IEEE 802.11b

X-Micro WLAN Broadband Router

User's Manual

Version 1.2

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Copyright Statement

INFORMATION TO USER

FCC INFORMATION

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.

The 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 instruction, may cause harmful interference to radio communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment dose 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.

Notice: The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification not expressly approved by the party responsible could void the user's authority to operate the device.

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 X-Micro 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 X-Micro 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 X-Micro WLAN Broadband Router includes the following items,

✓   The X-Micro WLAN Broadband Router
✓   The AC to DC 9V Power Adapter
✓   User's manual CD-ROM

1.2   Product Specifications

Product Name	X-Micro 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 @ -88 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) Four 10/100BaseT with RJ45 connectors (LAN)
Power Consumption	DC 9V Power Adapter
Dimension	160 x 110 x 35 mm
Operating Temperature	0 – 50ºC ambient temperature
Storage Temperature	-20 - 70ºC 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.
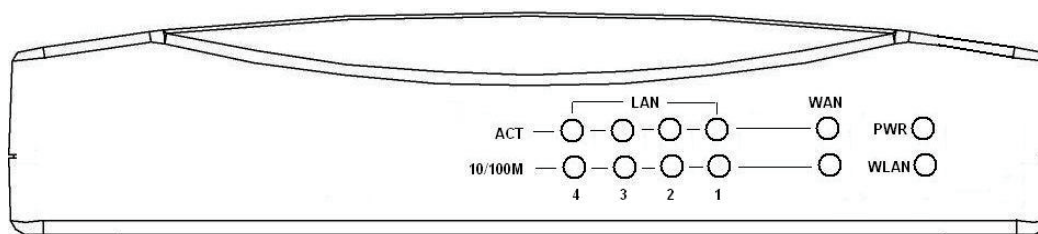
1.4   Front Panel Description

Figure 1 – X-Micro 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

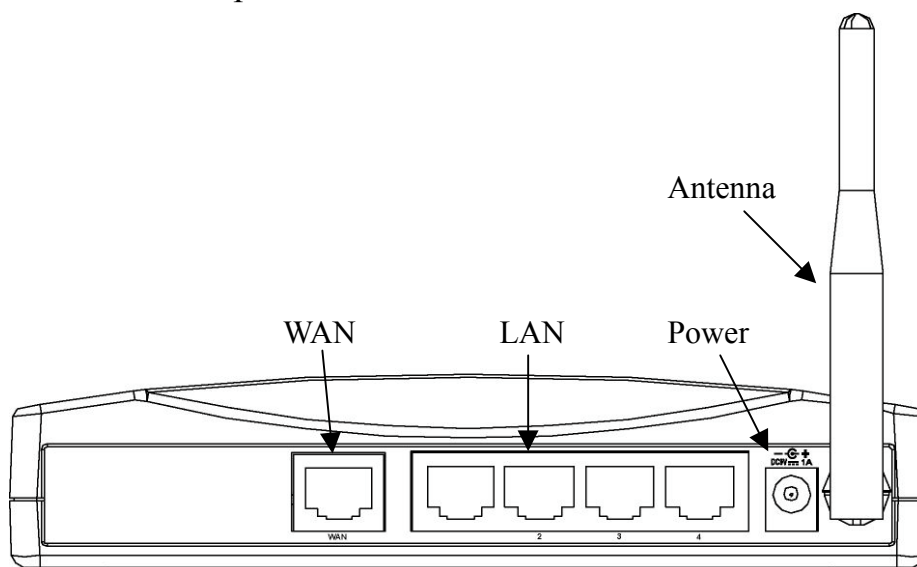|		interface.
6. LAN 10/100M LED	On	Connection speed is 100Mbps on LAN interface.
	Off	Connection speed is 10Mbps on LAN interface.

1.5 Rear Panel Description

Figure 2 – X-Micro 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 +9 V power supply connection. The external AC to DC adaptor provide adaptive power requirement to the X-Micro WLAN Broadband Router.
4. Antenna	The Wireless LAN Antenna.

