EtherFast®
Cable/DSL Routers

Use this User Guide to install the following Linksys product(s):

BEFSRU31   EtherFast Cable/DSL Router with USB Port and 10/100 3-Port Switch
BEFSR41 v2 EtherFast Cable/DSL Router with 10/100 4-Port Switch
BEFSR11   EtherFast 1-Port Cable/DSL Router

User Guide

⅃LINKSYS®

FCC STATEMENT
The Instant Broadband EtherFast Cable/DSL Router has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used 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 device
• Connect the equipment to an outlet other than the receiver's
• Consult a dealer or an experienced radio/TV technician for assistance

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Introduction

The Linksys EtherFast Cable/DSL Router

Congratulations on the purchase of your EtherFast Cable/DSL Router from Linksys! The EtherFast Cable/DSL Router is the perfect solution for connecting a network of PCs to a high-speed broadband Internet connection and to an Ethernet network backbone. Configurable as a DHCP server, the EtherFast Cable/DSL Router is the only visible network device on the Internet. The Router also serves as your Internet firewall, protecting your network's PCs from being accessed by external users. All incoming data packets are monitored and filtered. Your Router can also be configured to block internal users' access to the Internet with IP Filtering, as well as play Internet games, video-conference, and much more.

Now all of your PCs can enjoy lightning-fast broadband Internet connections and share internal network data. Link it all together and your network will blaze along faster than you ever thought possible.

Features

- Connects to a Broadband Modem and to an Ethernet Network Backbone
- Equipped With a 3 or 4-Port 10/100 Switch (BEFSRU31 & BEFSR41 v2 only)
- Connects All of Your PCs to the Internet with Just One IP Address
- Firewall Protects Your PCs From Outside Intruders on the Internet
- Configurable Through a PC's Web Browser Using Netscape Navigator 4.0 or Internet Explorer 4.0
- Supports IPSec Pass-Through for Virtual Private Networking (VPNs)
- Administer Your Router Remotely Over the Internet
- 10/100 Switch Speeds Up Your Gaming and Multimedia Connections (BEFSRU31 & BEFSR41 v2 only)
- Configurable as a DHCP Server on Your Network
- Compatible with Virtually All Standard Internet Applications
- Administrators Can Block Specific Internal Users' Internet Access
- DMZ Hosting Feature Enables Internet Multimedia Applications Such as Video-Conferencing and Internet Gaming

Package Contents for the 4-Port Router

- One EtherFast Cable/DSL Router with 10/100 4-Port Switch
- One Power Adapter
- One Power Cord
- One User Guide and Registration Card

Network Requirements

- One RJ-45 broadband Internet connection, with a cable or DSL modem
- One PC with a 10Mbps or 10/100 Mbps Ethernet card or adapter installed
- TCP/IP network protocol installed on each PC
- UTP CAT 5 network cables with RJ-45 connectors
- Internet Explorer 4.0 and higher, or Netscape Navigator 4.0 and higher

Version 5.5 for Internet Explorer and Version 4.7 for Netscape Navigator are highly recommended for optimal results.

Package Contents for the 1-Port Router

• One EtherFast 10/100 1-Port Cable/DSL Router
• One Power Adapter
• One User Guide and Registration Card

Package Contents for the 3-Port Router

• One EtherFast Cable/DSL Router with USB Port & 10/100 3-Port Switch
• One USB Cable
• One 3.5" Floppy Disk for USB Setup
• One Power Adapter
• One User Guide and Registration Card

Network Requirements

• One RJ-45 broadband Internet connection, with a cable or DSL modem
• One PC with a 10/100 Mbps Ethernet card or adapter installed
• TCP/IP network protocol installed on each PC
• UTP CAT 5 network cables with RJ-45 connectors
• Internet Explorer 4.0 and higher, or Netscape Navigator 4.0 and higher

> Version 5.5 for Internet Explorer and Version 4.7 for Netscape
> Navigator are highly recommended for optimal results.

Network Requirements

• One RJ-45 broadband Internet connection, with a cable or DSL modem
• One PC with a 10/100 Mbps Ethernet card or adapter installed,
  or a PC with a USB port
• TCP/IP network protocol installed on each PC
• UTP CAT 5 network cables with RJ-45 connectors
• Internet Explorer 4.0 and higher, or Netscape Navigator 4.0 and higher

> Version 5.5 for Internet Explorer and Version 4.7 for Netscape
> Navigator are highly recommended for optimal results.

Getting to Know the 4-Port EtherFast Cable/DSL Router

The 4-Port Router's Rear Panel

Your Router's ports, where network cables are connected, are located on the rear panel of your Router.

The 4-Port Router's Ports   BEFSR41 v2 shown above

WAN   The **WAN** (Wide Area Network) port is where you connect your cable or DSL modem.

Ports 1-4   These four **LAN** (Local Area Network) ports connect to network devices, such as PCs, print servers, and remote hard drives. If port **1** is being used, the **Uplink** port will not work- these two shared ports have internally shared wiring.

Uplink   The **Uplink** port is used to expand your network by connecting to another switch or hub. Uplinking to another Router, switch or a hub is done by simply running a cable from the **Uplink** port to the other device. See page 10 for more on uplinking.

                        If the **Uplink** port is being used, Port 1 will not work.

Power   The **Power** port is where you will connect the power adapter. Be sure to connect the power cord to the power adapter before plugging it in.

4-Port Router's Front Panel LEDs

The LAN Indicators   BEFSR41 v2 shown above

Power   *Green*. The **Power** LED lights up when the Router is powered on.

Link/Act   *Green*. The **Link/Act** LED serves two purposes. If the LED is continuously lit up, the Router is successfully connected to a device through the corresponding port (**1**, **2**, **3** or **4**). If the LED is flickering, the Router is actively sending or receiving data over that port.

Full/Col   *Green*. The **Full/Col** LED also serves two purposes. If this LED is lit up continuously, the connection made through the corresponding port is running in Full Duplex mode. If the LED flickers, the connection is experiencing collisions. Infrequent collisions are normal.

                        If this LED flickers too often, there may be a problem with your connection. See the Troubleshooting section if you have problems.

100   *Orange*. The **100** LED lights up when a successful 100Mbps connection is made through the corresponding port.

                        If this LED is not lighting up, then your connection speed is 10 Mbps.

The WAN Indicators

Link	*Green*. The **Link** LED lights up when a successful connection is made between the Router and your broadband device or network.
Act	*Green*. The **Act** LED flickers when the Router is sending or receiving data over the broadband **WAN** port (to the Internet).
Diag	*Orange*. The **Diag** LED lights up when the Router goes through its self-diagnosis mode during every boot-up, and also when you click **Apply** to update any changes made in the Router's Utility. It will turn off upon successful completion of the diagnosis.
	If this LED stays on for an abnormally long period of time, see the Troubleshooting section.

The Reset Button[*] The **Reset** button can be used in one of two ways.

1. If your Router is having problems connecting to the Internet, press the **Reset** button in for just a moment with a paper clip or a pencil tip. This clears up any jammed connections, and is similar to pressing the **Reset** button on your PC to reboot it.

2. If you are experiencing extreme problems with your Router and have tried all other troubleshooting measures, press the **Reset** Button in and hold it down until the orange **Diag** LED on the front panel turns on and off completely.

This will restore factory defaults and clear all of the Router's settings, including the IP addresses you entered.

Leaving the power off for too long could result in the loss of network connections.

See also restoring factory defaults through the Web-based Utility in the Cable/DSL Router's Web-based Utility section.

[*] The **Reset** Button is located on the front panel of the 4-Port Router, and the rear panel of the 3-Port Router and the 1-Port Router.

Getting to Know the 1-Port EtherFast Cable/DSL Router

The One-Port Router's Rear Panel

The rear panel of the Router is where all of the Router's cabling connections are made, and where you can reset or configure the Router's **LAN** port.

BEFSR11 shown above

The One-Port Router's Ports

WAN	The **WAN** (Wide Area Network) port is where you connect your cable or DSL modem.
LAN	The **LAN** (Local Area Network) port is where you connect your Router to a PC, hub, or switch. If you have more than one PC, connect an Ethernet hub or switch to your Router, then connect your PCs to that hub or switch.
Power	The **Power** port connects to the power adapter.

Buttons & Switches

The Reset Button   Details on the **Reset** button are found on page 7.

The Crossover Switch   The Crossover Switch (**X ǁ**) toggles the **LAN** port between crossover mode (**X**) and straight-through mode (**ǁ**).

If you are connecting the Router's **LAN** Port directly to a <u>PC or an uplink port on a hub or switch</u>, choose the crossover (**X**) mode.

If you are connecting the Router's **LAN** port to a <u>standard port on a hub or switch</u>, choose the straight-through (**ǁ**) mode.

Note: If you're not sure which mode to use on the Crossover Switch, check the LAN port's Link LED on the front panel of the Router.

If the Link LED does not light up after the Router is fully installed and config-ured, try switching the Crossover Switch to the other side. If the Link LED lights up, you know that your mode setting is correct.

When "**uplinking**," or connecting two pieces of network hardware together, such as a router and a switch, **a** *general* **rule of thumb** is to plug one end of a network cable into a straight-through port, and the other end into a crossover port.

Standard ports are straight-through ports, and uplink ports are crossover ports.

The 1-Port Router's Front Panel LEDs

BEFSR11 shown above

The LAN Indicators

Power   *Green*. The **Power** LED lights up green when the Router is powered on.

Link/Act   *Green*. The **Link/Act** LED serves two purposes. If the LED is continuously lit up, the Router is successfully connected to a device through the **LAN** port. If the LED is flickering, the Router is actively sending or receiving data through the **LAN** port.

Full/Col   *Green*. The **Full/Col** LED also serves two purposes. If this LED remains lit, a LAN port connection is being success-fully maintained. If the LED flickers, the connection is experiencing collisions. Infrequent collisions are normal.

If this LED flickers too often, there may be a problem with your connection. See Troubleshooting on page 56 if you encounter problems.

10/100   *Orange*. The **10/100** LED lights up when a successful 100Mbps connection is made through the corresponding port.

If a connection is running at 10Mbps, the **10/100** LED will not light up.

The WAN Indicators

Link   *Green*. The **Link** LED lights up when a successful connec-tion is made between the Router and your Broadband device or network.

Act   *Green*. The **Act** LED flickers when the Router is sending or receiving data over the broadband **WAN** port.

