5GHz Outdoor Router

User Manual

USER MANUAL 1.0.0

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Table of Contents

1. Terminology

3DES	Triple Data Encryption Standard
AES	Advanced Encryption Standard
ANSI	American National Standards Institute
AP	Access Point
CCK	Complementary Code Keying
CSMA/CA	Carrier Sense Multiple Access/Collision Avoidance
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
DDNS	Dynamic Domain Name Server
DH	Diffie-Hellman Algorithm
DHCP	Dynamic Host Configuration Protocol
DSSS	Direct Sequence Spread Spectrum
EAP	Extensible Authentication Protocol
ESP	Encapsulating Security Payload
FCC	Federal Communications Commission
FTP	File Transfer Protocol
IEEE	Institute of Electrical and Electronic Engineers
IKE	Internet Key Exchange
IP	Internet Protocol
ISM	Industrial, Scientific and Medical
LAN	Local Area Network
MAC	Media Access Control
MD5	Message Digest 5
NAT	Network Address Translation
NT	Network Termination
NTP	Network Time Protocol
PPTP	Point to Point Tunneling Protocol
PSD	Power Spectral Density
RF	Radio Frequency
SHA1	Secure Hash Algorithm
SNR	Signal to Noise Ratio
SSID	Service Set Identification
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol

TKIP	Temporal Key Integrity Protocol
UPNP	Universal Plug and Play
VPN	Virtual Private Network
WDS	Wireless Distribution System
WEP	Wired Equivalent Privacy
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access

2. Introduction

The 5GHz Outdoor Router is an affordable IEEE 802.11A/N specifications of Outdoor Router solution; setting SOHO and enterprise standard for high performance, secure, manageable and reliable WLAN. This document describes the steps required for the initial IP address assign and other configuration of the outdoor router. The description includes the implementation of the above steps.

2.1 Package contents

The package of the WLAN Broadband Router includes the following items,
- ✓ 5GHz Outdoor Router
- ✓ DC 12V Power Adapter
- ✓ Documentation CD
- ✓ POE Injector
- ✓ Tie

2.2 Product Features

➢ Compatible with IEEE 802.11a standard to provide wireless speeds of 54Mbps data rate.
➢ Compatible with IEEE 802.11n Specifications provides wireless speed up to 150Mbps data rate.
➢ Maximizes the performance and ideal for media-centric applications like streaming video, gaming and Voice over IP technology.
➢ Support various operation (Bridge/Gateway/Ethernet Converter) modes between wireless and wired Ethernet interfaces.
➢ Supports WPS, 64-bit and 128-bit WEP, WPA, WPA2 encryption to protect the wireless data transmission.
➢ Support TKIP/AES/TKIPAES of WPA algorithms.
➢ Support IEEE 802.3x full duplex flow control on 10/100M Ethernet interface.
➢ Support DHCP server to provide clients auto IP addresses assignment.
➢ Support DHCP client, static IP, PPPoE, L2TP and PPTP of WAN Interface.
➢ Supports firewall security with port filtering, IP filtering, MAC filtering, port forwarding, DMZ hosting and URL filtering functions.
➢ Support WEB based management and configuration.
➢ Support System Log.
➢ Support Dynamic DNS
➢ Support NTP

2.3   Front Panel Description

LED Indicator	State	Description
1. PWR LED	ON	The WLAN Broadband Router is powered ON.
	Off	The WLAN Broadband Router is powered Off.
2. WLAN LED	Flashing	Data is transmitting or receiving on the wireless.
	ON	Wireless Radio ON.
	Off	Wireless Radio Off.
3. WAN LED ACT	Flashing	Data is transmitting or receiving on the WAN interface.
	ON	Port linked.
	Off	No link.
4. LAN LED ACT	Flashing	Data is transmitting or receiving on the LAN interface.
	ON	Port linked.
	Off	No link.

2.4   Rear Panel Description

Interfaces	Description
LAN(Middle)	The RJ-45 sockets allow LAN connection through Category 5 cables. Support auto-sensing on 10/100M speed and half/ full duplex; comply with IEEE 802.3/ 802.3u respectively.
WAN(Right)	The RJ-45 socket allows WAN connection through a Category 5 cable. Support auto-sensing on 10/100M speed and half/ full duplex; comply with IEEE 802.3/ 802.3u respectively.

3. Installation

3.1   Hardware Installation

3.1.1 Appearance and Interface Introduction

Notes: The product shot is for reference only please refer to physical product.

❶LED Panel

❷Waterproof Sliding Door

❸Pass trough Ethernet cable from this hole

❹Push this button to remove upper housing

❺Wall Mount

❻Pole Mount
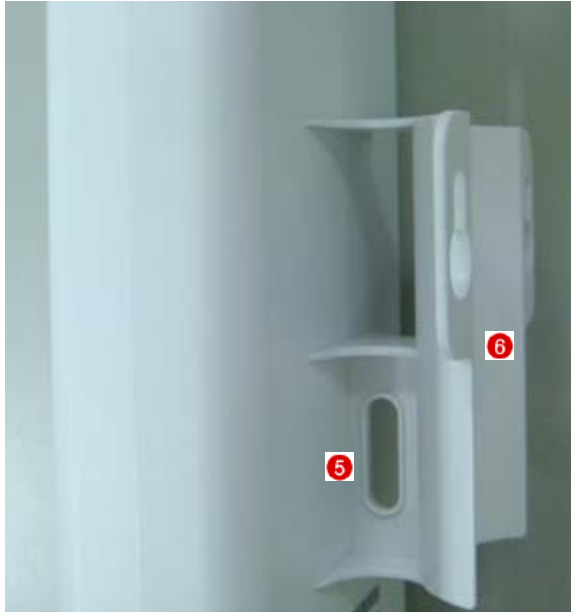
❼LAN port (with POE)
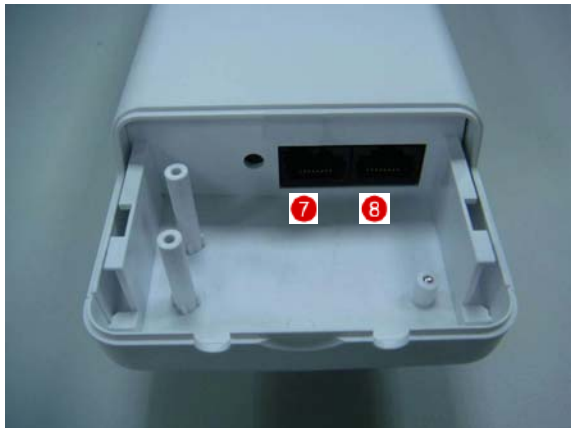
❽WAN port

3.1.2 Hardware installation steps

Step1: Push the button in the side to remove upper housing.
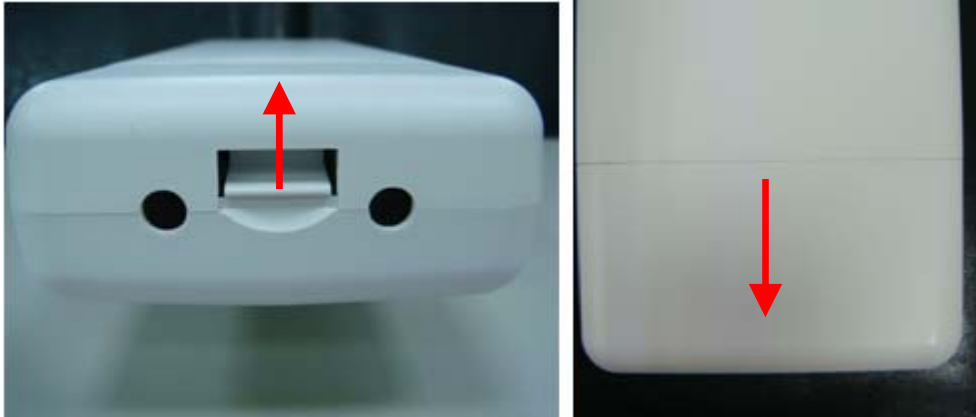
Step2: Pass through Ethernet cable from the hole, and insert the Ethernet cable to LAN port.

Note: RJ-45 8P8C Ethernet cable is required.

Step3: Install the upper housing and make sure the housing is well installed.

Step4:

Install POE Injector

DC: Insert adapter

POE: This hole is linked to LAN port of the Outdoor Router with RJ-45.

LAN: This hole is linked to LAN side PC/Hub or Router/ADSL modem device with RJ-45

Step5: Complete the hardware installation as diagram at below.

Notes: Use **Reset button** on POE injector. Push continually the reset button of POE injector about 5 ~ 10 seconds to reset the configuration parameters to factory defaults.

3.2   Software Installation

There is no software driver or utility installation needed, but only the configuration setting. Please refer to chapter 4 for software configuration.

Notice: It will take about 50 seconds to complete the boot up sequence after power on the Outdoor Router; Power LED will be active, and after that the WLAN Activity LED will be flashing to show the WLAN interface is enabled and working now.