2   Installation

2.1   Hardware Installation

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

The best transmission location for your X-Micro 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 X-Micro WLAN Broadband Router to your wired network.

Connect the Ethernet WAN interface of X-Micro 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 X-Micro WLAN Broadband Router.

Use only the AC/DC power adapter supplied with the X-Micro 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 X-Micro 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 X-Micro 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 X-Micro WLAN Broadband Router

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

3.3   Management and configuration on the X-Micro WLAN Broadband Router
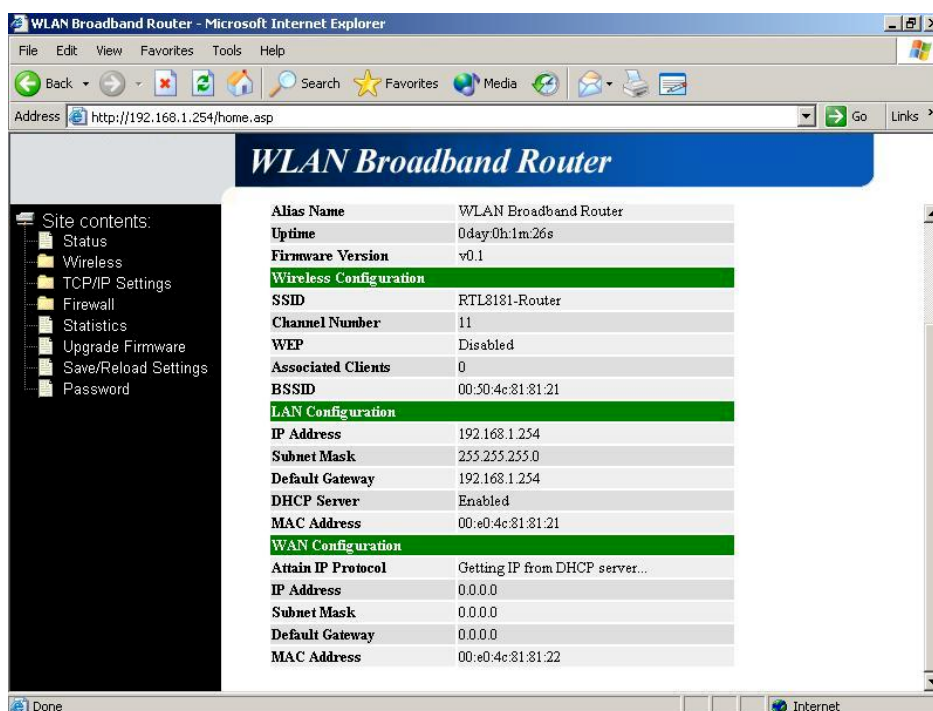
3.3.1   Status

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 X-Micro WLAN Broadband Router.
Uptime	It shows the duration since X-Micro WLAN Broadband Router is powered on.
Firmware version	It shows the firmware version of X-Micro WLAN Broadband Router.
Wireless configuration	
SSID	It shows the SSID of this X-Micro WLAN Broadband Router. The SSID is the unique name of X-Micro 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 X-Micro WLAN Broadband Router. BSSID is a six-byte address.
LAN configuration	
IP Address	It shows the IP address of LAN interfaces of X-Micro WLAN Broadband Router.
Subnet Mask	It shows the IP subnet mask of LAN interfaces of X-