Diag   *Red*. The **Diag** LED lights up when the Router goes through its self-diagnostic test during boot-up. It will turn off upon successful completion of the diagnosis. The **Diag** LED also lights up when you press the **Reset** button or click **Apply** to save any changes made in the Web-based Utility.

If this LED stays on for an abnormally long period of time, see the Troubleshooting section.

Getting to Know the 3-Port EtherFast Cable/DSL Router

The 3-Port Router's Rear Panel Ports

The 3-Port Router's Ports

BEFSRU31 shown above

USB   The USB port (Type B - slave) can connect to a USB-ready PC or a USB hub. This allows you to enjoy an immediate, plug-and-play connection without even configuring a network adapter for your PC. To work with USB ports, your PC must be running Windows 98, 2000, or Millennium.

USB ports do not work on PCs running Windows 95 or Windows NT.

USB Compatibility with Your PC

To use the USB port on the 3-Port Router, you must have Windows 98, 2000, or Millennium installed on your PC. USB cannot run in a Windows 95 or NT environment.

Also, your PC must have a USB port installed and enabled. Some PCs may have a disabled USB port. If your port doesn't seem to be working, there may be jumpers on the motherboard or a menu option in the BIOS to enable a PC's USB port.

Other motherboards have USB interfaces, but no ports. You can install your own USB port and attach it to your PC's motherboard using hardware purchased at retail computer stores. See your PC's User Guide for instructions.

The USB Icon

This USB icon denotes the presence of a USB port or connector.

Your 3-Port Router comes with a USB cable that has two different types of connectors. Type A, the master connector, is shaped like a rectangle and plugs into your PC's USB port. Type B, the slave connector, resembles a square and connects to the USB port on the rear panel of your Router.

USB Type A   **USB Type B**
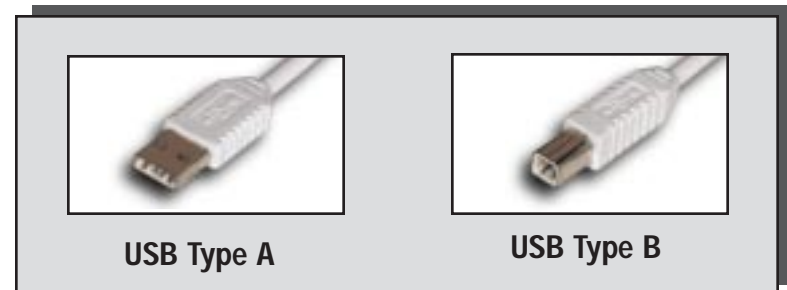
1, 2, 3   These three **LAN** ports connect to your PCs, hubs, switches, print servers, or any other device with an Ethernet port.

Uplink   The **Uplink** port connects to another hub or switch for port expansion when you run out of open ports for your network devices. Since the **Uplink** port and the standard port right next to it share internal wiring, you can only use one of the two ports at a time.

WAN   This **WAN** port connects to your cable or DSL modem. **Your modem connection will not work from any other port.**

Power   The **Power** port connects to the power adapter.

Buttons

The Reset Button   Details on the Reset button are found on page 7.

The 3-Port Router's Front Panel LEDs

The LAN Indicators

Power   *Green*. The **Power** LED lights up green when the Router is powered on.

Link/Act   Green. The **Link/Act** LED serves two purposes. If the LED is continuously lit up, the Router is successfully connected to a device through the corresponding RJ-45 port (**1**, **2**, or **3**). If the LED flickers, then that port is sending or receiving data to and from the network.

Full/Col   *Green*. The **Full/Col** LED also serves two purposes. If this LED is continuously lit up, the connection made through the corresponding port is successfully running in Full Duplex mode. If the LED is flickering, the connection is experiencing collisions. Infrequent collisions are normal.

If this LED flickers too often, there may be a problem with your connection. See the Troubleshooting section if you have problems.

100   *Orange*. The **100** LED lights up when a successful 100Mbps connection is made through the corresponding port. If this LED does not light up, then your connection speed is 10 Mbps.

USB   The **USB** LED lights up when the USB port is successfully connected to a PC, USB hub, or other USB device.

The WAN Indicators

Link   *Green*. The **Link** LED lights up when a successful connection is made between the Router and your broadband device or network.

Act   *Green*. The **Act** LED flickers when the Router is sending or receiving data over the broadband **WAN** port.

Diag   *Orange*. The **Diag** LED lights up when the Router goes through its self-diagnostic test during boot-up. It will turn off upon successful completion of the diagnosis. This LED will also light up when you make changes in the Utility and click **Apply** to save them.

If this LED stays on for an abnormally long period of time, see the Troubleshooting section.

Connecting the Cable/DSL Router to Your Network

Overview

Unlike a hub or a switch, the Cable/DSL Router's setup consists of more than simply plugging hardware together. Since the Router acts as a DHCP server, you will have to set some values for the Router and also configure your networked PCs to accept the IP addresses that the Router assigns them.

You will need the following data from your ISP (Internet Service Provider) to install the Cable/DSL Router:

 • Your broadband-configured PCs' Computer Name and Workgroup Name
 • *Your broadband-configured PCs' fixed*
        Internet IP Address
 • *Your Subnet Mask*   *Only if applicable*
 • *Your Default Gateway*
 • *Your Primary DNS Server IP address(es)*

The installation technician from your ISP should have left this information with you after the installation. Or, you can call your ISP to request the data.

Once you have the above values, you can begin the Installation and Setup of your EtherFast Cable/DSL Router.

LANs and WANs

Simply put, a **router** is a network device that connects two networks together.

In this instance, your EtherFast Cable/DSL Router connects your **Local Area Network (LAN)**, or the group of PCs in your home or office, to the **Wide Area Network (WAN)**, that is, the Internet. Your Router processes and regulates the data that travels between these two networks.

Think of your Router as a network device with two sides: the first side is made up of your private **Local Area Network (LAN)** of PCs, which this User Guide sometimes calls the "internal LAN." The other, public side is the Internet, or the **Wide Area Network (WAN)**, outside of your home or office.

Your Router's firewall (NAT) protects your network of PCs with security so users on the public, Internet side cannot "see" your PCs. This is why your internal LAN, or network, is private.

Remember that your Router's ports connect to two sides: your 10/100 **LAN** port(s) and the Internet **WAN** port. The LAN port(s) transmit data at 10Mbps or 100 Mbps, whereas the broadband port, or WAN port, transmits data at 10 Mbps, because 10Mbps is currently the maximum speed for cable and DSL service.

IP Addressing: A Quick Lesson

What's an IP Address?

| **IP** stands for Internet Protocol. |

Every device on an IP-based network, including PCs, print servers, and routers, requires an **IP address** to identify its "location," or address, on the network. Since the Internet is simply one huge global network, every PC that logs on to the Internet also requires an IP address.

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

Static IP Addresses

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 you assigned it to will always have that same IP address. Static IP addresses are commonly used with network devices such as server PCs or print servers.

> Since your Router is a device that connects two networks, it needs two IP addresses - one for the LAN side, and one for the WAN side. In this User Guide, you'll see references to the "WAN IP address" and the "LAN IP address."
>
> Since the Router has firewall security (NAT), the only IP address that can be seen from the Internet for your network is the Router's WAN IP address.
>
> However, even this WAN IP address for the Router can be blocked, so that your Router and network seem invisible to the Internet - see *Blocking WAN Requests* on page 48.

If you use your 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 your Router.

Dynamic IP Addresses

A **dynamic IP address** is automatically assigned to a device on the network, e.g., PCs and print servers. These IP addresses are called "dynamic" because they are only *temporarily* assigned to the PC or device. After a certain time period, they expire.

If a PC logs on to the network (or the Internet) and its dynamic IP address has expired, the **DHCP server** will assign it a new dynamic IP address.

DHCP (Dynamic Host Configuration Protocol) Servers

PCs and other network devices using dynamic IP addressing are assigned a new IP address by a **DHCP server**. DHCP frees you from having to assign IP addresses manually every time a new user is added to your network.

DHCP servers can either be a designated PC on the network or another network device, such as the Cable/DSL Router.

By factory default, DHCP is enabled on your Router. If you already have a DHCP server running on your network, you *must* disable one of the two DHCP servers. If you run more than one DHCP server on your network, you will experience network errors, such as conflicting IP addresses.

To disable DHCP on your Router, see page 44.

> ⚠ **Even if you assign a static IP address to a PC, that PC can still use DHCP's dynamic IP addressing.**
>
> If the dynamic IP addressing fails to provide a dynamic IP address for any reason, that PC automatically uses its default static IP address.

Connecting Your Hardware Together and Booting Up

1. Before you begin, **make sure that all of your hardware is powered off**, including your Router, PCs, hubs, switches, and the cable or DSL modem.

2. **A. If you have the 4-Port Cable/DSL Router**, connect one end of a network cable to one of the LAN ports (labeled **1**, **2**, **3**, or **4**) on the back of the Router, and the other end into a standard port on a network device, e.g., a PC, print server, hub, or switch. See page 66 for details on network cabling.

   > A **standard port** is any port other than the WAN port and the Uplink port. It's a straight-through port.

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

2. **B. If you are connecting the 1-Port Router to just one PC**, plug one end of a network cable into the Router's **LAN** port and the other end into the PC's network adapter port. Set the Crossover Switch to crossover mode (**X**). If the crossover mode does not light up a **Link** LED, see page 10.

   If you are connecting the 1-Port Router to a hub or switch, plug one end of a network cable into the Router's **LAN** port, and the other end into to a standard port on your network's hub or switch. Set the **LAN** port's Crossover Switch to its straight-through (**II**) mode.

   If your hub or switch has no more standard ports available, connect the Router using its **LAN** port to the **Uplink** port on the hub or switch. Set the Crossover Switch to straight-through mode (**II**) for this set-up.

2. **C. If you have the 3-Port Cable/DSL Router**, connect one end of a network cable from the one of the Router's LAN ports (labeled **1**, **2**, or **3**) to a port on a PC, hub, switch, or other network device.

   The 3-Port Router features one USB plug-and-play port that connects instantly to any USB-ready desktop or notebook PC. This allows you to connect to and access your Router without even configuring any network cards. Use the enclosed USB cable to connect your PC to the Router: the Type A end connects to your PC's USB port, while Type B connects to the Router's USB port.

3. **Connect the network cable** from your cable or DSL modem to the **WAN** port on your Router's rear panel. This is the only port that will work for your modem connection.

