User's Manual

Version: 2.6

WLAN Broadband Router

WA - 2204

CC&C Technologies, Inc.

Note：This router can also be used as an Access Point

Trademarks

Copyright Statement

INFORMATION TO USER

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 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 connected.

---Consult the dealer or an experienced radio/TV technician for help.

Installation and use of this Wireless LAN device must be in strict accordance with the instructions included in the user documentation provided with the product. Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. The manufacturer is not responsible for any radio or television interference caused by unauthorized modification of this device, or the substitution of the connecting cables and equipment other than manufacturer specified. It is the responsibility of the user to correct any interference caused by such unauthorized modification, substitution or attachment. Manufacturer and its authorized resellers or distributors will assume no liability for any damage or violation of government regulations arising from failing to comply with these guidelines.

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

Your device contains a low power transmitter. When device is transmitted it sends out Radio Frequency (RF) signal.

In order to maintain compliance with the FCC RF exposure guidelines, this equipment should be installed and operated with minimum distance 20cm between the radiator and your body. Use only with supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.

"CC&C Technologies, Inc. declare that WA-2204 (WLAN Broadband Router) is limited in CH1~CH 11 by specified firmware controller in USA. "

The users 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.

REGULATORY INFORMATION

WLAN Broadband Router must be installed and used in strict accordance with the instructions. This device complies with the following radio frequency and safety standards.

USA - Federal Communications Commission (FCC)

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference that may cause undesired operation.

Europe - R&TTE Directive

This device complies with the specifications listed below

- EN 301-489-1 & -17 General EMC requirements for Radio equipment.
- EN 300-328-1 & -2 Technical requirements for Radio equipment.
- EN 60950-1 Safety Requirements for Radio equipment

The channel identifiers, channel center frequencies, and regulatory domains of each 22-MHz-wide channel are shown in following Table.

Channel Identifier	*Center Frequency (MHZ)*	*Regulatory Domains*					
		Japan	*ETSI*	*North America*	*Israel*	*France*	*Mexico*
1	*2412*	*V*	*V*	*V*			
2	*2417*	*V*	*V*	*V*			
3	*2422*	*V*	*V*	*V*	*V*		
4	*2427*	*V*	*V*	*V*	*V*		
5	*2432*	*V*	*V*	*V*	*V*		
6	*2437*	*V*	*V*	*V*	*V*		
7	*2442*	*V*	*V*	*V*	*V*		
8	*2447*	*V*	*V*	*V*	*V*		
9	*2452*	*V*	*V*	*V*	*V*		
10	*2457*	*V*	*V*	*V*		*V*	*V*
11	*2462*	*V*	*V*	*V*		*V*	*V*
12	*2467*	*V*	*V*			*V*	
13	*2472*	*V*	*V*			*V*	
14	*2484*	*V*					

Terminology

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
DHCP	Dynamic Host Configuration Protocol
DSSS	Direct Sequence Spread Spectrum
EAP	Extensible Authentication Protocol
FCC	Federal Communications Commission
FTP	File Transfer Protocol
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
ISM	Industrial, Scientific and Medical
LAN	Local Area Network
MAC	Media Access Control
NAT	Network Address Translation
NT	Network Termination
PPTP	Point to Point Tunneling Protocol
PSD	Power Spectral Density
RF	Radio Frequency
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
WDS	Wireless Distribution System
WEP	Wired Equivalent Privacy
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access

Table of Contents

1 Introduction

The Wireless LAN Broadband Router is an affordable IEEE 802.11b wireless LAN broadband 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 WLAN router configuration. The description includes the implementation of the above steps.

Notice: It will take about 25 seconds to complete the boot up sequence after powered on the WLAN Broadband Router; all LEDs are blank while booting except the Power LED, and after that the WLAN Activity LED will be flashing to show the WLAN interface is enabled and working now.

1.1 Package contents

The package of the WLAN Broadband Router includes the following items,

- ✓ The WLAN Broadband Router
- ✓ The AC to DC power adapter
- ✓ The Documentation CD

1.2 Product Specifications

Product Name	WLAN Broadband Router
Standard	802.11b(Wireless), 802.3(10BaseT), 802.3u(100BaseT)
Data Transfer Rate	11Mbps(Wireless), 100Mbps(Ethernet)
Modulation Method	DBPSK/ DQPSK/ CCK
Frequency Band	2.4GHz – 2.483GJz ISM Band, DSSS
RF Output Power	20±2dBm
Receiver Sensitivity	11Mbps better than 8% PER @ -80 dBm
Operation Range	30 to 300 meters (depend on surrounding)
Antenna	External Antenna, ANT. Gain:2.5 dBi
LED	Power, Active (WLAN), Act/Link (Ethernet)
Security	64 bit/ 128 bit WEP, WPA-PSK (TKIP), port filtering, IP filtering, MAC filtering, port forwarding and DMZ hosting
LAN interface	One 10/100BaseT with RJ45 connector (WAN) Four 10/100BaseT with RJ45 connectors (LAN)
Power Consumption	7.5V DC Power Adapter

Dimension	140 x 110 x 35 mm
Operating Temperature	0 – 50°C ambient temperature
Storage Temperature	-20 - 70°C ambient temperature
Humidity	5 to 90 % maximum (non-condensing)

1.3 Product Features

- Complies with IEEE 802.11b standard for 2.4GHz Wireless LAN.
- Supports 11Mbps data transfer rate with automatic fallback to 5.5M, 2M and 1Mbps.
- Supports bridging, routing functions between wireless and wired Ethernet interfaces.
- Supports 64-bit and 128-bit WEP encryption/decryption function to protect the wireless data transmission.
- Supports IEEE 802.1x Authentication.
- Support Wi-Fi Protected Access Authentication with Radius and Pre-Shared Key mode.
- Supports Inter-Access Point Protocol (IAPP).
- Supports Wireless Distribution System (WDS).
- Supports IEEE 802.3x full duplex flow control on 10/100M Ethernet interface.
- Supports DHCP server to provide clients auto IP addresses assignment.
- Supports DHCP client for Ethernet WAN interface auto IP address assignment.
- Supports static and dynamic IP routing.
- Supports PPPoE on Ethernet WAN interface.
- Supports clone MAC address function.
- Supports firewall security with port filtering, IP filtering, MAC filtering, port forwarding, trigger port and DMZ hosting functions.
- Supports WEB based management and configuration.
- Supports PPTP Client on Ethernet WAN interface.
- Supports UPnP for automatic Internet access.

1.4 Front Panel Description

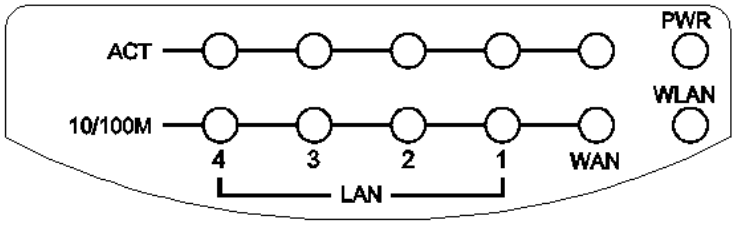


Figure 1 –WLAN Broadband Router Front Panel

LED Indicator	State	Description
1. Power LED	On	The WLAN Broadband Router is powered on.
	Off	The WLAN Broadband Router is powered off.
2. WLAN Activity LED	Flashing	Data is transmitting or receiving on the antenna.
	Off	No data is transmitting or receiving on the antenna.
3. WAN ACT LED	Flashing	Data is transmitting or receiving on the WAN interface.
	Off	No data is transmitting or receiving on the WAN interface.
4. WAN 10/100M LED	On	Connection speed is 100Mbps on WAN interface.
	Off	Connection speed is 10Mbps on WAN interface.
5. LAN ACT LED	Flashing	Data is transmitting or receiving on the LAN interface.
	Off	No data is transmitting or receiving on the LAN interface.
6. LAN 10/100M LED	On	Connection speed is 100Mbps on LAN interface.
	Off	Connection speed is 10Mbps on LAN interface.

1.5 Rear Panel Description

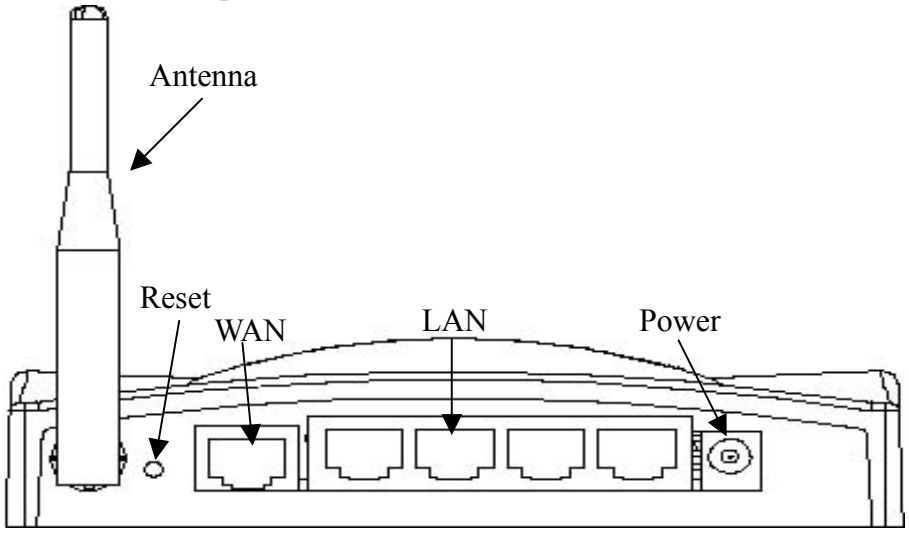


Figure 2 – WLAN Broadband Router Rear Panel

Interfaces	Description
1. Reset	Push continually the reset button 5 seconds to reset the configuration parameters to factory defaults.
2. WAN	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. LAN	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.
4. Power	The power jack allows an external DC +7.5 V power supply connection. The external AC to DC adaptor provide adaptive power requirement to the WLAN Broadband Router.
5. Antenna	The Wireless LAN Antenna.

2 Installation

2.1 Hardware Installation

Step One: Place the Wireless LAN Broadband Router to the best optimum transmission location.

The best transmission location for your WLAN Broadband Router is usually at the geographic center of your wireless network, with line of sign to all of your mobile stations.

Step Two: Connect the WLAN Broadband Router to your wired network.

Connect the Ethernet WAN interface of WLAN Broadband Router by category 5 Ethernet cable to your switch/ hub/ xDSL modem or cable modem. A straight-through Ethernet cable with appropriate cable length is needed.

Step Three: Supply DC power to the WLAN Broadband Router.

Use only the AC/DC power adapter supplied with the WLAN Broadband Router; it may occur damage by using a different type of power adapter.

The hardware installation finished.

2.2 Software Installation

- There are no software drivers, patches or utilities installation needed, but only the configuration setting. Please refer to chapter 3 for software configuration.

3 Software configuration

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

The WLAN Broadband 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**:** ***<empty>***
WEB login Password**:** ***<empty>***

3.1 Prepare your PC to configure the WLAN Broadband Router

For OS of Microsoft Windows 95/ 98/ Me:

1. Click the ***Start*** button and select ***Settings***, then click ***Control Panel***. The ***Control Panel*** window will appear.
   Note: Windows Me users may not see the Network control panel. If so, *select* **View all Control Panel options** on the left side of the window
2. Move mouse and double-click the right button on ***Network*** icon. The ***Network*** window will appear.
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 and reboot your PC after completes the IP parameters setting.

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 completes 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 completes the IP parameters setting.

