

LINKSYS®

A Division of Cisco Systems, Inc.



Broadband Router

with QoS

User Guide



Model No. **RT042**

CISCO SYSTEMS



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WARNING: This product contains chemicals, including lead, known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

How to Use this Guide

This User Guide has been designed to make understanding networking with the Router easier than ever. Look for the following items when reading this Guide:



This checkmark means there is a Note of interest about something you should pay special attention to while using the Router.



This exclamation point means there is a Caution or Warning about something that could damage your property or the Router.



This question mark provides you with a reminder about something you might need to do while using the Router.

In addition to these symbols, there are definitions for technical terms that are presented like this:

word: definition.

Also, each figure (diagram, screenshot, or other image) is provided with a figure number and description, like this:

Figure 0-1: Sample Figure Description

Figure numbers and descriptions can also be found in the “List of Figures” section in the “Table of Contents”.

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Chapter 1: Introduction

Welcome

Thank you for choosing the Broadband Router. The Linksys Broadband Router with QoS is a kind of "splitter" for your Internet connection. Just connect your DSL or Cable Modem to the Router, and all the computers in your home or office can share the Internet at the same time. Use the built-in 4-port switch to attach four local PCs directly, or daisy-chain out to more hubs and switches as your network grows. It has Auto MDI/MDI-X cross-over detection so you don't have to worry about the cable type.

The Router's QoS (Quality of Service) feature lets you define the amount of the available bandwidth for each of the devices on your network. This means that you can prioritize time-sensitive data like Voice Over IP phone calls or streaming media ahead of less sensitive email and web surfing. The dual Internet ports let you optionally connect a second Internet line for additional bandwidth.

Of course, once your computers are connected to the Internet through the Router, they can communicate with each other too, sharing resources and files. All your computers can print on a shared printer connected anywhere in the home. And you can share all kinds of files between computers, like music, digital pictures, and other documents.

In addition to this, you can control access to the Internet through the Router's Parental Control features. This allows you to set a schedule, see what websites and programs are being used, optimize performance, and block those sites you don't wish to be accessed.

This user guide will give you all the information you need to connect, set up, and configure your Router.

broadband: an always-on, fast Internet connection.

network: a series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

bandwidth: the transmission capacity of a given device or network.

DHCP (Dynamic Host Configuration Protocol) : a networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time.

browser: an application program that provides a way to look at and interact with all the information on the Internet.

Ethernet: a network protocol that specifies how data is placed on and retrieved from a common transmission medium.

firewall: a set of related programs located at a network gateway server that protects the resources of a network from users from other networks.

router: a networking device that connects multiple networks together.

What's in this Guide?

This user guide covers the steps for setting up and using the Broadband Router.

- **Chapter 1: Introduction**
This chapter describes the Router's applications and this User Guide.
- **Chapter 2: Networking Basics**
This chapter describes the basics of networking.
- **Chapter 3: Getting to Know the Broadband Router**
This chapter describes the physical features of the Router.
- **Chapter 4: Connecting the Broadband Router**
This chapter instructs you on how to connect the Router to your network.
- **Chapter 5: Setting Up and Configuring the Router**
This chapter explains how to use the Web-Based Utility to set up the Router and configure its settings.
- **Appendix A: Troubleshooting**
This appendix describes some problems and solutions, as well as frequently asked questions, regarding the Router's installation and usage.
- **Appendix B: Upgrading Firmware**
This appendix instructs you on how to upgrade the Router's firmware if you should need to do so.
- **Appendix C: Finding the MAC Address and IP Address for your Ethernet Adapter.**
This appendix describes how to find the MAC address for your computer's Ethernet adapter so you can use the Router's MAC address cloning feature.
- **Appendix D: Using the RT042 Utility**
This appendix describes the Router Utility that comes on the Router's CD.
- **Appendix E: The Setup Wizard**
This appendix describes the Setup Wizard included with the Web-based utility, for easy Internet set up.
- **Appendix F: Windows Help**
This appendix describes how you can use Windows Help for instructions about networking, such as installing the TCP/IP protocol.
- **Appendix G: Glossary**
This appendix gives a brief glossary of terms frequently used in networking.

firmware: the programming code that runs a networking device.

MAC (Media Access Control) Address - The unique address that a manufacturer assigns to each networking device.

adapter: a device that adds network functionality to your PC.

IP (Internet Protocol): a protocol used to send data over a network.

ip address: the address used to identify a computer or device on a network.

TCP (Transmission Control Protocol): a network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

TCP/IP (Transmission Control Protocol/Internet Protocol): a set of instructions PCs use to communicate over a network.

Broadband Router

- **Appendix H: Specifications**
This appendix provides the Router's technical specifications.
- **Appendix I: Warranty Information**
This appendix contains the Router's warranty information.
- **Appendix J: Regulatory Information**
This appendix supplies the regulatory information regarding the Router.
- **Appendix K: Contact Information**
This appendix provides contact information for a variety of Linksys resources, including Technical Support.

Chapter 2: Networking Basics

An Introduction to LANs

A Router is a network device that connects two networks together.

The Router connects your local area network (LAN), or the group of PCs in your home or office, to the Internet. The Router processes and regulates the data that travels between these two networks.

The Router's Network Address Translation (NAT) technology protects your network of PCs so users on the Internet cannot "see" your PCs. This is how your LAN remains private. The Router protects your network by inspecting the first packet coming in through the Internet port before delivery to the final destination on one of the Ethernet ports. The Router inspects Internet port services like the web server, ftp server, or other Internet applications, and, if allowed, it will forward the packet to the appropriate PC on the LAN side.

The Use of IP Addresses

IP stands for Internet Protocol. Every device in an IP-based network, including PCs, print servers, and routers, requires an IP address to identify its location, or address, on the network. This applies to both the Internet and LAN connections.

There are two ways of assigning IP addresses to your network devices.

A static IP address is a fixed IP address that you assign manually to a PC or other device on the network. Since a static IP address remains valid until you disable it, static IP addressing ensures that the device assigned it will always have that same IP address until you change it. Static IP addresses are commonly used with network devices such as server PCs or print servers.

If you use the Router to share your cable or DSL Internet connection, contact your ISP to find out if they have assigned a static IP address to your account. If so, you will need that static IP address when configuring the Router. You can get the information from your ISP.

A dynamic IP address is automatically assigned to a device on the network. These IP addresses are called dynamic because they are only temporarily assigned to the PC or other device. After a certain time period, they expire and may change. If a PC logs onto the network (or the Internet) and its dynamic IP address has expired, the DHCP server will assign it a new dynamic IP address.

LAN: the computers and networking products that make up your local network

NAT (Network Address Translation): NAT technology translates IP addresses of a local area network to a different IP address for the Internet.

FTP (File Transfer Protocol): a protocol used to transfer files over a TCP/IP network.

Packet: a unit of data sent over a network.

server: any computer whose function in a network is to provide user access to files, printing, communications, and other services.

Static IP address: a fixed address assigned to a computer or device that is connected to a network.

Dynamic IP address: a temporary IP address assigned by a DHCP server.

DSL (Digital Subscriber Line): an always-on broadband connection over traditional phone lines.

ISP (Internet Service Provider): a company that provides access to the Internet.

Broadband Router

A DHCP server can either be a designated PC on the network or another network device, such as the Router. By default, the Router's Internet Connection Type is **Obtain an IP automatically** (DHCP).

The PC or network device obtaining an IP address is called the DHCP client. DHCP frees you from having to assign IP addresses manually every time a new user is added to your network.

For DSL users, many ISPs may require you to log on with a user name and password to gain access to the Internet. This is a dedicated, high-speed connection type called Point to Point Protocol over Ethernet (PPPoE). PPPoE is similar to a dial-up connection, but PPPoE does not dial a phone number when establishing a connection. It also will provide the Router with a dynamic IP address to establish a connection to the Internet.

PPPoE (Point to Point Protocol over Ethernet): a type of broadband connection that provides authentication (username and password) in addition to data transport.

Chapter 3: Getting to Know the Broadband Router

The Front Panel

The Router's LEDs are located on the front panel.



Figure 3-1: Front Panel

LEDs

- | | |
|---------------------|---|
| Ethernet 1-4 | Green. The Ethernet LEDs serves two purposes. If an LED is continuously lit, the Router is connected to a device through the corresponding port (1, 2, 3, or 4). If an LED is flashing, the Router is actively sending or receiving data over that port. |
| Internet1 | Green. The Internet1 LED lights up when the Router is connected to your cable or DSL modem through the corresponding Internet port. |
| Internet2 | Green. The Internet2 LED lights up when the Router is connected to your cable or DSL modem through the second Internet port. |
| Diag | Orange. The Diag LED lights up when the system is not ready. The LED goes off when the system is ready. |
| System | Green. The System LED lights up when the Router is powered on. If the LED is flashing, the Router is running a diagnostic test. |

port: the connection point on a computer or networking device used for plugging in cables or adapters.

The Back and Side Panels

The Router's ports and Reset button are located on the back panel of the Router.

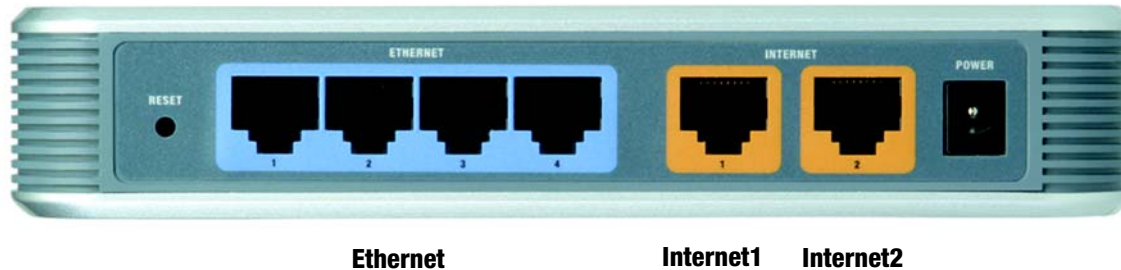


Figure 3-2: Back Panel

Reset Button

Reset Button The Reset button can be used in one of two ways:
If the Router is having problems connecting to the Internet, press the Reset button for just a second with a paper clip or a pencil tip. This is similar to pressing the Reset button on your PC to reboot it.

If you are experiencing extreme problems with the Router and have tried all other troubleshooting measures, press and hold in the Reset button for 30 seconds. This will restore the factory defaults and clear all of the Router's settings, such as port forwarding or a new password.

boot: to start a device and cause it to start executing instructions.

Ports

Ethernet 1-4 These four **Ethernet** ports connect to network devices, such as PCs, print servers, or additional switches.

Internet1 The **Internet1** port connects to a cable or DSL modem.

Internet2 The **Internet2** port acts as an additional Internet port and connects to a cable or DSL modem.

Power The **Power** port is where you will connect the included AC power cable.

Proceed to "Chapter 4: Connecting the Broadband Router."

Chapter 4: Connecting the Broadband Router

Overview

To set up your network, you will need to do the following:

- Connect the Router to one of your PCs according to the instructions in this chapter.
- Set up and configure the Router with the setting(s) provided by your Internet Service Provider (ISP) according to “Chapter 5: Setting up and Configuring the Broadband Router.”

The installation technician from your ISP should have left the setup information with you after installing your broadband connection. If not, you can call your ISP to request the information. Once you have the setup information for your specific type of Internet connection, then you can begin installation and setup of the Router.

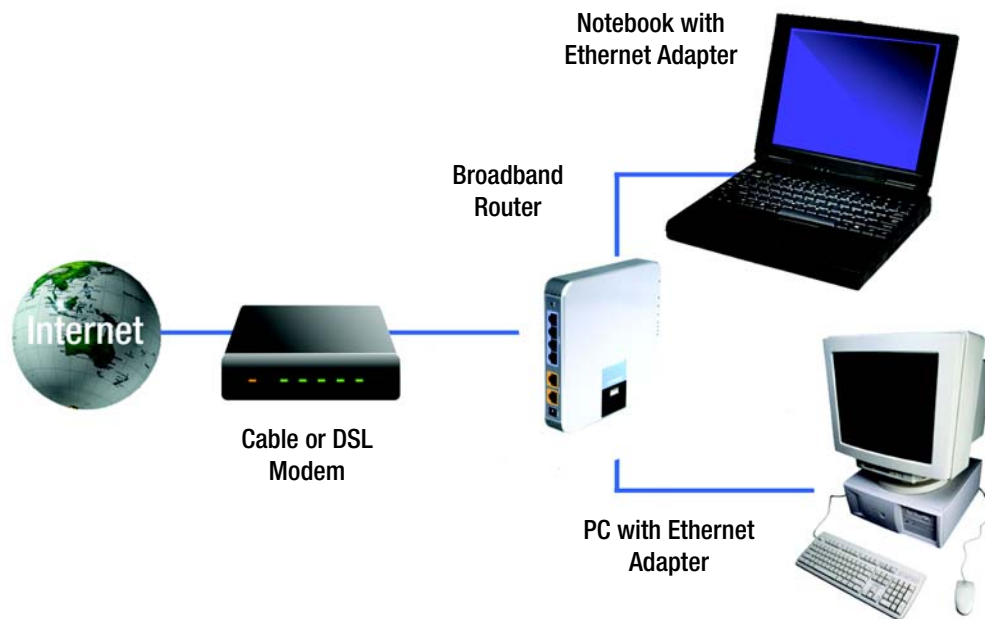


Figure 4-1: Example of a Typical Network

Connection Instructions

1. Before you begin, make sure that all of your hardware is powered off, including the Router, PCs, hubs, switches, and cable or DSL modem.
2. Connect one end of an Ethernet network cable to one of the Ethernet ports on the back of the Router. Connect the other end to an Ethernet port on a network device, e.g., a PC, print server, hub, or switch.

