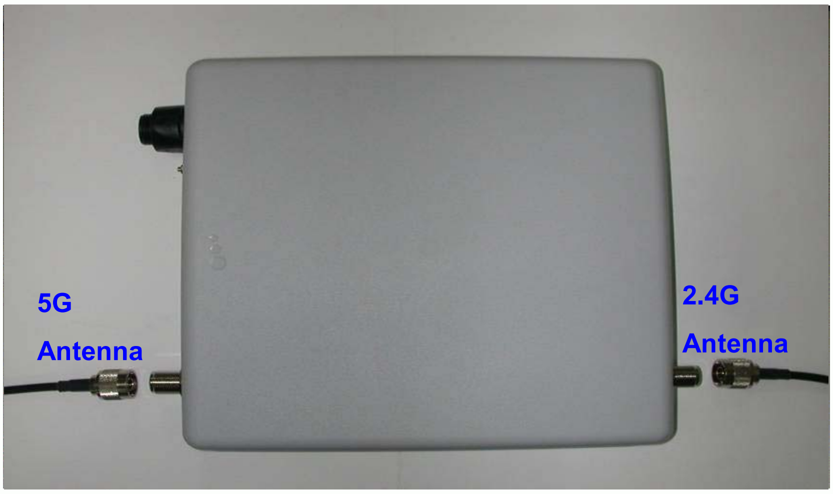
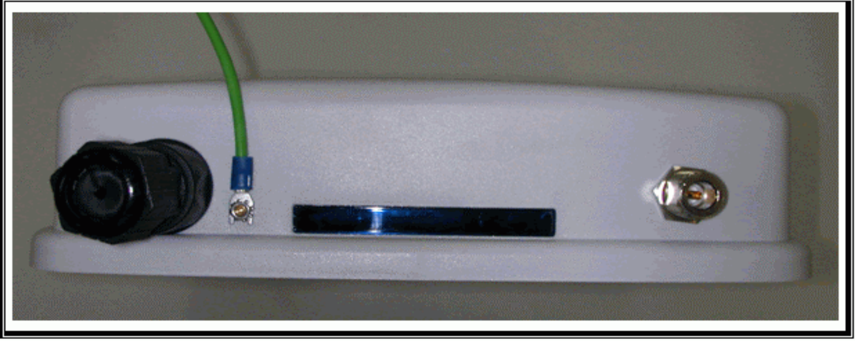
Additional waterproof tool, such as waterproof tape, is recommended to use to enhance the waterproof function. It is suggested to have a lightening protector between antenna and antenna port. Connect the RF cable as the figure of "OD RF Cable Connection" and connect the ground wire as the figure of "OD Ground Wire Connection."

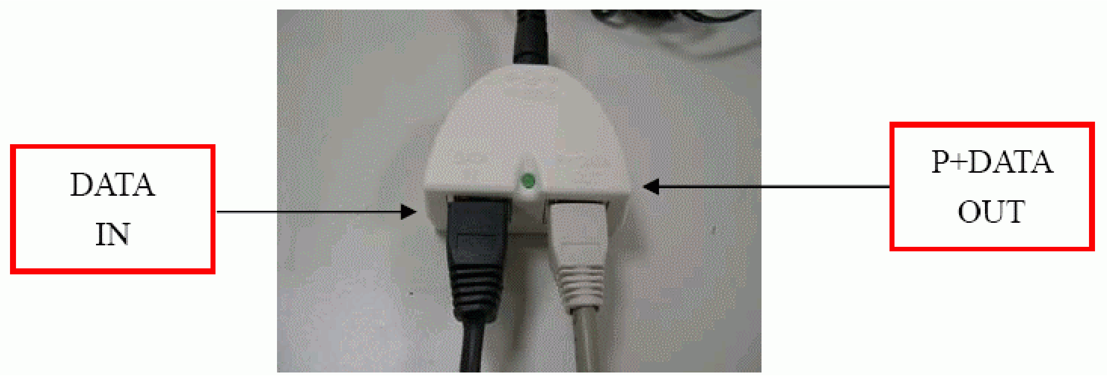
OD RF Cable Connection



OD Ground Wire Connection



4. Plug the other end of the waterproof RJ-45 cable to the PoE device.
   The PoE device is guaranteed only in indoor environment.



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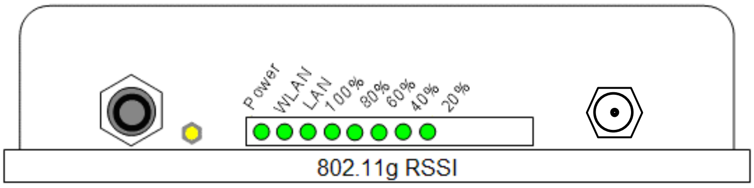

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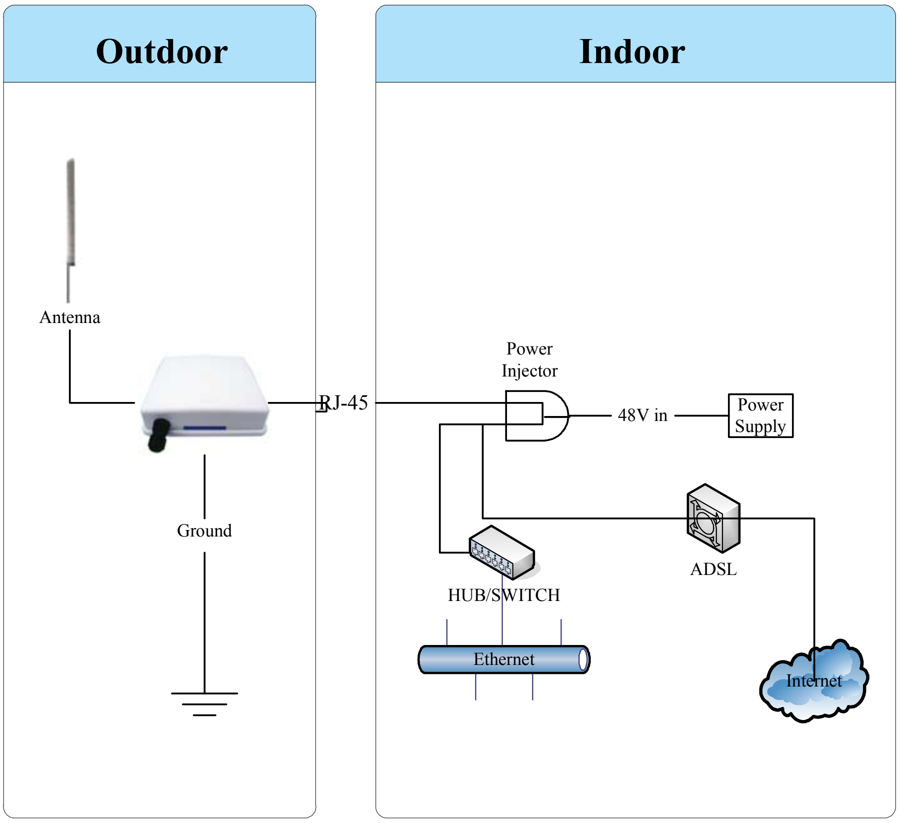


Ch 2. First Time Configuration

Before Start to Configure

There are two ways to configure the device, one is through web-browser, and the other is through Secure Shell CLI interface. To access the configuration interfaces, make sure you are using a computer connected to the same network as the device. The default IP address of the device is 192.168.2.254, and the subnet-mask is 255.255.255.0.

The device has three operation modes (Router/Bridge/WISP). In bridge mode, also known as AP Client, you can access the device by both WLAN (Wireless Local Area Network) and wired LAN. And in router/WISP modes, the device can be accessed by both WLAN and WAN. The default IP addresses for the device are 192.168.2.254(for

LAN), 172.1.1.1(for WAN), so you need to make sure the IP address of your PC is in the same subnet as the device, such as 192.168.2.X (for LAN), 172.1.1.X (for WAN).

Please note that the DHCP server inside the device is default to up and running. Do not have multiple DHCP servers in your network environment, otherwise it will cause abnormal situation.

We also provide an auto-discovery tool which is for finding out the IP of the device. In case, you've forgot the IP of the device or the IP of the device has been changed, you can use the tool to find out the IP of the device even your PC is not in the same subnet as the device is.

Knowing the Network Application

The device can act as the following roles, and it supports WDS (Wireless Distribution System) function.

- Access Point
- WDS (Wireless Repeater)
- Bridge/Router
- WISP
- AP Client

The device provides 3 different operation modes and the wireless radio of device can act as AP/Client/WDS. The operation mode is about the communication mechanism between the wired Ethernet NIC and wireless NIC, the following is the types of operation mode.

Router

The wired Ethernet (WAN) port is used to connect with ADSL/Cable modem and the wireless NIC is used for your private WLAN. The NAT is existed between the 2 NIC and all the wireless clients share the same public IP address through the WAN port to ISP. The default IP configuration for WAN port is static IP. You can access the web server of device through the default WAN IP address 172.1.1.1 and modify the setting base on your ISP requirement.

Bridge

The wired Ethernet and wireless NIC are bridged together. Once the mode is selected, all the WAN related functions will be disabled.

WISP (Wireless ISP)

This mode can let you access the AP of your wireless ISP and share the same public IP address from your ISP to the PCs connecting with the wired Ethernet port of the device.

To use this mode, first you must set the wireless radio to be client mode and connect to the AP of your ISP then you can configure the WAN IP configuration to meet your ISP requirement.

The wireless radio of the device acts as the following roles.

AP (Access Point)

The wireless radio of device serves as communications "hub" for wireless clients and provides a connection to a wired LAN.

AP Client

This mode provides the capability to connect with the other AP using infrastructure/Ad-hoc networking types. With bridge operation mode, you can directly connect the wired Ethernet port to your PC and the device becomes a wireless adapter. And with WISP operation mode, you can connect the wired Ethernet port to a hub/switch and all the PCs connecting with hub/switch can share the same public IP address from your ISP.

WDS (Wireless Distribution System)

This mode serves as a wireless repeater; the device forwards the packets to another AP with WDS function. When this mode is selected, all the wireless clients can't survey and connect to the device. The device only allows the WDS connection.

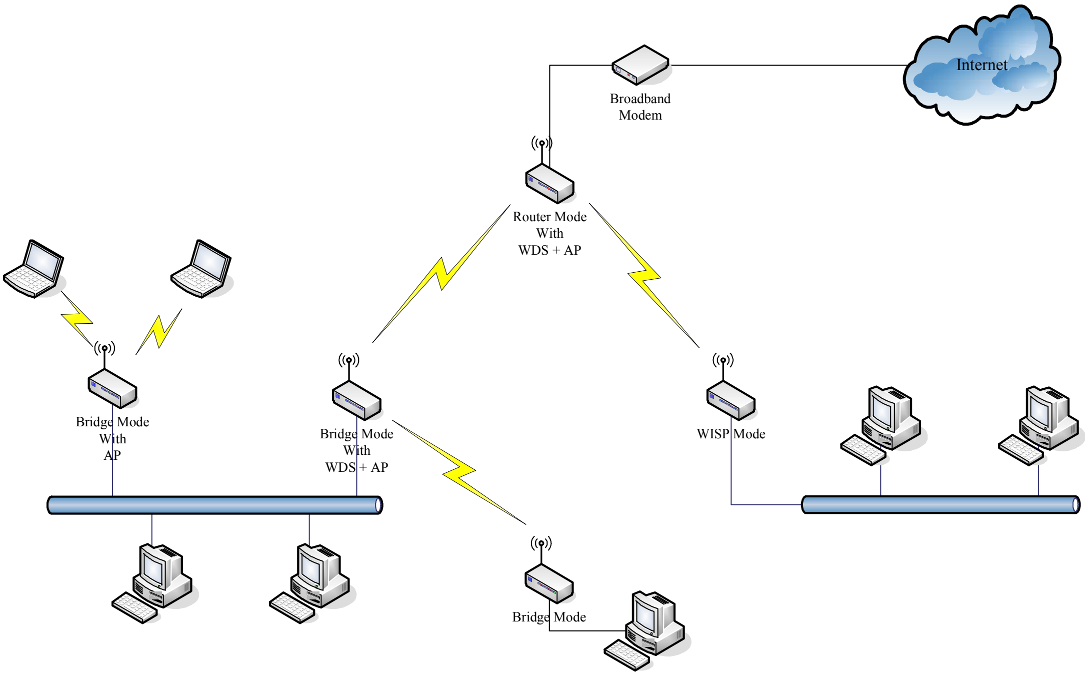
WDS+AP

This mode combines WDS plus AP modes, it not only allows WDS connections but also the wireless clients can survey and connect to the device.

The following table shows the supporting combination of operation and wireless radio modes.