4. Software configuration

There are web based management and configuration functions allowing you to have the jobs done easily.

The Outdoor Router is delivered with the following factory default parameters on the Ethernet LAN interfaces.

Default IP Address: 192.168.1.254
Default IP subnet mask: 255.255.255.0
WEB login User Name: admin
WEB login Password: admin

4.1   Prepare your PC to configure the WLAN Broadband Router

For OS of Microsoft Windows 2000/ XP:
1. Click the *Start* button and select Settings, then click *Control Panel*. The *Control Panel* window will appear.
2. Move mouse and double-click the right button on *Network and Dial-up Connections* icon. Move mouse and double-click the *Local Area Connection* icon. The *Local Area Connection* window will appear. Click *Properties* button in the *Local Area Connection* window.
3. Check the installed list of *Network Components*. If TCP/IP is not installed, click the *Add* button to install it; otherwise go to step 6.
4. Select *Protocol* in the *Network Component Type* dialog box and click *Add* button.
5. Select *TCP/IP* in *Microsoft of Select Network Protocol* dialog box then click OK button to install the TCP/IP protocol, it may need the Microsoft Windows CD to complete the installation. Close and go back to *Network* dialog box after the TCP/IP installation.
6. Select *TCP/IP* and click the properties button on the *Network* dialog box.
7. Select Specify an IP address and type in values as following example.
   - ✓ IP Address: *192.168.1.1*, any IP address within 192.168.1.1 to 192.168.1.253 is good to connect the Wireless LAN Access Point.
   - ✓ IP Subnet Mask: *255.255.255.0*
8. Click *OK* to complete the IP parameters setting.

For OS of Microsoft Windows Vista / 7:
1. Click the *Start* button and select *Settings*, then click *Control Panel*. The *Control Panel* window will appear.
2. Move mouse and double-click the right button on *Network Connections* item. The *Network Connections* window will appear. Double click *Local Area Connection* icon, then User Account Control window shown. Right click Continue button to set properties.
3. In *Local Area Connection Properties* window, Choose *Networking* tab, move mouse and click *Internet Protocol Version 4 (TCP/IPv4)*, then click *Properties* button.
4. Move mouse and click *General* tab, Select *Specify an IP address* and type in values as following example.
   - ✓ IP Address: *192.168.1.1*„ any IP address within 192.168.1.1 to 192.168.1.253 is good to connect the Wireless LAN Access Point.
   - ✓ IP Subnet Mask: *255.255.255.0*
5. Click *OK* to complete the IP parameters setting.

For OS of Microsoft Windows NT:
1. Click the *Start* button and select Settings, then click *Control Panel*. The *Control Panel* window will appear.
2. Move mouse and double-click the right button on Network icon. The Network window will appear. Click Protocol tab from the Network window.
3. Check the installed list of Network Protocol window. If TCP/IP is not installed, click the Add button to install it; otherwise go to step 6.
4. Select Protocol in the Network Component Type dialog box and click Add button.
5. Select *TCP/IP* in *Microsoft of Select Network Protocol* dialog box then click OK button to install the TCP/IP protocol, it may need the Microsoft Windows CD to complete the installation. Close and go back to *Network* dialog box after the TCP/IP installation.
6. Select *TCP/IP* and click the properties button on the *Network* dialog box.
7. Select Specify an IP address and type in values as following example.
   - ✓ IP Address: *192.168.1.1*, any IP address within 192.168.1.1 to 192.168.1.253 is good to connect the Wireless LAN Access Point.
   - ✓ IP Subnet Mask: *255.255.255.0*
8. Click *OK* to complete the IP parameters setting.

4.2   Connect to the WLAN Broadband Router

Open a WEB browser, i.e. Microsoft Internet Explore 6.1 SP1 or above, then enter 192.168.1.254 on the URL to connect the WLAN Broadband Router.

4.3   Management and configuration on the Outdoor Router

4.3.1 Wizard

This Wizard page guides you to configure Internet connection and Wireless Settings quickly.

Step 1: configure Internet connection

Click **Next** button to next step for Internet connection settings. There are five options (DHCP, Static Mode, PPPOE, L2TP, PPTP) for Internet connection on WAN port.

a. DHCP (Auto Config)

If you select **DHCP** option, please click **Next** button to jump at Step2.

b. Static Mode (fixed IP)

If you select **Static Mode**, please fill in these fields on next page.

Item	Description
IP Address	Fill in the IP address for WAN interface.
Subnet Mask	Fill in the subnet mask for WAN interface.
Default Gateway	Fill in the default gateway for WAN interface out going data packets.
Primary DNS Server	Fill in the IP address of Domain Name Server 1.
Secondary DNS Server	Fill in the IP address of Domain Name Server 2.

When you finish these settings, then click *Next* button to jump at Step2.

5G Outdoor Router
User Manual

c. PPPOE (ADSL)

Quick Setup

Step 1: configure Internet connection

○ **DHCP (Auto Config)**
　Choose this, ISP automatically configure this device.
○ **Static Mode (fixed IP)**
　Choose this, user need to configure this device manually.
◉ **PPPOE (ADSL)**
　Choose this, user must input a username and password for ISP authenticator.
○ **L2TP**
　L2TP Client
○ **PPTP**
　PPTP Client

| Back | Next | Cancel | Apply |

If you select **PPPOE**, please fill in these fields on next page.

Quick Setup

Step 1: configure Internet connection

PPPoE Mode	
User Name	pppoe_user
Password	••••••••••••
Verify Password	••••••••••••
Operation Mode	Keep Alive ▾
	Keep Alive Mode: Redial Period 60 senconds
	On demand Mode: Idle Time 5 minutes

| Back | Next | Cancel | Apply |

Item	Description
User Name	If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server.
Password	If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server.
Verify Password	Fill in the password again for verification.
Operation Mode	**Keep Alive:** Keep the PPPoE connection all the time. Please also configure the Redial Period field. **On Demand:** Please configure the Idle Time field. When time is up, the PPPoE connection will disconnect. The connection will re-connect when any outgoing packet arise. **Manual:** Let user connect the PPPoE connection manually.

When you finish these settings, then click *Next* button to jump at Step2.

d. L2TP

If you select **L2TP**, please fill in these fields on next page.

Item	Description
L2TP Server IP Address	Allow user to make a tunnel with remote site directly to secure the data transmission among the connection. User can use embedded L2TP client supported by this router to make a VPN connection. If you select the L2TP support on WAN interface, fill in the IP address for it.
User Name	Fill in the user name and password to login the L2TP server.
Password	Fill in the user name and password to login the L2TP server.
Address Mode	**Static:** To configure the IP address information by manually, please fill in the related setting at below. **Dynamic:** The option allows the machine to get IP address information automatically from DHCP server on WAN side.
IP Address	Fill in the IP address for WAN interface.
Subnet Mask	Fill in the subnet mask for WAN interface.
Default Gateway	Fill in the default gateway for WAN interface out going data packets.
Operation Mode	**Keep Alive:** Keep the L2TP connection all the time. Please also configure the Redial Period field. **Manual:** Let user connect the L2TP connection manually.

When you finish these settings, then click *Next* button to jump at Step2.

e. PPTP

If you select **PPTP**, please fill in these fields on next page.

Quick Setup

Step 1: configure Internet connection

PPTP Mode	
PPTP Server IP Address	pptp_server
User Name	pptp_user
Password	••••••••••
Address Mode	Static
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.254
Operation Mode	Keep Alive
	Keep Alive Mode: Redial Period 60 senconds

[Back] [Next] [Cancel] [Apply]

Item	Description
PPTP Server IP Address	Allow user to make a tunnel with remote site directly to secure the data transmission among the connection. User can use embedded PPTP client supported by this router to make a VPN connection. If you select the PPTP support on WAN interface, fill in the IP address for it.
User Name	Fill in the user name and password to login the PPTP server.
Password	Fill in the user name and password to login the PPTP server.
Address Mode	**Static:** To configure the IP address information by manually, please fill in the related setting at below. **Dynamic:** The option allows the machine to get IP address information automatically from DHCP server on WAN side.
IP Address	Fill in the IP address for WAN interface.
Subnet Mask	Fill in the subnet mask for WAN interface.
Default Gateway	Fill in the default gateway for WAN interface out going data packets.
Operation Mode	**Keep Alive:** Keep the PPTP connection all the time. Please also configure the Redial Period field. **Manual:** Let user connect the PPTP connection manually.

When you finish these settings, then click *Next* button to jump at Step2.

Step 2: configure Wireless Settings

There are three options (Disable, WEP, WPA-PSK/WPA2-PSK) for Wireless security connection.

Disable

WEP

WPA-PSK/WPA2-PSK

Item	Description
Network Name (SSID)	It is the wireless network name. The SSID can be 32 bytes long.
Security	Please select the security mode related wireless data encryption.
KEY	**WEP:** When you select WEP, please input 5, 13 (ASCII), 10 or 26 (HEX) characters for WEP Key. **WPA-PSK/WPA2-PSK:** When WPA/WPA2 Pre-shared key encryption is selected, please fill in the Pre-shared key. The format can be passphrase or Hex (64 characters).