Repeat this step to connect more PCs or other network devices to the Router.

3. Connect your cable or DSL modem's Ethernet cable to one of the Router's Internet ports. If using the Internet2 port, connect a second cable to it, and the other end to the network device, e.g., modem or public server.
4. Power on the cable or DSL modem and the other network device if using one.
5. Connect the included AC power cable to the Router's Power port, and then plug the power adapter into an electrical outlet.

The System LED on the front panel will light up as soon as the power adapter is connected properly.

Proceed to “Chapter 5: Setting Up and Configuring the Broadband Router.”



Figure 4-2: Connect a PC



Figure 4-3: Connect the Internet



Figure 4-4: Connect the Power

Chapter 5: Setting Up and Configuring the Broadband Router

Overview

For your convenience, use the Router's Web-based Utility to set it up and configure it. This chapter will explain all of the functions in this Utility.

There are five main tabs in the Utility: System Summary, Basic Setup, Parental Control, Advanced Setup, and Log. Additional tabs will be available after you click one of the main tabs. The tabs, and each of its screens, are described below:

System Summary Tab

The System Summary Tab displays the router's current status and settings. You can also configure the user and IP bandwidth. Clicking any underlined text will take you to any related pages in the utility.

Basic Setup Tab

- **Network.** Use this screen to enter your Internet connection information and network settings.
- **Password.** You can change the Router's password on this screen. For better network security, you should change the password from the Router's default.
- **Time.** Change the time on this screen. Make sure you change it from the default setting, if necessary, to show the accurate time.
- **MAC Clone.** Some ISPs require that you register a MAC address. This feature "clones" your network adapter's MAC address onto the Router, and prevents you from having to call your ISP to change the registered MAC address to the Router's MAC address.

Parental Control Tab

- **On-Line Scheduler.** This feature allows you to allow or deny Internet access, according to the schedule, to any of the users on your network.

Broadband Router

- **Website Hit Rate.** This feature allows you to view the frequency at which each of your network's users are viewing their ten most favorite websites. You can also block these sites, if you wish.
- **Application Usage.** This feature allows you to view which applications, according to user, are taking up the most bandwidth on your network and block those sites if you wish.
- **Performance Optimization.** This feature allows you to list the network applications most often used on your network, according to user, and set the priority at which it is run.
- **Block List.** This feature allows you to find out which websites or applications are blocked for each of your users, and unblock them if you wish.

Advanced Setup Tab

- **DMZ Host.** The DMZ (Demilitarized Zone) Host feature allows one local user to be exposed to the Internet, not protected by the Router's firewall, to use a special-purpose service such as Internet gaming or video conferencing.
- **Forwarding.** Port forwarding can be used to set up public services on your network. You may use this function to establish a Web server or FTP server via an IP Gateway.
- **UPnP.** UPnP forwarding can be used to set up public services on your network.
- **DDNS.** DDNS (Dynamic DNS) service allows you to assign a fixed domain name to a dynamic Internet IP address. This allows you to host your own Web, FTP or other type of TCP/IP server in your LAN.
- **Advanced Routing.** The Router's dynamic routing feature can be used to automatically adjust to physical changes in the network's layout. The static routing feature allows multiple routers to operate on one network.
- **VPN Pass Through.** This tab allows you to enable or disable IPSec Pass Through, PPTP Pass Through, and L2TP Pass Through.
- **Remote Management.** This allows you to manage the Router through a remote location over the Internet.
- **System Management.** This screen includes tools to help troubleshoot network problems, reset the Router to factory default settings, upgrade the Router's firmware, and store and retrieve configuration files.

Log Tab

- **System Log.** The System Log displays Syslog, E-mail and Log Settings.
- **System Statistics.** This tab displays the system statistics.

DMZ: removes the Router's firewall protection from one PC, allowing it to be "seen" from the Internet.

gateway: device that interconnects networks with different, incompatible communications protocols.

DDNS: allows the hosting of a website, FTP server, or e-mail server with a fixed domain name (e.g., www.xyz.com) and a dynamic IP address.

domain: a specific name for a network of computers.

IPSec (Internet Protocol Security): a VPN protocol used to implement secure exchange of packets at the IP layer.

PPTP (Point-to-Point Tunneling Protocol): a VPN protocol that allows the Point to Point Protocol (PPP) to be tunneled through an IP network. This protocol is also used as a type of broadband connection in Europe.

upgrade: to replace existing software or firmware with a newer version.

How to Access the Web-based Utility

To access the Router's Web-based Utility, launch Internet Explorer or Netscape Navigator, and enter the Router's default IP address, **192.168.1.1**, in the *Address* field. Then, press the **Enter** key.

A screen will appear asking you for your User name and Password. Enter **admin** in the *User name* field and the *Password* field. Then, click the **OK** button.

System Summary Tab

The first screen that appears is System Summary Tab. This screen displays the router's current status and settings. This information is read only. Clicking underlined text will take you to related setup pages. On the right side of the screen and all other screens in the Utility will be a link to the Site Map, which has links to all of the Utility's tabs. Click the **Site Map** button to view the Site Map. Then, click on desired tab subject.

System Information

System Up Time: The length of time in Days, Hours, and Minutes that the Router is active and the current time are displayed.

Internet IP Addresses: This shows the current IP Address for each Internet port. You can release and renew each of these addresses, depending upon your settings. Clicking the underlined text will take you to the *Network* screen on the *Basic Settings* tab.

User Usage

This is a graphic display of the users on your network, showing which Internet connection they are accessing and how much bandwidth they are consuming.



Figure 5-1: Entering the Router's IP Address



Figure 5-2: Accessing the Web-Based Utility



Figure 5-3: The Site Map Button

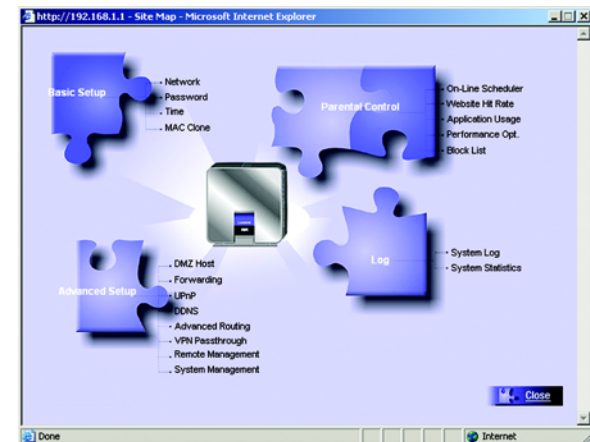


Figure 5-4: Site Map

User Bandwidth

This is a list of all users on your network, displaying how they're connected and allowing you to set the amount of bandwidth they are allowed and to delete them as users on your network. The headings for this list are:

User Name: Shows the name of this user on your network.

IP: Shows the IP Address of this user's PC.

Interface: Shows the Internet port the user is accessing. You can also configure the user to go through the other Internet port by selecting the interface from the drop-down menu when dual Internet ports are used.

Min.Rate (Kbit/Sec): Enter the minimum allowable bandwidth for this user. The default setting is 0.

Max.Rate (Kbit/Sec): Enter the maximum allowable bandwidth for this user. The default setting is 512.

Delete: Click the trashcan icon if you wish to delete this user from the user bandwidth or from Internet access.



Figure 5-5: System Summary Tab

ISP Bandwidth

This section allows you to set the maximum upstream or downstream bandwidth per Internet port, maximizing your network's performance. This information can be obtained from your ISP.

Click the **Save Settings** button to save the network settings or click the **Cancel Changes** button to undo your changes.

Basic Setup Tab - Network

The *Basic Setup* tab contains all of the router's basic setup functions. The first screen that appears, the *Network* screen, includes basic settings for your network. The router can be used in most network settings without changing any of the default values. Some users may need to enter additional information in order to connect to the Internet through an ISP (Internet Service Provider) or broadband (DSL, cable modem) carrier.

If you need help to configuring the router, click the **Setup Wizard** button. A walk-through of the Wizard is provided in "Appendix E: The Setup Wizard".

Host Name & Domain Name: Enter a host and domain name for the Router. Some ISPs may require these names as identification, and these settings can be obtained from your ISP. In most cases, leaving these fields blank will work.

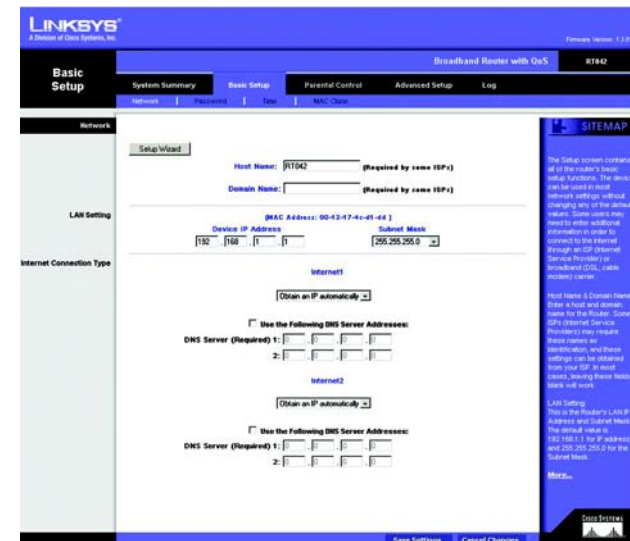


Figure 5-6: Basic Setup Tab - Network

LAN Setting

This shows the Router's MAC Address, which is a 12-digit code assigned to each piece of hardware for identification. Also listed here are the Router's IP Address and Subnet Mask. The default value is 192.168.1.1 for IP address and 255.255.255.0 for the Subnet Mask.

Internet Connection Type

Obtain an IP Automatically

If your ISP automatically assigns an IP Address, select **Obtain an IP automatically**. Your ISP will assign these values. If you check the box for **Use the Following DNS Server Addresses**, enter a specific DNS Server IP. Multiple DNS IP Settings are common. In most cases, the first available DNS entry is used.

Static IP

If you have to specify the Internet IP Address, Subnet Mask, Default Gateway Address, and DNS Server, select **Static IP**. You must obtain this information from your ISP.

PPPoE (Point-to-Point Protocol over Ethernet) (most DSL users)

You have to check with your ISP to make sure whether PPPoE should be enabled or not. If they do use PPPoE:

1. Enter your User Name and Password.
2. If you select **Connect on Demand** option, the PPPoE connection will be disconnected if it has been idle for a period longer than the Max Idle Time setting.
3. If you select **Keep Alive** option, the Router will keep the connection alive by sending out a few data packets at the Redial Period, so your Internet service thinks that the connection is still active.

hardware: the physical aspect of computers, telecommunications, and other information technology devices.

subnet mask: an address code that determines the size of the network.

Obtain an IP automatically

Use the Following DNS Server Addresses:

DNS Server (Required) 1: [0] [0] [0] [0]

2: [0] [0] [0] [0]

Figure 5-7: Obtain an IP Automatically

Static IP

IP Address: [0] [0] [0] [0]

Subnet Mask: [0] [0] [0] [0]

Gateway: [0] [0] [0] [0]

DNS Server (Required) 1: [0] [0] [0] [0]

2: [0] [0] [0] [0]

Figure 5-8: Static IP

PPPoE

User Name: []

Password: []

Connect on Demand: Max Idle Time [5] Min.

Keep Alive: Redial Period [30] Sec.

Figure 5-9: PPPoE

PPTP (Point-to-Point Tunneling Protocol)

1. Enter the Specify IP Address, Subnet Mask and Default Gateway Address that is provided by your ISP.
2. Enter your User Name and Password.
3. If you select **Connect on Demand** option, the connection will be disconnected if it has been idle for a period longer than the Max Idle Time setting.
4. If you select **Keep Alive** option, the Router will keep the connection alive by sending out a few data packets at the Redial Period, so your Internet service thinks that the connection is still active.

Click the **Save Settings** button to save the network settings or click the **Cancel Changes** button to undo your changes.

Basic Setup Tab - Password

The Router's default User Name and password is **admin**. For greater network security, you should change the Router's password from this default to one of your own. If you leave the password field blank, all users on your network will be able to access the Router simply by entering **admin** into the password field.

Old Password: Enter the old password. The default Password is **admin** when you first power up the Router.



NOTE: The password cannot be recovered if it is lost or forgotten. If the password is lost or forgotten, you have to reset the Router to its factory default settings.

New Password: Enter a new password for the Router. Your password must be less than 15 characters long and it can't contain any spaces.

Confirm New Password: Re-enter the password for confirmation.

Click the **Save Settings** button to save the Password settings or click the **Cancel Changes** button to undo the changes.

PPTP

IP Address: 0 . 0 . 0 . 0

Subnet Mask: 0 . 0 . 0 . 0

Gateway: 0 . 0 . 0 . 0

User Name:

Password:

Connect on Demand: Max Idle Time 5 Min.

Keep Alive: Redial Period 30 Sec.

Figure 5-10: PPTP

LINKSYS
A Division of Cisco Systems, Inc.

Broadband Router with G+S R1547
Firmware Version: 1.2.5

Basic Setup | System Summary | Basic Setup | Parental Control | Advanced Setup | Log

Network | Password | Time | MAC Clone

Password

User Name: admin

Old Password:

New Password:

Confirm New Password:

SITEMAP

The Router's default password is "admin" and it is strongly recommended that you change the Router's password.

More...

Save Settings Cancel Changes

Figure 5-11: Basic Setup Tab - Password

Basic Setup Tab - Time

Time

The Router uses the time settings to time stamp log events, to automatically update the Content Filter List, and for other internal purposes.