4. **Connect the power adapter** to the **Power** port on the rear panel of the Router, then plug the power adapter into a power outlet.

> It is highly recommended that you plug your Router into a power strip with surge protection.

• The **Power** LED on the front panel will light up green as soon as the power adapter is connected properly.

• The **Diag** LED will light up red for a few seconds when the Router goes through its self-diagnostic test. This LED will turn off when the self-test is complete.

5. **Power on the cable or DSL modem**.

6. **Press the Reset button** on the Router's front panel with a paper clip or a pencil. Hold the button in until the **Diag** LED lights up and then turns off. This will restore the Router's factory default settings.

Technical Checkpoint:
Did you remember to check for **Link** LEDs for all your connections?

If all of your **Link** LEDs are not lighting up, make sure that all your cables are securely plugged in, and that all of your hardware is powered on properly.

Your Router's hardware installation is now complete!
Continue with the next section to configure
your Router and PCs.

Uplinking: Connecting More Devices to Your Router

If your Router's **LAN** ports are all full and you still have PCs and/or devices to connect, add a hub or a switch to your Router.

To do so, use the Router's **Uplink** port to connect to a standard port on a hub or switch. If you have a PC/device connected to the port right next to the **Uplink** port (on the 3- and 4-Port Routers), disconnect that PC/device and plug it into an open port on the new hub or switch.

Since the **Uplink** port shares internal wiring with the port right next to it, you can only use only one of these two ports at a time: these ports are called **shared ports**.

If your new hub or switch also has an **Uplink** port, it too can be uplinked when you next run out of ports, and so on.

Use the Router's **Uplink** port to connect to a standard port on a hub or switch. This leaves you with new, open ports on the hub or switch, to which you can add more PCs and/or network devices.

See *www.linksys.com* for complete product lines of 10/100 Mbps hubs and switches.

Configuring Your Router's USB Port

Now that all of your Router's hardware is connected together, you must enable the PC that is connected to the Router through its USB port.

Since your Router acts as a network adapter for your PC, there's no need for you to install a USB adapter for that PC. Just follow the directions below to enable your PC's USB connection to the Router:

• If you are running Windows 98, continue on this page, below.
• If you are running Windows 2000, go to page 26.
• If you are running Windows Millennium, go to page 29.

> After you finish this configuration, make sure that TCP/IP is installed on your PC(s). For instructions on installing TCP/IP, see page 65.

You can also connect your Router's USB port to other USB devices besides USB-ready PCs, such as USB hubs.

USB Installation for Windows 98

1. Start up your PC in Windows 98.

2. Windows will display a message saying that it has detected new hardware. Click **Next**.
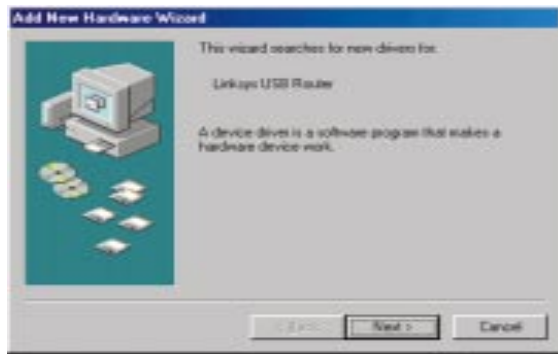
3. Select "Search for the best driver for your device (Recommended)." Click **Next**.

4. Select "Floppy disk drives" and click **Next** to start the search for your driver.

5. A new window will appear, saying that Windows is now ready to install the best driver for this device. Click **Next** to continue.

6. Windows will begin copying the files to your PC. Do not click **Cancel** or press the **Esc** key during this process.

    If Windows asks for your Windows operating system files before copying, direct your PC to the location of those files, e.g, **c:\windows\options\cabs**, or **D:\Win98** (assuming that your CD-ROM drive is named D).
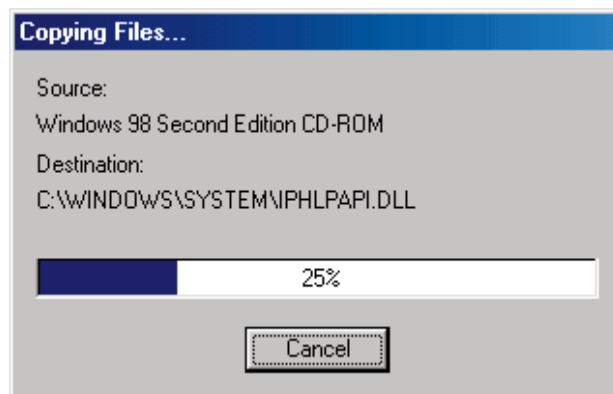
7. Windows will notify you that it has completed copying the driver files to your PC. Click **Finish**.
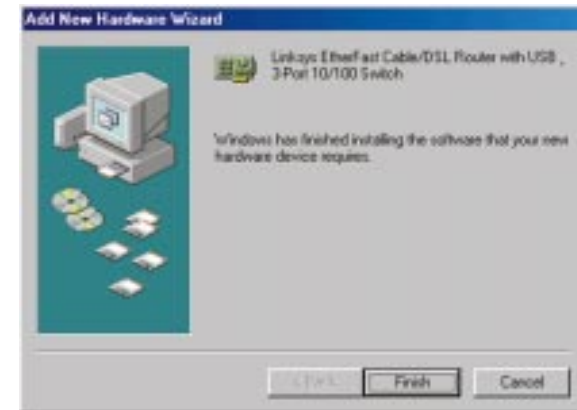
8. Windows will ask you if you want to restart your PC. Click **Yes** so your new installation will take effect.

    If it does not ask you, go to **Start**, **Shut Down**, then select **Restart** and click **Yes**.
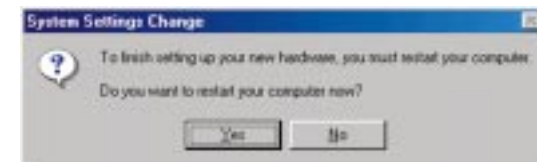
Your USB installation is now complete.
Go to page 33 to configure your network
to work with the Router.

USB Installation for Windows 2000

1. Start up your PC in Windows 2000. Windows will show a message notifying you that the PC has found new hardware. Windows' Hardware Wizard will show a message to say that it is ready to start installing the driver files to your PC. Click **Next**.

2. Select "*Search for a suitable driver for my device (Recommended)*" and click **Next**.
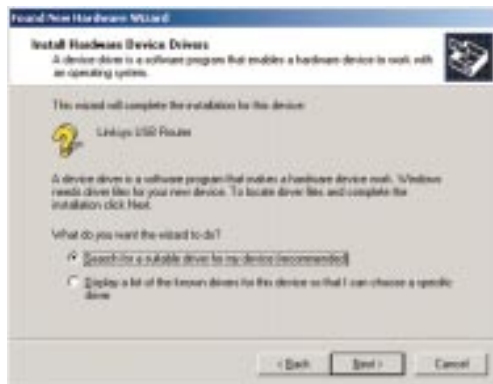
3. When Windows asks you where to search for driver files, select "Floppy Disk Drives" and click **Next**.

4. Windows will show a message saying that it has found the driver files. Click **Next**.
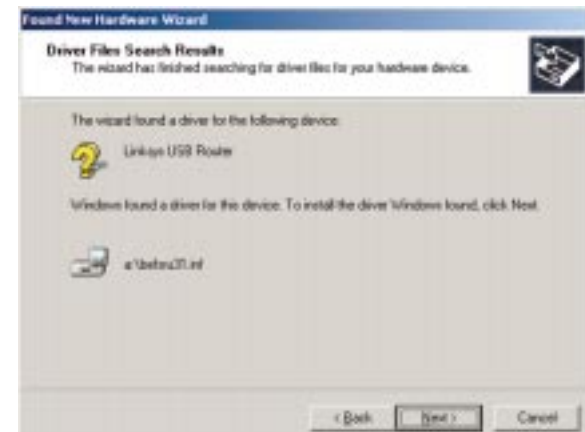
4. Windows will ask you if you want to continue with the installation. Click **Yes**.

5. Windows will copy the driver files to your PC.

   If Windows asks for your Windows operating system files before copying, direct your PC to the location of those files, e.g, `c:\windows\options\cabs`, or `D:\Win98` (assuming that your CD-ROM drive is named D).


6. Windows will display a message saying that it has finished installing the driver files on your PC. Click **Finish**.

7. Go to **Start**, **Settings**, **Control Panel**, and **Network** to display the screen below. Make sure that TCP/IP is installed for this PC.
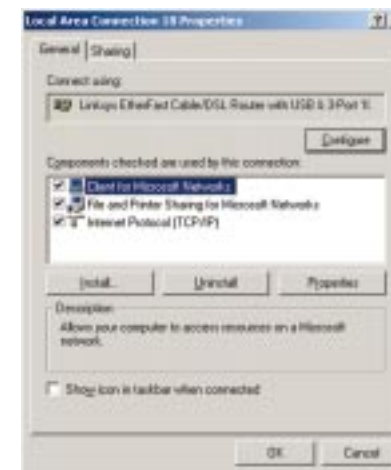

> **Your USB installation is now complete.**
> Go to page 33 to configure your network
> to work with the Router.

USB Installation for Windows Millennium

1. Start up your PC in Windows Millennium.
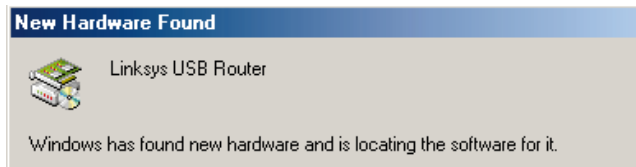
2. Windows will notify you that new hardware has been detected (shown above). Select "*Automatic search for a better drive (Recommended)*" and click **Next**.

3. Windows will notify you that it is ready to install the driver file on to your PC. Select "Specify a location" and type in "a:\Win98" in the field. Click **Next** to continue.
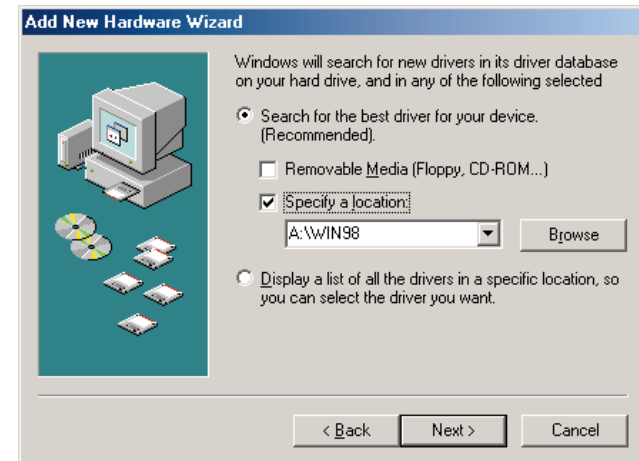
4. Windows will complete its search for driver files. Click **Next** to begin installing the files.

