# User's Manual

## Version: 2.2

## Wireless LAN Broadband Router

## Trademarks



## Copyright Statement



## 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.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

## IMPORTANT NOTE:

## FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

INFORMATION TO USER:□
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.□

# Revision History

| DATE | REVISION |
|---|---|
| 2003/7/16 | First release |
| 2003/7/22 | Release 1.1; add information about time required on boot-up sequence. |
| 2003/7/24 | Release 1.2; modify the boot-up sequence notice in chapter 1 |
| 2003/8/4 | Release 2.0; add configuration examples |
| 2003/9/5 | Release 2.1; support multi-language including English, German and Spanish, change to DC v7.5 power supply |
| 2003/9/17 | Release 2.2; add FCC interference statement |

# Terminology

| | |
|---|---|
| ANSI | American National Standards Institute |
| AP | Access Point |
| CCK | **C**omplementary **C**ode **K**eying |
| 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 |
| 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 |
| 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 |
| WEP | Wired Equivalent Privacy |
| WLAN | Wireless Local Area Network |

# 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 | 801.11b(Wireless), 802.3(10BaseT), 802.3u(100BaseT) |
| Data Transfer Rate | 11Mbps(Wireless), 100Mbps(Ethernet) |
| Modulation Method | DBPSK/ DQPSK/ CCK |
| Frequency Band | 2.4GHz – 2.497GJz ISM Band, DSSS |
| RF Output Power | < 17 dBm |
| Receiver Sensitivity | 11Mbps better than 8% PER @ -80 dBm |
| Operation Range | 30 to 300 meters (depend on surrounding) |
| Antenna | External Antenna |
| LED | Power, Active (WLAN), Act/Link (Ethernet) |
| Security | 64 bit/ 128 bit WEP, port filtering, IP filtering, MAC filtering, port forwarding and DMZ hosting |
| LAN interface | One 10/100BaseT with RJ45 connector (WAN)<br>Four 10/100BaseT with RJ45 connectors (LAN) |
| Power Consumption | 7.5V DC Power Adapter |

| | |
|---|---|
| Dimension | 160 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 802.3x 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.

## 1.4 Front Panel Description

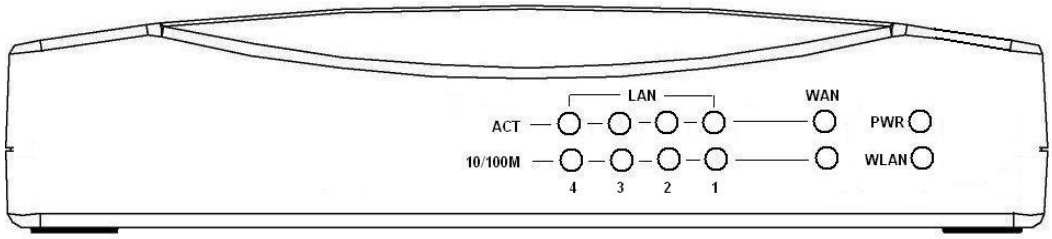



Figure 1 –WLAN Broadband Router Front Panel

| 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

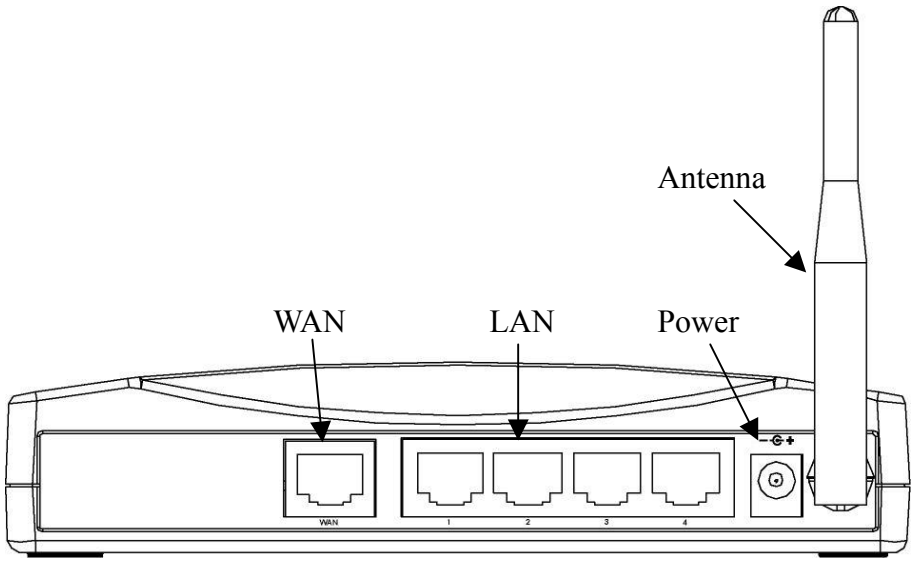



Figure 2 – WLAN Broadband Router Rear Panel

| Interfaces | Description |
|---|---|
| 1. 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. |
| 2. 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. |

| | |
|---|---|
| 3. 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. |
| 4. 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.