Set the local time using Network Time Protocol (NTP) automatically or manually.

Automatic: Select the Time Zone and enter the Daylight Saving and NTP Server. The default Time Zone is Pacific Time.

Manual: Enter the Hours, Minutes, Seconds, Month, Day and Year.

Click the **Save Settings** button to save the Time settings or click the **Cancel Changes** button to undo the changes.



Figure 5-12: Basic Setup Tab - Time

Basic Setup Tab - MAC Clone

Some ISPs require that you register a MAC address. This feature “clones” your network adapter's MAC address onto the Router, and prevents you from having to call your ISP to change the registered MAC address to the Router's MAC address. The Router's MAC address is a 12-digit code assigned to a unique piece of hardware for identification.

Enter the MAC Address in the User Defined MAC Address field for Internet ports 1 or 2, or click the **Clone** button to add the MAC Address from the PC viewing the Web-based Utility.

Click **Save Settings** to save the MAC Cloning settings or click the **Cancel Changes** button to undo your changes.



Figure 5-13: Basic Setup Tab - MAC Clone

Parental Control Tab - On-Line Scheduler

The *Parental Control* tab allows you to control and optimize your user's access to the Internet from your network. This control can also be exercised through the Utility provided on the CD included with the Router.

The first screen to appear, *On-Line Scheduler*, allows you to allow or deny Internet access, according to the schedule, to any of the users on your network.

Select User: From this drop-down menu, select the user whose access you wish to schedule.

From the schedule below, you can restrict or allow access to the Internet. Each day in the schedule is broken into eight blocks of time. Each block is divided into three hours. Click on any of the boxed hours to make the box red or green. A red box means that access is restricted. A green box means the user is allowed access.

You can also restrict or allow entire days, or daytime or evening periods, in the lower portion of the screen.

Click **Save Settings** to save the Scheduler settings or click the **Cancel Changes** button to undo your changes.



Figure 5-14: Parental Control Tab - On-Line Scheduler

Parental Control Tab - Website Hit Rate

From this screen, you can view the frequency at which each of your network's users are viewing their ten most favorite websites. You can also block these sites, if you wish.

Select User: From this drop-down menu, select the user whose top websites you wish to view.

Select Date: From this drop-down menu, select the date when the websites were viewed.

Refresh Data: Clicking this button will update the information displayed on the screen.

Website information is displayed in ranking order, from most viewed to least viewed, with the amount of "hits" displayed. Each website is displayed as a link, so you can click the name to bring up the site. Clicking the **Block** box will restrict that user from viewing that website.

Click **Save Settings** to save the settings or click the **Cancel Changes** button to undo your changes.



Figure 5-15: Parental Control Tab - Website Hit Rate

Parental Control Tab - Application Usage

From this screen, you can view which applications are taking up the most bandwidth on your network, according to user, and block those sites if you wish.

Select User: From this drop-down menu, select the user whose application usage you wish to view.

Select Date: From this drop-down menu, select the date when the applications were used.

Refresh Data: Clicking this button will update the information displayed on the screen.

Application information is displayed in ranking order, from most viewed to least viewed, with the amount of usage displayed for each application. For each application, there is also a column showing the protocol and port number used. Clicking the **Block** box will restrict that user from utilizing that application.

Click **Save Settings** to save the settings or click the **Cancel Changes** button to undo your changes.

Parental Control Tab - Performance Optimization

From this screen, you can list the network applications most often used on your network, according to user, and set the priority at which it is run. If an application is not listed, you can add it or you can edit those listed by clicking the **Add/Edit New Applications** button.

Select User: From this drop-down menu, select the user whose application performance you wish to optimize.

All applications are set at a Good level of optimization by default. To change this setting, click the **Enable** box next to the application. Otherwise, the performance optimization settings will be “greyed-out”. Then, click the radio button for **Normal**, **Good**, or **Better** optimization. Selecting **Normal** will decrease performance. Selecting **Better** will increase performance.

Click **Save Settings** to save the performance settings or click the **Cancel Changes** button to undo your changes.

Adding/Editing New Applications

To add or edit applications, click the **Add/Edit New Applications** button from the *Performance Optimization* screen on the *Parental Control* tab. Enter the Application Name when adding new applications or select the application you wish to edit from the list displayed.

Then, you can edit the protocol from the *Protocol* drop-down menu and edit the port range from the *Port Range* boxes. You can also change the application speed in the *Kbit/Sec* box.



Figure 5-16: Parental Control Tab - Application Usage

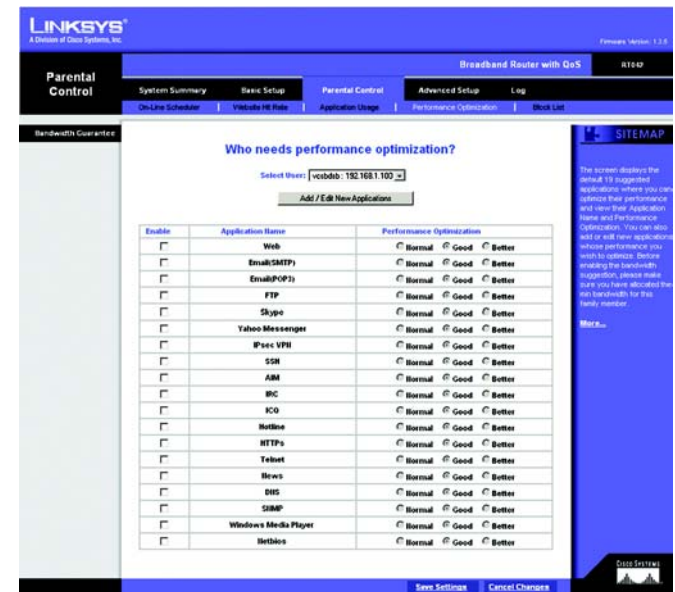
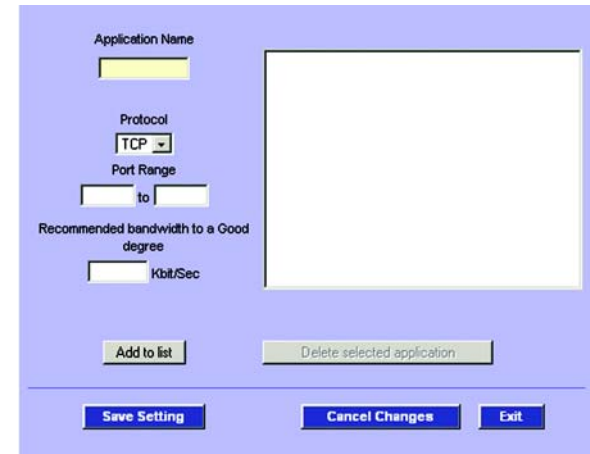


Figure 5-17: Parental Control Tab - Performance Optimization

Broadband Router

Click the **Add to List** button to add the new or newly edited selection to your list of applications. To delete an application, select from the list and click the **Delete Selected Application** button.

Click **Save Settings** to save the settings or click the **Cancel Changes** button to undo your changes. If you wish to leave this screen without saving your changes, click the **Exit** button.



The screenshot shows a configuration window with a light blue background. At the top, there is a text input field for "Application Name". Below it is a "Protocol" dropdown menu currently set to "TCP". Underneath is a "Port Range" section with two input fields separated by "to". Below that is a "Recommended bandwidth to a Good degree" section with an input field followed by "kbit/Sec". On the right side of the window is a large empty rectangular box. At the bottom, there are three buttons: "Add to list", "Delete selected application", and "Save Setting".

Figure 5-18: Parental Control Tab - Performance Optimization: Add/Edit New Applications

Parental Control Tab - Block List

From this screen, you can find out which websites or applications are blocked for each of your users, and unblock them if you wish.

Select User: From this drop-down menu, select the user whose web or application usage you wish to view.

Refresh Data: Clicking this button will update the information displayed on the screen.

Change the information displayed on this screen by clicking the **Web Site Block List** for viewing blocked web sites or the **Application Block List** for viewing blocked applications. The web sites and/or applications are then listed. An option for Un-Blocking is provided and is used by clicking the **Un-Block** button.

Click **Save Settings** to save the settings or click the **Cancel Changes** button to undo your changes.



The screenshot shows the "Block List" screen in the Linksys web interface. The top navigation bar includes "Parental Control" and "Block List". The main content area is titled "Whose block list?" and features a "Select User:" dropdown menu with "jacob@192.168.1.100" selected. Below this is a "Refresh Data" button. There are two radio buttons: "Web Site Block List" (which is selected) and "Application Block List". Below these is a table with two columns: "Web Site" and "Un-Block". A "SITEMAP" sidebar is visible on the right side of the screen.

Figure 5-19: Parental Control Tab - Block List

Advanced Setup Tab - DMZ Host

The DMZ (Demilitarized Zone) Host feature allows one local user to be exposed to the Internet, not protected by the Router's firewall, to use a special-purpose service such as Internet gaming or video conferencing.

Check the **Enable DMZ Host** box to use this feature. Then, enter the **DMZ Private IP Address**, which is the IP Address of the PC using this feature. The Default value zero (0) will deactivate the DMZ Host.

Click the **Save Settings** button to save the DMZ Host setting or click the **Cancel Changes** button to undo the changes.

Advanced Setup Tab - Forwarding

Port forwarding can be used to set up public services on your network. When users from the Internet make certain requests of your network, the Router can forward those requests to computers equipped to handle them. If, for example, you set port number 80 (HTTP) to be forwarded to IP Address 192.168.1.2, then all HTTP requests from outside users will be forwarded to 192.168.1.2.

You may use this function to establish a Web server or FTP server via an IP Gateway. Be sure that you enter a valid IP Address. (You may need to establish a static IP address in order to properly run an Internet server.) For added security, Internet users will be able to communicate with the server, but they will not actually be connected. The packets will simply be forwarded through the Router.

Port Range Forwarding

1. Select the Service from the pull-down menu.
2. If the Service you need is not listed in the menu, please click the **Service Management** button to add the new Service Name. On the screen that opens, enter the **Service Name**, **Protocol** and **Port Range**. Click the **Add to List** button. Then, click the **Save Setting** button. Click the **Exit** button. The screen will close and you will be returned to the *Forwarding* screen.
3. Enter the IP Address of the server that you want the Internet users to access. Then enable the entry by clicking the box below *Enable*.
4. Click the **Add to List** button, and configure as many entries as you would like. Click the **Save Settings** button to activate the settings you've changed. You can also click **Delete selected application**, to delete those settings you don't wish to use.



Figure 5-20: Advanced Setup Tab - DMZ Host

HTTP (HyperText Transport Protocol): the communications protocol used to connect to servers on the Internet.



Figure 5-21: Advanced Setup Tab - Forwarding

Port Triggering

Some Internet applications or games use alternate ports to communicate between server and LAN host. When you want to use those applications, enter the triggering (outgoing) port and alternate incoming port in this table. The Router will forward the incoming packets to the LAN host.

1. Enter the **Application Name**, **Range** of trigger port numbers, and the **Incoming Port Range**.
2. Click the **Add to List** button to add Port Triggering or **Delete selected application** to delete applications.

Click the **Show Tables** button to display the services you have assigned for Port Forwarding or Port Triggering. Click the **Save Settings** button to save the settings, click the **Cancel Changes** button to undo your changes, click the Show Tables to see the details.

Figure 5-22: Service Management

Advanced Setup Tab - UPnP

UPnP forwarding can be used to set up public services on your network. Windows XP can modify those entries via UPnP when UPnP function is enabled by selecting **Yes**.

1. Select the Service from the pull-down menu.
2. Enter the Name or IP Address of the server that you want the Internet users to access. Then enable the entry by clicking the box below *Enable*.
3. If the Service you need is not listed in menu, please click the **Service Management** button. A new screen will open and, from there, add the new **Service Name**, and **Protocol** as well as **External** and **Internal Ports**. Click the **Add to List** button. Then, click the **Save Setting** button. Click the **Exit** button and you will be returned to the UPnP screen.
4. Click the **Add to List** button, and configure as many entries as you would like. Click the Save Settings button to activate the settings you've changed. You can also click **Delete selected application**, to delete those settings you don't wish to use.

Click the **Show Tables** button to display the services you have assigned for Port Forwarding or Port Triggering. Click the **Save Settings** button to save the settings, click the **Cancel Changes** button to undo your changes, click the Show Tables to see the details.

Figure 5-23: Advanced Setup Tab - UPnP

Advanced Setup Tab - DDNS

DDNS (Dynamic DNS) service allows you to assign a fixed domain name to a dynamic Internet IP address. This allows you to host your own Web, FTP or other type of TCP/IP server in your LAN over either of the Internet ports.

Before configuring DDNS, you need to visit www.dyndns.org and register a domain name. (The DDNS service is provided by DynDNS.org).

DDNS Service: The DDNS feature is disabled by default. To enable this feature, select **DynDNS.org** from the pull-down menu, and enter the **User name**, **Password**, and **Host Name** of the account you set up with DynDNS.org.

Internet IP Address: The current Internet IP Address of the Internet port being utilized is displayed here. Because it is dynamic, this will occasionally change.

Status: The status of the DDNS function and Internet connection is displayed.

Click the **Save Settings** button to save the DDNS settings or click the **Cancel Changes** button to undo your changes.

Advanced Setup Tab - Advanced Routing

Dynamic Routing

The Router's dynamic routing feature can be used to automatically adjust to physical changes in the network's layout. The Router uses the dynamic RIP protocol. It determines the route that the network packets take based on the fewest number of hops between the source and the destination. The RIP protocol regularly broadcasts routing information to other routers on the network.