When you finish these settings, then click *Apply* button to save.

4.3.2 Operation Mode

a. Bridge:

The **Bridge** mode allows that all Ethernet and wireless interfaces are bridged into a single bridge interface.

b. Gateway:

The **Gateway** mode allows that the first Ethernet port is treated as WAN port and the Ethernet port and the wireless interface are bridged together and are treated as LAN ports.

c. Ethernet Converter:

The **Ethernet Converter** mode allows that the wireless interface is treated as WAN port, and the Ethernet ports are LAN ports.

4.3.3 Internet Settings

4.3.3.1 WAN
a. STATIC

Item	Description
IP Address	Fill in the IP address for WAN interface.
Subnet Mask	Fill in the subnet mask for WAN interface.
Default Gateway	Fill in the default gateway for WAN interface out going data packets.
Primary DNS Server	Fill in the IP address of Domain Name Server 1.
Secondary DNS Server	Fill in the IP address of Domain Name Server 2.
MAC Clone	Take NIC MAC address of PC on LAN side as the MAC address of WAN interface.

b. DHCP

Wide Area Network (WAN) Settings

You may choose different connection type suitable for your environment. Besides, you may also configure parameters according to the selected connection type.

WAN Connection Type: DHCP (Auto config)

DHCP Mode

Hostname (optional)	

MAC Clone

Enabled	Disable

Apply   Cancel

Item	Description
Hostname	Fill in the host name of Host Name of DHCP server. The default value is empty.
MAC Clone	Take NIC MAC address of PC on LAN side as the MAC address of WAN interface.

c. PPPoE

Wide Area Network (WAN) Settings

You may choose different connection type suitable for your environment. Besides, you may also configure parameters according to the selected connection type.

WAN Connection Type:	PPPoE (ADSL)
PPPoE Mode	
User Name	pppoe_user
Password	●●●●●●●●●●●●
Verify Password	●●●●●●●●●●●●
MAC Clone	
Enabled	Disable

Apply   Cancel

Item	Description
User Name	If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server.
Password	If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server.
Verify Password	Fill in the password again for verification.
MAC Clone	Take NIC MAC address of PC on LAN side as the MAC address of WAN interface.

d. L2TP

Wide Area Network (WAN) Settings

You may choose different connection type suitable for your environment. Besides, you may also configure parameters according to the selected connection type.

WAN Connection Type: L2TP

L2TP Mode

Server IP	l2tp_server
User Name	l2tp_user
Password	••••••••••
Address Mode	Static
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.254
Operation Mode	Keep Alive Keep Alive Mode: Redial Period 60 senconds On demand Mode: Idle Time 5 minutes

MAC Clone

Enabled	Disable

Apply   Cancel

Item	Description
Server IP	Allow user to make a tunnel with remote site directly to secure the data transmission among the connection. User can use embedded L2TP client supported by this router to make a VPN connection. If you select the L2TP support on WAN interface, fill in the IP address for it.
User Name	Fill in the user name and password to login the L2TP server.
Password	Fill in the user name and password to login the L2TP server.
Address Mode	**Static:** To configure the IP address information by manually, please fill in the related setting at below. **Dynamic:** The option allows the machine to get IP address information automatically from DHCP server on WAN side.
IP Address	Fill in the IP address for WAN interface.
Subnet Mask	Fill in the subnet mask for WAN interface.
Default Gateway	Fill in the default gateway for WAN interface out going data packets.
Operation Mode	**Keep Alive:** Keep the L2TP connection all the time. Please also configure the Redial Period field. **On Demand:** Please configure the Idle Time field. When time is up, the L2TP connection will disconnect. The connection will re-connect when any outgoing packet arise. **Manual:** Let user connect the L2TP connection manually.
MAC Clone	Take NIC MAC address of PC on LAN side as the MAC address of WAN interface.

e. PPTP

Wide Area Network (WAN) Settings

You may choose different connection type suitable for your environment. Besides, you may also configure parameters according to the selected connection type.

WAN Connection Type:	PPTP

PPTP Mode

Server IP	pptp_server
Server IP	pptp_server
User Name	pptp_user
Password	••••••••••
Address Mode	Static
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.254
Operation Mode	Keep Alive
	Keep Alive Mode: Redial Period 60 senconds
	On demand Mode: Idle Time 5 minutes

MAC Clone

Enabled	Disable

[Apply]   [Cancel]

Item	Description
Server IP	Allow user to make a tunnel with remote site directly to secure the data transmission among the connection. User can use embedded PPTP client supported by this router to make a VPN connection. If you select the PPTP support on WAN interface, fill in the IP address for it.
User Name	Fill in the user name and password to login the PPTP server.
Password	Fill in the user name and password to login the PPTP server.
Address Mode	**Static:** To configure the IP address information by manually, please fill in the related setting at below. **Dynamic:** The option allows the machine to get IP address information automatically from DHCP server on WAN side.
IP Address	Fill in the IP address for WAN interface.
Subnet Mask	Fill in the subnet mask for WAN interface.
Default Gateway	Fill in the default gateway for WAN interface out going data packets.
Operation Mode	**Keep Alive:** Keep the PPTP connection all the time. Please also configure the Redial Period field. **On Demand:** Please configure the Idle Time field. When time is up, the PPTP connection will disconnect. The connection will re-connect when any outgoing packet arise. **Manual:** Let user connect the PPTP connection manually.
MAC Clone	Take NIC MAC address of PC on LAN side as the MAC address of WAN interface.

4.3.3.2 LAN

Local Area Network (LAN) Settings

You may enable/disable networking functions and configure their parameters as your wish.

LAN Setup	
MAC Address	00:1A:EF:18:D5:33
IP Address	192.168.1.254
Subnet Mask	255.255.255.0
DHCP Type	Server
Start IP Address	192.168.1.100
End IP Address	192.168.1.200
Lease Time	86400
802.1d Spanning Tree	Disable
LLTD	Disable
IGMP Proxy	Disable
UPNP	Disable
Router Advertisement	Disable
PPPoE Relay	Disable
DNS Proxy	Disable

Apply   Cancel

Item	Description
MAC Address	Show the MAC address of LAN interface.
IP Address	Fill in the IP address of LAN interfaces.
Subnet Mask	Fill in the subnet mask of LAN interfaces.
DHCP Type	**Disable:** Disable DHCP server on LAN side. **Server:** Enable DHCP server on LAN side.
Start IP Address	Fill in the start IP address to allocate a range of IP addresses; client with DHCP function set will be assigned an IP address from the range.
End IP Address	Fill in the end IP address to allocate a range of IP addresses; client with DHCP function set will be assigned an IP address from the range.
Lease Time	Fill in the lease time of DHCP server function.

802.1d Spanning Tree	Select enable or disable the IEEE 802.1d Spanning Tree function from pull-down menu.
LLTD	Select enable or disable the Link Layer Topology Discover function from pull-down menu.
IGMP Proxy	Select enable or disable the IGMP proxy function from pull-down menu.
UPNP	Select enable or disable the UPnP protocol from pull-down menu.
Router Advertisement	Select enable or disable the Router Advertisement from pull-down menu.
PPPoE Relay	Select enable or disable the PPPoE Relay function from pull-down menu.
DNS Proxy	Select enable or disable the DNS Proxy function from pull-down menu.

4.3.3.3 DHCP clients

The "DHCP clients" page shows all the active DHCP clients. The table window shows the active clients with their Hostname, MAC address, assigned IP address, and time expired information.

DHCP Client List

You could monitor DHCP clients here.

DHCP Clients			
Hostname	MAC Address	IP Address	Expires in
Chris-PC	00:16:D3:17:26:0D	192.168.1.100	23:55:05

Refresh

4.3.3.4 VPN Passthrough

VPN Passthrough

VPN passthrought configurations including: L2TP, IPSec, and PPTP passthrough.

VPN Pass Through	
L2TP Passthrough	Disable ▾
IPSec Passthrough	Disable ▾
PPTP Passthrough	Disable ▾

Apply   Cancel

Item	Description
L2TP Passthrough	Select enable or disable the L2TP pass-through function from pull-down menu.
IPSec Passthrough	Select enable or disable the IPSec pass-through function from pull-down menu.
PPTP Passthrough	Select enable or disable the PPTP pass-through function from pull-down menu.

4.3.4 Wireless Settings

4.3.4.1 Basic

Basic Wireless Settings

You could configure the minimum number of Wireless settings for communication, such as Network Name (SSID) and Channel. The Access Point can be set simply with only the minimum setting items.