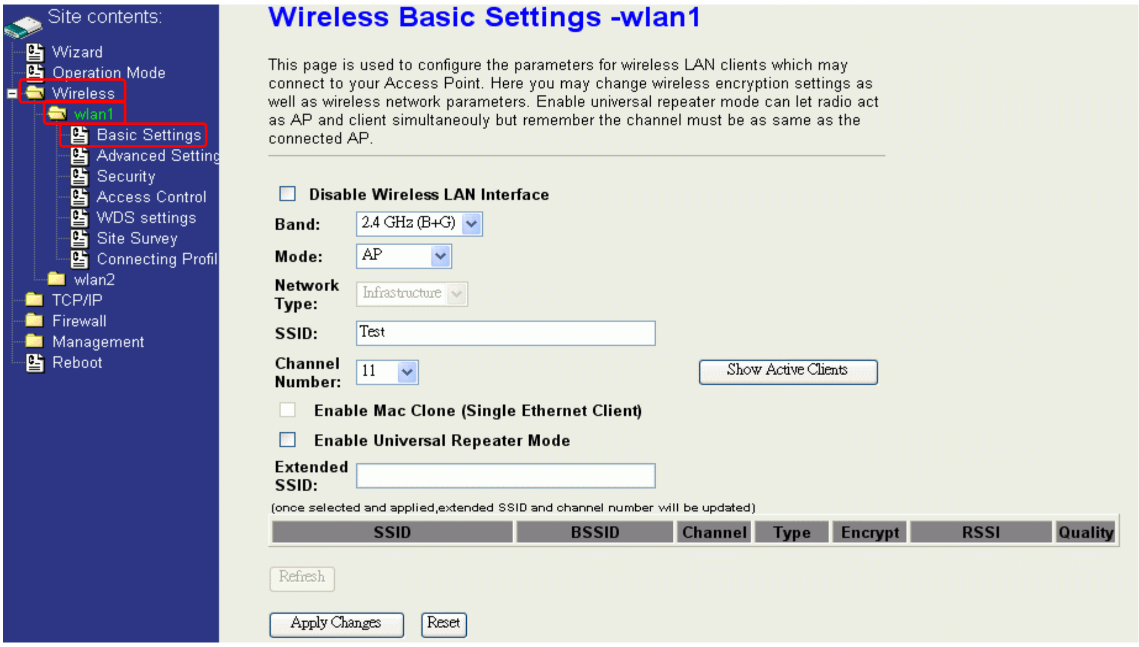
	Bridge	***Router***	***WISP***
AP	V	V	X
WDS	V	V	X
Client	V	X	V
AP+WDS	V	V	X

Hereafter are some topologies of network application for your reference.



Ch 3. WLAN 1 Wireless Configuration

Basic Settings



Wireless Basic Settings -wlan1

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneouly but remember the channel must be as same as the connected AP.

□ Disable Wireless LAN Interface

Band: 2.4 GHz (B+G)

Mode: AP

Network Type: Infrastructure

SSID: Test

Channel Number: 11

□ Enable Mac Clone (Single Ethernet Client)

□ Enable Universal Repeater Mode

Extended SSID:

(once selected and applied,extended SSID and channel number will be updated)

SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality

Disable Wireless LAN Interface

Disable the wireless interface of device

Band:

The device supports 2.4GHz(B), 2.4GHz(G) and 2.4GHz(B+G) mixed modes.

Mode:

The radio of device supports different modes as following:

1. AP

   The radio of device acts as an Access Point to serves all wireless clients to join a wireless local network.

2. Client

   Support Infrastructure and Ad-hoc network types to act as a wireless adapter.

3. WDS

   Wireless Distribution System, this mode serves as a wireless repeater, only devices with WDS function supported can connect to it, all the wireless clients can't survey and connect the device when the mode is selected.

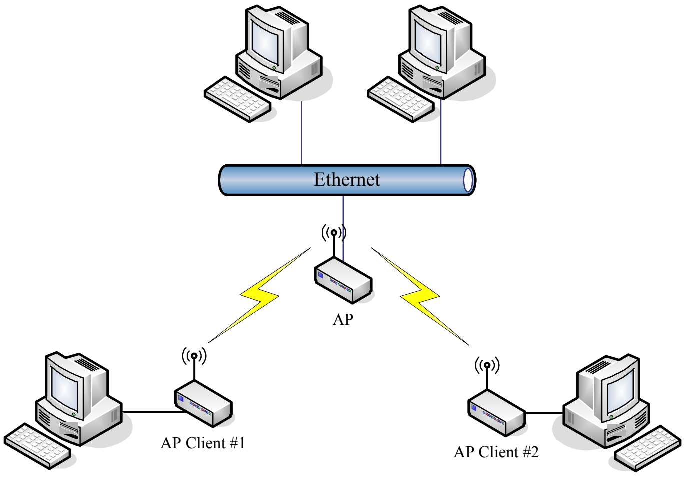
4. AP+WDS

   Support both AP and WDS functions, the wireless clients and devices with WDS function supported can survey and connect to it.

Network Type:

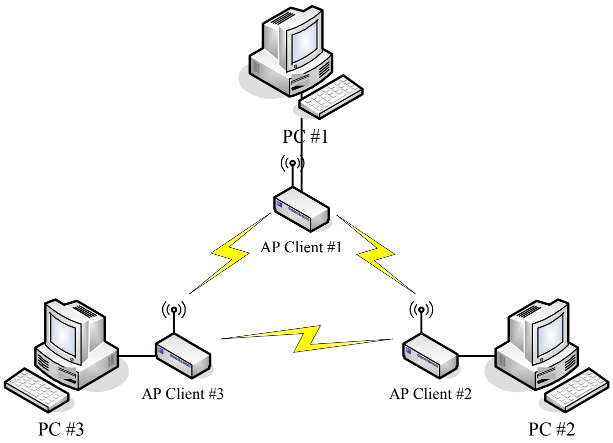
Infrastructure:

This type requires the presence of 802.11b/g Access Point. All communication is done via the Access Point.



Ad Hoc:

This type provides a peer-to-peer communication between wireless stations. All the communication is done from Client to Client without any Access Point involved. Ad Hoc networking must use the same SSID and channel for establishing the wireless connection.



In client mode, the device can't support the Router mode function including Firewall and WAN settings.

SSID:

The SSID is a unique identifier that wireless networking devices use to establish and maintain wireless connectivity. Multiple access point/bridges on a network or sub-network can use the same SSID. SSIDs are case sensitive and can contain up to 32 alphanumeric characters. Do not include spaces in your SSID.

Channel Number:

The following table is the available frequencies (in MHz) for the 2.4-GHz radio:

Channel No.	Frequency	Country Domain
1	2412	Americas, EMEA, Japan, and China
2	2417	Americas, EMEA, Japan, and China
3	2422	Americas, EMEA, Japan, Israel, and China
4	2427	Americas, EMEA, Japan, Israel, and China
5	2432	Americas, EMEA, Japan, Israel, and China
6	2437	Americas, EMEA, Japan, Israel, and China
7	2442	Americas, EMEA, Japan, Israel, and China
8	2447	Americas, EMEA, Japan, Israel, and China
9	2452	Americas, EMEA, Japan, Israel, and China
10	2457	Americas, EMEA, Japan, and China
11	2462	Americas, EMEA, Japan, and China
12	2467	EMEA and Japan
13	2472	EMEA and Japan
14	2484	Japan only

※ EMEA (Europe, the Middle East and Africa).

When set to "Auto", the device will find the least-congested channel for use.

Associated Client:

Show the information of active wireless client stations that connected to the device.

REMARK

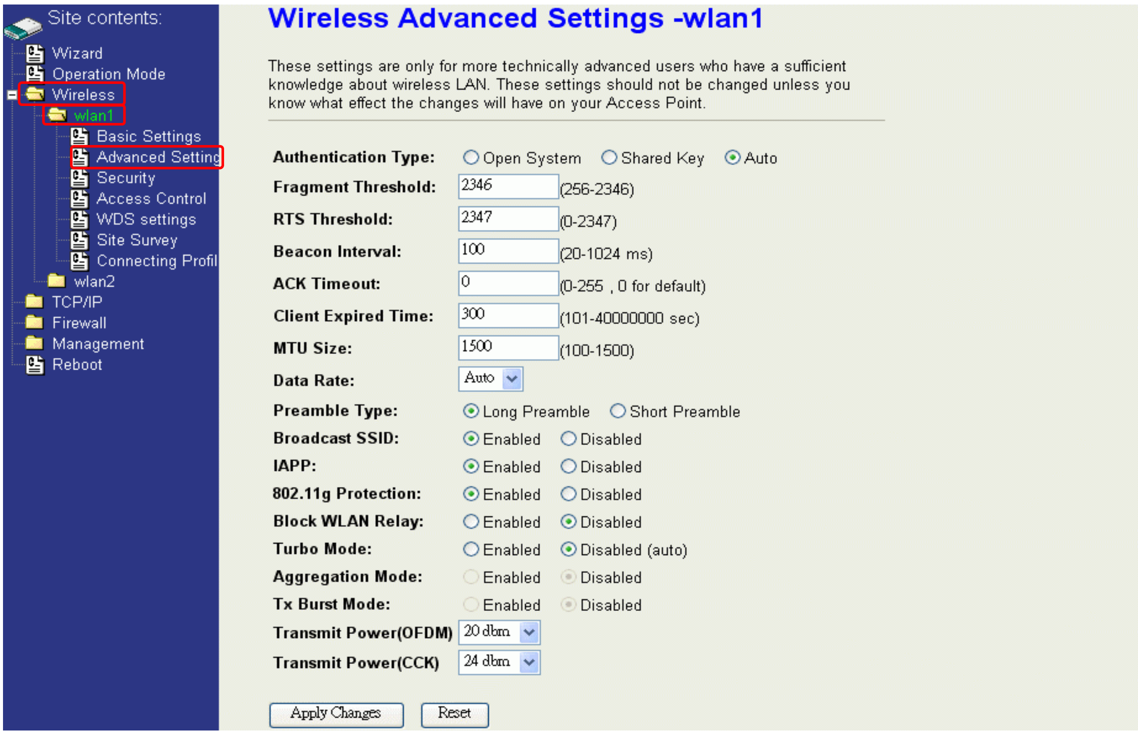
IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

Advanced Settings

These settings are only for more technically advanced users who have sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your device. The default setting is optimized for the normal operation. For specific application, setting configuration will required highly attention to reach optimistic condition.

Note：

Any unreasonable value change to default setting will reduce the throughput of the device.



Wireless Advanced Settings -wlan1

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your Access Point.

Authentication Type:	○ Open System ○ Shared Key ● Auto	
Fragment Threshold:	2346	(256-2346)
RTS Threshold:	2347	(0-2347)
Beacon Interval:	100	(20-1024 ms)
ACK Timeout:	0	(0-255 , 0 for default)
Client Expired Time:	300	(101-40000000 sec)
MTU Size:	1500	(100-1500)
Data Rate:	Auto	
Preamble Type:	● Long Preamble ○ Short Preamble	
Broadcast SSID:	● Enabled ○ Disabled	
IAPP:	● Enabled ○ Disabled	
802.11g Protection:	● Enabled ○ Disabled	
Block WLAN Relay:	○ Enabled ● Disabled	
Turbo Mode:	○ Enabled ● Disabled (auto)	
Aggregation Mode:	○ Enabled ● Disabled	
Tx Burst Mode:	○ Enabled ● Disabled	
Transmit Power(OFDM)	20 dbm	
Transmit Power(CCK)	24 dbm	

Authentication Type

The device supports two Authentication Types "Open system" and "Shared Key". When you select "Share Key", you need to setup "WEP" key in "Security" page (See the next section). The default setting is "Auto". The wireless client can associate with the device by using one of the two types.

Fragment Threshold

The fragmentation threshold determines the size at which packets are fragmented (sent as several pieces instead of as one block). Use a low setting in areas where communication is poor or where there is a great deal of radio interference. This function will help you to improve the network performance.

RTS Threshold

The RTS threshold determines the packet size at which the radio issues a request to send (RTS) before sending the packet. A low RTS Threshold setting can be useful in areas where many client devices are associating with the device, or in areas where the clients are far apart and can detect only the device and not each other. You can enter a setting ranging from 0 to 2347 bytes.

Beacon Interval

The beacon interval is the amount of time between access point beacons in mini-seconds. The default beacon interval is 100.

ACK Timeout

The default ACK timeout is 0. You may need to change this value due to the environment or distance.

Client Expired Time

The client expired time determines time interval the client need to re-associate with the device while client is idle. The default client expired time is 300 sec.

MTU Size

Maximum Transmission Unit, the default MTU size is 1500. The MTU setting controls the maximum Ethernet packet size your PC will send. Why a limit? Because although larger packets can be constructed and sent, your ISP and Internet backbone routers and equipment will fragment any larger than their limit, then these parts are re-assembled by the target equipment before reading. This fragmentation and re-assembly is not optimal. You may need to change the MTU for optimal performance of your wireless LAN traffic.

Data Rate

The standard IEEE 802.11b/11g supports 1, 2, 5.5, 11 / 6, 9, 12, 18, 24, 36, 48 and 54 Mbps data rates. You can choose the rate that the device uses for data transmission. The default value is “auto”. The device will use the highest possible selected transmission rate.

