USER MANUAL

DIR-412

VERSION 1.0

D-Link®

WIRELESS

Preface

D-Link reserves the right to revise this publication and to make changes in the content hereof without obligation to notify any person or organization of such revisions or changes.

Manual Revisions

Revision	Date	Description
1.0	November 11, 2009	First Release

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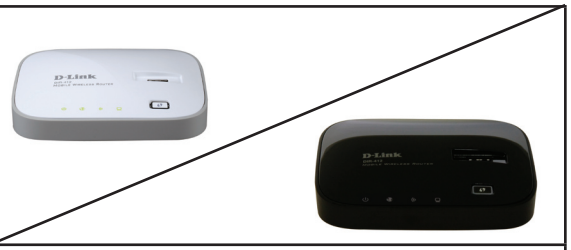
Package Contents

D-Link DIR-412 Mobile Wireless Router (Available in White or Black*)	
Power Adapter	
Ethernet Cable	
CD-ROM	

Note: Using a power supply with a different voltage rating than the one included with the DIR-412 will cause damage and void the warranty for this product.

*The white version of the DIR-412 Wireless N Router will be used for all diagrams in this user manual.

System Requirements

Network Requirements	• An Ethernet-based Cable or DSL modem • IEEE 802.11n-draft/g wireless clients • 10/100 Ethernet
Web-based Configuration Utility Requirements	**Computer with the following:** • Windows®, Macintosh, or Linux-based operating system • An installed Ethernet adapter **Browser Requirements:** • Internet Explorer 6.0 or higher • Mozilla 1.7.12 or higher • Firefox 1.5 or higher • Safari 1.0 or higher (with Java 1.3.1 or higher) • Flock 0.7.14 or higher • Opera 6.0 or higher **Windows® Users:** Make sure you have the latest version of Java installed. Visit www.java.com to download the latest version.
CD Installation Wizard Requirements	**Computer with the following:** • Windows® XP with Service Pack 2 or Vista® • An installed Ethernet adapter • CD-ROM drive

Features

- **Faster Wireless Networking** - The DIR-412 provides up to 150Mbps* wireless connection with other 802.11n wireless clients. This capability allows users to participate in real-time activities online, such as video streaming, online gaming, and real-time audio.

- **Compatible with 802.11g Devices** - The DIR-412 is still fully compatible with the IEEE 802.11g standard, so it can connect with existing 802.11g PCI, USB and Cardbus adapters.

- **3G Internet Connection Support** - Connect a 3G USB dongle to the DIR-412 to access 3G Internet Services.

- **Advanced Firewall Features** - The Web-based user interface displays a number of advanced network management features including:

    - **Content Filtering** - Easily applied content filtering based on MAC Address, URL, and/or Domain Name.

    - **Filter Scheduling** - These filters can be scheduled to be active on certain days or for a duration of hours or minutes.

    - **Secure Multiple/Concurrent Sessions** - The DIR-412 can pass through VPN sessions. It supports multiple and concurrent IPSec, PPTP, and L2TP sessions, so users behind the DIR-412 can securely access corporate networks.

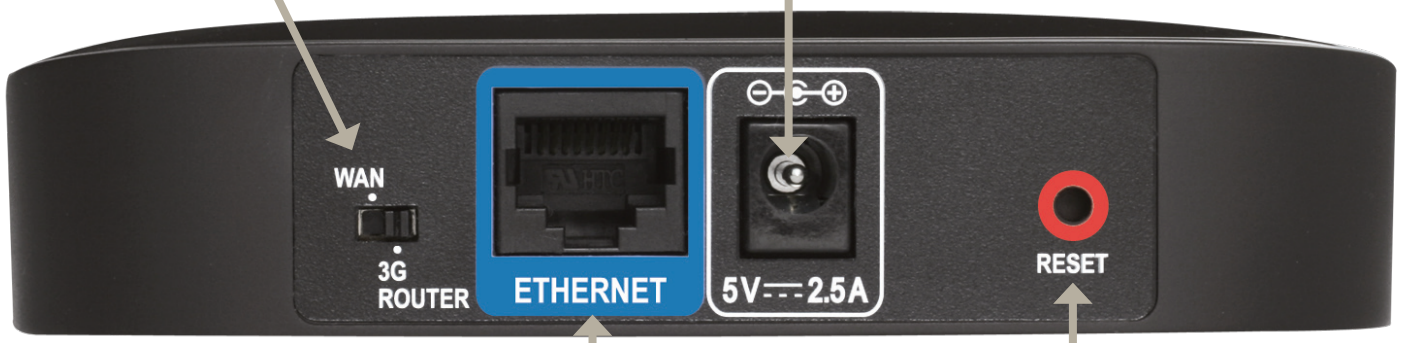
- **User-friendly Setup Wizard** - Through its easy-to-use Web-based user interface, the DIR-412 lets you control what information is accessible to those on the wireless network, whether from the Internet or from your company's server. Configure your router to your specific settings within minutes.

* Maximum wireless signal rate derived from IEEE Standard 802.11g and Draft 802.11n specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate. Environmental conditions will adversely affect wireless signal range.

Hardware Overview
Connections

WAN Mode/3G Router Mode Switch
Use this switch to change between WAN mode and 3G Router mode.

Power Receptor
Receptor for the supplied power adapter.



Ethernet Port
In WAN mode the Ethernet port is used to connect to your WAN connection. In 3G mode the Ethernet port is used to connect to your LAN connection.

Reset
Pressing the Reset button restores the router to its original factory default settings.

Hardware Overview

Top View

Ethernet LED
A solid green light indicates that a link has been established. This LED blinks during data transmission.

3G USB Connection
Connect your 3G USB dongle to this port if you want to use a 3G Internet connection.

Power LED
Lights orange during bootup. Lights green when router has booted up. A solid green light indicates a proper connection to the power supply. If the LED blinks orange the system has failed.

Internet LED
A solid green light indicates a successful 3G connection. A solid orange light indicates a 3G error, a WAN failure, or a system failure. A blinking green light indicates that the WAN connection is enabled when the Router is operating in WAN mode.

WLAN LED
A solid green light indicates that the wireless segment is ready. This LED blinks during wireless data transmission.

WPS Button
Press the WPS button for 1 second to initiate the WPS process. The button will flash blue while a WPS connection is being established. The button will light blue for 300 seconds if a successful WPS connection has been made.

Hardware Overview

Switching Between WAN Mode/3G Router Mode

The DIR-412 features a hardware switch that enables users to switch between WAN mode and 3G router mode.

When the DIR-412 is operating in WAN mode, WAN connectivity is achieved via the DIR-412's Ethernet port. In this mode LAN clients need to access the DIR-412 via the DIR-412's wireless connection. When the DIR-412 is operating in WAN mode network connectivity is more resilient as Internet connectivity can be failed over to a backup 3G connection, if the main WAN connection fails.

When the DIR-412 is in 3G router mode, LAN clients can access the DIR-412 via the DIR-412's Ethernet connection, as well as via the wireless connection.

Installation

This section will walk you through the installation process. Placement of the router is very important. Do not place the router in an enclosed area such as a closet, cabinet, or in the attic or garage.

Before you Begin

- Please configure the router with the computer that was last connected directly to your modem.
- You can only use the Ethernet port or 3G modem. If you were using the 3G USB modem before using the router, then you must turn off your modem, disconnect the USB cable and connect an Ethernet cable to the Ethernet port on the router, and then turn the modem back on. In some cases, you may need to call your ISP to change connection types (USB to Ethernet).
- If you have DSL and are connecting via PPPoE, make sure you disable or uninstall any PPPoE software such as WinPoet, Broadjump, or Enternet 300 from your computer or you will not be able to connect to the Internet.

Wireless Installation Considerations

The D-Link wireless router lets you access your network using a wireless connection from virtually anywhere within the operating range of your wireless network. Keep in mind, however, that the number, thickness and location of walls, ceilings, or other objects that the wireless signals must pass through, may limit the range. Typical ranges vary depending on the types of materials and background RF (radio frequency) noise in your home or business. The key to maximizing wireless range is to follow these basic guidelines:

1. Keep the number of walls and ceilings between the D-Link router and other network devices to a minimum - each wall or ceiling can reduce your adapter's range from 3-90 feet (1-30 meters.) Position your devices so that the number of walls or ceilings is minimized.

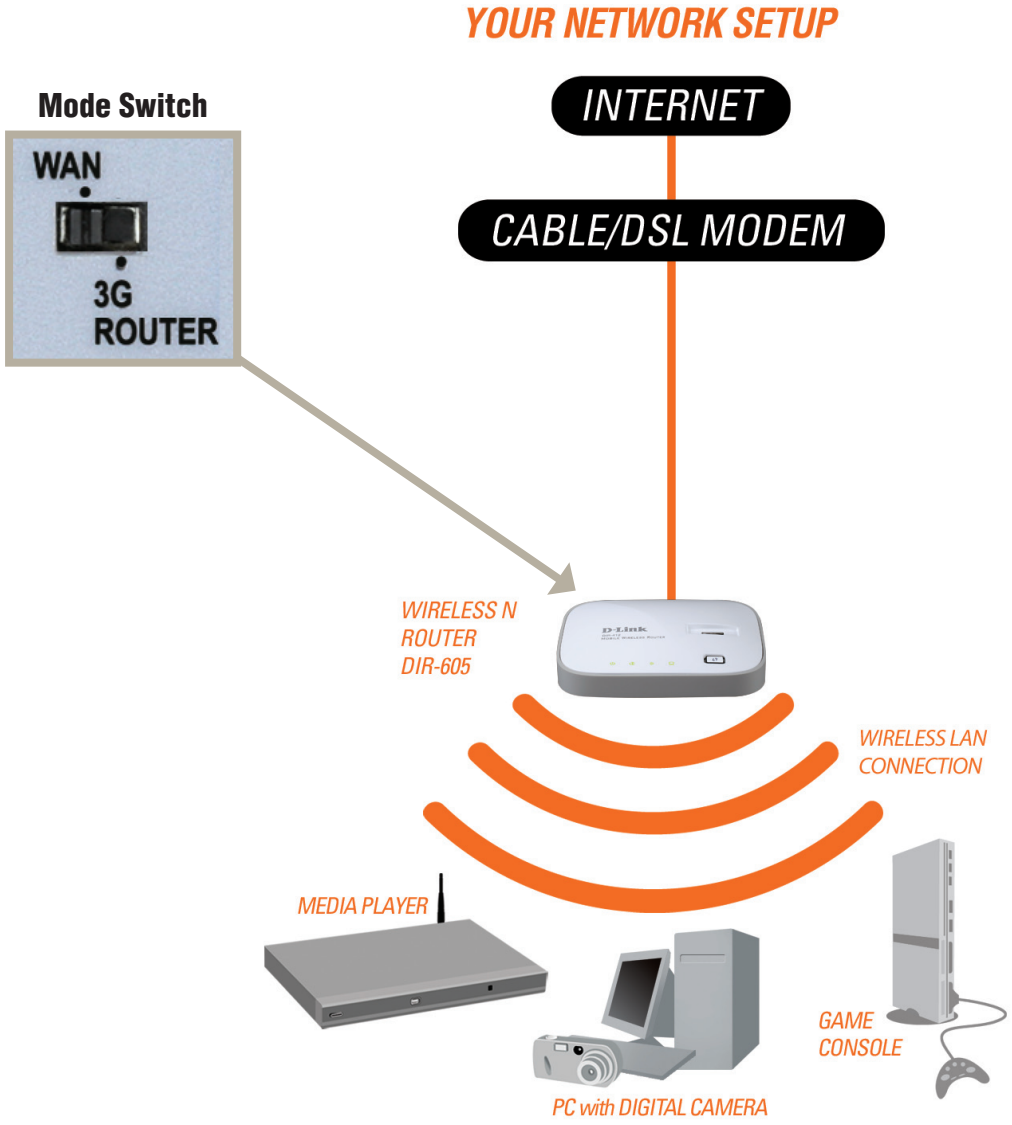
2. Be aware of the direct line between network devices. A wall that is 1.5 feet thick (.5 meters), at a 45-degree angle appears to be almost 3 feet (1 meter) thick. At a 2-degree angle it looks over 42 feet (14 meters) thick! Position devices so that the signal will travel straight through a wall or ceiling (instead of at an angle) for better reception.

3. Building Materials make a difference. A solid metal door or aluminum studs may have a negative effect on range. Try to position access points, wireless routers, and computers so that the signal passes through drywall or open doorways. Materials and objects such as glass, steel, metal, walls with insulation, water (fish tanks), mirrors, file cabinets, brick, and concrete will degrade your wireless signal.

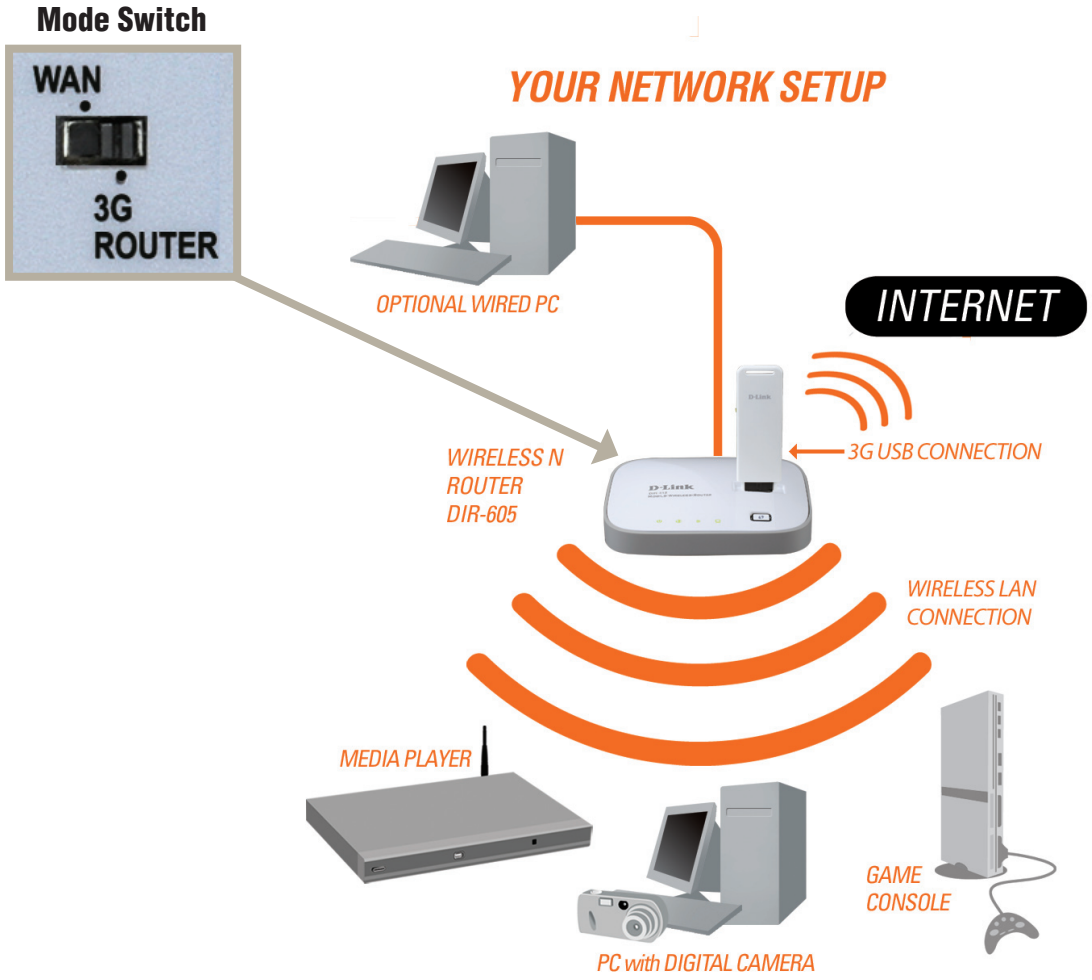
4. Keep your product away (at least 3-6 feet or 1-2 meters) from electrical devices or appliances that generate RF noise.

5. If you are using 2.4GHz cordless phones or X-10 (wireless products such as ceiling fans, lights, and home security systems), your wireless connection may degrade dramatically or drop completely. Make sure your 2.4GHz phone base is as far away from your wireless devices as possible. The base transmits a signal even if the phone in not in use.

Network Diagram
WAN Connection Mode



Network Diagram
3G Connection Mode



Connect to Cable/DSL

If your Internet connection is provided using a cable/DSL/satellite modem, carry out the following procedure before connecting the router to a cable/DSL/satellite modem:

- If using the DIR-412 for the first time, please select the default mode as **3G Router** to adjust your configuration. Move the toggle switch on the back of the router to the 3G Router mode position.
- Configure the wireless settings on the DIR-412 in 3G Router mode (see the **Wireless Settings** page for more information).
- After configuring the wireless settings, move the switch to the **WAN Mode** position and wait for the device to reboot.

To connect to a cable/DSL/Satellite modem, please follow the steps below:

1. Unplug the Ethernet cable (that connects your computer to your modem) from your computer and place it into the Ethernet port on the router.

2. Plug the power adapter into the router and connect it to an outlet or power strip. Wait about 50 seconds for the router to boot.

3. Connect the DIR-412 to your computer wirelessly using the settings (SSID, encryption key) you configured previously.

4. Verify the link lights on the router. The power light, Internet light, and the Wireless LAN light should be lit. If not, make sure your computer, modem, and router are powered on and verify the cable connections are correct.

Connect to a 3G Internet Service

If you are using a 3G USB dongle to connect to the Internet, please follow the steps below:

1. Move the toggle switch to the **3G Router** mode position and wait for the DIR-412 to reboot.

2. Insert your 3G USB dongle into the DIR-412's 3G USB port.

3. Plug one end of Ethernet cable into the DIR-412, and the other end into your PC.

4. Plug the power adapter to the router and connect to an outlet or power strip. Wait about 50 seconds for the router to boot.

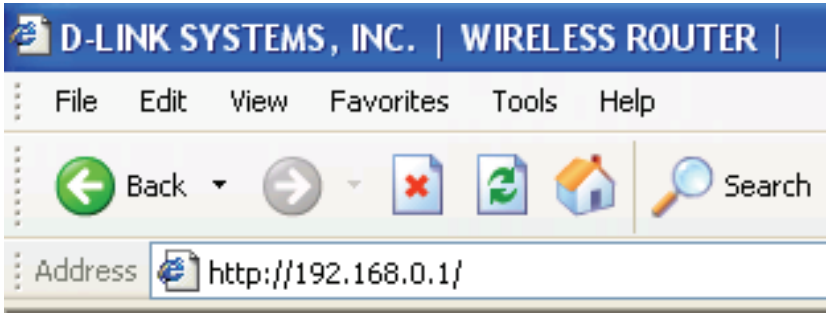
5. Verify the link lights on the router. The power light, Internet light, and the Wireless LAN light should be lit. If not, make sure your computer and router are powered on and verify the cable connections are correct.

Configuration

This section will show you how to configure your new D-Link wireless router using the web-based configuration utility.

Web-based Configuration Utility

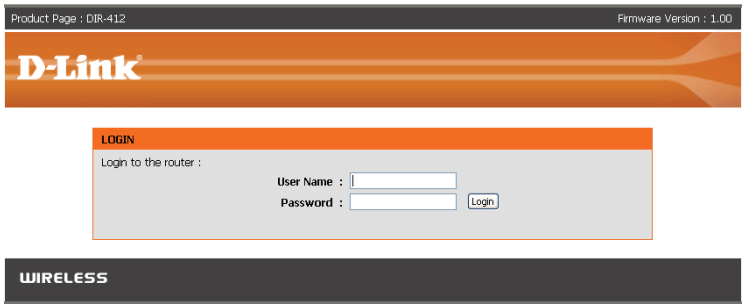
To access the configuration utility, open a web-browser such as Internet Explorer and enter the IP address of the router (192.168.0.1).



Type **Admin** in the **User Name** field and then enter your password. Leave the password blank by default.

Click the **Login** button to log in to the router.

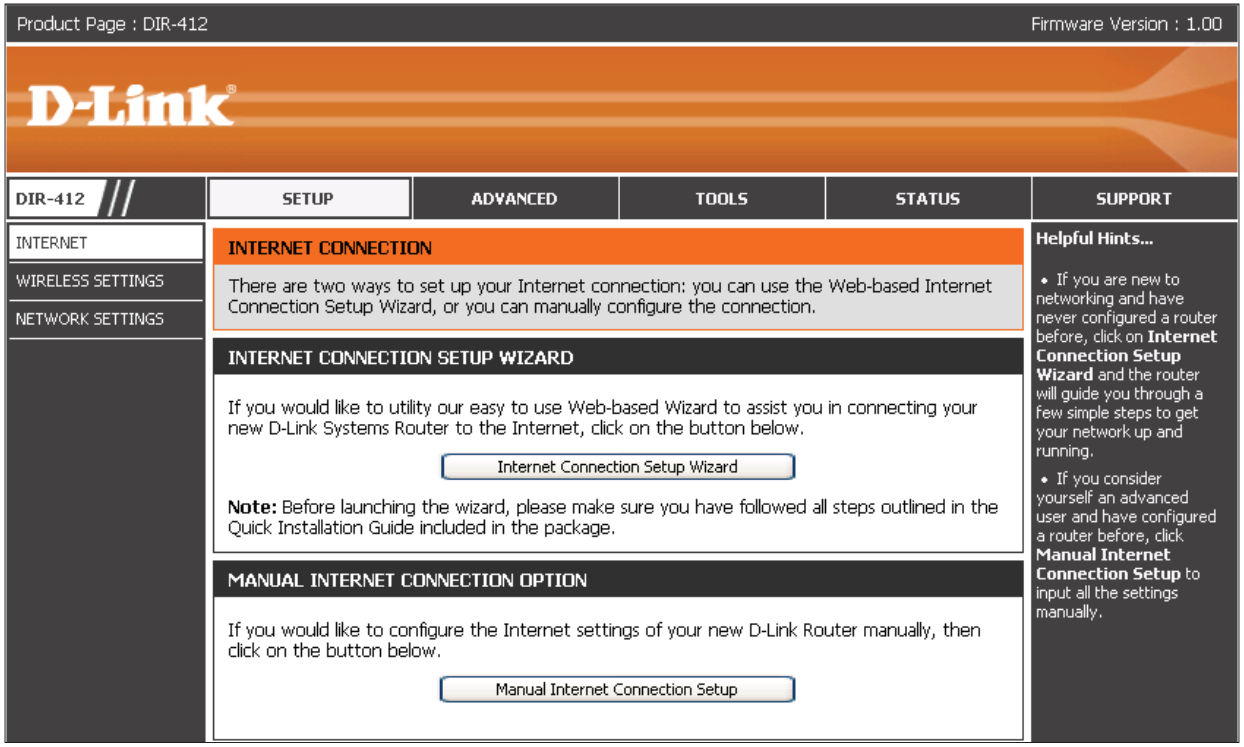
If you get a **Page Cannot be Displayed** error, please refer to the **Troubleshooting** section for assistance.



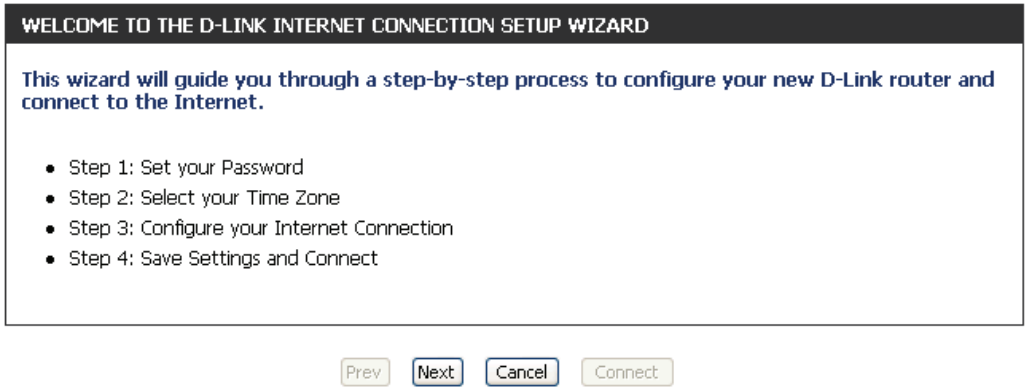
Internet Connection Setup Wizard (3G Mode)

Once logged into the web interface of the router, the **Setup > Internet** page will appear. Click the **Internet Connection Setup Wizard** button to quickly configure your router using the setup wizard.

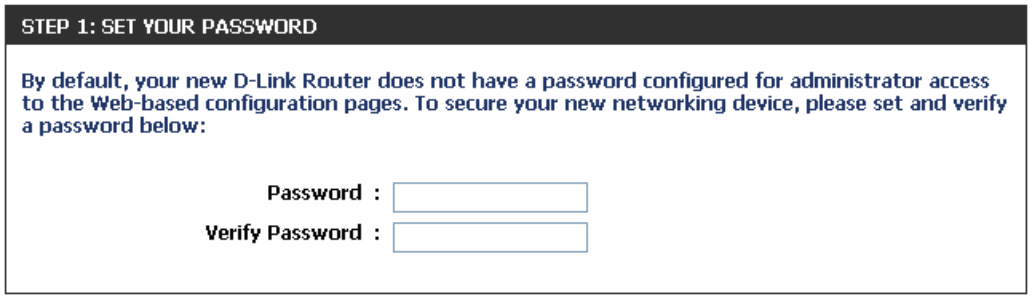
If you want to enter your settings without running the wizard, click **Manual Internet Connection Setup** and skip to "Manual Configuration (3G Mode)".



