

Linksys BEFCMUH4

Cable Gateway with 4-Port Switch/USB/HomePNA and 802.11b Wireless-Ready

Quick Guide

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FCC STATEMENT

The Linksys BEFCMUH4 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 interface in a residential installation. This equipment generates, uses, and can 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 measure:

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

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Chapter 1: Introduction

Overview

Thank you for purchasing the Linksys BEFCMUH4 Cable Gateway. The Linksys BEFCMUH4 provides the ideal solution for connecting your wireless network to a high-speed broadband Internet connection and a 10/100 Fast Ethernet backbone. Configurable as a DHCP server for your existing network, the Linksys BEFCMUH4 acts as the only externally recognized Internet gateway on your local area network (LAN) and serve as an Internet NAT firewall against unwanted outside intruders. The Linksys BEFCMUH4 can also be configured to filter internal users' access to the Internet.

A typical gateway relies on a hub or a switch to share its Internet connection, but the Linksys BEFCMUH4 channels this connection through the blazing, full duplex of its built-in 10/100 4-Port Switch. This cutting-edge combination of wireless router and switch technology eliminates the need to buy an additional hub or switch and extends the range of your wireless network. Now your entire wireless network can enjoy blazing broadband Internet connections supported by its robust switched backbone. With the dual-function speed and power of the Linksys BEFCMUH4, your network will take off at speeds faster than you ever imagined possible.

Software Features

DOCSIS Features

- Cable Modem (CM) is 1.0 and non 1.1 upgradeable
- Concatenation, Fragmentation, Payload Header suppression, IGMP and BPI and BPI Plus are supported features for DOCSIS 1.1
- 4/16/32/64/128/256/512/1024 QAM Downstream Receiver
- 2/4/8/16/32/64/128/256 QAM Advanced TDMA Upstream Transmitter
- Both IP and LLC filters are supported
- Sixteen (16) destination address filters and 256 multicast/unicast DA filters
- Sixteen (16) independent upstream queues for multiple QoS support

USB Features

- OS (Win2K, XP, WinME) supported for USB interface

Wireless Features

- Supports at least one beacon/DTIM interval of within the range 20-1000 μ s
- Supports reception of fragmented packets
- Supports reception of RTS and generation of CTS

Firewall Features

- Stateful Packet Inspection against both Denial of Service and Distributed Denial of Service attacks and will protect against the following:
 - Reassembly attacks
 - SYN Attack (SYN Flood)
 - ICMP Flood
 - Ping of Death Attack
 - Tear Drop Attack
 - IP Spoofing Attack
 - LAND Attack
 - Jolt
 - Winnuke Attack (Netbios out-of-bound)
 - OverDrop
 - BONK, BOINK
 - Blind Spoofing
 - Echo/Chargen
 - Storm
 - Smurf Attack
 - Mime Flood
- De-Militarized Zone (DMZ) which allows a computer on the LAN to expose all of its ports to the WAN that are not otherwise filtered
- Logged Events which all security incidents will be logged
- Keyword blocking is based on keywords in a URL and can be specified by the user

NAT Requirements

The implementation of NAT must allow for specific port redirection. Listed below are applications supported.

- FTP
- IRC
- H.323
- Quake
- Blizzard games
- Chat ALG
- Real Audio/Video
- CUSEEME
- Netmeeting
- MS Games but not with game zone
- DIABOLO II
- Activision Games
- PCAnywhere
- SSL
- NNTP
- Port Forwarding, incoming traffic that is not part of an existing connection will be dropped unless the user specifies forwarding of the server to a host on the LAN

Virtual Private Network (VPN) Feature

- Having the ability to enable or disable PPTP and IPsec pass through

Minimum Requirements

- ▶ One RJ-45 Broadband Internet connection, with a Cable Modem
- ▶ One PC with an installed 10Mbps, 100Mbps, or 10/100 Mbps Ethernet card (optional)
- ▶ TCP/IP network protocol for each PC
- ▶ UTP network cable with RJ-45 connector
- ▶ Microsoft Internet Explorer 4.0 or later, or Netscape Navigator 4.0 or later. (5.0 and 4.7, respectively, are strongly recommended.)
- ▶ Windows 95, 98, Millennium, NT 4.0, 2000 or XP

Package Contents

- ☒ {1} Cable Modem
- ☒ {1} AC Power adapter
- ☒ {1} CAT.5 Ethernet cable {RJ-45}
- ☒ {1} USB cable
- ☒ {1} User's Manual

Chapter 2: Using the Linksys BEFCMUH4

All interface and status LEDs are provided on the front panel. The power connectors, signal connectors, and Restore Factory Defaults/Reboot button are on the rear panel.

The Linksys BEFCMUH4's Rear Panel

The rear panel of the Linksys BEFCMUH4 is where all of the device's connections are made.