Working Mode: Select **NAT** mode if this Router is hosting your network's connection to the Internet. Select **Router** mode if this Router exists on a network with other routers, including a separate network gateway that handles the Internet connection. In Router Mode, any computer connected to the Router will not be able to connect to the Internet unless you have another router function as the gateway.

RIP (Routing Information Protocol): The Router, using the RIP protocol, calculates the most efficient route for the network's data packets to travel between the source and the destination, based upon the shortest paths.

Receive RIP versions: Choose a protocol for receiving data from the network. (None, RIPv1, RIPv2, Both RIPv1 and v2).



Figure 5-24: Advanced Setup Tab - DDNS

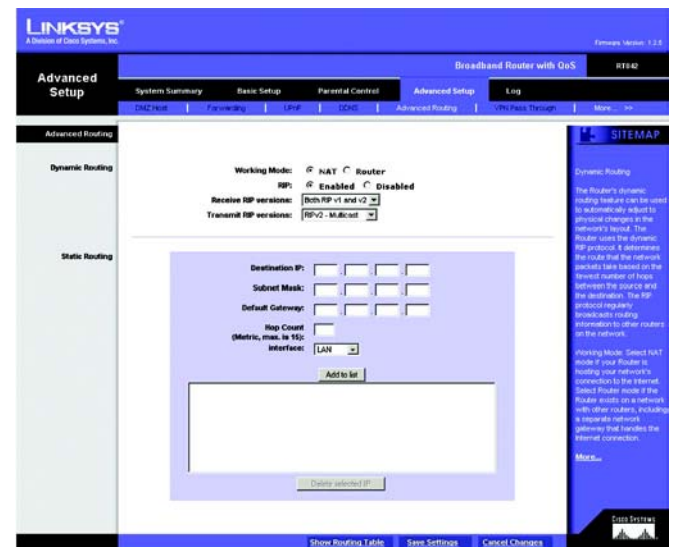


Figure 5-25: Advanced Setup Tab - Advanced Routing

Transmit RIP versions: Choose a protocol for transmitting data on the network. (None, RIPv1, RIPv2-Broadcast, RIPv2-Multicast)

Static Routing

You will need to configure Static Routing if there are multiple routers installed on your network. The static routing function determines the path that data follows over your network before and after it passes through this Router. You can use static routing to allow different IP domain users to access the Internet.

In many cases, it is better to use dynamic routing (see above), as that allows the Router to automatically adjust to physical changes in the network's layout. In order to use static routing, the Router's DHCP settings must be disabled.

To set up static routing, add routing entries in the Router's table that tell the device where to send all incoming packets. All of your network routers should direct the default route entry to this Router.

Enter the following data to create a static route entry:

1. **Destination IP:** Enter the network address of the remote LAN segment. For a standard Class C IP domain, the network address is the first three fields of the Destination LAN IP, while the last field should be zero.
2. **Subnet Mask:** Enter the Subnet Mask used on the destination LAN IP domain. For Class C IP domains, the Subnet Mask is 255.255.255.0.
3. **Default Gateway:** If this Router is used to connect your network to the Internet, then your gateway IP is the Router's IP Address. If you have another router handling your network's Internet connection, enter the IP Address of that router instead.
4. **Hop Count** (max. 15): This value gives the number of nodes that a data packet passes through before reaching its destination. A node is any device on the network, such as switches, PCs, etc.
5. **Interface** (LAN, Internet1, Internet2): Select whether your network is on the LAN or one of the Internet ports. If you're connecting to a sub-network, select **LAN**. If you're connecting to another network through one of the Internet ports, select **Internet1** or **Internet2**.

Click **Add to list** to add a static route entry or click **Delete Selected IP** to delete the static route entry.

Click the **Save Settings** button to save the Routing settings, click the **Cancel Changes** button to undo your changes or click the **Show Routing Table** button to view the current routing table.

static routing: forwarding data in a network via a fixed path.



NOTE: Static Routing is an **advanced feature**. Please proceed with caution.

default gateway: a device that forwards Internet traffic from your local area network.

node: a network junction or connection point, typically a computer or work station.

Advanced Setup Tab - VPN Pass Through

The VPN Pass Through screen allows you to enable or disable IPsec Pass Through, PPTP Pass Through, and L2TP Pass Through.

IPsec Pass Through: Internet Protocol Security (IPsec) is a suite of protocols used to implement secure exchange of packets at the IP layer. IPsec Pass Through is enabled by default to allow IPsec tunnels to pass through the Router.

PPTP Pass Through: Point to Point Tunneling Protocol (PPTP) Pass Through is the method used to enable VPN sessions. PPTP Pass Through is enabled by default.

L2TP Pass Through: Layer 2 Tunneling Protocol (L2TP) Pass Through is the method used to enable VPN sessions. PPTP Pass Through is enabled by default.

Click the **Save Settings** button when you finish the VPN Pass Through settings, or click the **Cancel Changes** button to undo the changes.



Figure 5-26: Advanced Setup Tab - VPN Pass Through

VPN (Virtual Private Network): a security measure to protect data as it leaves one network and goes to another over the Internet.

Advanced Setup Tab - Remote Management

If you want to manage this Router from a remote location over the Internet, click the **Enable** button. You can enter any port number from 0 to 65, 535 for remote management. You can also set up remote management for a different number.

Click the **Save Settings** button to save your settings, or click the **Cancel Changes** button to undo the changes.



Figure 5-27: Advanced Setup Tab - Remote Management

Advanced Setup Tab - System Management

The *System Management* screen includes several tools to help troubleshoot network problems, such as looking up DNS names, ping tests, resetting the Router to factory default settings, upgrading the Router's firmware, and storing and retrieving configuration files.

Diagnostics

DNS Name Lookup

The Internet has a service called the Domain Name Service (DNS), which allows users to enter an easily remembered host name, such as `www.RT042.com`, instead of numerical TCP/IP addresses to access Internet resources. The Router has a DNS lookup tool that will return the numerical TCP/IP address of a host name.

Enter the host name to look up in the *Look up the name* field and click the **Go** button. Do not add the prefix `http://`, otherwise the result will be Address Resolving Failed. The Router will then query the DNS server and display the result in the Diagnostics section of the screen.



NOTE: The IP address of the DNS server must be entered in the Network Settings page for the DNS Name Lookup feature to function.

Ping

The Ping test bounces a packet off an IP Address across the Internet, which returns to the sender. This test shows if the Router is able to contact a remote host. If users on the LAN are having problems accessing services on the Internet, try pinging the DNS server, or another IP Address at the ISP's location. If this test is successful, try pinging addresses outside the ISP. This will show if the problem lies with the ISP's connection.

Enter the IP address you wish to pinged and click the **Go** button. The test will take a few seconds to complete. Once completed, a message showing the results will be displayed in the Diagnostics section of the screen. The results include Packets transmitted / received / loss and Round Trip Time (Minimum, Maximum, and Average).



NOTE: Ping tests require an IP address. The Router's DNS Name Lookup tool may be used to find the IP address of a host.

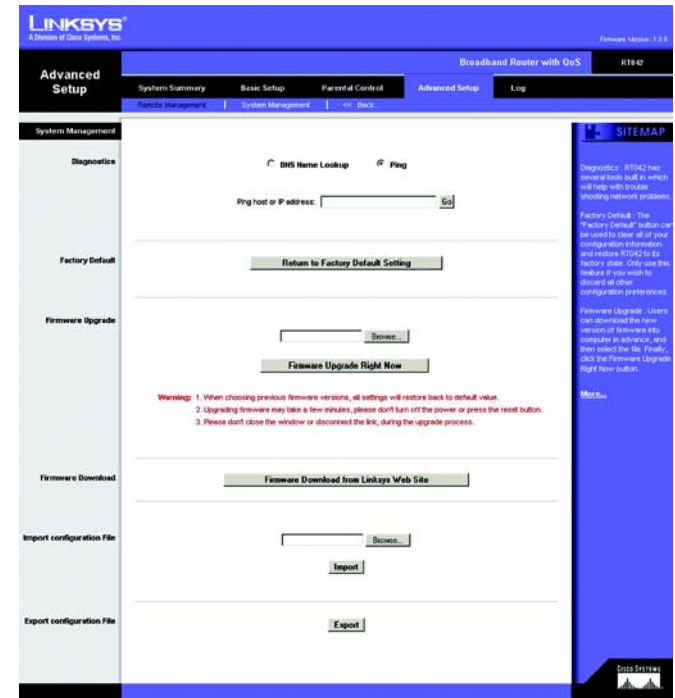


Figure 5-28: Advanced Setup Tab - System Management

DNS (Domain Name Server): the IP address of your ISP's server, which translates the names of websites into IP addresses.

ping: an Internet utility used to determine whether a particular IP address is online.

Factory Default

The Factory Default feature can be used to clear all of your configuration information and restore the Router to its factory default settings. Only use this feature if you wish to discard all other configuration preferences.

Click the **Return to Factory Default Setting** button if you want to restore the Router to the factory default settings. After clicking the button, another screen will appear, confirming that you'd like to restore the factory default settings. Click **OK** to reboot the Router.

Firmware Upgrade

Users can use the following function to upgrade the Router's firmware to the newest version. If you have already downloaded the firmware into your computer, then click the **Browse** button to look for the file. Then, click the **Firmware Upgrade Right Now** button.

Firmware Download

Users can click the **Firmware Download from Linksys Web Site** button to link to the downloads on the Support page of the Linksys website. Select the Router from the pull-down menu and choose the firmware from the options. After downloading the firmware, follow the Firmware Upgrade instructions above.

download: to receive a file transmitted over a network.

Import Configuration File

Before importing a configuration file, you will need to specify where it is located. Click the **Browse** button, and select a file that you have previously saved using the Export button in the window that opens. After you select the file, click the **Import** button. This process may take up to a minute. You will then need to restart the Router in order for the changes to take effect.

Export Configuration File

To export a configuration file, click the **Export** button. You will be asked where you would like to store the file. This file will be called "RV042.exp" by default, but you may rename it if you wish. This process may take up to a minute.

Log Tab - System Log

The System Log screen contains three functions: Syslog, E-mail and Log Setting.

Syslog

The System Log (of Syslog) function logs network activity with the use of a separate Syslog server. You need a Syslog server for this feature to work.

Enable Syslog: Check this box to enable logging.

Syslog Server: In addition to the standard event log, the Router can send a detailed log to an external Syslog server. Syslog is an industry-standard protocol used to capture information about network activity. The Router's Syslog captures all log activity and includes every connection source and destination IP address, IP service, and number of bytes transferred. Enter the Syslog server name or IP address in the *Syslog Server* field. Restart the Router for logging to take effect.

E-mail

Enable E-Mail Alert: Check this box to enable E-Mail Alert, informing you of network activity.

Mail Server: To have a log or alert information e-mailed to you, enter the name or IP address of your SMTP server here. Your Internet Service Provider can provide you with this information.

Send E-mail To: This is the E-mail address where your log files will be sent. Leave this field blank if you do not want to receive copies of your log information.

Log Queue Length: The default length is 50 entries. The Router will e-mail the log when the number of log entries exceeds the queue.

Log Time Threshold: The default time is 10 minutes. In this case, the Router will e-mail the log every 10 minutes.

The Router will e-mail the log when it meets either the Log Queue Length or Log Time Threshold settings.

E-mail Log Now: Click the **E-mail Log Now** button to immediately send the log to the address in the *Send E-mail to* field.

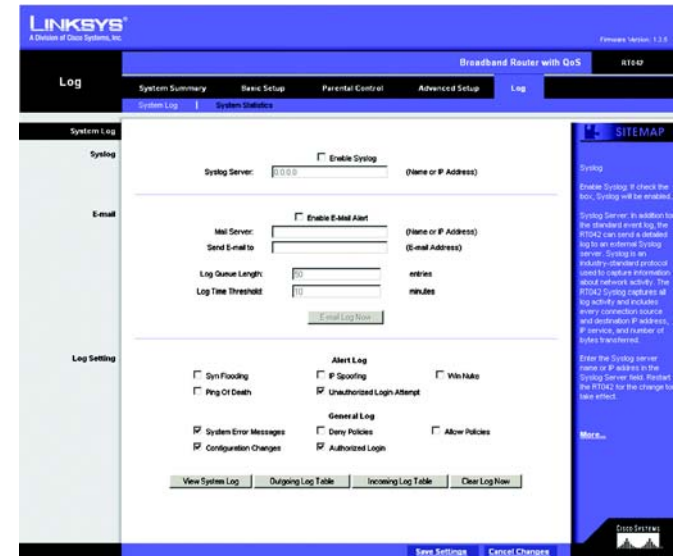


Figure 5-29: Log Tab - System Log

byte: a unit of data that is usually eight bits long

SMTP (Simple Mail Transfer Protocol): the standard e-mail protocol on the Internet.

Log Setting

Alert Log

Check the appropriate box when you want receive alert logs for any of the following events: **Syn Flooding, IP Spoofing, Win Nuke, Ping of Death and Unauthorized Login Attempt.**

General Log

Check the appropriate box when you want to receive alert logs for any of the following events: **System Error Messages, Deny Policies, Allow Policies, Configuration Changes and Authorized Login.**

View System Log: Click this button to view **ALL** logs, **System Log, Access Log, Firewall Log, or VPN Log.**

Outgoing Log Table: Click this button to view the outgoing packet information.

Incoming Log Table: Click this button to view the incoming packet information.

Clear Log Now: This button will clear out your log without e-mailing it. Only use this button if you don't mind losing your log information.

