WRG-N15

IEEE802.11n Wireless Router

User Guide

November 2007

Contents

Before You Start

Please read and make sure you understand all the prerequisites for proper installation of your new Wireless Broadband Router. Have all the necessary information and equipment on hand before beginning the installation.

Installation Overview

NOTE: You must have an account setup with an ISP (Internet Service Provider) in order to use this device for Internet access. Contact your preferred broadband Internet service provider to set up an account.

The procedure to install the Wireless Broadband Router can be described in general terms in the following steps:

1. Gather information and equipment needed to install the device. Before you begin the actual installation make sure you have all the necessary information and equipment.
2. Install the hardware, connect the cables to the device and connect the power adapter.
3. Check the IP settings on your computer and change them if necessary so the computer can access the web-based management software built into the Wireless Broadband Router.
4. Use the web-based management software to configure the device to suit the requirements of your Internet service.

Packing List

Open the shipping carton and carefully remove all items. Make sure that you have the items listed here.

- One LinkTek WL11N Wireless Broadband Router
- One CD-ROM containing the User's Guide and Quick Installation Guide
- Ethernet cable
- One power adapter suitable for your electric service
- One Quick Installation Guide

CAUTION: The Wireless Broadband Router must be used with the power adapter included with the device. Using a power supply with a different voltage rating will damage and void the warranty for this product

If any of the above items are missing, please contact your reseller.

Installation Notes

In order to establish a connection to the Internet it will be necessary to provide information to the router that will be stored in its memory. For some users, only their account information (User Name and Password) is required. For others, various parameters that control and define the Internet connection will be required.

Internet Connection

The WL11N is intended for use with a broadband device such as an ADSL, xDSL or cable (CATV) modem. The physical connection to the Internet must first be established through a broadband device, typically this should be set up as an invisible bridge.

Operating Systems

The WL11N uses an HTML-based web interface for setup and management. The web configuration manager may be accessed using any operating system capable of running web browser software, including Microsoft Windows® operating systems.

Web Browser

Any common web browser can be used to configure the router using the web configuration management software. The program is designed to work best with more recently released browsers. The web browser must have JavaScript enabled. JavaScript is enabled by default on many browsers. Make sure JavaScript has not been disabled by other software (such as virus protection, firewall software or Internet security packages) that may be running on your computer.

Ethernet or Wireless Adapter

Any computer that uses the router must be able to connect to it through an Ethernet port or through the wireless 802.11n/g/b connection. The computer therefore must have either an Ethernet adapter or 802.11n/g/b adapter installed. Network adapters are standard for most computers sold presently.

Installation Information

Print this page and record the listed information here in case you have to re-configure your WAN (Internet) connection in the future or reset the device configuration settings.

Information you will need from your Internet service provider:		
Username	This is the Username that is used to log on to your Internet service provider's network. It is commonly in the form – user@isp.com.	Record your info here.
Password	This is the Password that is used, in conjunction with the Username above, to log on to your Internet provider's network.	
Internet Connection Type	This is the method that your ISP uses to send and receive data between the Internet and your computer.	
Information you will need about your WL11N Wireless Broadband Router:		
Username	This is the Username you will be prompted to enter when you access the WL11N configuration screens using a Web browser. The default Username is **admin**.	Record your info here.
Password	This is the Password you will be prompted to enter when you access the WL11N's configuration windows using a Web browser. The default Password is **admin**.	
LAN IP address	This is the IP address you will enter into the Address field of your Web browser to access the router's configuration windows using a Web Browser. The default IP address is **192.168.1.1**.	
LAN Subnet Mask	This is the subnet mask used by the WL11N, and will be used throughout your LAN. The default subnet mask is **255.255.255.0**.	
Information you will need about your LAN or computer:		
DHCP Client status	Your Wireless Broadband Router is configured, by default, to be a DHCP server. This means that it can assign an IP address, subnet mask, and a default gateway address to computers on your LAN. The range of IP addresses the will assign are from **192.168.1.100** to **192.168.1.199** using the default DHCP server settings. Computers must to be configured to Obtain an IP address automatically (as DHCP clients) to use the DHCP server.	Record your info here.

Information about your Wireless LAN:		
SSID		Record your info here.
Channel		
Authentication		
WEP (Hex/ASCII)	Key 1: Key 2: Key 3: Key 4:	Record your info here.
WPA (802.1x)	RADIUS IP Address: Port: Secret:	
WPA-PSK	Pass phrase:	

Introduction

This section provides a brief description of the router, its associated technologies, and a list of router features.

Router Description and Operation

The LinkTek WL11N Wireless Broadband Router is designed to provide connectivity for your private Ethernet and 802.11g/802.11b/802.11n wireless network to the Internet via ADSL, xDSL, cable modem or other common broadband connection.

The router is easy to install and use. The four standard Ethernet ports are used to connect computers or other Ethernet devices to the wired LAN (Local Area Network); the embedded wireless access point is used for connecting 802.11b, 802.11g and 802.11n wireless devices.

Router Features

The LinkTek WL11N Wireless Broadband Router provides the following features:

- **802.11n Wireless LAN** – Wireless connectivity for IEEE 802.11n/802.11g/802.11b workstations and devices.
- **Wi-Fi Protected Status** – Quick, effective and simple wireless security implementation for WPS devices.
- **Broadband Connection Sharing** - Connects multiple computers to a Broadband (Cable or DSL) modem to share the Internet connection.
- **Ethernet Switch -** Allows sharing of an Internet connection with multiple computers and devices.
- **VPN Supported -** Supports multiple and concurrent IPsec and PPTP pass-through sessions, so multiple users behind the WL11N can access corporate networks through various VPN clients more securely.
- **Advanced Firewall, MAC Filtering, and WebSite Filtering Features -** The Web-based user interface displays a number of advanced network management features including:
- **Port Forwarding Supported -** Enables you to expose WWW, FTP and other services on your LAN to be accessible to Internet users.
- **Special Application Supported -** Special applications requiring multiple connections, like Internet gaming, video conferencing, Internet telephony and so on. The WL11N can sense the application type and open a multi-port tunnel for it.
- **DMZ Host Supported -** Allows a networked computer to be fully exposed to the Internet. This function is used when the Special Application feature is insufficient to allow an application to function correctly.

Front View

The LED indicators on the Wireless Broadband Router are located on the front panel the device.

Front of Wireless Broadband Router

Place the router in a location where it is not exposed to heat and where the LED indicators are visible.

LED Display

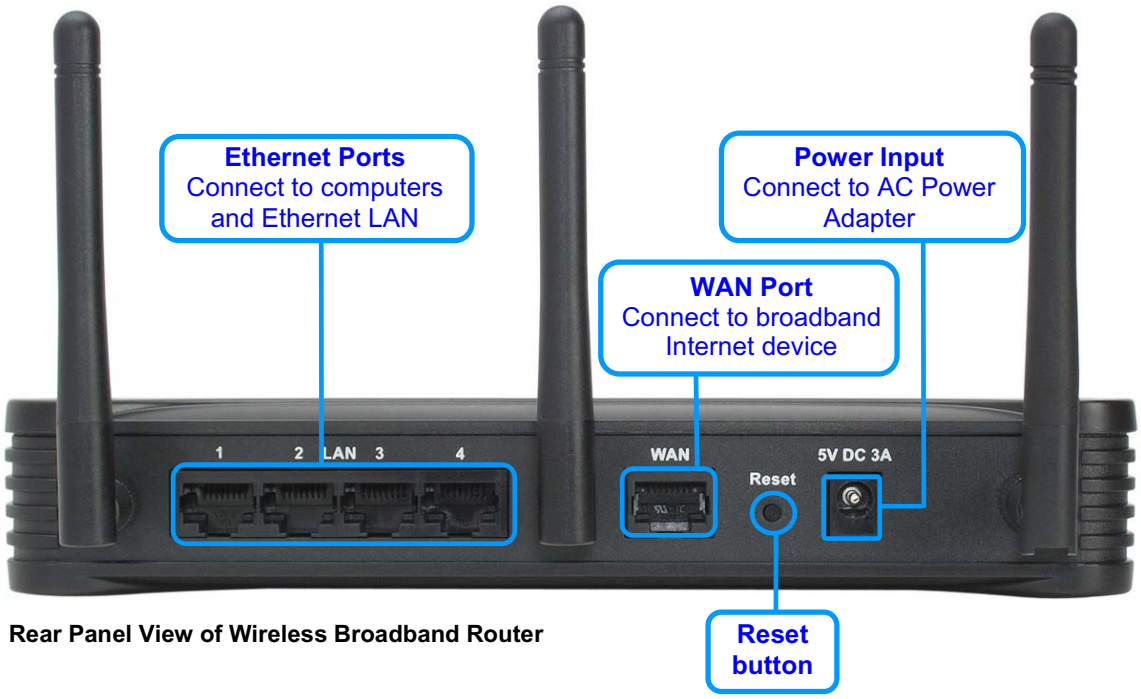
Place the router in a location that permits an easy view of the LED indicators on the front of the device.

The LED indicators include the **WPS**, **LAN**, **WLAN**, **WAN**, **Status** and **Power** indicators. The **WLAN** and Ethernet indicators monitor link status and activity (Link/Act).

WPS	Blinks blue for 120 seconds while searching for WPS enabled station. See Wi-Fi Protected Setup (WPS) for more information.
LAN (1-4)	A solid green light indicates a valid link on startup. This light blinks when there is activity currently passing through the Ethernet ports.
WLAN	Steady green light indicates a wireless connection. A blinking green light indicates activity on the WLAN interface
WAN	Lights steady green during power on self-test (POST). Once the connection status has been settled, the light will blink green. If the indicator lights steady green after the POST, the system has failed and the device should be rebooted.
Status	Blinks green when system function is normal.
Power	Steady green light indicates the unit is powered on. When the device is powered off this remains dark.

Rear Panel Connections

All cable connections to the router and the power adapter connect at the rear panel. Use the Reset button to restore the settings to the factory default values. See the next section for instructions to connect the power adapter and power on the router.



Rear Panel View of Wireless Broadband Router

CAUTION: Using a power supply with a different voltage rating will damage the device and void the warranty of this product.

Connecting Devices to the Router

The Wireless Broadband Router connects three separate networks, a private Ethernet LAN, Wireless LAN and the public Internet (WAN). Choose a location for the router where Ethernet devices can be connected to the LAN ports and the WAN port can be easily connected to the cable modem or DSL modem that provides the broadband Internet connection. Typically the broadband device is configured as a bridge, however some devices allow for more complex options. Consult the user manual of the broadband device for more information on how best to configure the broadband Internet connection.

The router should be protected from dust, water, moisture and heat. Make sure network cables, power adapters and power cords are placed safely out of the way so they do not create a tripping hazard. As with any electrical appliance, observe common sense safety procedures.

Place the router on a shelf, desktop, or other secure stable platform. Ideally you should be able to view the LED indicators on the front panel.

Connect Router to Ethernet

The router can be connected to computers or other Ethernet devices using the four Ethernet LAN ports on the rear panel. Any connection to an Ethernet concentrating device such as a switch or hub must operate at a speed of 10/100 Mbps only. When connecting the router to any Ethernet device capable of operating at speeds between 10~100Mbps, be sure that the device has auto-negotiation (NWay) enabled for the connecting port. Use standard CAT5 or better Ethernet cable with RJ-45 connectors. The Ethernet LAN ports are auto MDI-II/MDI-X so you can use straight-through or crossover Ethernet cabling.

The rules governing Ethernet cable lengths apply to the LAN to router connection. Be sure the Ethernet cables connected to the LAN ports do not exceed 100 meters in length.

Connecting through 802.11 Wireless

The default wireless settings of the access point allow roaming 802.11g and 802.11b wireless clients to associate with it. The first time you set up the router however, use the Ethernet connection to configure the channel and SSID. For wireless client-to-Internet connection through the router, first configure the Internet connection through the Ethernet. When the Internet connection has been established, make sure the wireless clients are configured as DHCP clients if you are using the router's DHCP server. Otherwise, make certain the wireless clients have IP settings that allow them to use the router as a gateway to the Internet.

General Guide to Setting Up a Wireless Network

In order to get the best performance from the wireless component of the router, you should have some basic understanding of how wireless networks operate. Wireless networking is a relatively new technology and there are more factors to consider when setting up or designing a wireless network than designing a wired network. If you are setting up a wireless network, especially if you are using multiple access points and/or covering a large area, good planning from the outset can ensure the best possible reliability, performance, coverage and effective security.

Radio

Wireless local network (as called WI-FI) devices such as notebook computers and wireless access points use electromagnetic waves within a broad, unlicensed range of the radio spectrum (between 2.4GHz and 2.5GHz) to transmit and receive radio signals. A wireless access point (AP) becomes a base station for the wireless nodes (notebook computer for example) in its

broadcast range. Often a wireless access point such as the AP embedded in the LinkTek WL11N, will also provide a connection to a wired network - usually Ethernet - and ultimately an Internet connection. The IEEE 802.11 standard precisely defines the encoding techniques used to digitally used for data transmission. The embedded wireless access point can be used by IEEE 802.11g, 802.11b and 802.11n devices. These standards are compatible but use different algorithms for data transmission.