- | | |
|-------------------------|--|
| Power | The Power Port is where you will connect the included AC Power adapter. |
| HPNA | The Home PNA Port (RJ-11 connector). |
| USB | The USB Port. You can connect the Gateway to PC using USB line. |
| Ports 1-4 | These four LAN (Local Area Network) ports are where you will connect networked devices, such as PCs, print servers and any other Ethernet devices you want to put on your network. If Port 4 is being used, the Uplink Port will not work. |
| Cable | The Cable Line Port (Coaxial Copper). |
| Wireless PC Card | The Wireless Network PC Card is inserted into this slot to enable the wireless features. This slot is not hot swappable. |

The Reset Button

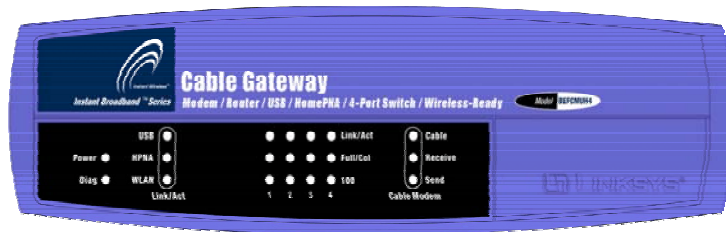
Briefly pressing the Reset Button will refresh the Gateway's connections, potentially clearing any jammed links.

Pressing the Reset Button and holding it in for a few seconds will clear all of

the Gateway's data and restore the factory defaults. This should be done only if you are experiencing heavy routing problems, and only after you have exhausted all of the other troubleshooting options. By resetting the Gateway, you run the risk of creating conflicts between your PCs' actual IP Addresses and what the Gateway thinks their IP Addresses should be. You may be forced to reboot the entire system(s).

If your Gateway locks up, simply power it down for 5 seconds by removing the power cable from the Gateway's Power Port. Leaving the power off for too long could result in the loss of network connections.

The Linksys BEFCMUH4's Front Panel



- Power** *Green.* The power LED illuminates when the device is powered on.
- Diag** *Red.* The Diag LED illuminates when the device goes through its self-diagnosis mode during boot-up and restart. It will turn off upon successful completion of the diagnosis.

The LAN indicators

- USB** *Green.* The USB LED illuminates when the USB port is properly connected to your PC.
- HPNA** *Green.* The HPNA LED illuminates when the HPNA port is plugged in and ready to transfer data.
- WLAN** *Green.* The WLAN LED illuminates when the Wireless PC card slide-in.
- Link/Act** *Green.* Steady on when link is up and blinking when data is following through this LAN port.
- Full/Col** *Green.* Steady on when it operates at full duplex mode. *Off* at half duplex mode. *Blinking* when collision is occurred on this

port.

10/100 *Green.* Steady on when a successful 100Mbps connection is made through the corresponding port.

The WAN indicators

Cable *Green.* Steady on when cable is registered and ready to transfer data. *Blinking* when no downstream RF carrier present.

Receive *Green.* Blinking when user data going through the cable modem to PC present.

Send *Green.* **Blinking** when user data going through the cable modem from PC present.

Chapter 3: Connect the Gateway

Overview

Unlike a simple hub or switch, the Gateway's setup consists of more than simply plugging hardware together. You will have to configure your networked PCs to accept the IP addresses that the Gateway assigns them (if applicable), and you will also have to configure the Gateway with setting(s) provided by your Internet Service Provider (ISP).

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 data.

Once you have the setup information you need for your specific type of Internet connection, you can begin installation and setup of the Gateway.

Connecting Your Hardware Together and Booting Up

1. Before you begin, make sure that all of your hardware is powered off, including the Gateway, PCs, hubs, and switches.
2. Connect one end of an Ethernet cable to one of the LAN ports (labeled 1, 2, 3, or 4) on the back of the Gateway and the other end to a standard port on a network device, e.g., a PC, print server, hub, or switch. Repeat the above step to connect more PCs or network devices to the Gateway.
3. Connect the cable from your ISP to the **Cable** port on the Gateway's back panel.
4. Connect the power-supply cable to the Power port on the rear of the Gateway, then plug the supplied AC power cable into a power outlet and power on the Linksys BEFCMUH4.
 - 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 Gateway

goes through its self-diagnostic test. The LED will turn off when the self-test is complete.

5. Power on the network devices that connected to the Linksys BEFCMUH4.

The Hardware Installation is complete. Continue to the next page to configure your PCs with Linksys BEFCMUH4.

Chapter 4: Configure Your PCs

Overview

The instructions in this chapter will help you configure each of your computer to be able to communicate with the Gateway.

To do this, you need to configure your PC's network settings to obtain an IP (or TCP/IP) address automatically (called DHCP). Computers use IP addresses to communicate with each other across a network or the Internet.

Find out which operating system your computer is running, such as Windows 95, 98, Millennium, NT 4.0, 2000, or XP. You will need to know which operating system your computer is running. You can find out by clicking the **Start** button and then going to the **Settings** option. Then click **Control Panel**, and then double-click the **System** icon. If your Start menu doesn't have a Settings option, you're running Windows XP. Click the Cancel button when done.

You may need to do this for each computer you are connecting to the Gateway.