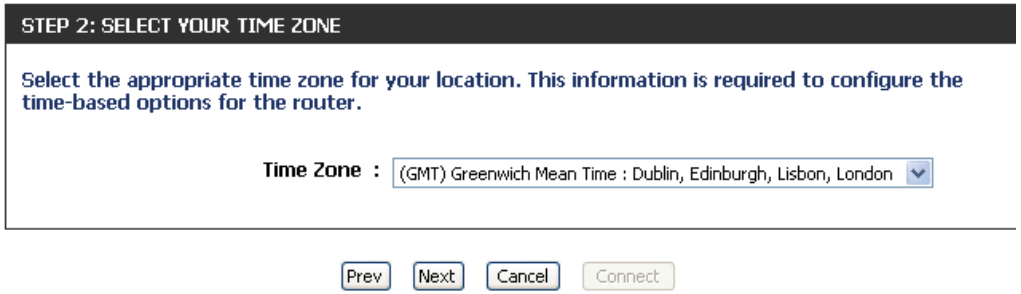
Click **Next** to continue.



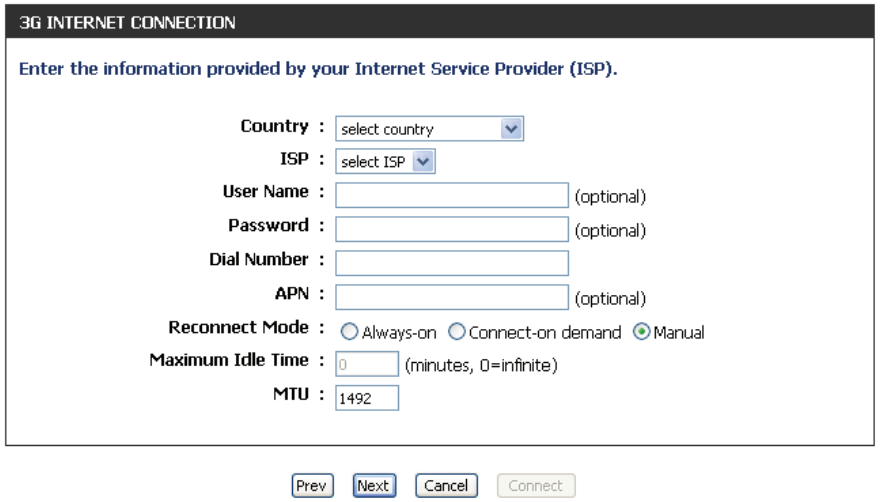
Create a new password and then click **Next** to continue.



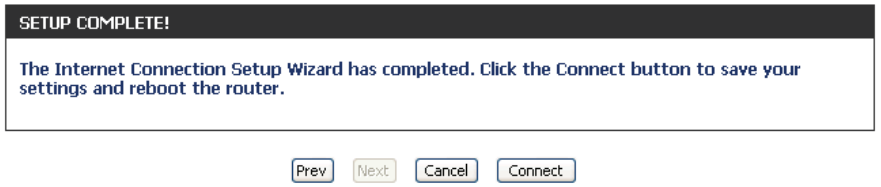
Select your time zone from the drop-down menu and then click **Next** to continue.



Configure your 3G Internet Connection settings and then click **Next** to continue.



Click **Connect** to save your settings. Once the router has finished rebooting, click **Continue**. Please allow 1-2 minutes to connect.



Manual Configuration (3G Mode)
3G Internet Connection

If you opt to set up your Internet connection manually, you will be redirected to a WAN page that allows you to configure your 3G configuration parameters.

Country: Select your country from the drop-down menu.

ISP: Select your Internet Service Provider (ISP) from the drop-down menu.

User Name: Enter the user name for your 3G Internet connection.

Password: Enter the password for your 3G Internet connection.

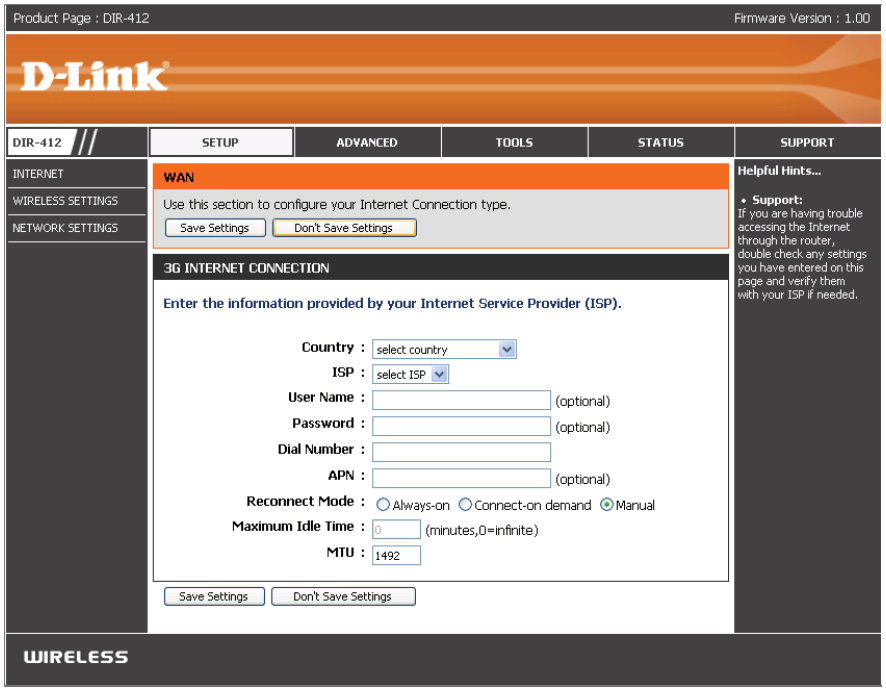
Dial Number: Enter the dial number for your 3G service provider.

APN: Enter the Access Point Name (APN) for your 3G service provider.

Reconnect Mode: Click a radio button to choose a reconnection mode. The options are **Always-on**, **Connect on demand**, or **Manual**.

Maximum Idle Time: Enter the maximum amount of time the Internet connection should be maintained during inactivity. To disable this feature, enable the **Always-on** reconnect mode.

MTU: Maximum Transmission Unit. You may need to change the MTU for optimal performance with your specific ISP. The default is 1500.

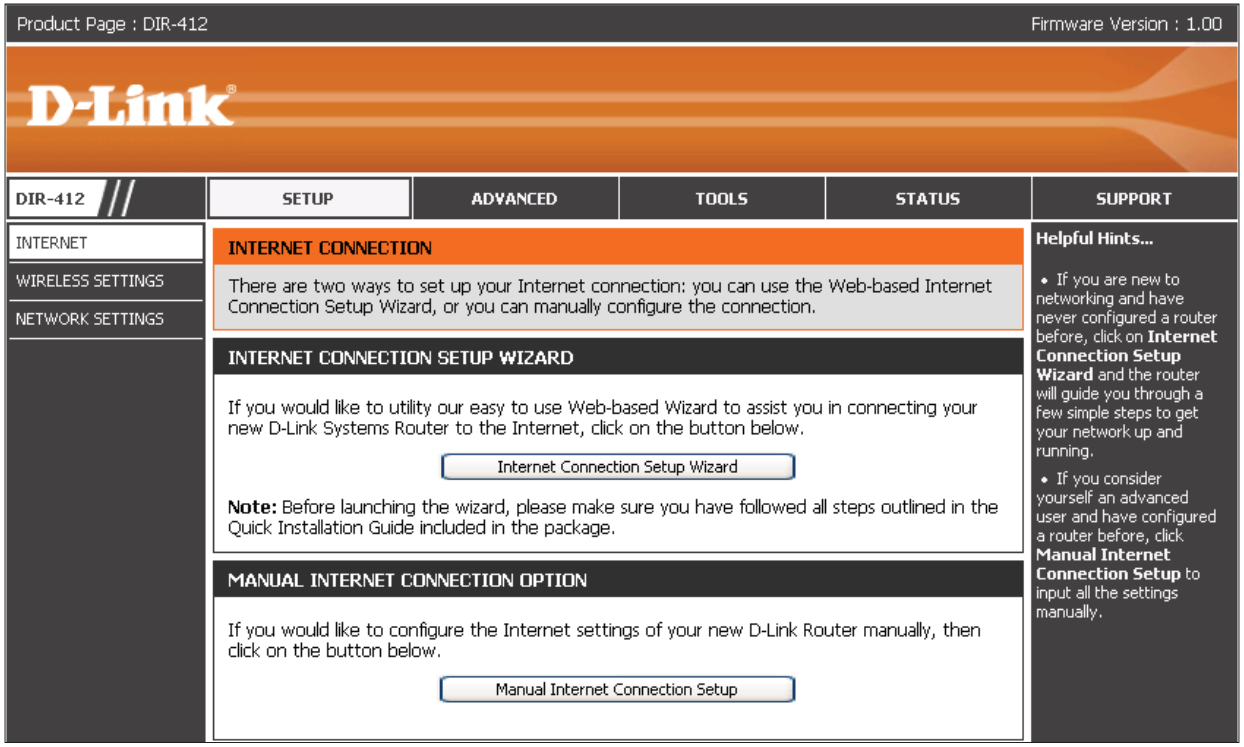


Click the **Save Settings** button when you have finished configuring the 3G connection.

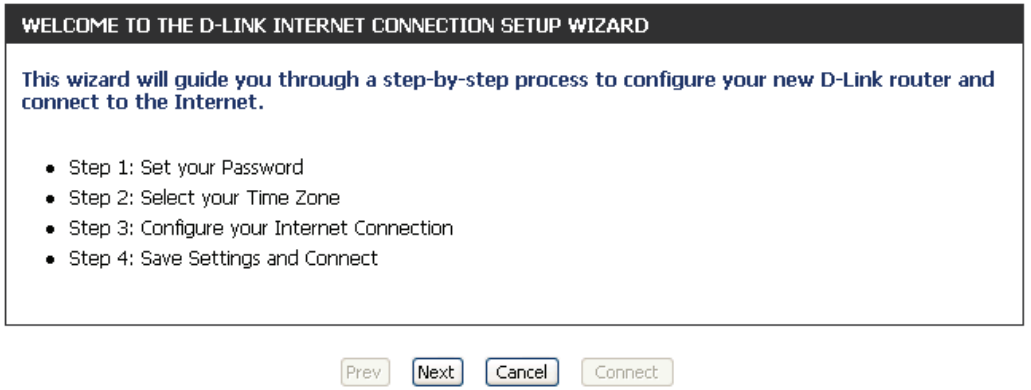
Internet Connection Setup Wizard (WAN Mode)

Once logged into the web interface of the router, the **Setup > Internet** page will appear. Click the **Internet Connection Setup Wizard** button to quickly configure your router using the setup wizard.

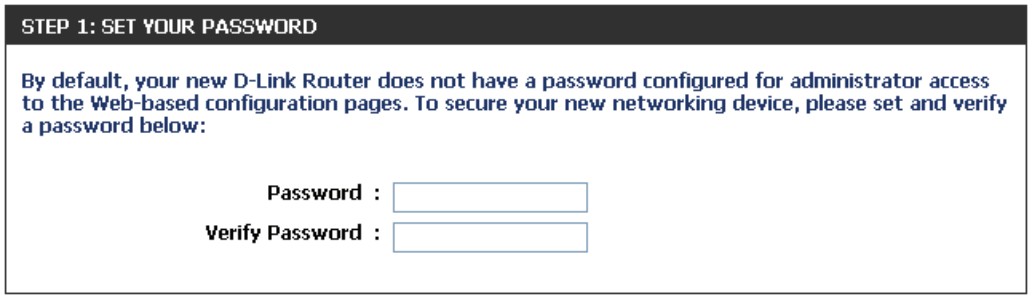
If you want to enter your settings without running the wizard, click **Manual Internet Connection Setup** and skip to "Manual Configuration (WAN Mode)" on page .



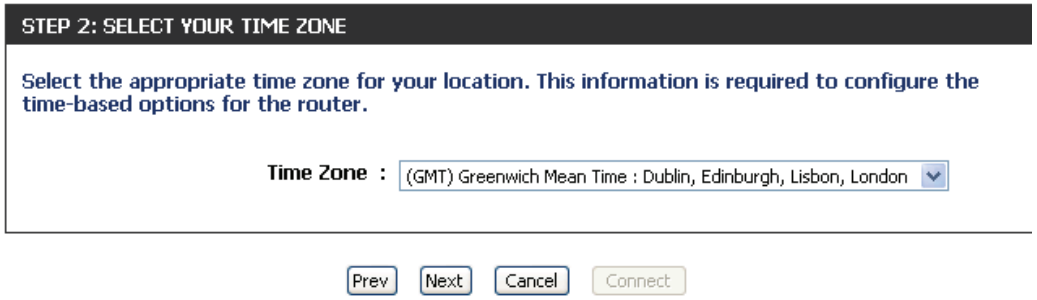
Click **Next** to continue.



Create a new password and then click **Next** to continue.

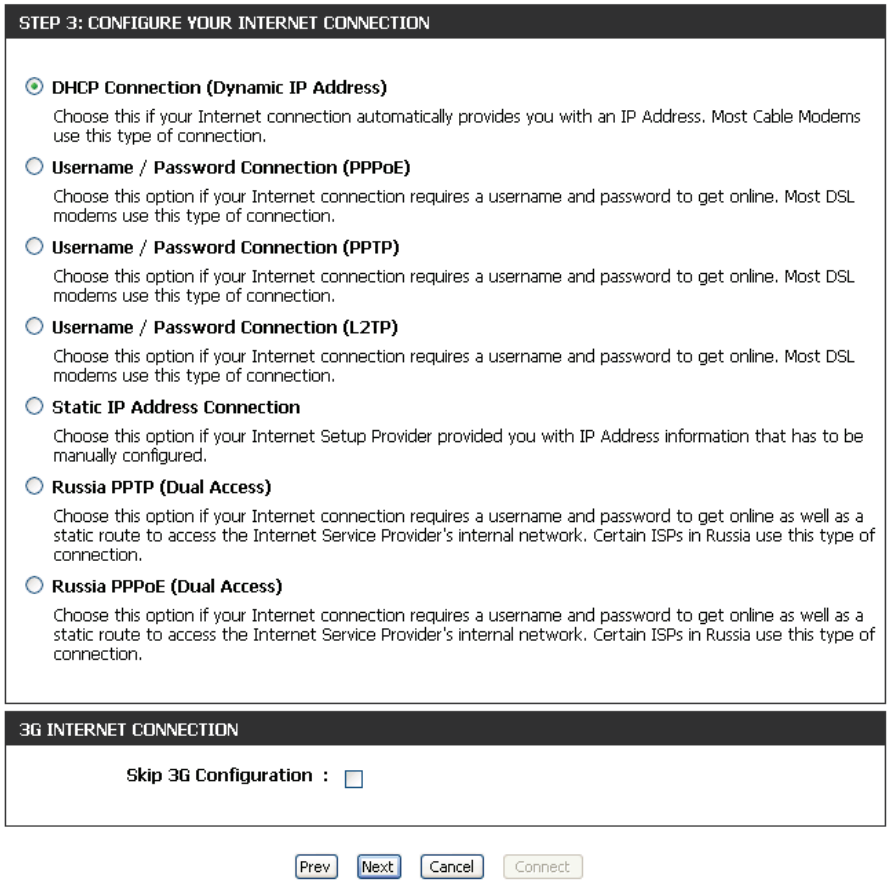


Select your time zone from the drop-down menu and then click **Next** to continue.



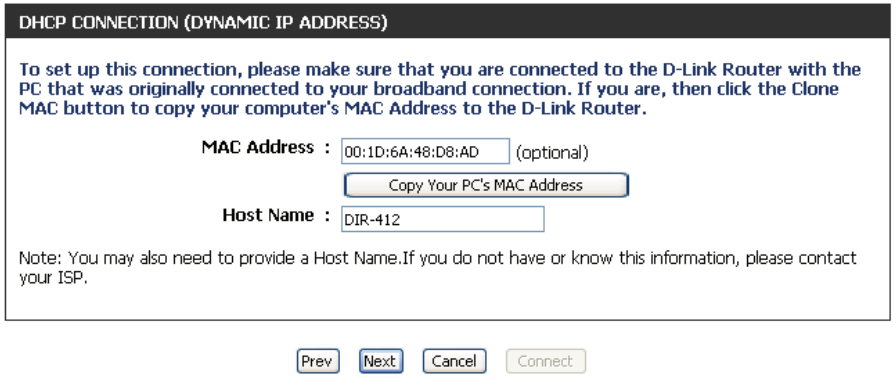
Select the type of Internet connection you will use on your WAN connection. If using the DIR-412 for the first time, leave the **Skip 3G Configuration** box unchecked. Check the **Skip 3G Configuration** box if you do not want to configure the router's 3G connection.

Click **Next** to continue.



If you selected Dynamic IP Address, you may need to enter the MAC address of the computer that was last connected directly to your modem. If you are currently using that computer, click **Copy Your PC's MAC Address** and then click **Next** to continue.

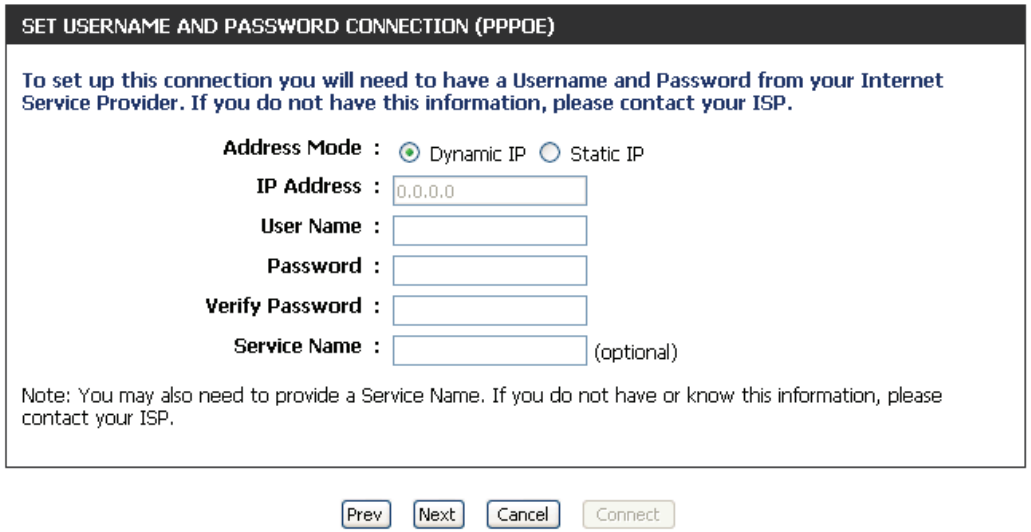
The Host Name is optional but may be required by some ISPs. The default host name is "**DIR-412**".



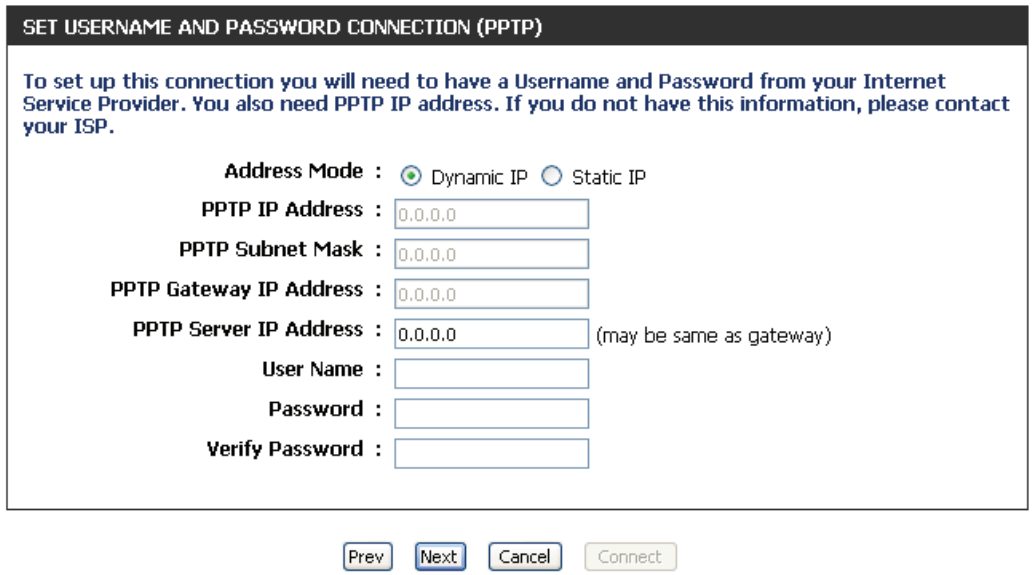
If you selected PPPoE, enter your PPPoE username and password. Click **Next** to continue.

Select **Static** if your ISP assigned you the IP address, subnet mask, gateway, and DNS server addresses.

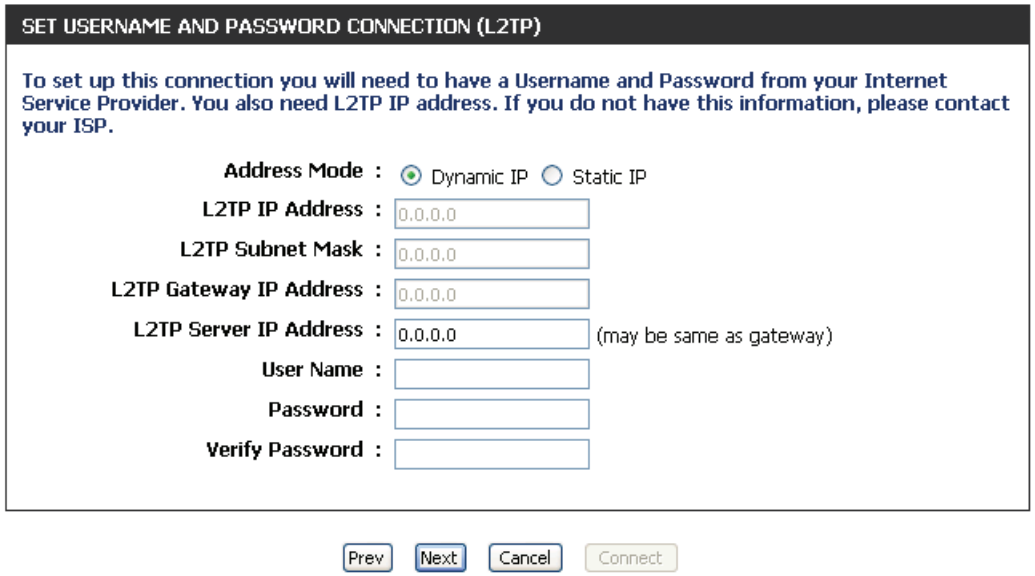
Note: Make sure to remove your PPPoE software from your computer. The software is no longer needed and will not work through a router.



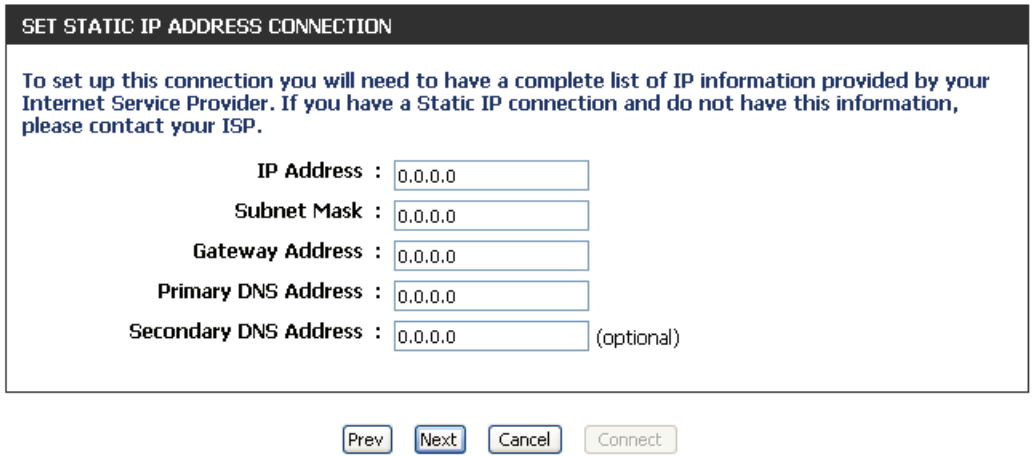
If you selected PPTP, enter your PPTP username and password. Click **Next** to continue.



If you selected L2TP, enter your L2TP username and password. Click **Next** to continue.

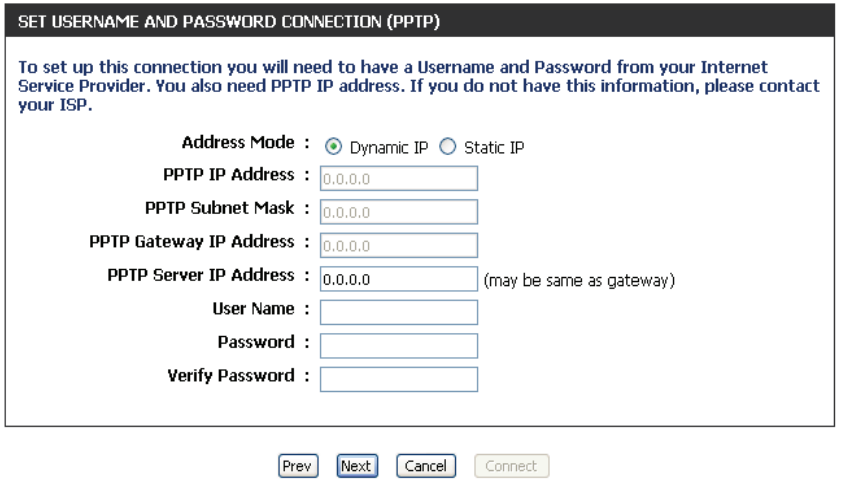


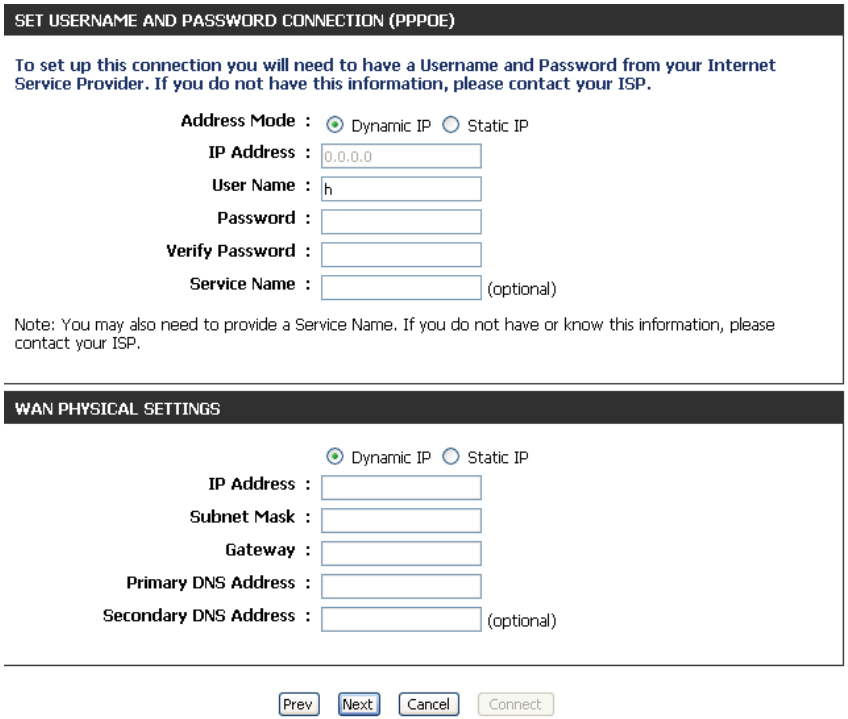
If you selected Static IP Address Connection, enter the network settings supplied by your Internet provider. Click **Next** to continue.