Wireless Network

Wireless On/Off	Wireless OFF Current Status:Radio ON
Antenna Switch	○ External ● Internal
Wireless Mode	11a/n mixed mode
SSID	802.11an_Router
Broadcast Network Name (SSID)	● Enable ○ Disable
AP Isolation	○ Enable ● Disable
MBSSID AP Isolation	○ Enable ● Disable
BSSID	00:1A:EF:18:D5:33
Frequency (Channel)	AutoSelect Current Channel:48

HT Physical Mode

Operating Mode	● Mixed Mode ○ Green Field
Channel BandWidth	○ 20 ● 20/40
Guard Interval	○ Long ● Auto
MCS	Auto

Apply   Cancel

Item	Description
Wireless On/Off	Click *Wireless OFF* button to turn off wireless RF radio. Click *Wireless ON* button to turn on wireless RF radio.
Antenna Switch	Select Internal antenna or External antenna for using. The default is using Internal antenna.
Wireless Mode	Click to select wireless mode from pull down menu.
SSID	It is the wireless network name. The SSID can be 32 bytes long. User can use the default SSID or change it.
Broadcast Network Name (SSID)	Enable or disable the SSID broadcast function.
AP Isolation	Wireless network is similar to the virtual local area network. All of the Wireless client devices can access each other completely. When you enable this function, it will turn off connection between wireless clients. Only allows connection between wireless client and this AP router.
MBSSID AP Isolation	Enable this function will turn off connection between clients with different MBSSID. Example: The client connected with BSSID 1. When enable this function, it will not connect with BSSID 2. Only can access between clients with SSID 1.
BSSID	Show the MAC address of Wireless interface.
Frequency (Channel)	Select the wireless communication frequency/channel from pull-down menu.
Operating Mode	Select "Mixed Mode" for 11b/g/n mode or "Green Field" for 11n mode.
Channel BandWidth	Select the operating channel width 20 MHz or 20/40 MHz.
Guard Interval	Select "Long" or "Auto". Guard intervals are used to ensure that distinct transmissions do not interfere with one another. Only effect under Mixed Mode.
MCS	Select 0~7 or "Auto" from pull down menu. The default is "Auto". Only effect under Mixed Mode.

4.3.4.2 Advanced

Advanced Wireless Settings

Use the Advanced Setup page to make detailed settings for the Wireless. Advanced Setup includes items that are not available from the Basic Setup page, such as Beacon Interval, Control Tx Rates and Basic Data Rates.

Advanced Wireless	
B/G Protection Mode	Auto
Beacon Interval	100 ms (range 20 - 999, default 100)
Data Beacon Rate (DTIM)	1 ms (range 1 - 255, default 1)
Fragment Threshold	2346 (range 256 - 2346, default 2346)
RTS Threshold	2347 (range 1 - 2347, default 2347)
TX Power	100 (range 1 - 100, default 100)
Short Preamble	○ Enable ⦿ Disable
Short Slot	⦿ Enable ○ Disable
Tx Burst	⦿ Enable ○ Disable
Country Code	US (United States)

Apply   Cancel

Item	Description
B/G Protection Mode	Default: **Auto**. You can select the other options including **On** and **Off**. The B/G protection technology is CTS-To-Self. It will try to reserve the throughput for 11g clients from 11b clients connecting to the device as AP mode.
Beacon Interval	Beacons are the packets sending by Access point to synchronize the wireless network. The beacon interval is the time interval between beacons sending by this unit in AP or AP+WDS operation. The default and recommended beacon interval is 100 milliseconds.
Data Beacon Rate(DTM)	This is the Delivery Traffic Indication Map. It is used to alert the clients that multicast and broadcast packets buffered at the AP will be transmitted immediately after the transmission of this beacon frame. You can change the value from 1 to 255. The AP will check the buffered data according to this value. For example, selecting "1" means to check the buffered data at every beacon.
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.
TX Power	The default TX power is 100%. In case of shortening the distance and the coverage of the wireless network, input a smaller value to reduce the radio transmission power. For example, input 80 to apply 80% Tx power.
Short Preamble	Default: Disable. It is a performance parameter for 802.11 b/g mode and not supported by some of very early stage of 802.11b station cards. If there is no such kind of stations associated to this AP, you can enable this function.
Short Slot	It is used to shorten the communication time between this AP and station.
TX Burst	The device will try to send a serial of packages with single ACK reply from the clients. Enable this function to apply it.
Country Code	Select the country code for wireless from pull down menu.

4.3.4.3　Security

a. Disable

If you set Security Mode to "**Disable"**, the wireless data transmission will not include encryption to prevent from unauthorized access and monitoring.

b. WEPAUTO

Wireless Security/Encryption Settings

Setup the wireless security and encryption to prevent from unauthorized access and monitoring.

Security Wireless	
Security Mode	WEPAUTO

Wire Equivalence Protection (WEP)			
Default Key		Key 1	
WEP Keys	WEP Key 1 :		Hex
	WEP Key 2 :		Hex
	WEP Key 3 :		Hex
	WEP Key 4 :		Hex

Access Policy	
Policy	Disable
Add a station Mac:	

Apply   Cancel

If you set Security Mode to "**WEPAUTO"**, please fill in the related configurations at below.

Item	Description
Default Key	Specify a Key number for effective.
WEP Keys (1~4)	When you select WEPAUTO, please input 5, 13 (ASCII), 10 or 26 (HEX) characters for WEP Key.

c. WPAPSK/WPA2PSK

Wireless Security/Encryption Settings

Setup the wireless security and encryption to prevent from unauthorized access and monitoring.

Security Wireless

Security Mode	WPAPSKWPA2PSK ▾

WPA

WPA Algorithms	○ TKIP ○ AES ○ TKIPAES
Pass Phrase	12345678
Key Renewal Interval	3600 seconds (0 ~ 4194303)

Access Policy

Policy	Disable ▾
Add a station Mac:	

[Apply] [Cancel]

If you set Security Mode to "**WPAPSKWPA2PSK"**, please fill in the related configurations at below.

Item	Description
WPA Algorithms	Select **TKIP**, **AES**, or **TKIPAES** for WPA algorithms.
Pass Phrase	Please fill in a passphrase like 'test wpa 123', or a hexadecimal string like '65E4 E123 456 E1'.
Key Renewal Interval	Please fill in a number for Group Key Renewal interval time.

d. WPA1WPA2

Wireless Security/Encryption Settings

Setup the wireless security and encryption to prevent from unauthorized access and monitoring.

Security Wireless	
Security Mode	WPA1WPA2 ▼

WPA	
WPA Algorithms	○ TKIP ○ AES ○ TKIPAES
Key Renewal Interval	3600 seconds (0 ~ 4194303)
PMK Cache Period	10 minute
Pre-Authentication	⊙ Disable ○ Enable

Radius Server	
IP Address	
Port	1812
Shared Secret	
Session Timeout	0
Idle Timeout	

If you set Security Mode to "**WPA1WPA2"**, please fill in the related configurations at below.

Item	Description
WPA Algorithms	Select **TKIP** or **AES** for WPA algorithms.
Key Renewal Interval	Please fill in a number for Group Key Renewal interval time.
PMK Cache Period	Only valid in WPA2 security. Set WPA2 PMKID cache timeout period, after time out, the cached key will be deleted. PMK Cache Period unit is minute.
Pre-Authentication	Only valid in WPA2 security. The most important features beyond WPA to become standardized through 802.11i/WPA2 are: Pre-authentication, which enables secure fast roaming without noticeable signal latency.
IP Address	Enter the RADIUS Server's IP Address provided by your ISP.
Port	Enter the RADIUS Server's port number provided by your ISP. (The Default is 1812.)
Shared Secret	Enter the password that the Wireless Router shares with the RADIUS Server.
Session Timeout	Session timeout interval is for 802.1x re-authentication setting. Set to zero to disable 802.1x re-authentication service for each session. Session timeout interval unit is second and must be larger than 60.
Idle Timeout	Enter the idle timeout in the column.

e. Access Policy

Item	Description
Policy	Select the **Disabled, Allow** or **Reject** of drop down menu choose wireless access control mode. This is a security control function; only those clients registered in the access control list can link to this WLAN Broadband Router.
Add a station MAC	Fill in the MAC address of client to register this AP router access capability.

4.3.4.4   WDS

a. Disable

If you set WDS to "**Disable"**, Wireless Distribution System function will not effect.

b. Bridge Mode

　　Bridge mode allows user to operate as a standard bridge that forwards traffic between WDS links (links that connect to other units in Repeater). The MAC addresses of WDS peers must be configured on the Wireless 11n Access Points/ Repeaters. Basically this mode is used when you have a 5G outdoor router with more than one WDS link to other AP/Repeaters.

Note: In this mode wireless clients will not be able to connect to the 5G outdoor router directly.

Item	Description
Frequency (Channel)	Select the wireless communication frequency/channel from pull-down menu.
LAN IP Address	Fill in the IP address of LAN interfaces.
DHCP Type	**Disable:** Disable DHCP server on LAN side.