802.11g uses a method called Orthogonal Frequency Division Multiplexing (OFDM) for transmitting data at higher data rates. OFDM is a more efficient encoding method than Direct Sequence Spread Spectrum (DSSS) transmission, the method used by 802.11b devices. However, in order to support different data transmission rates while also be compatible with 802.11b, 802.11g uses a combination of OFDM and DSSS when 802.11b devices are present.

Range

An access point will send and receive signals within a limited range. Also, be aware that the radio signals are emitted in all directions giving the access point a spherical operating range. The physical environment in which the AP is operating can have a huge impact on its effectiveness. If you experience low signal strength or slow throughput, consider positioning the router in a different location. See the discussion below concerning the wireless environment and location of the AP (LinkTek WL11N).

SSID and Channel

Wireless networks use an SSID (Service Set Identifier) as means of identifying a group of wireless devices, similar to a domain or subnet. This allows wireless devices to roam from one AP to another and remain connected. Wireless devices that wish to communicate with each other must use the same SSID. Several access points can be set up using the same SSID so that wireless stations can move from one location to another without losing connection to the wireless network.

The embedded wireless access point of the router operates in *Infrastructure* mode. It controls network access on the wireless interface in its broadcast area. It will allow access to the wireless network to devices using the correct SSID after a negotiation process takes place. By default, the LinkTek WL11N broadcasts its SSID so that any wireless station in range can learn the SSID and ask permission to associate with it. Many wireless adapters are able to survey or scan the wireless environment for access points. An access point in Infrastructure mode allows wireless devices to survey that network and select an access point with which to associate. You may disable SSID broadcasting in the web manager’s wireless menu.

In addition, the AP can use different channels (frequency bands) to avoid unwanted overlap or interfere between control zones of separate APs. Wireless nodes must use the same SSID and the same channel as the AP with which it wishes to associate. However, because of the nature of the CSMA/CA (carrier sense multiple access with collision avoidance) protocol, using the same channel on two different APs can contribute significantly to wireless congestion. If you are using multiple APs on your network and are experiencing low throughput or significant transmission delay, carefully consider how channels are assigned to the different APs.

Wireless Security

Various security options are available on the LinkTek WL11N including open or WEP and WPA (including WPA-PSK). Authentication may use an open system or a shared key. Read below for more information on configuring security for the wireless interface.

Installation Considerations for Wireless LAN

Many physical environmental factors can impact wireless networks. Radio waves are used to carry the encoded data between devices. These radio transmissions can become degraded due to signal attenuation, multi-path distortion and interference or noise. Attenuation simply means that the strength of the signal weakens with the distance it travels, even if the transmission path is unobstructed. Multi-path distortion occurs when radio signals bounce off objects like walls, ceilings, metal appliances, etc. This may cause a signal to be duplicated, with each separate yet identical signal arriving at a receiver at different times. Interference and noise from electrical devices such as microwave ovens, fluorescent lights, automobile engines and other radio emitting devices can cause signal degradation. With all of this in mind, choose a location for all access points on the wireless LAN.

Wireless networking lets you access your network from nearly anywhere you want. However, the number of walls, ceilings, or other objects that the wireless signals must pass through can limit signal range. Typical ranges vary depending on the types of materials and background RF noise in your home or business. To maximize range and signal strength, use these basic guidelines:

- Keep the number of walls and ceilings between the access point and other network devices to a minimum - each wall or ceiling can reduce your wireless device's range from 3-90 feet (1-30 meters.) Position wireless devices so that the number of walls or ceilings is minimized.
- Be aware of the direct line between network devices. A wall that is 1.5 feet thick (.5 meters), at a 45-degree angle appears to be almost 3 feet (1 meter) thick. At a 2-degree angle it looks over 42 feet (14 meters) thick! Position devices so that the signal will travel straight through a wall or ceiling (instead of at an angle) for better reception.
- Materials can impede the wireless signal - a solid metal door or aluminum studs may have a negative effect on range. Try to position wireless devices and computers with wireless adapters so that the signal passes through drywall or open doorways and not dense, especially metallic, materials. Also, note that metal filing cabinets and appliances can reflect radio signals. When these metal objects are moved around, your wireless network may be affected.
- Keep your access point away (at least 3-6 feet or 1-2 meters) from electrical devices or appliances that generate extreme RF noise such as microwave ovens, CRT monitors, motors, etc.

Power on Wireless Broadband Router

CAUTION: The Wireless Broadband Router must be used with the power adapter included with the device. Using a power supply with a different voltage rating will damage and void the warranty for this product

To power on the Wireless Broadband Router:

1. Insert the AC Power Adapter cord into the power receptacle located on the rear panel of the Wireless Broadband Router and plug the adapter into a suitable nearby power source. See the back panel illustration above to view the power receptacle.

2. The Power LED indicator will immediately light green and remain lit. The Status LED should light steady green initially and begin to blink after a few seconds.

3. If an Ethernet port is connected to a computer or other device, look at the Ethernet Link/Act LED indicators to make sure they have valid connections. The Wireless Broadband Router will attempt to establish the WAN connection, if the WAN line is connected and the connection is properly configured the WAN LED indicator will light up after several seconds.

Factory Reset Button

The Wireless Broadband Router may be reset to the original factory default settings by depressing the reset button for a few seconds while the device is powered on. Use a ballpoint or paperclip to gently push down the reset button. Remember that this will wipe out any settings stored in flash memory including user account information and LAN IP settings. The device settings will be restored to the factory default IP address **192.168.1.1** and the subnet mask is **255.255.255.0**, the default management Username is **admin** and the default Password is **admin**.

The router may also be reset to factory default configuration settings through the web management interface.

Configuration

All device configuration for the router is done through the web-based management software. Use a standard web browser with JavaScript enabled to connect to the web manager. Make sure the proxy settings for the browser do not require use of a proxy server.

IP Settings on Your Computer

In order to configure your system to receive IP settings from the router it must first have the TCP/IP protocol installed. If you have an Ethernet port on your computer, it probably already has TCP/IP protocol installed. The DHCP server will automatically enable your computer to use a browser to manage the router. Configuring IP Settings on Your Computer on page 72 describes how to change the IP configuration for a computer running a Windows operating system to be a DHCP client. If you are running another operating system, make sure your computer is configured as a DHCP client so it can automatically obtain IP settings from the router. Some operating systems will automatically select the best IP settings. Consult the user manual for the operating system (OS) if you are unsure.

For computers using manually configured IP settings, make sure the IP address is on the same subnet as the router. The computer should use an IP address in the range 192.168.1.2 to 192.168.1.254 with a subnet mask of 255.255.255.0.

NOTE: If you are not sure how to configure your Windows computer to be a DHCP client, see Configuring IP Settings on Your Computer in Configuring IP Settings on Your Computer.

Access the Configuration Manager

In order to make sure your computer's IP settings allow it to communicate with the router, it is advisable to configure your system be a DHCP client – that is, it will get IP settings from the router. Configuring IP Settings on Your Computer on page 72 describes how to configure different Windows operating systems to "Obtain IP settings automatically".

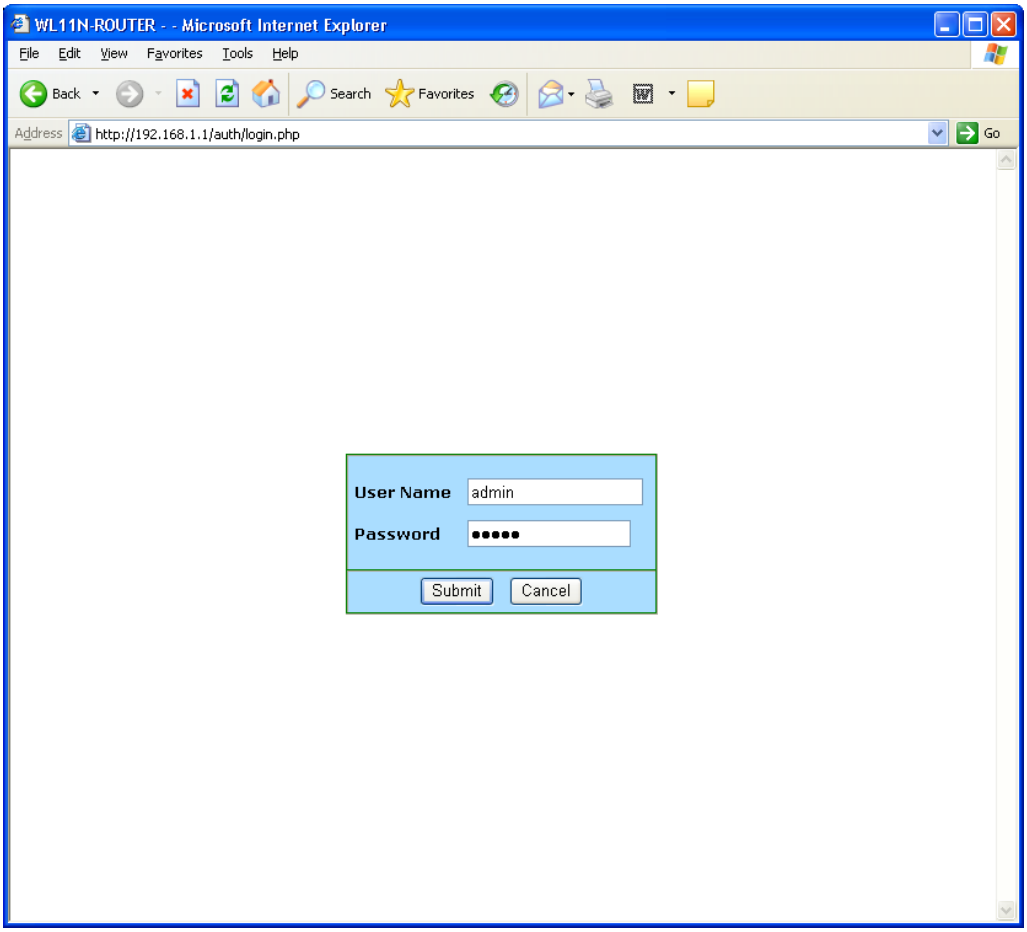
Be sure that the web browser on your computer is not configured to use a proxy server in the Internet settings. In Windows Internet Explorer, you can check if a proxy server is enabled using the following procedure:

1. In Windows, click on the **Start** button and choose **Control Panel**.
2. In the **Control Panel** window, click on the **Network and Internet Options** icon.
3. In the **Network and Internet Connections** window, click the **Internet Options** icon.
4. In the **Internet Properties** window, click on the **Connections** tab and click on the **LAN Settings** button
5. Verify that the "Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections)." option is NOT checked. If it is checked, click in the checked box to deselect the option and click **OK**.

Alternatively, you can access this **Internet Options** menu using the **Tools** pull-down menu in Internet Explorer.

Login to Home Page

To use the web-based management software, launch a suitable web browser and direct it to the IP address of the router. Type in **http://** followed by the default IP address, **192.168.1.1** in the address bar of the browser. The URL in the address bar should read: **http://192.168.1.1**. Type in the default User Name admin and the default Password admin then click the **Submit** button to access the web-based manager.

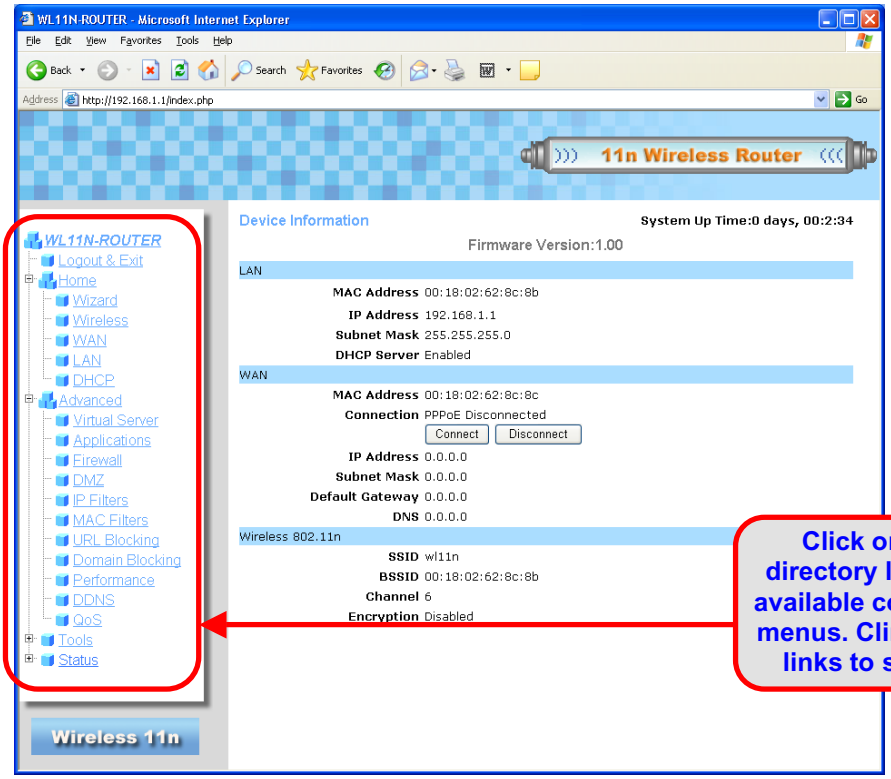


Enter Password

It is recommended to change the web-based manager access user name and password once you have verified that a connection can be established. The user name and password allows any PC within the same subnet as the router to access the web-based manger.