Russia PPTP (dual mode) and **Russia PPPoE (dual mode)** are specifically for Russian users. Please fill in the username and password given by Russia ISPs and click **Next** to continue.

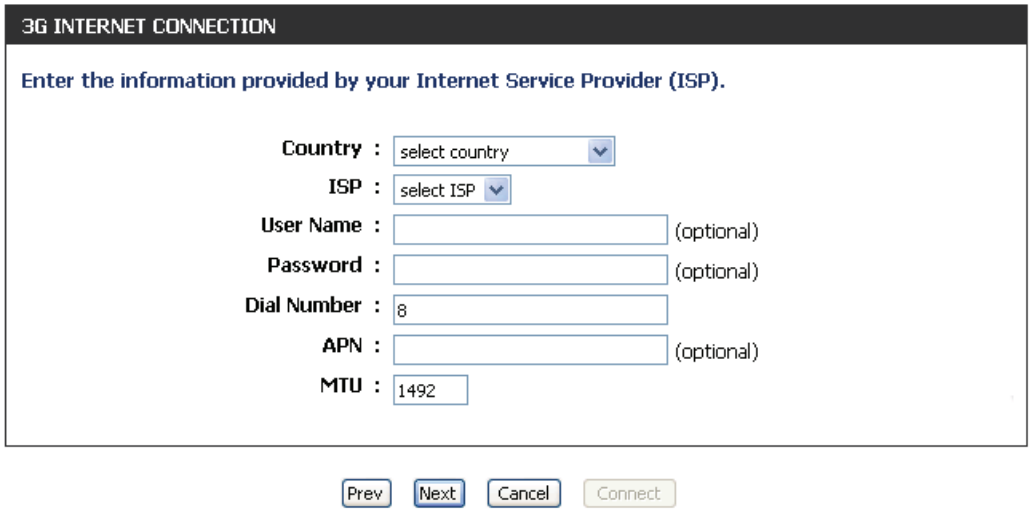
Other users may ignore these 2 settings.



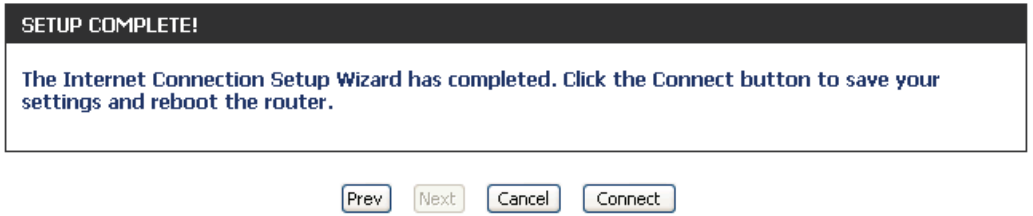


If you left the **Skip 3G Configuration** checkbox unchecked in **Step 3** of the **Internet Connection Setup Wizard**, the following window appears:

Configure the parameters for your 3G Internet Connection and click next to **Continue**.



Click **Connect** to save your settings and reboot the router. Please allow 1-2 minutes to connect.



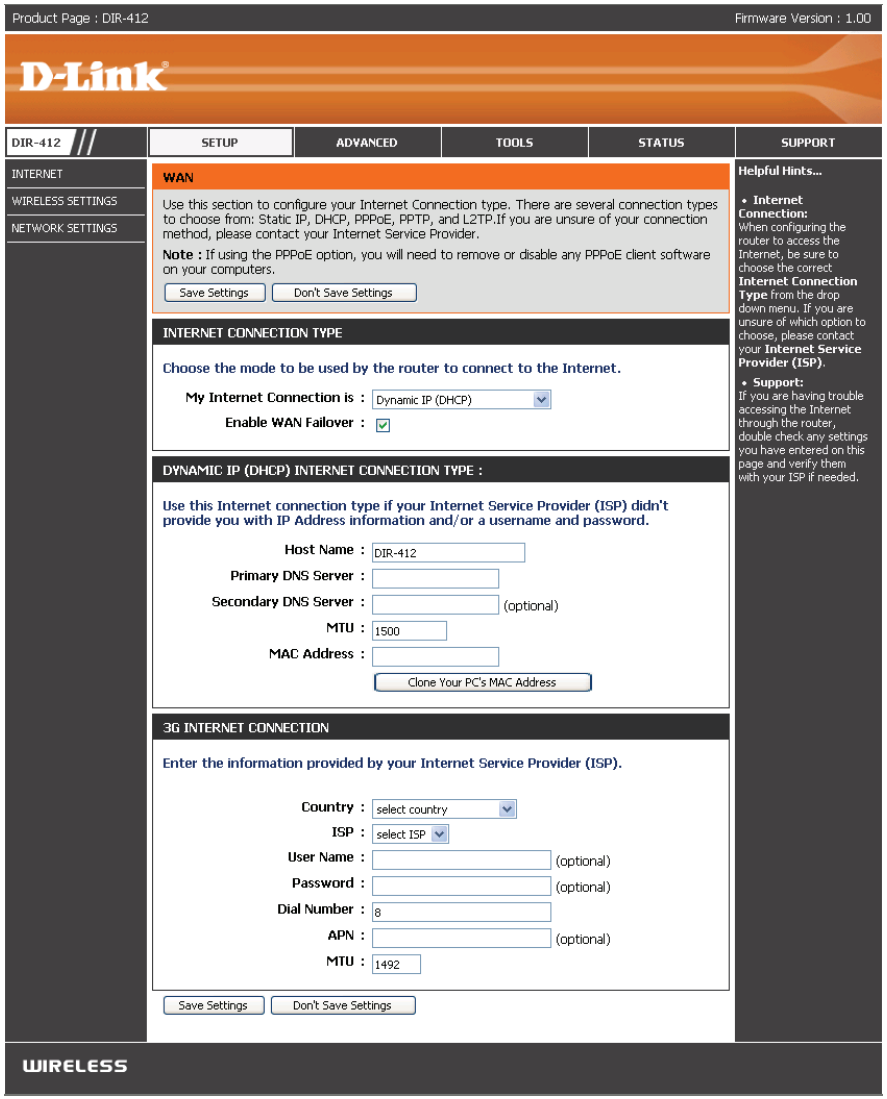
Manual Configuration (WAN Mode)

If you opt to set up your Internet connection manually, you will be redirected to a WAN page that allows you to select your Internet type and enter the correct configuration parameters.

Internet Connection Type: Select your Internet connection type using the "**My Internet Connection is:**" drop-down menu. To enable the Router to connect to the Internet via the 3G Internet connection in the event that the WAN connection fails, check the **Enable WAN Failover** box. Configure the parameters for your WAN connection in the section below the **Internet Connection Type** section as described in the following pages.

3G Internet Connection: If enabling the WAN Failover feature, configure the parameters for your 3G Internet Connection.

Click the **Save Settings** button when you have finished configuring the WAN connection.



Manual Configuration (WAN Mode)
Static IP Address

Choose **Static IP (DHCP)** from the **My Internet Connection is** drop-down menu if all the Internet port's IP information is provided to you by your ISP. You will need to enter in the IP address, subnet mask, gateway address, and DNS address(es) provided to you by your ISP. Each IP address entered in the fields must be in the appropriate IP form, which are four octets separated by a dot (x.x.x.x). The Router will not accept the IP address if it is not in this format.

IP Address: Enter the IP address assigned by your ISP.

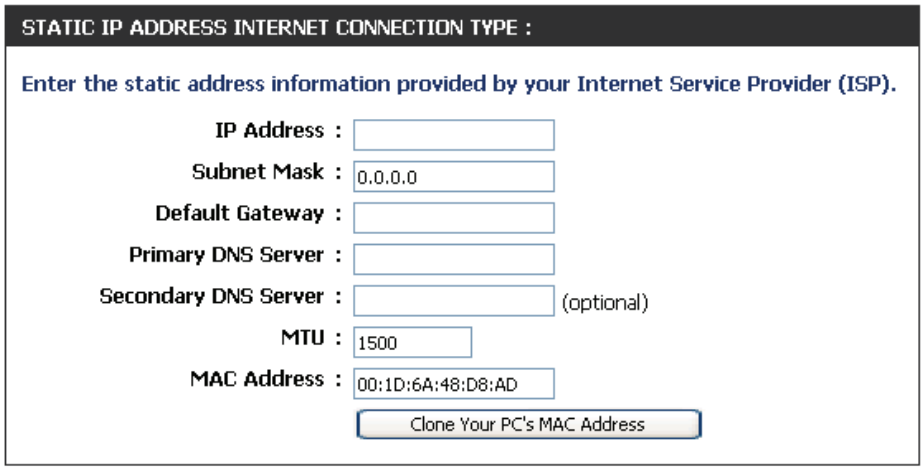
Subnet Mask: Enter the Subnet Mask assigned by your ISP.

Default Gateway: Enter the Gateway assigned by your ISP.

DNS Servers: Enter the Primary and Secondary DNS server IP addresses assigned by your ISP.

MTU: Maximum Transmission Unit - You may need to change the MTU for optimal performance with your specific ISP. 1500 is the default MTU.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.



Manual Configuration (WAN Mode)
Dynamic IP Address (DHCP)

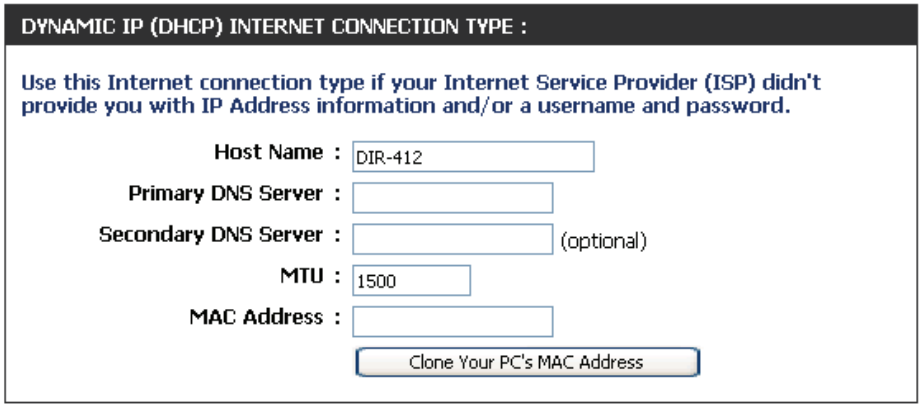
Choose **Dynamic IP (DHCP)** from the **My Internet Connection is** drop-down menu if all WAN IP information is obtained from your ISP.

Host Name: The Host Name is optional but may be required by some ISPs. The default host name is the device name of the Router and may be changed.

DNS Addresses: Enter the Primary and Secondary DNS server IP addresses assigned by your ISP.

MTU: Maximum Transmission Unit - you may need to change the MTU for optimal performance with your specific ISP. 1500 is the default MTU.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.



Manual Configuration (WAN Mode)
PPPoE (Username/Password)

Choose **PPPoE (Username/Password)** from the **My Internet Connection is** drop-down menu if your ISP uses a PPPoE connection. Your ISP will provide you with a username and password. This option is typically used for DSL services. Make sure to remove your PPPoE software from your computer. The software is no longer needed and will not work through a router.

Address Mode: Select **Static** if your ISP assigned you the IP address, subnet mask, gateway, and DNS server addresses. In most cases, select **Dynamic**.

IP Address: Enter the IP address (Static PPPoE only).

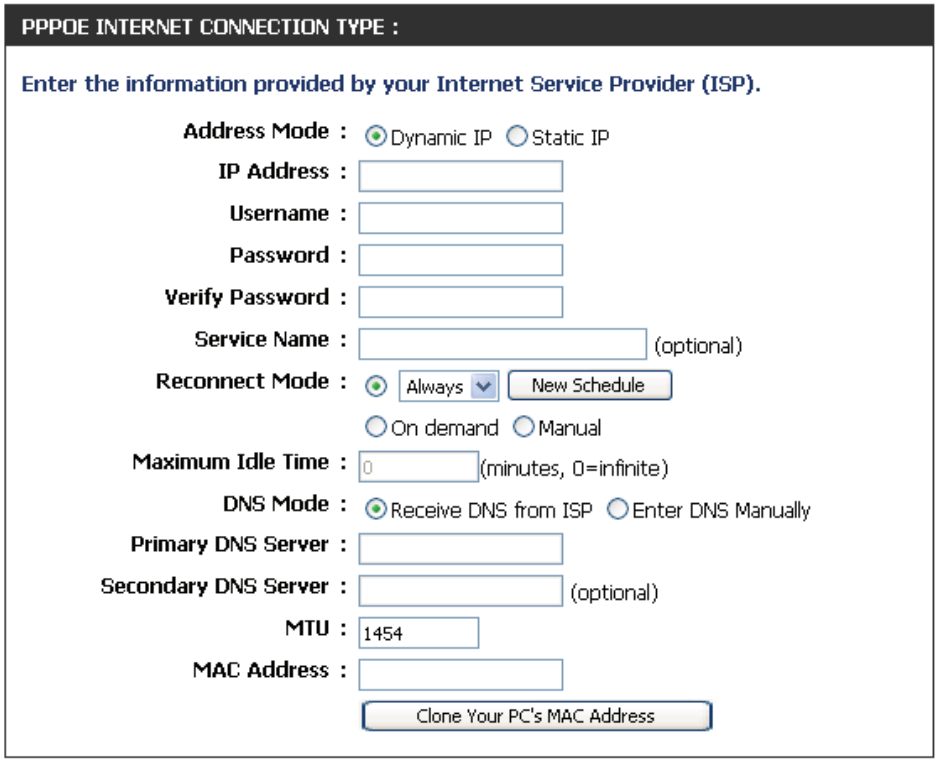
User Name: Enter your PPPoE user name.

Password: Enter your PPPoE password and then retype the password in the next box.

Service Name: Enter the ISP Service Name (optional).

Reconnect Mode: Select either **Always-on**, **On-Demand**, or **Manual**.

Maximum Idle Time: Enter a maximum idle time during which the Internet connection is maintained during inactivity. To disable this feature, enable Auto-reconnect.



DNS Mode: Click the **Receive DNS from ISP** radio button if you want to dynamically receive the DNS Server IP addresses from your ISP. To manually enter the DNS Server IP addresses, click the **Enter DNS Manually** radio button and enter the DNS Server IP addresses in the **Primary DNS Server** and **Secondary DNS Server** fields.

MTU: Maximum Transmission Unit - You may need to change the MTU for optimal performance with your specific ISP. 1492 is the default MTU.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.

Manual Configuration (WAN Mode)
PPTP (Username/Password)

Choose **PPTP (Username/Password)** from the **My Internet Connection is** drop-down menu if your ISP uses a PPTP connection. Your ISP will provide you with a username and password. This option is typically used for DSL services.

Address Mode: Select **Static** if your ISP assigned you the IP address, subnet mask, gateway, and DNS server addresses. In most cases, select **Dynamic**.

PPTP IP Address: Enter the IP address (Static PPTP only).

PPTP Subnet Mask: Enter the Subnet Mask (Static PPTP only).

PPTP Gateway IP Address: Enter the Gateway IP address provided by your ISP (Static PPTP only).

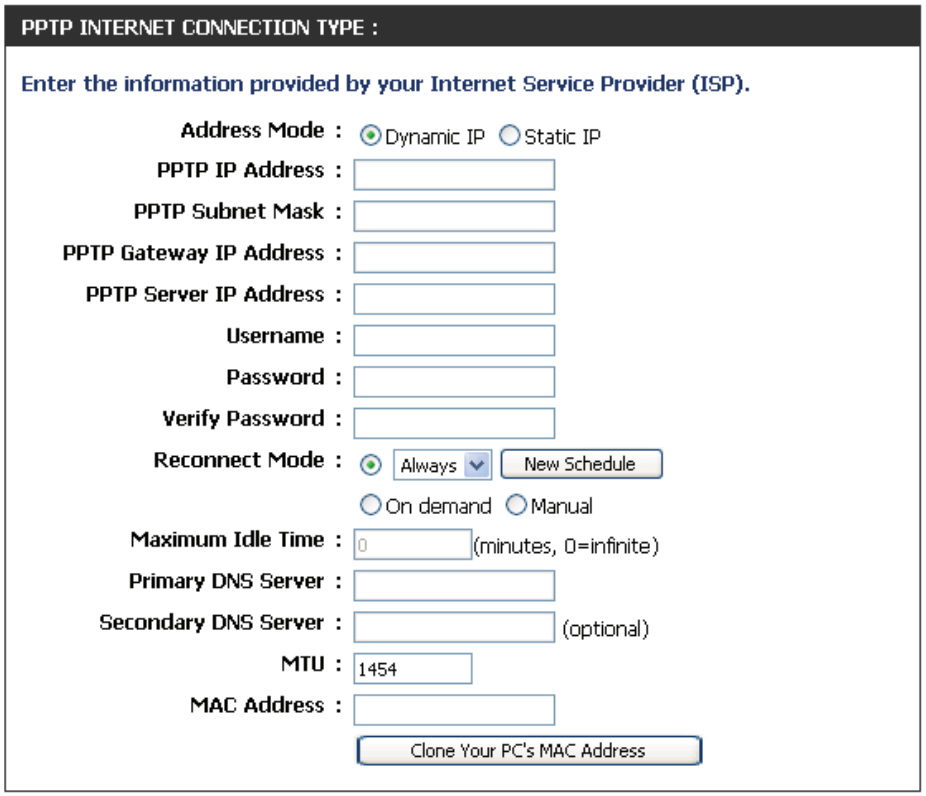
PPTP Server IP Address: Enter the Server IP provided by your ISP (optional).

Username: Enter your PPTP username.

Password: Enter your PPTP password and password in the next box.

Reconnect Mode: Select either **Always-on**, **On-Demand**, or **Manual**.

Maximum Idle Time: Enter a maximum idle time during which the Internet connection is maintained during inactivity. To disable this feature, enable Auto-reconnect.



DNS Servers: Enter the Primary and Secondary DNS Server Addresses (Static PPTP only).

MTU: Maximum Transmission Unit - You may need to change the MTU for optimal performance with your specific ISP. 1400 is the default MTU.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.

Manual Configuration (WAN Mode)
L2TP (Username/Password)

Choose **L2TP (Username/Password)** from the **My Internet Connection is** drop-down menu if your ISP uses an L2TP connection. Your ISP will provide you with a username and password. This option is typically used for DSL services.

Address Mode: Select **Static IP** if your ISP assigned you the IP address, subnet mask, gateway, and DNS server addresses. In most cases, select **Dynamic IP**.

L2TP IP Address: Enter the L2TP IP address supplied by your ISP (Static IP only).

L2TP Subnet Mask: Enter the Subnet Mask supplied by your ISP (Static L2TP only).

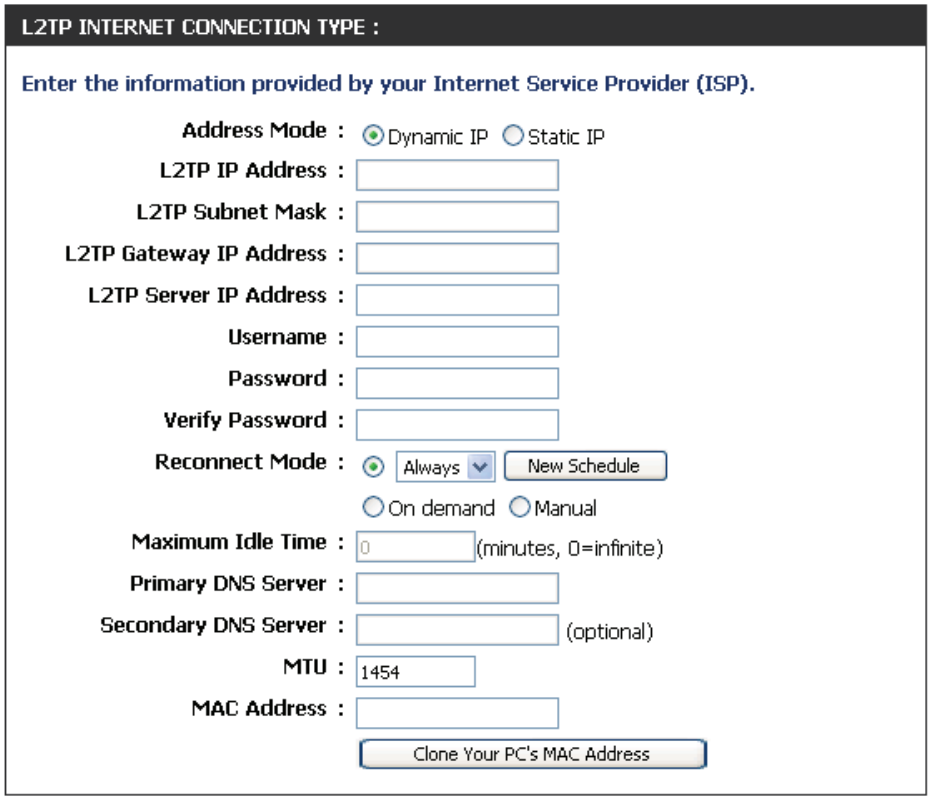
L2TP Gateway IP Address: Enter the Gateway IP address provided by your ISP (Static L2TP only).

L2TP Server IP Address: Enter the Server IP address provided by your ISP (optional).

User Name: Enter your L2TP user name.

Password: Enter your L2TP password and then retype the password in the next box.

Reconnect Mode: Select either **Always-on**, **On-Demand**, or **Manual**.



Maximum Idle Time: Enter a maximum idle time during which the Internet connection is maintained during inactivity. To disable this feature, enable Auto-reconnect.

DNS Servers: Enter the Primary and Secondary DNS Server Addresses (Static L2TP only).

MTU: Maximum Transmission Unit - You may need to change the MTU for optimal performance with your specific ISP. 1400 is the default MTU.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.

Manual Configuration (WAN Mode)
Russia PPTP (Dual Access)

Choose **Russia PPTP (Dual Access)** from the **My Internet Connection is** drop-down menu if your ISP uses a PPTP connection. Your ISP will provide you with a username and password. This option is typically used for DSL services.

Address Mode: Select **Static IP** if your ISP assigned you the IP address, subnet mask, gateway, and DNS server addresses. In most cases, select **Dynamic IP**.

PPTP IP Address: Enter the IP address (Static PPTP only).

PPTP Subnet Mask: Enter the Subnet Mask (Static PPTP only).

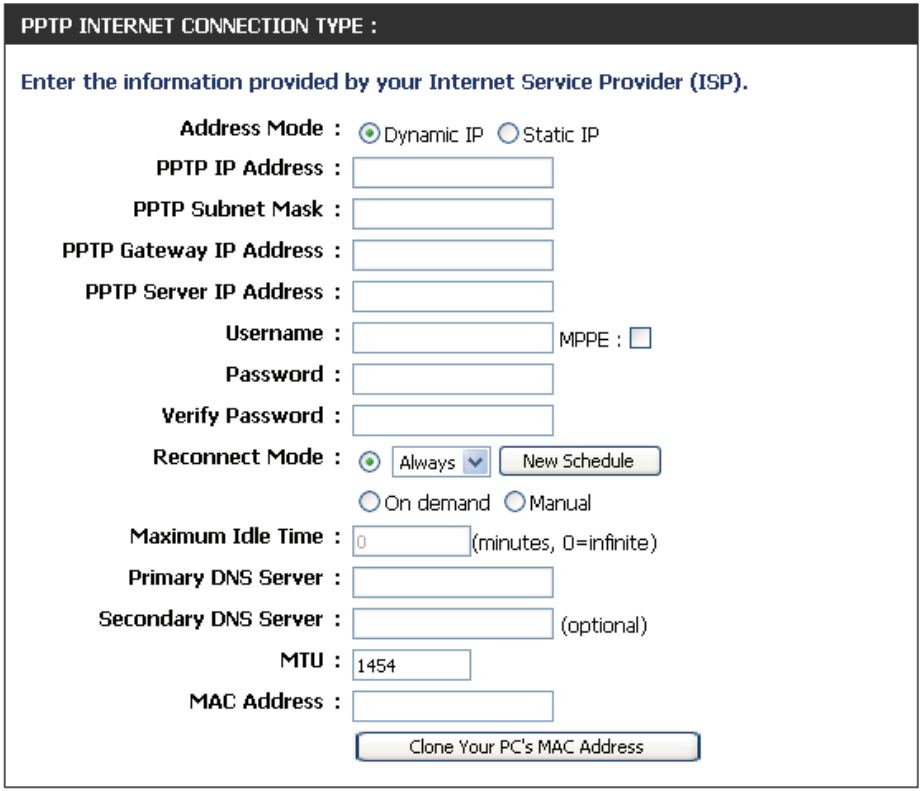
PPTP Gateway IP Address: Enter the Gateway IP address provided by your ISP (Static PPTP only).