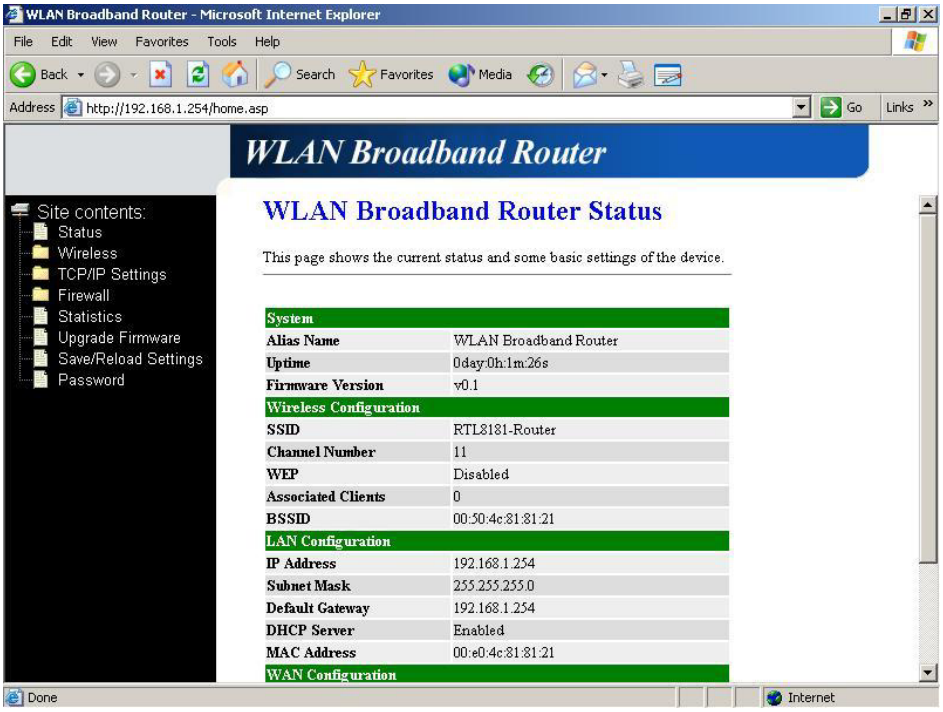
## 3.2 Connect to the WLAN Broadband Router

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

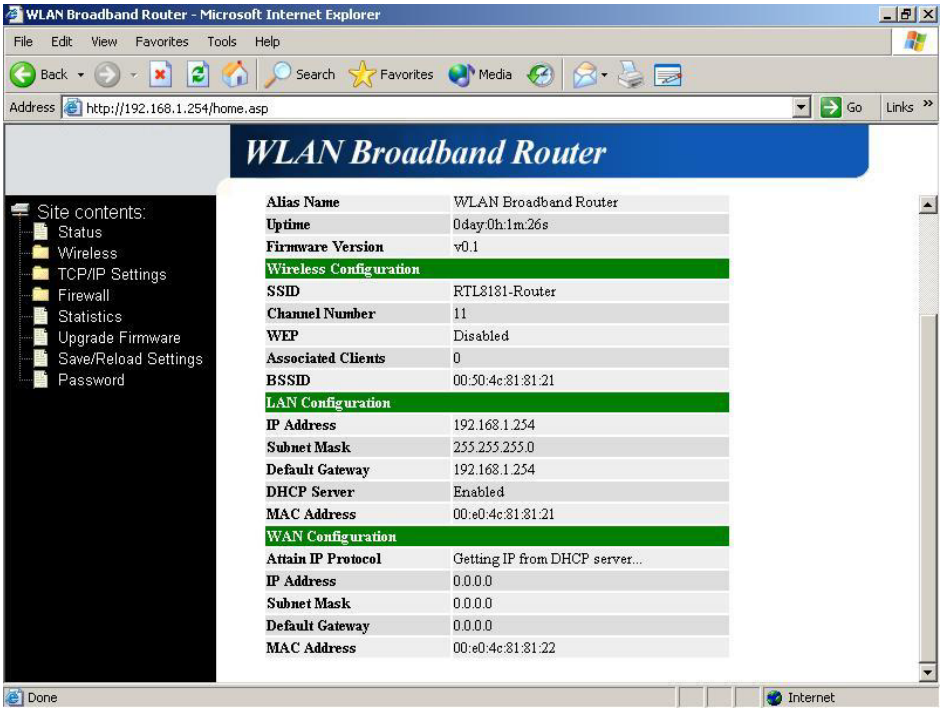
## 3.3 Management and configuration on the WLAN Broadband Router