Click the **Save Settings** button to save your Log settings, or click the **Cancel Changes** button to undo the changes.

Log Tab - System Statistics

This tab displays the system statistics including the Device Name, Status, IP Address, MAC Address, Subnet Mask, Default Gateway, DNS, Received Packets, Sent Packets, Total Packets, Received Bytes, Sent Bytes, Total Bytes, Error Packets Received and Dropped Packets Received for the Ethernet ports as well as both of the Internet ports.

Click the **Refresh** button to update these statistics.



Figure 5-30: Log Tab - System Statistics

Appendix A: Troubleshooting

This appendix provides solutions to problems that may occur during the installation and operation of the Router. Read the descriptions below to help solve your problems. If you can't find an answer here, check the Linksys website at www.linksys.com.

Common Problems and Solutions

1. *I need to set a static IP address on a PC.*

The Router, by default, assigns an IP address range of 192.168.1.100 to 192.168.1.149 using the DHCP server on the Router. To set a static IP address, you can only use the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.150 to 192.168.1.254. Each PC or network device that uses TCP/IP must have a unique address to identify itself in a network. If the IP address is not unique to a network, Windows will generate an IP conflict error message. You can assign a static IP address to a PC by performing the following steps:

For Windows 98 and Millennium:

- A. Click **Start**, **Setting**, and **Control Panel**. Double-click **Network**.
- B. In *The following network components are installed* box, select the **TCP/IP**-> associated with your Ethernet adapter. If you only have one Ethernet adapter installed, you will only see one TCP/IP line with no association to an Ethernet adapter. Highlight it and click the **Properties** button.
- C. In the *TCP/IP properties* window, select the **IP address** tab, and select **Specify an IP address**. Enter a unique IP address that is not used by any other computer on the network connected to the Router. You can only use an IP address in the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254. Make sure that each IP address is unique for each PC or network device.
- D. Click the **Gateway** tab, and in the *New Gateway* prompt, enter **192.168.1.1**, which is the default IP address of the Router. Click the **Add** button to accept the entry.
- E. Click the **DNS** tab, and make sure the **DNS Enabled** option is selected. Enter the Host and Domain names (e.g., John for Host and home for Domain). Enter the DNS entry provided by your ISP. If your ISP has not provided the DNS IP address, contact your ISP to get that information or go to its website for the information.
- F. Click the **OK** button in the *TCP/IP properties* window, and click **Close** or the **OK** button for the *Network* window.
- G. Restart the computer when asked.

For Windows 2000:

- A. Click **Start**, **Settings**, and **Control Panel**. Double-click **Network and Dial-Up Connections**.
- B. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
- C. In the *Components checked are used by this connection* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Select **Use the following IP address** option.
- D. Enter a unique IP address that is not used by any other computer on the network connected to the Router. You can only use an IP address in the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254.
- E. Enter the Subnet Mask, **255.255.255.0**.
- F. Enter the Default Gateway, **192.168.1.1** (Router's default IP address).
- G. Toward the bottom of the window, select **Use the following DNS server addresses**, and enter the Preferred DNS server and Alternative DNS server (provided by your ISP). Contact your ISP or go on its website to find the information.
- H. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
- I. Restart the computer if asked.

For Windows XP:

The following instructions assume you are running Windows XP with the default interface. If you are using the Classic interface (where the icons and menus look like previous Windows versions), please follow the instructions for Windows 2000.

- A. Click **Start** and **Control Panel**.
- B. Click the **Network and Internet Connections** icon and then the **Network Connections** icon.
- C. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
- D. In the *This connection uses the following items* box, highlight **Internet Protocol (TCP/IP)**. Click the **Properties** button.
- E. Enter a unique IP address that is not used by any other computer on the network connected to the Router. You can only use an IP address in the ranges 192.168.1.2 to 192.168.1.99 and 192.168.1.151 to 192.168.1.254.
- F. Enter the Subnet Mask, **255.255.255.0**.
- G. Enter the Default Gateway, **192.168.1.1** (Router's default IP address).
- H. Toward the bottom of the window, select **Use the following DNS server addresses**, and enter the Preferred DNS server and Alternative DNS server (provided by your ISP). Contact your ISP or go on its website to find the information.
- I. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window. Click the **OK** button in the *Local Area Connection Properties* window.

2. I want to test my Internet connection.

A. Check your TCP/IP settings.

For Windows 98 and Millennium:

Refer to “Appendix F: Windows Help” for details. Make sure **Obtain IP address automatically** is selected in the settings.

For Windows 2000:

1. Click **Start**, **Settings**, and **Control Panel**. Double-click **Network and Dial-Up Connections**.
2. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
3. In the *Components checked are used by this connection* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Make sure that **Obtain an IP address automatically** and **Obtain DNS server address automatically** are selected.
4. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
5. Restart the computer if asked.
6. Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
7. Restart the computer if asked.

For Windows XP:

The following instructions assume you are running Windows XP with the default interface. If you are using the Classic interface (where the icons and menus look like previous Windows versions), please follow the instructions for Windows 2000.

1. Click **Start** and **Control Panel**.
 2. Click the **Network and Internet Connections** icon and then the **Network Connections** icon.
 3. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
 4. In the *This connection uses the following items* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Make sure that **Obtain an IP address automatically** and **Obtain DNS server address automatically** are selected.
- B. Open a command prompt.
- For Windows 98 and Millennium, click **Start** and **Run**. In the *Open* field, type **command**. Press the **Enter** key or click the **OK** button.

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- For Windows 2000 and XP, click **Start** and **Run**. In the *Open* field, type **cmd**. Press the **Enter** key or click the **OK** button.
- C. In the command prompt, type **ping 192.168.1.1** and press the **Enter** key.
- If you get a reply, the computer is communicating with the Router.
 - If you do NOT get a reply, check the cable, and make sure **Obtain an IP address automatically** is selected in the TCP/IP settings for your Ethernet adapter.
- D. In the command prompt, type **ping** followed by your Internet IP address and press the **Enter** key. The Internet IP Address can be found in the web interface of the Router. For example, if your Internet IP address is 1.2.3.4, you would enter **ping 1.2.3.4** and press the **Enter** key.
- If you get a reply, the computer is connected to the Router.
 - If you do NOT get a reply, try the ping command from a different computer to verify that your original computer is not the cause of the problem.
- E. In the command prompt, type **ping www.linksys.com** and press the **Enter** key.
- If you get a reply, the computer is connected to the Internet. If you cannot open a webpage, try the ping command from a different computer to verify that your original computer is not the cause of the problem.
 - If you do NOT get a reply, there may be a problem with the connection. Try the ping command from a different computer to verify that your original computer is not the cause of the problem.
- 3. I am not getting an IP address on the Internet with my Internet connection.**
- A. Refer to “Problem #2, I want to test my Internet connection” to verify that you have connectivity.
- B. If you need to register the MAC address of your Ethernet adapter with your ISP, please see “Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter.” If you need to clone the MAC address of your Ethernet adapter onto the Router, see the MAC Address Clone section of “Chapter 5: Setting up and Configuring the Broadband Router” for details.
- C. Make sure you are using the right Internet settings. Contact your ISP to see if your Internet connection type is DHCP, Static IP Address, or PPPoE (commonly used by DSL consumers). Please refer to the Basic Setup section of “Chapter 5: Setting up and Configuring the Broadband Router” for details on Internet Connection Type settings.
- D. Make sure you use the right cable. Check to see if the Internet LED is solidly lit.
- E. Make sure the cable connecting from your cable or DSL modem is connected to the Router’s Internet port. Verify that the Status page of the Router’s Web-based Utility shows a valid IP address from your ISP.
- F. Turn off the computer, Router, and cable/DSL modem. Wait 30 seconds, and then turn on the Router, cable/DSL modem, and computer. Check the Status tab of the Router’s Web-based Utility to see if you get an IP address.

4. I am not able to access the Router's Web-based Utility Setup page.

- A. Refer to "Problem #2, I want to test my Internet connection" to verify that your computer is properly connected to the Router.
- B. Refer to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" to verify that your computer has an IP Address, Subnet Mask, Gateway, and DNS.
- C. Set a static IP address on your system; refer to "Problem #1: I need to set a static IP address."
- D. Refer to "Problem #10: I need to remove the proxy settings or the dial-up pop-up window (for PPPoE users)."

5. I can't get my Virtual Private Network (VPN) to work through the Router.

Access the Router's web interface by going to <http://192.168.1.1> or the IP address of the Router, and go to the **VPN => VPN Pass Through** tab. Make sure you have IPsec passthrough and/or PPTP passthrough enabled.

VPNs that use IPsec with the ESP (Encapsulation Security Payload known as protocol 50) authentication will work fine. At least one IPsec session will work through the Router; however, simultaneous IPsec sessions may be possible, depending on the specifics of your VPNs.

VPNs that use IPsec and AH (Authentication Header known as protocol 51) are incompatible with the Router. AH has limitations due to occasional incompatibility with the NAT standard.

Change the IP address for the Router to another subnet to avoid a conflict between the VPN IP address and your local IP address. For example, if your VPN server assigns an IP address 192.168.1.X (X is a number from 1 to 254) and your local LAN IP address is 192.168.1.X (X is the same number used in the VPN IP address), the Router will have difficulties routing information to the right location. If you change the Router's IP address to 192.168.2.1, that should solve the problem. Change the Router's IP address through the Basic Setup tab of the Web-based Utility. If you assigned a static IP address to any computer or network device on the network, you need to change its IP address accordingly to 192.168.2.Y (Y being any number from 1 to 254). Note that each IP address must be unique within the network.

Your VPN may require port 500/UDP packets to be passed to the computer that is connecting to the IPsec server. Refer to "Problem #7, I need to set up online game hosting or use other Internet applications" for details.

Check the Linksys website at www.linksys.com for more information.

6. I need to set up a server behind my Router.

To use a server like a web, ftp, or mail server, you need to know the respective port numbers they are using. For example, port 80 (HTTP) is used for web; port 21 (FTP) is used for FTP, and port 25 (SMTP outgoing) and port 110 (POP3 incoming) are used for the mail server. You can get more information by viewing the documentation provided with the server you installed. Follow these steps to set up port forwarding through the Router's Web-based Utility. We will be setting up web, ftp, and mail servers.

- A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Advanced Setup => Forwarding** tab.
- B. Select the Service from the pull-down menu. If the Service you need is not listed in the menu, click the **Service Management** button to add the new Service Name, and enter the Protocol and Port Range. Click the **Add to List** button. Then click the **Save Setting** button. Click the **Exit** button.
- C. Enter the IP Address of the server that you want the Internet users to access. For example, if the web server's Ethernet adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address. Then check the **Enable** checkbox for the entry. Consider the examples below:

Application	Start and End	Protocol	IP Address	Enable
Web server	80 to 80	Both	192.168.1.100	X
FTP server	21 to 21	TCP	192.168.1.101	X
SMTP (outgoing)	25 to 25	Both	192.168.1.102	X
POP3 (incoming)	110 to 110	Both	192.168.1.102	X

- D. Click the **Add to List** button, and configure as many entries as you like.

When you have completed the configuration, click the **Save Settings** button.

7. I need to set up online game hosting or use other Internet applications.

If you want to play online games or use Internet applications, most will work without doing any port forwarding or DMZ hosting. There may be cases when you want to host an online game or Internet application. This would require you to set up the Router to deliver incoming packets or data to a specific computer. This also applies to the Internet applications you are using. The best way to get the information on what port services to use is to go to the website of the online game or application you want to use. Follow these steps to set up online game hosting or use a certain Internet application:

- A. Access the Router’s Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Advanced Setup => Forwarding** tab.
- B. Select the Service from the pull-down menu. If the Service you need is not listed in the menu, click the **Service Management** button to add the new Service Name, and enter the Protocol and Port Range. For example, if you have a web server, you would enter the range 80 to 80. Click the **Add to List** button. Then click the **Save Setting** button. Click the **Exit** button.
- C. Enter the IP Address of the server that you want the Internet users to access. For example, if the web server’s Ethernet adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check “Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter” for details on getting an IP address. Then check the **Enable** checkbox for the entry. Consider the examples below:

Application	Start and End	Protocol	IP Address	Enabled
UT	7777 to 27900	Both	192.168.1.100	X
Halflife	27015 to 27015	Both	192.168.1.105	X
PC Anywhere	5631 to 5631	UDP	192.168.1.102	X
VPN IPSEC	500 to 500	UDP	192.168.1.100	X

- D. Click the **Add to List** button, and configure as many entries as you like.

When you have completed the configuration, click the **Save Settings** button.

8. I can't get the Internet game, server, or application to work.

If you are having difficulties getting any Internet game, server, or application to function properly, consider exposing one PC to the Internet using DeMilitarized Zone (DMZ) hosting. This option is available when an application requires too many ports or when you are not sure which port services to use. Make sure you disable all the forwarding entries if you want to successfully use DMZ hosting, since forwarding has priority over DMZ hosting. (In other words, data that enters the Router will be checked first by the forwarding settings. If the port number that the data enters from does not have port forwarding, then the Router will send the data to whichever PC or network device you set for DMZ hosting.) Follow these steps to set DMZ hosting:

- A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Setup => Forwarding** tab.
- B. Disable or remove the entries you have entered for forwarding. To delete an entry, select it and then click the **Delete selected application** button. Keep this information in case you want to use it at a later time.
- C. Click the **DMZ Host** tab.
- D. Enter the Ethernet adapter's IP address of the computer you want exposed to the Internet. This will bypass the NAT security for that computer. Please refer to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.

Once completed with the configuration, click the **Save Settings** button.