5. Windows will display a message saying that it has finished installing the driver files on your PC. Click **Finish**.

7. When your PC is finished restarting, click on **Start**, **Settings**, **Control Panel**, and **Network**. Make sure that TCP/IP is installed for your PC.
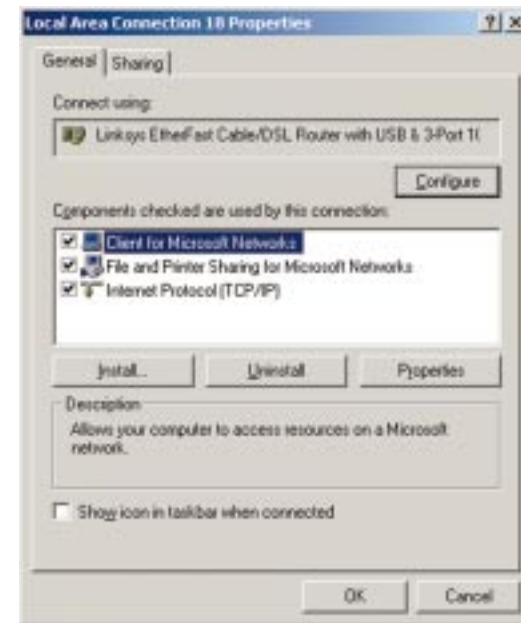
6. Windows will ask you to restart your PC. Click **Yes**.

> **Your USB installation is now complete.**
> Go to page 33 to configure your network
> to work with the Router.

Configuring Your Network with the Cable/DSL Router

Configuring the Cable/DSL Router

Now that your Cable/DSL Router is connected to your network, you can begin configuring your Router.

> **IMPORTANT!** *If you have previously enabled any* **Internet-sharing proxy server software** *on any of your PCs, you must disable it now. Some examples of proxy server software are Internet LanBridge, Wingate, and Sygate. To disable your proxy server software:*
>
> • *If you are running Netscape Navigator: Click* **Edit** *>>* **Preferences** *>>* **Advanced** *>>* **Proxies**> *and click* **Direct Connection to the Internet**.
>
> • *If you are running Internet Explorer, click* **Start**>> **Settings**>> **Control Panel**>> **Internet Options**>> **Connections**>> **LAN Settings**. *Remove the checks from all three boxes. Click* **OK** *to continue.*
>
> *Also, you must disable any* **Internet log-on software** *(such as Ivasion Winpoet or Enternet 300) and any* **firewall software** *(such as ZoneAlarm and Watchdog) on all of your PCs.*

1. Make sure that each of your PCs has the TCP/IP protocol configured. Otherwise, see page 64 now to do so, before configuring your Router.

2. **Open your web browser** and type `http://192.168.1.1` in the browser's Address field. This number is the default IP address of your Router. Press **Enter**.

---

3. **A username and password prompt** will appear. Leave the User Name field empty and type `admin`, which is the default password, into the **Password** box. Click **OK**.

4. **The Cable/DSL Router's Setup page** will appear.

5. **Configure the following values**:

Host Name & Domain Name These fields allow you to give a Host and Domain name for the Router. Some ISPs require these names as identification. You may have to check with your ISP to see if your broadband Internet service has been configured with Host and Domain names. In most cases, leaving these two fields blank will still work.

LAN IP Address These values refer to your internal network settings. Unless you have specific internal needs, there should be no reason to change these values. For the internal LAN side, the Router's default values are as follows:

- Private IP Address: 192.168.1.1
- Subnet Mask: 255.255.255.0

WAN IP Address These values refer to the external network (the Internet) you connect to every time you access your Internet connection.

Most broadband ISPs assign their clients to a different IP address each time they log on. If this is the case with your ISP, select **Obtain an IP Address Automatically** and go to step 5.

If your ISP assigns you a fixed, static IP address, select **Specify an IP Address** and enter the appropriate values into the **IP Address**, **Subnet Mask, Default Gateway Address** and **DNS (Required)** fields provided by your ISP.

If you need to enable PPPoE support, choose **Enable**. If you do enable PPPoE, remember to remove any existing PPPoE applications already on any of your PCs. More information on *PPPoE* can be found on page 41.

6. When you have properly configured the Setup window, click **Apply**, then click **Continue**.

7. **Select the DHCP tab**.

8. DHCP is already enabled on your Router by factory default. By leaving the setting on **Enable**, the Router is configured to automatically assign IP addresses to each of your PCs.

Optional: In the *Number of DHCP Users* field, enter the number of PCs you plan on networking to the Router. If you add more PCs to your network in the future, don't forget to change this value.

If you already have a DHCP server on your network, select **Disable** for the *DHCP Server* option. If you do so, you must assign your Router a new static IP address.

9. Click **Apply**, then click **Continue**.

10. **Reset the power on the cable or DSL modem**, then restart the PC so the new Router settings will take effect.

Your Cable/DSL Router is now configured on your network. Continue on to the next section to complete your network setup.

Configuring PCs to Connect to the Cable/DSL Router

Now that your Router is configured, you will have to configure your other PCs to accept the IP addresses that your Router will provide.

Note: Make sure that a network card or adapter has been successfully installed in each PC you plan on configuring before continuing.

These instructions apply only to Windows 95 and Windows 98 machines. For TCP/IP setup under Windows NT, see your Windows NT manual.

1. Click the **Start** button, select **Settings**, then **Control Panel**.

2. Double-click on the **Network** icon.

3. In the **Configuration** window, select the **TCP/IP protocol** line associated with your network card/adapter. If there is no TCP/IP protocol line listed for your card/adapter, go to page 64 to install the TCP/IP protocol **now**.
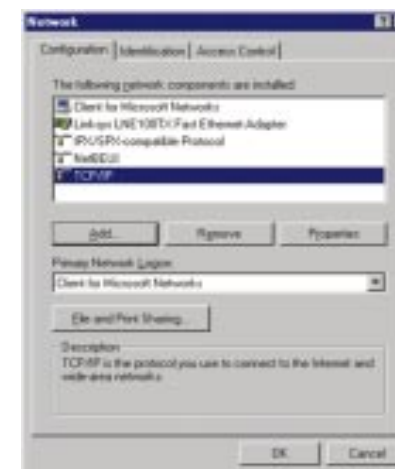
4. Click the **Properties** button, then choose the **IP Address** tab. Select **Obtain an IP address automatically**. Click **OK**.

You have now completed the PC's client settings, so it can connect to the Router.

5. Click **OK**. Windows may ask for original Windows installation files. Direct your PC to the location of the files, e.g., `D:\win98` or `D:\win95`, `c:\windows\options\cabs`.

6. Windows will ask you to restart the PC. Click **Yes**.

7. Repeat steps 1-6 for each PC on your network.

> **When all of your PCs are configured, the Cable/DSL Router Setup and Configuration is complete.**
>
> **If you want to learn more about the Router's Web-based Utility, proceed to the next section.**

The Cable/DSL Router's Web-based Utility

Quick & Easy Router Administration

The EtherFast Cable/DSL Router uses a web browser-based administrative Utility that is programmed into a chipset. All administrative tasks for the Router are performed through this Setup Utility. The Utility can be accessed through any PC on the network by typing `http://192.168.1.1` into the web browser's **Address** field (even if that PC does not yet have Internet access), shown below.

After entering the address value into the web browser, a password request page will pop up, shown below.

Leave the User Name field blank and type "**admin**" into the Password field.

In this section, you'll find brief descriptions of each web page in the Utility and each page's key functions. More detailed explanations and instructions can be found by clicking each page's **Help** button in your Router's Setup Utility.

To apply any settings you've changed on a page, click the **Apply** button, then click **Continue**. To clear any values you've entered on any page, click **Cancel**.

Setup

Note: *The Setup page in this picture may differ slightly from the one you see.*

The Basic Setup screen is the first screen you see when you access the Setup Utility. If you have already installed and set up your Router, you have already seen this screen and properly configured all of the screen's values.

- **Host Name** This entry is required by some ISPs.

- **Domain Name** This entry is required by some ISPs.

- **Firmware Version** This entry shows the version and date of the firmware you are using. Future versions of the Router's firmware will be posted and available for download on the Linksys Web site.

- **LAN IP Address and Subnet Mask** The IP Address and Subnet Mask of the Router as it is seen on the internal LAN. The default value is 192.168.1.1 for the IP address and 255.255.255.0 for the Subnet Mask.

- **WAN IP Address** This is the IP address that your Router has, when seen from the external WAN, or the Internet.

- **MAC Address Cloning** Click on "MAC Address" (next to WAN IP Address) to display your Router's **MAC address**, which is a 12-digit code assigned to a unique piece of hardware for identification, like a social security number. Some ISPs require that you register the MAC address of your network card/adapter, which was connected to your cable or DSL modem during installation. If your ISPs require MAC address registration, find your adapter's MAC address by doing the following:

- If you are running Windows 98:

  Go to **Start**, **Run**, type in "command," and press **Enter**. At the DOS prompt, type "winipcfg."

- If you are running Windows 2000 or Millennium:

  Go to **Start**, **Run**, type in "command," and press **Enter**. At the DOS prompt, type "ipconfig/all." The "Physical Address" with 12 digits is your Router's MAC address.

  Enter those 12 digits into the fields below, and click **Apply**. This "clones" your network adapter's MAC address onto your Router, and prevents you from having to call your ISP to change the registered MAC address to the Router's MAC address.

Note: This is a sample screen. Please enter the MAC Address for your Network Card/Adapter into this field.

- **Subnet Mask** This is the Router's Subnet Mask, as seen by external users on the Internet (including your ISP). If you select "Obtain an IP address automatically," your ISP will assign these values.

- **Default Gateway Address** Your ISP will provide you with the Default Gateway IP Address. If you select "Obtain an IP address automatically," your ISP will assign these values.