	Server: Enable DHCP server on LAN side.
Encryp Type	Select encryption type for wireless data transmission. There are four options: **None**, **WEP**, **TKIP** or **AES.**
Encryp Key	When you select **WEP** encryption type on above, please input 5, 13 (ASCII), 10 or 26 (HEX) characters for WEP Key. When you select **TKIP** or **AES** encryption type on above, please input a Passphrase or Hex (64 characters).
AP MAC Address	Fill in the MAC address of AP which WDS links in Repeater or Lazy mode.

c. Repeater Mode

   Repeater mode allows user to operate as a wireless repeater, extending the range for remote wireless clients and connecting them to an AP connected to the wired network. The MAC addresses of WDS peers must be configured on the Wireless 5G Access Point/Repeater.

Item	Description
Frequency (Channel)	Select the wireless communication frequency/channel from pull-down menu.
LAN IP Address	Fill in the IP address of LAN interfaces.
DHCP Type	**Disable:** Disable DHCP server on LAN side. **Server:** Enable DHCP server on LAN side.
Encryp Type	Select encryption type for wireless data transmission. There are four options: **None**, **WEP**, **TKIP** or **AES.**
Encryp Key	When you select **WEP** encryption type on above, please input 5, 13 (ASCII), 10 or 26 (HEX) characters for WEP Key. When you select **TKIP** or **AES** encryption type on above, please input a Passphrase or Hex (64 characters).
AP MAC Address	Fill in the MAC address of AP which WDS links in Repeater or Lazy mode.

4.3.4.5   WPS

You could setup security easily by choosing PIN or PBC method to do Wi-Fi Protected Setup.

WPS Config

WPS:	Enable ▾

[Apply]

WPS Summary

WPS Current Status:	Idle
WPS Configured:	No
WPS SSID:	RalinkInitAP_0E63F3
WPS Auth Mode:	Open
WPS Encryp Type:	None
WPS Default Key Index:	1
WPS Key(ASCII):	
AP PIN:	87330946 [Generate]

[Reset OOB]

WPS Progress

WPS mode	● PIN ○ PBC
PIN	

[Apply]

Item	Description
WPS	Select **Enable** or **Disable** the Wi-Fi Protected Setup function. Then click ***Apply*** button to take effect function after change.
WPS Summary	After enabling the WPS function, if there is connection the WPS Summary will show related information and status.
AP PIN	Here shows the AP's PIN code (Personal Identification Number) that the enrollee should enter the registrar's PIN code to make a connection. Click ***Generate*** button to generate a new AP PIN code.
Reset OOB	Click ***Reset OOB*** button to reset WPS AP to the OOB (out-of-box) configuration.
WPS mode	Select WPS mode. **PIN**: Personal Identification Number. **PBC**: Push Button Communication.
PIN	Input enrollee's PIN code to AP-registrar.

4.3.5 Firewall

4.3.5.1   MAC/IP/Port Filtering

MAC/IP/Port Filtering Settings

You may setup firewall rules to protect your network from virus,worm and malicious activity on the Internet.

Basic Settings

MAC/IP/Port Filtering   Disable ▾

[Apply]   [Reset]

Item	Description
MAC/IP/Port Filtering	Select **Enable** or **Disable** the MAC/IP/Port Filtering function.

MAC/IP/Port Filter Settings

Source MAC address	
Dest IP Address	
Source IP Address	
Protocol	None
Dest Port Range	-
Source Port Range	-
Action	Accept
Comment	

(The maximum rule count is 32.)

[Apply]　[Reset]

Item	Description
Source MAC address	Fill in the MAC address of source NIC, to restrict data transmission.
Dest IP Address	Fill in the IP address of destination, to restrict data transmission.
Source IP Address	Fill in the IP address of source, to restrict data transmission.
Protocol	Select the protocol that you want to restrict. There are four options: None, TCP, UDP and ICMP.
Dest Port Range	Fill in the start-port and end-port number of destination, to restrict data transmission.
Source Port Range	Fill in the start-port and end-port number of source, to restrict data transmission.
Action	Select **Accept** or **Drop** to specify the action of filtering policies.
Comment	Make a comment for the filtering policy.

Current MAC/IP/Port filtering rules in system:

No.	Source MAC address	Dest IP Address	Source IP Address	Protocol	Dest Port Range	Source Port Range	Action	Comment	Pkt Cnt
1 ☐	00:16:17:18:19:20	168.95.1.1	192.168.1.100	TCP	100 - 100	100 - 100	Drop	drop port 100	-
Others would be dropped									-

[Delete Selected]　[Reset]

Item	Description
☐	Make a mark for next action.
Delete Selected	Click *Delete Selected* button to delete all that you selected.
Reset	Click *Reset* button to clear selected items.

4.3.5.2 Port Forwarding

Virtual Server Settings

You may setup Virtual Servers to provide services on Internet.

Port Forwarding	
Port Forwarding	Enable
IP Address	
Port Range	-
Protocol	TCP&UDP
Comment	

(The maximum rule count is 32.)

[Apply] [Reset]

Current Port Forwarding in system:

No.	IP Address	Port Range	Protocol	Comment
1 ☐	192.168.1.100	300 - 400	TCP + UDP	forward 300-400

[Delete Selected] [Reset]

Item	Description
Port Forwarding	Select **Enable** or **Disable** the Port Forwarding function.
IP Address	To forward data packets coming from WAN to a specific IP address that hosted in local network behind the NAT firewall, fill in the IP address.
Port Range	To forward data packets coming from WAN to a specific IP address that hosted in local network behind the NAT firewall, fill in the port range.
Protocol	Specify protocol, TCP&UDP, TCP or UDP.
Comment	Make a comment for the port forwarding policy.
☐	Make a mark for next action.
Delete Selected	Click *Delete Selected* button to delete all that you selected.
Reset	Click *Reset* button to clear selected items.

(The maximum rule count is 32.)

Apply   Reset

Item	Description
Virtual Server	Select **Enable** or **Disable** the Virtual Server function.
IP Address	To forward data packets coming from WAN to a specific IP address that hosted in local network behind the NAT firewall, fill in the IP address.
Public Port	To forward data packets coming from WAN to a specific IP address that hosted in local network behind the NAT firewall, fill in the public port.
Private Port	To forward data packets coming from WAN to a specific IP address that hosted in local network behind the NAT firewall, fill in the private port.
Protocol	Specify protocol, TCP&UDP, TCP or UDP.
Comment	Make a comment for the virtual server policy.
☐	Make a mark for next action.
Delete Selected	Click *Delete Selected* button to delete all that you selected.
Reset	Click *Reset* button to clear selected items.

4.3.5.3   DMZ

DMZ Settings

You may setup a De-militarized Zone(DMZ) to separate internal network and Internet.

DMZ Settings	
DMZ Settings	Enable ∨
DMZ IP Address	192.168.1.200

[Apply] [Reset]

Item	Description
DMZ Settings	Enable or Disable the DMZ function.
DMZ IP Address	To support DMZ in your firewall design, fill in the IP address of DMZ host that can be access from the WAN interface.

4.3.5.4 System Security

System Security Settings

You may configure the system firewall to protect AP/Router itself from attacking.

Remote management	
Remote management (via WAN)	Deny ▼

Ping form WAN Filter	
Ping form WAN Filter	Disable ▼

Stateful Packet Inspection (SPI)	
SPI Firewall	Disable ▼

[Apply] [Reset]

Item	Description
Remote management	Select **Deny** or **Allow** for remote management function.
Ping form WAN Filter	Select **Disable** or **Enable** for Ping permit from WAN.
SPI Firewall	Select **Disable** or **Enable** for SPI firewall function.

4.3.5.5 Content Filtering

Content Filter Settings

You can setup Content Filter to restrict the improper content access.

Webs Content Filter	
Filters:	☑ Proxy ☑ Java ☑ ActiveX

[Apply] [Reset]

Webs URL Filter Settings

Current Webs URL Filters:	
No	URL
1 ☐	www.google.com
2 ☐	edition.cnn.com

[Delete] [Reset]

Add a URL filter:	
URL:	

[Add] [Reset]

Item	Description
Filters	Select an option or multi-option for Webs content filter. Then click **Apply** button to save or click **Reset** button to clear all.
URL	Fill in a URL string for URL filter. Then click **Add** button to save the URL filter policy or click **Reset** button to clear the field.
□	Make a mark for next action.
Delete	Click *Delete* button to delete all that you selected.
Reset	Click *Reset* button to clear selected items.

Webs Host Filter Settings

Current Website Host Filters:	
No	Host(Keyword)
1 □	violence

Delete   Reset

Add a Host(keyword) Filter:	
Keyword	

Add   Reset

Item	Description
Keyword	Fill in a word for Webs Host Filter policy.
□	Make a mark for next action.
Delete	Click *Delete* button to delete all that you selected.
Reset	Click *Reset* button to clear selected items.

4.3.6 Administration

4.3.6.1 Management

System Management

You may configure administrator account and password, NTP settings, and Dynamic DNS settings here.