Web Manager

When you successfully connect to the web manager, the **Device Information** display in the **Status** menu directory is displayed. For quick configuration of the Internet connection, launch the Setup Wizard in the Home directory.



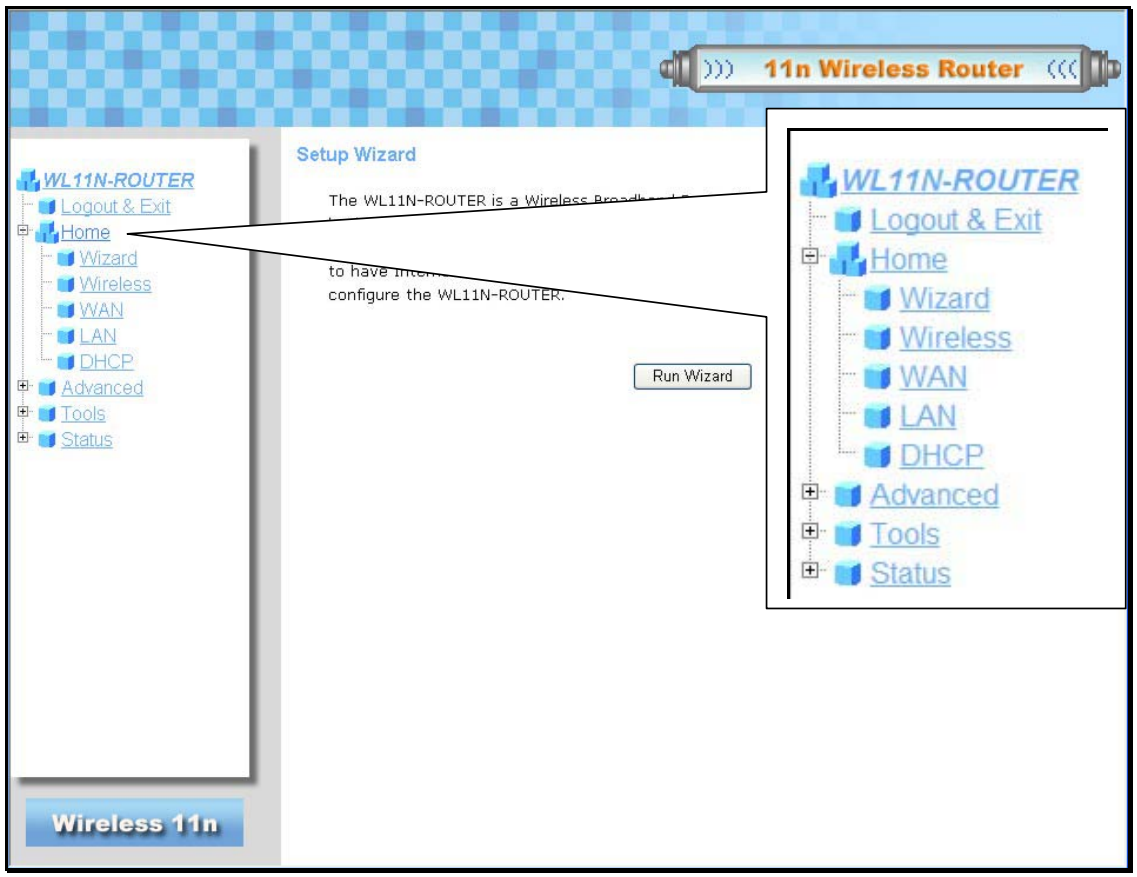
Web Manager – First Time Log On

All configuration and management of the router is done using the web-based management interface. To view the menus contained in each menu directory, click the + symbol to expand the menu tree.

Parent Directory	Configuration and Read-only menus
Home	Click the Home link to access the Setup Wizard and the menus used to configure the basic router settings. The Home directory menus are Wizard, Wireless, WAN, LAN and DHCP.
Advanced	Click the Advanced link to access the Virtual Server, Applications, Firewall, DMZ, IP Filters, MAC Filters, URL Blocking, Domain Blocking, Wireless Performance, DDNS and QoS menus.
Tools	Click the Tools link to access the Administrator (used to set the system password), Time, System, Firmware and Miscellaneous menus.
Status	Click the Status link to view the DHCP Clients, View Log, Wireless Clients and Statistics displays.

Basic Configuration – Home Directory Menus

The first time you setup the router it is recommended that you configure the WAN connection using a single computer making sure that both the computer and the router are not connected to the Ethernet LAN or other Ethernet devices. Once the Internet connection is configured and working, go ahead and connect other Ethernet and wireless devices.

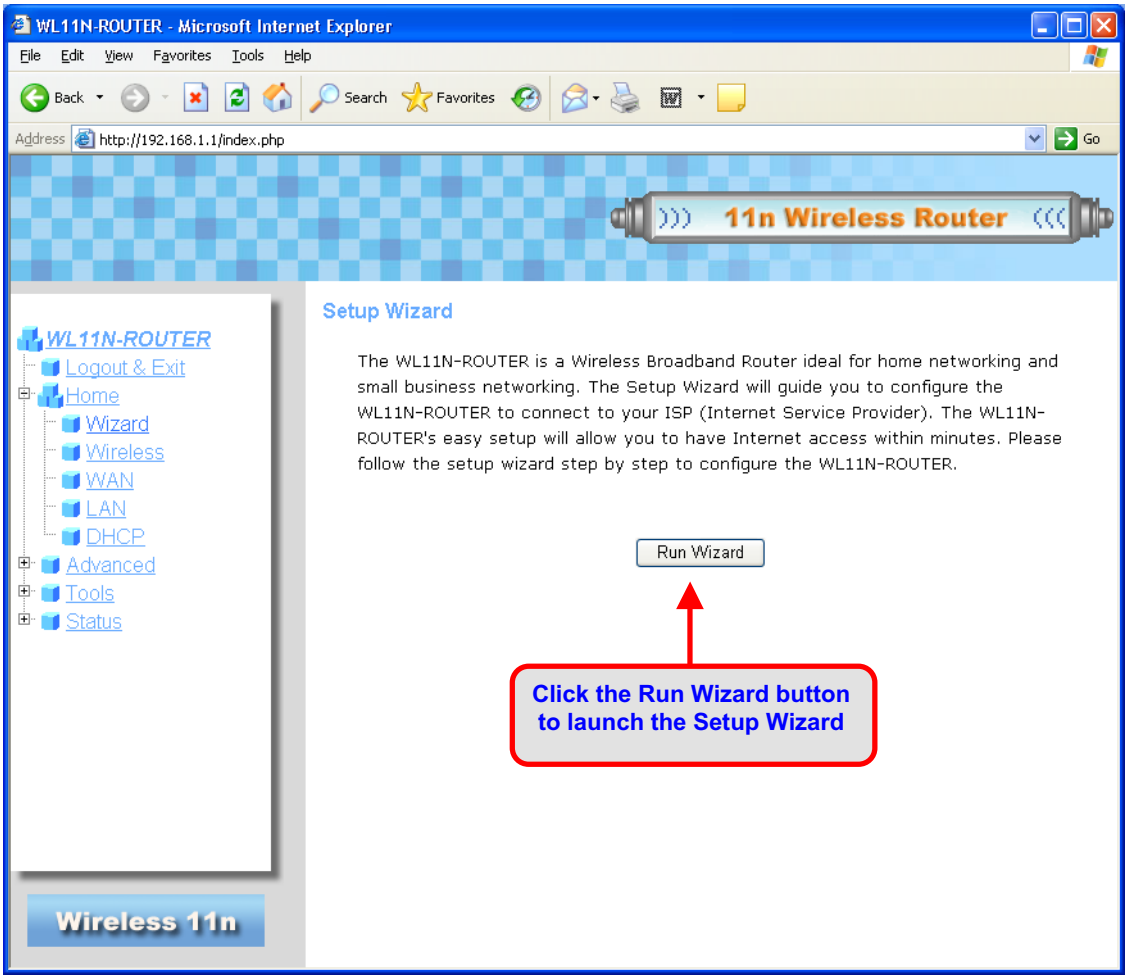


Home Directory Menus

The Setup Wizard page is the first page to appear when clicking on the Home directory link.

Setup Wizard

To use the Setup Wizard, click the **Run Wizard** button in the first browser window that appears in the Home directory and follow the instructions in the pop-up window that appears.



Launch Setup Wizard

Follow the instruction below to the type of connection used for your broadband Internet connection.

Using the Setup Wizard

The initial window summarizes the setup process. Click the **Next** button to proceed. You may stop using the Setup Wizard at any time by clicking the **Exit** button. If you exit the wizard you will return to the **Setup Wizard** window without saving any of the settings changed during the process.

The first pop-up window of the Setup Wizard lists the basic steps in the process. These steps are as follows:

1. Set the system password
2. Set the system time.
3. Configure the connection to the Internet.
4. Set the wireless configuration.
5. Save the new configuration settings and reboot the system.

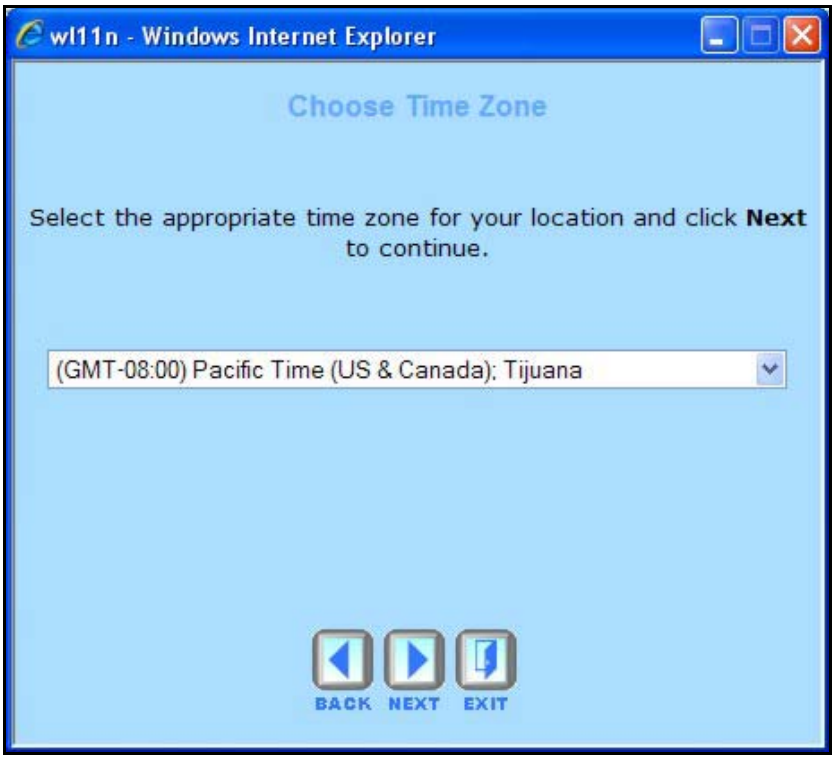
Using the Setup Wizard- Set System Password

Change the password used for management access of the router. Type the new **Password** and **Confirm** it in the spaces provided. Click the **Next** button to proceed.

NOTE: The System user name “admin” cannot be changed.

Using the Setup Wizard - Choose Time Zone

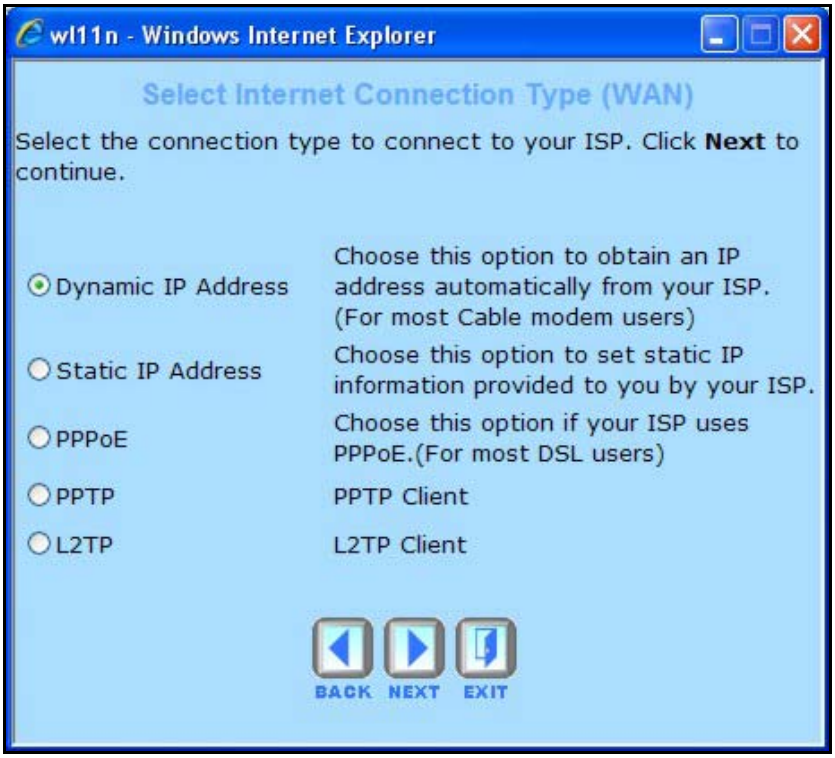
Choose the time zone you are in from the pull-down menu and click **Next**. This sets the system time used for the router. If you wish to return to the previous window during the setup process, click the **Back** button.