- **DNS (Domain Name Server) IP Address** Your ISP will provide you with at least one DNS Server IP Address. If you select "Obtain an IP address automatically," these values will be assigned by your ISP.

> You can check whether the values you entered for the above settings are correct by testing your Internet access.

- **PPPoE (Point-to-Point Protocol over Ethernet)** Some DSL-based ISPs use PPPoE to establish communications with an end-user. If you are using a DSL line, check with your ISP to see if they use PPPoE. If they do use PPPoE, you must enable it. To enable PPPoE:

  1. Click on the **Enable** option in the PPPoE section of the *Setup* screen.
  2. Enter the **User Name** you use to log on to your Internet connection.
  3. Enter your corresponding **Password**.

- **Connect on Demand** If you aren't actively using the Internet, you can configure your Router to cut your connection with your ISP after a certain period of time. If you have been disconnected due to inactivity, *Connect on Demand* enables your Router to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate *Connect on Demand*, choose the **Enable** option.

- **Max Idle Time** *Max Idle Time* is the number of minutes that passes before the Router drops your Internet connection, due to inactivity. If you want your Internet connection to remain on at all times, enter zero (**0**) in this field and click **Apply**. Otherwise, enter in the number of minutes you want to elapse before your Internet access disconnects.

- **Keep Alive Option** This option keeps your PPPoE-enabled Internet access connected indefinitely, even when it sits idle. It keeps the connection alive by sending out a few data packets periodically, so your Internet service thinks that the connection is still active. To use this option, click on the box next to Keep Alive to select it, and click **Apply**.

Password

It is **strongly** recommended that you set a password for the Router. When you first power up the Router, there is no default Password setting assigned.

If you leave the password field blank, all users on your network will be able to access the Router simply by entering the unit's IP address into their web browser's location window.

> If you select the Restore Factory Default option and click **Apply**, you will clear all of the Router's settings.
>
> Do not restore the factory defaults unless you are having difficulties with the Router and have exhausted all other troubleshooting measures. Once the Router is reset, you will have to re-enter all of your configuration data.

Status
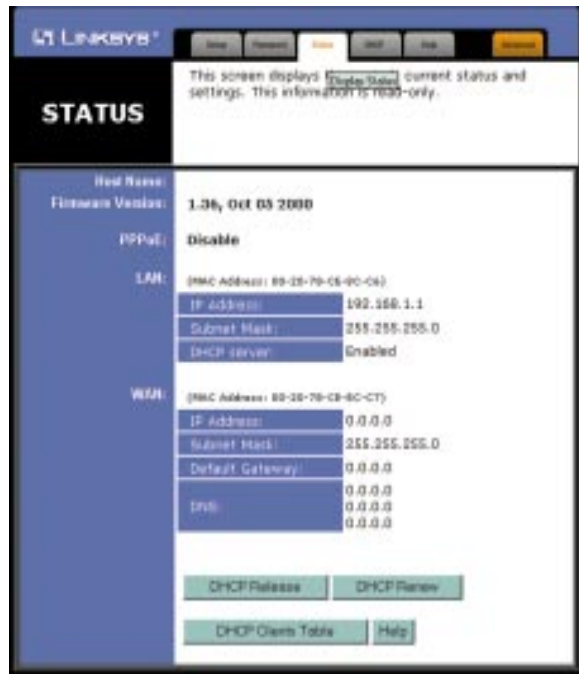
This tab displays the current status of the Router; it reflects the data and selections you've entered under the Setup tab.

All of the information provided on this screen is read-only. To make changes, select the Setup tab.

• **Host Name** This field shows the name of your Router. This entry is necessary for some ISPs.

• **Firmware Version** This field shows the installed version and date of the firmware. Version dates are slightly more accurate than version numbers.

• **PPPoE (Point-to-Point Protocol over Ethernet)** This field shows whether you have enabled the use of the Router's PPPoE support.

• **LAN** These fields display the current IP Address and Subnet Mask of the Router, as seen by users on your internal network.

DHCP Server This field shows the status of the Router's DHCP server function, which is either enabled or disabled.

• **WAN** These fields display the WAN IP Address, WAN Subnet Mask and WAN Default Gateway IP address of the Router, as seen by external users on the Internet.

DNS (Domain Name System) IP Address These fields show the IP Address(es) of the DNS currently used by the Router. Multiple DNS IP settings are common. In most cases, the first available DNS entry is used.

DHCP
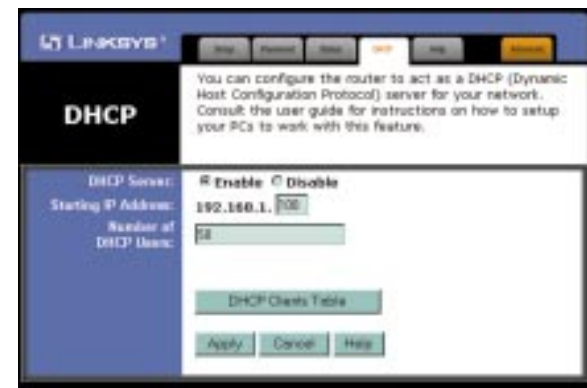
A DHCP (Dynamic Host Configuration Protocol) server automatically assigns IP addresses to each PC on your network for you. Unless you already have one, it is highly recommended that you leave your Router enabled as a DHCP server.

• **DHCP Server** DHCP is already enabled by factory default. If you already have a DHCP server on your network, set the Router's DHCP option to **Disable** and click **Apply**. If you disable DHCP, remember to assign a static IP address to your Router.

• **Starting IP Address** Enter a value for the DHCP server to start with when issuing IP addresses. This value must be (192.168.1.) 2 or greater, because the default IP address for your Router is *192.168.1.1*.

• **Number of DHCP Users** (Optional) Enter the maximum number of PCs that you want the DHCP server to assign IP addresses to. This number cannot be greater than 253.

• **DHCP Clients Table** Click on the **Clients Table** button to show the current DHCP Client data. (This data is stored in temporary memory and changes periodically).

Help
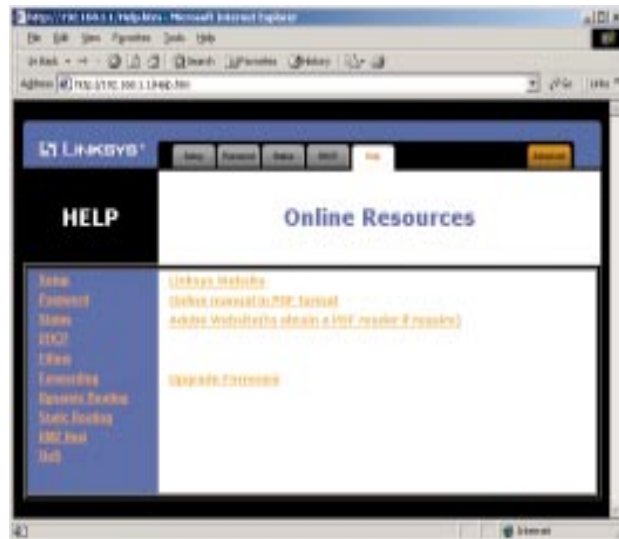
Under the Help tab, you'll find links to all of the Utility's internal support documentation, including the application that upgrades the Router's firmware.

New firmware versions are posted on www.linksys.com, and can be downloaded for free. If your Router can access the Internet already, there's no need to download a newer firmware version, unless that version has a new feature that you want to use. "Flashing," or loading new firmware onto your Router does not enhance the speed or the quality of your connection speed.

See page 48 for directions on enabling remote firmware upgrades (IP Filtering).

To upgrade the Router's firmware:

1. Select the *Help* tab (shown on the previous page).

2. Click on **Upgrade Firmware** to display a new window (shown below):
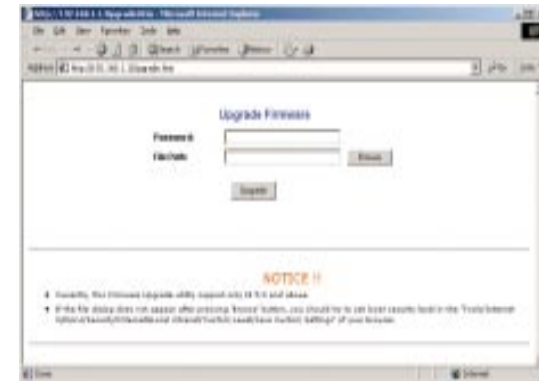
3. Enter your Router's administration password into the *Password Confirm* field.

4. Click the **Browse** button to find the firmware upgrade file that you downloaded from the Linksys Web site.

5. Double-click the **Upgrade file**. Click on the **Upgrade** button and follow the instructions there.

IP Filtering
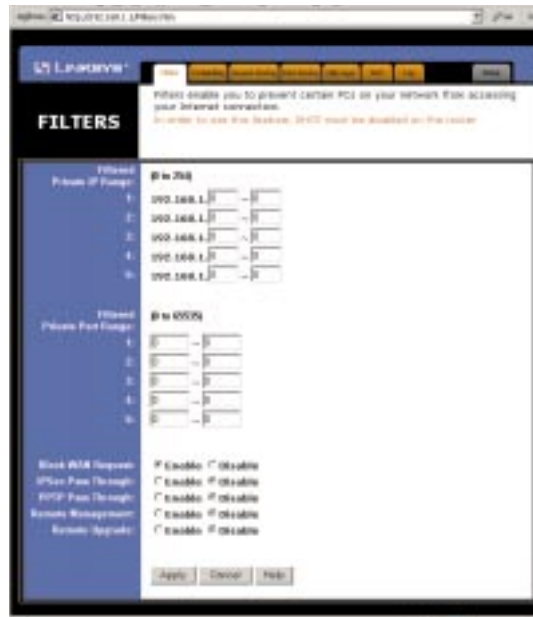
IP Filters block specific internal users from accessing the Internet and enable VPN (Virtual Private Network) sessions. You can set up filters by using IP addresses or network port numbers (or a range of ports).

> Note: Only *one* VPN session may be conducted at a time.

Setting Up Filters

• To set up a filter using IP addresses, enter the range of IP addresses you wish to filter into the IP address fields. Users who have filtered IP addresses will not be able to access the Internet at all. If you only want to filter one IP address instead of a range of IP addresses, enter the same value into both fields. For instance, if you wish to filter the PC with the IP address of 192.168.1.5, enter **5** into both fields on one line: 192.168.1.**5**~ 192.168.1.**5**. Click **Apply** when you're done.