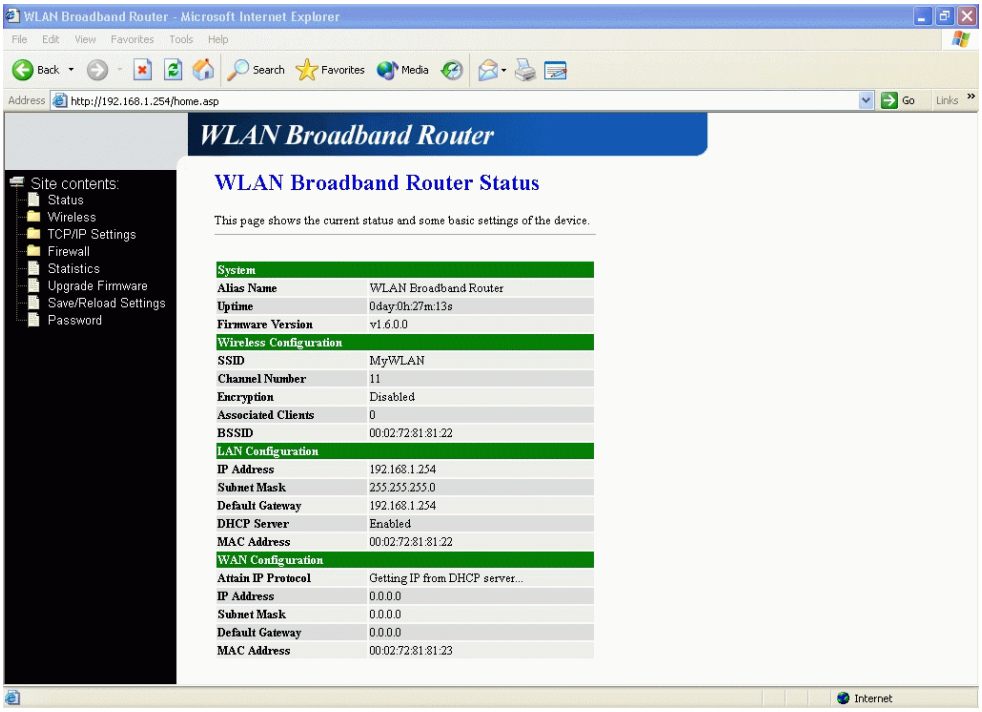
3.2 Connecit to the WLAN Broadband Router

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

3.3 Management and configuration on the WLAN Broadband Router

3.3.1 Status

This page shows the current status and some basic settings of the device, includes system, wireless, Ethernet LAN and WAN configuration information.



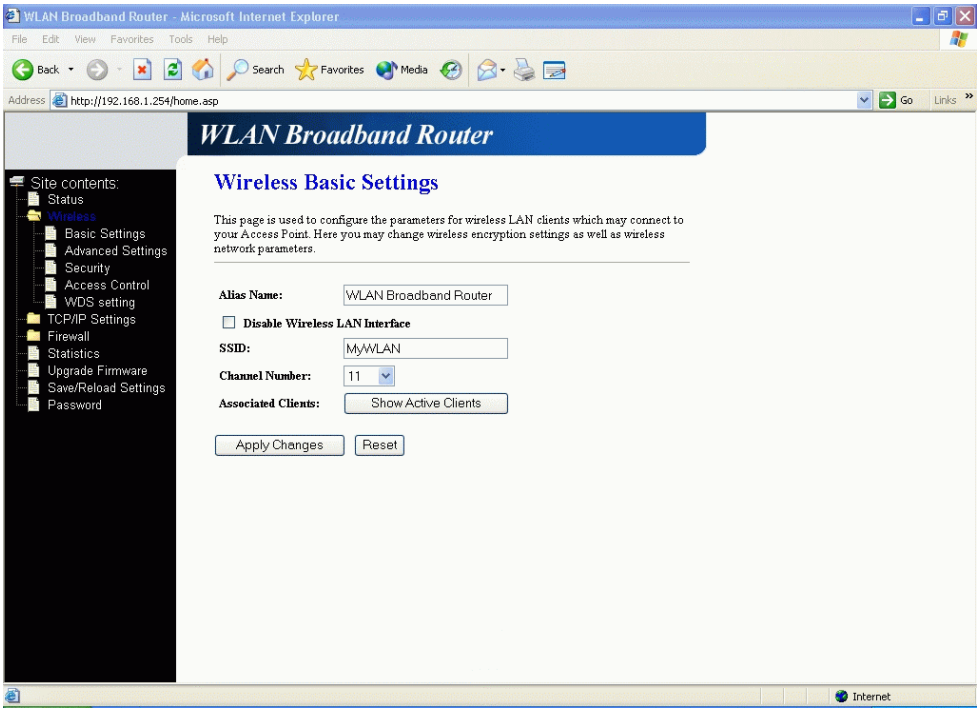
Screen snapshot – Status

Item	Description
System	
Alias Name	It shows the alias name of this WLAN Broadband Router.
Uptime	It shows the duration since WLAN Broadband Router is powered on.
Firmware version	It shows the firmware version of WLAN Broadband Router.
Wireless configuration	

SSID	It shows the SSID of this WLAN Broadband Router. The SSID is the unique name of WLAN Broadband Router and shared among its service area, so all devices attempts to join the same wireless network can identify it.
Channel Number	It shows the wireless channel connected currently.
Encryption	It shows the status of encryption function.
Associated Clients	It shows the number of connected clients (or stations, PCs).
BSSID	It shows the BSSID address of the WLAN Broadband Router. BSSID is a six-byte address.
LAN configuration	
IP Address	It shows the IP address of LAN interfaces of WLAN Broadband Router.
Subnet Mask	It shows the IP subnet mask of LAN interfaces of WLAN Broadband Router.
Default Gateway	It shows the default gateway setting for LAN interfaces outgoing data packets.
DHCP Server	It shows the DHCP server is enabled or not.
MAC Address	It shows the MAC address of LAN interfaces of WLAN Broadband Router.
WAN configuration	
Attain IP Protocol	It shows how the WLAN Broadband Router gets the IP address. The IP address can be set manually to a fixed one or set dynamically by DHCP server or attain IP by PPPoE connection.
IP Address	It shows the IP address of WAN interface of WLAN Broadband Router.
Subnet Mask	It shows the IP subnet mask of WAN interface of WLAN Broadband Router.
Default Gateway	It shows the default gateway setting for WAN interface outgoing data packets.
MAC Address	It shows the MAC address of WAN interface of WLAN Broadband Router.

3.3.2 Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients that may connect to your Broadband Router. Here you may change wireless encryption settings as well as wireless network parameters.



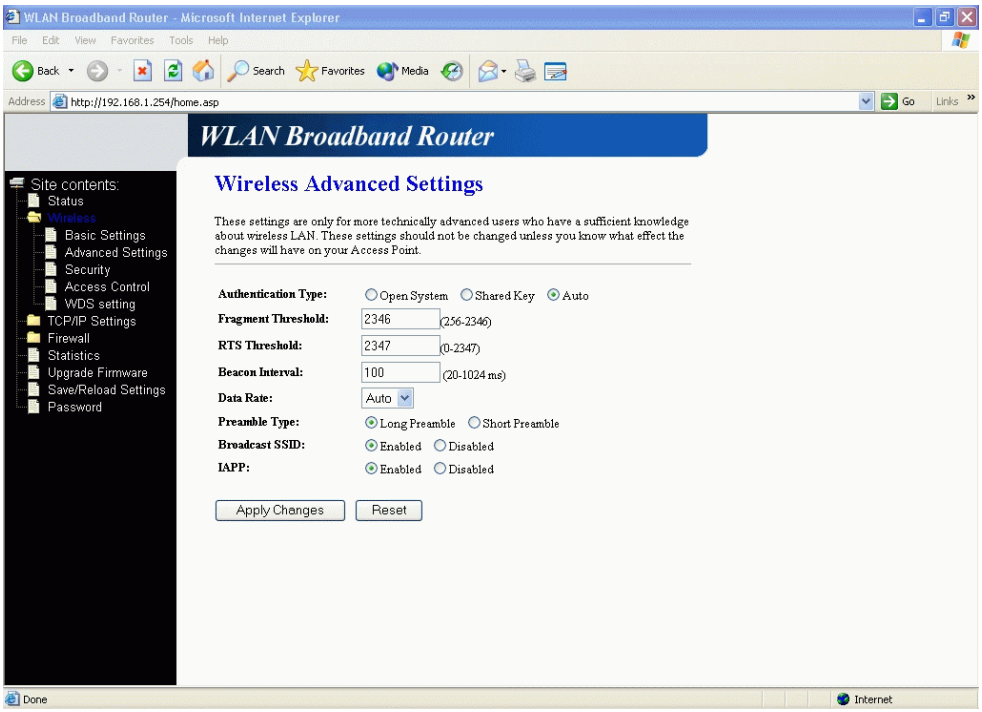
Screen snapshot – Wireless Basic Settings

Item	Description
Alias Name	It is the alias name of this WLAN Broadband Router. The alias name can be 32 characters long.
Disable Wireless LAN Interface	Tick on to disable the wireless LAN data transmission.
SSID	It is the wireless network name. The SSID can be 32 bytes long.
Channel Number	Select the wireless communication channel from pull-down menu.
Associated Clients	Click the ***Show Active Clients*** button to open Active Wireless Client Table that shows the MAC address, transmit-packet, receive-packet and transmission-rate for each associated wireless client.
Apply Changes	Click the ***Apply Changes*** button to complete the new

	configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.3 Wireless Advanced Settings

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 WLAN Broadband Router.



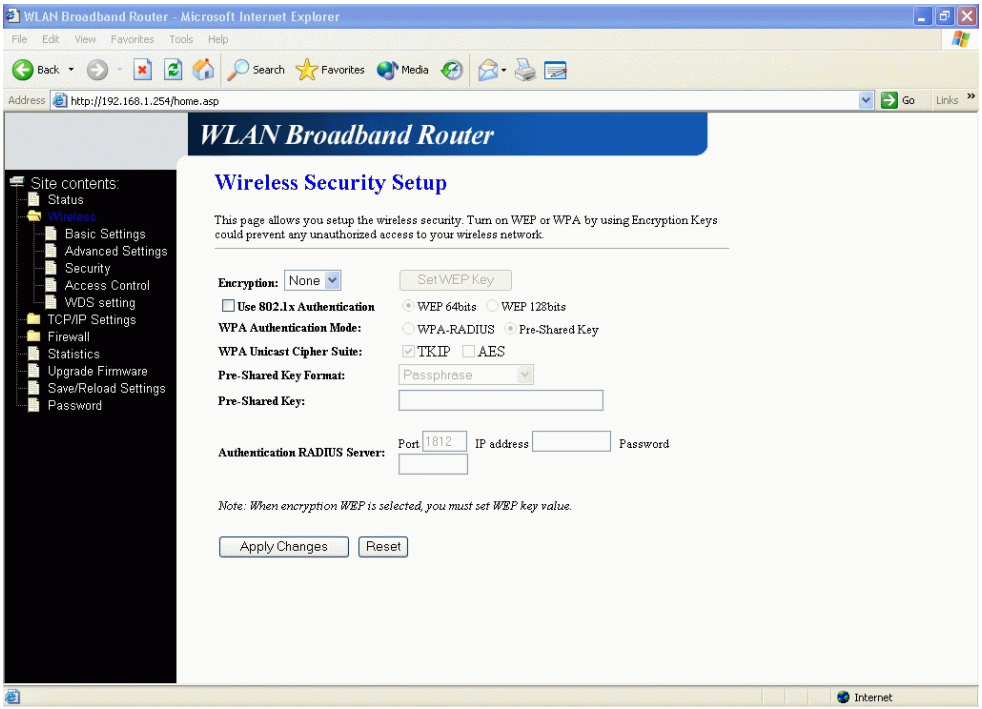
Screen snapshot – Wireless Advanced Settings

Item	Description
Authentication Type	Click to select the authentication type in ***Open System***, ***Shared Key*** or ***Auto selection***.
Fragment Threshold	Set the data packet fragmentation threshold, value can be written between 256 and 2346 bytes. Refer to 4.10 What is Fragment Threshold?
RTS Threshold	Set the RTS Threshold, value can be written between 0 and 2347 bytes. Refer to 4.11 What is RTS(Request To Send) Threshold?
Beacon Interval	Set the Beacon Interval, value can be written between 20

	and 1024 ms. Refer to 4.12 What is Beacon Interval?
Data Rate	Select the transmission data rate from pull-down menu. Data rate can be auto-select, 11M, 5.5M, 2M or 1Mbps.
Preamble Type	Click to select the ***Long Preamble*** or ***Short Preamble*** support on the wireless data packet transmission. Refer to 4.13 What is Preamble Type?
Broadcast SSID	Click to enable or disable the SSID broadcast function. Refer to 4.14 What is SSID Broadcast?
IAPP	Click to enable or disable the IAPP function. Refer to4.19 What is Inter-Access Point Protocol(IAPP)?
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

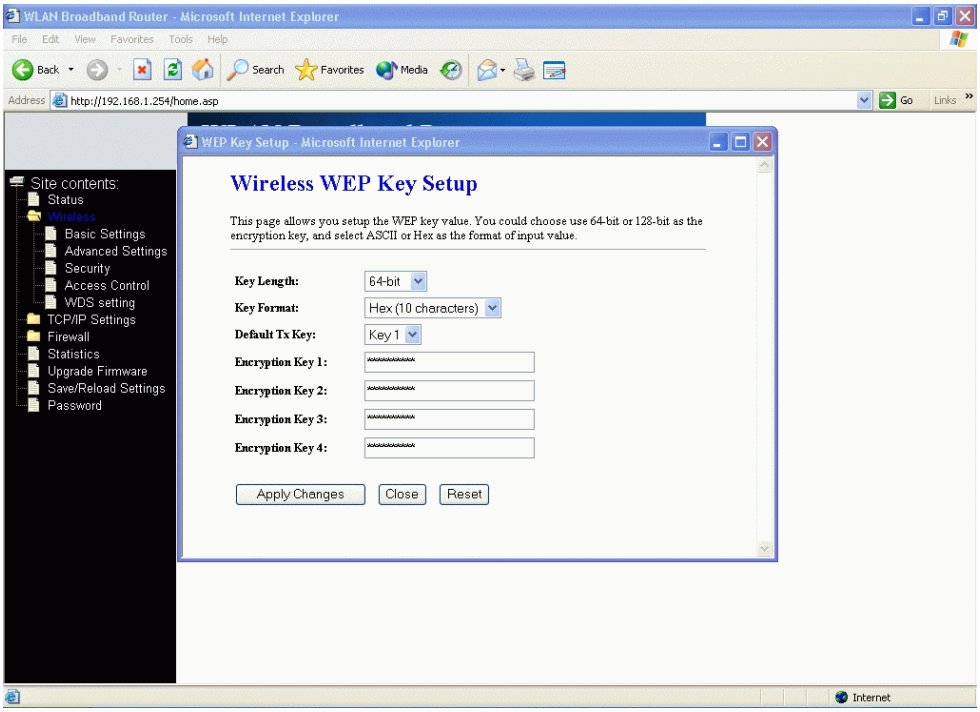
3.3.4 Wireless Security Setup

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.