Select the **Connection Type** specific to your service and click **Next** to go to the next **Setup Wizard** window. Follow the instructions below for the type of connection you have selected.

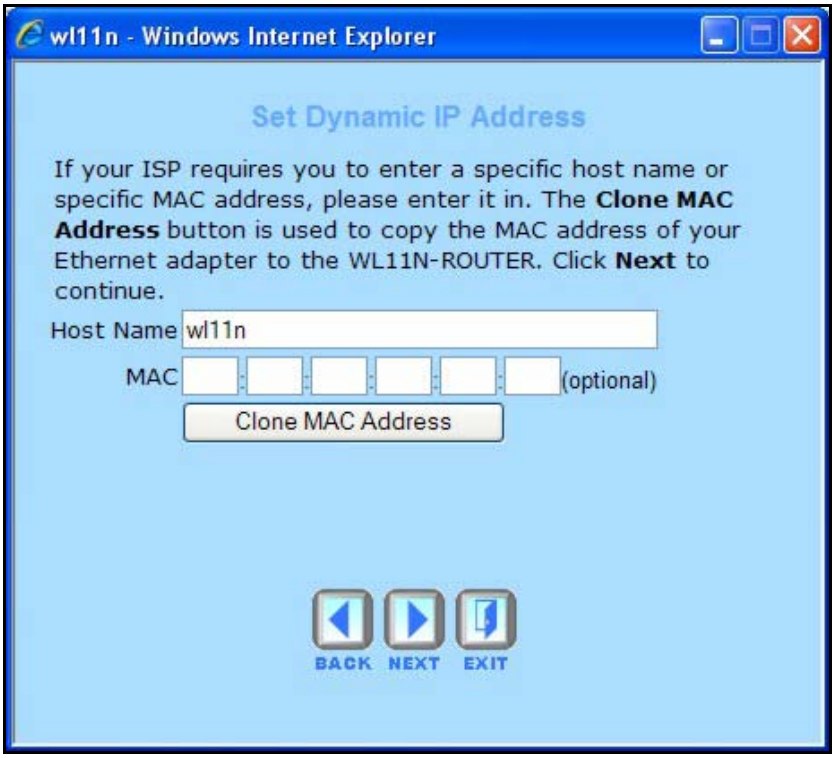
Using the Setup Wizard - Choose Connection Type

Now select the Connection Type used for the Internet connection. Your ISP has given this information to you. The connection types available for are **Static IP**, **Dynamic IP**, **PPPoE**, **PPtP** and **L2tP**. Each connection type has different settings that are configured in the next **Setup Wizard** window.



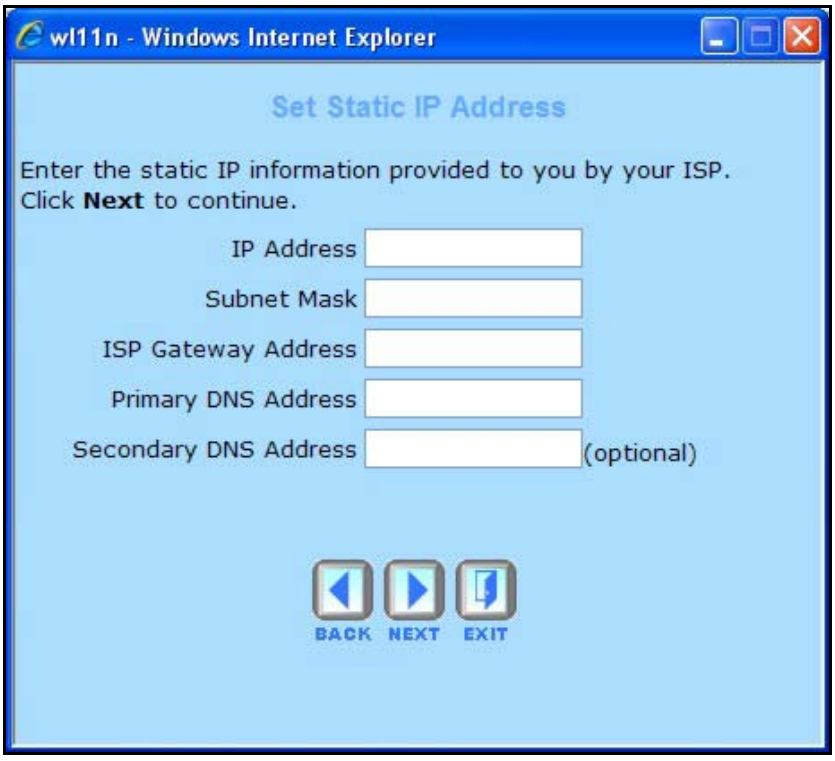
Using the Setup Wizard - For Dynamic IP Address connections:

1. Select the specific **Connection Type** from the drop-down menu. The available Dynamic IP Address connection and encapsulation types are *1483 Bridged IP LLC* and *1483 Bridged IP VC-Mux*.
2. If you are instructed to change the **VPI** or **VCI** number, type in the correct setting in the available entry fields. Most users will not need to change these settings. The Internet connection cannot function if these values are incorrect.
3. You may want to copy the MAC address of your Ethernet adapter to the router. Some ISPs record the unique MAC address of your computer's Ethernet adapter when you first access their network. This can prevent the router (which has a different MAC address) from being allowed access to the ISPs network (and the Internet). To clone the MAC address of your computer's Ethernet adapter, type in the MAC address in the Cloned MAC Address field and click the **Clone MAC Address** button. This will copy the information to a file used by the router to present to the ISP's server used for DHCP.
4. Click **Next** to go to the **Set Wireless LAN Connection** pop-up window.



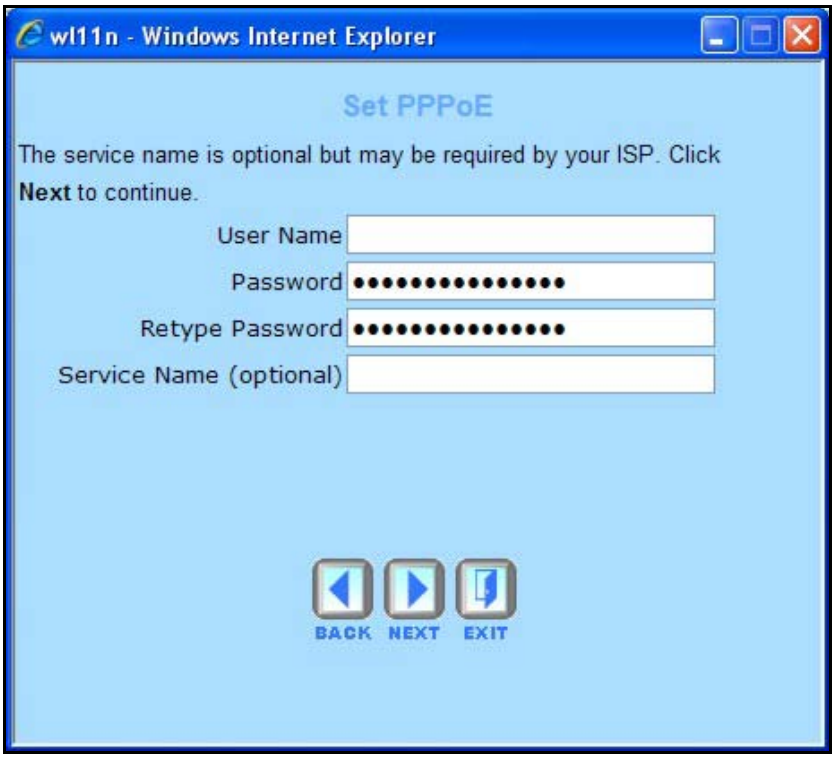
Using the Setup Wizard - For Static IP Address connections:

1. Select the specific **Connection Type** from the drop-down menu. The available Static IP Address connection and encapsulation types are *1483 Bridged IP LLC*, *1483 Bridged IP VC-Mux*, *1483 Routed IP LLC*, *1483 Routed IP VC-Mux* and *IPoA*.
2. Change the **IP Address**, **Subnet Mask**, **ISP Gateway Address**, **Primary DNS Address**, and **Secondary DNS** Server IP **Address** as instructed by your ISP. For IPoA connections it may also be necessary to change the **ARP Server Address**. IPoA connection users who have not been given this information should leave the field blank.
3. If you are instructed to change the **VPI** or **VCI** number, type in the correct setting in the available entry fields. Most users will not need to change these settings. The Internet connection cannot function if these values are incorrect.
4. Click **Next** to go to the **Set Wireless LAN Connection** pop-up window.



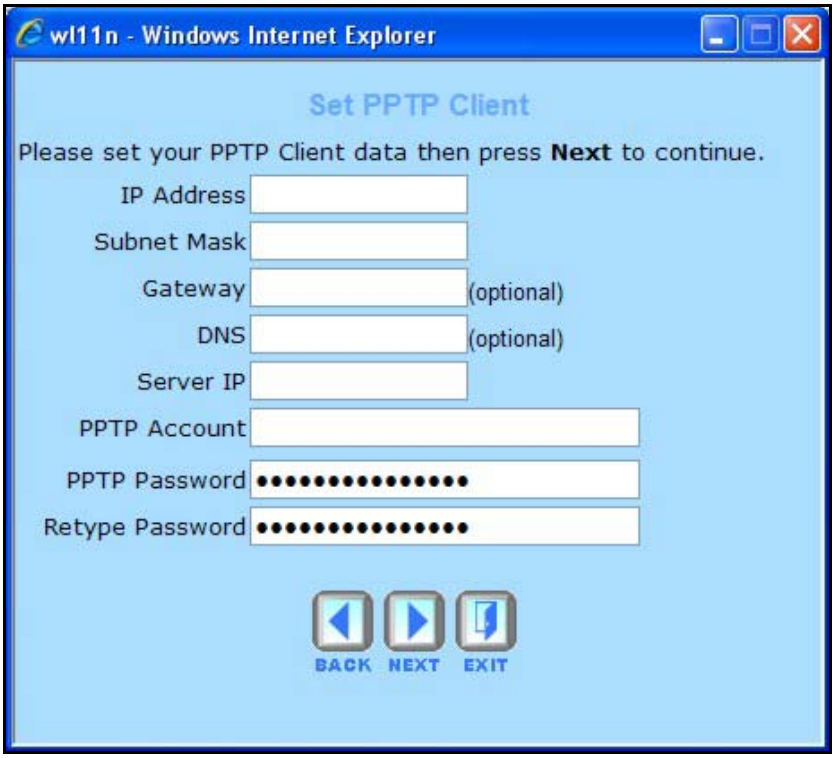
Using the Setup Wizard - For PPPoE connections:

1. Type in the **Username** and **Password** used to identify and verify your account to the ISP. **Retype** the password to make sure it is correct.
2. Click **Next** to go to the **Set Wireless LAN Connection** pop-up window.



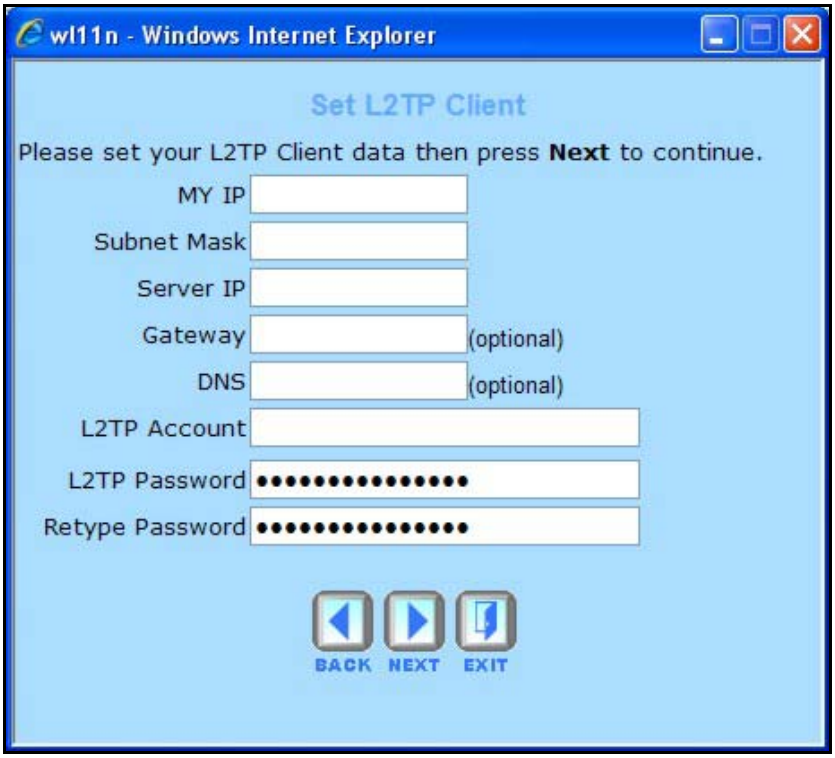
Using the Setup Wizard – For PPTP Client connections:

1. Enter the appropriate PPTP Client information including PPTP **Server IP**, **PPTP Account** name, and the **PPTP Password** twice.
2. Click **Next** when you are ready to continue to the **Set 802.11g Wireless LAN Configuration** window.