• To filter users by network port number, enter a network port number or a range of network ports. Enter the port numbers you want to filter into the port numbers fields. Users connected to the Router will no longer be able to access any port number listed there.

Blocking WAN Requests

• By enabling the *Block WAN Request* feature, you can prevent your network from being "**pinged**," or detected, by other Internet users. The *Block WAN Request* feature also reinforces your network security by hiding your network ports. Both functions of the *Block WAN Request* feature make it more difficult for outside users to work their way into your network.

• Click the **Apply** button to save your changes.

Using IPSec Pass Through

• This feature lets you use IPSec Pass Through. To use this feature, click on **Enable** next to "IPSec Pass Through," then click on **Apply**.

• To disable IPSec Pass Through, click on **Disable** and then click on **Apply**.

Using PPTP Pass Through

• Point-to-Point Tunneling Protocol is the method used to enable VPN (Virtual Private Networking) sessions. To enable this feature, click on **Enable** next to PPTP Pass Through, and then click **Apply**.

• To disable this feature, click on **Disable** next to PPTP Pass Through, and then click **Apply**.

Using Remote Management

> **Remote Management** and **Remote Upgrades** must be activated <u>before</u> you leave to a remote location.

• This feature allows you to manage your Router from a remote location, via the Internet. To enable this feature, click on **Enable,** then click on **Apply**.

• To disable Remote Management, click on **Disable**, then click on **Apply**.

Using Remote Upgrade

• This feature allows you to "flash," or upgrade, your Router's firmware from a remote location. To enable Remote Upgrade, click on **Enable**, then click on **Apply**.

• To disable this feature, click on **Disable**, then click on **Apply**.

IP Forwarding

Dynamic Routing
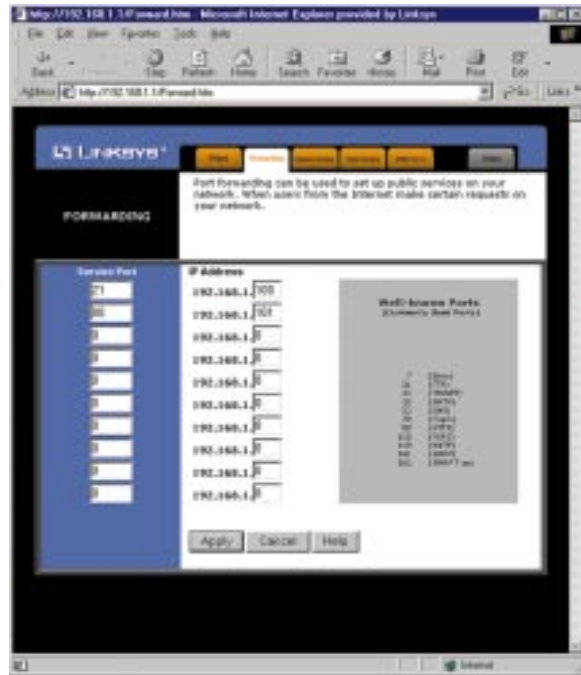
Forwarding sets up public services on your network, such as web servers, ftp servers, or email servers.

When users send this type of request to your network via the Internet, the Router will forward those requests to the appropriate PC. Before using Forwarding, the Router's DHCP function must be disabled under the DHCP tab and the Router must be assigned a new static LAN IP address.

If you need to forward all ports for one PC, use DMZ Hosting.

 To add a server using Forwarding:

1. Enter the port number or range of ports used by the server. On the same line, enter the LAN IP address of the server that you want the Internet user(s) to access.

2. Configure as many entries as needed- the Router supports up to 10 ranges of ports. Click **Apply** when you're done.

With Dynamic Routing, you can automatically adjust to physical changes in the network's layout. 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. The RIP protocol regularly broadcasts routing information to other routers on the network.

To set up dynamic routing:

1. Select the correct working mode. **Gateway Mode** should be used if your Router is hosting your network's connection to the Internet. **Router Mode** should be selected if the Router exists on a network with other routers.

2. Select the **protocol** by which you transmit data on the network.

3. Select the **protocol** by which the Router receives network data.

4. Click the **Apply** button to save your changes.

Static Routing

If your Cable/DSL Router is connected to more than one network, you may have to set up a static route between the two networks. A static route is a pre-determined pathway that network data packets must travel to reach a specific host or network. Click the **Show Routing Table** button to view the current static routing configuration.

To create a static route entry:

1. Select **Static Route Entry** from the drop-down list. The Cable/DSL Router supports up to 20 static route entries.

2. Enter the following data to create a static route:

Destination LAN IP The Destination LAN IP address is the Address of the remote network or host to which you want to assign a static route. Enter the IP address of the host for which you wish to create a static route here. If you are establishing a route to an entire network, be sure that the network portion of the IP address is set to zero (**0**).

For example, the Router's standard IP address is 192.168.1.1. Based on this address, the address of the network to which the Router is connected is 192.168.1, with the last digit (1, in this case) determining the Router's place on the network. Therefore, you would enter the IP address 192.168.1.0 if you wanted to route to the Router's entire network, rather than to just the Router.

Subnet Mask The Subnet Mask (also called the Network Mask) determines which portion of an IP address is the network portion and which portion is the host portion. In the example above, the Network Mask is 255.255.255.0. This determines (by using the values 255) that the first three numbers of an network IP address identify this particular network, while the last digit (from 1 to 254) would identify the specific host.

Default Gateway This IP address must be the IP address of the gateway device that allows for contact between the Router and the remote network or host.

Hop Count 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.

Interface Interface tells you whether your network is on the internal LAN or the WAN, or the external Internet. If you're connecting to a sub-network, select LAN. If you're connecting to another network through the Internet, select WAN.

3. Click **Apply** to save your changes.

DMZ Hosting

Logging

The DMZ Hosting feature allows one local user to be exposed to the Internet
to use a special-purpose service such as Internet gaming and video-confer-
encing.

Whereas IP Forwarding can only forward a maximum of 10 ranges of ports,
DMZ hosting forwards all the ports for one PC simultaneously.

• To expose one PC, enter the computer's IP address and click **Apply**.

• Deactivate DMZ by entering a zero (**0**) in the field and clicking **Apply**.

The Log feature provides you with a log of all incoming and outgoing URLs
or IP addresses for your Internet connection.

Outgoing Access Log lists all the URLS or IP addresses of Internet sites that
users on your network have accessed, and *Incoming Access Log* gives you a
log of all incoming Internet traffic.

This data can also be accessed by other network users if the file is shared out.

• To activate logging, click on **Enable** next to "Access Log."

• Enter in the IP address of the PC that you want to send the log to. Make
  sure that this PC is using a static IP address. Click **Apply** when you're
  done.

• Click on **Outgoing Access Log** or **Incoming Access Log** to view each log.

• To disable Logging, click on **Disable** in the Log window, then click **Apply**.

Troubleshooting

Common Problems and Solutions

This section provides possible solutions to problems regarding the installation and operation of the Cable/DSL Router. Read below description to solve your problems. If you can't find an answer here, check the Linksys website at www.linksys.com.

1. I can't connect to the Cable/DSL Router.
- Check to see that the Cable/DSL Router is properly installed, the LAN connections are OK (Link LEDs should be on), and it is powered ON.
- Make sure that your PC and the Router are on the same network segment. If you are not sure, initiate the DHCP function and let the PC get the IP address automatically.
- Make sure that your PC is using an IP address between 192.168.1.2 to 192.168.1.254 and thus compatible with the Cable/DSL Router default IP address of 192.168.1.1.
- Also, the Subnet Mask must be set to 255.255.255.0 to match the Cable/DSL Router's Subnet Mask. You can check these settings for the Router by going to **Start**, **Settings**, **Control Panel**, and **Network**: check the *Properties* for the TCP/IP protocol.

2. The Diag LED stays lit when it should not be lit.
- The **Diag** LED lights up when the Router is first powered up. Meantime, the system will boot up itself and check for proper operation. After finishing the checking procedure, the LED turns off to show the system is working fine. If the LED remains lit after this time, the device is not working properly. Try to re-flash the firmware by assigning a static IP address to the computer, then upgrade the firmware again. If that doesn't help, contact your dealer for further inspection.

3. I can't browse through the Cable/DSL Router.
- Check if both ends of the network cable and power adapter are properly connected. Check if the status LEDs on the front panel are functioning properly.
- If using Windows 95 or Windows 98, check the TCP/IP setup on the client side. Run "**winipcfg**" by clicking on the **Start** button, then selecting **Run**. The PC should have an IP address of 192.168.1.xxx ("xxx" is from 2 to 254.) Subnet Mask is 255.255.255.0, the default gateway IP

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should be the Router's IP Address, and DNS (in "More".)
- Same as above, check the same setup values in the Status Monitor page of the Cable/DSL Router.

4. When I enter a URL or IP address, I get a "Request timed out" error.
- Check to see if other PCs give you the same error message. If they do, make sure that your workstations' IP settings are correct: IP address, Subnet Mask, Default Gateway and DNS Server data.
- If the PCs are configured correctly but still not working, check the Cable/DSL Router. Make sure that it is connected and powered on. Connect to the Router and check its settings. If you cannot connect to it, check the LAN and power connections.
- If the Cable/DSL Router is configured correctly, check your Internet connection. (DSL/cable modem, etc.) to see that it is working correctly.

5. I can't obtain an IP address from my cable or DSL modem.
- Make sure that all of your cabling is properly connected and that all of the Router's **WAN** and **LAN** LEDs are lighting up.
- Power down your cable or DSL modem for a few seconds. Turn it back on. After the modem goes through its self-test, check to see if you now have an IP address.
- Make sure that your cable or DSL modem is DHCP-capable.
- You may have to enter the Host or Domain name in the Setup page of the Router's web-based utility. Go to page 33 for more information.
- Your ISP may require MAC Addresses. Check with your ISP. This address can be obtained in the Status screen of the Router's Web-based Utility.

6. I can't access my email or the Internet.
- Some ISPs,especially cable providers, configure their networks so that you don't have to enter a full Internet address into your web browser or e-mail application to reach your home page or receive your e-mail.
- If your Internet home page address is something very simple, such as "www", instead of "www.linksys.com", or your e-mail server's address is something like "e-mail" or "pop3", instead of "pop.mail.linksys.com," you won't be able to properly configure your Cable/DSL Router until you determine the actual Internet addresses of your Web and e-mail connections.
- You must obtain this information before connecting the Router to your network. To do so, you can ask your ISP, or turn to page 61 to learn how to find this data yourself by "pinging" your Router for an IP address.