Preamble Type

The preamble is part of the 802.11 frame and is PHY dependant. All 802.11b/g systems support the long preamble. The short preamble (optional) maybe used to improve throughput when all stations on the network support the short preamble.

Broadcast SSID

Broadcasting the SSID will let your wireless clients find the device automatically. If you are building a public Wireless Network, disable this function can provide better security. Every wireless stations located within the coverage of the device must connect this device by manually configure the SSID in your client settings.

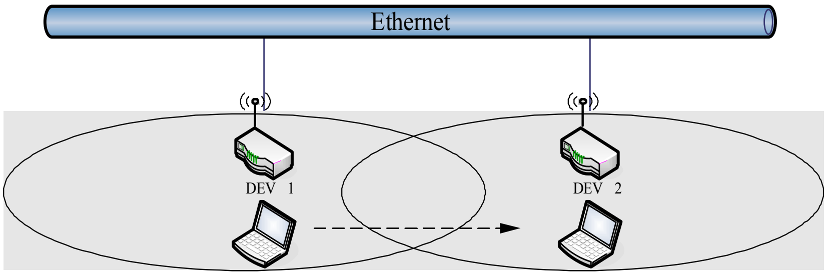
IAPP (Inter-Access Point Protocol)

This function will let Wireless Stations roam among a network environment with multiple devices. Wireless Stations are able to switch from one device to another as they move between the coverage areas. Users can have more wireless working range. An example is as the following figure.

You should comply with the following instructions to roam among the wireless coverage areas.

<u>Note</u>： **For implementing the roaming function, the setting MUST comply the following two items.**

- All the devices must be in the same subnet network and the SSID must be the same.
- If you use the 802.1x authentication, you need to have the user profile in these devices for the roaming station.



Wireless Station moves
between the coverage areas

802.11g Protection

This ensures that 802.11g stations are backwards compatible with legacy 802.11b stations. With 802.11g protection enabled, a CTS will be used to lock out 802.11b stations while the 802.11g station is transmitting. While this does allow backwards compatibility with legacy 802.11b stations, it should be disabled in a pure 802.11g environment, as it will have a significant impact on 802.11g performance (as high as 50% decrease in throughput).

Block WLAN Relay (Isolate Client)

The device supports isolation function. If you are building a public Wireless Network, enable this function can provide better security. The device will block packets between wireless clients (relay). All the wireless clients connected to the device can't see each other.

Aggregation Mode

Not applicable for WLAN 1.

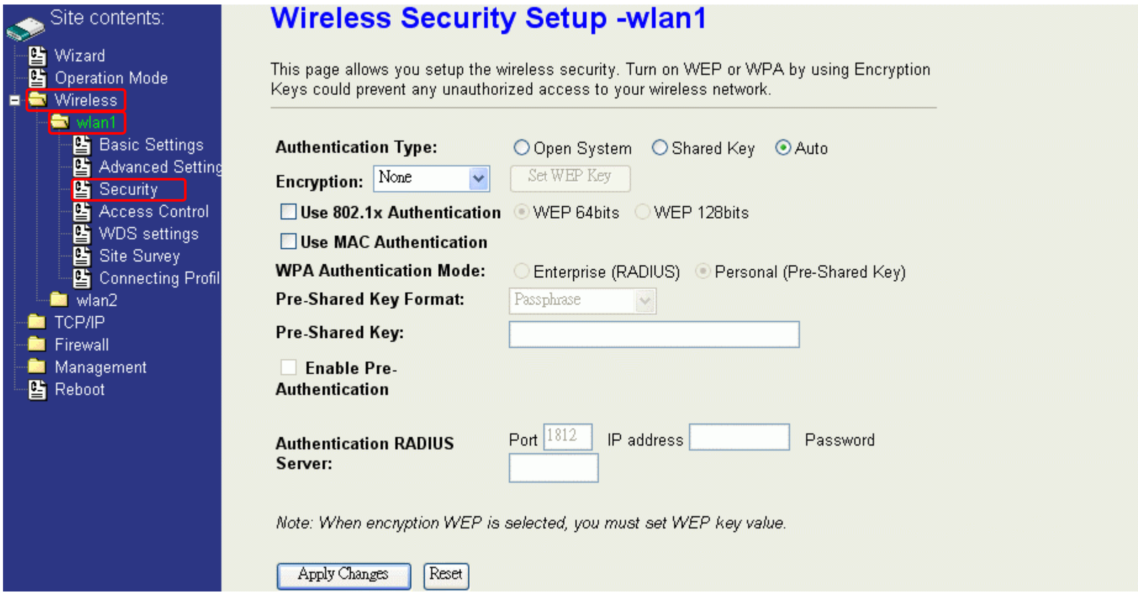
Tx Burst Mode

Not applicable for WLAN 1.

Configuring Wireless Security

This device provides complete wireless security function include WEP, 802.1x, WPA-TKIP, WPA2-AES and WPA2-Mixed in different mode (see the Security Support Table).

The default security setting of the encryption function is disabled. Choose your preferred security setting depending on what security function you need.



Wireless Security Setup -wlan1

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Authentication Type: ○ Open System ○ Shared Key ● Auto

Encryption: None [Set WEP Key]

□ **Use 802.1x Authentication** ● WEP 64bits ○ WEP 128bits

□ **Use MAC Authentication**

WPA Authentication Mode: ○ Enterprise (RADIUS) ● Personal (Pre-Shared Key)

Pre-Shared Key Format: Passphrase

Pre-Shared Key:

□ **Enable Pre-Authentication**

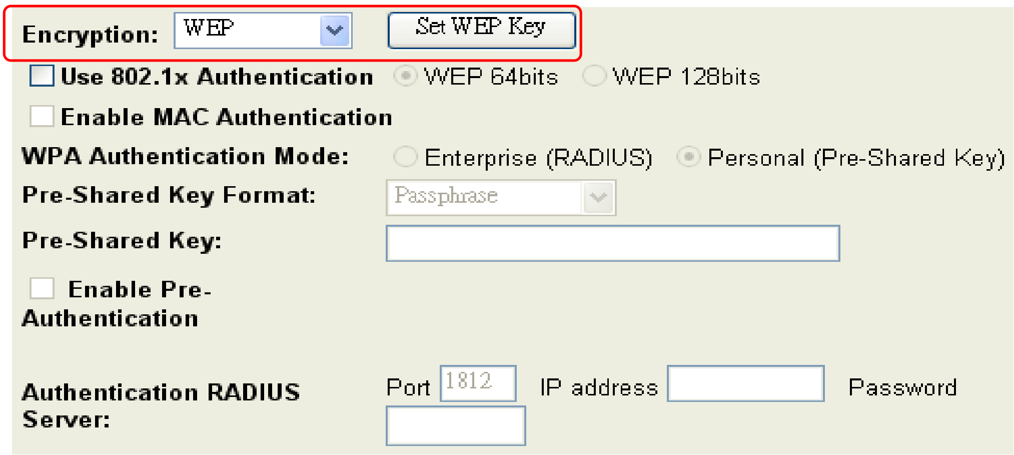
Authentication RADIUS Server: Port 1812 IP address Password

Note: When encryption WEP is selected, you must set WEP key value.

[Apply Changes] [Reset]

WEP Encryption Setting

Wired Equivalent Privacy (WEP) is implemented in this device to prevent unauthorized access to your wireless network. The WEP setting must be as same as each client in your wireless network. For more secure data transmission, you can change encryption type to "WEP" and click the "Set WEP Key" button to open the "Wireless WEP Key setup" page.



Encryption: WEP

□ Use 802.1x Authentication ● WEP 64bits ○ WEP 128bits

□ Enable MAC Authentication

WPA Authentication Mode: ○ Enterprise (RADIUS) ● Personal (Pre-Shared Key)

Pre-Shared Key Format: Passphrase

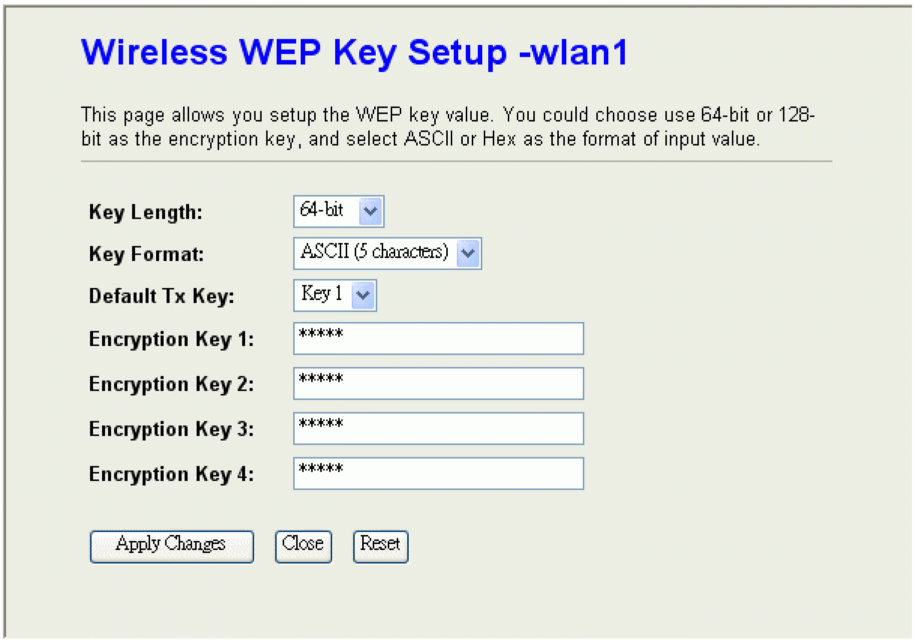
Pre-Shared Key:

□ Enable Pre-Authentication

Authentication RADIUS Server: Port 1812 IP address Password

When you decide to use the WEP encryption to secure your WLAN, please refer to the following setting of the WEP encryption:

- 64-bit WEP Encryption：64-bit WEP keys are as same as the encryption method of 40-bit WEP. You can input 10 hexadecimal digits (0~9, a~f or A~F) or 5 ACSII chars.
- 128-bit WEP Encryption：128-bit WEP keys are as same as the encryption method of 104-bit WEP. You can input 26 hexadecimal digits (0~9, a~f or A~F) or 10 ACSII chars.
- The Default Tx Key field decides which of the four keys you want to use in your WLAN environment.



Wireless WEP Key Setup -wlan1

This page allows you setup the WEP key value. You could choose use 64-bit or 128-bit as the encryption key, and select ASCII or Hex as the format of input value.

Key Length: 64-bit

Key Format: ASCII (5 characters)

Default Tx Key: Key 1

Encryption Key 1: *****

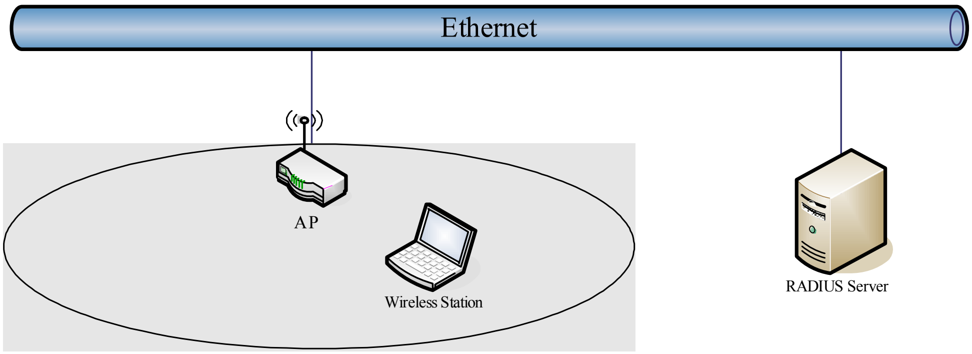
Encryption Key 2: *****

Encryption Key 3: *****

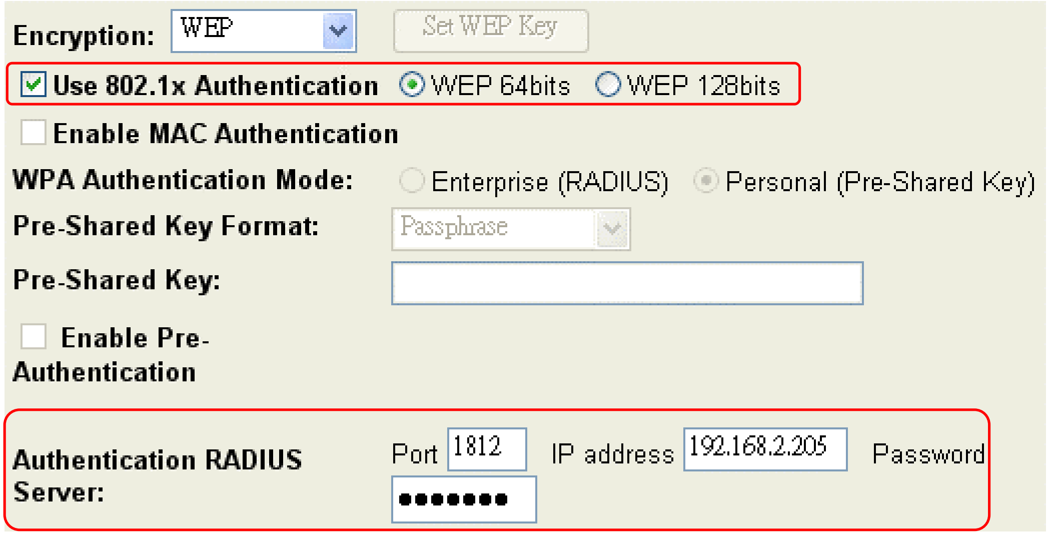
Encryption Key 4: *****

WEP Encryption with 802.1x Setting

The device supports external RADIUS Server that can secure networks against unauthorized access. If you use the WEP encryption, you can also use the RADIUS server to check the admission of the users. By this way every user must use a valid account before accessing the Wireless LAN and requires a RADIUS or other authentication server on the network. An example is shown as following.