PPTP Server IP Address: Enter the Server IP provided by your ISP (optional).

Username: Enter your PPTP username. Check the **MPPE** box to enable the MPPE encryption protocol between the DIR-412 and PPTP server.

Password: Enter your PPTP password and then retype the password in the next box.

Reconnect Mode: Select either **Always-on**, **On-Demand**, or **Manual**.



Maximum Idle Time: Enter a maximum idle time during which the Internet connection is maintained during inactivity. To disable this feature, enable Auto-reconnect.

DNS Servers: Enter the Primary and Secondary DNS Server Addresses (Static PPTP only).

MTU: Maximum Transmission Unit - You may need to change the MTU for optimal performance with your specific ISP. 1400 is the default MTU.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.

Manual Configuration (WAN Mode)

Russia PPPoE (Dual Access)

Choose **Russia PPoE (Dual Access)** from the **My Internet Connection is** drop-down menu if your ISP uses a PPPoE connection. Your ISP will provide you with a username and password. This option is typically used for DSL services.

Address Mode: Select **Static** if your ISP assigned you the IP address, subnet mask, gateway, and DNS server addresses. In most cases, select **Dynamic**.

IP Address: Enter the IP address (Static PPPoE only).

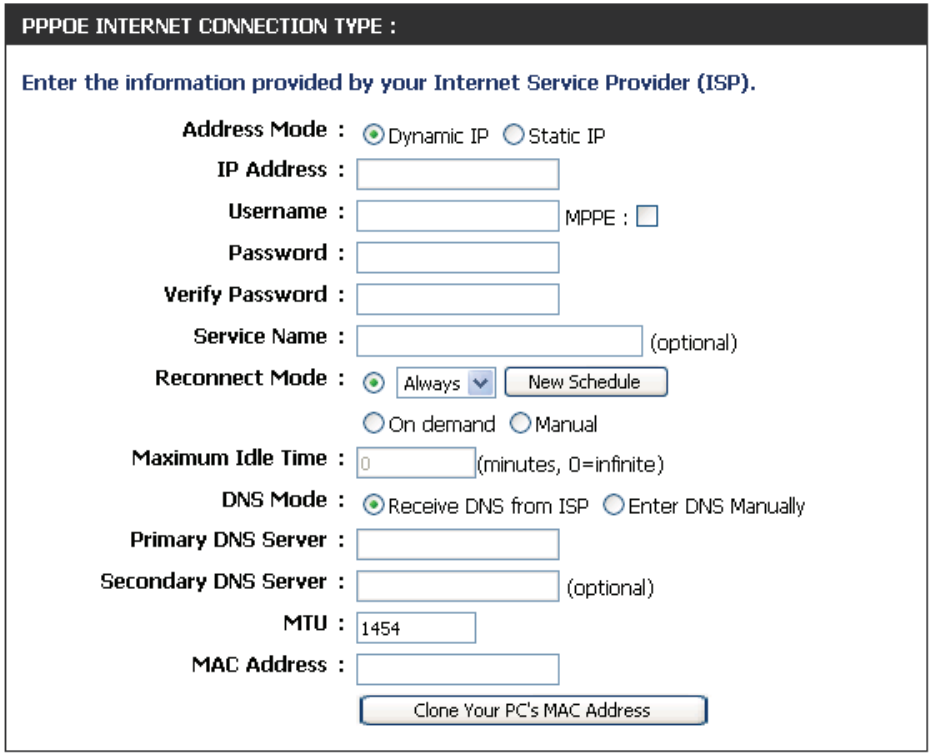
User Name: Enter your PPPoE user name. Check the **MPPE** box to enable the MPPE encryption protocol between the DIR-412 and PPPoE server.

Password: Enter your PPPoE password and then retype the password in the next box.

Service Name: Enter the ISP Service Name (optional).

Reconnect Mode: Select either **Always-on**, **On-Demand**, or **Manual**.

Maximum Idle Time: Enter a maximum idle time during which the Internet connection is maintained during inactivity. To disable this feature, enable Auto-reconnect.



DNS Mode: Click the **Receive DNS from ISP** radio button if you want to dynamically receive the DNS Server IP addresses from your ISP. To manually enter the DNS Server IP addresses, click the **Enter DNS Manually** radio button and enter the DNS Server IP addresses in the **Primary DNS Server** and **Secondary DNS Server** fields.

MAC Address: The default MAC Address is set to the Internet port's physical interface MAC address on the Broadband Router. It is not recommended that you change the default MAC address unless required by your ISP. You can use the **Clone Your PC's MAC Address** button to replace the Internet port's MAC address with the MAC address of your Ethernet card.

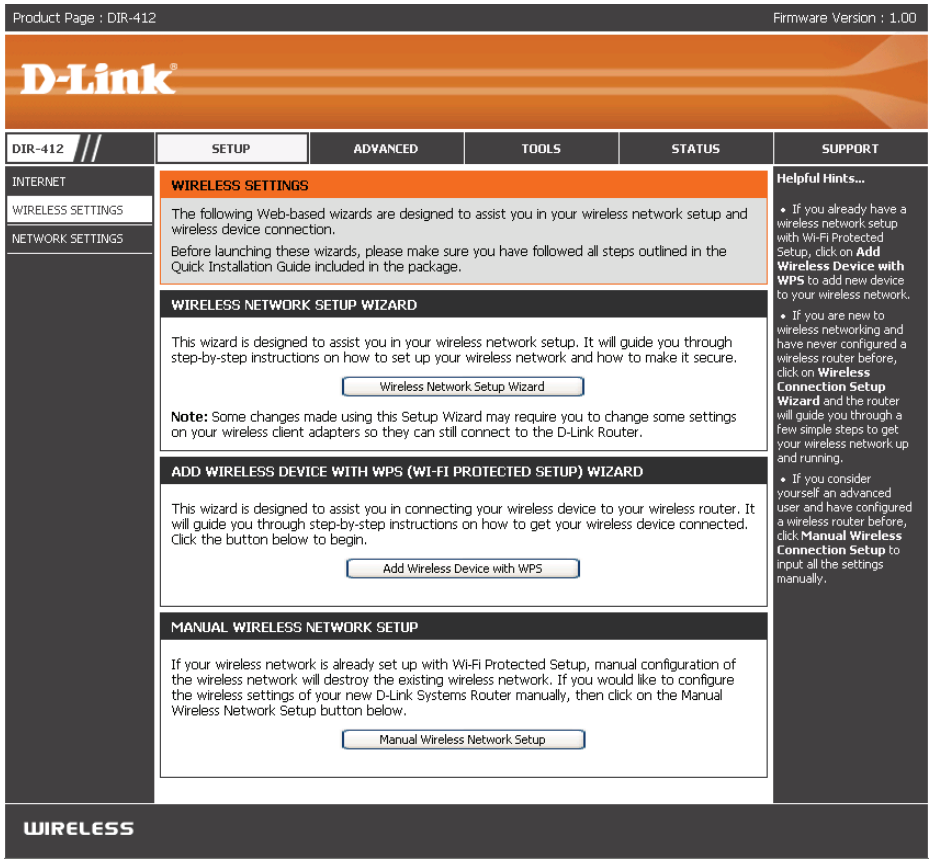
MTU: Maximum Transmission Unit - You may need to change the MTU for optimal performance with your specific ISP. 1492 is the default MTU.

Wireless Settings

If you want to configure the wireless settings on your router using the wizard, click **Wireless Network Setup Wizard** and refer to “Wireless Connection Setup Wizard” on page .

Click **Add Wireless Device with WPS** if you want to add a wireless device using Wi-Fi Protected Setup (WPS) and refer to “Add Wireless Device with WPS Wizard” on page .

If you want to manually configure the wireless settings on your router click **Manual Wireless Network Setup** and refer to the next page.



Manual Wireless Network Setup

Enable Wireless: Check the box to enable the wireless function. If you do not want to use wireless, uncheck the box to disable all the wireless functions. Click **Add New** to create your own time schedule to enable the wireless function.

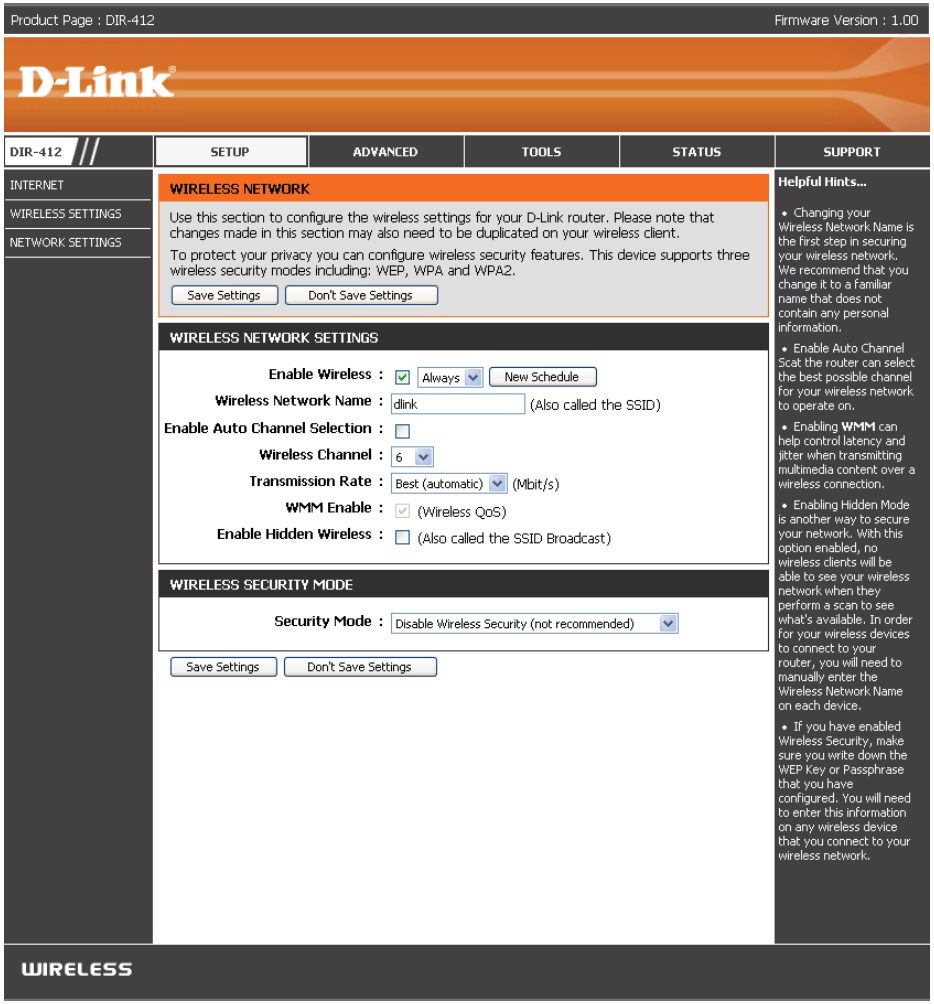
Wireless Network Name: Service Set Identifier (SSID) is the name of your wireless network. Create a name using up to 32 characters. The SSID is case-sensitive.

Enable Auto Channel Selection: The **Auto Channel Scan** setting can be selected to allow the DIR-412 to choose the channel with the least amount of interference.

Wireless Channel: Indicates the channel setting for the DIR-412. By default the channel is set to 6. The Channel can be changed to fit the channel setting for an existing wireless network or to customize the wireless network. If you enable **Auto Channel Scan**, this option will be greyed out.

Transmission Rate: Select the transmit rate. It is strongly suggested to select **Best (Auto)** for best performance.

WMM Enable: WMM (Wi-Fi Multimedia) is QoS for your wireless network. Check this box to improve the quality of video and voice applications for your wireless clients. This feature is not available in 802.11n configurations.



Enable Hidden Wireless: Enabling Hidden Mode is another way to secure your network. With this option enabled, no wireless clients will be able to see your wireless network when they perform a scan to see what's available. In order for your wireless devices to connect to your router, you will need to manually enter the Wireless Network Name on each device.

Wireless Security: Refer to **Section 4- Wireless security** for more information regarding wireless security.

Network Settings

This section will allow you to change the local network settings of the router and to configure the DHCP settings.

Router IP Address: Enter the IP address of the router. The default IP address is 192.168.0.1.

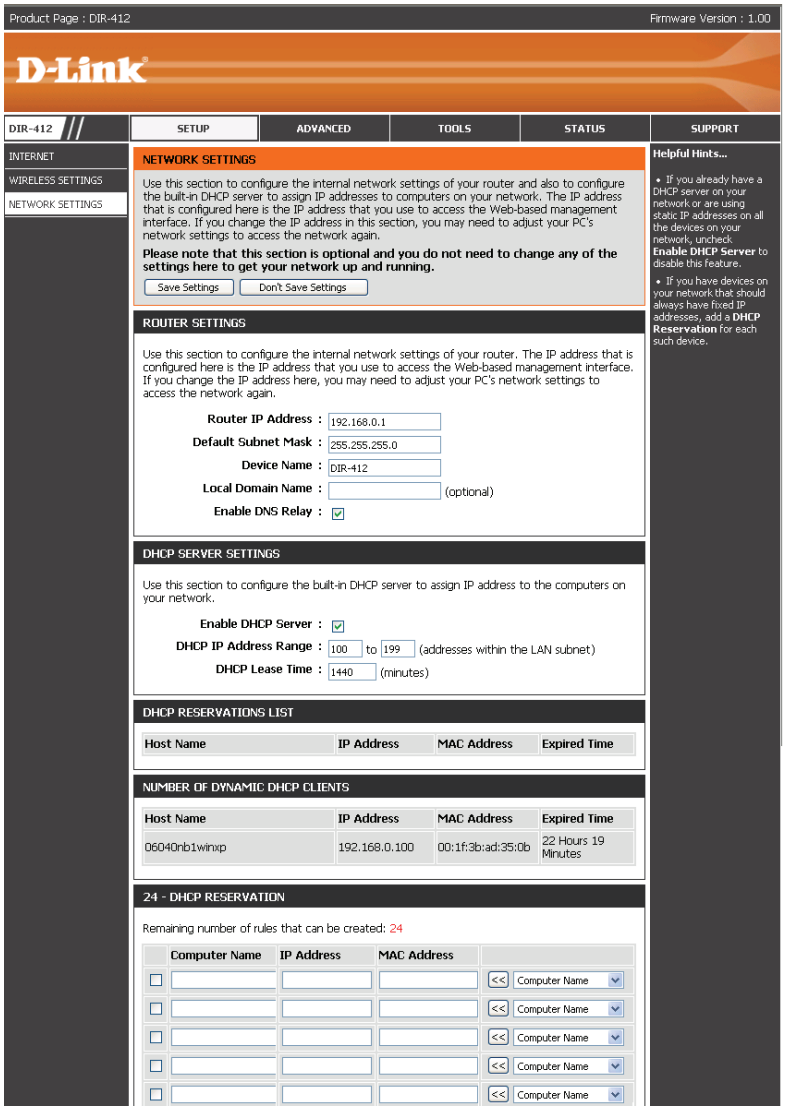
If you change the IP address, once you click **Apply**, you will need to enter the new IP address in your browser to get back into the configuration utility.

Default Subnet Mask: Enter the Subnet Mask. The default subnet mask is 255.255.255.0.

Device Name: Enter the Device name (set to “DIR-412” by default).

Local Domain Name: Enter the Domain name (Optional).

Enable DNS Relay: Uncheck the box to transfer the DNS server information from your ISP to your computers. If checked, your computers will use the router for a DNS server.



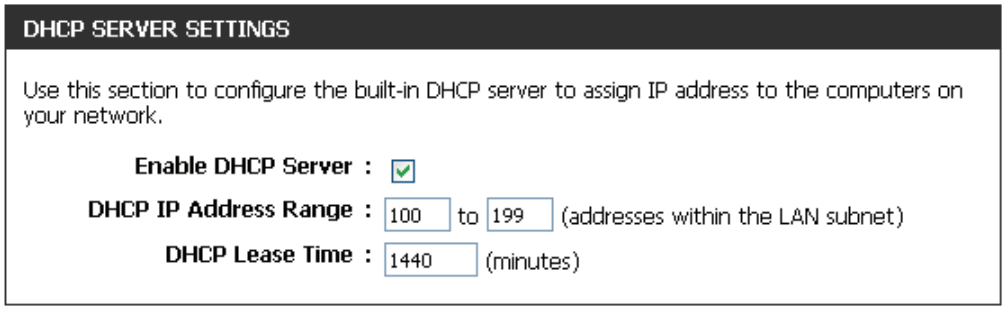
DHCP Server Settings

DHCP stands for Dynamic Host Control Protocol. The DIR-412 has a built-in DHCP server. The DHCP Server will automatically assign an IP address to the computers on the LAN/private network. Be sure to set your computers to be DHCP clients by setting their TCP/IP settings to “Obtain an IP Address Automatically.” When you turn your computers on, they will automatically load the proper TCP/IP settings provided by the DIR-412. The DHCP Server will automatically allocate an unused IP address from the IP address pool to the requesting computer. You must specify the starting and ending address of the IP address pool.

Enable DHCP Server: Check this box to enable the DHCP server on your router. Uncheck to disable this function.

DHCP IP Address Range: Enter the starting and ending IP addresses for the DHCP server’s IP assignment.

Note: If you statically (manually) assign IP addresses to your computers or devices, make sure the IP addresses are outside of this range or you may have an IP conflict.



DHCP Lease Time: The length of time for the IP address lease. Enter the Lease time in minutes.

DHCP Reservation

If you want a computer or device to always have the same IP address assigned, you can create a DHCP reservation. The router will assign the IP address only to that computer or device.

Configure the parameters, as described below, to create a new DHCP Reservation.

Note: This IP address must be within the DHCP IP Address Range.

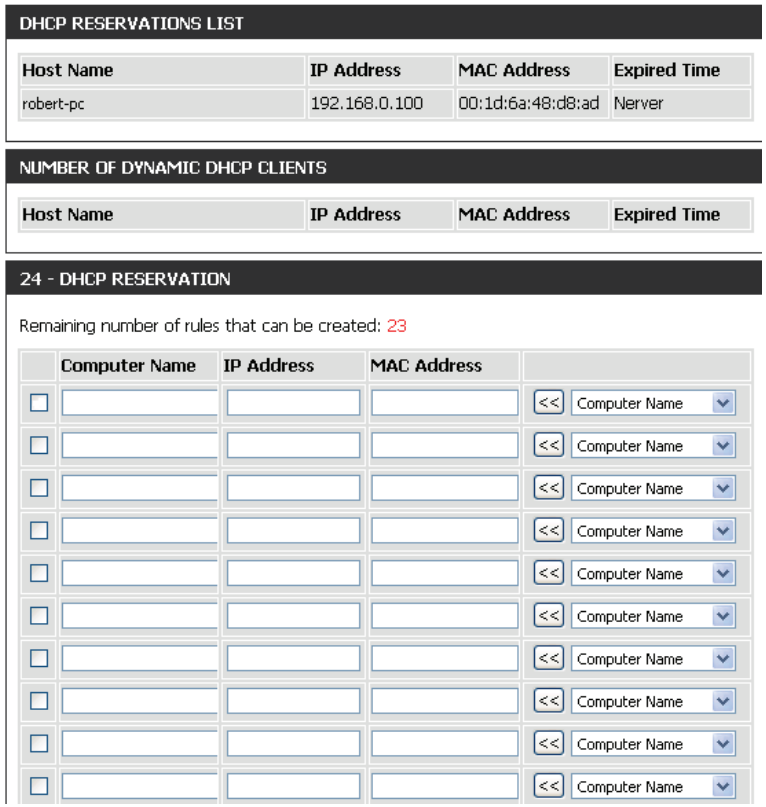
DHCP Reservations List: Displays a list of the DHCP reservations that have been configured on the router.

Number of Dynamic DHCP Clients: In this section, you can see information about the LAN devices that are currently being leased IP addresses.

Computer Name: Enter the computer name or select a computer name from the drop-down menu on the right-hand side and click **<<**.

IP Address: Enter the IP address you want to assign to the computer or device. This IP Address must be within the DHCP IP Address Range.

MAC Address: Enter the MAC address of the computer or device.



When you have finished configuring the above settings, check the boxes next to the DHCP Reservation entries you want to add to the DHCP Reservations List and click the **Save Settings** button at the top or bottom of the window to save your entries and activate your reservations.

Virtual Server

The DIR-412 can be configured as a virtual server so that remote users accessing Web or FTP services via the public IP address can be automatically redirected to local servers in the LAN (Local Area Network).

The DIR-412 firewall feature filters out unrecognized packets to protect your LAN network so all computers networked with the DIR-412 are invisible to the outside world. If you wish, you can make some of the LAN computers accessible from the Internet by enabling Virtual Server. Depending on the requested service, the DIR-412 redirects the external service request to the appropriate server within the LAN network.

The DIR-412 is also capable of port-redirection meaning incoming traffic to a particular port may be redirected to a different port on the server computer.

Each virtual service that is created will be listed at the bottom of the screen in the Virtual Servers List. Pre-defined virtual services are already listed in the table. You may use them by enabling them and assigning the server IP to use that particular virtual service.

For a list of ports for common applications, please visit the **Support** section for more information.

The Virtual Server feature allows you to open a single port. If you would like to open a range of ports, refer to the next page. Configure the parameters, as described below, to create a new Virtual Server entry.

Name: Enter a name for the rule or select an application from the drop-down menu. Select an application and click **<<** to populate the fields.

IP Address: Enter the IP address of the computer on your local network that you want to allow the incoming service to. If your computer is receiving an IP address automatically from the router (DHCP), you computer will be listed in the "Computer Name" drop-down menu. Select your computer and click **<<**.

Public Port/ Private Port: Enter the port number that you want to open next to Private Port and Public Port. The private and public ports are usually the same. The private port is the port being used by the application on the computer within your local network, and the public port is the port seen from the Internet side.

Protocol Type: Select **TCP**, **UDP**, or **Both** from the drop-down menu.

Schedule: The schedule of time when the Virtual Server Rule will be enabled. The schedule may be set to Always, which will allow the particular service to always be enabled. You can create your own times in the **Tools** > **Schedules** section.

Port Forwarding

Port Forwarding is a feature that allows you to open a single port or a range of ports and redirect the data received through those ports to a single PC on your network.

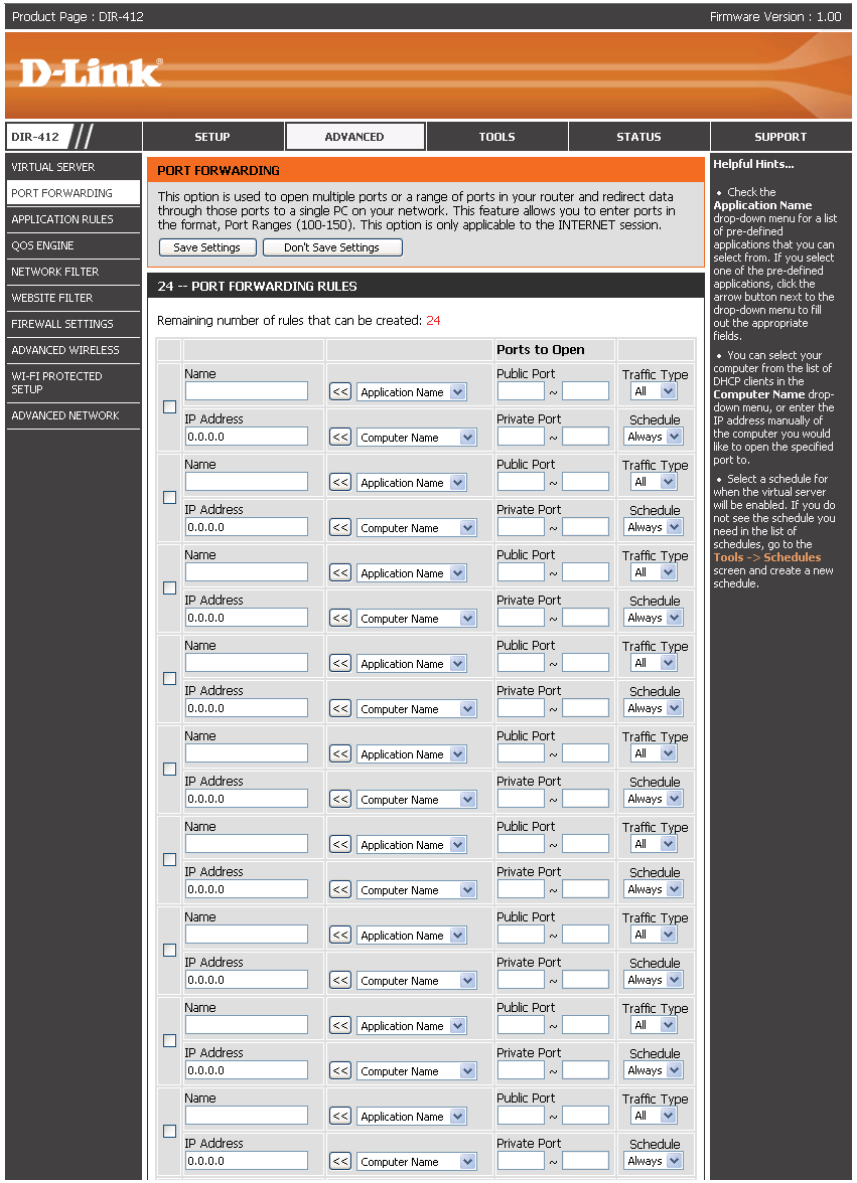
Name: Enter a name for the rule or select an application from the drop-down menu. Select an application and click << to populate the fields.

IP Address: Enter the IP address of the computer on your local network that you want to allow the incoming service to. If your computer is receiving an IP address automatically from the router (DHCP), you computer will be listed in the "Computer Name" drop-down menu. Select your computer and click <<.