9. I forgot my password, or the password prompt always appears when saving settings to the Router.

Reset the Router to factory defaults by pressing the Reset button for ten seconds and then releasing it. If you are still getting prompted for a password when saving settings, then perform the following steps:

- A. Access the Router's web interface by going to **http://192.168.1.1** or the IP address of the Router. Enter the default password admin, and click the **Setup => Password** tab.
- B. Enter the old password in the *Old Password* field.
- C. Enter a different password in the *New Password* field, and enter the new password in the *Confirm New Password* field to confirm the password.
- D. Click the **Save Settings** button.

10. I am a PPPoE user, and I need to remove the proxy settings or the dial-up pop-up window.

If you have proxy settings, you need to disable these on your computer. Because the Router is the gateway for the Internet connection, the computer does not need any proxy settings to gain access. Please follow these directions to verify that you do not have any proxy settings and that the browser you use is set to connect directly to the LAN.

For Microsoft Internet Explorer 5.0 or higher:

- A. Click **Start, Settings, and Control Panel**. Double-click **Internet Options**.
- B. Click the **Connections** tab.
- C. Click the **LAN settings** button and remove anything that is checked.
- D. Click the **OK** button to go back to the previous screen.
- E. Click the option **Never dial a connection**. This will remove any dial-up pop-ups for PPPoE users.

For Netscape 4.7 or higher:

- A. Start **Netscape Navigator**, and click **Edit, Preferences, Advanced, and Proxies**.
- B. Make sure you have **Direct connection to the Internet** selected on this screen.
- C. Close all the windows to finish.

11. To start over, I need to set the Router to factory default.

Hold the Reset button for up to 30 seconds and then release it. This will return the password, forwarding, and other settings on the Router to the factory default settings. In other words, the Router will revert to its original factory configuration.

12. I need to upgrade the firmware.

In order to upgrade the firmware with the latest features, you need to go to the Linksys website and download the latest firmware at www.linksys.com. Follow these steps:

- A. Go to the Linksys website at <http://www.linksys.com> and download the latest firmware, or use the Web-based Utility to be automatically redirected to the download webpage. Go to System Management - Firmware Upgrade, and click the **Firmware Download from Linksys Web Site** button. Select the Router from the pull-down menu and choose the firmware from the options.
- B. Extract the firmware file on your computer.
- C. To upgrade the firmware, follow the steps in the Upgrade section found in "Chapter 5: Setting up and Configuring the Broadband Router" or "Appendix B: Upgrading Firmware."

13. My DSL service's PPPoE is always disconnecting.

PPPoE is not actually a dedicated or always-on connection. The DSL ISP can disconnect the service after a period of inactivity, just like a normal phone dial-up connection to the Internet. There is a setup option to “keep alive” the connection. This may not always work, so you may need to re-establish connection periodically.

- A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
- B. Enter the password, if asked. (The default password is admin.)
- C. On the *Basic Setup* tab, select the option **Keep Alive**, and set the *Redial Period* option at **20** (seconds).
- D. Click the **Save Settings** button.
- E. Click the **Status** tab, and click the **Connect** button.
- F. You may see the login status display as Connecting. Press the **F5** key to refresh the screen, until you see the login status display as Connected.

If the connection is lost again, follow steps E and F to re-establish connection.

14. I need to use port triggering.

Port triggering looks at the outgoing port services used and will trigger the Router to open a specific port, depending on which port an Internet application uses. Follow these steps:

- A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
- B. Enter the password, if asked. (The default password is **admin**.)
- C. Click the **Advanced Setup => Forwarding** tab.
- D. Enter any name you want to use for the Application Name.
- E. Enter the Start and End Ports of the Triggered Port Range. Check with your Internet application provider for more information on which outgoing port services it is using.
- F. Enter the Start and End Ports of the Forwarded Port Range. Check with your Internet application provider for more information on which incoming port services are required by the Internet application.

Once completed with the configuration, click the **Save Settings** button.

15. When I enter a URL or IP address, I get a time-out error or am prompted to retry.

- Check if other PCs work. If they do, ensure that your workstation's IP settings are correct (IP Address, Subnet Mask, Default Gateway, and DNS). Restart the computer that is having a problem.
- If the PCs are configured correctly, but still not working, check the Router. Ensure that it is connected and powered on. Connect to it and check its settings. (If you cannot connect to it, check the LAN and power connections.)

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- If the Router is configured correctly, check your Internet connection (DSL/cable modem, etc.) to see if it is working correctly. You can remove the Router to verify a direct connection.
- Manually configure the TCP/IP with a DNS address provided by your ISP.
- Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools, Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is set to **Never dial a connection**. For Netscape Navigator, click **Edit, Preferences, Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

Frequently Asked Questions

Is IPSec Passthrough supported by the Router?

Yes, enable or disable IPSec Passthrough on the VPN => VPN Pass Through tab.

Where is the Router installed on the network?

In a typical environment, the Router is installed between the cable/DSL modem and the LAN. Plug the Router into the cable/DSL modem's Ethernet port.

Does the Router support IPX or AppleTalk?

No. TCP/IP is the only protocol standard for the Internet and has become the global standard for communications. IPX, a NetWare communications protocol used only to route messages from one node to another, and AppleTalk, a communications protocol used on Apple and Macintosh networks, can be used for LAN to LAN connections, but those protocols cannot connect from the Internet to the LAN.

What is Network Address Translation and what is it used for?

Network Address Translation (NAT) translates multiple IP addresses on the private LAN to one public address that is sent out to the Internet. This adds a level of security since the address of a PC connected to the private LAN is never transmitted on the Internet. Furthermore, NAT allows the Router to be used with low cost Internet accounts, such as DSL or cable modems, when only one TCP/IP address is provided by the ISP. The user may have many private addresses behind this single address provided by the ISP.

Does the Router support any operating system other than Windows 98, Millennium, 2000, or XP?

Yes, but Linksys does not, at this time, provide technical support for setup, configuration or troubleshooting of any non-Windows operating systems.

Does the Router support ICQ send file?

Yes, with the following fix: click **ICQ menu => preference => connections** tab=>, and check **I am behind a firewall or proxy**. Then set the firewall time-out to 80 seconds in the firewall setting. The Internet user can then send a file to a user behind the Router.

I set up an Unreal Tournament Server, but others on the LAN cannot join. What do I need to do?

If you have a dedicated Unreal Tournament server running, you need to create a static IP for each of the LAN computers and forward ports 7777, 7778, 7779, 7780, 7781, and 27900 to the IP address of the server. You can also use a port forwarding range of 7777 to 27900. If you want to use the UT Server Admin, forward another port (8080 usually works well but is used for remote admin. You may have to disable this.), and then in the [UWeb.WebServer] section of the server.ini file, set the ListenPort to 8080 (to match the mapped port above) and ServerName to the IP assigned to the Router from your ISP.

Can multiple gamers on the LAN get on one game server and play simultaneously with just one public IP address?

It depends on which network game or what kind of game server you are using. For example, Unreal Tournament supports multi-login with one public IP.

How do I get Half-Life: Team Fortress to work with the Router?

The default client port for Half-Life is 27005. The computers on your LAN need to have "+clientport 2700x" added to the HL shortcut command line; the x would be 6, 7, 8, and on up. This lets multiple computers connect to the same server. One problem: Version 1.0.1.6 won't let multiple computers with the same CD key connect at the same time, even if on the same LAN (not a problem with 1.0.1.3). As far as hosting games, the HL server does not need to be in the DMZ. Just forward port 27015 to the local IP address of the server computer.

How can I block corrupted FTP downloads?

If you are experiencing corrupted files when you download a file with your FTP client, try using another FTP program.

The web page hangs; downloads are corrupt, or nothing but junk characters are being displayed on the screen. What do I need to do?

Force your Ethernet adapter to 10Mbps or half duplex mode, and turn off the "Auto-negotiate" feature of your Ethernet adapter as a temporary measure. (Please look at the Network Control Panel in your Ethernet adapter's Advanced Properties tab.) Make sure that your proxy setting is disabled in the browser. Check our website at www.linksys.com for more information.

If all else fails in the installation, what can I do?

Reset the Router by holding down the Reset button for ten seconds. Reset your cable or DSL modem by powering the unit off and then on. Obtain and flash the latest firmware release that is readily available on the Linksys website, www.linksys.com.

How can I be notified of new Router firmware upgrades?

All Linksys firmware upgrades are posted on the Linksys website at www.linksys.com, where they can be downloaded for free. The Router's firmware can be upgraded using the Web-based Utility. If the Router's Internet connection is working well, there is no need to download a newer firmware version, unless that version contains

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new features that you would like to use. Downloading a more current version of Router firmware will not enhance the quality or speed of your Internet connection, and may disrupt your current connection stability.

Will the Router function in a Macintosh environment?

Yes, but the Router's setup pages are accessible only through Internet Explorer 5.0 or Netscape Navigator 5.0 or higher for Macintosh.

I am not able to get the web configuration screen for the Router. What can I do?

You may have to remove the proxy settings on your Internet browser, e.g., Netscape Navigator or Internet Explorer. Or remove the dial-up settings on your browser. Check with your browser documentation, and make sure that your browser is set to connect directly and that any dial-up is disabled. Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools, Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is set to **Never dial a connection**. For Netscape Navigator, click **Edit, Preferences, Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

What is DMZ Hosting?

Demilitarized Zone (DMZ) allows one IP address (computer) to be exposed to the Internet. Some applications require multiple TCP/IP ports to be open. It is recommended that you set your computer with a static IP if you want to use DMZ Hosting. To get the LAN IP address, see "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter."

If DMZ Hosting is used, does the exposed user share the public IP with the Router?

No.

Does the Router pass PPTP packets or actively route PPTP sessions?

The Router allows PPTP packets to pass through.

Is the Router cross-platform compatible?

Any platform that supports Ethernet and TCP/IP is compatible with the Router.

How many ports can be simultaneously forwarded?

Theoretically, the Router can establish 4,000 sessions at the same time, but you can only forward 30 ranges of ports.

Does the Router replace a modem? Is there a cable or DSL modem in the Router?

No, this version of the Router must work in conjunction with a cable or DSL modem.

Which modems are compatible with the Router?

The Router is compatible with virtually any cable or DSL modem that supports Ethernet.

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How can I check whether I have static or DHCP IP addresses?

Ask your ISP to find out.

How do I get mIRC to work with the Router?

Under the Setup => Forwarding tab, set port forwarding to 113 for the PC on which you are using mIRC.

If your questions are not addressed here, refer to the Linksys website, www.linksys.com.

Appendix B: Upgrading Firmware

You can use the Router's Web-based Utility to upgrade the firmware; however, if you do so, you may lose the settings you have configured on the Router.

To upgrade the Router's firmware, follow these instructions:

1. Download the Router's firmware upgrade file from the Linksys website, www.linksys.com or click the **Firmware Download from Linksys Web Site** button that appears on the *System Management* screen under the *Advanced Setup* tab. Select the Router from the pull-down menu and choose the firmware from the options.
2. After downloading the file, extract it on your computer.
3. Under Firmware Upgrade, on the same screen, click the **Browse** button to select the firmware file.
4. Click the **Firmware Upgrade Right Now** button, and follow the on-screen instructions.

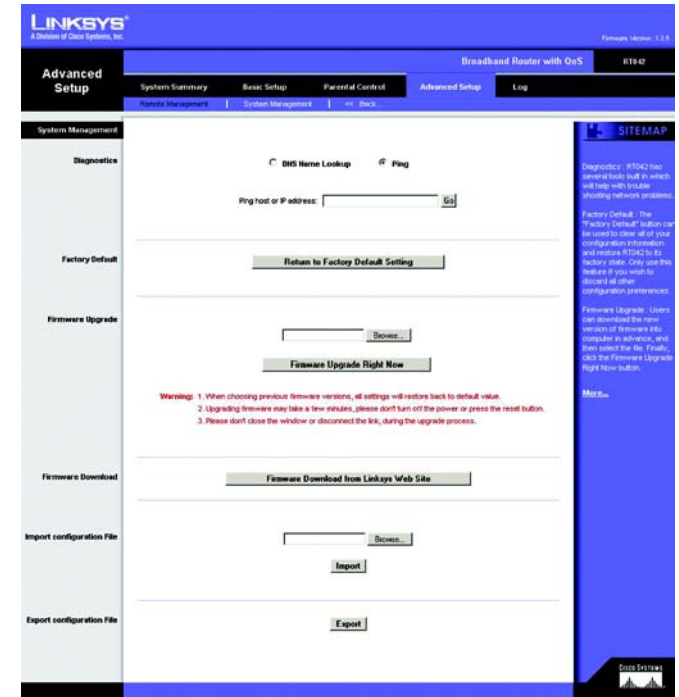


Figure B-1: Advanced Setup Tab - System Management

Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter

This section describes how to find the MAC address for your computer's Ethernet adapter so you can use the MAC address cloning feature of the Router. You can also find the IP address of your computer's Ethernet adapter. This IP address is used for the Router's filtering, forwarding, and/or DMZ features. Follow the steps in this appendix to find the adapter's MAC or IP address in Windows 98, Me, 2000, or XP.

Windows 98 or Me Instructions

1. Click **Start** and **Run**. In the *Open* field, enter **winipcfg**. Then press the **Enter** key or the **OK** button.
2. When the *IP Configuration* screen appears, select the Ethernet adapter you have connected to the Router via a CAT 5 Ethernet network cable.
3. Write down the Adapter Address as shown on your computer screen. This is the MAC address for your Ethernet adapter and is shown as a series of numbers and letters.

The MAC address/Adapter Address is what you will use for MAC address cloning or MAC filtering.

The example shows the Ethernet adapter's IP address as 192.168.1.100. Your computer may show something different.