You should choose WEP 64 or 128 bit encryption to fit with your network environment first. Then add user accounts and the target device to the RADIUS server. In the device , you need to specify the IP address、Password (Shared Secret) and Port number of the target RADIUS server.



Encryption: WEP　Set WEP Key

☑ Use 802.1x Authentication　● WEP 64bits　○ WEP 128bits

□ Enable MAC Authentication

WPA Authentication Mode: ○ Enterprise (RADIUS)　● Personal (Pre-Shared Key)

Pre-Shared Key Format: Passphrase

Pre-Shared Key:

□ Enable Pre-Authentication

Authentication RADIUS Server: Port 1812　IP address 192.168.2.205　Password ●●●●●●●

WPA Encryption Setting

WPA feature provides a high level of assurance for end-users and administrators that their data will remain private and access to their network restricted to authorized users. You can choose the WPA encryption and select the Authentication Mode.

WPA Authentication Mode

This device supports two WPA modes. For personal user, you can use the Pre-shared Key to enhance your security setting. This mode requires only an access point and client station that supports WPA-PSK. For Enterprise, authentication is achieved via WPA RADIUS Server. You need a RADIUS or other authentication server on the network.

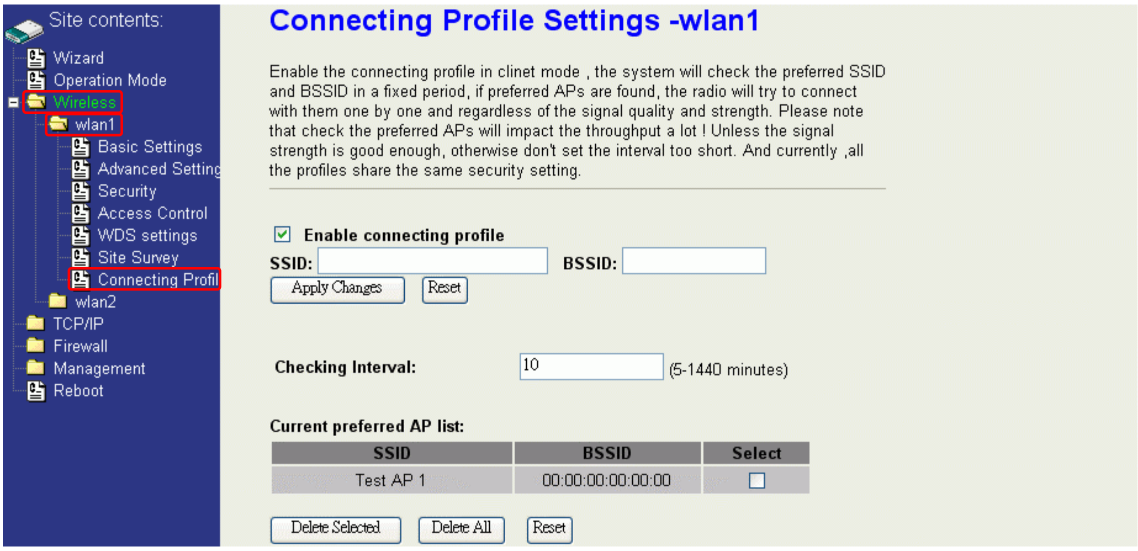
- **Enterprise (RADIUS):**

  When WPA Authentication mode is Enterprise (RADIUS), you have to add user accounts and the target device to the RADIUS Server. In the device , you need to specify the IP address、Password (Shared Secret) and Port number of the target RADIUS server.

- **Pre-Share Key:**

  This mode requires only an access point and client station that supports WPA-PSK. The WPA-PSK settings include Key Format, Length and Value. They must be as same as each wireless client in your wireless network. When Key format is Passphrase, the key value should have 8~63 ACSII chars. When Key format is Hex, the key value should have 64 hexadecimal digits (0~9, a~f or A~F).

Connecting Profile



Connecting Profile Settings -wlan1

Enable the connecting profile in clinet mode , the system will check the preferred SSID and BSSID in a fixed period, if preferred APs are found, the radio will try to connect with them one by one and regardless of the signal quality and strength. Please note that check the preferred APs will impact the throughput a lot ! Unless the signal strength is good enough, otherwise don't set the interval too short. And currently ,all the profiles share the same security setting.

☑ **Enable connecting profile**

SSID: ______ **BSSID:** ______

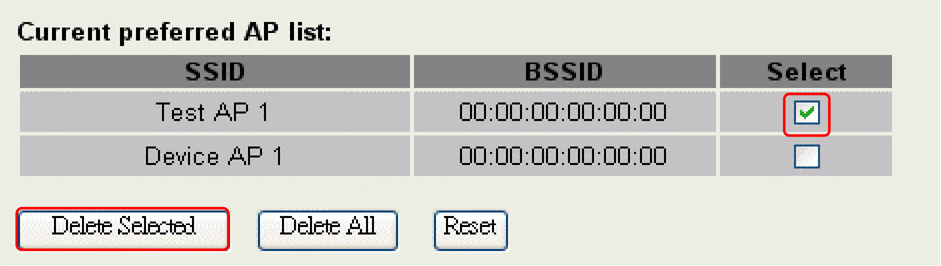
Checking Interval: 10 (5-1440 minutes)

Current preferred AP list:

SSID	BSSID	Select
Test AP 1	00:00:00:00:00:00	□

To enable this function, this device must be in the client mode. User clicks to enable this function and input the SSID of preferred AP and then click “Apply Changes”. The BSSID field is an option in case of two preferred APs having the same SSID. In this case, this device will check both SSID and BSSID and connect to the matching AP. We can leave it empty in the normal case.

After enabling the connecting profile, the system will check the preferred SSID in a fixed period. If preferred APs are found, the radio will try to connect with them one by one from top to down of the list and regardless of the signal quality and strength. The users can put their most favorite AP on the top so it will be connected first. Please note that check the preferred APs will impact the throughput a lot! Unless the signal strength is good enough, otherwise don't set the interval too short. The default value is 10 minutes. And currently, all the profiles share the same security setting.



Current preferred AP list:

SSID	BSSID	Select
Test AP 1	00:00:00:00:00:00	☑
Device AP 1	00:00:00:00:00:00	□

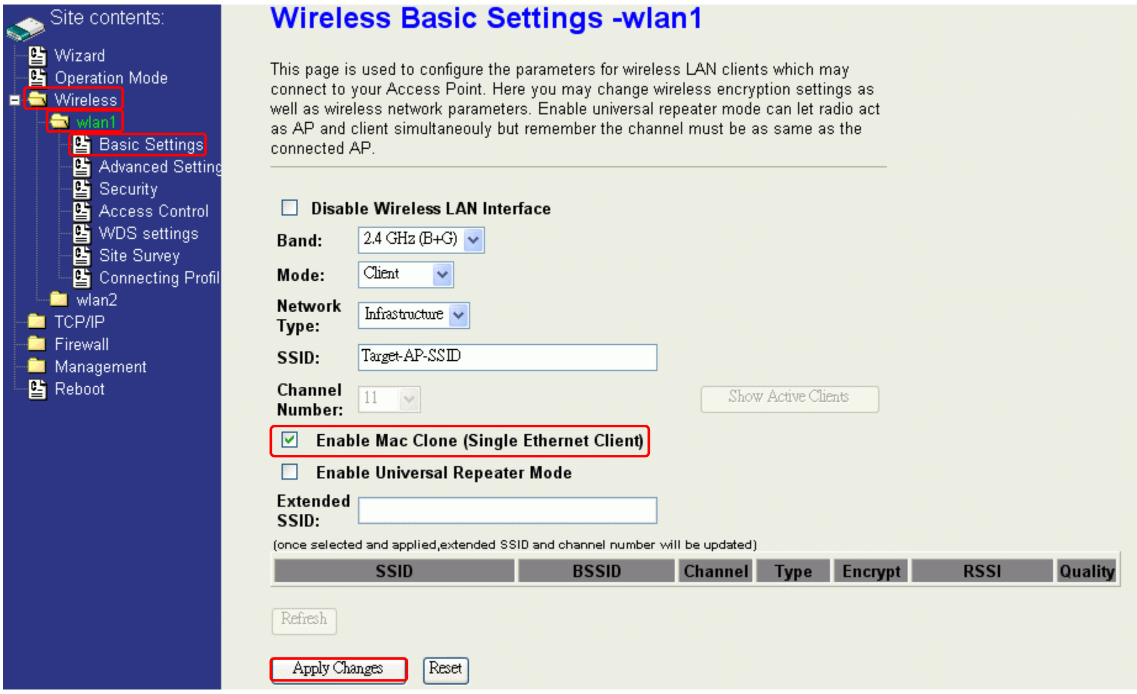
To delete one SSID in the list, users click the square to select it and click “Delete Selected” and then click “OK” in the pop-up window to confirm it. The user can delete the whole list once for all! Just click “Delete All” and then click “OK” in the pop-up window to confirm it.

To simply disable this function, the user just clicks to disable “Enable connecting profile”. The preferred AP list will be preserved for the next use.

MAC Clone for Single Ethernet Client

Enable/Disable Mac Clone (Single Ethernet Client) in Wireless-Basic Settings page determines whether the Ethernet Client use it’s own MAC address or AP-Client’s MAC address to transmit data. Enable MAC Clone, the single Ethernet client can use its own MAC address. Disable MAC Clone, the single Ethernet client must to use AP-Client’s MAC address.

While you use this device act as AP-Client and only one host connect to this device via Ethernet, you need to check this option in this page, otherwise the other device can’t recognize your host behind AP-Client. If you use hub/switch connect multi-device to this AP-Client, you should uncheck this option.



Wireless Basic Settings -wlan1

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneously but remember the channel must be as same as the connected AP.

☐ Disable Wireless LAN Interface

Band: 2.4 GHz (B+G)

Mode: Client

Network Type: Infrastructure

SSID: Target-AP-SSID

Channel Number: 11

☑ Enable Mac Clone (Single Ethernet Client)

☐ Enable Universal Repeater Mode

Extended SSID:

(once selected and applied,extended SSID and channel number will be updated)

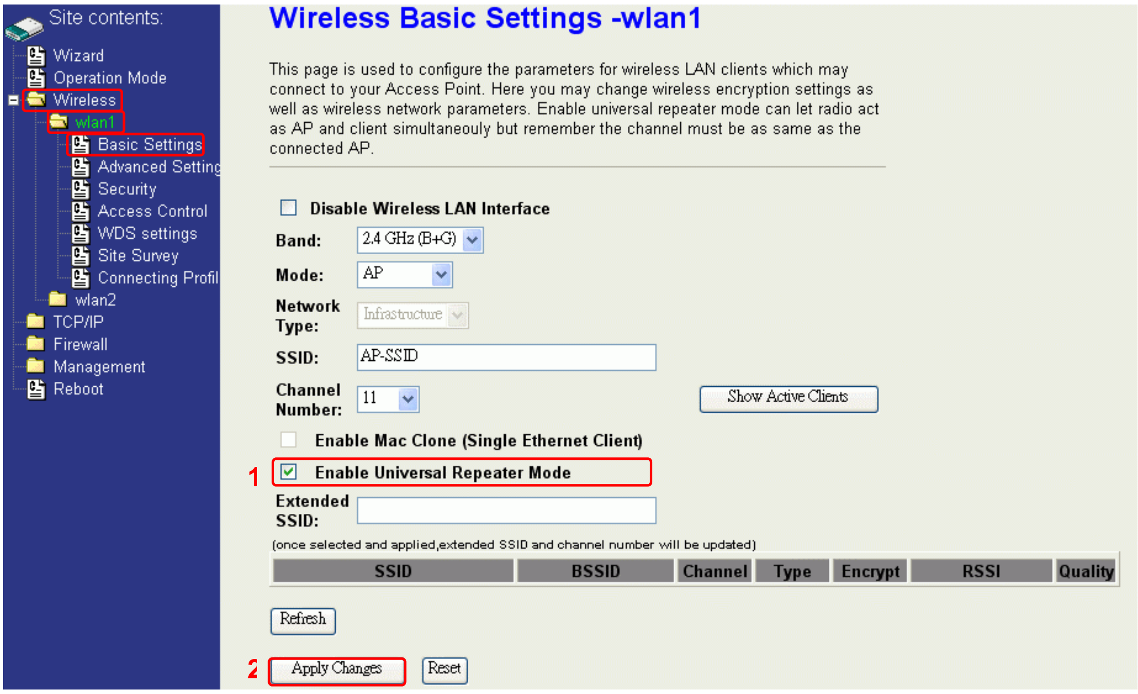
SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality

Configuring Universal Repeater

This device can be configured as a Repeater. In this mode, the device can extend available wireless range of other AP let user can link the network that they want, Also the device working as AP and Repeater same time.