Public Port/ Private Port: Enter the range of ports that you want to open next to the Private Port and Public Port fields. The private and public ports are usually the same. The private ports are the ports being used by the application on the computer within your local network, and the public ports are the ports seen from the Internet side.

Traffic Type: Use the drop-down menu to select whether **TCP**, **UDP**, or **All** types of traffic are being used for the port forwarding rule.

Schedule: Select a schedule for when the Port Forwarding Rule will be enabled. The schedule may be set to Always, which will allow the particular service to always be enabled. You can create your own times in the **Tools** > **Schedules** section.



Application Rules

Some applications require multiple connections, such as Internet gaming, video conferencing, Internet telephony and others. These applications have difficulties working through NAT (Network Address Translation). Special Applications makes some of these applications work with the DIR-412. If you need to run applications that require multiple connections, specify the port normally associated with an application in the “Trigger Port” field, select the protocol type as TCP or UDP, then enter the firewall (public) ports associated with the trigger port to open them for inbound traffic.

The DIR-412 provides some predefined applications in the table on the bottom of the web page. Select the application you want to use and enable it.

Name: Enter a name for the rule. You may select a pre-defined application from the drop-down menu and click **<<**.

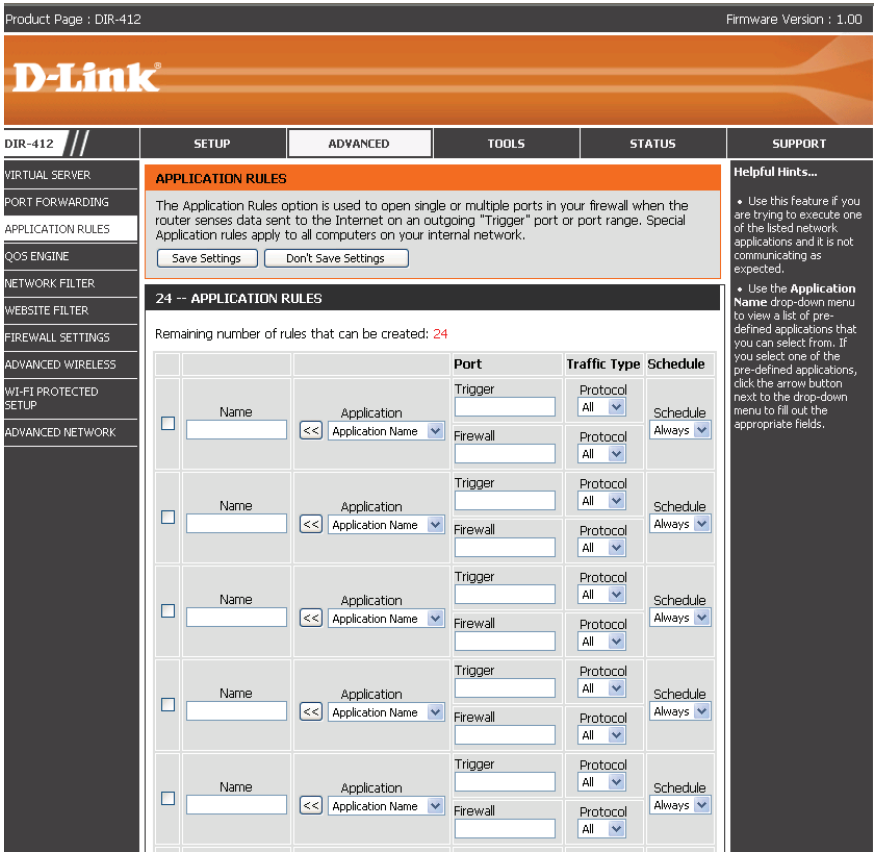
Trigger: This is the port used to trigger the application. It can be either a single port or a range of ports.

Traffic Type: Select the protocol of the trigger port (TCP, UDP, or All).

Firewall: This is the port number on the Internet side that will be used to access the application. You may define a single port or a range of ports. You can use a comma to add multiple ports or port ranges.

Traffic Type: Select the protocol of the firewall port (TCP, UDP, or All).

Schedule: Select a schedule for when the Application Rule will be enabled. If you do not see the schedule you need in the list of schedules, go to the Tools -> Schedules screen and create a new schedule.



QoS Engine

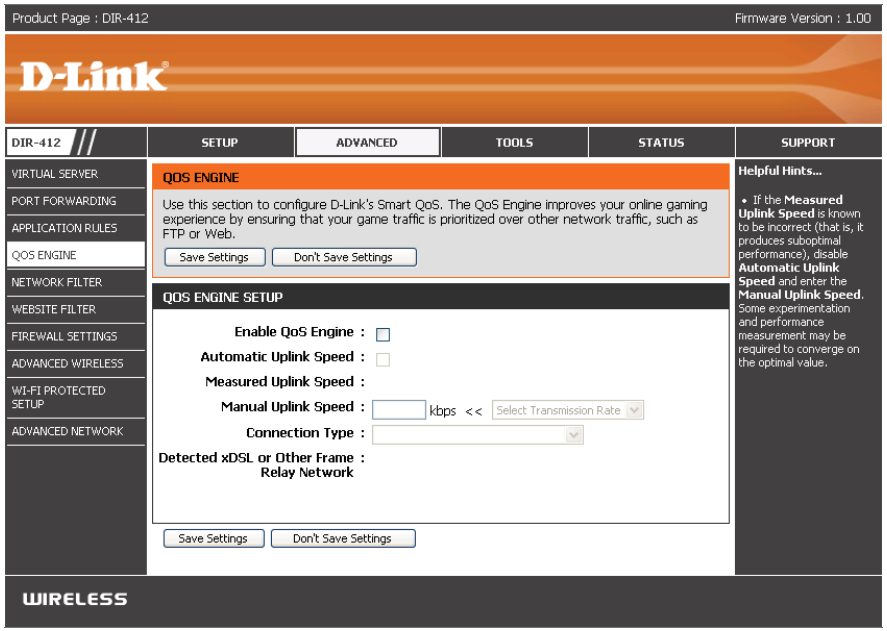
The QoS Engine option helps improve your network gaming performance by prioritizing applications. By default the QoS Engine settings are disabled and application priority is not classified automatically.

Enable QoS Engine: This option is disabled by default. Enable this option for better performance and experience with online games and other interactive applications, such as VoIP.

Automatic Uplink Speed: This option will allow your router to automatically determine the uplink speed of your Internet connection.

Measured Uplink Speed: This displays the detected uplink speed.

Manual Uplink Speed: The speed at which data can be transferred from the router to your ISP. This is determined by your ISP. ISP's offer speed as a download/upload pair. For example, 1.5Mbits/284Kbits. Using this example, you would enter 284. Alternatively you can test your uplink speed with a service such as www.dslreports.com.



Connection Type: This option allows you to select your connection type. Users can select "auto-detect" or choose the xDSL or cable networks if they know.

Detected xDSL or Other Frame Relay Network: This displays if xDSL or another type of frame relay network has been detected. The DIR-412 can detect the network and the user can confirm this.

Network Filters

Use MAC (Media Access Control) Filters to allow or deny LAN (Local Area Network) computers by their MAC addresses from accessing the Network. You can either manually add a MAC address or select the MAC address from the list of clients that are currently connected to the Broadband Router.

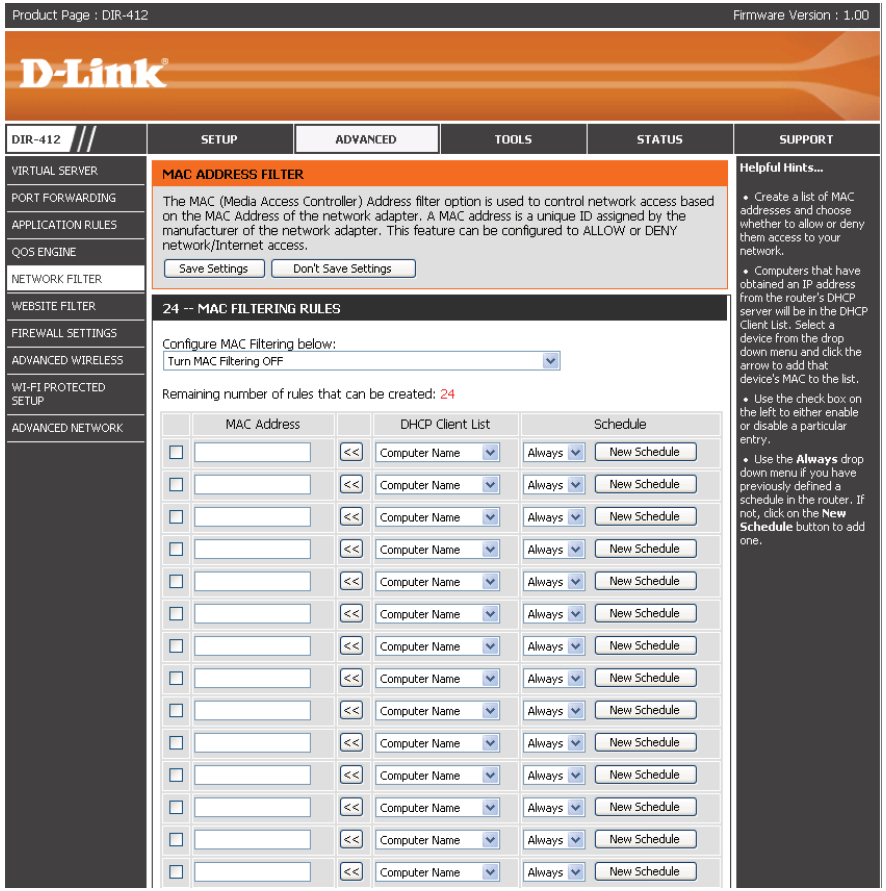
Configure MAC Filtering: Select Turn MAC Filtering Off, allow MAC addresses listed below, or deny MAC addresses listed below from the drop-down menu.

MAC Address: Enter the MAC address you would like to filter.

To find the MAC address on a computer, please refer to the Networking Basics section in this manual.

DHCP Client: Select a DHCP client from the drop-down menu and click << to copy the MAC Address from the DHCP client.

Schedule: Select a schedule for when the Network Filter will be enabled. The user can click the **New Schedule** button to bring up the "Schedule Webpage" to configure a new schedule.



Website Filters

Website Filters are used to allow you to set up a list of allowed Web sites that can be used by multiple users through the network. To use this feature select to **Allow** or **Deny**, enter the domain or website and click **Add**, and then click **Save Settings**. You must also select **Apply Web Filter** under the Access Control section.

Configure Website Filter Below: Select **Deny** or **Allow** computers access to only these sites.

Website URL: Enter the URLs that you want to allow or deny.

Schedule: Use the drop-down menu to select the schedule for the Network Filter rule. Click the **New Schedule** button to bring up the "Schedule Webpage" to configure the new schedule.

Firewall Settings

A firewall protects your network from the outside world. The D-Link DIR-412 offers a firewall type functionality. The SPI feature helps prevent cyber attacks. Sometimes you may want a computer exposed to the outside world for certain types of applications. If you choose to expose a computer, you can enable DMZ. DMZ is short for Demilitarized Zone. This option will expose the chosen computer completely to the outside world.

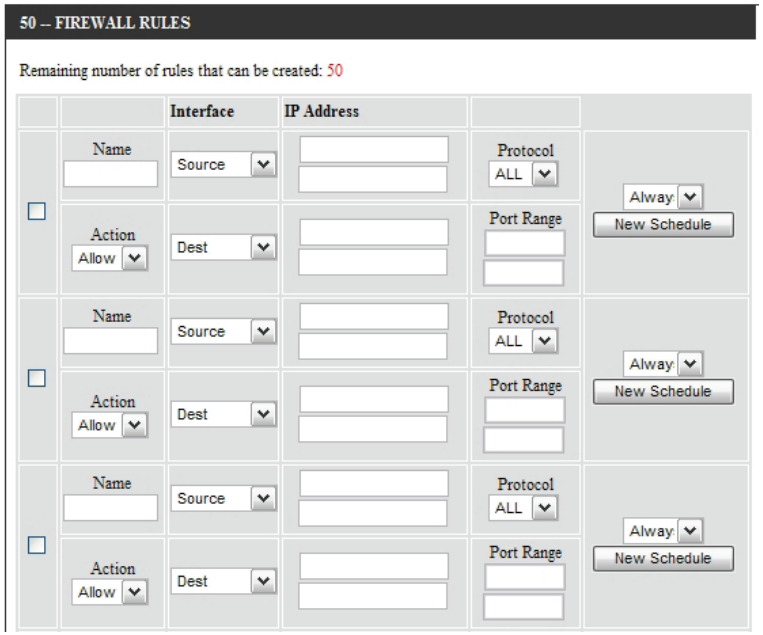
Enable SPI: SPI (Stateful Packet Inspection, also known as dynamic packet filtering) helps to prevent cyber attacks by tracking more state per session. It validates that the traffic passing through the session conforms to the protocol.

DMZ Host: Check the **Enable DMZ** box and specify the IP address of the computer on the LAN that you want to have unrestricted Internet communication in the **DMZ IP Address** field. Use the drop-down menu to specify a host that currently has a DHCP lease from the DIR-412. If this computer has obtained its IP address automatically using DHCP, be sure to make a static reservation on the **System > Network Settings** page so that the IP address of the DMZ machine does not change.

Firewall Rules: Use this section to create rules that deny or allow traffic from passing through the device. See the following page for information on how to create firewall rules.

Firewall Rules

To create a firewall rule, configure the parameters as described below:



Name: Enter a name for the firewall rule.

Action: Use the drop-down menu to specify if the router should **Allow** or **Deny** traffic matching the firewall rule.

Interface: Use the drop-down menus to select the **Source** and **Destination** interfaces for the Firewall Rule

Use the **IP Address** fields next to each **Interface** drop-down menu to specify the IP address ranges for the Source/Destination interfaces.

The first host in the IP address range should be entered in the top field and the last host in the IP address range should be entered in the field beneath for both the Source/Destination intefaces.

Protocol: Use the drop-down menu to select the protocol that will be used for the firewall rule (TCP, UDP, ICMP, or ALL).

Port Range: Enter the range of ports that the firewall rule will apply to.

The first port in the port range should be entered in the top field and the last host in the port range should be entered in the field beneath.

Schedule: Use the drop-down menu to select the schedule for the Network Filter rule. Click the **New Schedule** button to bring up the “Schedule Webpage” to configure the new schedule.

Advanced Wireless Settings

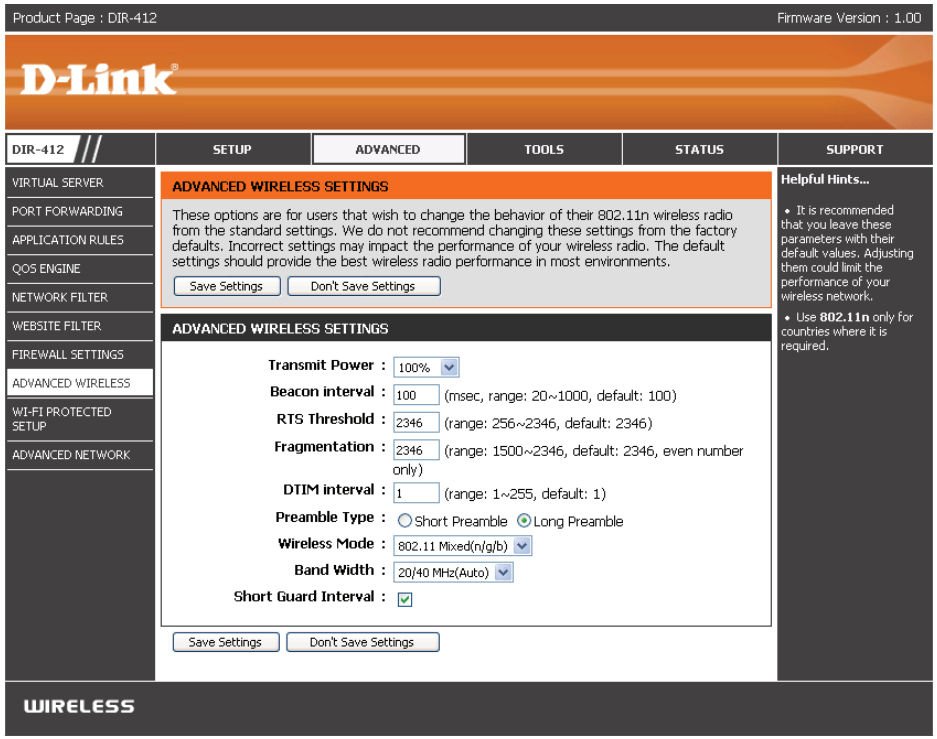
Transmit Power: Set the transmit power of the antennas.

Beacon Period: Beacons are packets sent by an Access Point to synchronize a wireless network. Specify a value. 100 is the default setting and is recommended.

RTS Threshold: This value should remain at its default setting of 2432. If inconsistent data flow is a problem, only a minor modification should be made.

Fragmentation: The fragmentation threshold, which is specified in bytes, determines whether packets will be fragmented. Packets exceeding the 2346 byte setting will be fragmented before transmission. 2346 is the default setting.

DTIM Interval: (Delivery Traffic Indication Message) 1 is the default setting. A DTIM is a countdown informing clients of the next window for listening to broadcast and multicast messages.



Preamble Type: Select **Short** or **Long Preamble**. The preamble defines the length of the CRC block (Cyclic Redundancy Check is a common technique for detecting data transmission errors) for communication between the wireless router and the roaming wireless network adapters. Note: High network traffic areas should use the **Short Preamble** type.

Wireless Mode: Use the drop-down menu to select the wireless modes you want to enable on the router. The available options are **802.11n only**, **802.11 Mixed(g/b)**, and **802.11 Mixed(n/g/b)**.

Band Width: This setting can be used to adjust the bandwidth of the wireless signal. The default setting is **20/40 MHz (Auto)**.

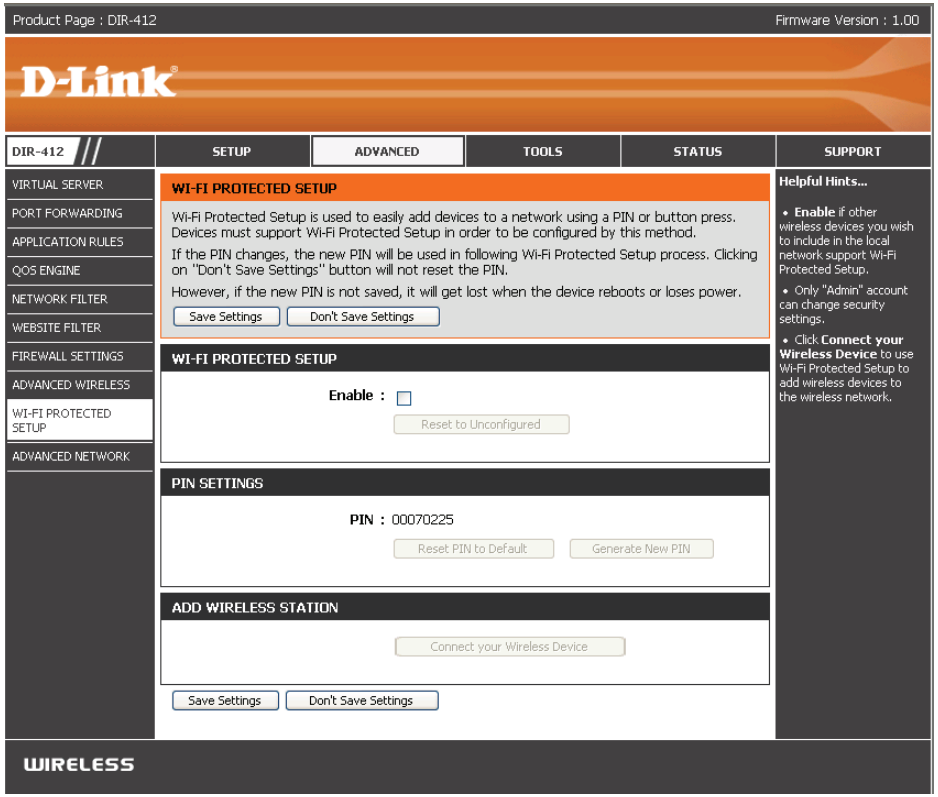
Short Guard Interval: Check this box to reduce the guard interval time therefore increasing the data capacity. However, it's less reliable and may create higher data loss.

Wi-Fi Protected Setup

Wi-Fi Protected Setup: Check this box to enable the function

PIN Settings: Use the buttons to generate a new PIN or Reset the PIN to Default settings.

Add Wireless Station: Click the button to start the wizard that sets up the WPA function. Please refer to Section 4-Wireless security “Add wireless device with WPA wizard” for more information.



Advanced Network Settings

UPnP: To use the Universal Plug and Play (UPnP™) feature check the **Enable UPNP** box. UPNP provides compatibility with networking equipment, software and peripherals.

WAN Ping: Unchecking the box will not allow the DIR-412 to respond to pings. Blocking the Ping may provide some extra security from hackers. Check the box to allow the Internet port to be “pinged”.

WAN Port Speed: You may set the port speed of the Internet port to 10Mbps, 100Mbps, or auto. Some older cable or DSL modems may require you to set the port speed to 10Mbps.

Multicast Streams: Check the **Enable Multicast Streams** box to allow multicast traffic to pass through the router from the Internet.

Check the **Wireless Enhance Mode** box to enable the router to forward all multicast streams from the Internet to the wireless station using a unicast stream. This feature helps improve the quality of multimedia applications for wireless users.

Administrator Settings

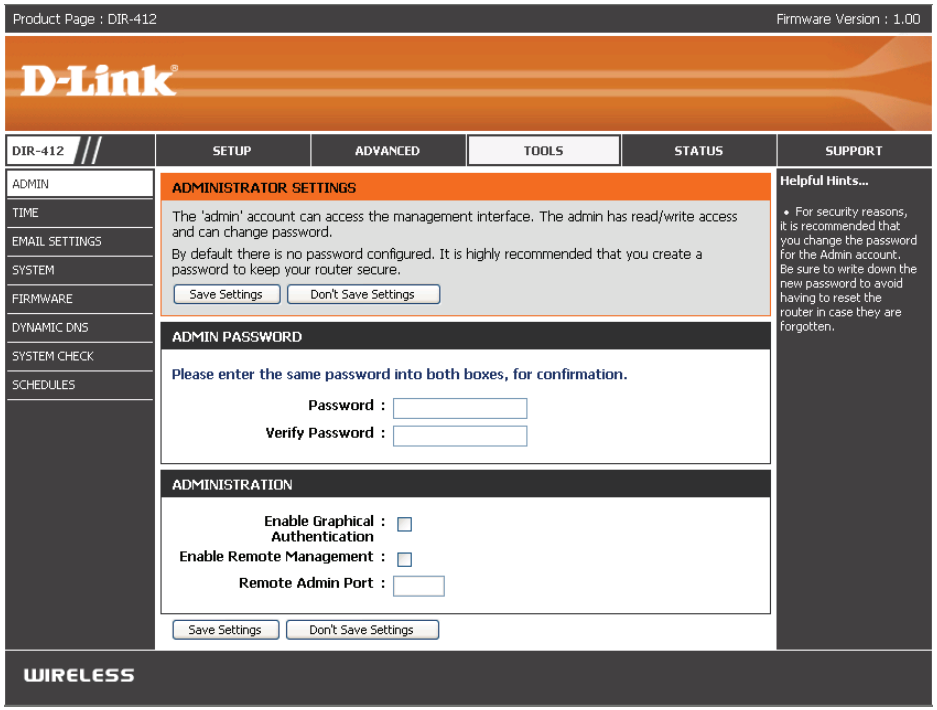
This page will allow you to change the Administrator and User passwords. You can also enable Remote Management. There are two accounts that can access the management interface through the web browser. The accounts are admin and user. Admin has read/write access while user has read-only access. User can only view the settings but cannot make any changes. Only the admin account has the ability to change both admin and user account passwords.

Admin Password: Enter and confirm a new password for the Administrator Login Name. The administrator can make changes to the settings.

Enable Graphical Authentication: Check this box to enable graphical authentication. The device supports this function to prevent phishing.

Enable Remote Management: Remote management allows the DIR-412 to be configured from the Internet by a web browser. A username and password is still required to access the Web-Management interface. In general, only a member of your network can browse the built-in web pages to perform Administrator tasks. This feature enables you to perform Administrator tasks from the remote (Internet) host.

Remote Admin Port: The port number used to access the DIR-412. Example: http://x.x.x.x:8080 whereas x.x.x.x is the Internet IP address of the DIR-412 and 8080 is the port used for the Web Management interface.



Time Settings

The Time Configuration option allows you to configure, update, and maintain the correct time on the internal system clock. From this section you can set the time zone that you are in and set the Time Server. Daylight Saving can also be configured to automatically adjust the time when needed.

Time Zone: Select the Time Zone from the drop-down menu.