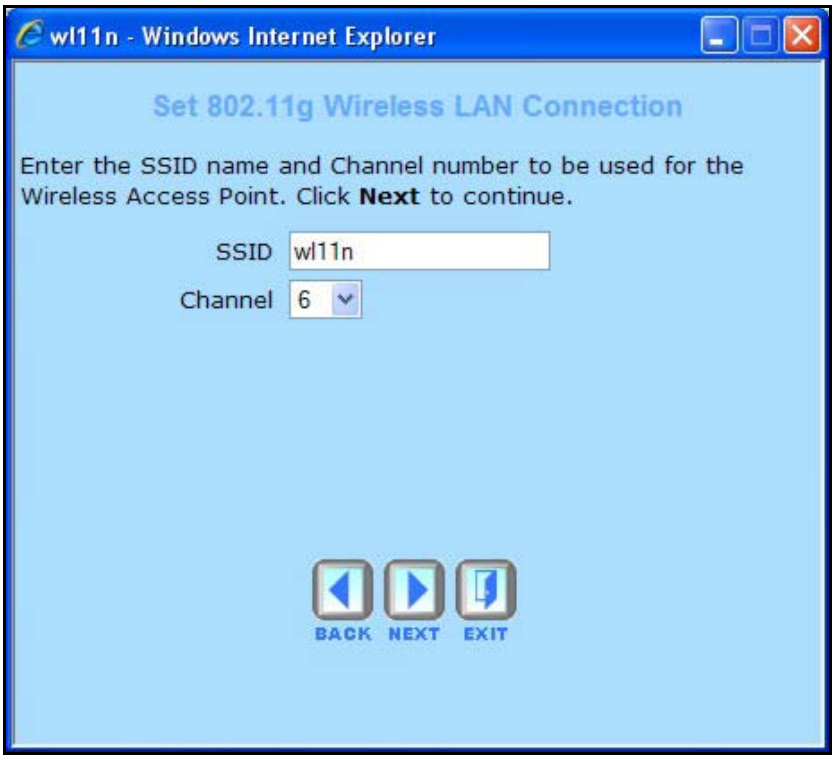
Using the Setup Wizard – For L2TP Client connections:

1. Enter the appropriate L2TP Client information including L2TP **Server IP**, **L2TP Account** name, and the **L2TP Password** twice.
2. Click **Next** when you are ready to continue to the **Set 802.11g Wireless LAN Configuration** window.



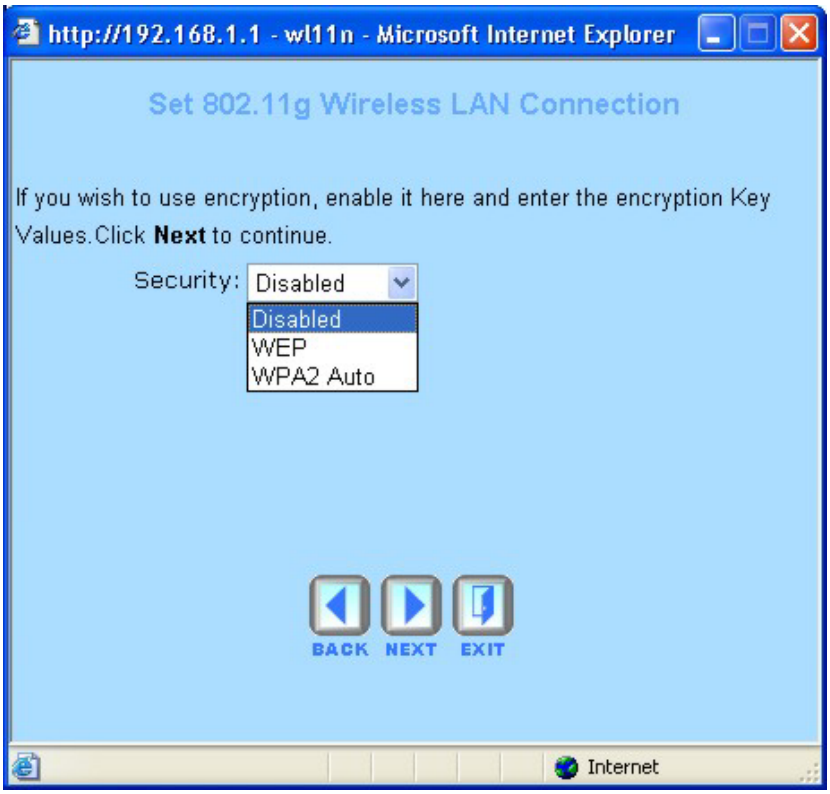
Using the Setup Wizard - Wireless LAN connection:

1. The **SSID** identifies members of the Service Set. Accept the default name or change it to something else. If the default SSID is changed, all other devices on the wireless network must use the same SSID.
2. The wireless **Channel** number is available from your Internet Service Provider (ISP). What channels are available for use by the access point depends on the local regulatory environment. Remember that all devices communicating with the device must use the same channel (and use the same SSID). Use the drop-down menu to select the channel used for your 802.11 Wireless LAN.
3. Click **Next** to go to the next window.



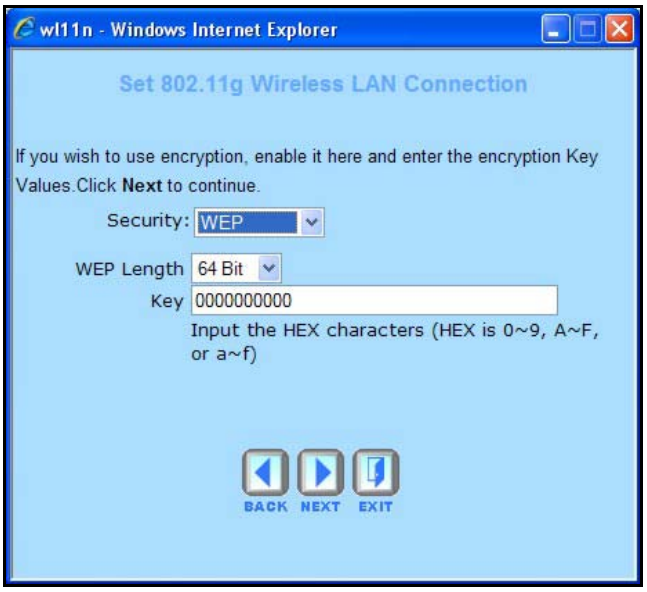
Using the Setup Wizard - Wireless LAN security:

Wireless LAN security supported includes WEP and WPA versions 1 and 2. Select the preferred method from the list and click on the **Next** button. You can choose to setup security later, in which case choose the Disabled option. If you choose to leave security disabled at this time, the next menu will be the Save and Take Effect wizard menu.



Using the Setup Wizard – WEP Configuration

The Setup Wizard wireless LAN security configuration is limited to WEP; for WPA or WPA2 security, use the web-based manager Wireless Settings menu. To configure WEP in the Setup Wizard, select Open, Shared or Both for Authentication Type, use the Cipher: pull down menu to select the level of encryption or cipher rate, 64 bits or 128 bits and type in an encryption key of appropriate length. For 64-bit encryption, type a key ten hexadecimal digit (0~9,A~F) key, for 128-bit encryption type a 26 hexadecimal digit key.

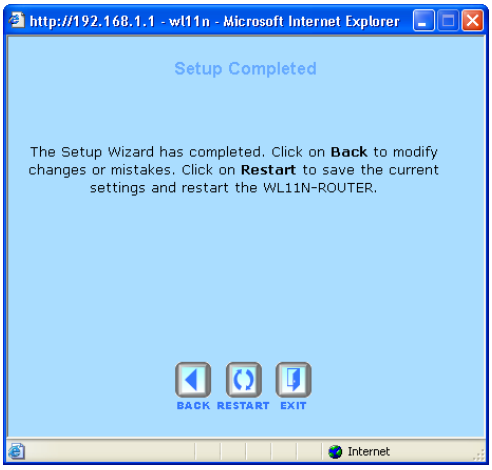


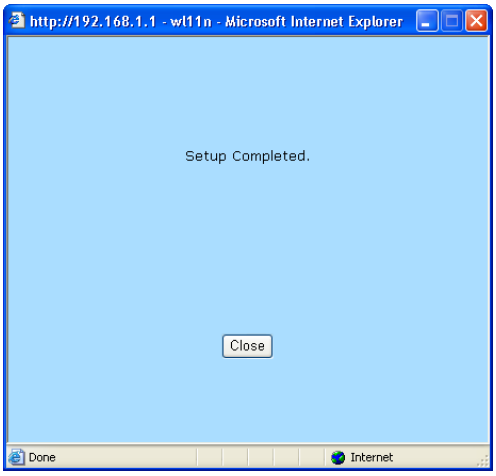
Using the Setup Wizard – WPA2 Auto Configuration

If you are configuring WPA security, select **Security** type WPA2 Auto, enter the **Passphrase** used for authentication. Click **Next** to continue to the final menu.

Using the Setup Wizard - Finish and Restart

Finally you can confirm that the setup process is completed. If you are satisfied that you have entered all the necessary information correctly, click the **Restart** button to save the new configuration settings and restart the router. If you need to change settings from a previous window, click the **Back** button.

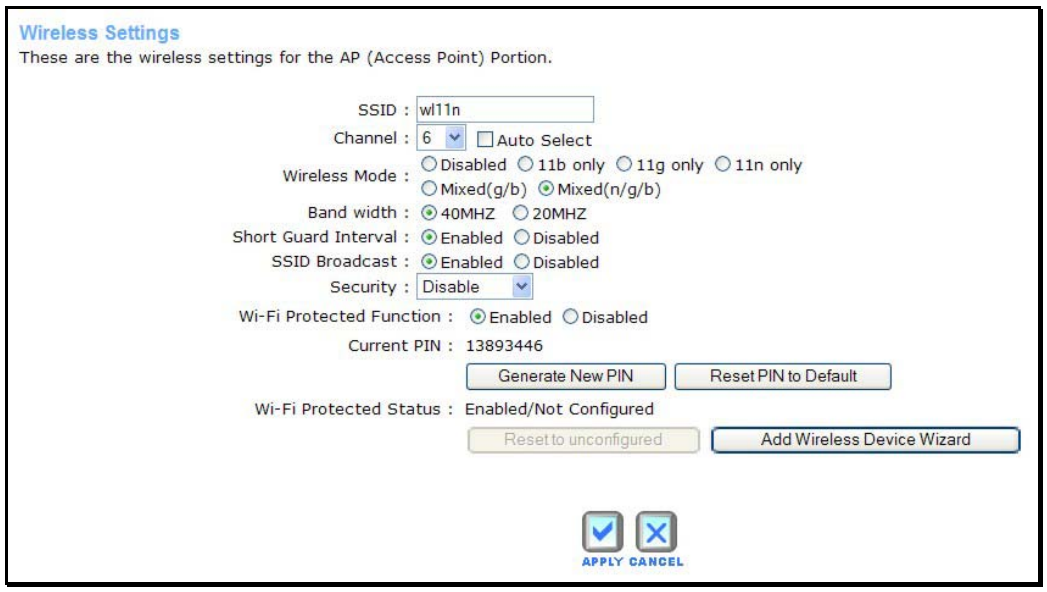




CAUTION: Do not turn the router off while it is restarting. After the router is finished restarting, you are now ready to continue to configure the router as desired. You may want to test the WAN connection by accessing the Internet with your browser.

Basic Wireless Setup

To configure the router's basic wireless and wired network configuration settings without running the Setup Wizard, you can access the windows used to configure Wireless, WAN, LAN and DHCP settings directly from the **Home** directory. To access the **Wireless Settings** window, click on the **Wireless** link on the left side of the first window that appears when you successfully access the web manager.



Wireless Settings menu – default settings

By default the wireless AP is enabled for use by 802.11b, 802.11g and 802.11n workstations. The **Set Wireless Mode** options are used to configure the access point to use 11b only, 11g only, 11n only, a mix of 11b and 11g, or a mix of all three standards. To turn off all wireless function, select the *Disable* option.

The **SSID** identifies members of the Service Set. Accept the default name or change it to something else. All other devices on the wireless network using the Wireless Broadband Router must use the same SSID.

What channels are available for use by the access point depends on the local regulatory environment. Remember that all devices communicating with the device must use the same channel (and use the same SSID). Use the drop-down menu to select the **Channel** used for your 802.11 Wireless LAN. The wireless channel number is available from your Internet Service Provider (ISP).