Screen snapshot – Wireless Security Setup

Item	Description
Encryption	Select the encryption supported over wireless access. The encryption method can be None, WEP or WPA. Refer to 4.9 What is WEP? 4.15 What is Wi-Fi Protected Access (WPA)? 4.16 What is 802.1X Authentication? 4.17 What is Temporal Key Integrity Protocol (TKIP)? 4.18 What is Advanced Encryption Standard (AES)?
Use 802.1x Authentication	While Encryption is selected to be WEP. Click the check box to enable IEEE 802.1x authentication function. Refer to 4.16 What is 802.1x Authentication?
WPA Authentication Mode	While Encryption is selected to be WPA. Click to select the WPA Authentication Mode with WPA-RADIUS or Pre-Shared Key. Refer to 4.15 What is Wi-Fi Protected Access (WPA)?
WPA Unicast Cipher Suite	While Encryption is selected to be WPA. Click to enable the WPA unicast cipher suite to be TKIP and AES. Refer to 4.17 What is Temporal Key Integrity Protocol (TKIP)? 4.18 What is Advanced Encryption Standard (AES)?
Pre-Shared Key Format	While Encryption is selected to be WPA. Select the Pre-shared key format from the pull-down menu. The format can be Passphrase or Hex (64 characters).
Pre-Shared Key	Pre-shared key 2 of WPA security encryption function.
Authentication RADIUS Server	Set the IP address, port and login password information of authentication RADIUS sever.
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.



Screen snapshot – Set WEP Key

Item	Description
Key Length	Select the WEP shared secret key length from pull-down menu. The length can be chose between 64-bit and 128-bit (known as "WEP2") keys. The WEP key is composed of initialization vector (24 bits) and secret key (40-bit or 104-bit).
Key Format	Select the WEP shared secret key format from pull-down menu. The format can be chose between plant text (ASCII) and hexadecimal (HEX) code.
Default Tx Key	Set the default secret key for WEP security function. Value can be chose between 1 and 4.
Encryption Key 1	Secret key 1 of WEP security encryption function.
Encryption Key 2	Secret key 2 of WEP security encryption function.
Encryption Key 3	Secret key 3 of WEP security encryption function.
Encryption Key 4	Secret key 4 of WEP security encryption function.
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Close	Click to close this WEP Key setup window.
Reset	Click the ***Reset*** button to abort change and recover the

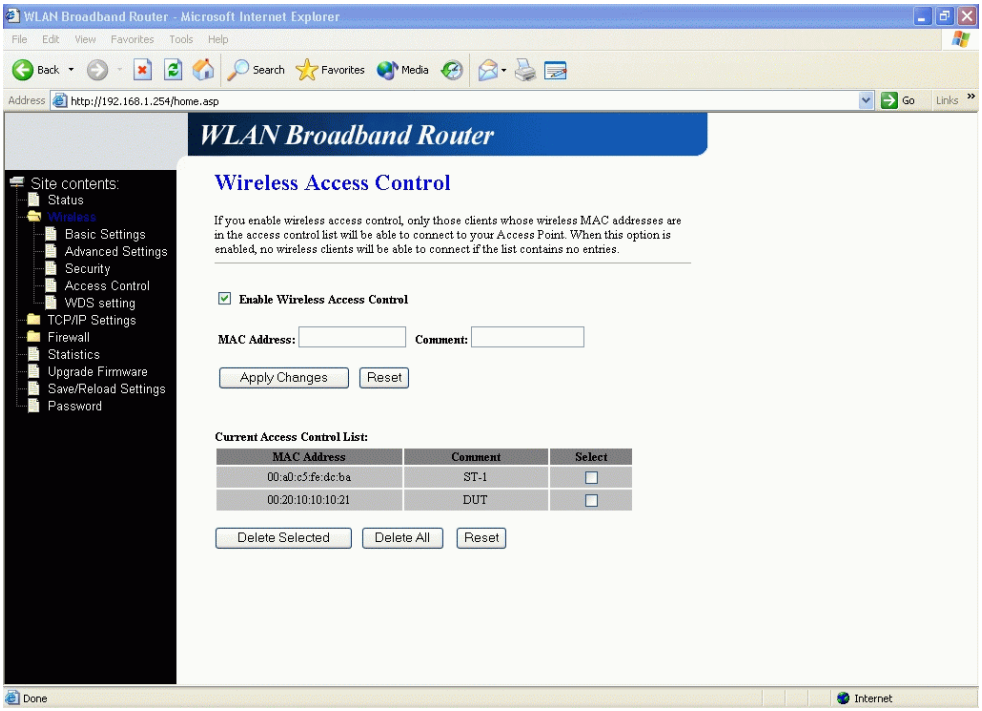
previous configuration setting.

WEP encryption key (secret key) length:

Length / Format	64-bit	128-bit
ASCII	5 characters	13 characters
HEX	10 hexadecimal codes	26 hexadecimal codes

3.3.5 Wireless Access Control

If you enable wireless access control, only those clients whose wireless MAC addresses are in the access control list will be able to connect to your Access Point. When this option is enabled, no wireless clients will be able to connect if the list contains no entries.



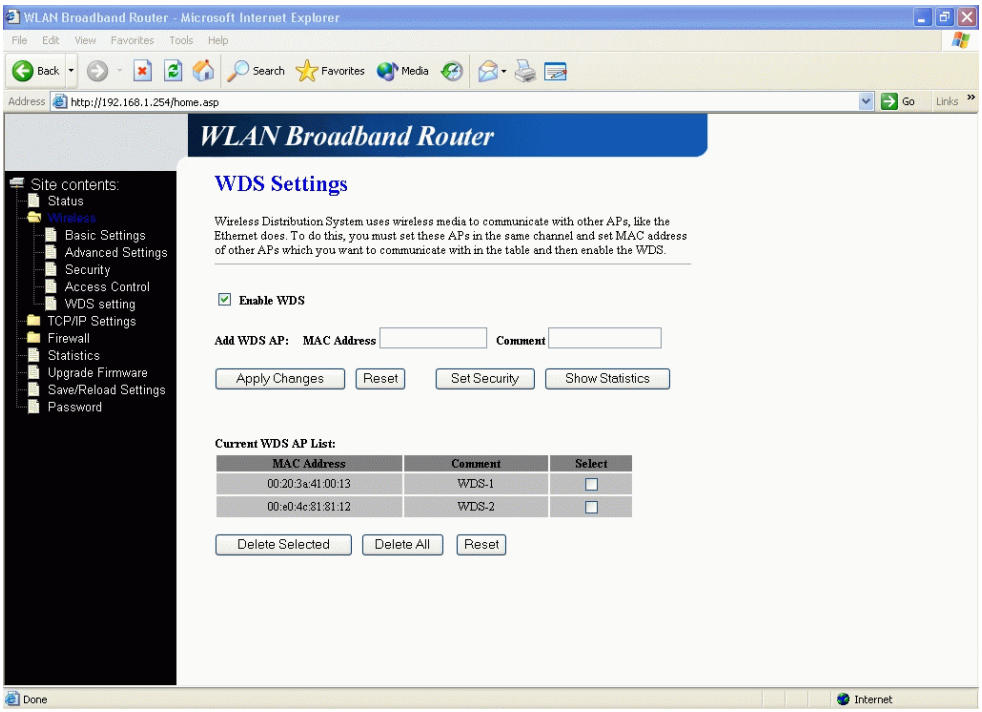
Screen snapshot – Wireless Access Control

Item	Description
Enable Wireless Access Control	Click the check box to enable wireless access control. This is a security control function; only those clients registered in the access control list can link to this WLAN Broadband Router.
MAC Address	Fill in the MAC address of client to register this WLAN

	Broadband Router access capability.
Comment	Fill in the comments for the registered client.
Apply Changes	Click the ***Apply Changes*** button to register the client to new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.
Current Access Control List	It shows the registered clients that are allowed to link to this WLAN Broadband Router.
Delete Selected	Click to delete the selected clients that will be access right removed from this WLAN Broadband Router.
Delete All	Click to delete all the registered clients from the access allowed list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.6 WDS Setup

Wireless Distribution System uses wireless media to communicate with other APs, like the Ethernet does. To do this, you must set these APs in the same channel and set MAC address of other AP that you want to communicate with in the table and then enable the WDS.

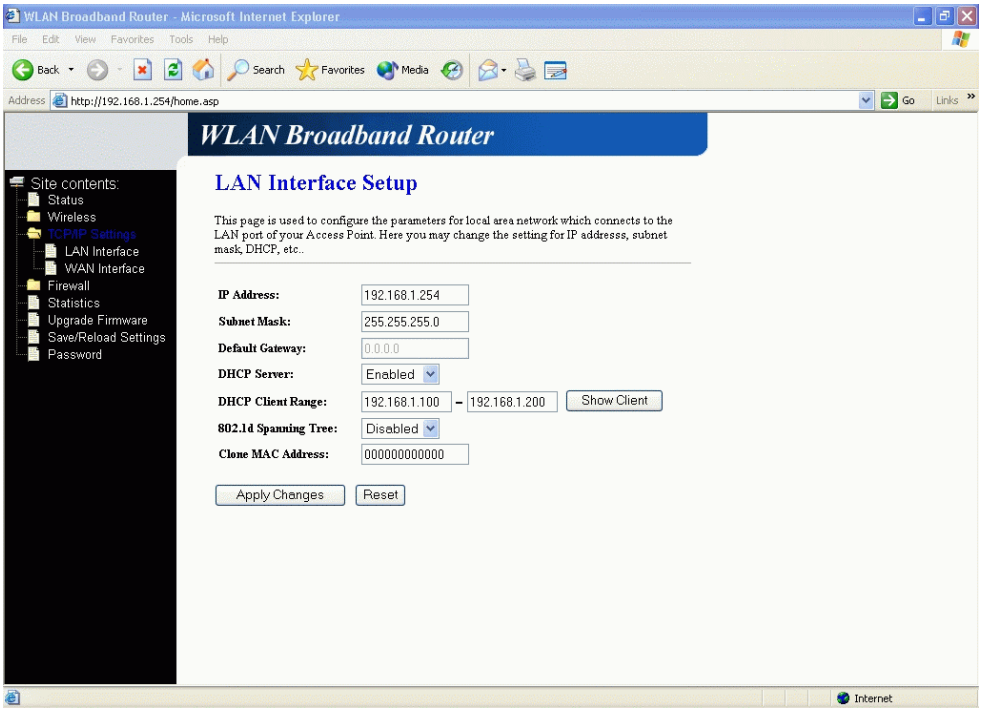


Screen snapshot – WDS Setup

Item	Description
Enable Wireless Distribution System	Click the check box to enable wireless distribution system. Refer to 4.20 What is Wireless Distribution System (WDS)?
MAC Address	Fill in the MAC address of AP to register the wireless distribution system access capability.
Comment	Fill in the comments for the registered AP.
Apply Changes	Click the ***Apply Changes*** button to register the AP to new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.
Current Access Control List	It shows the registered APs that are allowed in the wireless distribution system.
Delete Selected	Click to delete the selected clients that will be removed from the wireless distribution system.
Delete All	Click to delete all the registered APs from the wireless distribution system allowed list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.7 LAN Interface Setup

This page is used to configure the parameters for local area network that connects to the LAN ports of your WLAN Broadband Router. Here you may change the setting for IP address, subnet mask, DHCP, etc.