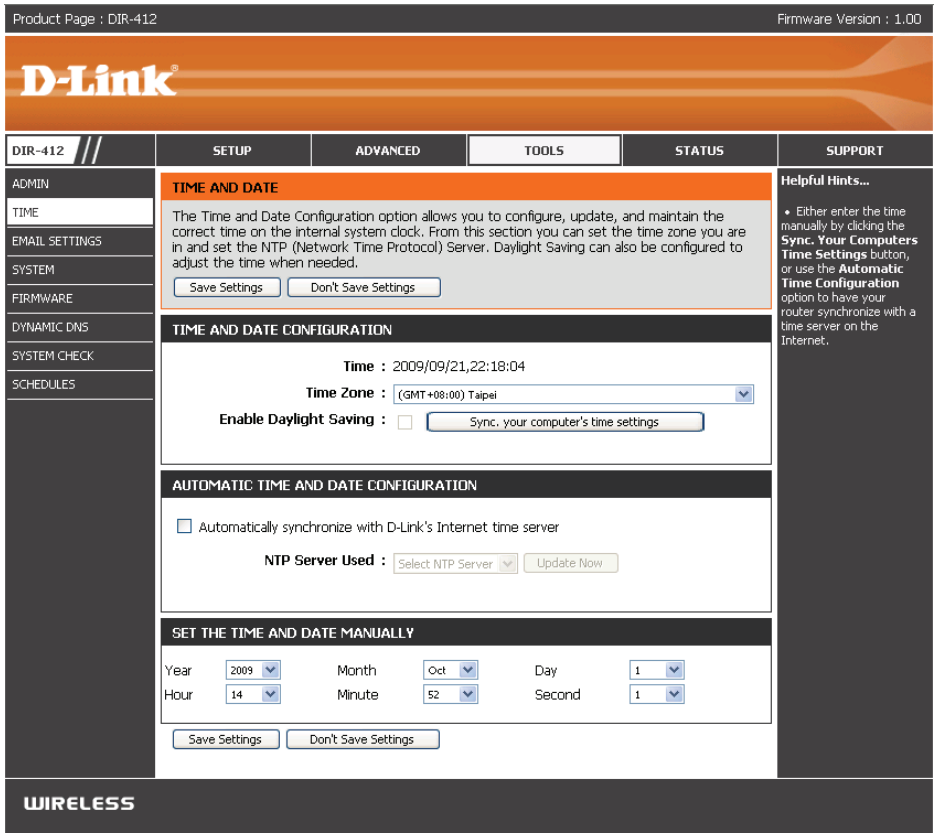
Enable Daylight Saving: Check the box to enable Daylight Saving time.

Sync your Computer's Time Settings: Click this button to set the device's time the same to local PC.

Automatic Time and Date Configuration: Check the box to enable the device to automatically synchronize with a D-Link NTP Server. NTP stands for Network Time Protocol. NTP synchronizes computer clock times in a network of computers. This will only connect to a server on the Internet, not a local server.

NTP Server Used: Select one of the D-Link NTP Servers from the drop-down menu. The DIR-412 will then synchronize it's clock to be the same time as the D-Link Internet time server. Click the **Update Now** button to synchronize with the D-Link Internet time server immediatley.

Set the Time and Date Manually: To manually input the time, use the drop-down menus to enter the values in these fields for the Year, Month, Day, Hour, Minute, and Second.



Click the **Save Settings** button to save any changes made.

E-mail Settings

The E-mail feature can be used to send the system log files, router alert messages, and firmware update notification to your e-mail address.

From E-mail Address: This e-mail address will appear as the sender when you receive a log file or firmware upgrade notification via e-mail.

To E-mail Address: Enter the e-mail address where you want the e-mail sent.

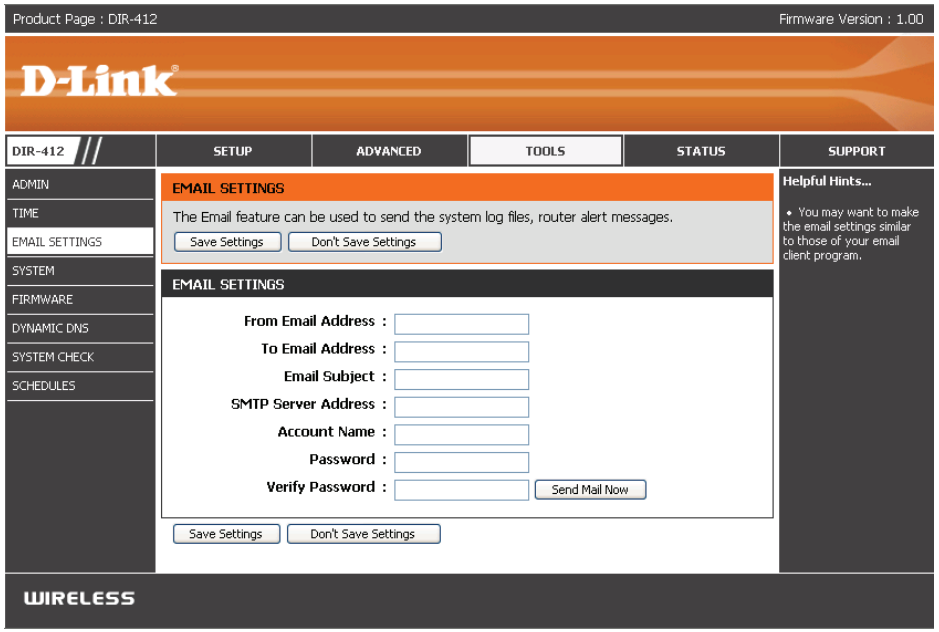
E-mail Subject: Enter a subject for the e-mails that will be sent from the Router.

SMTP Server Address: Enter the IP address of the SMTP server for sending e-mail.

Account Name: Enter your account name for sending e-mail.

Password: Enter the password associated with the account. Re-type the password associated with the account in the **Verify Password** field.

Send Mail Now: Click the **Send Mail Now** button to send a test message from the Router to the specified e-mail address.



System Settings

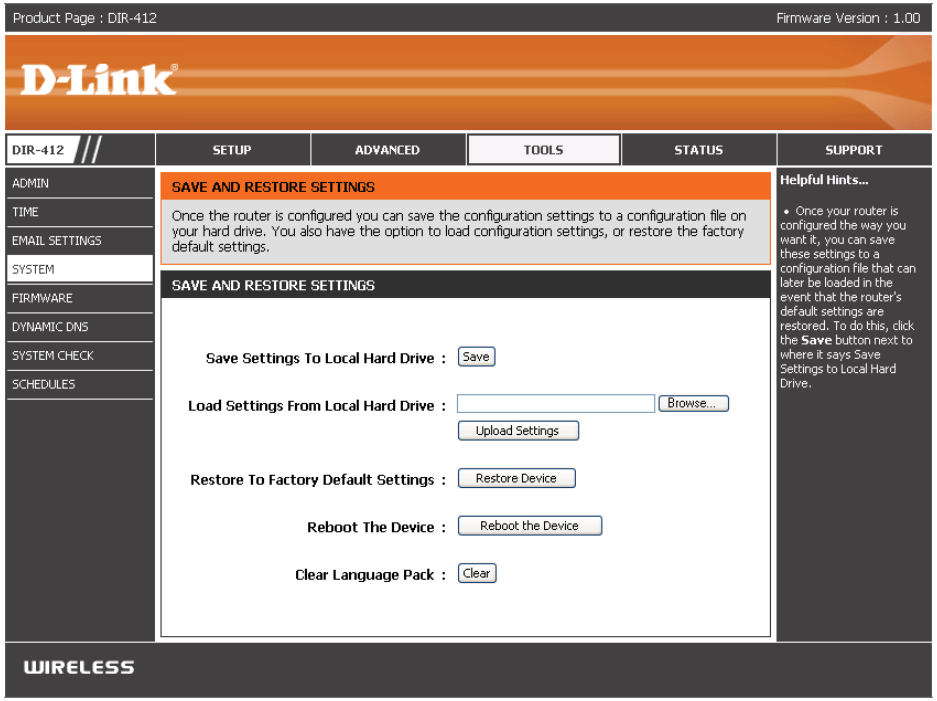
Save Settings to Local Hard Drive: Use this option to save the current router configuration settings to a file on the hard disk of the computer you are using. First, click the **Save** button. You will then see a file dialog, where you can select a location and file name for the settings.

Load Settings from Local Hard Drive: Use this option to load previously saved router configuration settings. First, use the **Browse** control to find a previously save file of configuration settings. Then, click the **Load** button to transfer those settings to the router.

Restore to Factory Default Settings: Click the **Restore** button to restore all configuration settings back to the settings that were in effect at the time the router was shipped from the factory. Any settings that have not been saved will be lost, including any rules that you have created. If you want to save the current router configuration settings, use the **Save** button above.

Reboot the Device: Click to reboot the router.

Clear Language Pack: Click the **Clear** button to restore the device back to the English interface version and remove other languages installed for the system web pages.



Update Firmware

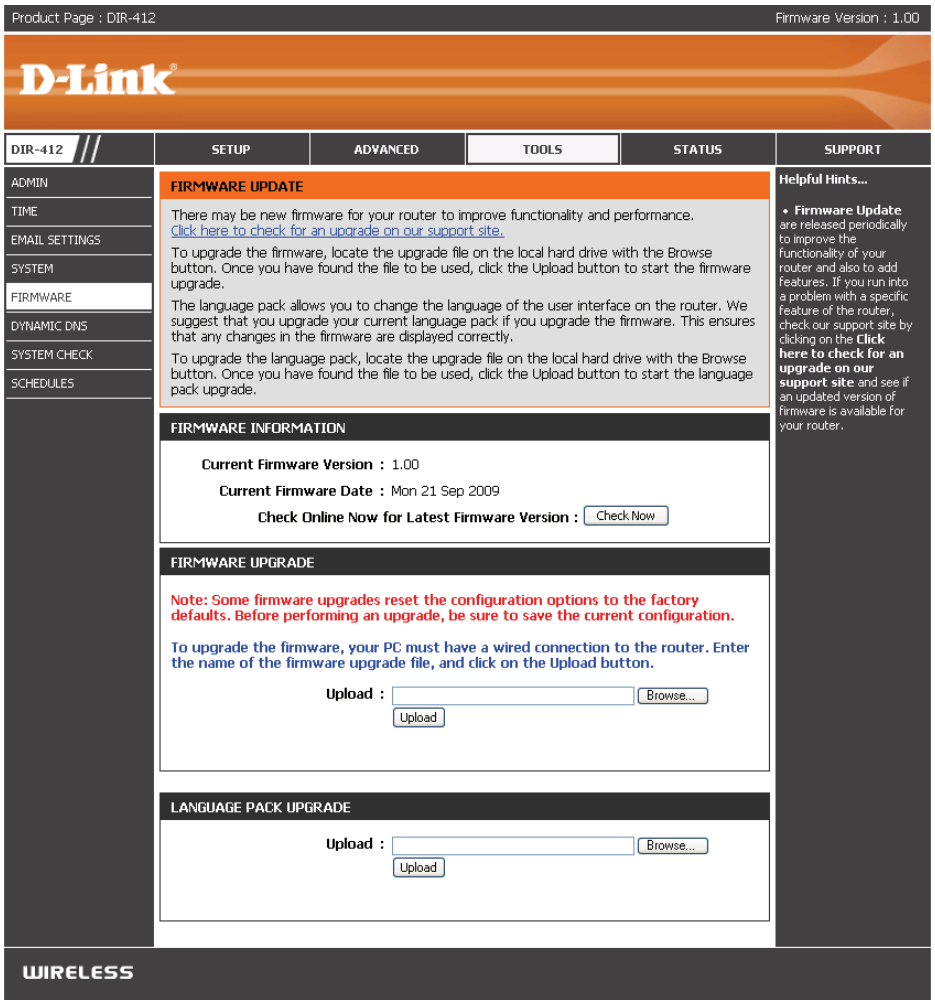
You can upgrade the firmware of the Router here. Make sure the firmware you want to use is on the local hard drive of the computer. Click on **Browse** to locate the firmware file to be used for the update. Please check the D-Link support site for firmware updates at http://support.dlink.com. You can download firmware upgrades to your hard drive from the D-Link support site.

Firmware Information: Displays the current firmware version and date.

You can also check the availability of a new firmware version online. If so, download the new firmware to your hard drive.

Firmware Upgrade: After you have downloaded the new firmware, click the **Browse** control to locate the firmware update on your hard drive. Click **Upload** to complete the firmware upgrade.

Language Pack Upgrade: This function allows the user to transfer the language of the GUI from English to their own language by upgrading the language pack. Click the **Browse** control to locate the desired language pack on your hard drive. Click **Upload** to complete the language pack upgrade.



DDNS

The DDNS feature allows you to host a server (Web, FTP, Game Server, etc…) using a domain name that you have purchased (www.whateveryournameis.com) with your dynamically assigned IP address. Most broadband Internet Service Providers assign dynamic (changing) IP addresses. Using a DDNS service provider, your friends can enter in your domain name to connect to your server no matter what your IP address is.

Enable DDNS: Dynamic Domain Name System is a method of keeping a domain name linked to a changing IP Address. Check the box to enable DDNS.

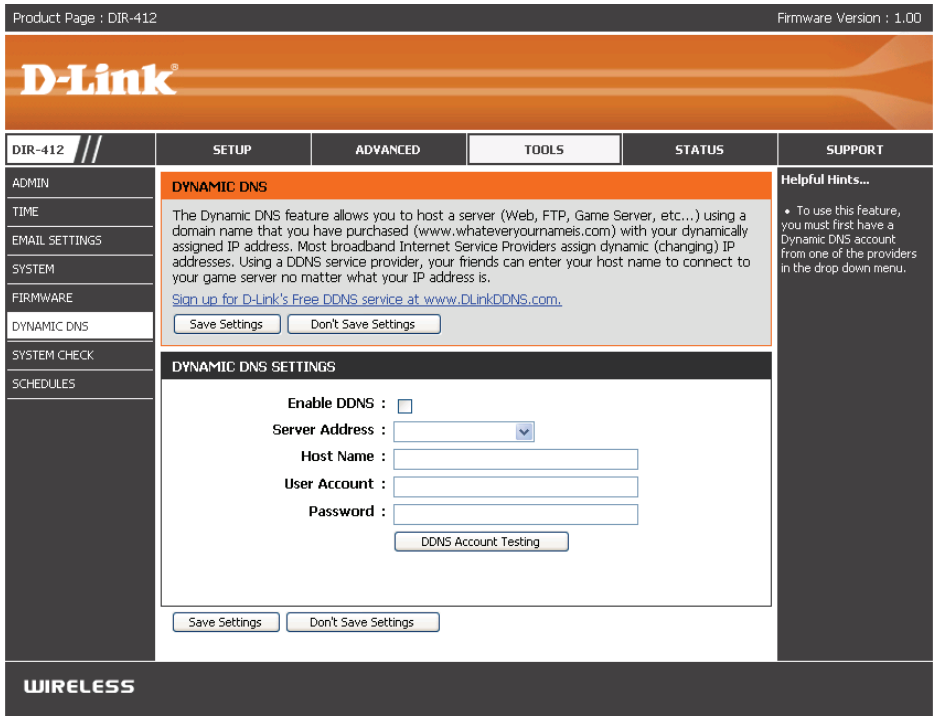
Server Address: Choose your DDNS provider from the drop down menu.

Host Name: Enter the Host Name that you registered with your DDNS service provider.

User Account: Enter the User Name for your DDNS account.

Password: Enter the Password for your DDNS account.

DDNS Account Testing: This is to test if the DDNS account is valid for use.

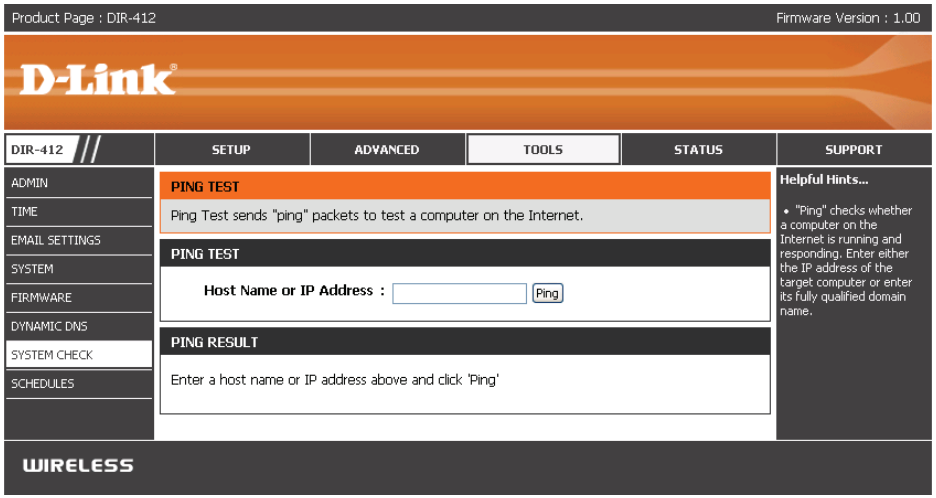


System Check

The System Check feature allows you to verify the physical connectivity on both the LAN and Internet interface.

Ping Test: The Ping Test is used to send Ping packets to test if a computer is on the Internet. Enter the IP Address that you wish to Ping, and click **Ping**.

Ping Results: The results of your ping attempts will be displayed here.



Schedules

Name: Enter a name for your new schedule.

Days: Select a day, a range of days, or All Week to include every day.

Time: Check **All Day - 24hrs** or use the **Start Time** and **End Time** fields to specify the start and end time for your schedule.

Add: Click **Add** to add your schedule.

Schedule Rules List: The list of schedules will be listed here. Click the **Edit** icon to make changes or click the **Delete** icon to remove the schedule.

Device Information

This page displays the current information for the DIR-412. It will display the LAN, WAN (Internet), and Wireless information.

If your Internet connection is set up for a Dynamic IP address then a **Release** button and a **Renew** button will be displayed. Use **Release** to disconnect from your ISP and use **Renew** to connect to your ISP.

If your Internet connection is set up for PPPoE, PPTP, L2TP, Russia PPTP, or Russia PPPoE a **Connect** button and a **Disconnect** button will be displayed. Use **Disconnect** to drop the Internet connection and use **Connect** to establish the Internet connection.

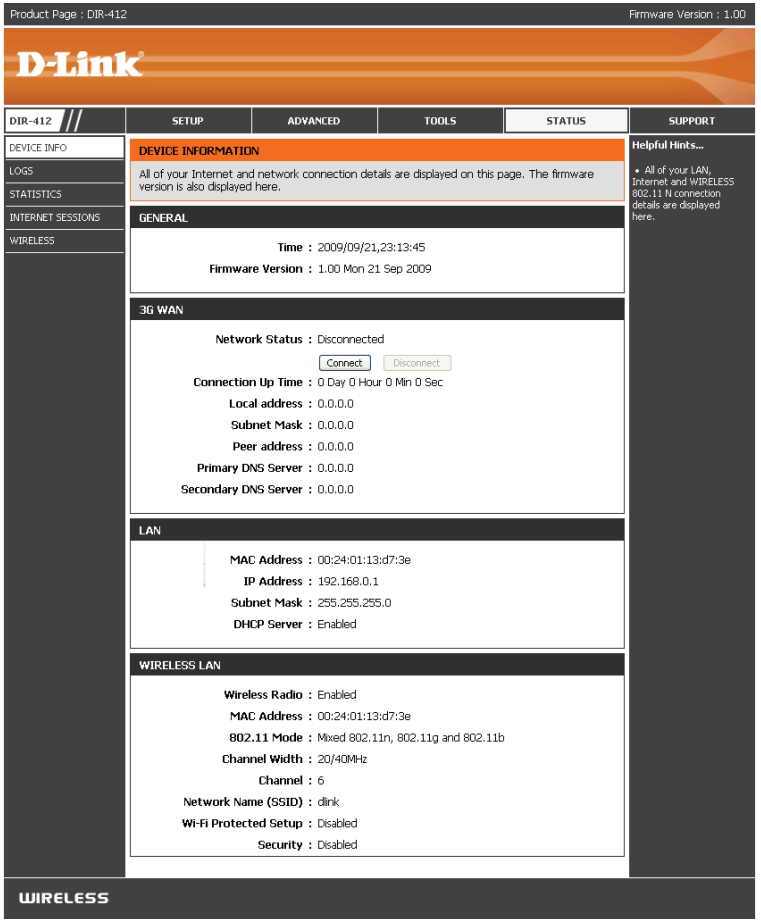
See the following for more information.

General: Displays the router's time and firmware version.

3G WAN/WAN: Displays the MAC address and the public IP settings for the router.

LAN: Displays the MAC address and the private (local) IP settings for the router.

Wireless LAN: Displays the wireless MAC address and your wireless settings such as SSID and Channel.



Logs

The router automatically logs (records) events of possible interest in it's internal memory. If there isn't enough internal memory for all events, logs of older events are deleted but logs of the latest events are retained. The Logs option allows you to view the router logs. You can define what types of events you want to view and the level of the events to view. This router also has external Syslog Server support so you can send the log files to a computer on your network that is running a Syslog utility.

Log Type: Use the radio buttons to choose the types of messages that should be displayed from the log. System, Firewall & Security, and Router Status messages can be selected.

Log Level: There are three levels of message importance: Informational, Warning, and Critical. Use the radio buttons to select the levels that should be displayed in the log.

First Page: Click this button to view the first page of the log file.

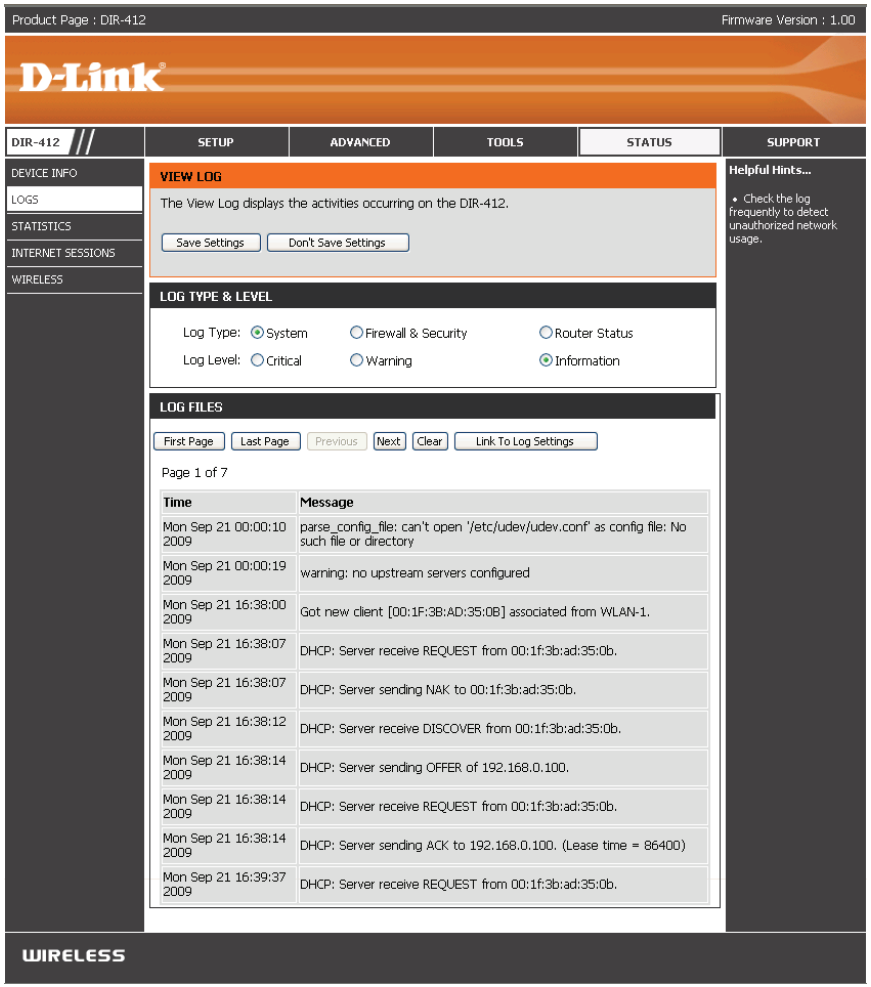
Last Page: Click this button to view the last page of the log file.

Previous: Click this button to view the previous page of the log file.

Next: Click this button to view the next page of the log file.

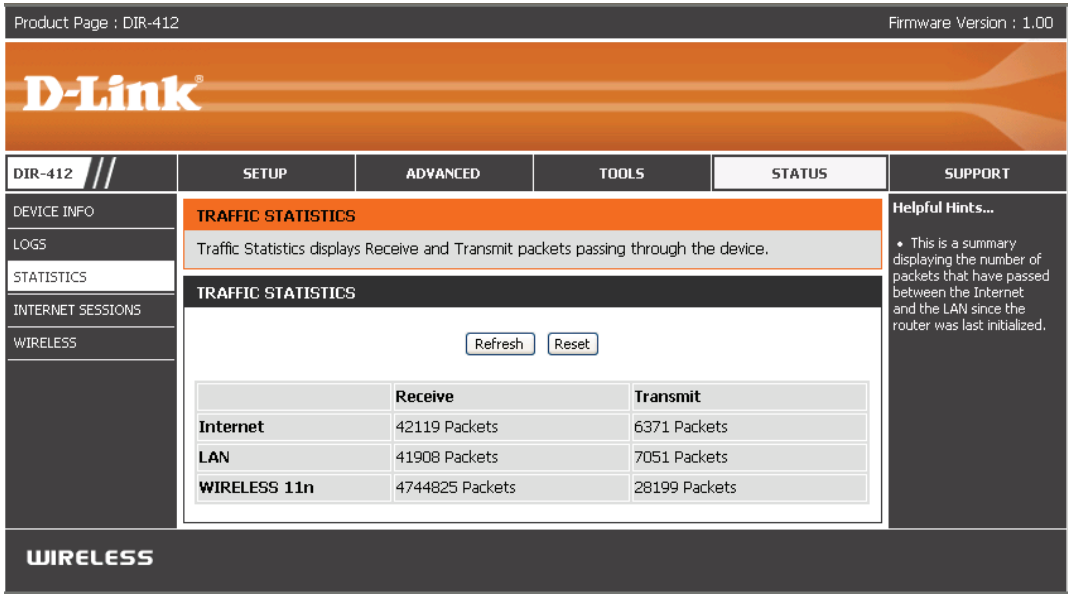
Clear: Clears all of the log contents.

Link to Log Settings: The user can click the button to " link to log settings" and save the logs to a local hard drive or to a Syslog server.



Statistics

The screen below displays the Traffic Statistics. Here you can view the amount of packets that pass through the DIR-412 on the Internet, LAN and Wireless connections. The traffic counter will reset if the device is rebooted.