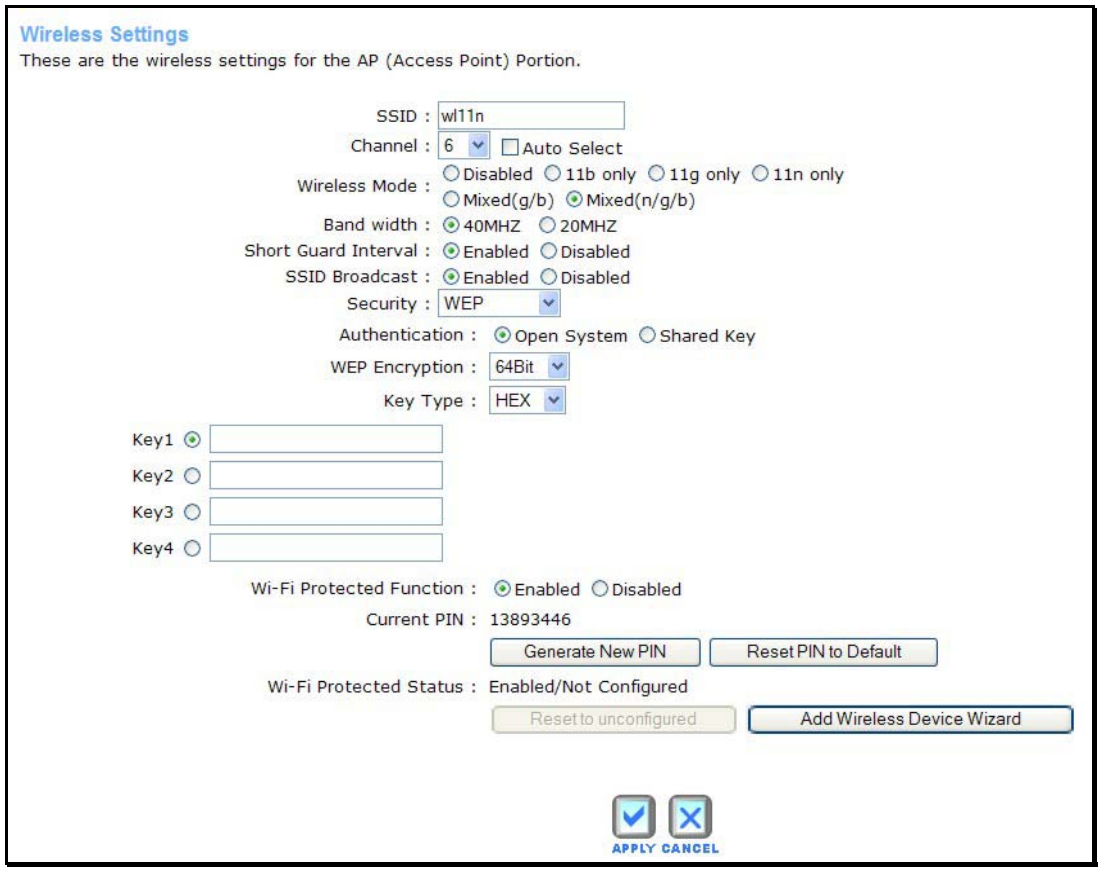
If network **Security** is not used, click None, then click **Apply**.

NOTE: For wireless stations that support WPS push button method, the easiest way to establish a secure connection is to simultaneously press the WPS button on the wireless workstation and the WPS button on the front of the Wireless Broadband Router. See below for more information on WPS.

Wi-Fi Protected Function is enabled by default. See below for more information on Wi-Fi Protected Status or WPS.

Wireless Security

In the **Wireless Settings** window, select the type of security you want to configure. The window will change to present the settings specific to the method being configured. The Wireless Broadband Router's wireless security options include three levels of WEP encryption, WPA for IEEE 802.1x network authentication, and WPA with a user-configured Pre Shared Key (PSK) or RADIUS authentication. The Wireless Broadband Router supports Wi-Fi Protected Setup (WPS) for quickly establishing a secure link to stations that support WPS. Enabling WEP or WPA security will automatically disable WPS function.



Wireless Settings window – WEP

Wireless bandwidth, Short Guard Interval and SSID Broadcast options are available for configuration for all security methods including WPS.

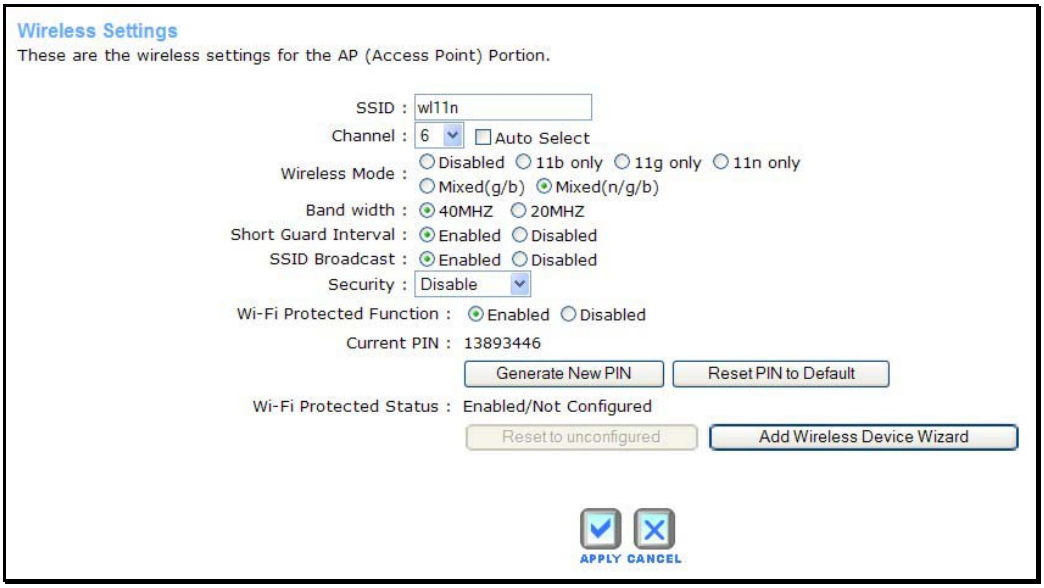
NOTE: Enabling WEP or WPA security will automatically disable WPS function.

Wi-Fi Protected Setup (WPS)

WPS provides an easy way to configure a secure connection to your wireless LAN. This option can be used on wireless stations that support Wi-Fi Protected Setup or WPS. The Wireless Broadband Router supports push button and PIN methods of WPS. WPS cannot be used with WPA or WPA2.

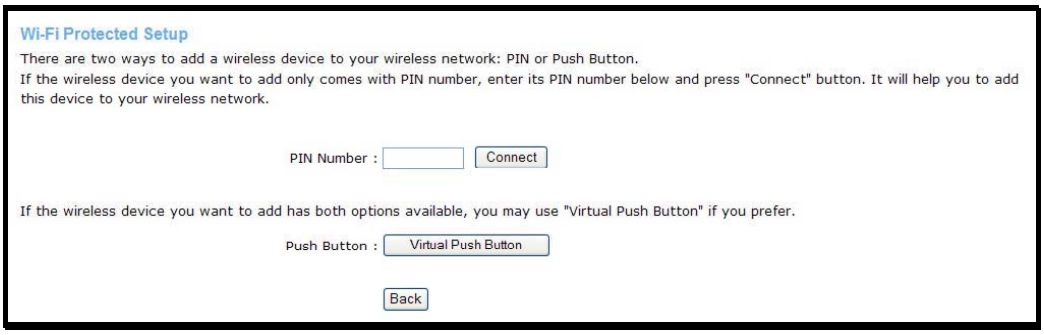
The WPS menu is located at the bottom of the Wireless menu. To use WPS click to select the **Enabled** radio button for **Wi-Fi Protected Function**.

NOTE: The **Generate New PIN** button is for the Wireless Broadband Router's own PIN. This is used when the router needs to connect to other WPS enabled access points.



Wireless Settings menu

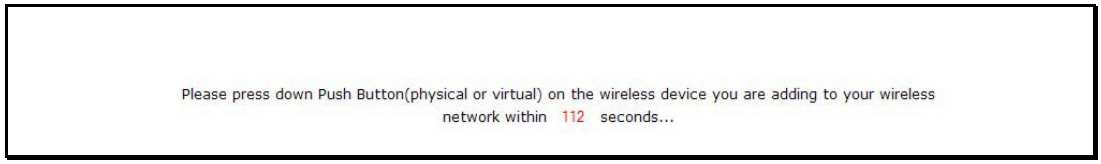
To add a wireless station using WPS, enter the PIN number of the WPS enabled wireless device and click on the **Connect** button.



WPS station PIN entry / Virtual Push Button menu

The router will attempt to establish the WPS secure connection for 120 seconds. Now start the WPS connection process on the device attempting to make the connection.

While the router is searching for the wireless station with the PIN just entered, a message informs you to start the WPS device.



WPS start PIN device message

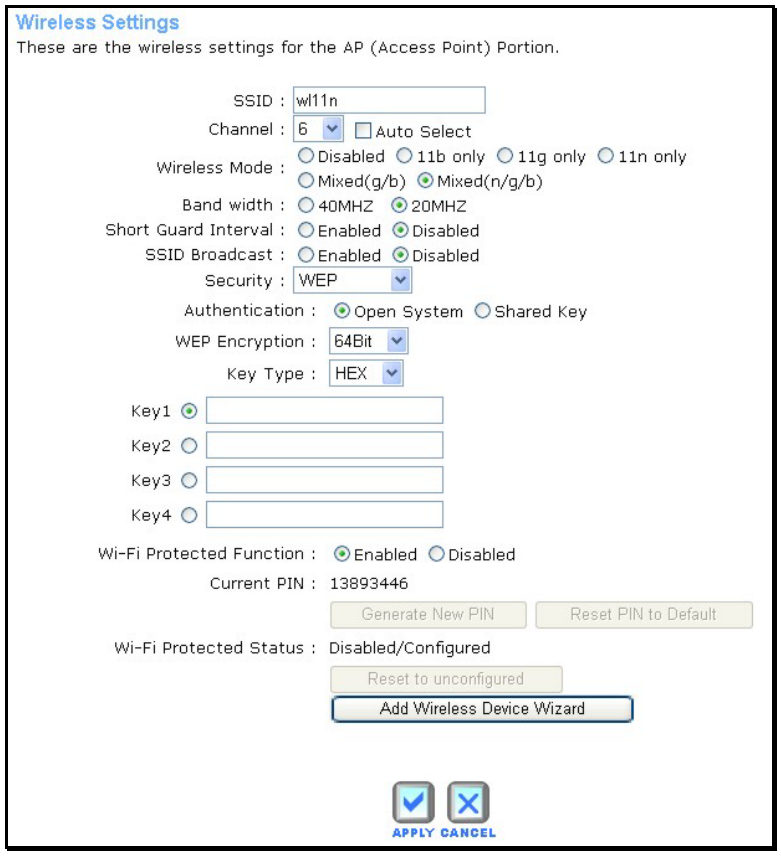
Alternatively, for wireless stations that support the push button WPS method, click on the **Virtual Push Button** or press the red WPS button on the front panel of the router to begin the WPS connection process.

WPS push button on WPS device message

The router will attempt to establish the WPS secure connection for 120 seconds. Press the button on the device trying to connect.

WEP Encryption

Use WEP encryption for basic wireless data encryption. Use WPA if wireless LANs that require a higher level of security. WEP (Wireless Encryption Protocol) encryption can be enabled for security and privacy. WEP encrypts the data portion of each frame transmitted from the wireless adapter using one of the predefined keys. The router offers 64 or 128-bit encryption with four keys available. Select the WEP option from the **Security:** pull-down menu to configure WEP encryption.



Wireless Settings menu – WEP encryption

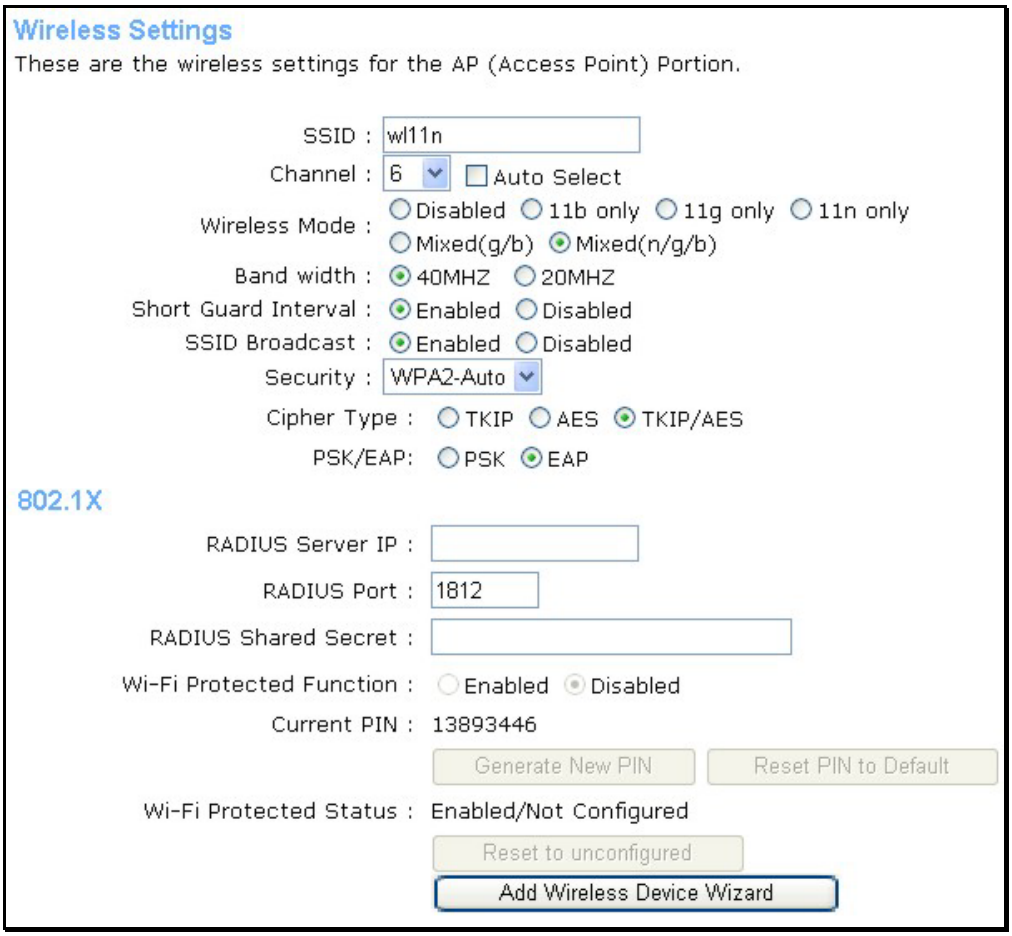
Enter the appropriate parameters for the type of security selected from this menu. WEP security requires the following:

- **Authentication Type:** Open Key or Shared Key.
- **Encryption Length:** The IP address of the RADIUS server.
- **Key Type:** ASCII or Hexidecimal.
- **Key:** Type up to four keys of appropriate length, 10 characters for 64-bit Hex or 26 characters for 128-bit Hex.