Following two ways describe how to make Universal Repeater effective.

1. Enable Universal Repeater Mode and then click Apply Changes button to take effective. After apply change, you can click Refresh button to show the nearby APs in the Table. You can select a SSID in the Table that you want and then click Apply Changes button to take effective.



Wireless Basic Settings -wlan1

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneouly but remember the channel must be as same as the connected AP.

□ Disable Wireless LAN Interface

Band: 2.4 GHz (B+G)

Mode: AP

Network Type: Infrastructure

SSID: AP-SSID

Channel Number: 11

Show Active Clients

□ Enable Mac Clone (Single Ethernet Client)

1 ☑ Enable Universal Repeater Mode

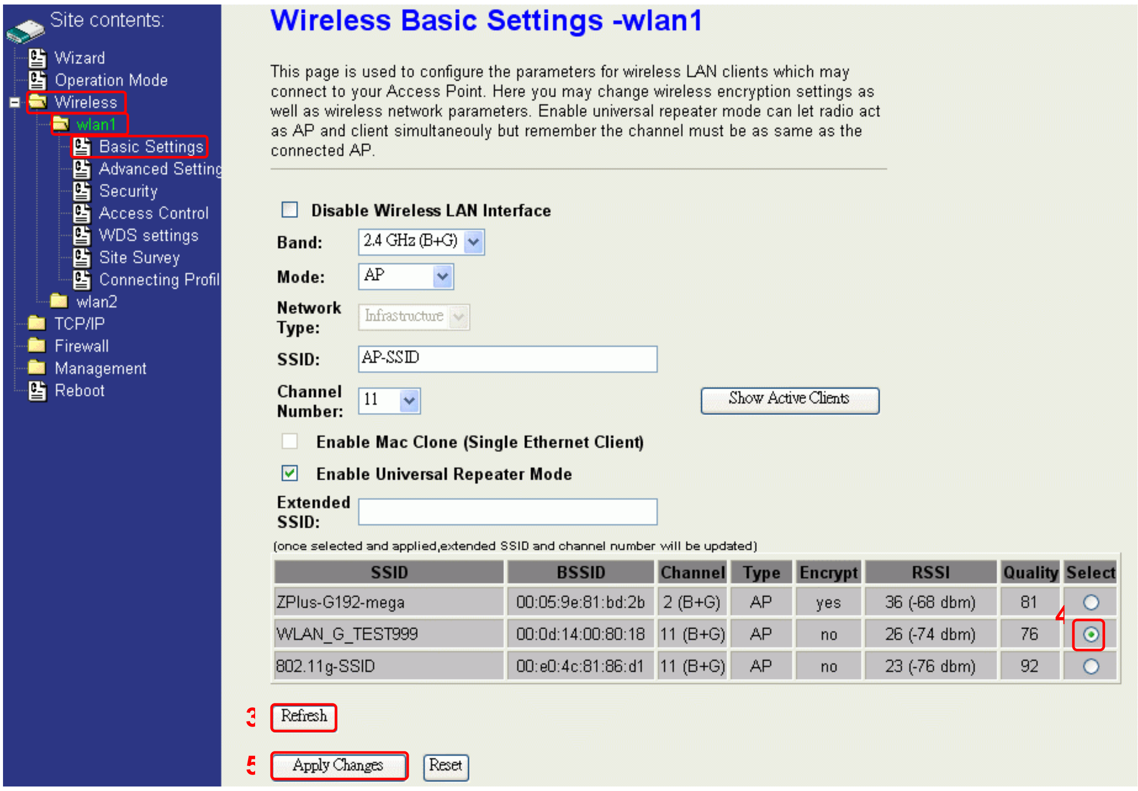
Extended SSID:

(once selected and applied,extended SSID and channel number will be updated)

SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality

Refresh

2 Apply Changes Reset



Wireless Basic Settings -wlan1

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneously but remember the channel must be as same as the connected AP.

☐ Disable Wireless LAN Interface

Band: 2.4 GHz (B+G)

Mode: AP

Network Type: Infrastructure

SSID: AP-SSID

Channel Number: 11

Show Active Clients

☐ Enable Mac Clone (Single Ethernet Client)

☑ Enable Universal Repeater Mode

Extended SSID:

(once selected and applied,extended SSID and channel number will be updated)

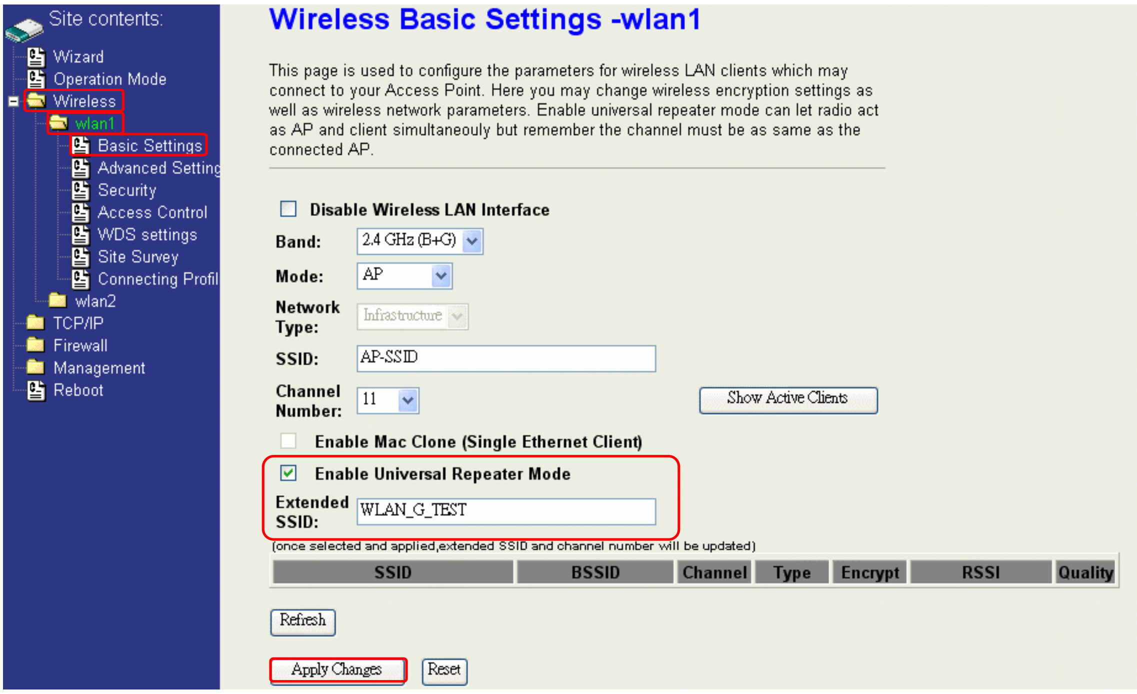
SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality	Select
ZPlus-G192-mega	00:05:9e:81:bd:2b	2 (B+G)	AP	yes	36 (-68 dbm)	81	○
WLAN_G_TEST999	00:0d:14:00:80:18	11 (B+G)	AP	no	26 (-74 dbm)	76	●
802.11g-SSID	00:e0:4c:81:86:d1	11 (B+G)	AP	no	23 (-76 dbm)	92	○

Refresh

Apply Changes Reset

Note: Under **AP、WDS and AP+WDS mode**, The Universal Repeater can take effective.

2. Enter specific SSID in the Extended SSID field and then click Apply Changes button to take effective.



Wireless Basic Settings -wlan1

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneously but remember the channel must be as same as the connected AP.

☐ Disable Wireless LAN Interface

Band: 2.4 GHz (B+G)

Mode: AP

Network Type: Infrastructure

SSID: AP-SSID

Channel Number: 11

Show Active Clients

☐ Enable Mac Clone (Single Ethernet Client)

☑ Enable Universal Repeater Mode

Extended SSID: WLAN_G_TEST

(once selected and applied,extended SSID and channel number will be updated)

SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality

Refresh

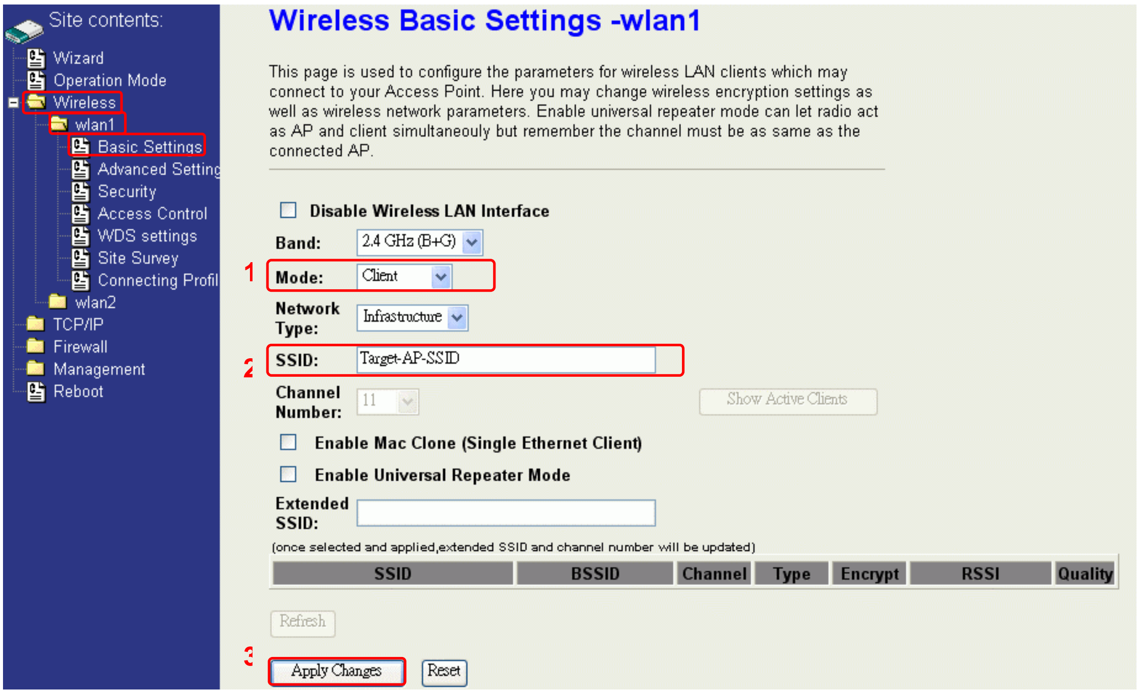
Apply Changes Reset

Configuring as WLAN Client Adapter

This device can be configured as a wireless Ethernet adapter. In this mode, the device can connect to the other wireless stations (Ad-Hoc network type) or Access Point (Infrastructure network type) and you don’t need to install any driver.

Quick start to configure

Step 1. In “Basic Settings” page, change the Mode to “Client” mode. And key in the SSID of the AP you want to connect then press “Apply Changes” button to apply the change.



Wireless Basic Settings -wlan1

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneously but remember the channel must be as same as the connected AP.