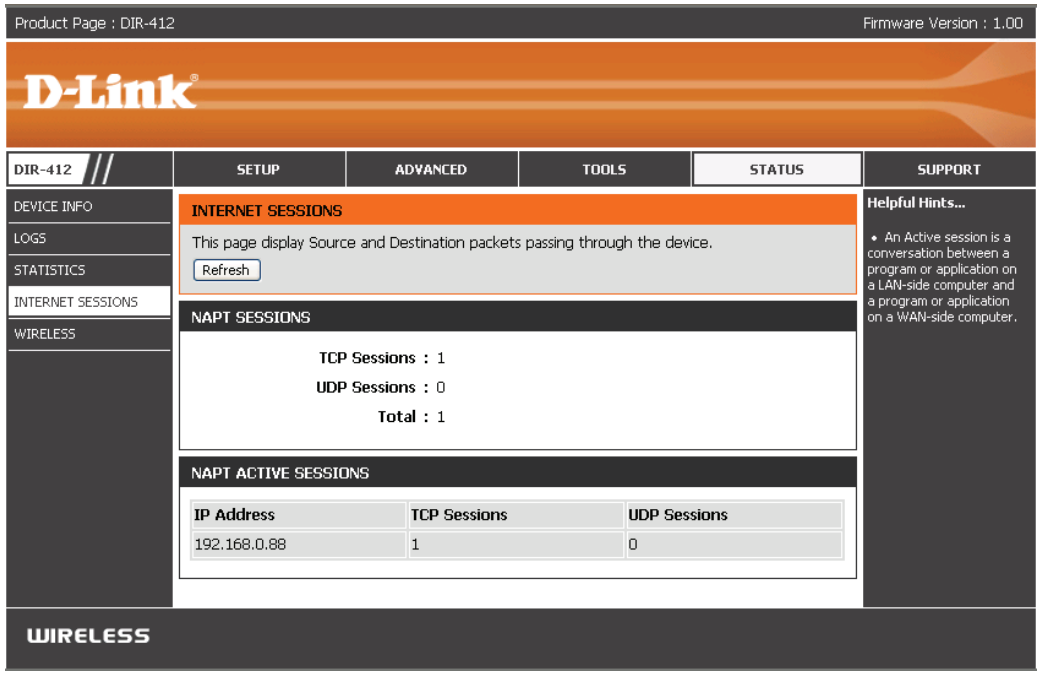


Internet Sessions

The Internet Sessions page displays full details of active Internet sessions through your router. An Internet session is a conversation between a program or application on a LAN-side computer and a program or application on a WAN-side computer.

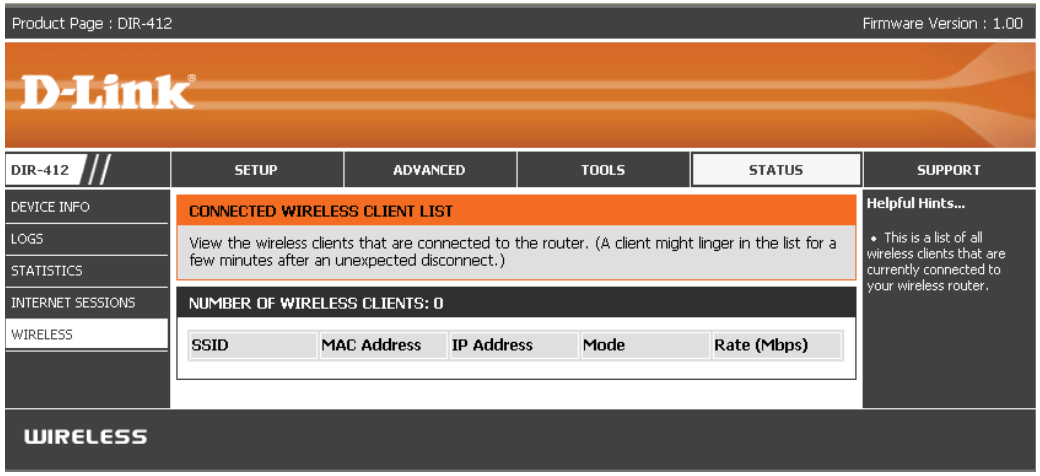
NAPT Sessions: Displays information about the NAPT Sessions on the router. Including the number of TCP Sessions, the number of UDP Sessions, and the combined number TCP and UDP NAPT Sessions.

NAPT Active Sessions: Displays the IP address of the local application and the TCP/UDP packets being sent by the source IP address for each NAPT Active Session.

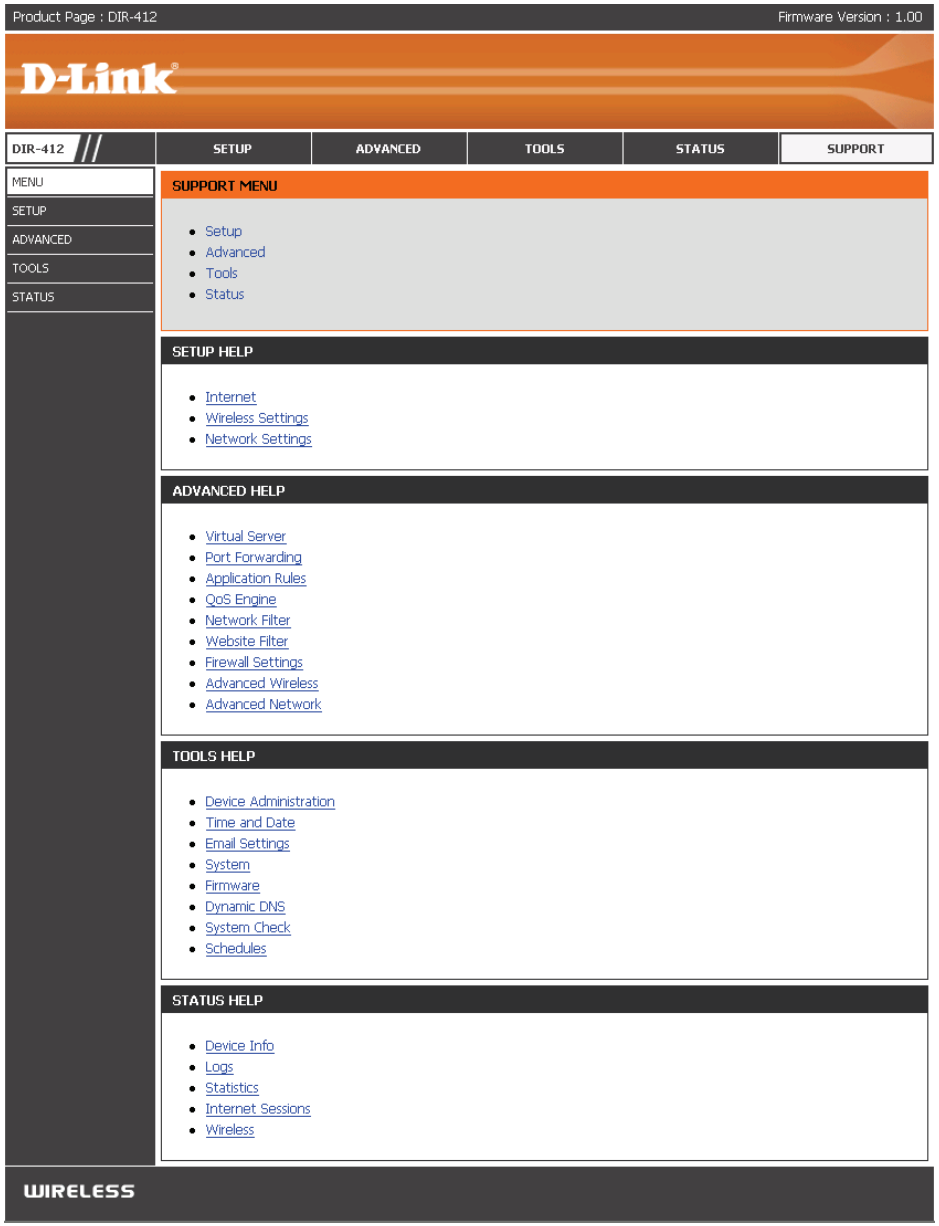


Wireless

The wireless client table displays a list of current connected wireless clients. This table also displays the connection time and MAC address of the connected wireless clients.



Support


Product Page : DIR-412
Firmware Version : 1.00
D-Link
DIR-412
SETUP
ADVANCED
TOOLS
STATUS
SUPPORT
MENU
SETUP
ADVANCED
TOOLS
STATUS
SUPPORT MENU
Setup
Advanced
Tools
Status
SETUP HELP
Internet
Wireless Settings
Network Settings
ADVANCED HELP
Virtual Server
Port Forwarding
Application Rules
QoS Engine
Network Filter
Website Filter
Firewall Settings
Advanced Wireless
Advanced Network
TOOLS HELP
Device Administration
Time and Date
Email Settings
System
Firmware
Dynamic DNS
System Check
Schedules
STATUS HELP
Device Info
Logs
Statistics
Internet Sessions
Wireless
WIRELESS

Wireless Security

This section will show you the different levels of security you can use to protect your data from intruders. The DIR-412 offers the following types of security:

- WPA2 (Wi-Fi Protected Access 2)
- WPA (Wi-Fi Protected Access)
- WPA2-PSK(Pre-Shared Key)
- WPA-PSK (Pre-Shared Key)

What is WPA?

WPA, or Wi-Fi Protected Access, is a Wi-Fi standard that was designed to improve the security features of WEP (Wired Equivalent Privacy).

The 2 major improvements over WEP:

- Improved data encryption through the Temporal Key Integrity Protocol (TKIP). TKIP scrambles the keys using a hashing algorithm and, by adding an integrity-checking feature, ensures that the keys haven't been tampered with. WPA2 is based on 802.11i and uses Advanced Encryption Standard (AES) instead of TKIP.

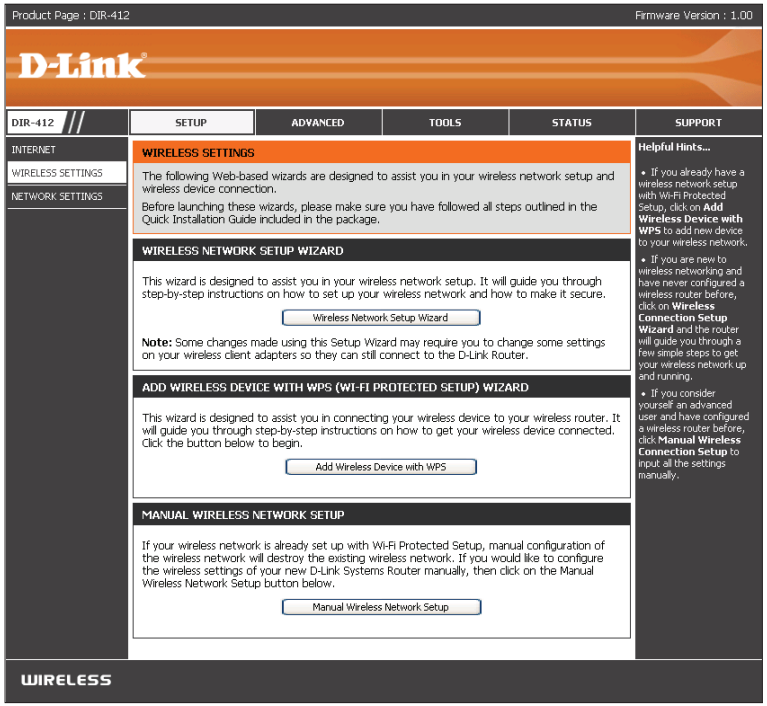
- User authentication, which is generally missing in WEP, through the extensible authentication protocol (EAP). WEP regulates access to a wireless network based on a computer's hardware-specific MAC address, which is relatively simple to be sniffed out and stolen. EAP is built on a more secure public-key encryption system to ensure that only authorized network users can access the network.

WPA-PSK/WPA2-PSK uses a passphrase or key to authenticate your wireless connection. The key is an alpha-numeric password between 8 and 63 characters long. The password can include symbols (!?*&_) and spaces. This key must be the exact same key entered on your wireless router or access point.

WPA/WPA2 incorporates user authentication through the Extensible Authentication Protocol (EAP). EAP is built on a more secure public key encryption system to ensure that only authorized network users can access the network.

Wireless Connection Setup Wizard

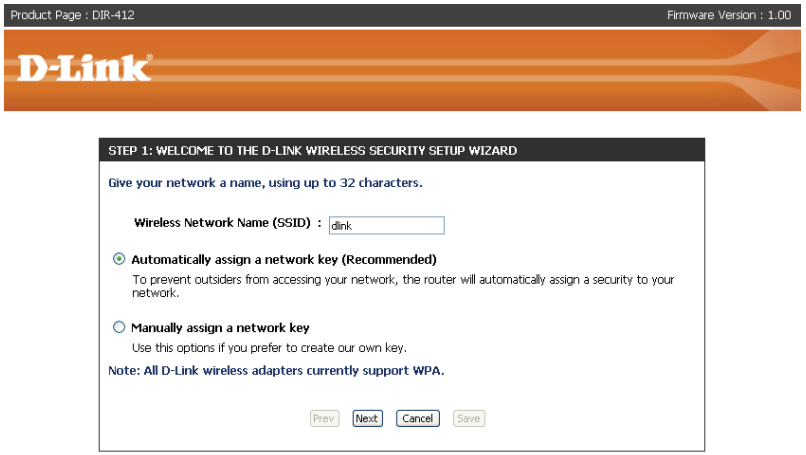
To run the security wizard, browse to the Setup page and then click the **Wireless Network Setup Wizard** button.



Enter the SSID (Service Set Identifier). The SSID is the name of your wireless network. Create a name using up to 32 characters. The SSID is case-sensitive.

If you would like the router to automatically assign a network key to your network, click the **Automatically assign a network key** radio button.

Click **Next** to continue.



Alternatively, click the **Manually assign a network key** radio button to create your own network key.

Click **Next** to continue.

The following window appears if you selected the option to manually create your own network key.

Type a password that you would like to use for wireless security in the **Wireless Security Password** field.

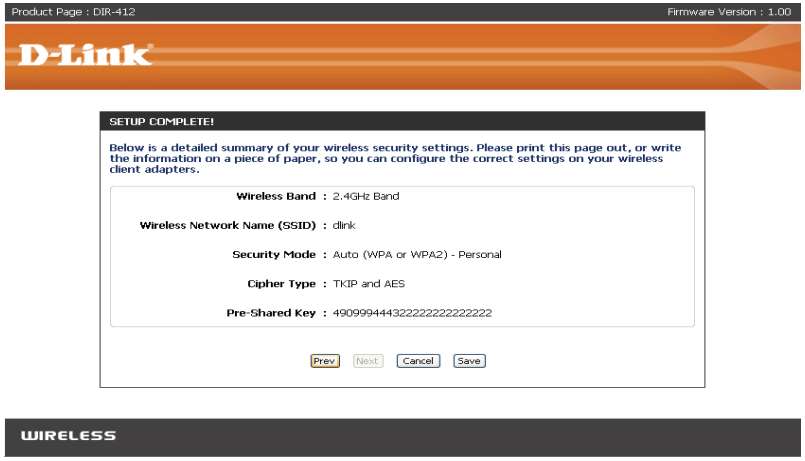
Click **Next** to continue.

The following window appears to indicate that the Wireless Connection Setup Wizard is complete.

If you selected the option that automatically generated a network key, the automatically generated key will display next to the **Pre-Shared Key** field.

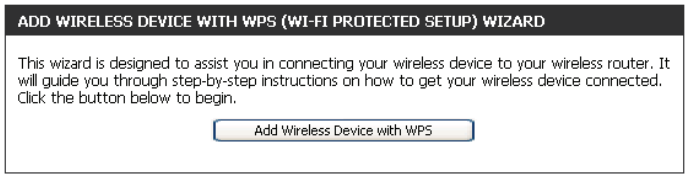
If you manually specified a network key, the **Wireless Security Password** that you specified will display next to the **Pre-Shared Key** field.

Click **Save** to finish the Security Wizard.



Add Wireless Device with WPS Wizard

From the **Setup** > **Wireless Settings** screen, click **Add Wireless Device with WPS**.

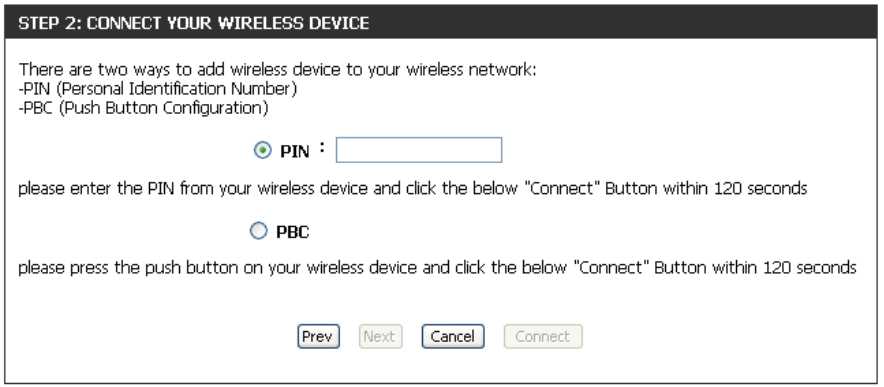


Select **Auto** to add a wireless client using WPS (Wi-Fi Protected Setup). Once you select **Auto** and click **Connect**, you will have a 120 second time limit to apply the settings to your wireless client(s) and successfully establish a connection.

If you select **Manual**, a settings summary screen will appear. Write down the security key and enter this on your wireless clients.

PIN: Select this option to use PIN method. In order to use this method you must know the wireless client's 8 digit PIN and click **Connect**.

PBC: Select this option to use PBC (Push Button) method to add a wireless client. Click **Connect**.



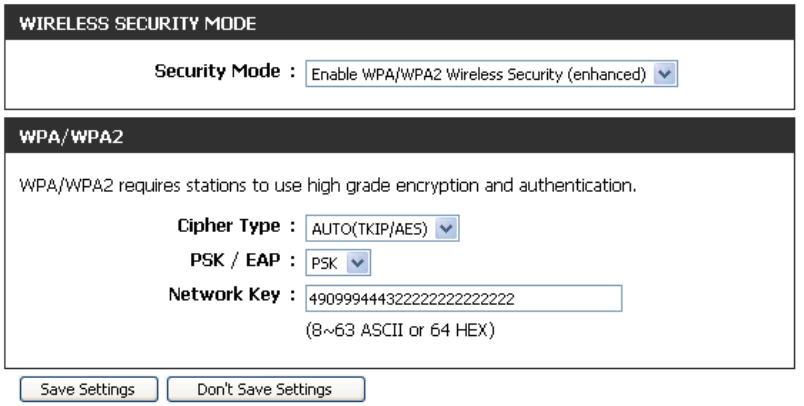
Configure WPA-Personal (PSK)

It is recommended to enable encryption on your wireless router before your wireless network adapters. Please establish wireless connectivity before enabling encryption. Your wireless signal may degrade when enabling encryption due to the added overhead.

1. Log into the web-based configuration by opening a web browser and entering the IP address of the router (192.168.0.1). Click on **Setup** and then click **Wireless Settings** on the left side and then click the **Manual Wireless Network Setup** button.

2. Select **Enable WPA/WPA2 Wireless Security (enhanced)** from the *Security Mode* drop-down menu.

3. Select **Auto(TKIP/AES)**, **TKIP**, or **AES** from the *Cipher Type* drop-down menu. If you have wireless clients that use both types, use **TKIP/AES**.



4. Select **PSK** from the *PSK / EAP* drop-down menu.

5. Enter a key (passphrase) in the *Network Key* field. The key is entered as a pass-phrase in either ASCII or HEX format. If using ASCII format the pass-phrase must be between 8-63 characters. If using HEX format the pass-phrase must be 64 characters. The ASCII or HEX pass-phrase must be the same at both ends of the wireless connection.

6. Click **Save Settings** to save your settings. If you are configuring the router with a wireless adapter, you will lose connectivity until you enable WPA-PSK on your adapter and enter the same passphrase as you did on the router.

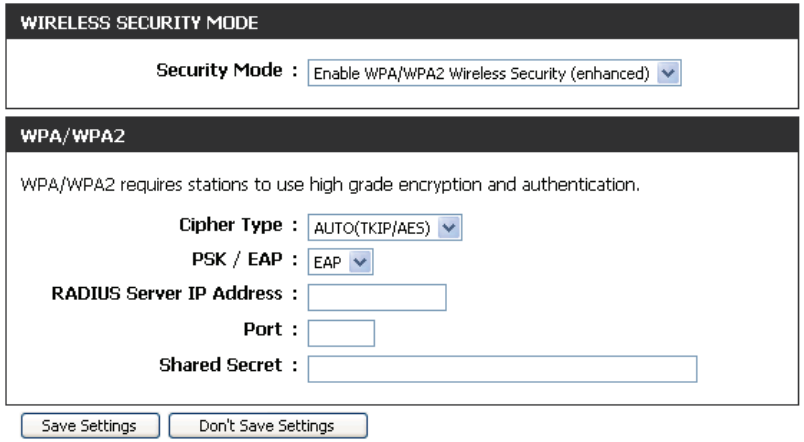
Configure WPA-Enterprise (RADIUS)

It is recommended to enable encryption on your wireless router before your wireless network adapters. Please establish wireless connectivity before enabling encryption. Your wireless signal may degrade when enabling encryption due to the added overhead.

1. Log into the web-based configuration by opening a web browser and entering the IP address of the router (192.168.0.1). Click on **Setup** and then click **Wireless Settings** on the left side and then click the **Manual Wireless Network Setup** button.

2. Select **Enable WPA/WPA2 Wireless Security (Enhanced)** from the *Security Mode* drop-down menu.

3. Select **Auto(TKIP/AES)**, **TKIP**, or **AES** from the *Cipher Type* drop-down menu. If you have wireless clients that use both types, use **TKIP/AES**.



4. Select **EAP** from the *PSK / EAP* drop-down menu.

5. Enter the IP Address of your RADIUS server in the *RADIUS Server IP Address* field.

6. Enter the port you are using with your RADIUS server in the *Port* field.

7. Enter the security key in the *Shared Secret* field.

8. Click **Save Settings** to save your settings. If you are configuring the router with a wireless adapter, you will lose connectivity until you enable WPA-Enterprise (RADIUS) on your adapter and enter the same passphrase as you did on the router.

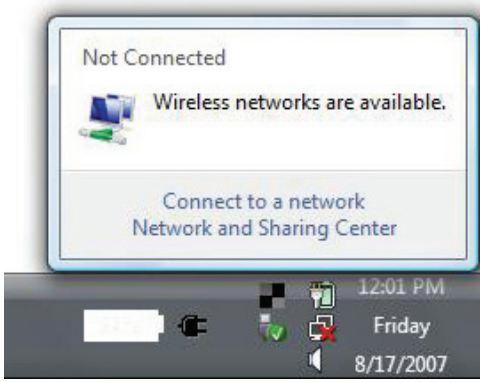
Connect to a Wireless Network
Using Windows Vista®

Windows Vista® users may use the built-in wireless utility. If you are using another company's utility or Windows® 2000, please refer to the user manual of your wireless adapter for help with connecting to a wireless network. Most utilities will have a "site survey" option similar to the Windows Vista® utility as seen below.

If you receive the **Wireless Networks Detected** bubble, click on the center of the bubble to access the utility.

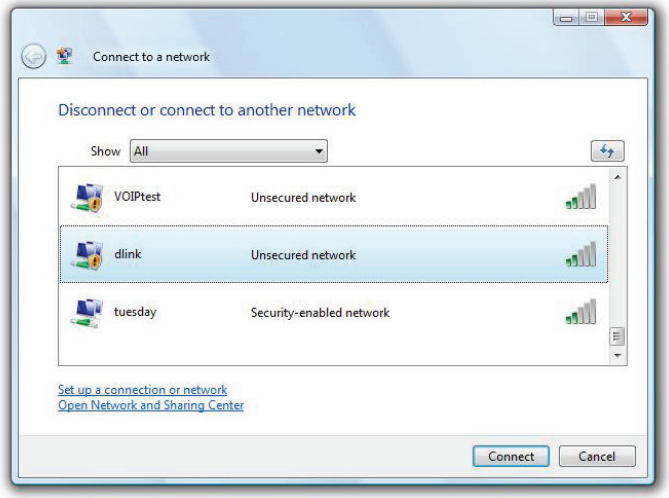
or

Right-click on the wireless computer icon in your system tray (lower-right corner next to the time). Select **Connect to a network**.



The utility will display any available wireless networks in your area. Click on a network (displayed using the SSID) and click the **Connect** button.

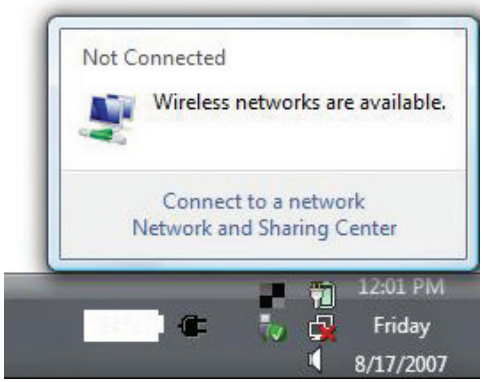
If you get a good signal but cannot access the Internet, check you TCP/IP settings for your wireless adapter. Refer to the **Networking Basics** section in this manual for more information.



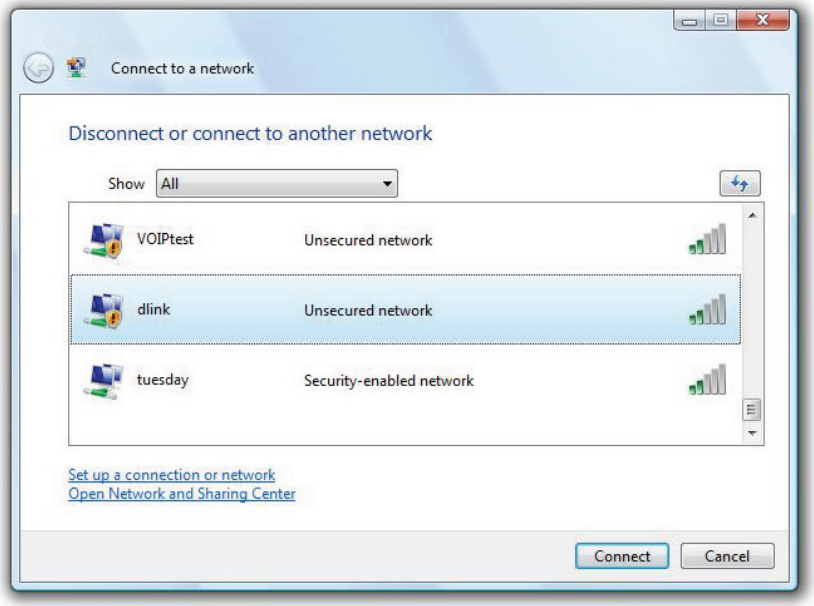
Configure WPA/WPA2

It is recommended to enable wireless security (WPA/WPA2) on your wireless router or access point before configuring your wireless adapter. If you are joining an existing network, you will need to know the security key or passphrase being used.