Adminstrator Settings

Username	admin
Password	•••••

Apply   Cancel

NTP Settings

Current Time	Sat Jan 1 00:51:07 UTC 2000 Sync with host
Time Zone:	(GMT-11:00) Midway Island, Samoa
NTP Server	ex: time.nist.gov ntp0.broad.mit.edu time.stdtime.gov.tw
NTP synchronization(hours)	

Apply   Cancel

Item	Description
Username	Fill in the user name for web management login control.
Password	Fill in the password for web management login control.
Current Time	It shows the current time.
Time Zone	Select the time zone in your country from pull-down menu..
NTP Server	Fill in NTP server IP address.
NTP synchronization	Fill in a number to decide the synchronization frequency with NTP server.

Item	Description
Dynamic DNS Provider	Click the drop down menu to pick up the right DDNS provider you registered.
Account	Fill in the account of DDNS you registered.
Password	Fill in the password of DDNS you registered.
DDNS	Fill in the domain name that you registered.

4.3.6.2   Upload Firmware

Item	Description
Location	Click the *Browse* button to select the new firmware image file on PC. And click the *Apply* button to upgrade firmware.

4.3.6.3   Settings Management

Settings Management

You might save system settings by exporting them to a configuration file, restore them by importing the file, or reset them to factory default.

Export Settings

Export Button	Export

Import Settings

Settings file location		Browse...

Import	Cancel

Load Factory Defaults

Load Default Button	Load Default

Item	Description
Export Button	Click *Export* button to export the current configuration to your PC.
Settings file location	Click *Browse* button to select the configuration file from your PC, then click *Import* button to update the configuration.
Load Default Button	Click the *Load Default* button to reset the configuration parameter to factory defaults.

4.3.6.4 Status

This page shows the current status and some basic settings of the device, includes system info, Internet Configurations and Local Network .

Access Point Status

This page show the current status and some basic settings of the device.

System Information	
Firmware Version	1.0.05-AN
System Up Time	13 mins, 11 secs
Operation Mode	Gateway Mode
Wireless Information	
Status	Radio ON
SSID	802.11an_Router
Channel	157
Encryption	OPEN
BSSID	00:1A:EF:18:D5:33
WAN Information	
Connected Type	DHCP
WAN IP Address	
Subnet Mask	
Default Gateway	
DNS1	
DNS2	
MAC Address	00:1A:EF:18:D5:35
LAN Information	
LAN IP Address	192.168.1.254
Subnet Mask	255.255.255.0
MAC Address	00:1A:EF:18:D5:33

4.3.6.5   System Log

This page is used to view system logs.

System Log

Syslog:

[Refresh] [Clear]

System Log

```
Jan  1 00:59:29 mypc syslog.info syslogd started: BusyBox v1.12.1
Jan  1 00:59:29 mypc user.notice kernel: klogd started: BusyBox v1.12.1 (2010-10
Jan  1 00:59:33 mypc user.info kernel: br0: topology change detected, propagatin
Jan  1 00:59:33 mypc user.info kernel: br0: port 2(eth2.1) entering forwarding s
Jan  1 00:59:33 mypc user.info kernel: br0: topology change detected, propagatin
Jan  1 00:59:33 mypc user.info kernel: br0: port 1(ra0) entering forwarding stat
```

Item	Description
Refresh	Click the *Refresh* button to refresh the log shown on the screen.
Clear	Click the *Clear* button to clear the log display screen.

4.4 Configuration Examples

4.4.1 Example one – PPPoE on the WAN

Sales division of Company ABC likes to establish a WLAN network to support mobile communication on sales' Notebook PCs. MIS engineer collects information and plans the WLAN Broadband Router implementation by the following configuration.

*WAN configuration:*PPPoE

User Name	user123
Password	password123

Note: User Name and password that ISP provided.

LAN configuration:

IP Address	10.10.10.254
Subnet Mask	255.255.255.0
DHCP Client Range	10.10.10.100 – 10.10.10.200

WLAN configuration:

SSID	AP
Channel Number	AutoSelect

1. Configure the WAN interface:

Open "Wide Area Network (WAN) Settings" page, select PPPoE then enter the User Name "user123" and Password "password123", the password is encrypted to display on the screen.

Press "*Apply*" button to confirm the configuration setting.

2. Configure the LAN interface:
Open "Local Area Network (LAN) settings" page, enter the IP Address "10.10.10.254", Subnet Mask "255.255.255.0". Enable DHCP Server, DHCP client range "10.10.10.100" to "10.10.10.200", default Gateway "10.10.10.254" .
Press "*Apply*" button to confirm the configuration setting.

Local Area Network (LAN) Settings

You may enable/disable networking functions and configure their parameters as your wish.

LAN Setup	
Hostname	AP
IP Address	10.10.10.254
Subnet Mask	255.255.255.0
LAN 2	○ Enable ⊙ Disable
LAN2 IP Address	
LAN2 Subnet Mask	
MAC Address	00:1A:EF:0E:63:F3
DHCP Type	Server
Start IP Address	10.10.10.100
End IP Address	10.10.10.200
Subnet Mask	255.255.255.0
Primary DNS Server	10.10.10.254
Secondary DNS Server	0.0.0.0
Default Gateway	10.10.10.254

3. Configure the WLAN interface:
Open "Basic Wireless Settings" page, enter the SSID "AP", Channel Number "AutoSelect".
Press "*Apply*" button to confirm the configuration setting.

Wireless Network	
Wireless On/Off	Wireless OFF Current Status:Radio ON
Antenna Switch	○ External ⊙ Internal
Wireless Mode	11a/n mixed mode
SSID	AP
Broadcast Network Name (SSID)	⊙ Enable ○ Disable
AP Isolation	○ Enable ⊙ Disable
MBSSID AP Isolation	○ Enable ⊙ Disable
BSSID	00:1A:EF:18:D5:33
Frequency (Channel)	AutoSelect Current Channel:40
HT Physical Mode	
Operating Mode	⊙ Mixed Mode ○ Green Field
Channel BandWidth	○ 20 ⊙ 20/40
Guard Interval	○ Long ⊙ Auto
MCS	Auto

4.4.2 Example two – fixed IP on the WAN

Company ABC likes to establish a WLAN network to support mobile communication on all
employees' Notebook PCs. MIS engineer collects information and plans the WLAN Broadband Router
implementation by the following configuration.

WAN configuration : Fixed IP

IP Address	192.168.20.254
Subnet Mask	255.255.255.0
Default Gateway	192.168.20.1
Primary DNS Address	168.95.1.1

LAN configuration:

IP Address	10.10.10.254
Subnet Mask	255.255.255.0
DHCP Client Range	10.10.10.100 – 10.10.10.200

WLAN configuration:

SSID	AP
Channel Number	AutoSelect

1. Configure the WAN interface:
Open "Wide Area Network (WAN) Settings" page, select STATIC(fixed IP) then enter IP Address
"192.168.20.254", subnet mask "255.255.255.0", Default gateway "192.168.20.1".
Press "*Apply*" button to confirm the configuration setting.

Wide Area Network (WAN) Settings

You may choose different connection type suitable for your environment. Besides, you may also
configure parameters according to the selected connection type.

WAN Connection Type:	STATIC (fixed IP)

Static Mode

IP Address	192.168.20.254
Subnet Mask	255.255.255.0
Default Gateway	192.168.20.1
Primary DNS Server	168.95.1.1
Secondary DNS Server	168.95.1.1

MAC Clone

Enabled	Disable

Apply   Cancel

2. Configure the LAN interface:
Open "Local Area Network (LAN) settings" page, enter the IP Address "10.10.10.254", Subnet Mask "255.255.255.0". Enable DHCP Server, DHCP client range "10.10.10.100" to "10.10.10.200", default Gateway "10.10.10.254" .
Press "*Apply*" button to confirm the configuration setting.

Local Area Network (LAN) Settings

You may enable/disable networking functions and configure their parameters as your wish.

LAN Setup

Hostname	AP
IP Address	10.10.10.254
Subnet Mask	255.255.255.0
LAN 2	○ Enable ⊙ Disable
LAN2 IP Address	
LAN2 Subnet Mask	
MAC Address	00:1A:EF:0E:63:F3
DHCP Type	Server
Start IP Address	10.10.10.100
End IP Address	10.10.10.200
Subnet Mask	255.255.255.0
Primary DNS Server	10.10.10.254
Secondary DNS Server	0.0.0.0
Default Gateway	10.10.10.254

3. Configure the WLAN interface:
Open "Basic Wireless Settings" page, enter the SSID "AP", Channel Number "AutoSelect".
Press "*Apply*" button to confirm the configuration setting.