Screen snapshot – LAN Interface Setup

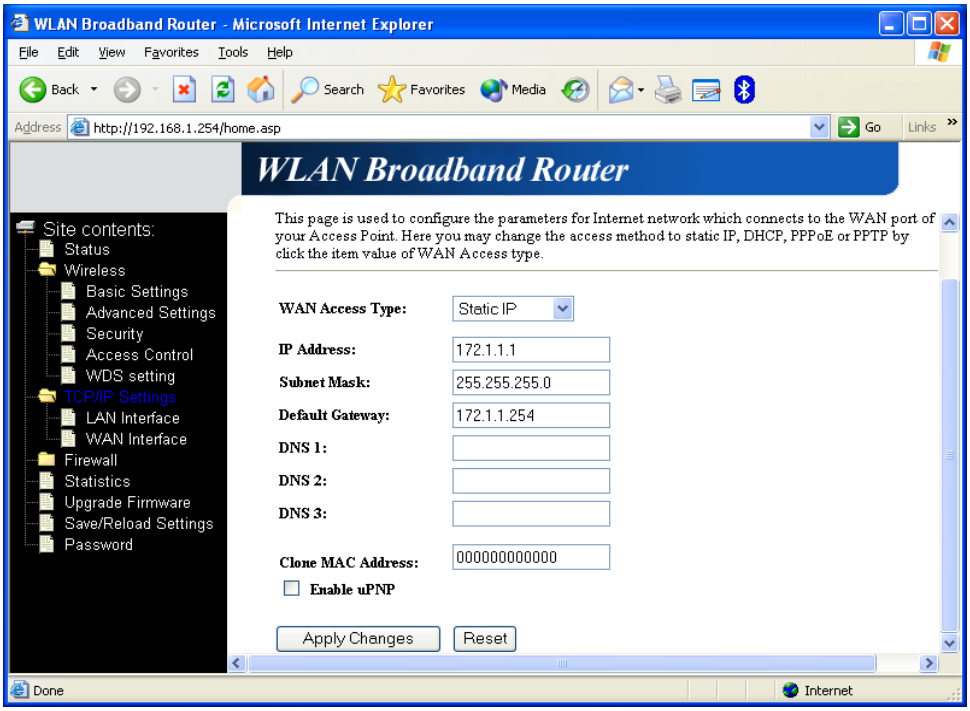
Item	Description
IP Address	Fill in the IP address of LAN interfaces of this WLAN Broadband Router.
Subnet Mask	Fill in the subnet mask of LAN interfaces of this WLAN Broadband Router.
Default Gateway	Fill in the default gateway for LAN interfaces out going data packets.
DHCP Server	Select to enable or disable the DHCP server function on LAN interfaces from pull-down menu.
DHCP Client Range	Fill in the start IP address and end IP address to allocate a range of IP addresses; client with DHCP function set will be assigned an IP address from the range.
Show Client	Click to open the ***Active DHCP Client Table*** window that shows the active clients with their assigned IP address, MAC address and time expired information.
802.1d Spanning Tree	Select to enable or disable the IEEE 802.1d Spanning Tree function from pull-down menu.
Clone MAC Address	Fill in the MAC address that is the MAC address to be cloned. Refer to 4.23 What is Clone MAC Address?

Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.8 WAN Interface Setup

This page is used to configure the parameters for wide area network that connects to the WAN port of your WLAN Broadband Router. Here you may change the access method to ***Static IP***, ***DHCP***, ***PPPoE*** or ***PPTP*** by click the item value of **WAN Access Type**.

A. Static IP

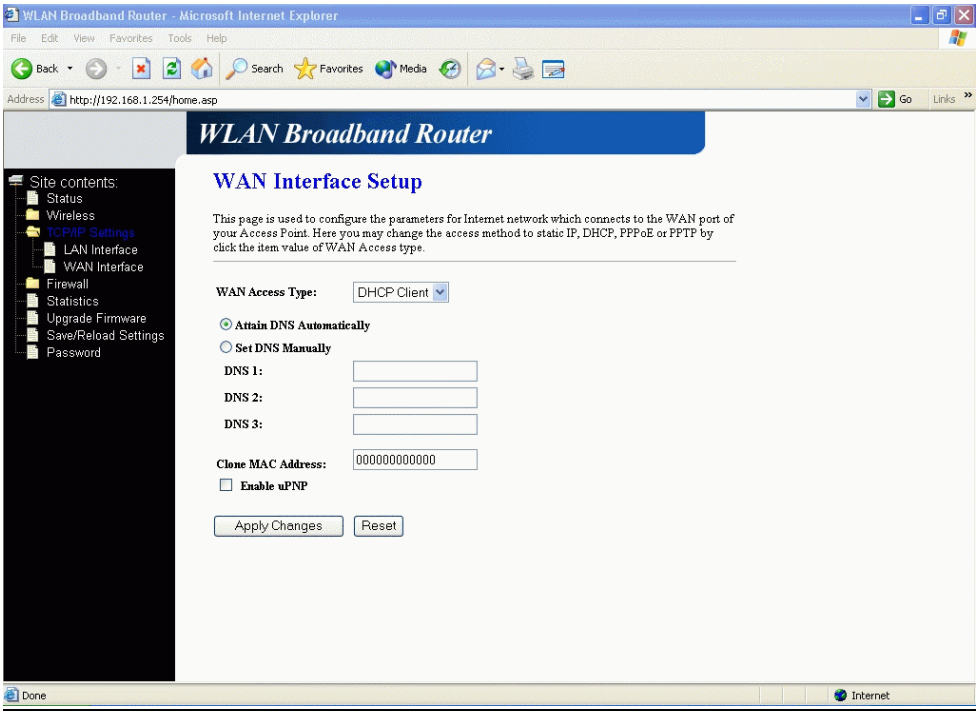


Screen snapshot – WAN Interface Setup – Static IP

Item	Description
Static IP	Click to select Static IP support on WAN interface. There are IP address, subnet mask and default gateway settings need to be done.
IP Address	If you select the Static IP support on WAN interface, fill in the IP address for it.
Subnet Mask	If you select the Static IP support on WAN interface, fill

	in the subnet mask for it.
Default Gateway	If you select the Static IP support on WAN interface, fill in the default gateway for WAN interface out going data packets.
DNS 1	Fill in the IP address of Domain Name Server 1.
DNS 2	Fill in the IP address of Domain Name Server 2.
DNS 3	Fill in the IP address of Domain Name Server 3.
Clone MAC Address	Fill in the MAC address that is the MAC address to be cloned. Refer to 4.23 What is Clone MAC Address?
Enable uPNP	Click the checkbox to enable uPNP function. Refer to 4.21 What is Universal Plug and Play (uPNP)?
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

B. DHCP Client

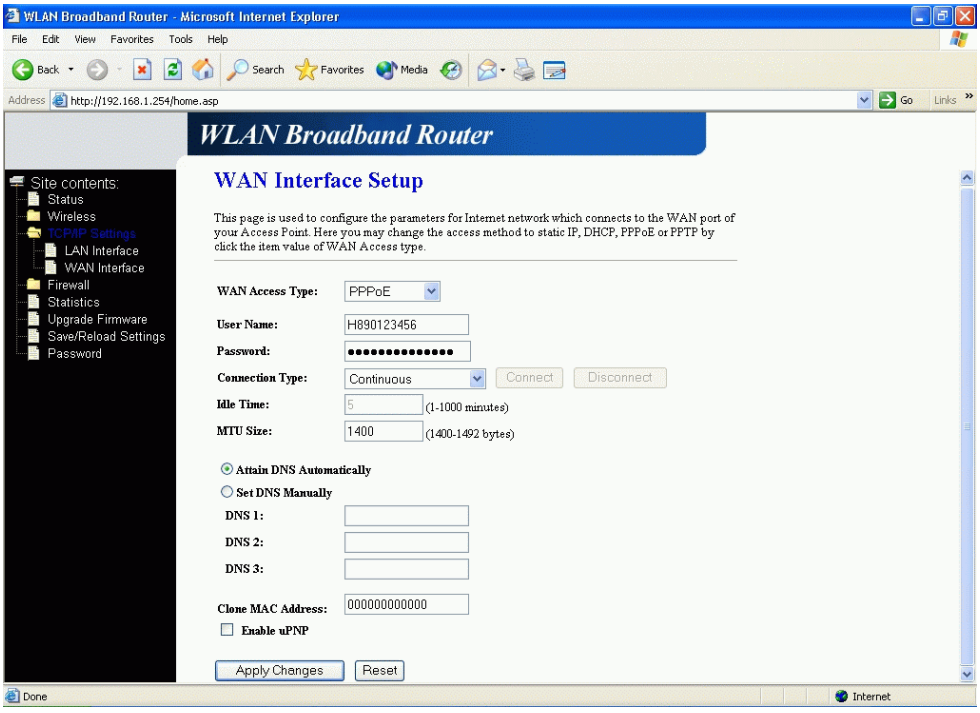


Screen snapshot – WAN Interface Setup – DHCP Client

Item	Description
DHCP Client	Click to select DHCP support on WAN interface for IP

	address assigned automatically from a DHCP server.
Attain DNS Automatically	Click to select getting DNS address for ***DHCP*** support. Please select ***Set DNS Manually*** if the ***DHCP*** support is selected.
Set DNS Manually	Click to select getting DNS address for ***DHCP*** support.
DNS 1	Fill in the IP address of Domain Name Server 1.
DNS 2	Fill in the IP address of Domain Name Server 2.
DNS 3	Fill in the IP address of Domain Name Server 3.
Clone MAC Address	Fill in the MAC address that is the MAC address to be cloned. Refer to 4.23 What is Clone MAC Address?
Enable uPNP	Click the checkbox to enable uPNP function. Refer to 4.21 What is Universal Plug and Play (uPNP)?
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

C. PPPoE



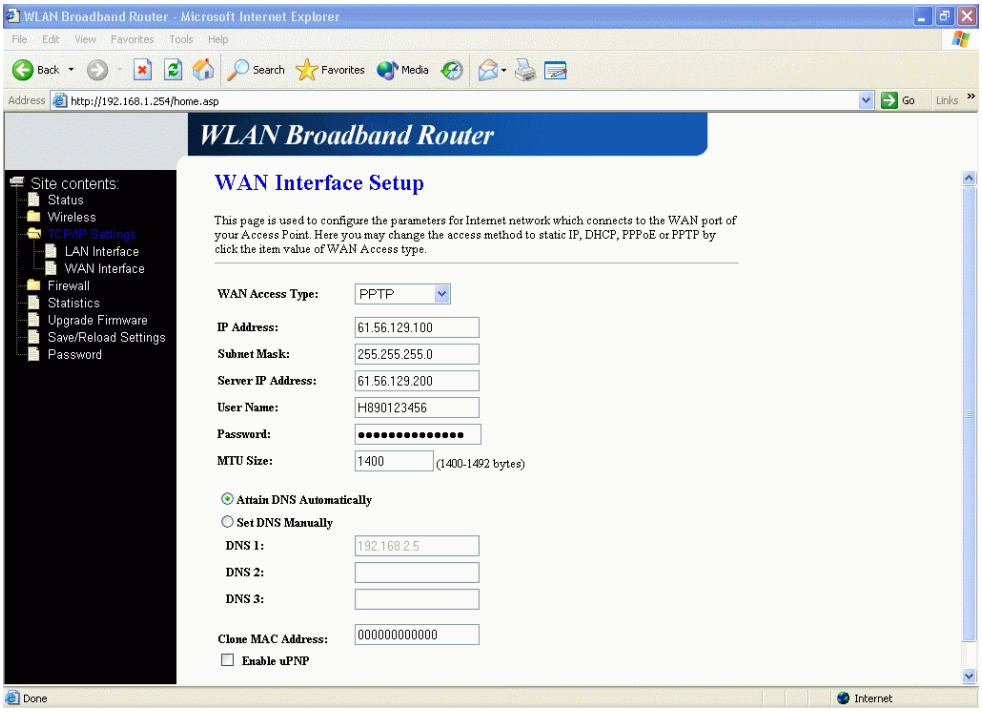
Screen snapshot – WAN Interface Setup – PPPoE