### 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.




Screenshot – Status-1



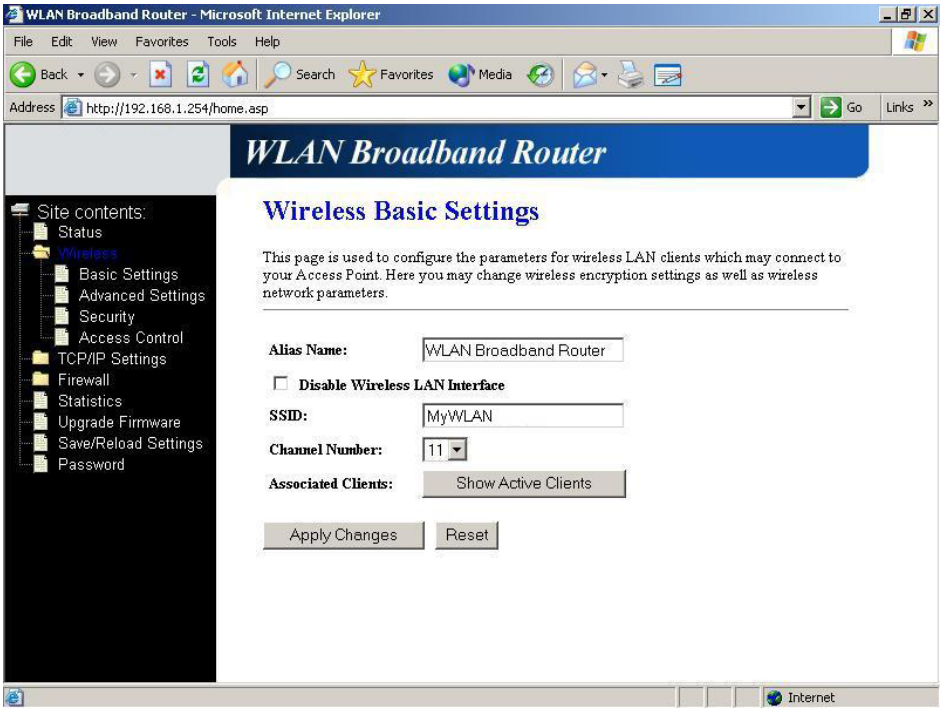

Screenshot – Status-2

| 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. |
| ***WEP*** | It shows the status of WEP 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.