Wireless Network

Wireless On/Off	Wireless OFF Current Status:Radio ON
Antenna Switch	○ External ⊙ Internal
Wireless Mode	11a/n mixed mode
SSID	AP
Broadcast Network Name (SSID)	⊙ Enable ○ Disable
AP Isolation	○ Enable ⊙ Disable
MBSSID AP Isolation	○ Enable ⊙ Disable
BSSID	00:1A:EF:18:D5:33
Frequency (Channel)	AutoSelect Current Channel:40

HT Physical Mode

Operating Mode	⊙ Mixed Mode ○ Green Field
Channel BandWidth	○ 20 ⊙ 20/40
Guard Interval	○ Long ⊙ Auto
MCS	Auto

4.4.3 Example three –set WLAN to be WAN as WiFi Client

User Mr. ABC likes to configure this WLAN Broadband Router to be a WiFi client. In order to communicate with another AP. Mr. ABC collects information and plans the WLAN Broadband Router implementation by the following configuration.

WiFi client:

WAN configuration: DHCP (Auto config)

IP Address	n/a
Subnet Mask	n/a
Default Gateway	n/a
Primary DNS Address	n/a

LAN configuration:

IP Address	10.10.10.254
Subnet Mask	255.255.255.0
DHCP Client Range	10.10.10.100 – 10.10.10.200

WLAN configuration:

SSID	Depend on AP
Channel Number	Depend on AP

WiFi server:

AP configuration:

SSID	TEST AP
Channel Number	Channel 1
Wireless Encryption	WPA2
DHCP server	192.168.1.33~192.168.1.254

1. Configure the Operation Mode:
Open "Operation Mode Configuration" page, select **Ethernet Converter**, then click "*Apply*" button to confirm the configuration setting and reboot the WLAN Broadband Router. After reboot, the wireless LAN will become to WAN interface.

2. Site Survey:
Open "Site Survey" page under Wireless Settings, and select the AP "testap".
Press "**Connect**" button to connect with the AP.

3. Wireless encryption setting:
If the AP has encryption setting, it will pop out a window for you filling the encryption setting.
Please fill up the encryption code and click "**Apply**" button to connect with the AP.

4. Station Link Status:
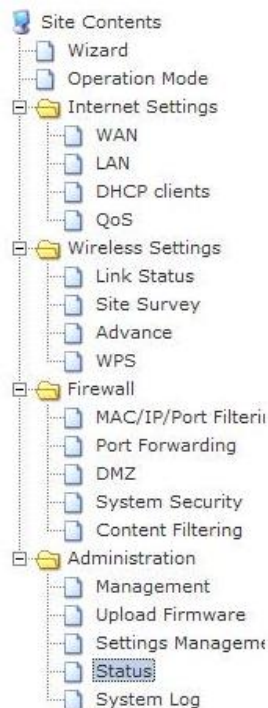After connection with AP, you can open "Link Status" page under Wireless Settings to check Link Status.

5   Status:
You also can open "Status" page under Administration to check Internet Configurations.

5. FREQUENTLY ASKED QUESTIONS (FAQ)

Enter topic text here.

5.1   What and how to find my PC's IP and MAC address?

IP address is the identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be zero to 255. For example, 191.168.1.254 could be an IP address

The MAC (Media Access Control) address is your computer's unique hardware number. (On an Ethernet LAN, it's the same as your Ethernet address.) When you're connected to the Internet from your computer (or host as the Internet protocol thinks of it), a correspondence table relates your IP address to your computer's physical (MAC) address on the LAN.

To find your PC's IP and MAC address,
✓   Open the Command program in the Microsoft Windows.
✓   Type in "ipconfig /all", then press the Enter button.
✓   Your PC's IP address is the one entitled IP Address and your PC's MAC address is the one entitled Physical Address.

5.2   What is Wireless LAN?

A wireless LAN (WLAN) is a network that allows access to Internet without the need for any wired connections to the user's machine.

5.3   What are ISM bands?

ISM stands for Industrial, Scientific and Medical; radio frequency bands that the Federal Communications Commission (FCC) authorized for wireless LANs. The ISM bands are located at 915 +/-13 MHz, 2450 +/-50 MHz and 5800 +/-75 MHz.

5.4   How does wireless networking work?

The 802.11 standard define two modes: infrastructure mode and ad hoc mode. In infrastructure mode, the wireless network consists of at least one access point connected to the wired network infrastructure and a set of wireless end stations. This configuration is called a Basic Service Set (BSS). An Extended Service Set (ESS) is a set of two or more BSSs forming a single sub-network. Since most corporate WLANs require access to the wired LAN for services (file servers, printers, Internet links) they will operate in infrastructure mode.
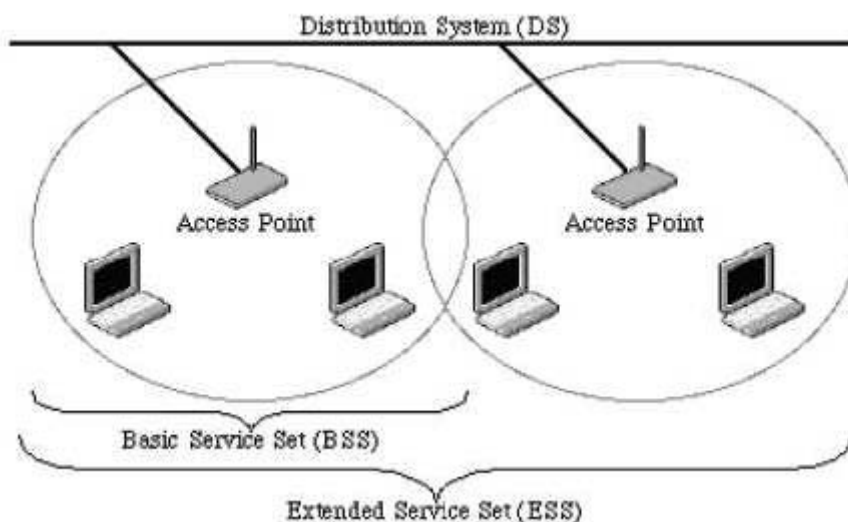
Example 1: wireless Infrastructure Mode

Ad hoc mode (also called peer-to-peer mode or an Independent Basic Service Set, or IBSS) is simply a set of 802.11 wireless stations that communicate directly with one another without using an access point or any connection to a wired network. This mode is useful for quickly and easily setting up a wireless network anywhere that a wireless infrastructure does not exist or is not required for services, such as a hotel room, convention center, or airport, or where access to the wired network is barred (such as for consultants at a client site).
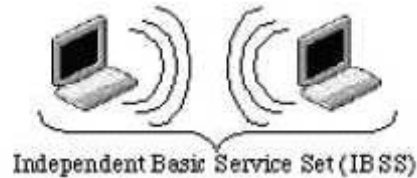
Example 2: wireless Ad Hoc Mode

5.5   What is BSSID?

A six-byte address is that distinguish a particular a particular access point from others. Also know as just SSID. Serve as a network ID or name.

5.6   What is ESSID?

The Extended Service Set ID (ESSID) is the name of the network you want to access. It is used to identify different wireless networks.

5.7   What are potential factors that may causes interference?

Factors of interference:

- Obstacles: walls, ceilings, furniture… etc.
- Building Materials: metal door, aluminum studs.
- Electrical devices: microwaves, monitors and electrical motors.

Solutions to overcome the interferences:

- ✓ Minimizing the number of walls and ceilings.
- ✓ Position the WLAN antenna for best reception.
- ✓ Keep WLAN devices away from other electrical devices, eg: microwaves, monitors, electric motors…etc.
- ✓ Add additional WLAN Access Points if necessary.

5.8   What are the Open System and Shared Key authentications?

IEEE 802.11 supports two subtypes of network authentication services: open system and shared key. Under open system authentication, any wireless station can request authentication. The station that needs to authenticate with another wireless station sends an authentication management frame that contains the identity of the sending station. The receiving station then returns a frame that indicates whether it recognizes the sending station. Under shared key authentication, each wireless station is assumed to have received a secret shared key over a secure channel that is independent from the 802.11 wireless network communications channel.

5.9   What is WEP?

An option of IEEE 802.11 function is that offers frame transmission privacy similar to a wired network. The Wired Equivalent Privacy generates secret shared encryption keys that both source and destination stations can use to alert frame bits to avoid disclosure to eavesdroppers.

WEP relies on a secret key that is shared between a mobile station (e.g. a laptop with a wireless Ethernet card) and an access point (i.e. a base station). The secret key is used to encrypt packets before they are transmitted, and an integrity check is used to ensure that packets are not modified in transit.

5.10   What is Fragment Threshold?

The proposed protocol uses the frame fragmentation mechanism defined in IEEE 802.11 to achieve parallel transmissions. A large data frame is fragmented into several fragments each of size equal to fragment threshold. By tuning the fragment threshold value, we can get varying fragment sizes. The determination of an efficient fragment threshold is an important issue in this scheme. If the fragment threshold is small, the overlap part of the master and parallel transmissions is large. This means the spatial reuse ratio of parallel transmissions is high. In contrast, with a large fragment threshold, the overlap is small and the spatial reuse ratio is low. However high fragment threshold leads to low fragment overhead. Hence there is a trade-off between spatial re-use and fragment overhead.