Item	Description

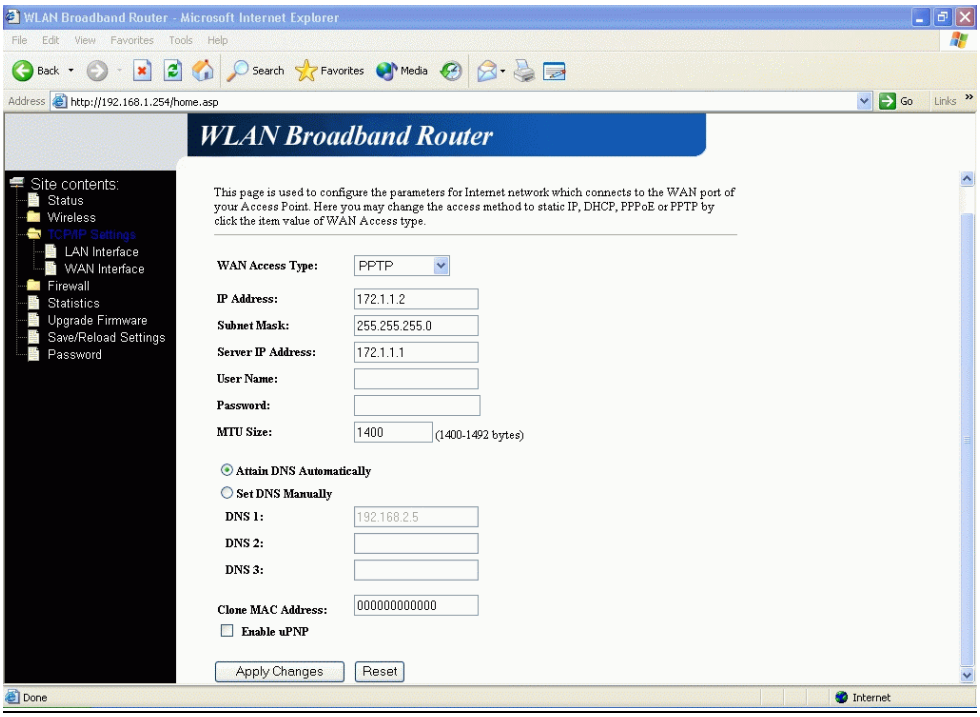
PPPoE	Click to select PPPoE support on WAN interface. There are user name, password, connection type and idle time settings need to be done.
User Name	If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server.
Password	If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server.
Connection Type	Select the connection type from pull-down menu. There are ***Continuous***, ***Connect on Demand*** and ***Manual*** three types to select. ***Continuous*** connection type means to setup the connection through PPPoE protocol whenever this WLAN Broadband Router is powered on. ***Connect on Demand*** connection type means to setup the connection through PPPoE protocol whenever you send the data packets out through the WAN interface; there are a watchdog implemented to close the PPPoE connection while there are no data sent out longer than the idle time set. ***Manual*** connection type means to setup the connection through the PPPoE protocol by clicking the ***Connect*** button manually, and clicking the ***Disconnect*** button manually.
Idle Time	If you select the ***PPPoE*** and ***Connect on Demand*** connection type, fill in the idle time for auto-disconnect function. Value can be between 1 and 1000 minutes.
MTU Size	Fill in the mtu size of MTU Size. The default value is 1400. Refer to 4.22 What is Maximum Transmission Unit (MTU) Size?
Attain DNS Automatically	Click to select getting DNS address for ***PPPoE*** support. Please select ***Set DNS Manually*** if the ***PPPoE*** support is selected.
Set DNS Manually	Click to select getting DNS address for ***Static IP*** support.
DNS 1	Fill in the IP address of Domain Name Server 1.
DNS 2	Fill in the IP address of Domain Name Server 2.
DNS 3	Fill in the IP address of Domain Name Server 3.

Clone MAC Address	Fill in the MAC address that is the MAC address to be cloned. Refer to 4.23 What is Clone MAC Address?
Enable uPNP	Click the checkbox to enable uPNP function. Refer to 4.21 What is Universal Plug and Play (uPNP)?
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

D. PPTP



Screen snapshot – WAN Interface Setup – PPTP –1



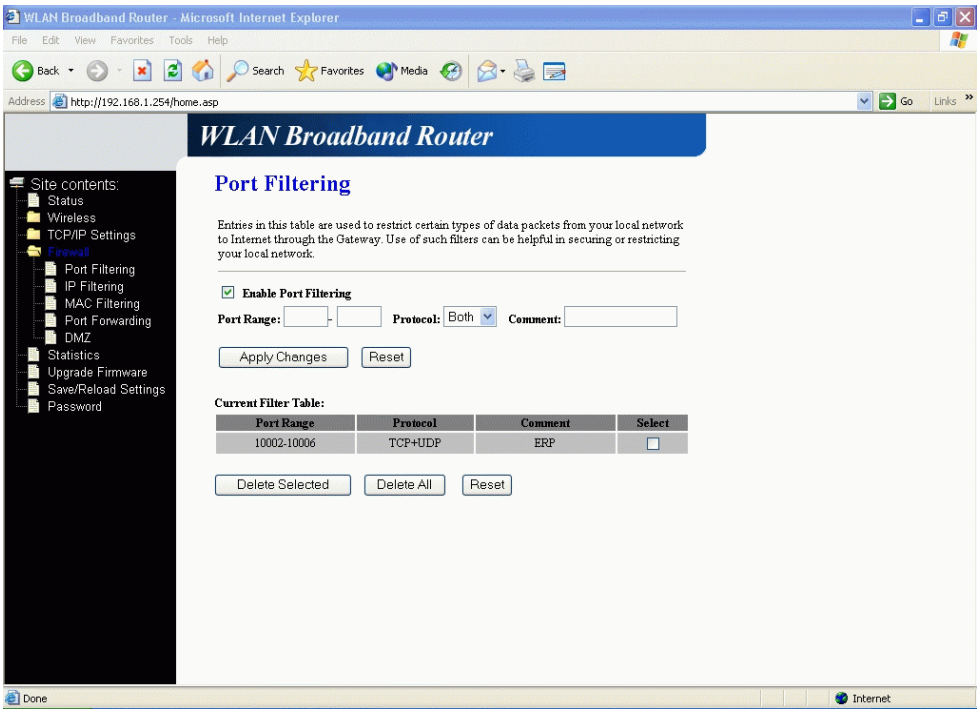
Screen snapshot – WAN Interface Setup – PPTP -2

Item	Description
PPTP	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.
IP Address	If you select the PPTP support on WAN interface, fill in the IP address for it.
Subnet Mask	If you select the PPTP support on WAN interface, fill in the subnet mask for it.
Server IP Address	Enter the IP address of the PPTP Server.
User Name	If you select the PPTP support on WAN interface, fill in the user name and password to login the PPTP server.
Password	f you select the PPTP support on WAN interface, fill in the user name and password to login the PPTP server.
MTU Size	Fill in the mtu size of MTU Size. The default value is 1400. Refer to 4.22 What is Maximum Transmission Unit (MTU) Size?
Attain DNS Automatically	Click to select getting DNS address for ***PPTP*** support. Please select ***Set DNS Manually*** if the ***PPTP*** support is

	selected.
Set DNS Manually	Click to select getting DNS address for ***PPTP*** support.
DNS 1	Fill in the IP address of Domain Name Server 1.
DNS 2	Fill in the IP address of Domain Name Server 2.
DNS 3	Fill in the IP address of Domain Name Server 3.
Clone MAC Address	Fill in the MAC address that is the MAC address to be cloned. Refer to 4.23 What is Clone MAC Address?
Enable uPNP	Click the checkbox to enable uPNP function. Refer to 4.21 What is Universal Plug and Play (uPNP)?
Apply Changes	Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.9 Firewall - Port Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.



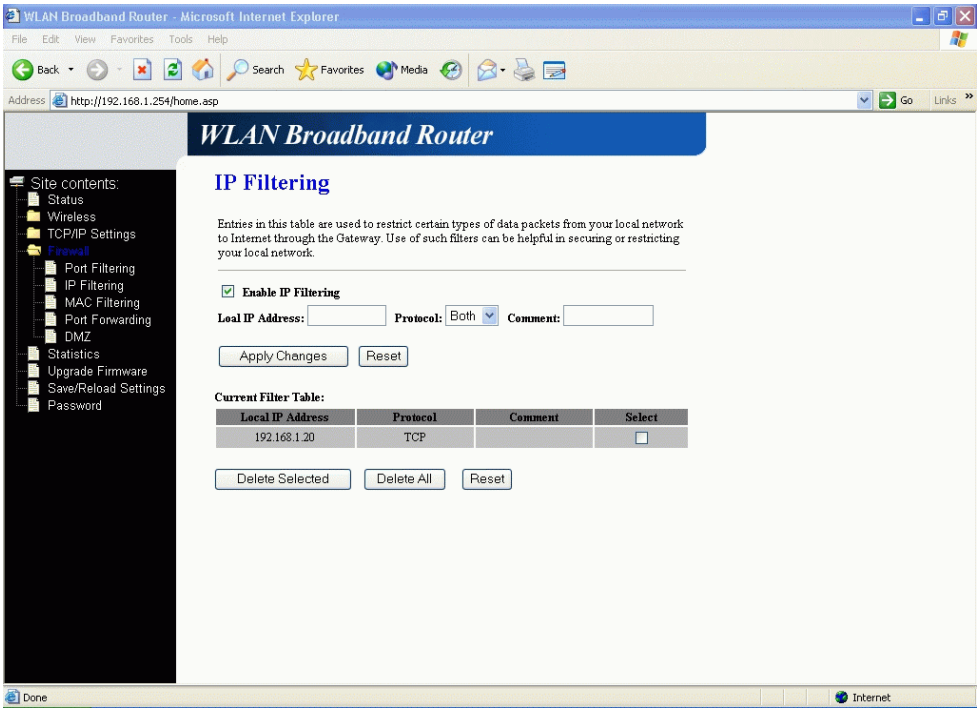
Screen snapshot – Firewall - Port Filtering

Item	Description

Enable Port Filtering	Click to enable the port filtering security function.
Port Range ***Protocol*** ***Comments***	To restrict data transmission from the local network on certain ports, fill in the range of start-port and end-port, and the protocol, also put your comments on it. The ***Protocol*** can be TCP, UDP or Both. ***Comments*** let you know about whys to restrict data from the ports.
Apply Changes	Click the ***Apply Changes*** button to register the ports to port filtering list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.
Delete Selected	Click to delete the selected port range that will be removed from the port-filtering list.
Delete All	Click to delete all the registered entries from the port-filtering list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.10 Firewall - IP Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.

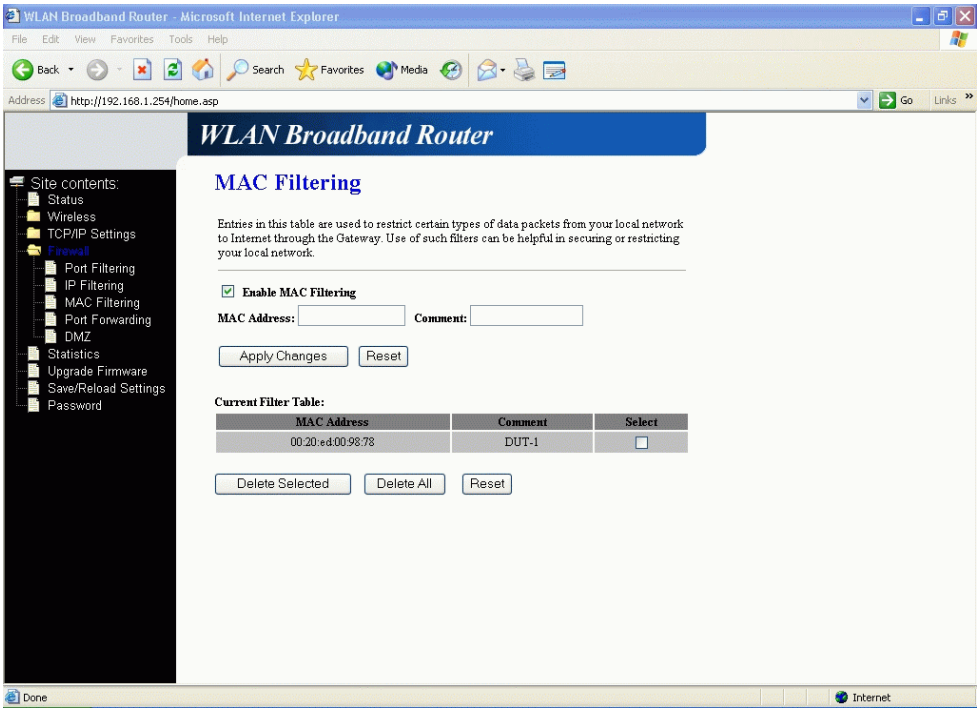


Screen snapshot – Firewall - IP Filtering

Item	Description
Enable IP Filtering	Click to enable the IP filtering security function.
Local IP Address ***Protocol*** ***Comments***	To restrict data transmission from local network on certain IP addresses, fill in the IP address and the protocol, also put your comments on it. The ***Protocol*** can be TCP, UDP or Both. ***Comments*** let you know about whys to restrict data from the IP address.
Apply Changes	Click the ***Apply Changes*** button to register the IP address to IP filtering list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.
Delete Selected	Click to delete the selected IP address that will be removed from the IP-filtering list.
Delete All	Click to delete all the registered entries from the IP-filtering list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.11 Firewall - MAC Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.