Note: The MAC address is also called the Adapter Address.

Windows 2000 or XP Instructions

1. Click **Start** and **Run**. In the *Open* field, enter **cmd**. Press the **Enter** key or click the **OK** button.
2. At the command prompt, enter **ipconfig /all**. Then press the **Enter** key.

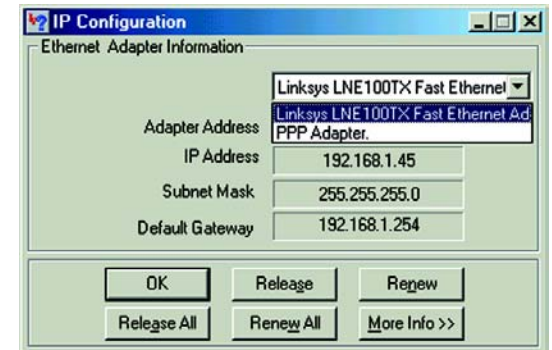


Figure C-1: IP Configuration Screen

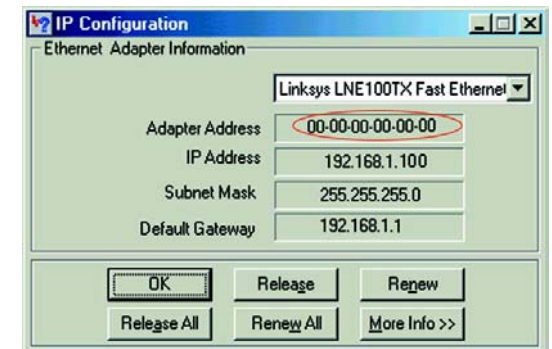


Figure C-2: MAC Address/Adapter Address

- Write down the Physical Address as shown on your computer screen; it is the MAC address for your Ethernet adapter. This appears as a series of numbers and letters.

The MAC address/Physical Address is what you will use for MAC address cloning or MAC filtering.



Note: The MAC address is also called the Physical Address.

The example shows the Ethernet adapter's IP address as 192.168.1.100. Your computer may show something different.

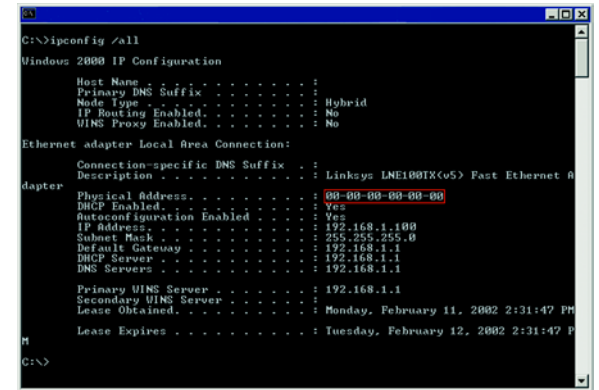


Figure C-3: MAC Address/Physical Address

For the Router's Web-based Utility

Some ISPs require that you register a MAC address. This feature “clones” your network adapter's MAC address onto the Router, and prevents you from having to call your ISP to change the registered MAC address to the Router's MAC address. The Router's MAC address is a 12-digit code assigned to a unique piece of hardware for identification.

Enter the MAC Address in the User Defined MAC Address field for Internet ports 1 or 2, or click the **Clone** button to add the MAC Address from the PC viewing the Web-based Utility.

Click **Save Settings** to save the MAC Cloning settings or click the **Cancel Changes** button to undo your changes.



Figure C-4: MAC Address Clone

Appendix D: Using the RT042 Utility

While many of the Router's functions can be utilized through the Web-based Utility, a separate utility also comes on the Router's CD. This RT042 Utility is more graphically oriented and can do many, though not all, of the things the Web-based Utility can do.

Starting the Utility

To start the utility, put the Router's CD in your PC's CD-Rom drive and open it. Then, double-click the Utility icon on the CD. You will then need to enter a password, this is the same as the Web-based Utility's password, which is by default, **admin**.

After entering the password and clicking the **OK** button, the Utility will automatically detect the PC connected to the Router on your network and its settings. The main Utility screen will then open.

This screen gives a graphical representation of the Router's connection to the Internet, displaying which Internet ports are active. From this screen, you can also control the amount of bandwidth used.

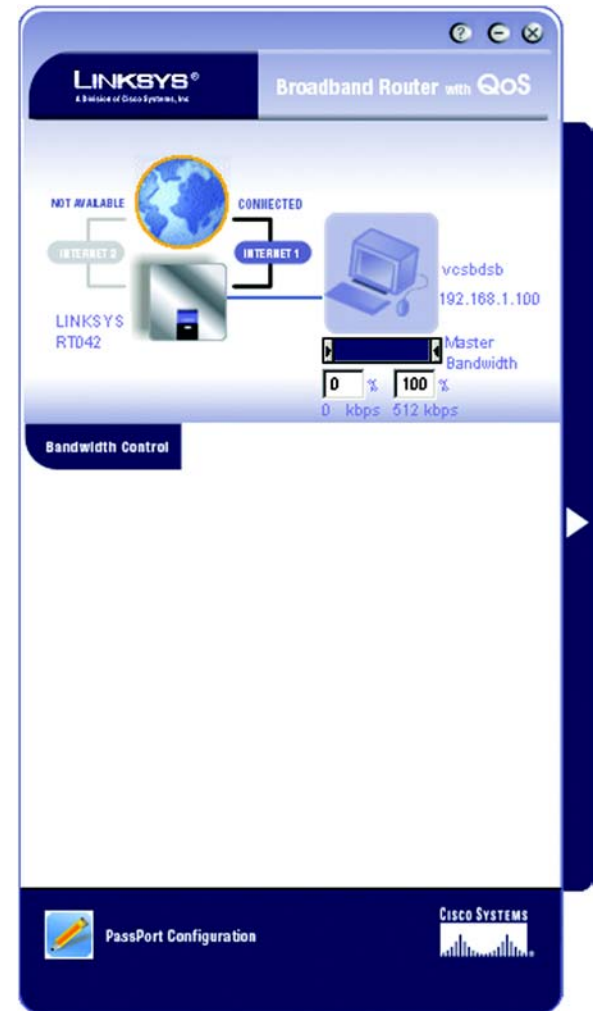


Figure D-1: The Utility's Main Screen



NOTE: You can change the Router's password by clicking the PassPort Configuration icon at the bottom of the screen. You will enter the old password. Then, enter the new password once in the New Password field and again in the Confirm New Password field for confirmation. Then, click the **Save** button, to save the new password.

Router Information

Clicking on the image of the Router will open up the *Router Information* screen.

The left side of this screen gives general statistics about the Router: Serial Number, Firmware Version, and Internet Connection types as well as bandwidth for each Internet port.

The right side of the screen provides user information for your network users, depending upon which Internet port they are accessing. You can also view which user is taking up the most bandwidth on your network from the usage percentage information.

From this screen, you can select PCs on your network whose usage you want to configure, either by restricting or optimizing their performance. By double-clicking the user listed, that user will appear as the PC icon on the Utility's main screen.

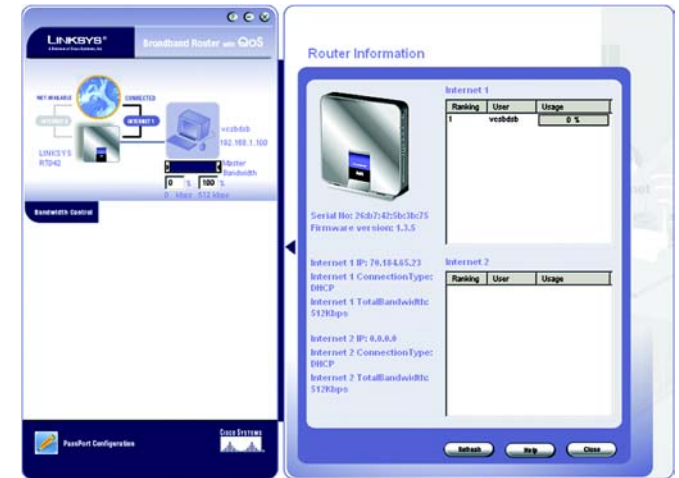


Figure D-2: The Router Information Screen

Usage Configuration Screens

Connection Status

The icons in the upper left corner also provide the following information on your connection status.

Router Status (earth) Icon: The earth icon shows the network connection status. The earth will spin when the router is connectin to the Internet.

Internet 1/Internet 2 Icons: Click the Internet2 button to switch to the other Internet port. Click the Internet 1 button to view and edit the Internet configuration. As you change the Internet port, the screen will change accordingly. If dual Internet is used , you can see who is going through Internet1 and Internet2. If only Internet 1 is used the status of Internet 2 will be shown as NOT AVAILABLE.

PC Status Icon: All PCs that are connected to the Router will be recorded and displayed. The off-line PCs will be shown as Intenet Disconnected, and on-line PCs will be shown as Internet Connected. PCs with a blue dot can be connected to the Internet, and the PCs with an orange dot can't connect to the Internet. When PCs are connecting to the Internet, the dot will flicker. You can prevent the selected PC from connecting to the Internet by clicking the blue dot, which will turn it orange. You can then click the orange dot again to allow it to connect to the Internet. The Host Name and IP Address of all PCs will display, and you can click the right mouse button to rename the host name for the PC.

Right Mouse click options: Select the PC, click the right mouse button, and the following tools will be available.

- **View button:** Click View Scheduler / View Hit Rate / View Usage / View Performance Optimization button to view the page of the user's passport.
- **Connect to Internet 1/2:** You can click the button to connect to the other internet port if both wan ports are used.
- **Remove:** You can click the Remove button to remove the selected PC from the topology. Because the PC was once connected to your home network by an occasional user, it will be recorded, and you can use this tool to remove the PC if you don't need to manage it from the topology.

Bandwidth Control

The left arrow controls the guaranteed bandwidth, and right arrow limits the bandwidth for each user. The percentage and bandwidth (kbps) from the minimum to maximum will display accordingly. The default is no guarantee and limit bandwidth, so the default min rate is 0% and max rate is 100%. You can allocate the guaranteed bandwidth for each user, with the total minimum bandwidth being 100% of the max bandwidth provided by the ISP. For example, if the max upstream bandwidth provided by ISP is 512Kbit/sec, and you allocate 50% for user A, he will get 256Kbit/sec guaranteed bandwidth. The max bandwidth user A can use will be 512Kbit/sec, but you also can lower the max bandwidth to limit the bandwidth for this user. For example, if you limit the max as 70%, the maximum bandwidth user A can use will be around 358Kbit/sec.

Once you change the bandwidth settings or rename the host name of PC, the Save bar will appear. After finishing the changes click the Save button to apply the changes, or click the Cancel button to undo the changes.

As noted above, you can configure each user's access to the Router, either by restricting or optimizing performance, by clicking the right arrow bar or the PC icon on the Utility's main screen, after selecting the user. This will open up the configuration screens. These are:

On-Line Scheduler: This allows you to allow or deny Internet access, according to the schedule, to any of the users on your network.

Hit Rate: From this screen, you can view the frequency at which each of your network's users are viewing their ten most favorite websites. You can also block these sites, if you wish.

Real Time Usage: From this screen, you can view which applications are taking up the most bandwidth on your network, according to user, and block those sites if you wish.

Performance Optimization: From this screen, you can list the network applications most often used on your network, according to user, and set the priority at which it is run.



Figure D-3: The On-Line Scheduler



Figure D-4: The Hit Rate Screen

On-Line Scheduler

From the schedule, you can restrict or allow access to the Internet. Select any day in the schedule or hours of time.

To refresh the information on the screen, click the **Refresh** button. If you need help on-line, click the **Help** button. Click **Save** to save the schedule or click the **Cancel** button to undo your changes.



Figure D-5: The Real Time Usage Screen

Hit Rate

From the Hit Rate screen, you can view the frequency at which each of your network's users are viewing their ten most favorite websites. You can also block these sites, if you wish.

Website information is displayed in ranking order, from most viewed to least viewed, with the amount of "hits" displayed. Each website is displayed as a link, so you can click the name to bring up the site. Clicking the **Block** box will restrict that user from viewing that website.

View URL Block List: Clicking this button will show which sites have been blocked for this user.

View One Week History: Click this button will display which websites this user viewed in the past week. You can also select individual days for further information.

To refresh the information on the screen, click the **Refresh** button. If you need help on-line, click the **Help** button. Click **Save** to save the blocked list or click the **Cancel** button to undo your changes.



Figure D-6: The Hit Rate Screen

Broadband Router

Real Time Usage

From this screen, you can view which applications are taking up the most bandwidth on your network, according to user, and block those sites if you wish.

Application information is displayed in ranking order, from most viewed to least viewed, with the amount of usage displayed for each application. For each application, there is also a column showing port number used. Clicking the **Block** box will restrict that user from utilizing that application.

View Application Block List: Clicking this button will show which applications have been blocked for this user.

View One Week History: Click this button will display which applications used in the past week. You can also select individual days for further information.

To refresh the information on the screen, click the **Refresh** button. If you need help on-line, click the **Help** button. Click **Save** to save the blocked list or click the **Cancel** button to undo your changes.

Performance Optimization

From the Performance Optimization screen, you can list the network applications most often used on your network, according to user, and set the priority at which it is run.

All applications are set at a Good level of optimization, shown in green, by default. To change this setting, click the **Enable** box next to the application. Then, you can move the slider to Normal optimization, shown in yellow, or Better optimization, shown in blue. Moving the slider towards yellow will decrease performance, while moving the slider towards blue will increase performance.