NOTE: If encryption of any kind, at any level is applied to the Wireless Broadband Router, all wireless devices using the router on the network must comply with all security measures.

WPA (Wi-Fi Protected Access)

Wi-Fi Protected Access was designed to provide improved data encryption, perceived as weak in WEP, and to provide user authentication, largely nonexistent in WEP.



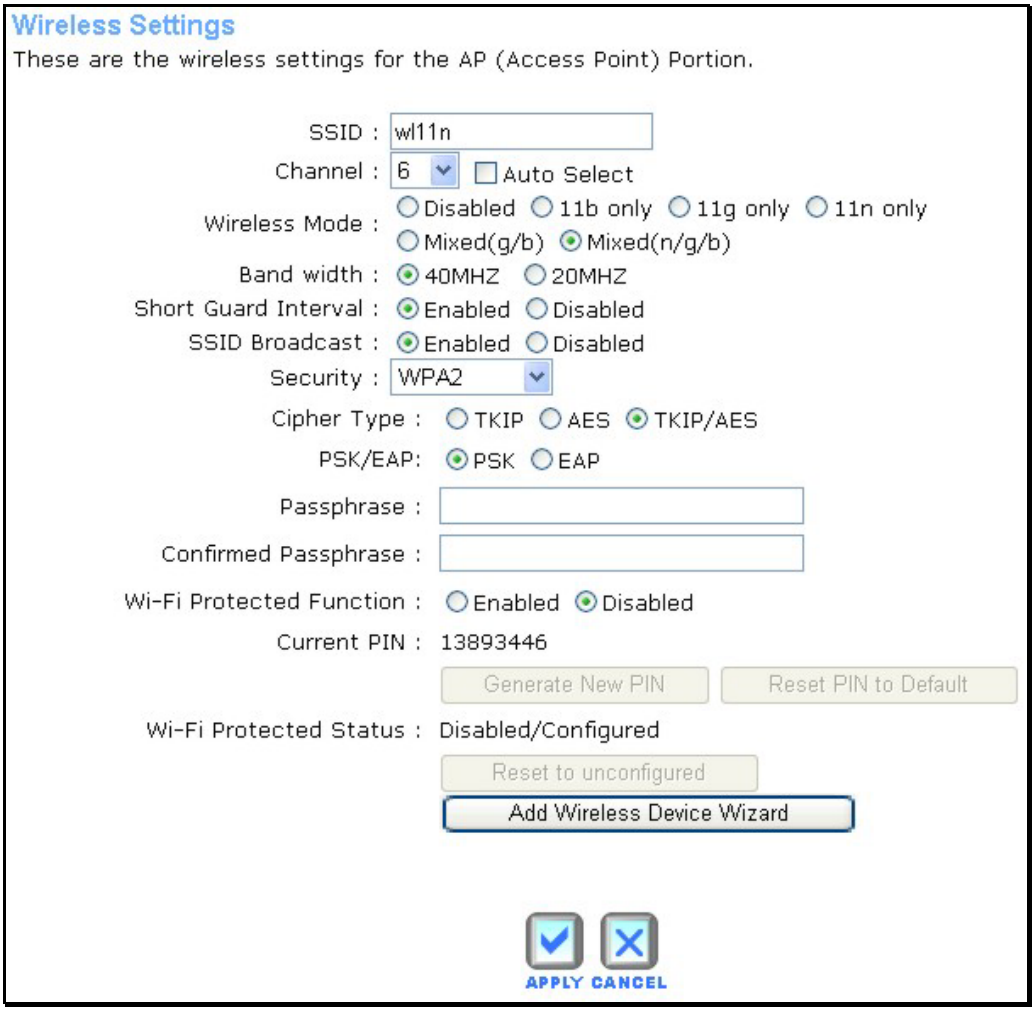
Wireless Settings menu – WPA2 EAP

Enter the appropriate parameters for the type of security selected from this menu. For EAP authentication using WPA or WPA2, enter the following:

- **Cypher Type:** Choose TKIP, AES or TKIP/AES.
- **RADIUS Server:** The IP address of the RADIUS server.
- **RADIUS Port:** The port number used for 802.1x.
- **Shared Key:** The password or character string used for wireless station authentication.
- **Key Renewal:** The time (in seconds) after which the Shared Key is changed automatically.

NOTE: If encryption of any kind, at any level is applied to the Wireless Broadband Router, all wireless devices using the router on the network must comply with all security measures.

Select the PSK authentication option to view the WPA passkey configuration menu.



Wireless Settings menu – WPA-PSK

Enter the appropriate parameters for the type of security from this menu. For PSK authentication using WPA or WPA2, enter the following:

- **Cypher Type:** Choose TKIP, AES or TKIP/AES.
- **Key Type:** Choose ASCII or Hexidecimal.
- **Passphrase:** The password or character string used for wireless station authentication.
- **Key Renewal:** The time (in seconds) after which the Shared Key is changed automatically.

WAN Configuration

To configure the router's WAN configuration settings without running the Setup Wizard, you can access the windows used to configure WAN, LAN, DHCP, and DNS settings directly from the **Home** directory. To access the WAN Settings window, click on the **WAN** menu link on the left side of the first window that appears when you successfully access the web manager.

Select Internet Connection Type

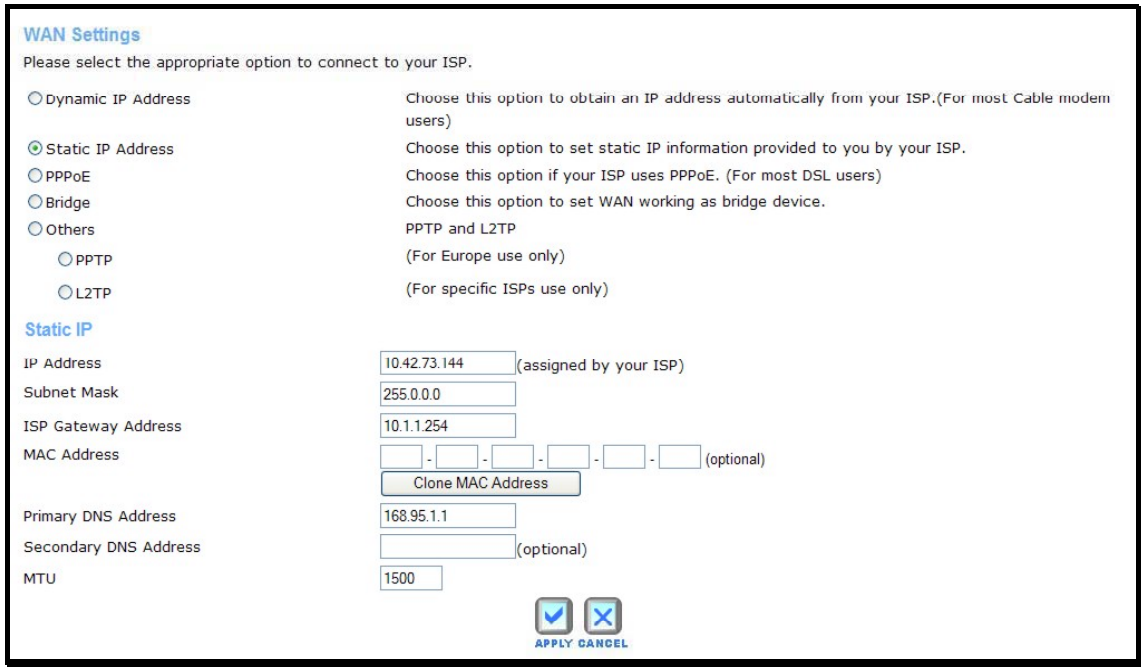
The default Internet Connection menu displays the Dynamic IP (DHCP) Internet Connection Type menu. To select another connection type, use the pull-down **My Internet Connection is:** menu to select the connection type you wish to configure. The menu configuration parameters in the display will change according to the connection option you choose. The available Internet connection types are:

- Static IP Address
- Dynamic IP Address (DHCP)
- PPPoE (Username / Password)
- Bridge Connection
- PPTP (Username / Password)
- L2TP (Username / Password)

Each connection type is discussed in its own section below.

Static IP Address Connection

When the router is configured to use Static IP Address assignment for the WAN connection, you must manually assign a global IP Address, Subnet Mask and Gateway IP Address used for the WAN connection.



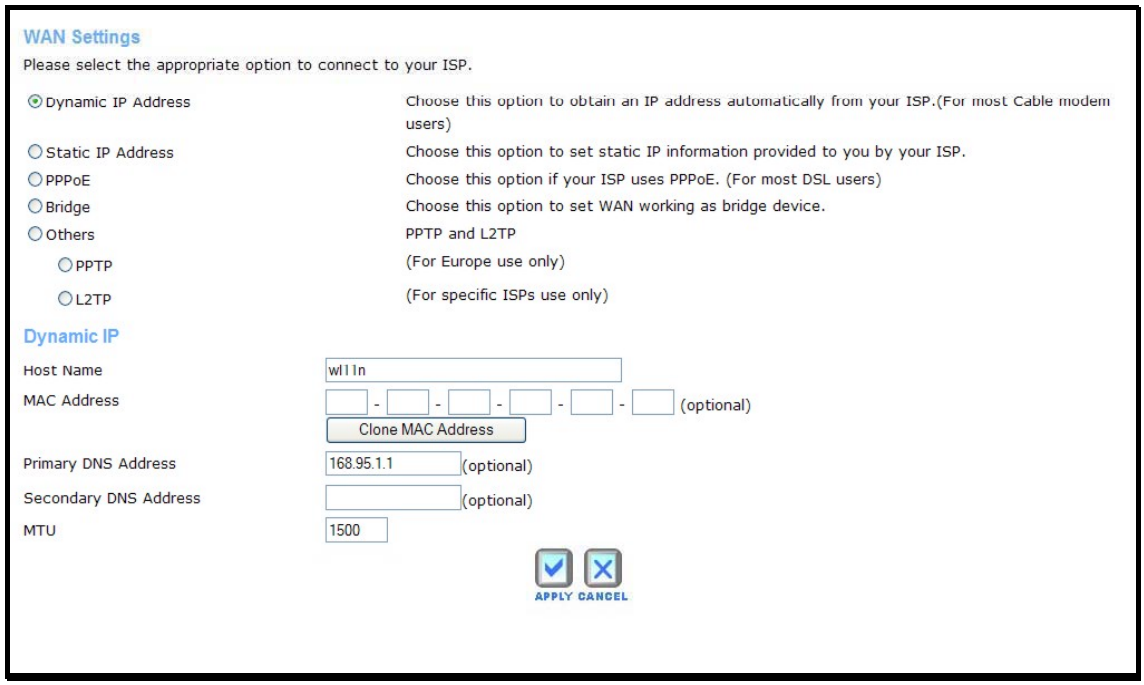
WAN Settings menu - Static IP Address

Configure the Static IP address connection and click the **Apply** button to put the new settings into effect. See the table below for a description of the parameters configured for the connection.

Static IP Parameters	Description
IP Address	This is the permanent global IP address for your account. This is the address that is visible outside your private network. Get this from your ISP.
Subnet Mask	This is the Subnet mask for the WAN interface. Get this from your ISP.
ISP Gateway Address	This is the IP address of your ISP's Gateway router. It provides the connection to the router for IP routed traffic that is outside your ISP's network. That is, this will be the primary connection from the router to most of the Internet. Get this IP address from your ISP.
MAC Address/Clone MAC Address	This field will instruct the user to enter the Media Access Control (MAC) address of the Ethernet Card of your computer, if instructed to do so by your ISP. To quickly accomplish this, click the **Clone MAC Address** button, which will automatically copy the MAC address of your Ethernet card and enter it into the space provided, which will replace the MAC address of the router.
DNS (Primary/ Secondary)	These are the IP addresses of your primary and backup domain name server, which should also be provided to you by your ISP. The router will first try the **Primary DNS Address** to resolve a website's URL IP address. If this IP address fails, the router will then try the **Secondary DNS Address**.
MTU	The Maximum Transmission Unit size may be changed if you want to optimize efficiency for uploading data through the WAN interface. The default setting (1492 bytes) should be suitable for most users. Some user may want to adjust the setting to optimize performance for wireless traffic or when low latency is desired (such as with Internet gaming). It is highly recommended that the user research how adjusting the MTU may affect network traffic throughput.