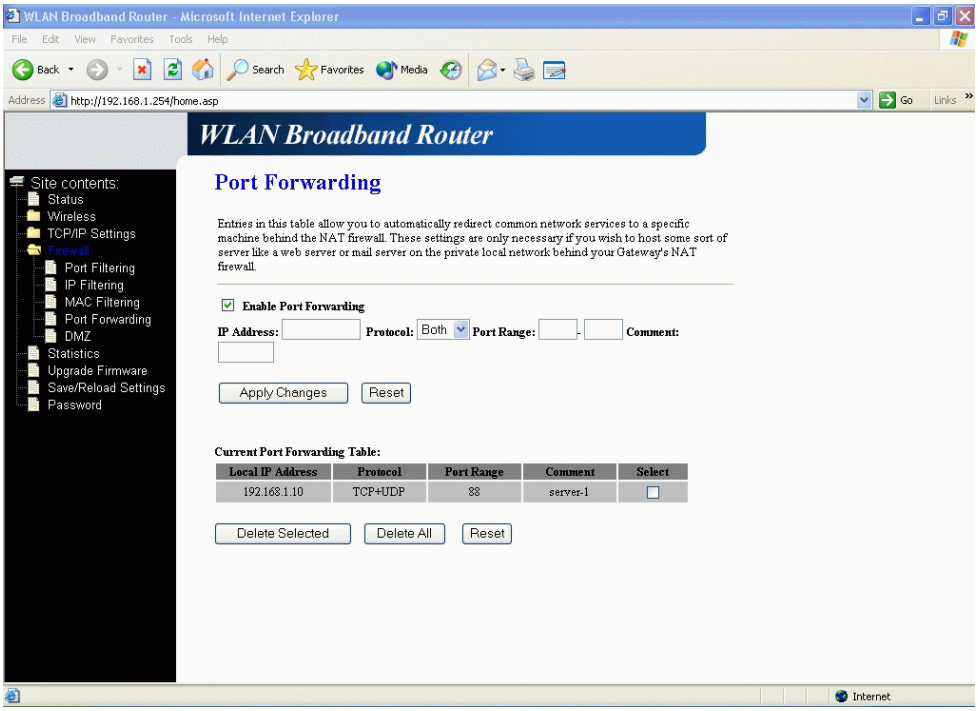
Screen snapshot – Firewall - MAC Filtering

Item	Description
Enable MAC Filtering	Click to enable the MAC filtering security function.
MAC Address ***Comments***	To restrict data transmission from local network on certain MAC addresses, fill in the MAC address and your comments on it. ***Comments*** let you know about whys to restrict data from the MAC address.
Apply Changes	Click the ***Apply Changes*** button to register the MAC address to MAC filtering list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.
Delete Selected	Click to delete the selected MAC address that will be removed from the MAC-filtering list.
Delete All	Click to delete all the registered entries from the

	MAC-filtering list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.12 Firewall - Port Forwarding

Entries in this table allow you to automatically redirect common network services to a specific machine behind the NAT firewall. These settings are only necessary if you wish to host some sort of server like a web server or mail server on the private local network behind your Gateway's NAT firewall.



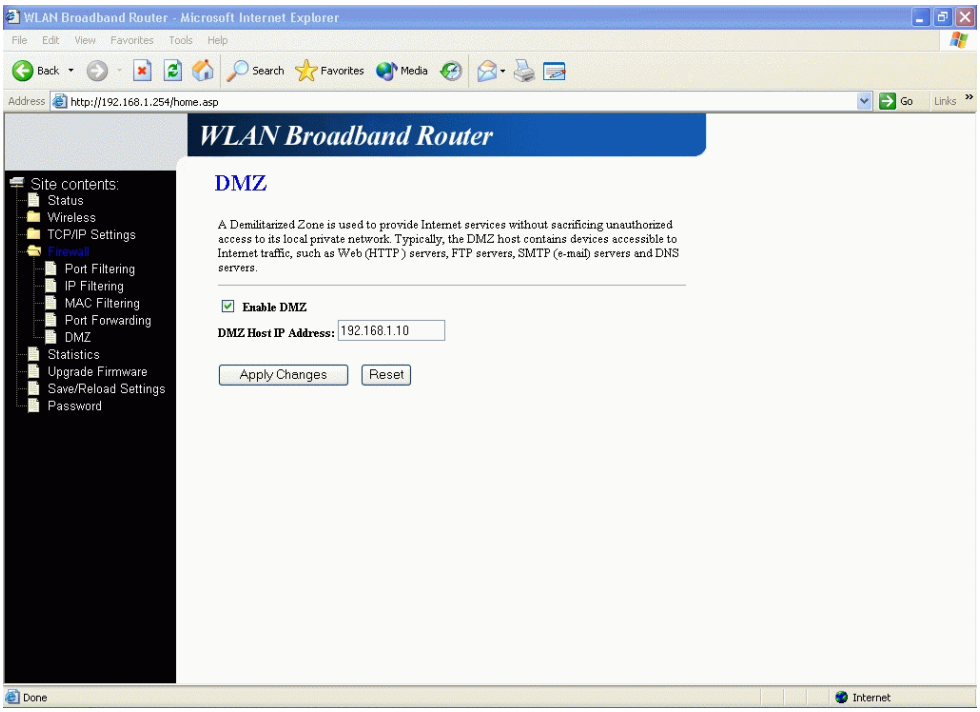
Screen snapshot – Firewall - Port Forwarding

Item	Description
Enable Port Forwarding	Click to enable the Port Forwarding security function.
IP Address ***Protocol*** ***Port Range*** ***Comment***	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, protocol, port range and your comments. The ***Protocol*** can be TCP, UDP or Both. The ***Port Range*** for data transmission. ***Comments*** let you know about whys to allow data packets forward to the IP address and port number.

Apply Changes	Click the ***Apply Changes*** button to register the IP address and port number to Port forwarding list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.
Delete Selected	Click to delete the selected IP address and port number that will be removed from the port-forwarding list.
Delete All	Click to delete all the registered entries from the port-forwarding list.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.13 Firewall - DMZ

A Demilitarized Zone is used to provide Internet services without sacrificing unauthorized access to its local private network. Typically, the DMZ host contains devices accessible to Internet traffic, such as Web (HTTP) servers, FTP servers, SMTP (e-mail) servers and DNS servers.



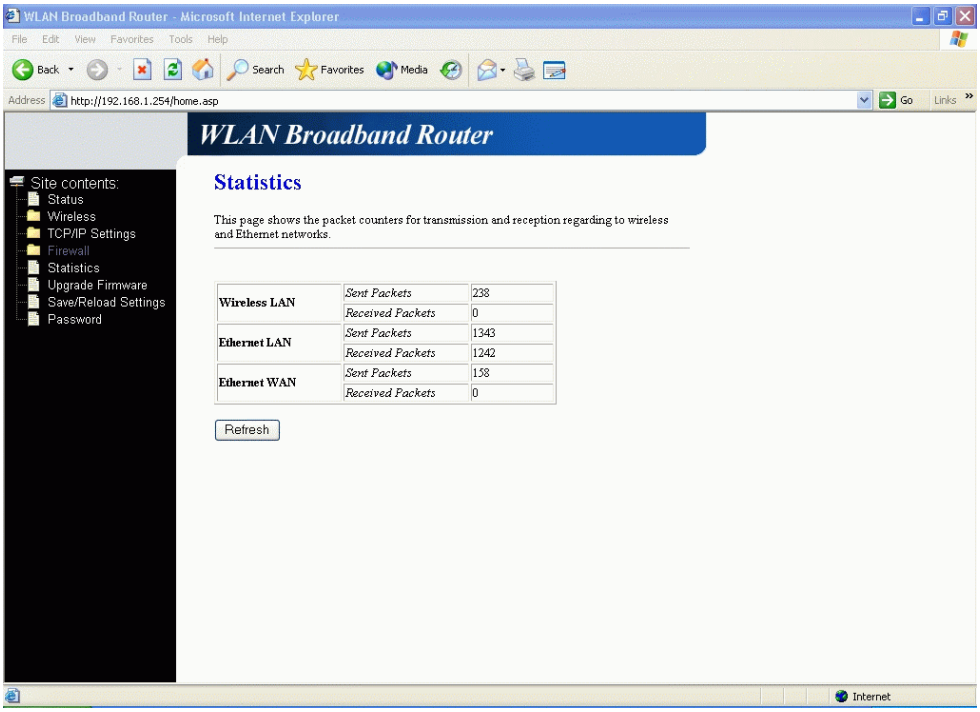
Screen snapshot – Firewall - DMZ

Item	Description
Enable DMZ	Click to enable the DMZ function.

DMZ Host 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.
Apply Changes	Click the ***Apply Changes*** button to register the IP address of DMZ host.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

3.3.14 Statistics

This page shows the packet counters for transmission and reception regarding to wireless, Ethernet LAN and Ethernet WAN networks.



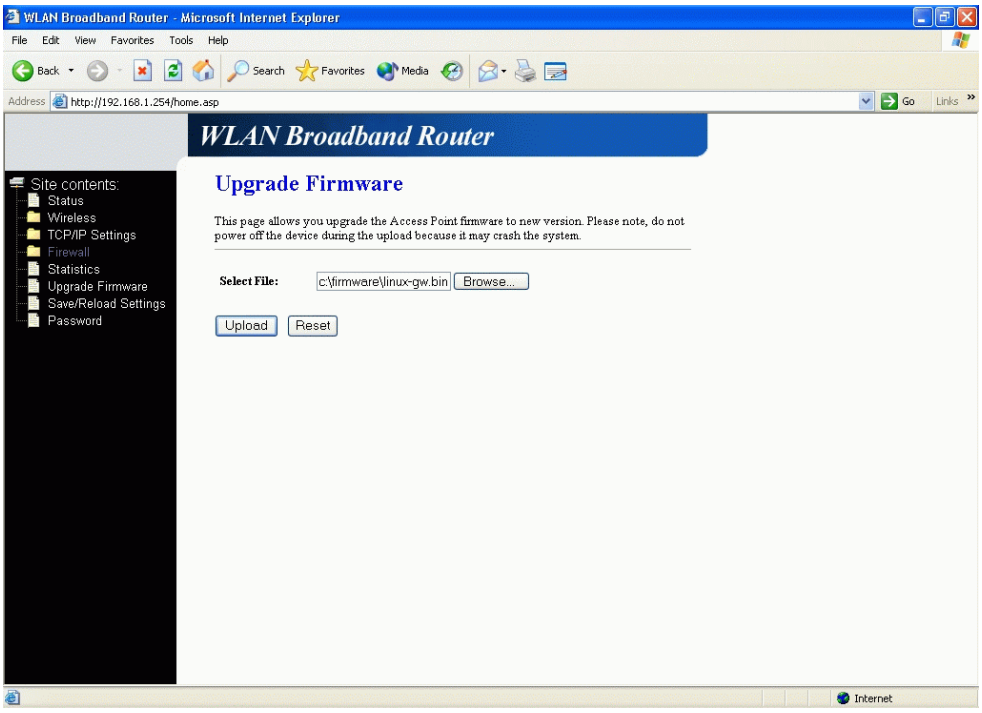
Screen snapshot – Statistics

Item	Description
Wireless LAN ***Sent Packets***	It shows the statistic count of sent packets on the wireless LAN interface.
Wireless LAN Received Packets	It shows the statistic count of received packets on the wireless LAN interface.
Ethernet LAN ***Sent Packets***	It shows the statistic count of sent packets on the Ethernet LAN interface.