Fragment threshold is the maximum packet size used for fragmentation. Packets larger than the size programmed in this field will be fragmented.

If you find that your corrupted packets or asymmetric packet reception (all send packets, for example). You may want to try lowering your fragmentation threshold. This will cause packets to be broken into smaller fragments. These small fragments, if corrupted, can be resent faster than a larger fragment. Fragmentation increases overhead, so you'll want to keep this value as close to the maximum value as possible.

5.11   What is RTS (Request to Send) Threshold?

The RTS threshold is the packet size at which packet transmission is governed by the RTS/CTS transaction. The IEEE 802.11-1997 standard allows for short packets to be transmitted without RTS/ CTS transactions. Each station can have a different RTS threshold. RTS/CTS is used when the data packet size exceeds the defined RTS threshold. With the CSMA/CA transmission mechanism, the transmitting station sends out an RTS packet to the receiving station, and waits for the receiving station to send back a CTS (Clear to Send) packet before sending the actual packet data.

This setting is useful for networks with many clients. With many clients, and a high network load, there will be many more collisions. By lowering the RTS threshold, there may be fewer collisions, and performance should improve. Basically, with a faster RTS threshold, the system can recover from problems faster. RTS packets consume valuable bandwidth, however, so setting this value too low will limit performance.

5.12   What is Beacon Interval?

In addition to data frames that carry information from higher layers, 802.11 include management and control frames that support data transfer. The beacon frame, which is a type of management frame, provides the "heartbeat" of a wireless LAN, enabling stations to establish and maintain communications in an orderly fashion.

Beacon Interval represents the amount of time between beacon transmissions. Before a station enters power save mode, the station needs the beacon interval to know when to wake up to receive the beacon (and learn whether there are buffered frames at the access point).

5.13   What is Preamble Type?

There are two preamble types defined in IEEE 802.11 specification. A long preamble basically gives the decoder more time to process the preamble. All 802.11 devices support a long preamble. The short preamble is designed to improve efficiency (for example, for VoIP systems). The difference between the two is in the Synchronization field. The long preamble is 128 bits, and the short is 56 bits.

5.14   What is SSID Broadcast?

Broadcast of SSID is done in access points by the beacon. This announces your access point (including various bits of information about it) to the wireless world around it. By disabling that feature, the SSID configured in the client must match the SSID of the access point.

Some wireless devices don't work properly if SSID isn't broadcast (for example the D-link DWL-120 USB 802.11b adapter). Generally if your client hardware supports operation with SSID disabled, it's

not a bad idea to run that way to enhance network security. However it's no replacement for WEP, MAC filtering or other protections.

5.15   What is Wi-Fi Protected Access (WPA)?

Wi-Fi's original security mechanism, Wired Equivalent Privacy (WEP), has been viewed as insufficient for securing confidential business communications. A longer-term solution, the IEEE 802.11i standard, is under development. However, since the IEEE 802.11i standard is not expected to be published until the end of 2003, several members of the WI-Fi Alliance teamed up with members of the IEEE 802.11i task group to develop a significant near-term enhancement to Wi-Fi security. Together, this team developed Wi-Fi Protected Access.

To upgrade a WLAN network to support WPA, Access Points will require a WPA software upgrade. Clients will require a software upgrade for the network interface card, and possibly a software update for the operating system. For enterprise networks, an authentication server, typically one that supports RADIUS and the selected EAP authentication protocol, will be added to the network.

5.16   What is WPA2?

It is the second generation of WPA. WPA2 is based on the final IEEE 802.11i amendment to the 802.11 standard.

5.17   What is 802.1x Authentication?

802.1x is a framework for authenticated MAC-level access control, defines Extensible Authentication Protocol (EAP) over LANs (WAPOL). The standard encapsulates and leverages much of EAP, which was defined for dial-up authentication with Point-to-Point Protocol in RFC 2284.

Beyond encapsulating EAP packets, the 802.1x standard also defines EAPOL messages that convey the shared key information critical for wireless security.

5.18   What is Temporal Key Integrity Protocol (TKIP)?

The Temporal Key Integrity Protocol, pronounced tee-kip, is part of the IEEE 802.11i encryption standard for wireless LANs. TKIP is the next generation of WEP, the Wired Equivalency Protocol, which is used to secure 802.11 wireless LANs. TKIP provides per-packet key mixing, a message integrity check and a re-keying mechanism, thus fixing the flaws of WEP.

5.19   What is Advanced Encryption Standard (AES)?

Security issues are a major concern for wireless LANs, AES is the U.S. government's next-generation cryptography algorithm, which will replace DES and 3DES.

5.20   What is Inter-Access Point Protocol (IAPP)?

The IEEE 802.11f Inter-Access Point Protocol (IAPP) supports Access Point Vendor interoperability, enabling roaming of 802.11 Stations within IP subnet.

IAPP defines messages and data to be exchanged between Access Points and between the IAPP and high layer management entities to support roaming. The IAPP protocol uses TCP for inter-Access Point communication and UDP for RADIUS request/response exchanges. It also uses Layer 2 frames to update the forwarding tables of Layer 2 devices.

5.21   What is Wireless Distribution System (WDS)?

The Wireless Distribution System feature allows WLAN AP to talk directly to other APs via wireless channel, like the wireless bridge or repeater service.

5.22   What is Universal Plug and Play (uPNP)?

UPnP is an open networking architecture that consists of services, devices, and control points. The

ultimate goal is to allow data communication among all UPnP devices regardless of media, operating system, programming language, and wired/wireless connection.

5.23   What is Maximum Transmission Unit (MTU) Size?

Maximum Transmission Unit (MTU) indicates the network stack of any packet is larger than this value will be fragmented before the transmission. During the PPP negotiation, the peer of the PPP connection will indicate its MRU and will be accepted. The actual MTU of the PPP connection will be set to the smaller one of MTU and the peer's MRU.

5.24   What is Clone MAC Address?

Clone MAC address is designed for your special application that request the clients to register to a server machine with one identified MAC address. Since that all the clients will communicate outside world through the WLAN Broadband Router, so have the cloned MAC address set on the WLAN Broadband Router will solve the issue.

5.25   What is DDNS?

DDNS is the abbreviation of Dynamic Domain Name Server. It is designed for user owned the DNS server with dynamic WAN IP address.

5.26   What is NTP Client?

NTP client is designed for fetching the current timestamp from internet via Network Time protocol. User can specify time zone, NTP server IP address.

5.27   What is VPN?

VPN is the abbreviation of Virtual Private Network. It is designed for creating point-to point private link via shared or public network.

5.28   What is IPSEC?

IPSEC is the abbreviation of IP Security. It is used to transferring data securely under VPN.

5.29   What is WLAN Block Relay between Clients?

An Infrastructure Basic Service Set is a BSS with a component called an Access Point (AP). The access point provides a local relay function for the BSS. All stations in the BSS communicate with the access point and no longer communicate directly. All frames are relayed between stations by the access point. This local relay function effectively doubles the range of the IBSS.

5.30   What is WMM?

WMM is based on a subset of the IEEE 802.11e WLAN QoS draft standard. WMM adds prioritized capabilities to Wi-Fi networks and optimizes their performance when multiple concurring applications, each with different latency and throughput requirements, compete for network resources. By using WMM, end-user satisfaction is maintained in a wider variety of environments and traffic conditions. WMM makes it possible for home network users and enterprise network managers to decide which data streams are most important and assign them a higher traffic priority.

5.31   What is WLAN ACK TIMEOUT?

ACK frame has to receive ACK timeout frame. If remote does not receive in specified period, it will be retransmitted.

5.32   What is Modulation Coding Scheme (MCS)?

MCS is Wireless link data rate for 802.11n. The throughput/range performance of an AP will depend on its implementation of coding schemes. MCS includes variables such as the number of spatial streams,

modulation, and the data rate on each stream. Radios establishing and maintaining a link must automatically negotiate the optimum MCS based on channel conditions and then continuously adjust the selection of MCS as conditions change due to interference, motion, fading, and other events.

5.33   What is Frame Aggregation?

Every 802.11 packet, no matter how small, has a fixed amount of overhead associated with it. Frame Aggregation combines multiple smaller packets together to form one larger packet. The larger packet can be sent without the overhead of the individual packets. This technique helps improve the efficiency of the 802.11n radio allowing more end user data to be sent in a given time.

5.34   What is Guard Intervals (GI)?

A GI is a period of time between symbol transmission that allows reflections (from multipath) from the previous data transmission to settle before transmitting a new symbol. The 802.11n draft specifies two guard intervals: 400ns (short) and 800ns (long). Support of the 400ns GI is optional for transmit and receive. The purpose of a guard interval is to introduce immunity to propagation delays, echoes, and reflections to which digital data is normally very sensitive.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:
. Reorient or relocate the receiving antenna.
. Increase the separation between the equipment and receiver.
. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
. Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

The antenna of the product, under normal use condition is at least 0.3 m away from the body of the user. Warning statement to the user for keeping at least 0.3 m separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.