Frequently Asked Questions

How many IP addresses can the Cable/DSL Router support? The Router supports a maximum of 253 IP addresses.

Is IPSec Pass-Thru supported by the EtherFast Cable/DSL Router? Yes, it is a built-in feature that the Router automatically enables.

Where is the Cable/DSL Router installed on the network? In a typical environment, the Router is installed between the Cable/DSL Modem and the LAN. Plug the Cable/DSL Router into the cable or DSL modem's Ethernet port.

Does the Cable/DSL 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 from LAN to LAN connections, but those protocols cannot connect from WAN to LAN.

Does the WAN connection of the Cable/DSL Router support 100Mbps Ethernet? Since broadband Internet connections like cable and DSL do not exceed 10Mbps, the Cable/DSL Router's current hardware design only supports 10Mbps Ethernet on its WAN port. It does support 100Mbps through the built-in auto-sensing Fast Ethernet 10/100 Switch on the LAN side of the Router. (for the 3 and 4-Port Routers only)

What is Network Address Translation (NAT) 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 network security since the addresses of PCs connected to the private LAN is never transmitted over the Internet. Furthermore, NAT allows the Cable/DSL Router to be used with low-cost Internet accounts, such as DSL or cable modems, where only one TCP/IP address is provided by the ISP. The user may have 253 private addresses behind this single address provided by the ISP.

Does the Cable/DSL Router support any operating system other than Windows 95, Windows 98, Windows 2000, or Windows NT? Yes, but Linksys does not provide technical support for setup, configuration or troubleshooting of any non-Windows operating systems at this time.

Does the Cable/DSL Router support ICQ send files? Yes, with the following fix: ICQ menu-> preference -> connections tab-> check "I am behind a firewall or proxy," and 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.

How do I get Napster to work with the Router? Napster is fully compatible with the Router and requires no special settings.

I set up an Unreal Tournament server, but others on the network cannot join. What do I do? If you are running a dedicated Unreal Tournament server, you must create a static IP address for each of the network's PCs and forward ports 7777, 7778, 7779, 7780, 7781, and 27900 to the IP address of the server. If you want to use the UT Server Admin, forward another port (8080 usually works well), 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 log on to one game server and play simultaneously with just one public IP address? It depends on which network game you're playing, and/or what kind of game server you are using. For example, Unreal Tournament does support multi-login with just one public IP address.

How do I get *Half-Life: Team Fortress* to Work with the Router? The default client port for Half-Life is 27005. The PCs on your LAN must have "+clientport 2700x" to the HL shortcut command line; the x would be 6, 7, 8, and on up. This lets multiple PCs connect to the same server.

One exception: Version 1.0.1.6 won't let multiple PCs with the same CD key connect at the same time, even if they're on the same LAN (not a problem with Version 1.0.1.3). For hosting games, the HL server does not need to be in the DMZ. Just forward port 27015 to the local IP of the server PC. There remains, however, a problem with people being booted after a few minutes with an "illegible server" message.

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.

My Web pages hang (distorted), I get corrupted downloads, or nothing but junk characters are being displayed on the screen. What do I do? Force your NIC

to 10Mbps or half duplex mode, and turn off the "Autonegotiate" feature on it temporarily. (To do this, go to the Network **Control Panel**, in your Ethernet Adapter's Advanced Properties tab). Check our web site 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 at least three seconds and reset your cable or DSL modem by powering the unit off and then on. Obtain and flash (upload) the latest firmware release available on the Linksys website, www.linksys.com.

How will 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 downloaded for free. The Router's firmware can be upgraded with TFTP programs. If your Router's Internet connection is working well, there is no need to download a newer firmware version, unless that version contains 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.

Does the Cable/DSL Router support IPsec? A new IPsec Pass Through features is now available in firmware versions 1.30 and later, which can be downloaded at www.linksys.com.

Does the Router function in a Macintosh environment? Yes, but the Router's setup pages are accessible only through Internet Explorer v4.0 or Netscape Navigator v4.0 or higher for Macintosh PCs.

What type of firewall does the Router have? The Cable/DSL Router uses NAT (Network Address Translation) and TCP/IP port inspections.

Does the Router do stateful packet inspection? No.

I cannot get the web configuration screen for the Router. What can I do? You may have forgotten to remove the proxy server settings on your Internet browser, e.g., Netscape Navigator or Internet Explorer. Or, remove the dial-up settings on your browser. Check your browser documentation.

What is DMZ Hosting? Demilitarized Zone (DMZ) allows one IP address (or 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 address if you want to use DMZ Hosting.

If DMZ Hosting is used, does the exposed user/PC share the public IP address with the Router? No.

Does the Router pass PPTP packets or actively route PPTP sessions? The Router allows PPTP packets to pass through.

What is the maximum number of users supported by the Router? The Router supports up to 253 users.

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 520 sessions at the same time, but you can only forward 10 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? This Router is compatible with virtually any cable or DSL modem that supports Ethernet.

What are the advanced features of the Router? The Router's advanced features include IP Filtering, IP Forwarding, Dynamic Routing, Static Routing, DMZ hosting, and Logging.

What is the maximum number of VPN sessions allowed by the Router? One VPN session at a time.

How big is the memory buffer on the Router? 512KB.

Does Linksys provided syslog support? No, Linksys does not currently provide syslog support.

How can I check whether I have static or DHCP IP Addresses? Consult your ISP to obtain this information.

How do I get mIRC to work with the Router? Under the Fowarding tab, set port forwarding to 113 for the PC on which you are using mIRC.

Appendix

How to Ping Your ISP's E-mail & Web Addresses

Almost all Internet addresses are configured with words and characters, i.e., *www.linksys.com*, *www.yahoo.com*, etc. However, these Internet addresses are actually assigned to **IP addresses**, numerical values which are the true addresses on the Internet.

For example, www.linksys.com is actually 206.135.116.3. Type it into your web browser and you will bring up the Linksys home page every time.

However, IP and web addresses are sometimes long and hard to remember. Because of this, certain ISPs will shorten their server addresses to single words or codes on their customers' web browser or e-mail configurations.

If your ISP's e-mail and Web server addresses are configured with single words ("www", "e-mail", "home", "pop3", etc.) instead of complete Internet addresses or IP addresses, your Router may have problems sending or receiving email and accessing the Internet. This happens because your Router has not been configured by your ISP to accept their abbreviated server addresses.

The solution is to find the true web addresses behind your ISP's code words. You can find these IP and web addresses of your ISP's servers by "**pinging**" them.

⚠️ **If you do not have your ISP's web and e-mail IP addresses, you *must* either get them from your ISP or follow these steps *prior* to connecting your Cable/DSL Router to your network.**

Step One: To Ping an IP Address

The first step to determining your ISP's web and e-mail server address is to ping its IP Address.

1. **Power on the PC and the cable or DSL modem**, and restore the network configuration set by your ISP if you have since changed it.

2. **Click Start**, then **Run,** and type "command" to bring up the DOS window.

3. **At the DOS command prompt**, type "ping mail" (assuming that the location for which you're trying to find an IP address is configured as "mail"). Press **Enter**. Information such as the following data, taken from a ping of Microsoft Network's email server, will be displayed.

```
C:\>ping mail

Pinging mail [24.53.32.4] with 32 bytes of data:

Reply from 24.53.32.4: bytes=32 time<10ms TTL=128
Reply from 24.53.32.4: bytes=32 time<10ms TTL=128
Reply from 24.53.32.4: bytes=32 time<10ms TTL=128
Reply from 24.53.32.4: bytes=32 time<10ms TTL=128

Ping statistics for 24.53.32.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
  loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

4. **Write down the IP address returned by the ping command**. (In the example above: 24.53.32.4.) This IP address is the actual IP address of the server "mail", or any other word or value you have pinged.

Step Two: Pinging for a Web Address

While the IP address returned above would work as your e-mail server address, it may not be permanent. IP addresses change all the time. Web addresses, however, usually don't. Because of this, you're likely to have less problems by configuring your system with web addresses rather than IP addresses. Follow the instructions below to find the web address assigned to the IP address you just pinged.

1. **At the DOS command prompt**, type "ping -a 24.53.32.4", where 24.53.32.4 is the IP address you just pinged. Information such as the following data will be displayed.

```
C:\>ping -a 24.53.32.4

Pinging mail.msnv3.occa.home.com [24.53.32.4] with
   32 bytes of data:

Reply from 24.53.32.4: bytes=32 time<10ms TTL=127
Reply from 24.53.32.4: bytes=32 time<10ms TTL=127
Reply from 24.53.32.4: bytes=32 time<10ms TTL=127
Reply from 24.53.32.4: bytes=32 time<10ms TTL=127