	Micro 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 X-Micro WLAN Broadband Router.
WAN configuration	
Attain IP Protocol	It shows how the X-Micro 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 X-Micro WLAN Broadband Router.
Subnet Mask	It shows the IP subnet mask of WAN interface of X-Micro 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 X-Micro 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.
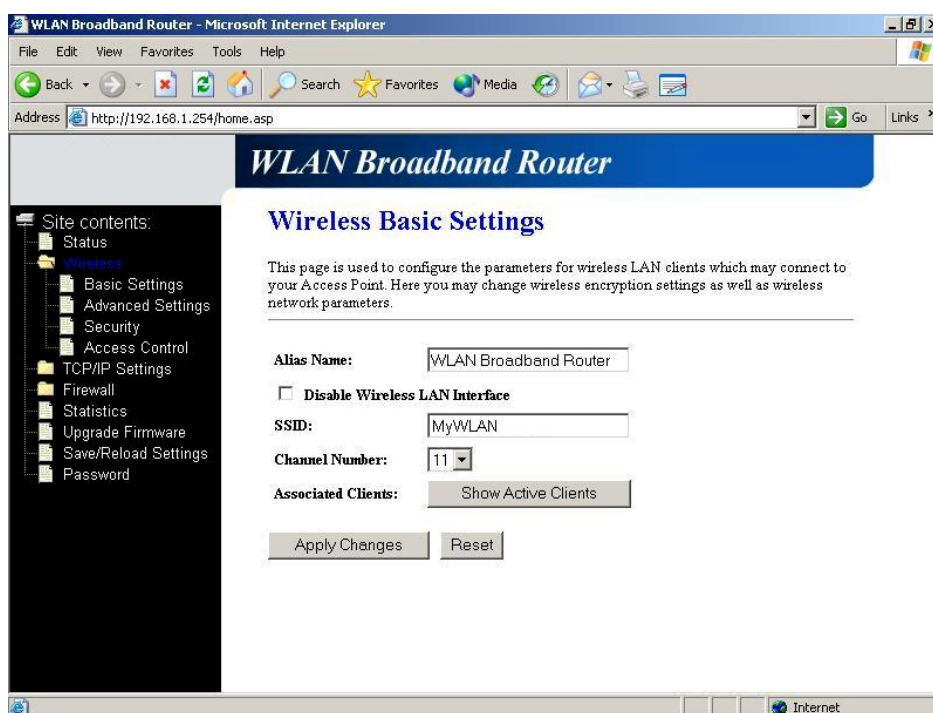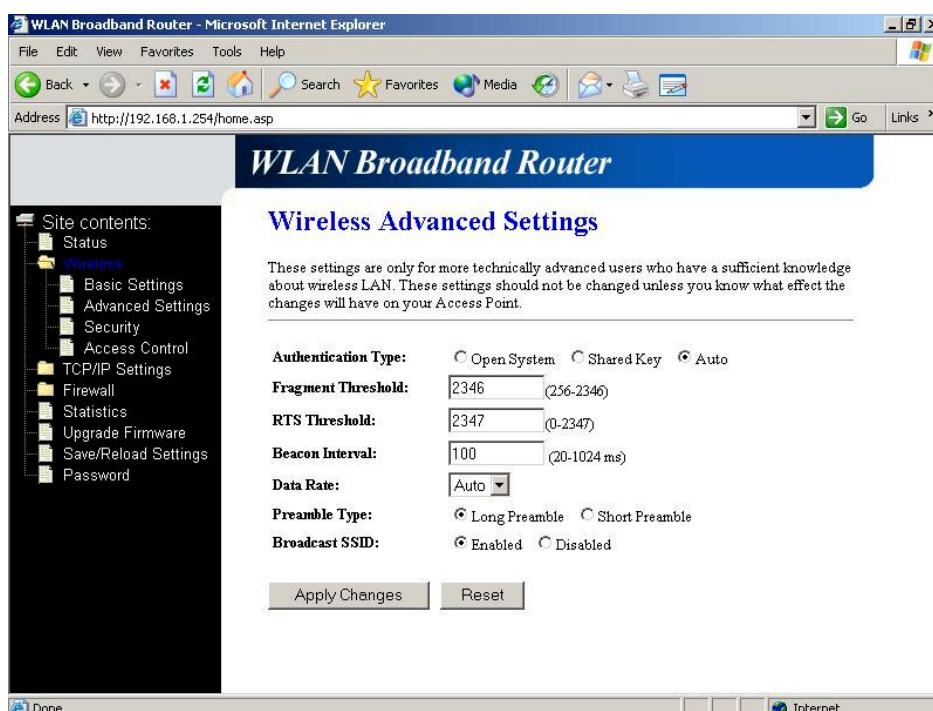
Screenshot – Wireless Basic Settings