1. Open the Windows Vista® Wireless Utility by right-clicking on the wireless computer icon in your system tray (lower right corner of screen). Select **Connect to a network**.



2. Highlight the wireless network (SSID) you would like to connect to and click **Connect**.



3. Enter the same security key or passphrase that is on your router and click **Connect**.

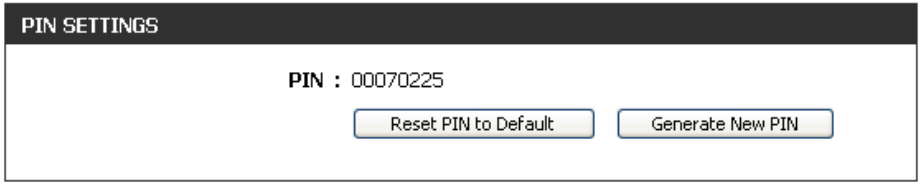
It may take 20-30 seconds to connect to the wireless network. If the connection fails, please verify that the security settings are correct. The key or passphrase must be exactly the same as on the wireless router.

Connect Using WCN 2.0

The router supports Wi-Fi protection, referred to as WCN 2.0 in Windows Vista®. The following instructions for setting this up depends on whether you are using Windows Vista® to configure the router or third party software.

When you first set up the router, Wi-Fi protection is disabled and unconfigured. To enjoy the benefits of Wi-Fi protection, the router must be both enabled and configured. There are three basic methods to accomplish this: use Windows Vista's built-in support for WCN 2.0, use software provided by a third party, or manually configure.

If you are running Windows Vista®, log into the router and click the **Enable** checkbox in the **Advanced** > **Wi-Fi Protected Setup** window. Use the Current PIN that is displayed in the **PIN Settings** section of **Advanced** > **Wi-Fi Protected Setup** window or choose to click the **Generate New PIN** button or **Reset PIN to Default** button.

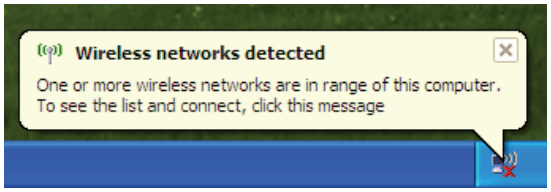


If you are using third party software to set up Wi-Fi Protection, carefully follow the directions. When you are finished, proceed to the next section to set up the newly-configured router.

Using Windows® XP

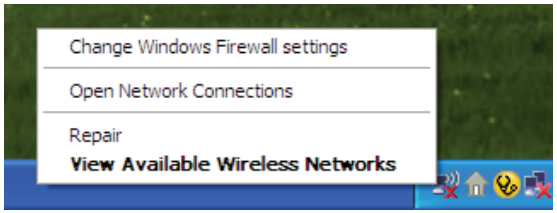
Windows® XP users may use the built-in wireless utility (Zero Configuration Utility). The following instructions are for Service Pack 2 users. If you are using another company's utility or Windows® 2000, please refer to the user manual of your wireless adapter for help with connecting to a wireless network. Most utilities will have a "site survey" option similar to the Windows® XP utility as seen below.

If you receive the **Wireless Networks Detected** bubble, click on the center of the bubble to access the utility.

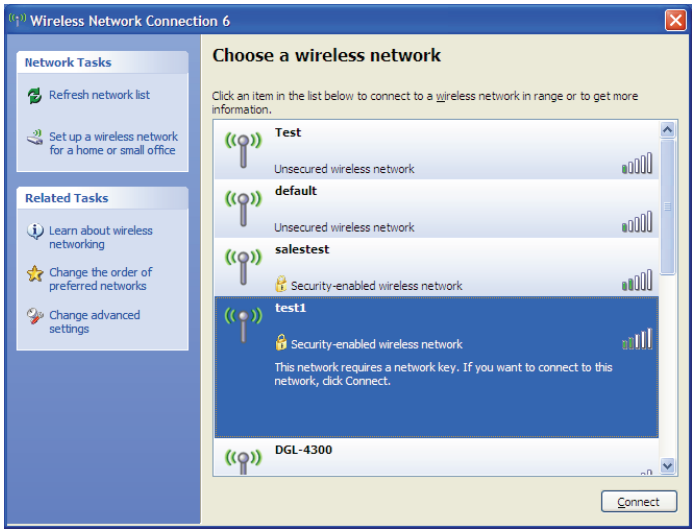


or

Right-click on the wireless computer icon in your system tray (lower-right corner next to the time). Select **View Available Wireless Networks**.



The utility will display any available wireless networks in your area. Click on a network (displayed using the SSID) and click the **Connect** button.

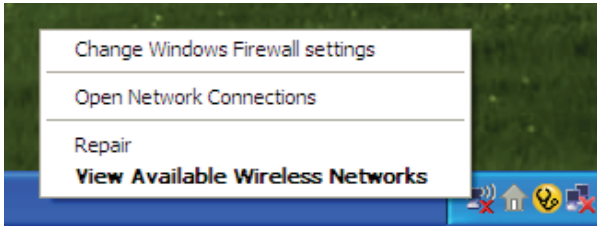


If you get a good signal but cannot access the Internet, check you TCP/IP settings for your wireless adapter. Refer to the **Networking Basics** section in this manual for more information.

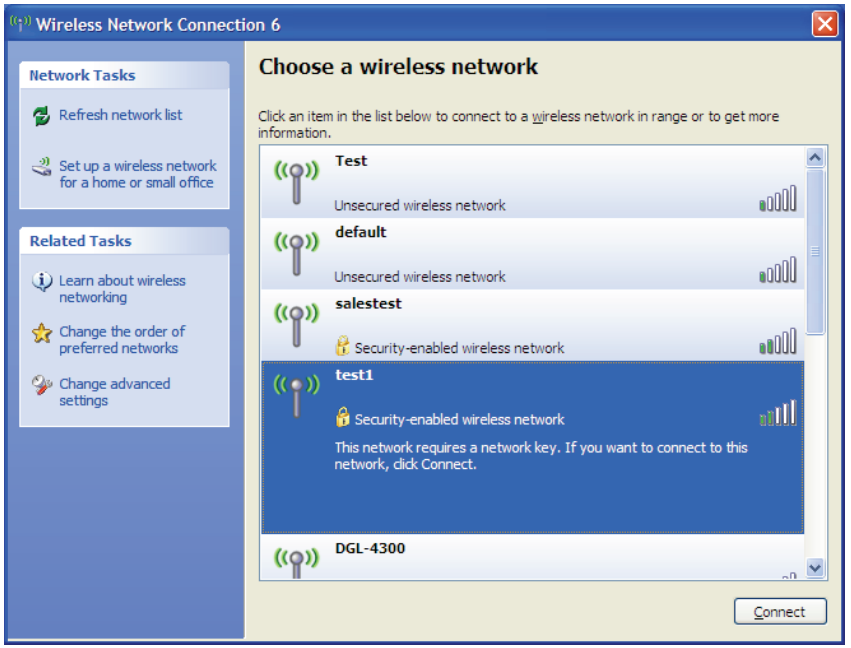
Configure WPA-PSK

It is recommended to enable WEP on your wireless router or access point before configuring your wireless adapter. If you are joining an existing network, you will need to know the WEP key being used.

1. Open the Windows® XP Wireless Utility by right-clicking on the wireless computer icon in your system tray (lower-right corner of screen). Select **View Available Wireless Networks**.

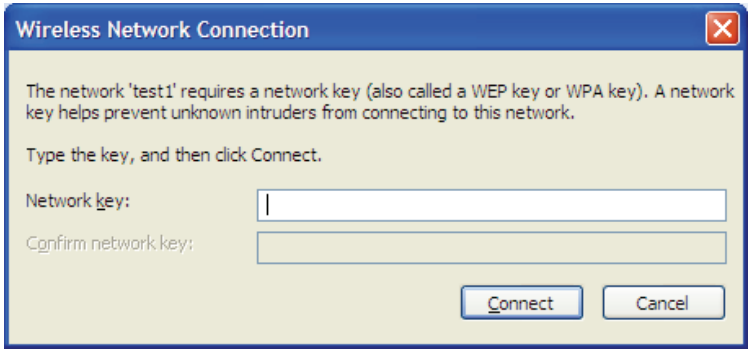


2. Highlight the wireless network (SSID) you would like to connect to and click **Connect**.



3. The **Wireless Network Connection** box will appear. Enter the WPA-PSK passphrase and click **Connect**.

It may take 20-30 seconds to connect to the wireless network. If the connection fails, please verify that the WPA-PSK settings are correct. The WPA-PSK passphrase must be exactly the same as on the wireless router.



Troubleshooting

This chapter provides solutions to problems that can occur during the installation and operation of the DIR-412. Read the following descriptions if you are having problems. (The examples below are illustrated in Windows® XP. If you have a different operating system, the screen shots on your computer will look similar to the following examples.)

1. Why can't I access the web-based configuration utility?

When entering the IP address of the D-Link router (192.168.0.1 for example), you are not connecting to a website on the Internet or have to be connected to the Internet. The device has the utility built-in to a ROM chip in the device itself. Your computer must be on the same IP subnet to connect to the web-based utility.

- Make sure you have an updated Java-enabled web browser. We recommend the following:
  - Internet Explorer 6.0 or higher
  - Netscape 8 or higher
  - Mozilla 1.7.12 (5.0) or higher
  - Opera 8.5 or higher
  - Safari 1.2 or higher (with Java 1.3.1 or higher)
  - Camino 0.8.4 or higher
  - Firefox 1.5 or higher

- Verify physical connectivity by checking for solid link lights on the device. If you do not get a solid link light, try using a different cable or connect to a different port on the device if possible. If the computer is turned off, the link light may not be on.

- Disable any Internet security software running on the computer. Software firewalls such as Zone Alarm, Black Ice, Sygate, Norton Personal Firewall, and Windows® XP firewall may block access to the configuration pages. Check the help files included with your firewall software for more information on disabling or configuring it.

- Configure your Internet settings:

    - Go to **Start** > **Settings** > **Control Panel**. Double-click the **Internet Options** Icon. From the **Security** tab, click the button to restore the settings to their defaults.

    - Click the **Connection** tab and set the dial-up option to Never Dial a Connection. Click the LAN Settings button. Make sure nothing is checked. Click **OK**.

    - Go to the **Advanced** tab and click the button to restore these settings to their defaults. Click **OK** three times.

    - Close your web browser (if open) and open it.

- Access the web management. Open your web browser and enter the IP address of your D-Link router in the address bar. This should open the login page for your the web management.

- If you still cannot access the configuration, unplug the power to the router for 10 seconds and plug back in. Wait about 30 seconds and try accessing the configuration. If you have multiple computers, try connecting using a different computer.

2. What can I do if I forgot my password?

If you forgot your password, you must reset your router. Unfortunately this process will change all your settings back to the factory defaults.

To reset the router, locate the reset button (hole) on the rear panel of the unit. With the router powered on, use a paperclip to hold the button down for 10 seconds. Release the button and the router will go through its reboot process. Wait about 30 seconds to access the router. The default IP address is 192.168.0.1. When logging in, the username is **admin** and leave the password box empty.

3. Why can't I connect to certain sites or send and receive e-mails when connecting through my router?

If you are having a problem sending or receiving e-mail, or connecting to secure sites such as eBay, banking sites, and Hotmail, we suggest lowering the MTU in increments of ten (Ex. 1492, 1482, 1472, etc).

Note: AOL DSL+ users must use MTU of 1400.

To find the proper MTU Size, you'll have to do a special ping of the destination you're trying to go to. A destination could be another computer, or a URL.

- Click on **Start** and then click **Run**.
- Windows® 95, 98, and Me users type in **command** (Windows® NT, 2000, and XP users type in **cmd**) and press **Enter** (or click **OK**).
- Once the window opens, you'll need to do a special ping. Use the following syntax:

  ping [url] [-f] [-l] [MTU value]

Example: **ping yahoo.com -f -l 1472**

```
C:\>ping yahoo.com -f -l 1482

Pinging yahoo.com [66.94.234.13] with 1482 bytes of data:

Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.
Packet needs to be fragmented but DF set.

Ping statistics for 66.94.234.13:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms

C:\>ping yahoo.com -f -l 1472

Pinging yahoo.com [66.94.234.13] with 1472 bytes of data:

Reply from 66.94.234.13: bytes=1472 time=93ms TTL=52
Reply from 66.94.234.13: bytes=1472 time=109ms TTL=52
Reply from 66.94.234.13: bytes=1472 time=125ms TTL=52
Reply from 66.94.234.13: bytes=1472 time=203ms TTL=52

Ping statistics for 66.94.234.13:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 93ms, Maximum =  203ms, Average =  132ms

C:\>
```

You should start at 1472 and work your way down by 10 each time. Once you get a reply, go up by 2 until you get a fragmented packet. Take that value and add 28 to the value to account for the various TCP/IP headers. For example, lets say that 1452 was the proper value, the actual MTU size would be 1480, which is the optimum for the network we're working with (1452+28=1480).

Once you find your MTU, you can now configure your router with the proper MTU size.

To change the MTU rate on your router follow the steps below:

- Open your browser, enter the IP address of your router (192.168.0.1) and click **OK**.
- Enter your username (admin) and password (blank by default). Click **OK** to enter the web configuration page for the device.
- Click on **Setup>Internet** and then click **Manual Internet Connection Setup**.
- To change the MTU enter the number in the **MTU** field and click **Save Settings** to save your settings.
- Test your e-mail. If changing the MTU does not resolve the problem, continue changing the MTU in increments of ten.

Wireless Basics

D-Link wireless products are based on industry standards to provide easy-to-use and compatible high-speed wireless connectivity within your home, business or public access wireless networks. Strictly adhering to the IEEE standard, the D-Link wireless family of products will allow you to securely access the data you want, when and where you want it. You will be able to enjoy the freedom that wireless networking delivers.

A wireless local area network (WLAN) is a cellular computer network that transmits and receives data with radio signals instead of wires. Wireless LANs are used increasingly in both home and office environments, and public areas such as airports, coffee shops and universities. Innovative ways to utilize WLAN technology are helping people to work and communicate more efficiently. Increased mobility and the absence of cabling and other fixed infrastructure have proven to be beneficial for many users.

Wireless users can use the same applications they use on a wired network. Wireless adapter cards used on laptop and desktop systems support the same protocols as Ethernet adapter cards.

Under many circumstances, it may be desirable for mobile network devices to link to a conventional Ethernet LAN in order to use servers, printers or an Internet connection supplied through the wired LAN. A Wireless Router is a device used to provide this link.

What is Wireless?

Wireless or Wi-Fi technology is another way of connecting your computer to the network without using wires. Wi-Fi uses radio frequency to connect wirelessly, so you have the freedom to connect computers anywhere in your home or office network.

Why D-Link Wireless?

D-Link is the worldwide leader and award winning designer, developer, and manufacturer of networking products. D-Link delivers the performance you need at a price you can afford. D-Link has all the products you need to build your network.

How does wireless work?

Wireless works similar to how cordless phone work, through radio signals to transmit data from one point A to point B. But wireless technology has restrictions as to how you can access the network. You must be within the wireless network range area to be able to connect your computer. There are two different types of wireless networks Wireless Local Area Network (WLAN), and Wireless Personal Area Network (WPAN).

Wireless Local Area Network (WLAN)

In a wireless local area network, a device called an Access Point (AP) connects computers to the network. The access point has a small antenna attached to it, which allows it to transmit data back and forth over radio signals. With an indoor access point as seen in the picture, the signal can travel up to 300 feet. With an outdoor access point the signal can reach out up to 30 miles to serve places like manufacturing plants, industrial locations, college and high school campuses, airports, golf courses, and many other outdoor venues.

Wireless Personal Area Network (WPAN)

Bluetooth is the industry standard wireless technology used for WPAN. Bluetooth devices in WPAN operate in a range up to 30 feet away.

Compared to WLAN the speed and wireless operation range are both less than WLAN, but in return it doesn't use nearly as much power which makes it ideal for personal devices, such as mobile phones, PDAs, headphones, laptops, speakers, and other devices that operate on batteries.

Who uses wireless?

Wireless technology as become so popular in recent years that almost everyone is using it, whether it's for home, office, business, D-Link has a wireless solution for it.

Home

- Gives everyone at home broadband access
- Surf the web, check e-mail, instant message, and etc
- Gets rid of the cables around the house
- Simple and easy to use

Small Office and Home Office

- Stay on top of everything at home as you would at office
- Remotely access your office network from home
- Share Internet connection and printer with multiple computers
- No need to dedicate office space

Where is wireless used?

Wireless technology is expanding everywhere not just at home or office. People like the freedom of mobility and it's becoming so popular that more and more public facilities now provide wireless access to attract people. The wireless connection in public places is usually called "hotspots".

Using a D-Link Cardbus Adapter with your laptop, you can access the hotspot to connect to Internet from remote locations like: Airports, Hotels, Coffee Shops, Libraries, Restaurants, and Convention Centers.

Wireless network is easy to setup, but if you're installing it for the first time it could be quite a task not knowing where to start. That's why we've put together a few setup steps and tips to help you through the process of setting up a wireless network.

Tips

Here are a few things to keep in mind, when you install a wireless network.

Centralize your router or Access Point

Make sure you place the router/access point in a centralized location within your network for the best performance. Try to place the router/access point as high as possible in the room, so the signal gets dispersed throughout your home. If you have a two-story home, you may need a repeater to boost the signal to extend the range.

Eliminate Interference

Place home appliances such as cordless telephones, microwaves, and televisions as far away as possible from the router/access point. This would significantly reduce any interference that the appliances might cause since they operate on same frequency.

Security

Don't let you next-door neighbors or intruders connect to your wireless network. Secure your wireless network by turning on the WPA or WEP security feature on the router. Refer to product manual for detail information on how to set it up.

Wireless Modes

There are basically two modes of networking:

- **Infrastructure** – All wireless clients will connect to an access point or wireless router.

- **Ad-Hoc** – Directly connecting to another computer, for peer-to-peer communication, using wireless network adapters on each computer, such as two or more DIR-412 wireless network Cardbus adapters.

An Infrastructure network contains an Access Point or wireless router. All the wireless devices, or clients, will connect to the wireless router or access point.

An Ad-Hoc network contains only clients, such as laptops with wireless cardbus adapters. All the adapters must be in Ad-Hoc mode to communicate.

Networking Basics

Check your IP address

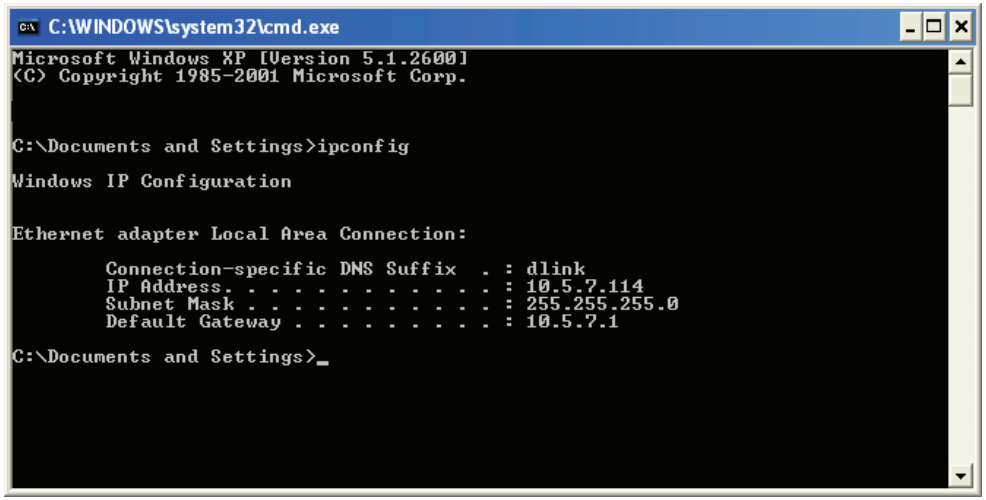
After you install your adapter, by default, the TCP/IP settings should be set to obtain an IP address from a DHCP server (i.e. wireless router) automatically. To verify your IP address, please follow the steps below.

Click on **Start** > **Run**. In the run box type ***cmd*** and click **OK.** (Windows Vista® users type *cmd* in the **Start Search** box.)

At the prompt, type ***ipconfig*** and press **Enter**.

This will display the IP address, subnet mask, and the default gateway of your adapter.

If the address is 0.0.0.0, check your adapter installation, security settings, and the settings on your router. Some firewall software programs may block a DHCP request on newly installed adapters.



Statically Assign an IP address

If you are not using a DHCP capable gateway/router, or you need to assign a static IP address, please follow the steps below:

Step 1

Windows Vista® - Click on **Start** > **Control Panel** > **Network and Internet** > **Network and Sharing Center** > **Manage Network Connections.**

Windows® XP - Click on **Start** > **Control Panel** > **Network Connections**.

Windows® 2000 - From the desktop, right-click **My Network Places** > **Properties**.

Step 2

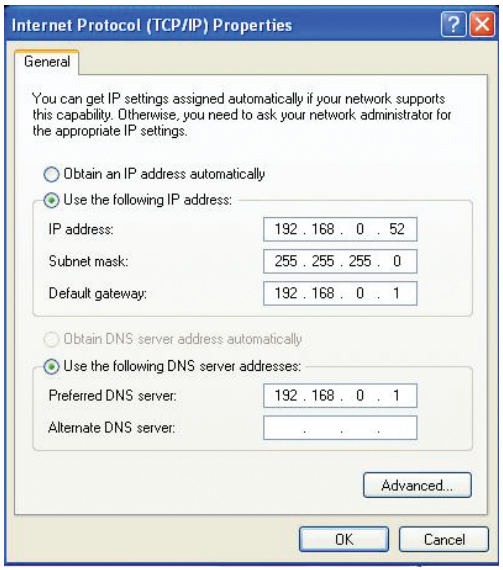
Right-click on the **Local Area Connection** which represents your network adapter and select **Properties**.

Step 3

Highlight **Internet Protocol (TCP/IP)** and click **Properties**.

Step 4

Click **Use the following IP address** and enter an IP address that is on the same subnet as your network or the LAN IP address on your router.



Example: If the router´s LAN IP address is 192.168.0.1, make your IP address 192.168.0.X where X is a number between 2 and 99. Make sure that the number you choose is not in use on the network. Set Default Gateway the same as the LAN IP address of your router (192.168.0.1).

Set Primary DNS the same as the LAN IP address of your router (192.168.0.1). The Secondary DNS is not needed or you may enter a DNS server from your ISP.

Step 5

Click **OK** twice to save your settings.

Technical Specifications

Standards

- IEEE 802.11n (draft 2.0)
- IEEE 802.11b/g
- IEEE 802.3
- IEEE 802.3u

Security

- WEP (64/128 bit)
- WPA-PSK/WPA2-PSK
- WPS (PIN/PBC)
- 802.1X

Wireless Signal Rates*

- 54Mbps
- 48Mbps
- 36Mbps
- 24Mbps
- 18Mbps
- 12Mbps
- 11Mbps
- 9Mbps
- 6Mbps
- 5.5Mbps
- 2Mbps

MCS (0-7)

- 130Mbps (270)
- 117Mbps (243)
- 104Mbps (216)
- 78Mbps (162)
- 66Mbps (135)
- 58.5Mbps (121.5)
- 52Mbps (108)
- 39Mbps (81)
- 26Mbps (54)
- 19.5Mbps (40.5)
- 12Mbps (27)
- 6.5Mbps (13.5)

Frequency Range

- 2.4GHz to 2.483GHz

Transmitter Output Power

- 17dBm (+/- 2dB) at 11Mbps, 5.5Mbps, 2Mbps, and 1Mbps at 77°F (25°C)

LEDs

- Power
- Internet
- WLAN
- Ethernet
- WPS

Operating Temperature

- 32°F to 104°F (0°C to 40°C)

Operating Humidity

- 10%-95% non-condensing

Storage Humidity

- 5%-95% non-condensing

Safety & Emissions

- NCC
- CSA International
- FCC Class B
- CE Class B

Dimensions

- Width = 4.76 inches (121mm)
- Height = 1.06 inches (27mm)
- Depth = 3.86 inches (97.92mm)

Warranty

- 1 Year Limited

* Maximum wireless signal rate derived from IEEE Standard 802.11g and Draft 802.11n specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate. Environmental factors will adversely affect wireless signal range.

CE Mark Warning:

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC 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.

For detailed warranty information applicable to products purchased outside the United States, please contact the corresponding local D-Link office.

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.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

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.
(2) This device must accept any interference received, including interference that may cause undesired operation.

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 a minimum distance of 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The following three 3G card have passed the co-located EMC/RF exposure test with this device and may be used with this device. Other 3G cards may or may not comply with the FCC regulations. Please consult the manufacturer before purchase.

The EUT could be applied with one 3G 1XEV-DO Card and the following three different models could be chosen. Therefore emission tests are added for simultaneous transmission between wireless LAN and 3G 1XEV-DO function. The emission tests have been performed at the poorest channel of both WLAN and 3G 1XEV-DO, and recorded in the report.

Interface	Brand Name	Model Name	FCC ID
3G USB	HUAWEI	E220	QISE220
3G USB	HUAWEI	E169	QISE169
3G USB	HUAWEI	E180	QISE180