□ Disable Wireless LAN Interface

Band: 2.4 GHz (B+G)

Mode: Client

Network Type: Infrastructure

SSID: Target-AP-SSID

Channel Number: 11

□ Enable Mac Clone (Single Ethernet Client)

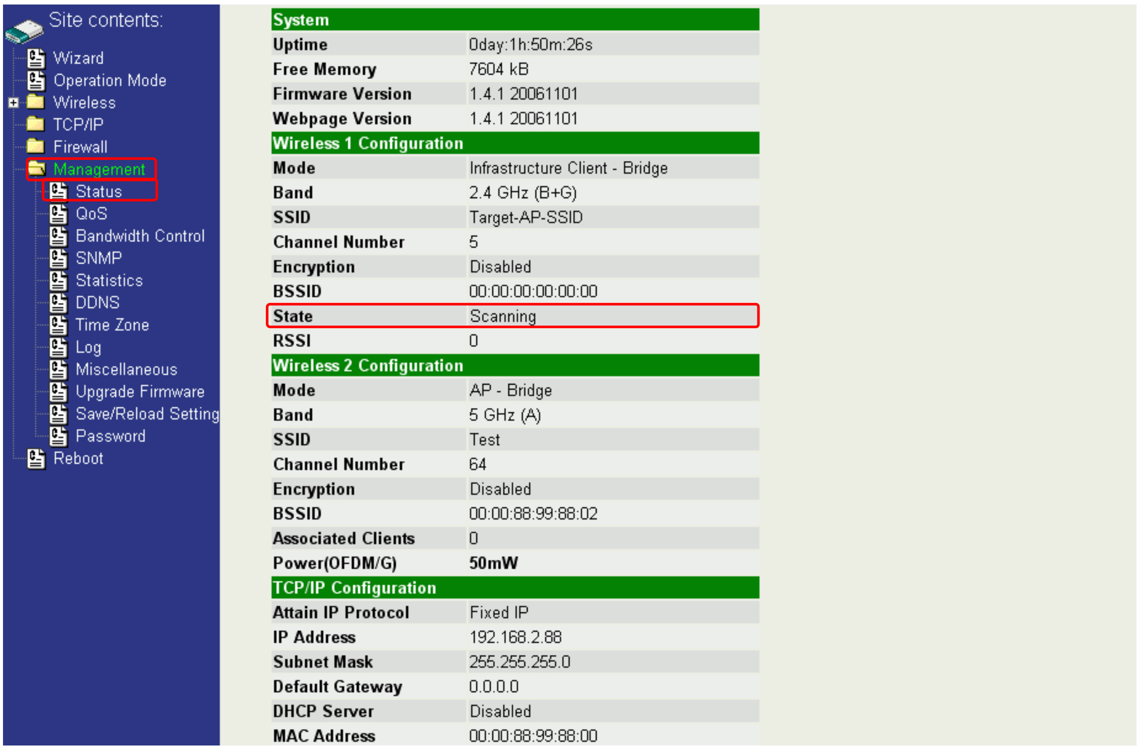
□ Enable Universal Repeater Mode

Extended SSID:

(once selected and applied,extended SSID and channel number will be updated)

SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality

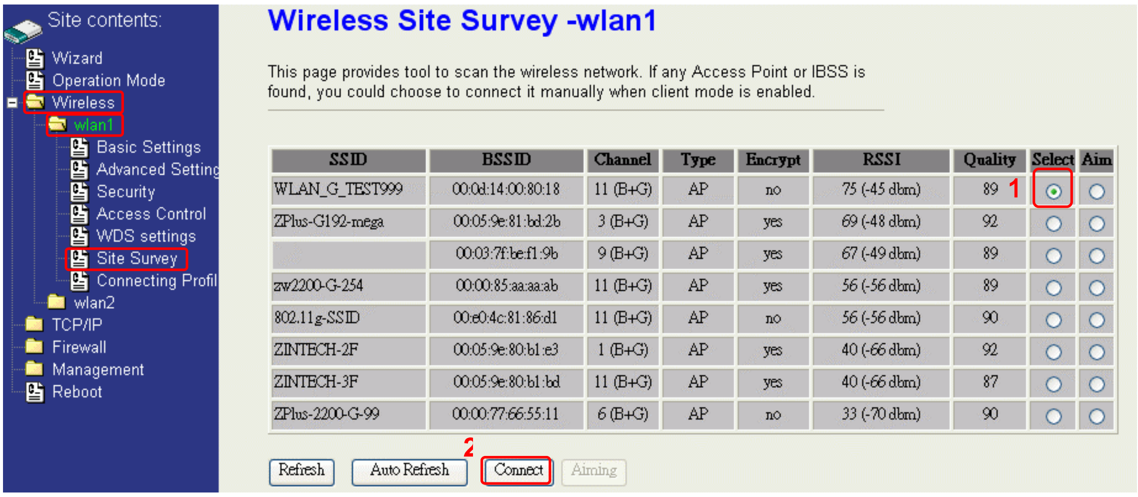
Step 2. Check the status of connection in “Status” web page



System	
Uptime	0day:1h:50m:26s
Free Memory	7604 kB
Firmware Version	1.4.1 20061101
Webpage Version	1.4.1 20061101
Wireless 1 Configuration	
Mode	Infrastructure Client - Bridge
Band	2.4 GHz (B+G)
SSID	Target-AP-SSID
Channel Number	5
Encryption	Disabled
BSSID	00:00:00:00:00:00
State	Scanning
RSSI	0
Wireless 2 Configuration	
Mode	AP - Bridge
Band	5 GHz (A)
SSID	Test
Channel Number	64
Encryption	Disabled
BSSID	00:00:88:99:88:02
Associated Clients	0
Power(OFDM/G)	50mW
TCP/IP Configuration	
Attain IP Protocol	Fixed IP
IP Address	192.168.2.88
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DHCP Server	Disabled
MAC Address	00:00:88:99:88:00

The alternative way to configure as following:

Step 1. In “Wireless Site Survey” page, select one of the SSIDs you want to connect and then press “Connect” button to establish the link.

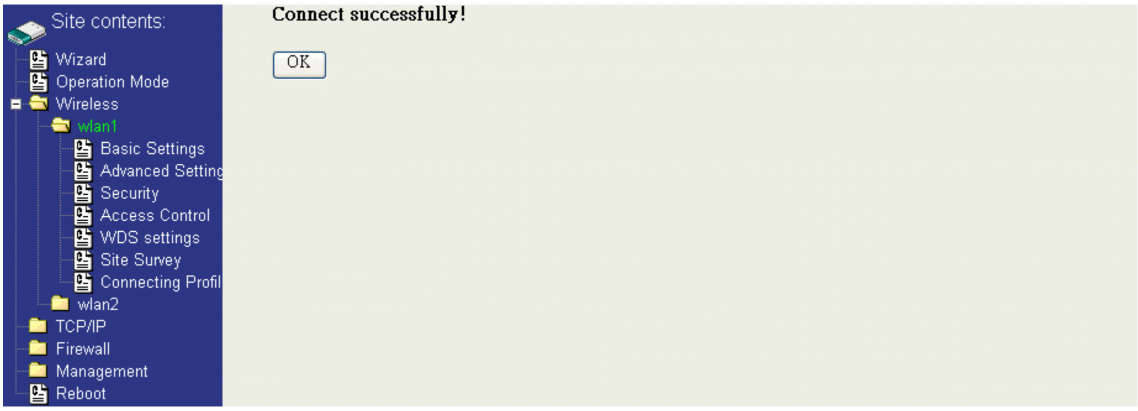


Wireless Site Survey -wlan1

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually when client mode is enabled.

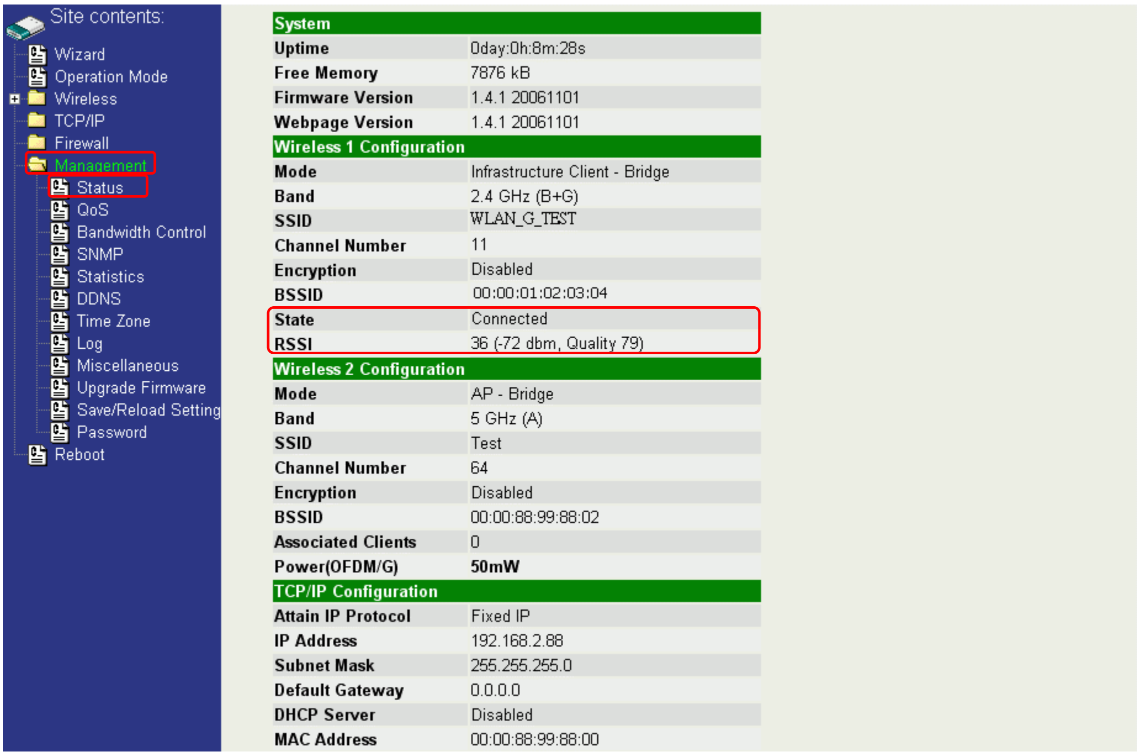
SSID	BSSID	Channel	Type	Encrypt	RSSI	Quality	Select	Aim
WLAN_G_TEST999	00:0d:14:00:80:18	11 (B+G)	AP	no	75 (-45 dbm)	89	●	○
ZPlus-G192-mega	00:05:9e:81:bd:2b	3 (B+G)	AP	yes	69 (-48 dbm)	92	○	○
	00:03:7f:be:f1:9b	9 (B+G)	AP	yes	67 (-49 dbm)	89	○	○
zw2200-G-254	00:00:85:aa:aa:ab	11 (B+G)	AP	yes	56 (-56 dbm)	89	○	○
802.11g-SSID	00:e0:4c:81:86:d1	11 (B+G)	AP	no	56 (-56 dbm)	90	○	○
ZINTECH-2F	00:05:9e:80:b1:e3	1 (B+G)	AP	yes	40 (-66 dbm)	92	○	○
ZINTECH-3F	00:05:9e:80:b1:bd	11 (B+G)	AP	yes	40 (-66 dbm)	87	○	○
ZPlus-2200-G-99	00:00:77:66:55:11	6 (B+G)	AP	no	33 (-70 dbm)	90	○	○

Step 2. If the linking is established successfully. It will show the message “Connect successfully”. Then press “OK”.



Connect successfully!

Step 3. Then you can check the linking information in “Status” page.



System	
Uptime	0day:0h:8m:28s
Free Memory	7876 kB
Firmware Version	1.4.1 20061101
Webpage Version	1.4.1 20061101
Wireless 1 Configuration	
Mode	Infrastructure Client - Bridge
Band	2.4 GHz (B+G)
SSID	WLAN_G_TEST
Channel Number	11
Encryption	Disabled
BSSID	00:00:01:02:03:04
State	Connected
RSSI	36 (-72 dbm, Quality 79)
Wireless 2 Configuration	
Mode	AP - Bridge
Band	5 GHz (A)
SSID	Test
Channel Number	64
Encryption	Disabled
BSSID	00:00:88:99:88:02
Associated Clients	0
Power(OFDM/G)	50mW
TCP/IP Configuration	
Attain IP Protocol	Fixed IP
IP Address	192.168.2.88
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DHCP Server	Disabled
MAC Address	00:00:88:99:88:00

Note ：

If the available network requires authentication and data encryption, you need to setup the authentication and encryption before step1 and all the settings must be as same as the Access Point or Station. About the detail authentication and data encryption settings, please refer the security section.

Authentication Type

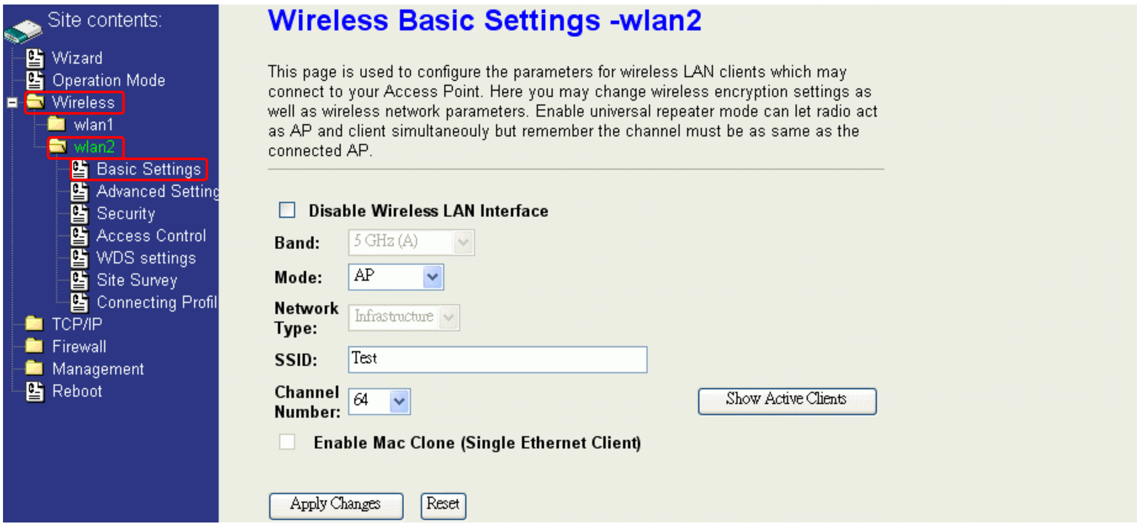
In client mode, the device also supports two Authentication Types “Open system” and “Shared Key”. Although the default setting is “Auto”, not every Access Points can support “Auto” mode. If the authentication type on the Access Point is knew by user, we suggest to set the authentication type as same as the Access Point.