Ethernet LAN Received Packets	It shows the statistic count of received packets on the Ethernet LAN interface.
Ethernet WAN ***Sent Packets***	It shows the statistic count of sent packets on the Ethernet WAN interface.
Ethernet WAN Received Packets	It shows the statistic count of received packets on the Ethernet WAN interface.
Refresh	Click the refresh the statistic counters on the screen.

3.3.15 Upgrade Firmware

This page allows you upgrade the Access Point firmware to new version. Please note, do not power off the device during the upload because it may crash the system.



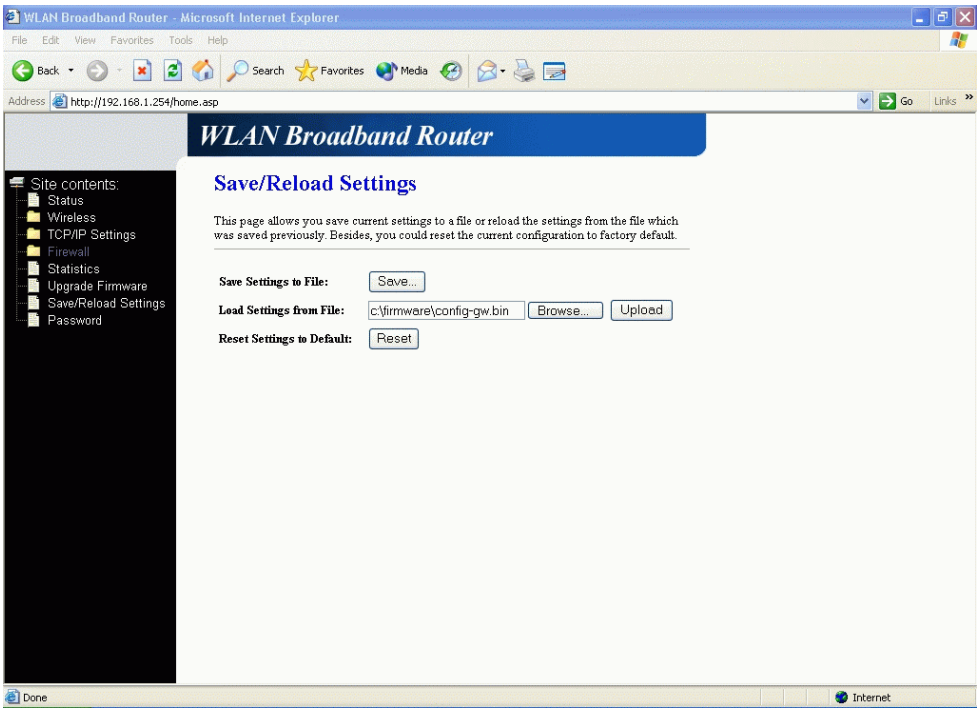
Screen snapshot – Upgrade Firmware

Item	Description
Select File	Click the ***Browse*** button to select the new version of web firmware image file.
Upload	Click the ***Upload*** button to update the selected web firmware image to the WLAN Broadband Router.
Reset	Click the ***Reset*** button to abort change and recover the

previous configuration setting.

3.3.16 Save/ Reload Settings

This page allows you save current settings to a file or reload the settings from the file that was saved previously. Besides, you could reset the current configuration to factory default.

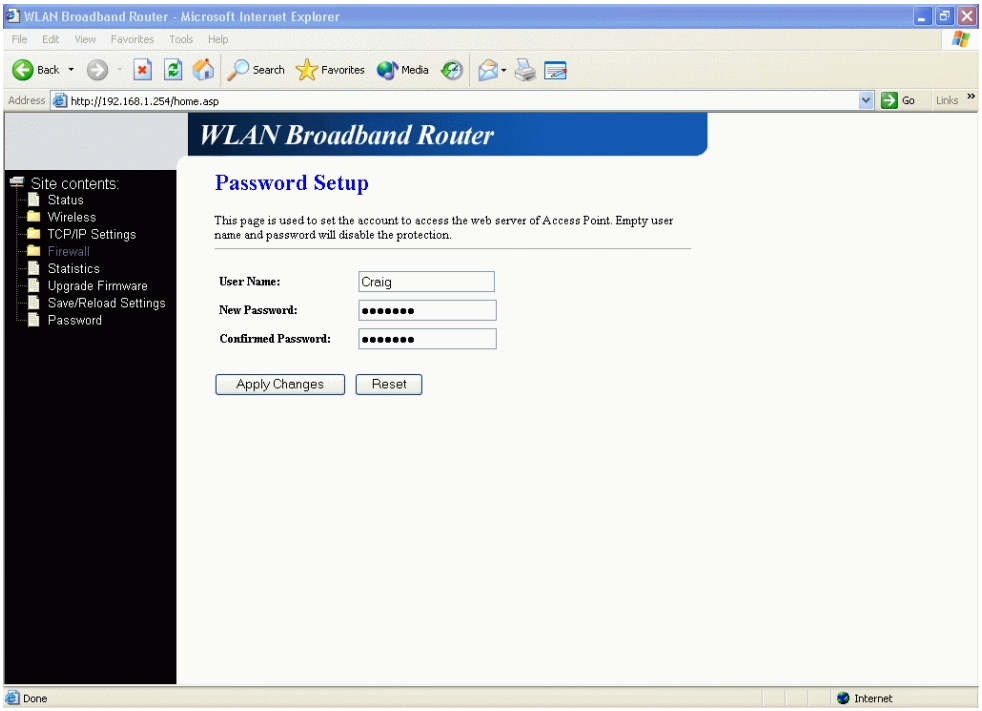


Screen snapshot – Save/Reload Settings

Item	Description
Save Settings to File	Click the ***Save*** button to download the configuration parameters to your personal computer.
Load Settings from File	Click the ***Browse*** button to select the configuration files then click the ***Upload*** button to update the selected configuration to the WLAN Broadband Router.
Reset Settings to Default	Click the ***Reset*** button to reset the configuration parameter to factory defaults.

3.3.17 Password Setup

This page is used to set the account to access the web server of Access Point. Empty user name and password will disable the protection.



Screen snapshot – Password Setup

Item	Description
User Name	Fill in the user name for web management login control.
New Password	Fill in the password for web management login control.
Confirmed Password	Because the password input is invisible, so please fill in the password again for confirmation purpose.
Apply Changes	Clear the ***User Name*** and ***Password*** fields to empty, means to apply no web management login control. Click the ***Apply Changes*** button to complete the new configuration setting.
Reset	Click the ***Reset*** button to abort change and recover the previous configuration setting.

4 Frequently Asked Questions (FAQ)

4.1 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.

4.2 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.

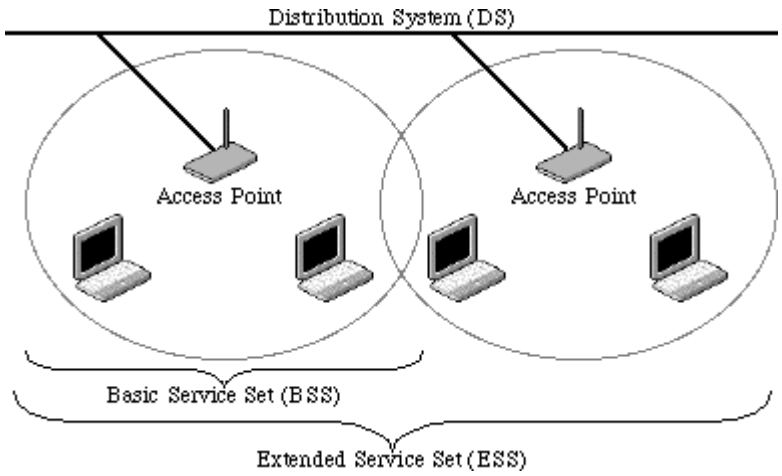
4.3 What are ISM bands?

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.

4.4 How does wireless networking work?

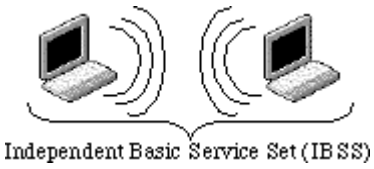
The 802.11 standard define two modes: infrastructure mode and ad hoc mode. In infrastructure mode, the wireless network consists of at least one access point connected to the wired network infrastructure and a set of wireless end stations. This configuration is called a Basic Service Set (BSS). An Extended Service Set (ESS) is a set of two or more BSSs forming a single subnetwork. 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

4.5 What is BSSID?

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

4.6 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.

4.7 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.

4.8 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.

4.9 What is WEP?

An optional IEEE 802.11 function 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.

4.10 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.

4.11 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.

4.12 What is Beacon Interval?

In addition to data frames that carry information from higher layers, 802.11 includes 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).

4.13 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.

4.14 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.

4.15 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.

4.16 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.

4.17 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.

4.18 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.

4.19 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.

4.20 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.

4.21 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.

4.22 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. The default is value 1400.

4.23 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 Configuration Examples

5.1 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	**H890123456**
Password	**PW192867543210**

LAN configuration

IP Address	**192.168.1.254**
Subnet Mask	**255.255.255.0**
Default Gateway	**0.0.0.0**
DHCP Client Range	**192.168.1.100 – 192.168.1.200**

WLAN configuration

SSID	**MyWLAN**
Channel Number	**11**

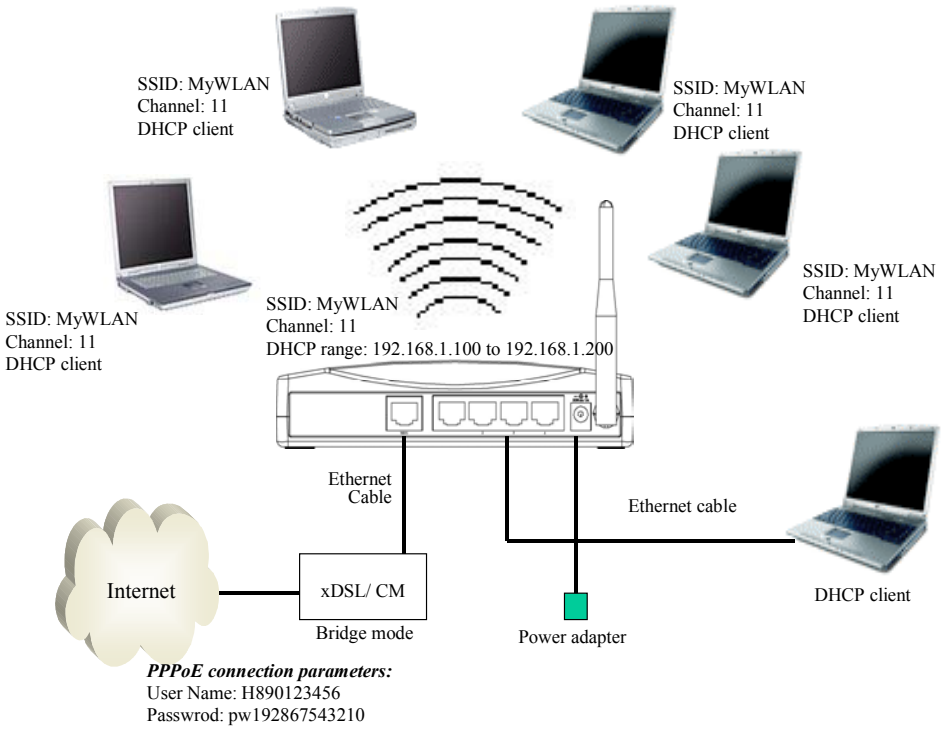
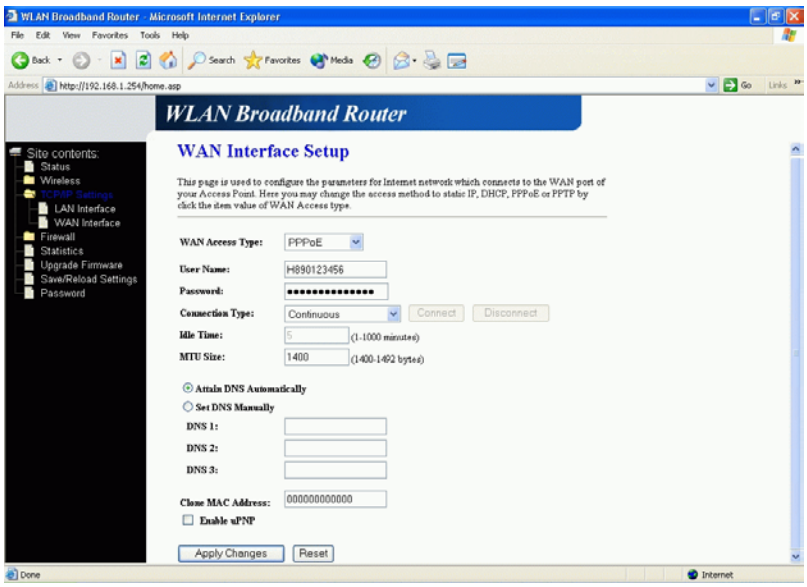