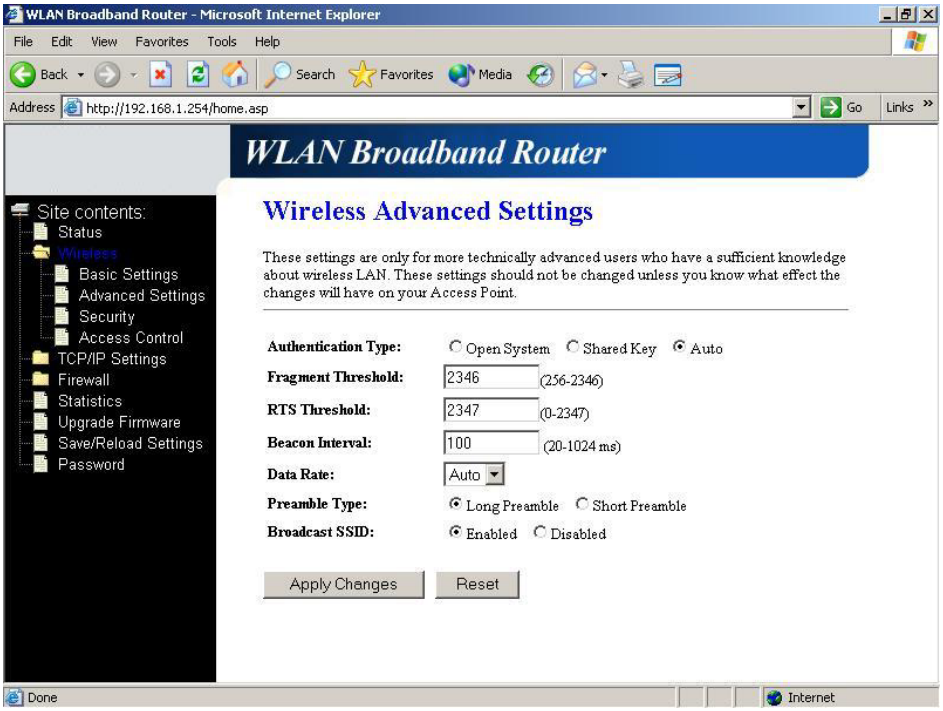

Screenshot – Wireless Basic Settings

| 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.



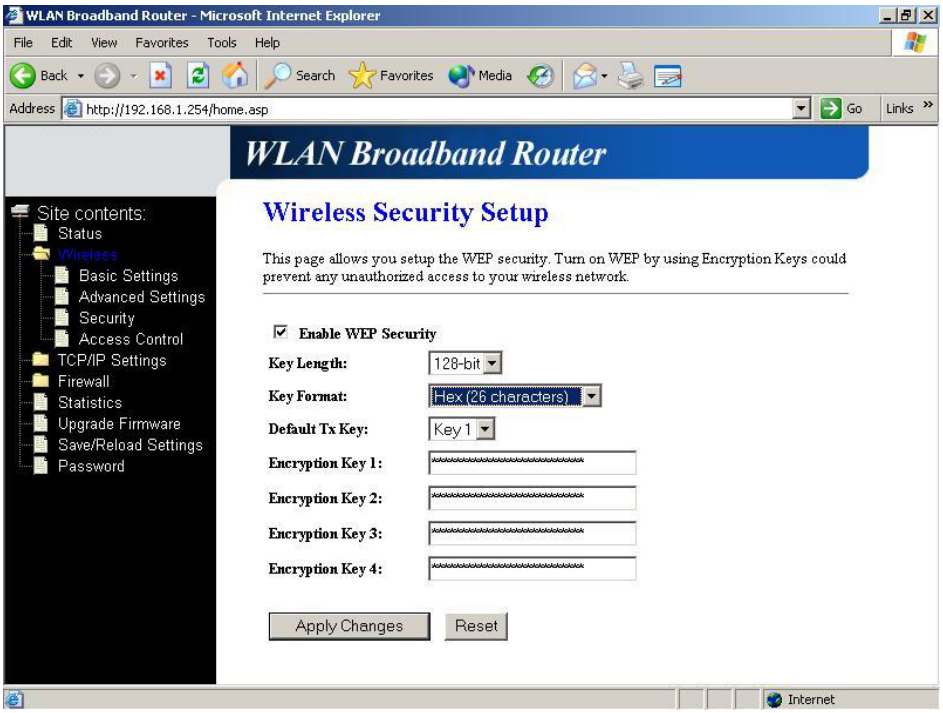

Screenshot – Wireless Advanced Settings

| 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.<br>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? |
| ***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 WEP security. Turn on WEP by using encryption keys could prevent any unauthorized access to your wireless network.




Screenshot – Wireless Security Setup

| Item | Description |
|---|---|
| ***Enable WEP Security*** | Click the check box to enable WEP security function. Refer to 4.9 What is WEP? |
| ***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.<br>The WEP key is composed of initialization vector (24 |