Data Encryption

In client mode, the device supports WEP and WPA Personal/Enterprise except WPA2 mixed mode data encryption. About the detail data encryption settings, please refer the security section.

Ch 4. WLAN 2 Wireless Configuration

Basic Settings



Wireless Basic Settings -wlan2

This page is used to configure the parameters for wireless LAN clients which may connect to your Access Point. Here you may change wireless encryption settings as well as wireless network parameters. Enable universal repeater mode can let radio act as AP and client simultaneouly but remember the channel must be as same as the connected AP.

☐ Disable Wireless LAN Interface

Band: 5 GHz (A)

Mode: AP

Network Type: Infrastructure

SSID: Test

Channel Number: 64

☐ Enable Mac Clone (Single Ethernet Client)

Disable Wireless LAN Interface

Disable the wireless interface of device

Band:

The device supports 5GHz (A) mixed modes.

Mode:

The radio of device supports different modes as following:

1. AP

   The radio of device acts as an Access Point to serves all wireless clients to join a wireless local network.

2. Client

   Support Infrastructure and Ad-hoc network types to act as a wireless adapter.

3. WDS

   Wireless Distribution System, this mode serves as a wireless repeater, only devices with WDS function supported can connect to it, all the wireless clients can't survey and connect the device when the mode is selected.

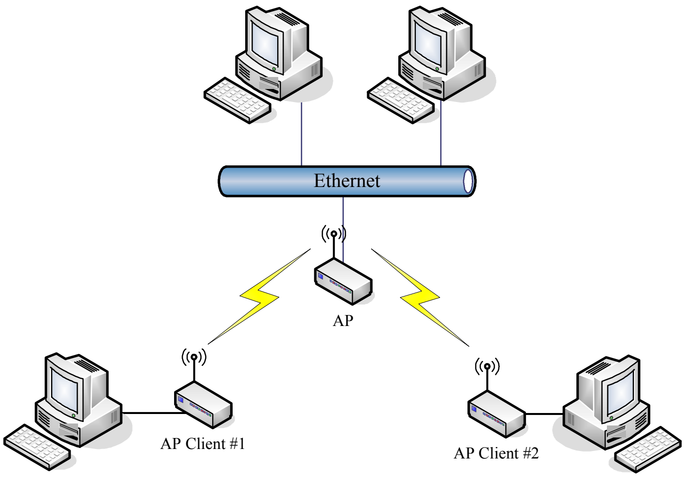
4. AP+WDS

   Support both AP and WDS functions, the wireless clients and devices with WDS function supported can survey and connect to it.

Network Type:

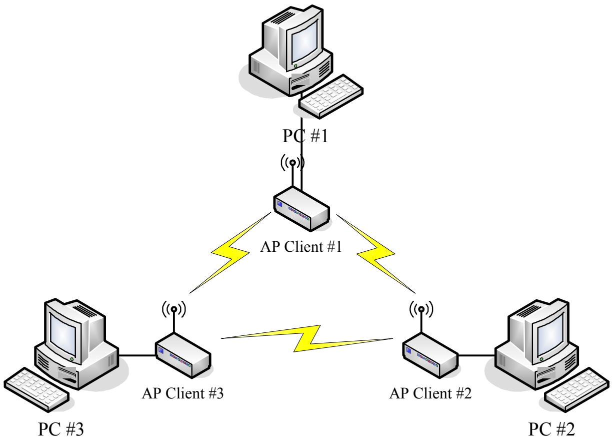
Infrastructure:

This type requires the presence of 802.11a Access Point. All communication is done via the Access Point.



Ad Hoc:

This type provides a peer-to-peer communication between wireless stations. All the communication is done from Client to Client without any Access Point involved. Ad Hoc networking must use the same SSID and channel for establishing the wireless connection.



In client mode, the device can't support the Router mode function including Firewall and WAN settings.

SSID:

The SSID is a unique identifier that wireless networking devices use to establish and maintain wireless connectivity. Multiple access point/bridges on a network or sub-network can use the same SSID. SSIDs are case sensitive and can contain up to 32 alphanumeric characters. Do not include spaces in your SSID.

Channel Number:

The following table is the available frequencies (in MHz) for the 5-GHz radio:

Channel Identifier	Frequency in MHz	Regulatory Domains			
		Americas (-A)	Japan (-J)	Singapore (-S)	Taiwan (-T)
34	5170		√		
36	5180			√	
38	5190		√		

40	5200			√	
42	5210		√		
44	5220			√	
46	5230		√		
48	5240			√	
52	5260				√
56	5280				√
60	5300				√
64	5320				√
149	5745	√			
153	5765	√			
157	5785	√			
161	5805	√			
165	5825	√			

Associated Client:

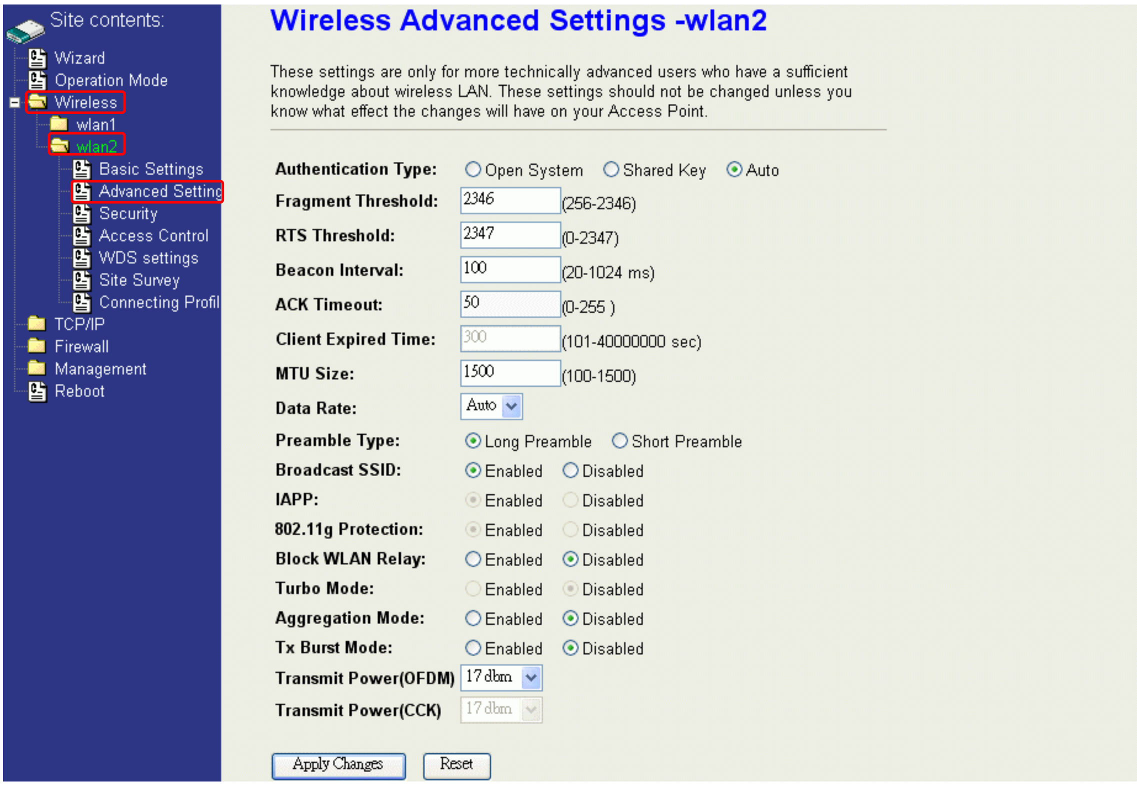
Show the information of active wireless client stations that connected to the device.

Advanced Settings

These settings are only for more technically advanced users who have sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your device. The default setting is optimized for the normal operation. For specific application, setting configuration will required highly attention to reach optimistic condition.

Note :

Any unreasonable value change to default setting will reduce the throughput of the device.



Wireless Advanced Settings -wlan2

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your Access Point.

Authentication Type:	○ Open System ○ Shared Key ● Auto
Fragment Threshold:	2346 (256-2346)
RTS Threshold:	2347 (0-2347)
Beacon Interval:	100 (20-1024 ms)
ACK Timeout:	50 (0-255)
Client Expired Time:	300 (101-40000000 sec)
MTU Size:	1500 (100-1500)
Data Rate:	Auto
Preamble Type:	● Long Preamble ○ Short Preamble
Broadcast SSID:	● Enabled ○ Disabled
IAPP:	● Enabled ○ Disabled
802.11g Protection:	● Enabled ○ Disabled
Block WLAN Relay:	○ Enabled ● Disabled
Turbo Mode:	○ Enabled ● Disabled
Aggregation Mode:	○ Enabled ● Disabled
Tx Burst Mode:	○ Enabled ● Disabled
Transmit Power(OFDM)	17 dbm
Transmit Power(CCK)	17 dbm

Authentication Type

The device supports two Authentication Types "Open system" and "Shared Key". When you select "Share Key", you need to setup "WEP" key in "Security" page (See the next section). The default setting is "Auto". The wireless client can associate with the device by using one of the two types.

Fragment Threshold

The fragmentation threshold determines the size at which packets are fragmented (sent as several pieces instead of as one block). Use a low setting in areas where communication is poor or where there is a great deal of radio interference. This function will help you to improve the network performance.

RTS Threshold

The RTS threshold determines the packet size at which the radio issues a request to send (RTS) before sending the packet. A low RTS Threshold setting can be useful in areas where many client devices are associating with the device, or in areas where the clients are far apart and can detect only the device and not each other. You can enter a setting ranging from 0 to 2347 bytes.

Beacon Interval

The beacon interval is the amount of time between access point beacons in mini-seconds. The default beacon interval is 100.

ACK Timeout

The default ACK timeout is 50. You may need to change this value due to the environment or distance.

Client Expired Time

Not applicable for WLAN 2.

MTU Size

Maximum Transmission Unit, the default MTU size is 1500. The MTU setting controls the maximum Ethernet packet size your PC will send. Why a limit? Because although larger packets can be constructed and sent, your ISP and Internet backbone routers and equipment will fragment any larger than their limit, then these parts are re-assembled by the target equipment before reading. This fragmentation and re-assembly is not optimal. You may need to change the MTU for optimal performance of your wireless LAN traffic.

Data Rate

The standard IEEE 802.11a supports 6, 9, 12, 18, 24, 36, 48 and 54 Mbps data rates. You can choose the rate that the device uses for data transmission. The default value is “auto”. The device will use the highest possible selected transmission rate.

Preamble Type

The preamble is part of the 802.11 frame and is PHY dependant. All 802.11a systems support the long preamble. The short preamble (optional) maybe used to improve throughput when all stations on the network support the short preamble.

Broadcast SSID

Broadcasting the SSID will let your wireless clients find the device automatically. If you are building a public Wireless Network, disable this function can provide better security. Every wireless stations located within the coverage of the device must connect this device by manually configure the SSID in your client settings.

IAPP (Inter-Access Point Protocol)

Not applicable for WLAN 2.

802.11g Protection

Not applicable for WLAN 2.

Block WLAN Relay (Isolate Client)

The device supports isolation function. If you are building a public Wireless Network, enable this function can provide better security. The device will block packets between wireless clients (relay). All the wireless clients connected to the device can’t see each other.

Aggregation Mode

This is a proprietary Ralink (802.11a chipset in the DLB70xx) aggregation setting that allows for jumbo frames consisting of multiple smaller frames that increases throughput between Ralink stations.