Dynamic IP Connection

A Dynamic IP Address connection configures the router to automatically obtain its global IP address from a DHCP server on the ISP's network. The service provider assigns a global IP address from a pool of addresses available to the service provider. Typically the IP address assigned has a long lease time, so it will likely be the same address each time the router requests an IP address.



WAN Settings window – Dynamic IP Address

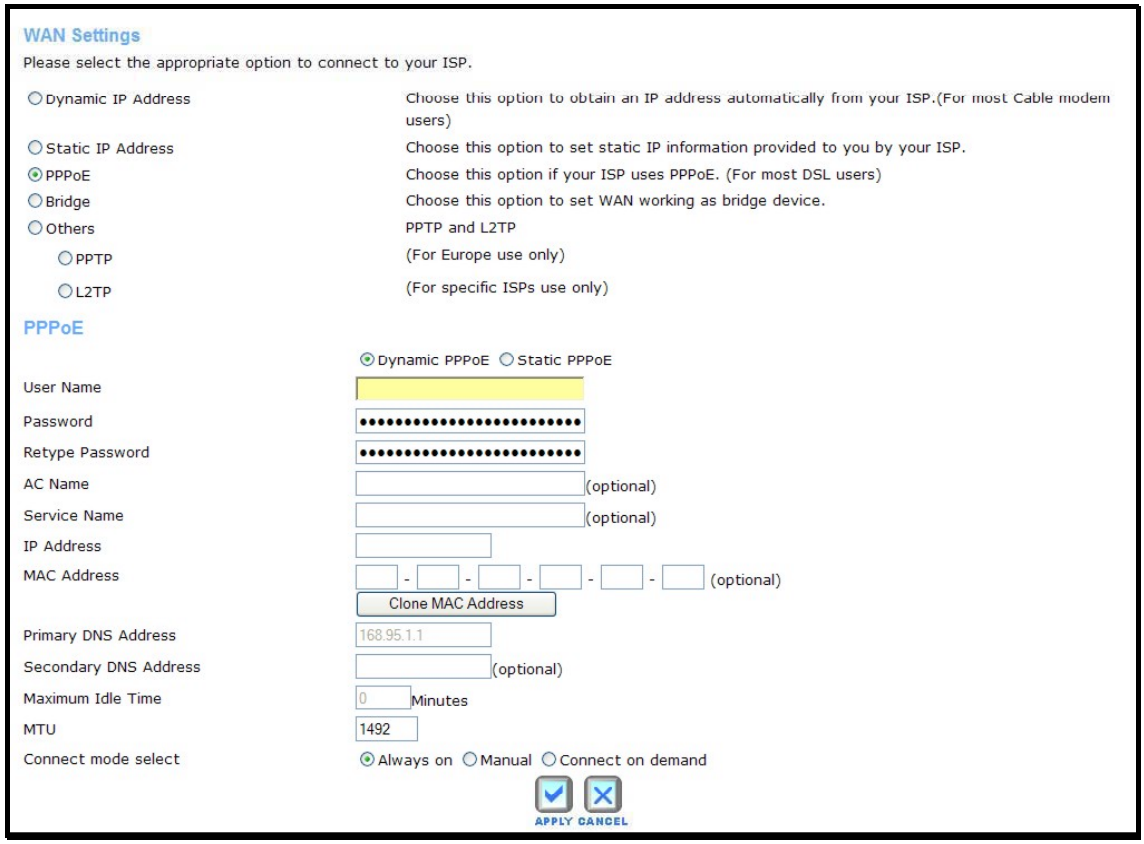
Configure the Dynamic IP address connection and click the **Apply** button to put the new settings into effect. See the table below for a description of the parameters configured for the connection.

Dynamic IP Parameters	Description
Host Name	Enter the Host Name provided if necessary (optional).
MAC Address/Clone MAC Address	This field will instruct the user to enter the Media Access Control (MAC) address of the Ethernet Card of your computer, if instructed to do so by your ISP. To quickly accomplish this, click the **Clone MAC Address** button, which will automatically copy the MAC address of your Ethernet card and enter it into the space provided, which will replace the MAC address of the router.
DNS (Primary/ Secondary)	These are the IP addresses of your primary and backup domain name server, which should also be provided to you by your ISP. The router will first try the **Primary DNS Address** to resolve a website's URL IP address. If this IP address fails, the router will then try the **Secondary DNS Address**.
MTU	The Maximum Transmission Unit size may be changed if you want to optimize efficiency for uploading data through the WAN interface. The default setting (1492 bytes) should be suitable for most users. Some user may want to adjust the setting to optimize performance for wireless traffic or when low latency is desired (such as with Internet gaming). It is highly recommended that the user research how adjusting the MTU may affect network traffic throughput.

PPPoE Connection

PPP or Point-to-Point protocol is a standard method of establishing a network connection/session between networked devices. PPPoE (PPP over Ethernet), as described in RFC 2516, is a method of using PPP through the Ethernet network.

There are two ways to configure the PPoE connection on the router, one is for a **Dynamic PPPoE** configuration, which means the router will implement some settings automatically through DHCP, such as the router's IP address and the default gateway. The other is through a **Static PPPoE** connection, in which the user must configure the IP address and the DNS addresses automatically.



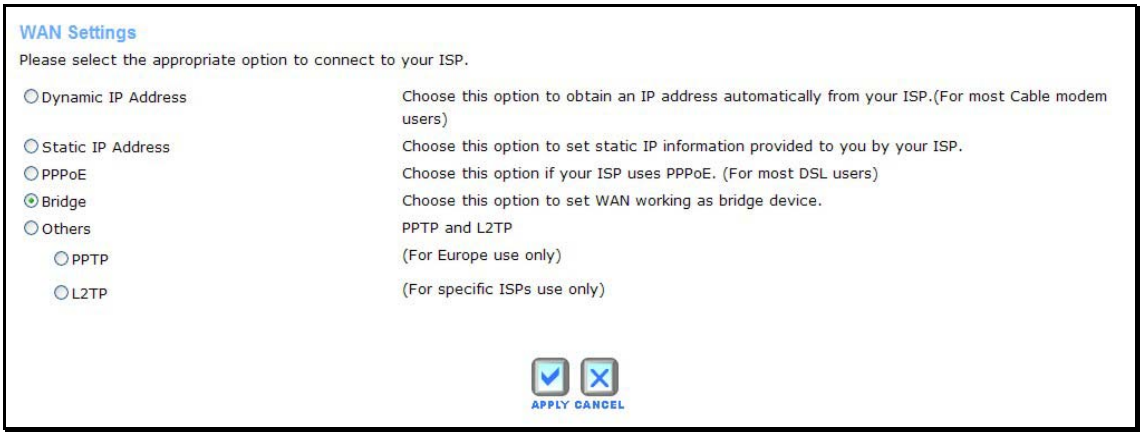
WAN Settings menu – PPPoE connection

Configure the PPPoE connection and click the **Apply** button to put the new settings into effect. See the table below for a description of the parameters configured for the connection.

PPPoE Parameters	Description
User Name	The user name supplied to you by your ISP.
Password	The password supplied to you by your ISP.
Retype Password	Retype the password entered in the **Password** feld.
Service Name	Enter the service name supplied to you by your ISP, if required.
IP Address	Enter the IP address given to you by your ISP. This field is only to be completed if the **Static PPPoE** button is selected.
MAC Address	This field requires the user to enter the Media Access Control (MAC) address of the Ethernet Card of your computer, if instructed to do so by your ISP. To quickly accomplish this, click the **Clone MAC Address** button, which will automatically copy the MAC address of your Ethernet card and enter it into the space provided, which will replace the MAC address of the router.
Primary DNS Address	This entry is for the IP address of your primary domain name server, which should also be provided to you by your ISP. The router will first try the Primary DNS Address to resolve a website's URL IP address. If this IP address fails, the router will then try the Secondary DNS Address. This field is only to be completed if the **Static PPPoE** button is selected.
Secondary DNS Address	The IP address of the secondary domain name server will be used to resolve a website's URL IP address if the **Primary DNS Address** fails. The information in this field should also be provided by your ISP and is only to be completed if the **Static PPPoE** button is selected.
Maximum Idle Time	A value of 0 means that the PPP connection will remain connected. If your network account is billed according to the amount of time the router is actually connected to the Internet, enter an appropriate Idle Time value (in seconds). This will disconnect the router after the WAN connection has been idle for the amount of time specified. The default value = 5.
MTU	This field refers to the Maximum Transfer Unit, which is the maximum size of a packet, in bytes, that will be accepted by the router. The default setting is 1500 bytes. This field should not be altered unless instructed by your ISP.
Connect Mode Select	This function, with **Connect-on-demand** selected, will allow the router to connect any workstation on your LAN to the Internet upon request. If this function is set at **Always-on**, no request from the workstation will be needed to connect to the Internet. If **Manual** is selected, it will be necessary for the workstation on the LAN to manually connect to the Internet through this router.

Bridge Connection

A Bridge connection does not require much configuration for the router, however most of the router functions are not available in bridge mode.



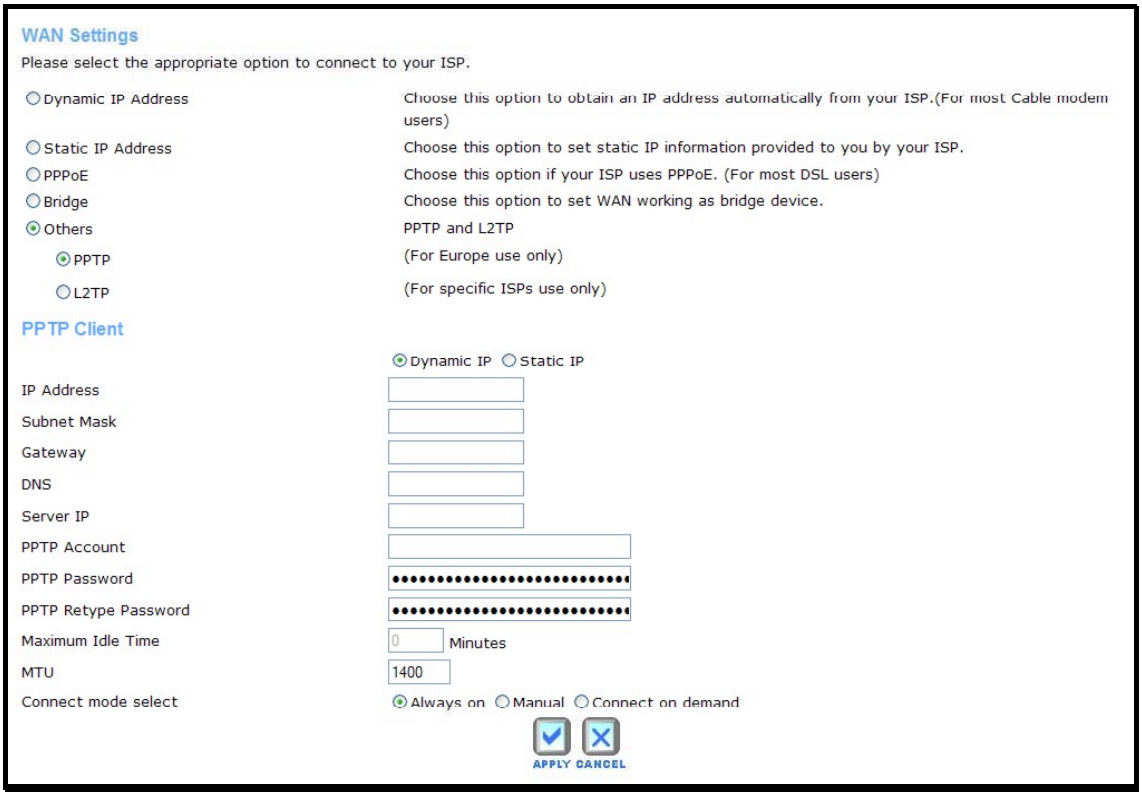
WAN Settings menu – Bridge connection

To configure the WL11N as a bridge for the WAN connection, select the **Bridge** WAN settings option and click **Apply**. Do this immediately change the IP settings status of the device to DHCP client. Be sure to have a DHCP server running and connected to the network if this option is to be used. Remember that as a bridge, third party connection software is normally required on each computer attempting to get Internet access.

PPTP Connection

If your ISP is using PPTP to provide your Internet connection, the ISP will give you the necessary information to configure the router.

There are two ways to enable the router to become a PPTP client, one is through assigning the router an IP address dynamically, which means that the DHCP protocol will be implemented by the router to automatically configure the IP settings. The user may input the IP settings manually by choosing the Static IP option above the configuring area.



PPTP Internet Connection configuration menu