Item	Description
Alias Name	It is the alias name of this X-Micro 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 X-Micro 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. 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.
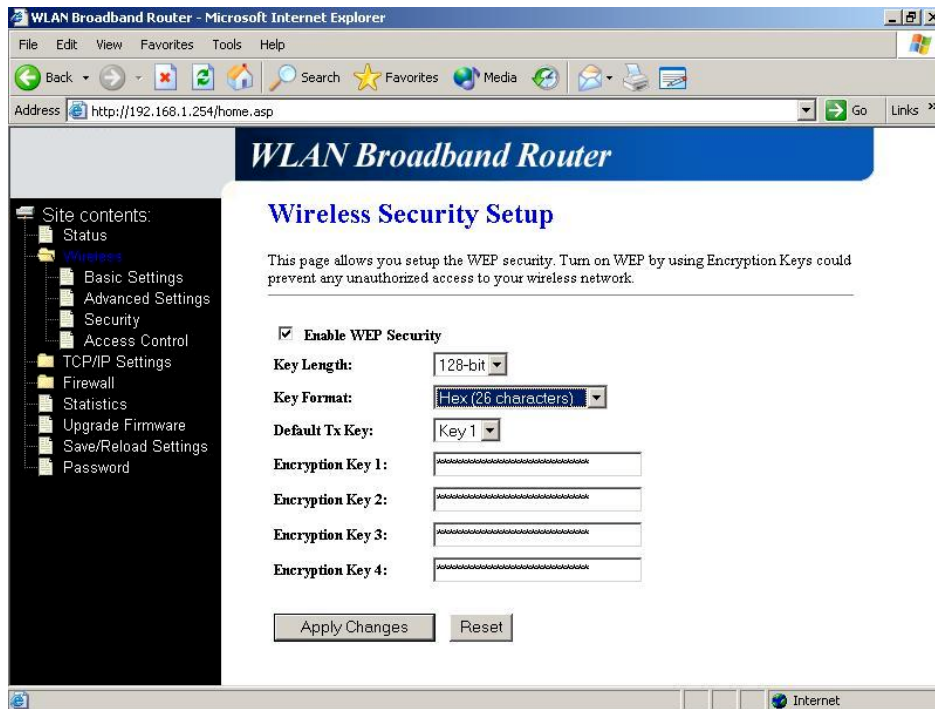
Screenshot – Wireless Security Setup

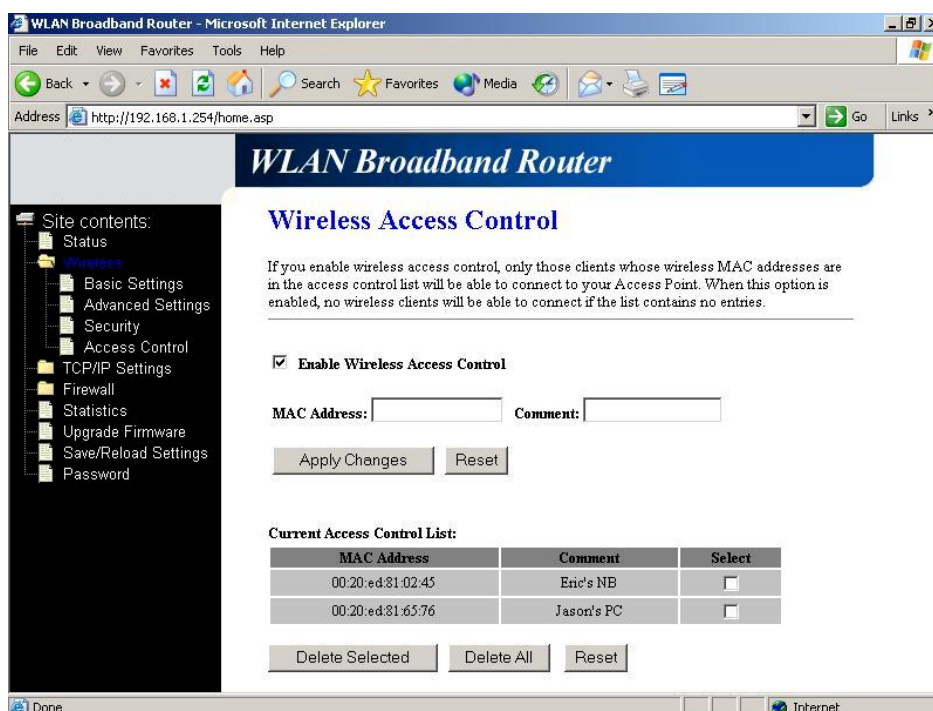| Item	Description
Enable WEP Security	Click the check box to enable WEP security function. Refer to <u>4.9 What is WEP?</u>
Key Length	Select the WEP shared secret key length from pull-down menu. The length can be chose between 64-bit and 128-bit (known as "WEP2") keys. The WEP key is composed of initialization 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.
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	10 hexadecimal codes
HEX	13 characters	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 X-Micro WLAN Broadband Router.
MAC Address	Fill in the MAC address of client to register this X-Micro 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 X-Micro WLAN Broadband Router.