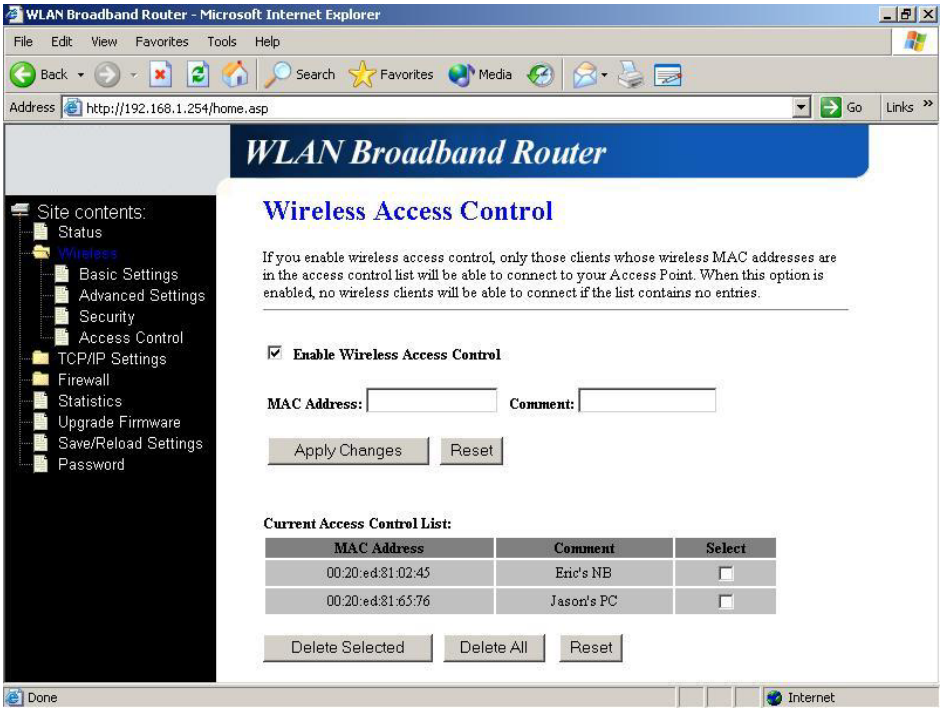
| | |
|---|---|
| | bits) and secret key (40-bit or 104-bit). |
| ***Key Format*** | Select the WEP shared secret key format from pull-down menu. The format can be chose between plant text (ASCII) and hexadecimal (HEX) code. |
| ***Default Tx Key*** | Set the default secret key for WEP security function. 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. |
| ***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.



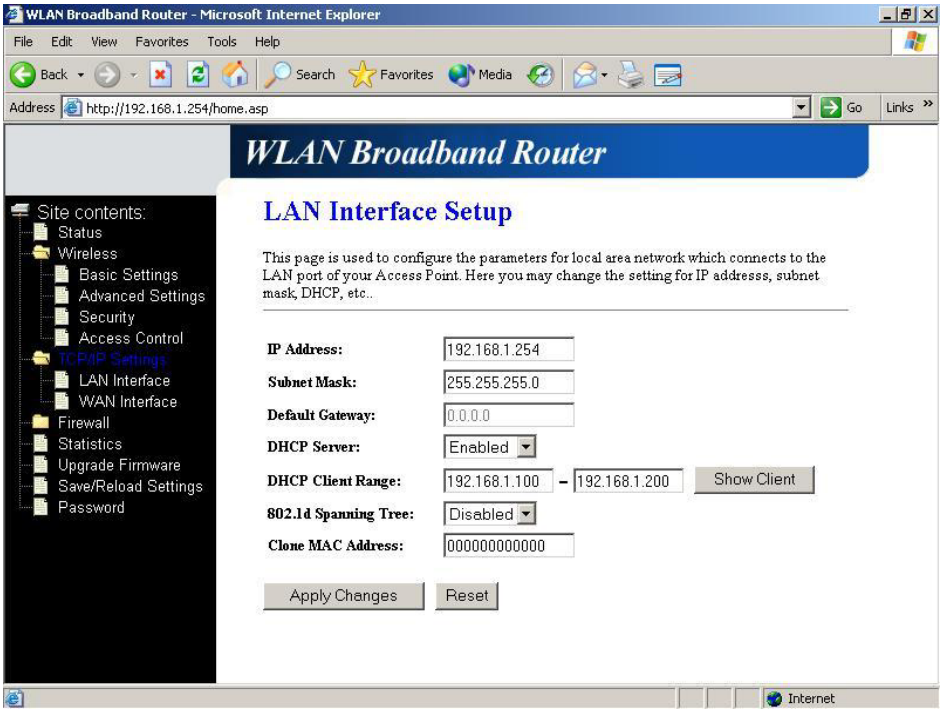

Screenshot – Wireless Access Control

| Item | Description |
|---|---|
| ***Enable WEP Security*** | 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 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.




Screenshot – 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.<br>Clone MAC address is designed for your special application that request the clients to register to a server machine with one identified MAC address.<br>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. |
| ***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. |

### 3.3.7 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 setting for IP address, PPPoE and DNS, etc.