Figure 3 – Configuration Example One – PPPoE on the WAN

Configure the WAN interface:

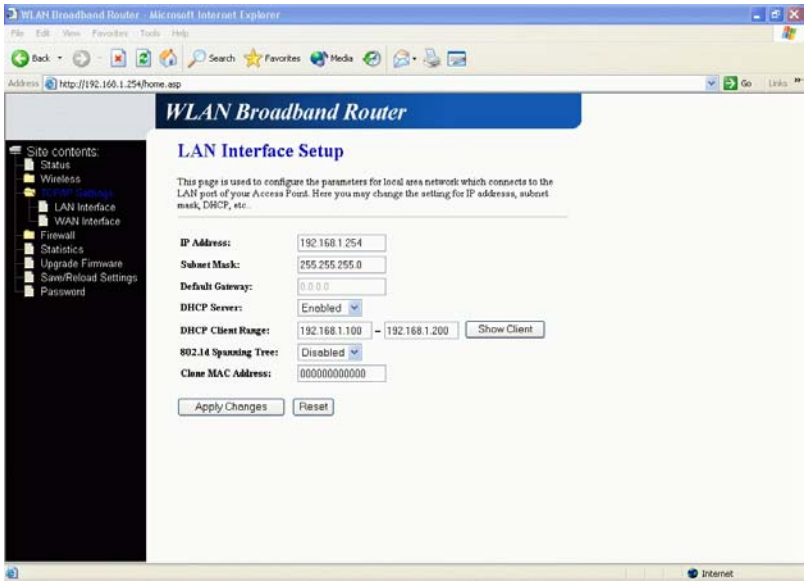
Open WAN Interface Setup page, select PPPoE then enter the User Name "**H890123456"** and Password "**PW192867543210**", the password is encrypted to display on the screen.



Press Apply Changes button to confirm the configuration setting.

Configure the LAN interface:

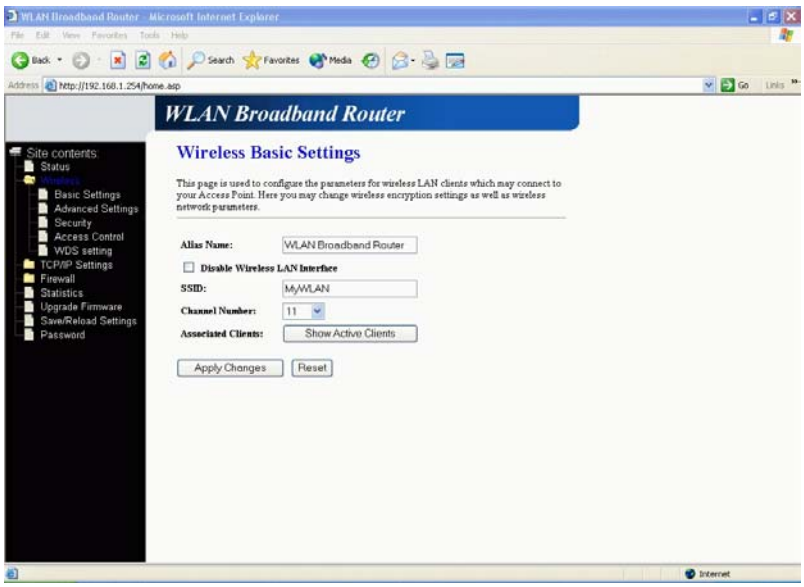
Open LAN Interface Setup page, enter the IP Address "**192.168.1.254**", Subnet Mask "**255.255.255.0**", Default Gateway "**0.0.0.0**", enable DHCP Server, DHCP client range "**192.168.1.100**" to "**192.168.1.200**".



Press Apply Changes button to confirm the configuration setting.

Configure the WLAN interface:

Open WLAN Interface Setup page, enter the SSID "**MyWLAN**", Channel Number "**11**".



Press Apply Changes button to confirm the configuration setting.

5.2 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	**192.168.2.254**
Subnet Mask	**255.255.255.0**
Default Gateway	**192.168.2.10**
DNS Address	**168.95.1.1**

LAN configuration

IP Address	**192.168.1.254**
Subnet Mask	**255.255.255.0**
Default Gateway	**192.168.2.254**
DHCP Client Range	**192.168.1.100 – 192.168.1.200**

WLAN configuration

SSID	**MyWLAN**
Channel Number	**11**

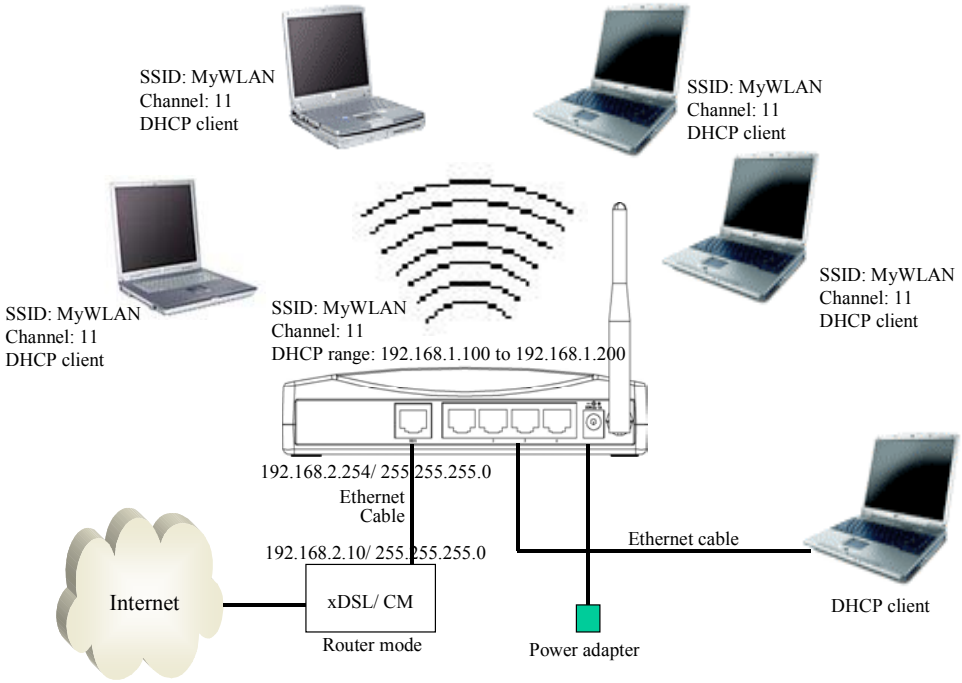
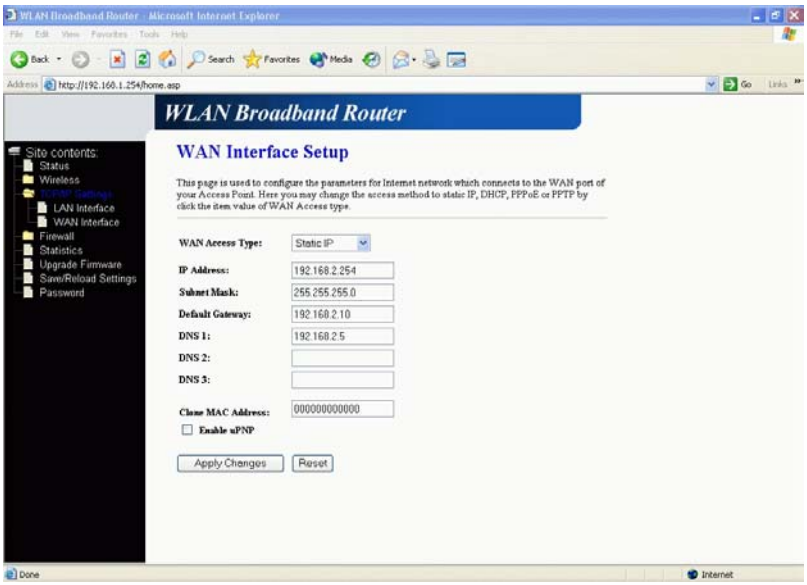


Figure 4 – Configuration Example Two – Fixed IP on the WAN

Configure the WAN interface:

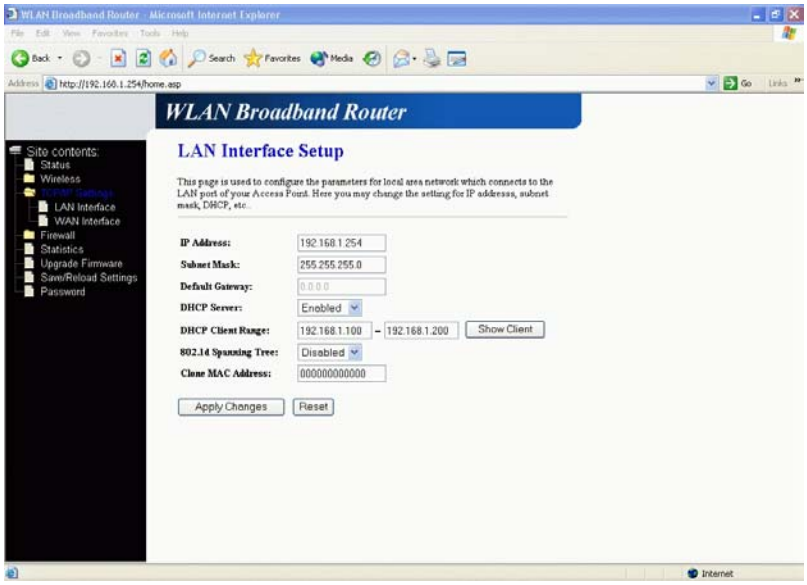
Open WAN Interface Setup page, select Fixed IP then enter IP Address "**192.168.2.254",** subnet mask "**255.255.255.0**", Default gateway "**192.168.2.10**".



Press Apply Changes button to confirm the configuration setting.

Configure the LAN interface:

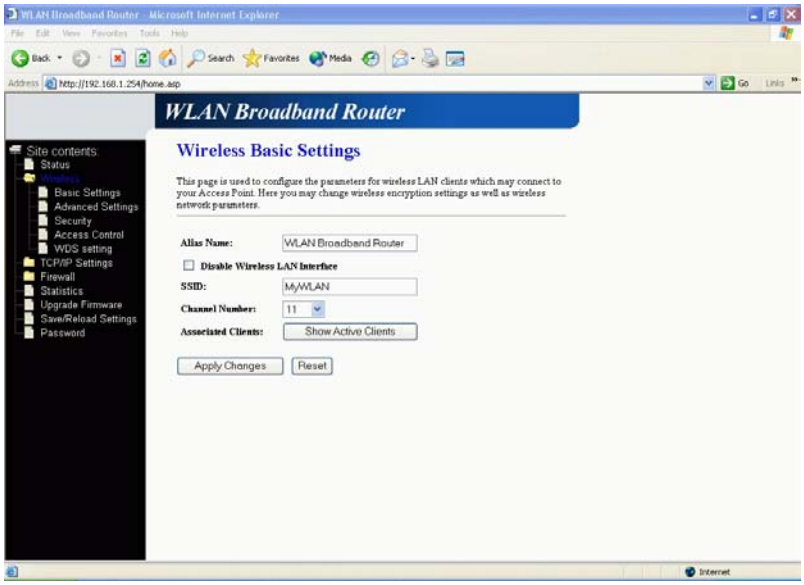
Open LAN Interface Setup page, enter the IP Address "**192.168.1.254**", Subnet Mask "**255.255.255.0**", enable DHCP Server, DHCP client range "**192.168.1.100**" to "**192.168.1.200**".



Press Apply Changes button to confirm the configuration setting.

Configure the WLAN interface:

Open WLAN Interface Setup page, enter the SSID "**MyWLAN**", Channel Number "11".



Press  button to confirm the configuration setting.