Delete Selected	Click to delete the selected clients that will be access right removed from this X-Micro 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 X-Micro WLAN Broadband Router. Here you may change the setting for IP address, subnet mask, DHCP, etc.
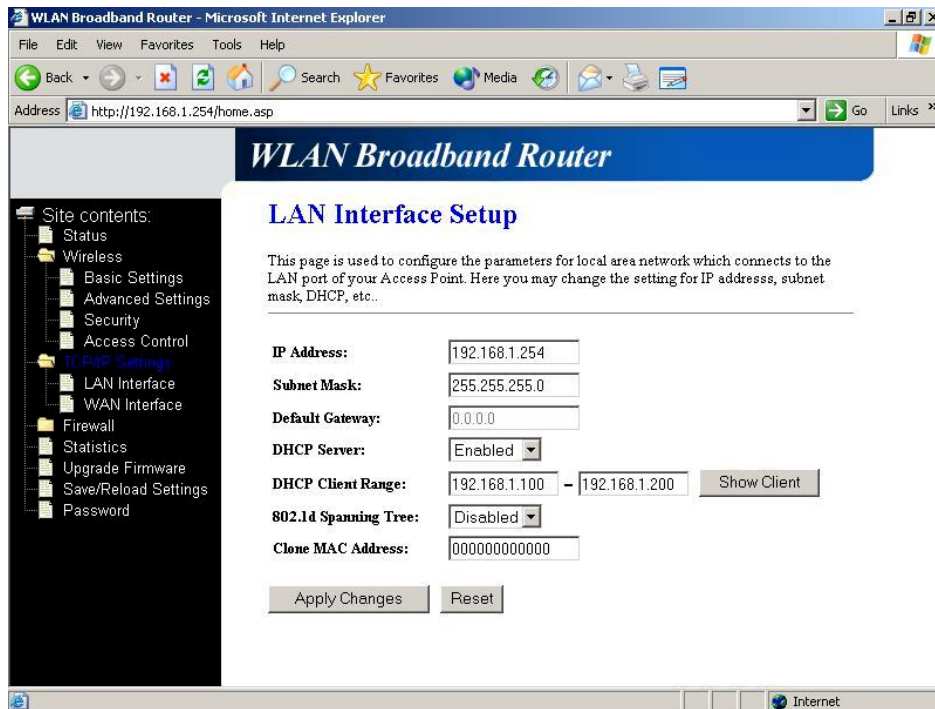
Screenshot – LAN Interface Setup

Item	Description
IP Address	Fill in the IP address of LAN interfaces of this X-Micro WLAN Broadband Router.
Subnet Mask	Fill in the subnet mask of LAN interfaces of this X-Micro 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