Ping statistics for 24.53.32.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
   loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms
```

2. **Write down the web address returned by the ping command**. (In the example above: mail.msnv3.occa.home.com.) This web address is the web address assigned to the IP address you just pinged. While the IP address of "mail" could change, it is likely that this web address will not.

3. **Replace your ISP's abbreviated server address** with this extended web address in the corresponding Internet application (web browser, e-mail application, etc.).

Once you have replaced the brief server address with the true server address, your Router should have no problem accessing the Internet through that Internet application.

Installing the TCP/IP Protocol

Follow these instructions to install the TCP/IP protocol on one of your PCs *only* after a network card has been successfully installed inside the PC. These instructions are for Windows 95 and Windows 98. For TCP/IP setup under Windows NT, see your Windows NT manual.

1. Click the **Start** button. Choose **Settings**, then **Control Panel**.

2. Double-click on the **Network** icon to bring up your Network window. Select the **Configuration** tab.

3. Click the **Add** button**.**

4. Double-click on **Protocol**.

5. Highlight *Microsoft* under the list of manufacturers.

6. Find and double-click **TCP/IP** in the list to the right (below)**.**
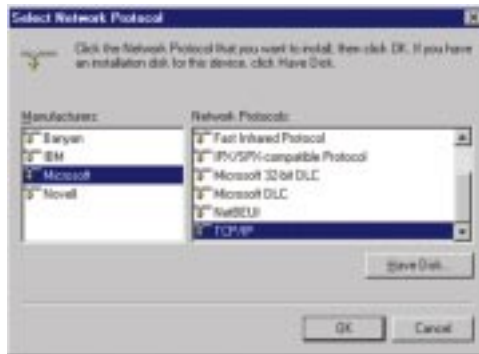
7. After a few seconds, the main Network window will appear. The TCP/IP
   Protocol should now be listed.

8. Click **OK**. Windows may ask for original Windows installation files.
   Supply them as needed, e.g., D:\win98, D:\win95, c:\windows\options\cabs.

9. Windows will ask you to restart the PC. Click **Yes**.

The TCP/IP Installation is now complete.

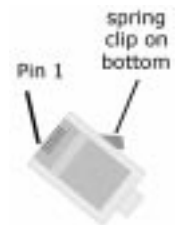### Twisted-Pair Cabling

There are different grades, or "categories," of twisted-pair cabling. Category
5 is the most reliable and most highly recommended. Category 3 is a good
second choice. Straight-through cables are used for connecting computers to a
hub. Crossover cables are used for connecting a hub to another hub (there is
an exception: some hubs have a built-in uplink port that is crossed internally,
which allows you to link or connect hubs together with a straight-through
cable instead).
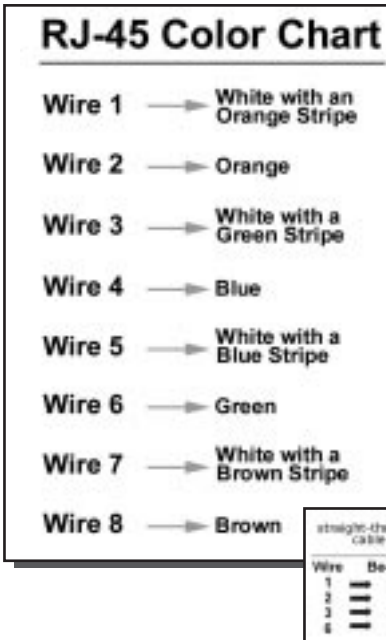
You can buy pre-made Category 5
cables, or cut and crimp your own.
Category 5 cables can be purchased or
crimped as either straight-through or
crossover. Inside a Category 5 cable
are 8 thin, color-coded wires inside
that run from one end of the cable to
the other. All 8 wires are used. In a
straight-through cable, wires 1, 2, 3,
and 6 at one end of the cable are also
wires 1, 2, 3, and 6 at the other end. In
a crossover cable, the order of the
wires change from one end to the
other: wire 1 becomes 3, and 2
becomes 6. See the diagrams on the
next page for more
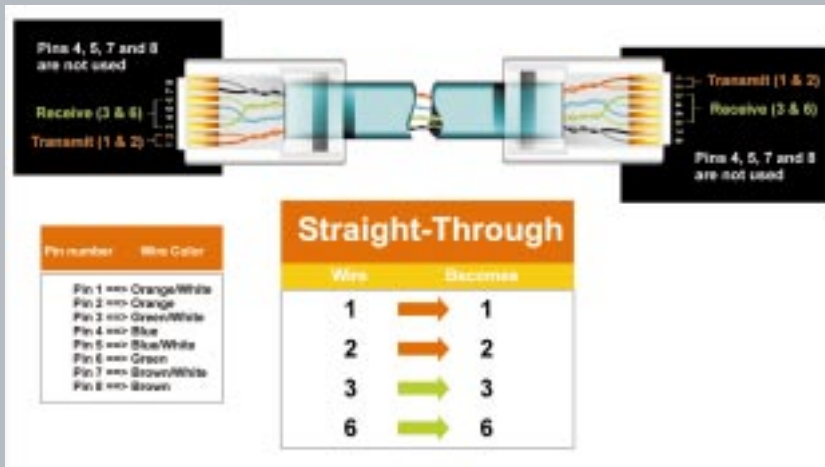detailed information on
straight-through and

crossover cabling.

To determine which wire is wire number 1, hold the cable
so that the end of the plastic RJ-45 tip (the part that goes
into a wall jack first) is facing away from you. Face the
clip down so that the copper side faces up (the springy clip
will now be parallel to the floor). When looking down on
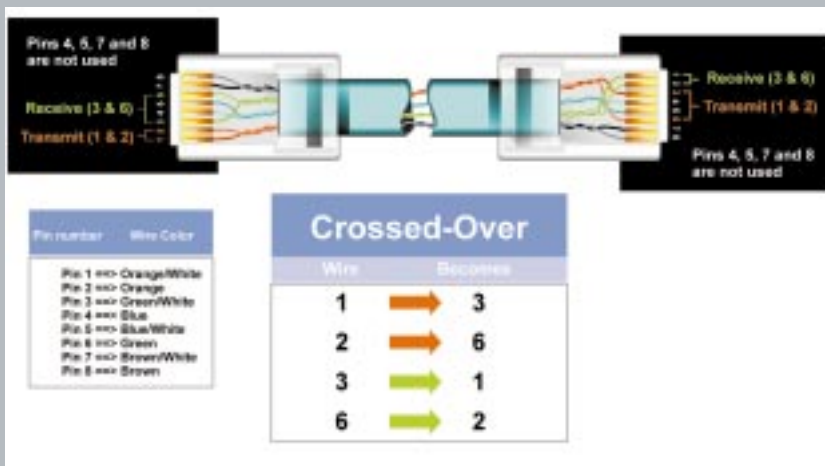the copper side, wire 1 will be on the far left.

Crimping Your Own Network Cables

• Straight-Through Cabling

Pins 4, 5, 7 and 8 are not used

Receive (3 & 6)

Transmit (1 & 2)

Transmit (1 & 2)

Receive (3 & 6)

Pins 4, 5, 7 and 8 are not used

Pin number	Wire Color
Pin 1 ==> Orange/White
Pin 2 ==> Orange
Pin 3 ==> Green/White
Pin 4 ==> Blue
Pin 5 ==> Blue/White
Pin 6 ==> Green
Pin 7 ==> Brown/White
Pin 8 ==> Brown

Straight-Through

Wire	Becomes
1	1
2	2
3	3
6	6

• Cross-Over Cabling

Pins 4, 5, 7 and 8 are not used

Receive (3 & 6)

Transmit (1 & 2)

Receive (3 & 6)

Transmit (1 & 2)

Pins 4, 5, 7 and 8 are not used

Pin number	Wire Color
Pin 1 ==> Orange/White
Pin 2 ==> Orange
Pin 3 ==> Green/White
Pin 4 ==> Blue
Pin 5 ==> Blue/White
Pin 6 ==> Green
Pin 7 ==> Brown/White
Pin 8 ==> Brown

Crossed-Over

Wire	Becomes
1	3
2	6
3	1
6	2

4-Port Router Specifications

Model Number	BEFSR41
Standards	IEEE 802.3 (10BaseT), IEEE 802.3u (100BaseTX)
Protocol	CSMA/CD
Ports	(LAN) Four 10/100 RJ-45 switched ports
	(WAN) One 10Base-T Ethernet RJ-45 port for the cable or DSL modem
Speed	(LAN) 10/100Mbps, (WAN) 10Mbps,
Cabling Type	(10BaseT) UTP Category 3 or better
	(100BaseTX) UTP Category 5 or better
Topology	Star
LED Indicators	Power,
	(LAN) Link/Act, Full/Coll, 100
	(WAN) Link, Act, Diag

Environmental Specifications

Dimensions	186mm x 154mm x 48mm (7.31" x 6.16" x 1.88")
Unit Weight	13.4 oz. (0.42 Kg)
Power Input	External, 9V AC, 1 Amp
Certifications	FCC Class B, CE Mark Commercial
Operating Temperature	0°C to 40°C (32°F to 104°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Operating Humidity	10% to 85%, Non-condensing
Storage Humidity	5% to 90%, Non-condensing

1-Port Router Specifications

Model Number	BEFSR11
Standards	IEEE 802.3 (10BaseT), IEEE 802.3u (100BaseTX)
Protocol	CSMA/CD
Ports	(LAN) One 10BaseT/100BaseTX RJ-45 port
	(WAN) One10BaseT Broadband Uplink port
Speed	(WAN) 10Mbps (10BaseT Ethernet)
	(LAN) 10Mbps (10BaseT Ethernet) or
	100Mbps (100BaseTX Fast Ethernet)
Cabling Type	(10BaseT) UTP Category 3 or better
	(100BaseTX) UTP Category 5 or better
Topology	Star
LED Indicators	Power,
	(LAN) Link/Act, Full/Coll, 100
	(WAN) Link, Act, Diag

3-Port Router Specifications

Model Number	BEFSRU31
Standards	IEEE 802.3 (10BaseT), IEEE 802.3u (100BaseTX)
Protocol	CSMA/CD
Ports	(LAN) Three 10/100 RJ-45 Switched ports
	(WAN) One 10Base-T Ethernet RJ-45 port
	for the cable or DSL modem
Speed	(LAN)10/100Mbps
	(WAN) 10Mbps
Cabling Type	(10BaseT) UTP Category 3 or better
	(100BaseTX) UTP Category 5 or better
Topology	Star
LED Indicators	Power
	(LAN) Link/Act, Full/Coll, 100
	(WAN) Link, Act, Diag
	(USB) USB

Environmental Specifications

Dimensions	186mm x 154mm x 48mm (7.31" x 6.16" x 1.88")
Unit Weight	12.6 oz. (0.35kg)
Power Input	External, 7.5V DC, 7Amps
Certifications	FCC Class B, CE Mark Commercial
Operating Temperature	0°C to 40°C (32°F to 104°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Operating Humidity	10% to 85%, Non-condensing
Storage Humidity	5% to 90%, Non-condensing

Environmental Specifications

Dimensions	186mm x 154mm x 48mm (7.31" x 6.16" x 1.88")
Unit Weight	13.4 oz. (0.42 Kg)
Power Input	External, 9V AC, 1 Amp
Certifications	FCC Class B, CE Mark Commercial
Operating Temperature	0°C to 40°C (32°F to 104°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Operating Humidity	10% to 85%, Non-condensing
Storage Humidity	5% to 90%, Non-condensing

Customer Support

For help with the installation or operation of your Instant Broadband EtherFast Cable/DSL Router, contact Linksys Customer Support at one of the phone numbers or Internet addresses below.

Information	800-546-5797 (1-800-LINKSYS)
Customer Support	800-326-7114
	949-261-1288
Fax	949-261-8868
Email	support@linksys.com
Web site	http://www.linksys.com
FTP site	fttp://ftp.linksys.com

www.linksys.com