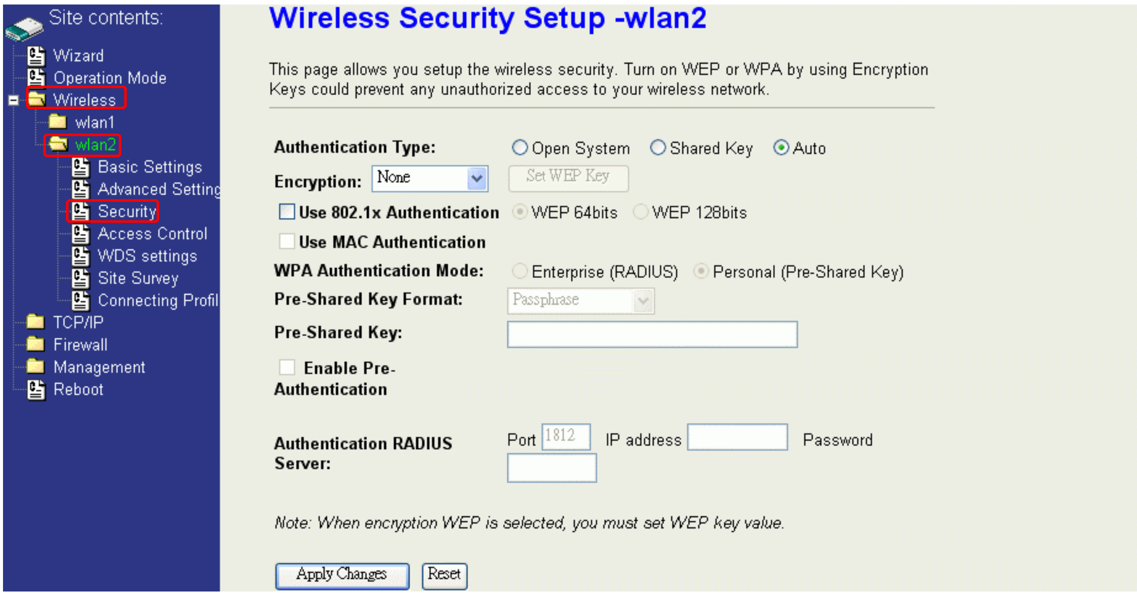
Tx Burst Mode

This is a proprietary Ralink (802.11a chipset in the device) burst setting and allows very small networks (1~3 clients) to transmit at higher speeds. In larger networks, this will result in degraded performance.

Configuring Wireless Security

This device provides complete wireless security function include WEP, 802.1x, WPA-TKIP, WPA2-AES and WPA2-Mixed in different mode (see the Security Support Table).

The default security setting of the encryption function is disabled. Choose your preferred security setting depending on what security function you need.



Wireless Security Setup -wlan2

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Authentication Type: ○ Open System ○ Shared Key ● Auto

Encryption: None | Set WEP Key

□ Use 802.1x Authentication ● WEP 64bits ○ WEP 128bits

□ Use MAC Authentication

WPA Authentication Mode: ○ Enterprise (RADIUS) ● Personal (Pre-Shared Key)

Pre-Shared Key Format: Passphrase

Pre-Shared Key:

□ Enable Pre-Authentication

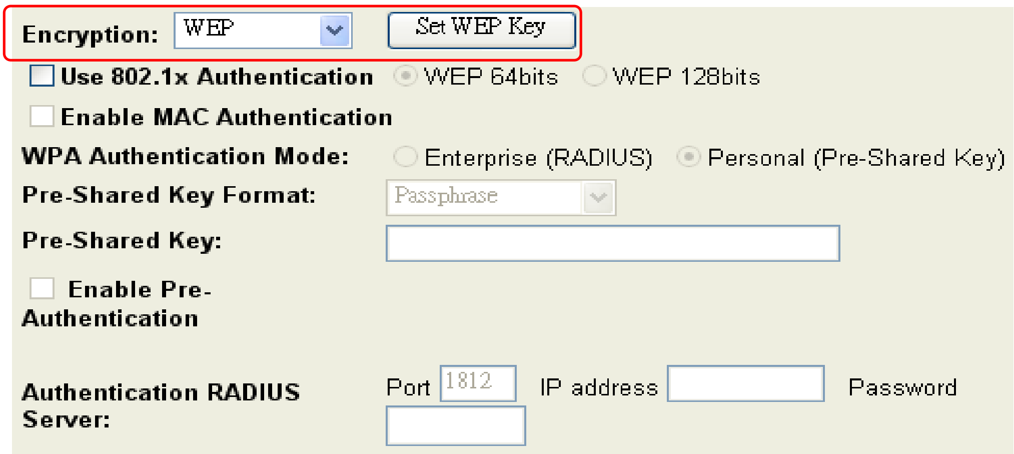
Authentication RADIUS Server: Port 1812 IP address Password

Note: When encryption WEP is selected, you must set WEP key value.

Apply Changes | Reset

WEP Encryption Setting

Wired Equivalent Privacy (WEP) is implemented in this device to prevent unauthorized access to your wireless network. The WEP setting must be as same as each client in your wireless network. For more secure data transmission, you can change encryption type to "WEP" and click the "Set WEP Key" button to open the "Wireless WEP Key setup" page.



Encryption: WEP | Set WEP Key

□ Use 802.1x Authentication ● WEP 64bits ○ WEP 128bits

□ Enable MAC Authentication

WPA Authentication Mode: ○ Enterprise (RADIUS) ● Personal (Pre-Shared Key)

Pre-Shared Key Format: Passphrase

Pre-Shared Key:

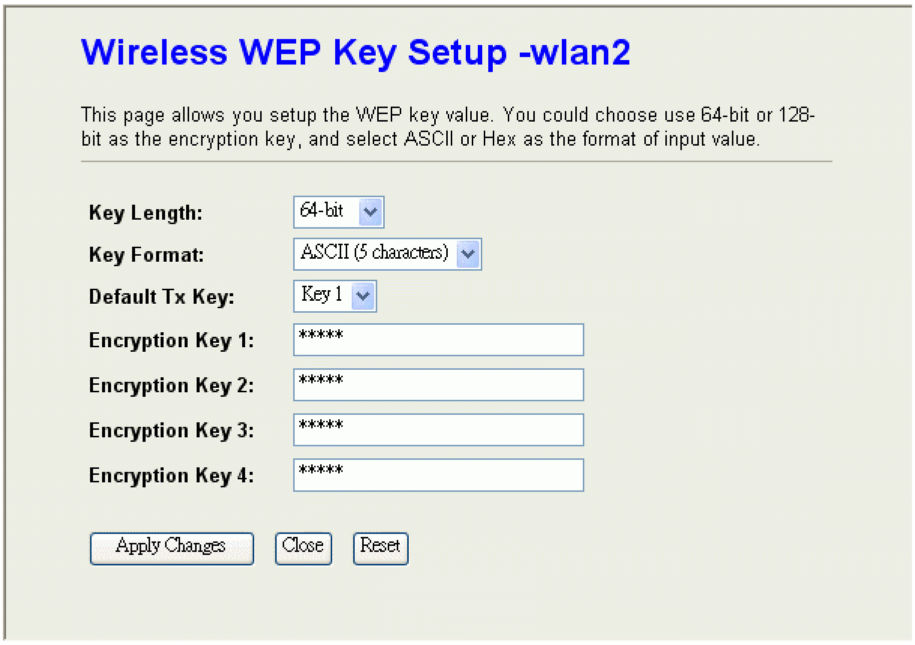
□ Enable Pre-Authentication

Authentication RADIUS Server: Port 1812 IP address Password

When you decide to use the WEP encryption to secure your WLAN, please refer to the following setting of the WEP encryption:

- 64-bit WEP Encryption：64-bit WEP keys are as same as the encryption method of 40-bit WEP. You can input 10 hexadecimal digits (0~9, a~f or A~F) or 5 ACSII chars.

- 128-bit WEP Encryption：128-bit WEP keys are as same as the encryption method of 104-bit WEP. You can input 26 hexadecimal digits (0~9, a~f or A~F) or 10 ACSII chars.
- The Default Tx Key field decides which of the four keys you want to use in your WLAN environment.



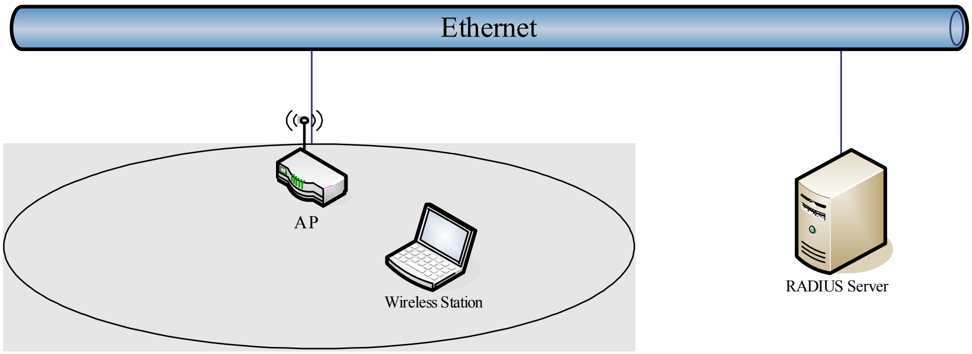
Wireless WEP Key Setup -wlan2

This page allows you setup the WEP key value. You could choose use 64-bit or 128-bit as the encryption key, and select ASCII or Hex as the format of input value.

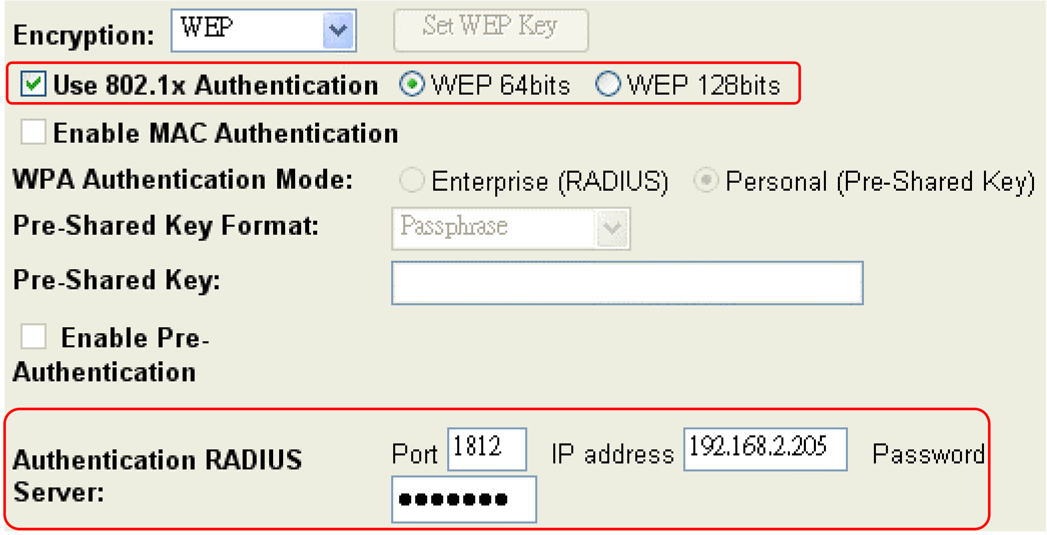
Key Length:	64-bit
Key Format:	ASCII (5 characters)
Default Tx Key:	Key 1
Encryption Key 1:	*****
Encryption Key 2:	*****
Encryption Key 3:	*****
Encryption Key 4:	*****

WEP Encryption with 802.1x Setting

The device supports external RADIUS Server that can secure networks against unauthorized access. If you use the WEP encryption, you can also use the RADIUS server to check the admission of the users. By this way every user must use a valid account before accessing the Wireless LAN and requires a RADIUS or other authentication server on the network. An example is shown as following.



You should choose WEP 64 or 128 bit encryption to fit with your network environment first. Then add user accounts and the target device to the RADIUS server. In the device , you need to specify the IP address、Password (Shared Secret) and Port number of the target RADIUS server.



Encryption: WEP | Set WEP Key

☑ Use 802.1x Authentication ● WEP 64bits ○ WEP 128bits

□ Enable MAC Authentication

WPA Authentication Mode: ○ Enterprise (RADIUS) ● Personal (Pre-Shared Key)

Pre-Shared Key Format: Passphrase

Pre-Shared Key:

□ Enable Pre-Authentication

Authentication RADIUS Server: Port 1812 IP address 192.168.2.205 Password ●●●●●●●

WPA Encryption Setting

WPA feature provides a high level of assurance for end-users and administrators that their data will remain private and access to their network restricted to authorized users. You can choose the WPA encryption and select the Authentication Mode.

WPA Authentication Mode

This device supports two WPA modes. For personal user, you can use the Pre-shared Key to enhance your security setting. This mode requires only an access point and client station that supports WPA-PSK. For Enterprise, authentication is achieved via WPA RADIUS Server. You need a RADIUS or other authentication server on the network.

- **Enterprise (RADIUS):**

  When WPA Authentication mode is Enterprise (RADIUS), you have to add user accounts and the target device to the RADIUS Server. In the device , you need to specify the IP address、Password (Shared Secret) and Port number of the target RADIUS server.

- **Pre-Share Key:**

  This mode requires only an access point and client station that supports WPA-PSK. The WPA-PSK settings include Key Format, Length and Value. They must be as same as each wireless client in your wireless network. When Key format is Passphrase, the key value should have 8~63 ACSII chars. When Key format is Hex, the key value should have 64 hexadecimal digits (0~9, a~f or A~F).