To refresh the information on the screen, click the **Refresh** button. If you need help on-line, click the **Help** button. Click **Save** to save the blocked list or click the **Cancel** button to undo your changes.



Figure D-7: The Performance Optimization Screen

Appendix E: The Setup Wizard

While the Broadband Router can be set up using the Web-based Utility, Internet connection can also be set up using the Setup Wizard, located on the *Network* screen of the *Basic Setup* tab. This wizard will walk you through the steps necessary to set up your Internet connection.

1. Click the **Setup Wizard** button on the *Network* screen to run the Setup Wizard to quickly set up the Router's Internet access.
2. The first screen to appear will ask for a Host and Domain name. Your Internet Service Provider (ISP) may require this information. If your ISP requires them, enter the **Host Name** and **Domain Name** in the fields provided. Click **Next** to continue. Click **Previous** if you want to return to the previous screen. Click **Exit** if you want to exit the wizard.



Figure E-1: Basic Setup Tab - Network

Enter a host and domain name for the Router.

Some ISPs (Internet Service Providers) may require these names as identification, and these settings can be obtained from your ISP. **In most cases, leaving these fields blank will work.**

Host Name:

Domain Name:

Figure E-2: Enter Host and Domain Names

Broadband Router

- From the next screen, choose your WAN (or Internet) connection type. **Obtain an IP automatically** is chosen by default. Click **Next** to continue. Click **Previous** if you want to return to the previous screen. Click **Exit** if you want to exit the wizard.

Select WAN connection Type.

Obtain an IP automatically:
If your ISP is running a DHCP server, select Obtain an IP automatically option. Your ISP will assign these values (includes DNS Server) automatically. Or users can check the box of Use the Following DNS Server Addresses, and enter the specific DNS Server IP. Multiple DNS IP Settings are common. In most cases, the first available DNS entry is used. **(default)**

Static IP:
If you have a specify WAN IP Address, Subnet Mask, Default Gateway Address and DNS Server, select Static IP. You can get this information from your ISP.

PPPoE (Point-to-Point Protocol over Ethernet):
You have to check with your ISP to make sure whether PPPoE should be enabled or not. If they do use PPPoE.

<< Previous Next >> Exit

Figure E-3: Select WAN connection Type

- The next screen that appears depends on your Internet Connection Type.

If you chose Obtain an IP automatically, the *Obtain an IP automatically* screen appears. Select **Use DNS Server provided by ISP (default)** or **Use the Following DNS Server Addresses**, if you want to enter a specific IP. Click **Next** to continue. Click **Previous** if you want to return to the previous screen. Click **Exit** if you want to exit the wizard.

Obtain an IP automatically **(For Internet)**

Use DNS Server provided by ISP **(default)**

Use the Following DNS Server Addresses

DNS Server (Required) 1: [] . [] . [] . []

2: [] . [] . [] . []

<< Previous Next >> Exit

Figure E-4: Obtain an IP automatically

Broadband Router

If you chose Static IP, the *Static IP* screen appears. Enter the **Static IP**, **Subnet Mask**, and **Default Gateway** provided by your ISP. Click **Next** to continue. Click **Previous** if you want to return to the previous screen. Click **Exit** if you want to exit the wizard.

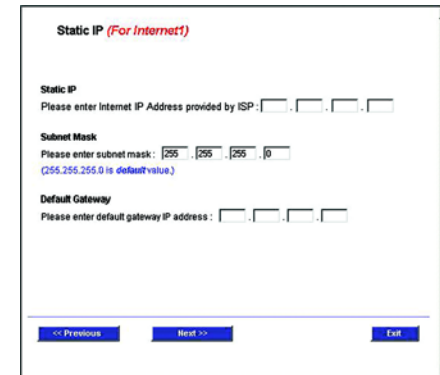


Figure E-5: Static IP

If you chose PPPoE, the *PPPoE* screen appears. Enter the **User Name** and **Password** provided by your ISP. Click **Next** to continue. Click **Previous** if you want to return to the previous screen. Click **Exit** if you want to exit the wizard.



Figure E-6: PPPoE

5. On the final screen, you can save your settings, if you don't need to make any changes. Click **Previous** if you want to return to the previous screen. Click **Exit** if you want to exit the wizard.

If you are sure the setting is correct, please click "Save Settings".

Or, you may click "<< Previous" to modify.

If you want to quit setup wizard, please click "Exit".



Figure E-7: Basic Setup Tab - Network

Appendix F: Windows Help

All Linksys networking products require Microsoft Windows. Windows is the most used operating system in the world and comes with many features that help make networking easier. These features can be accessed through Windows Help and are described in this appendix.

TCP/IP

Before a computer can communicate with the Router, TCP/IP must be enabled. TCP/IP is a set of instructions, or protocol, all PCs follow to communicate over a wired or wireless network. Your PCs will not be able to utilize networking without having TCP/IP enabled. Windows Help provides complete instructions on enabling TCP/IP.

Shared Resources

If you wish to share printers, folders, or files over your network, Windows Help provides complete instructions on utilizing shared resources.

Network Neighborhood/My Network Places

Other PCs on your network will appear under Network Neighborhood or My Network Places (depending upon the version of Windows you're running). Windows Help provides complete instructions on adding PCs to your network.

Appendix G: Glossary

Adapter - A device that adds network functionality to your PC.

Bandwidth - The transmission capacity of a given device or network.

Bit - A binary digit.

Boot - To start a device and cause it to start executing instructions.

Broadband - An always-on, fast Internet connection.

Browser - An application program that provides a way to look at and interact with all the information on the Internet.

Byte - A unit of data that is usually eight bits long

Cable Modem - A device that connects a computer to the cable television network, which in turn connects to the Internet.

DDNS (Dynamic Domain Name System) - Allows the hosting of a website, FTP server, or e-mail server with a fixed domain name (e.g., www.xyz.com) and a dynamic IP address.

Default Gateway - A device that forwards Internet traffic from your local area network.

DHCP (Dynamic Host Configuration Protocol) - A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

DMZ (Demilitarized Zone) - Removes the Router's firewall protection from one PC, allowing it to be "seen" from the Internet.

DNS (Domain Name Server) - The IP address of your ISP's server, which translates the names of websites into IP addresses.

Domain - A specific name for a network of computers.

Download - To receive a file transmitted over a network.

DSL (Digital Subscriber Line) - An always-on broadband connection over traditional phone lines.

Broadband Router

Dynamic IP Address - A temporary IP address assigned by a DHCP server.

Ethernet - A network protocol that specifies how data is placed on and retrieved from a common transmission medium.

Firewall - A set of related programs located at a network gateway server that protects the resources of a network from users from other networks.

Firmware - The programming code that runs a networking device.

FTP (File Transfer Protocol) - A protocol used to transfer files over a TCP/IP network.

Full Duplex - The ability of a networking device to receive and transmit data simultaneously.

Gateway - A device that interconnects networks with different, incompatible communications protocols.

Half Duplex - Data transmission that can occur in two directions over a single line, but only one direction at a time.

Hardware - The physical aspect of computers, telecommunications, and other information technology devices.

HTTP (HyperText Transport Protocol) - The communications protocol used to connect to servers on the Internet.

IP (Internet Protocol) - A protocol used to send data over a network.

IP Address - The address used to identify a computer or device on a network.

IPCONFIG - A Windows 2000 and XP utility that displays the IP address for a particular networking device.

IPSec (Internet Protocol Security) - A VPN protocol used to implement secure exchange of packets at the IP layer.

ISP (Internet Service Provider) - A company that provides access to the Internet.

LAN - The computers and networking products that make up your local network.

MAC (Media Access Control) Address - The unique address that a manufacturer assigns to each networking device.

mIRC - An Internet Relay Chat program that runs under Windows.

NAT (Network Address Translation) - NAT technology translates IP addresses of a local area network to a different IP address for the Internet.

Broadband Router

Network - A series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

Node - A network junction or connection point, typically a computer or work station.

Packet - A unit of data sent over a network.

Ping (Packet INternet Groper) - An Internet utility used to determine whether a particular IP address is online.

POP3 (Post Office Protocol 3) - A standard mail server commonly used on the Internet.

Port - The connection point on a computer or networking device used for plugging in cables or adapters.

PPPoE (Point to Point Protocol over Ethernet) - A type of broadband connection that provides authentication (username and password) in addition to data transport.

PPTP (Point-to-Point Tunneling Protocol) - A VPN protocol that allows the Point to Point Protocol (PPP) to be tunneled through an IP network. This protocol is also used as a type of broadband connection in Europe.

Router - A networking device that connects multiple networks together.

Server - Any computer whose function in a network is to provide user access to files, printing, communications, and other services.

SMTP (Simple Mail Transfer Protocol) - The standard e-mail protocol on the Internet.

SPI (Stateful Packet Inspection) Firewall - A technology that inspects incoming packets of information before allowing them to enter the network.

Static IP Address - A fixed address assigned to a computer or device that is connected to a network.

Static Routing - Forwarding data in a network via a fixed path.

Subnet Mask - An address code that determines the size of the network.

Switch - 1. A data switch that connects computing devices to host computers, allowing a large number of devices to share a limited number of ports. 2. A device for making, breaking, or changing the connections in an electrical circuit.

TCP (Transmission Control Protocol) - A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

Broadband Router

TCP/IP (Transmission Control Protocol/Internet Protocol) - A set of instructions PCs use to communicate over a network.

TFTP (Trivial File Transfer Protocol) - A version of the TCP/IP FTP protocol that has no directory or password capability.

UDP (User Datagram Protocol) - A network protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent.

Upgrade - To replace existing software or firmware with a newer version.

URL (Uniform Resource Locator) - The address of a file located on the Internet.

VPN (Virtual Private Network) - A security measure to protect data as it leaves one network and goes to another over the Internet.

WAN (Wide Area Network)- The Internet.

WINIPCFG - A Windows 98 and Me utility that displays the IP address for a particular networking device.

Appendix H: Specifications

Standards	IEEE 802.3, 802.3u
Ports	Power, Internet, and Ethernet
Button	Reset
Cabling Type	Cat-5
LEDs	Ethernet, Internet1, Internet2, Diag, and System
UPnP able/cert	able
Security Features	SPI, port, MAC, IP filter
Dimensions (W x H x D)	6.69" x 6.69" x 1.26" (170 mm x 170 mm x 32 mm)
Unit Weight	11.29 oz. (3.32 kg)
Power	3.3V 2.5A
Certifications	FCC
Operating Temp.	0°C to 40°C (32°F to 104°F)
Storage Temp.	0°C to 70°C (32°F to 158°F)
Operating Humidity	10% to 85% Non-Condensing
Storage Humidity	5% to 90% Non-Condensing

Appendix I: Warranty Information

LIMITED WARRANTY

Linksys warrants to You that, for a period of one year (the “Warranty Period”), your Linksys Product will be substantially free of defects in materials and workmanship under normal use. Your exclusive remedy and Linksys' entire liability under this warranty will be for Linksys at its option to repair or replace the Product or refund Your purchase price less any rebates. This limited warranty extends only to the original purchaser.

If the Product proves defective during the Warranty Period call Linksys Technical Support in order to obtain a Return Authorization Number, if applicable. **BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING.** If You are requested to return the Product, mark the Return Authorization Number clearly on the outside of the package and include a copy of your original proof of purchase. **RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PURCHASE.** You are responsible for shipping defective Products to Linksys. Linksys pays for UPS Ground shipping from Linksys back to You only. Customers located outside of the United States of America and Canada are responsible for all shipping and handling charges.

ALL IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE WARRANTY PERIOD. ALL OTHER EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF NON-INFRINGEMENT, ARE DISCLAIMED. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to You. This warranty gives You specific legal rights, and You may also have other rights which vary by jurisdiction.

This warranty does not apply if the Product (a) has been altered, except by Linksys, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Linksys, or (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident. In addition, due to the continual development of new techniques for intruding upon and attacking networks, Linksys does not warrant that the Product will be free of vulnerability to intrusion or attack.

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL LINKSYS BE LIABLE FOR ANY LOST DATA, REVENUE OR PROFIT, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, REGARDLESS OF THE THEORY OF LIABILITY (INCLUDING NEGLIGENCE), ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE THE PRODUCT (INCLUDING ANY SOFTWARE), EVEN IF LINKSYS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT WILL LINKSYS' LIABILITY EXCEED THE AMOUNT PAID BY YOU FOR THE PRODUCT. The foregoing limitations will apply even if any warranty or remedy provided under this Agreement fails of its essential purpose. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to You.

Please direct all inquiries to: Linksys, P.O. Box 18558, Irvine, CA 92623.

Appendix J: Regulatory Information

FCC Statement

This product has been tested and complies with the specifications 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 according to 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 is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment or devices
- Connect the equipment to an outlet other than the receiver's
- Consult a dealer or an experienced radio/TV technician for assistance

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Industry Canada (Canada)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations.

Appendix K: Contact Information

Need to contact Linksys?

Visit us online for information on the latest products and updates to your existing products at:

<http://www.linksys.com> or
[ftp.linksys.com](ftp://ftp.linksys.com)

Can't find information about a product you want to buy on the web? Do you want to know more about networking with Linksys products? Give our advice line a call at:
Or fax your request in to:

800-546-5797 (LINKSYS)
949-823-3002

If you experience problems with any Linksys product, you can call us at:
Don't wish to call? You can e-mail us at:

800-326-7114
support@linksys.com

If any Linksys product proves defective during its warranty period, you can call the Linksys Return Merchandise Authorization department for obtaining a Return Authorization Number at:
(Details on Warranty and RMA issues can be found in the Warranty Information section in this Guide.)

949-823-3000