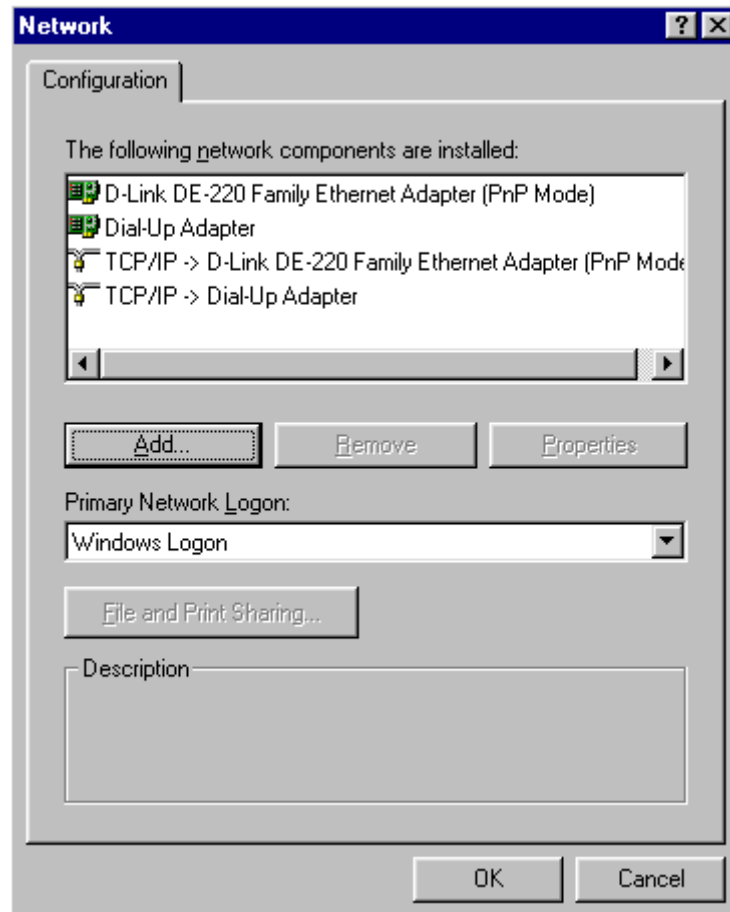
Important: *These instructions apply only to Windows 95, 98, Millennium, 2000, or XP machines. For TCP/IP setup under Windows NT, see your Windows manual. By default Windows 98, 2000, Me, and XP has TCP/IP installed and set to obtain an IP address automatically.*

The next few pages tell you, step by step, how to configure your network settings based on the type of Windows operating system you are using. Make sure that an Ethernet card or adapter has been successfully installed in each PC you will configure. Once you've configured your computers, continue to "**Chapter 5: Configure the Gateway**"

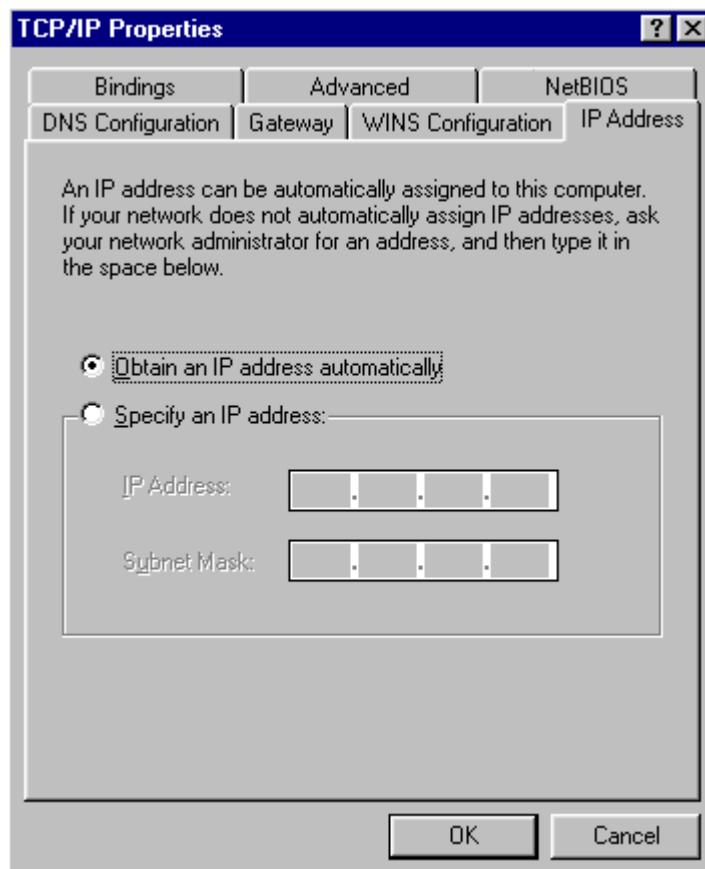
Configuring Windows 95, 98, and Millennium PCs

1. Go to the Network screen by click the **Start** button. Click **Settings** and then **Control Panel**. From there, double-click the **Network** icon.

2. On the Configuration tab, select the **TCP/IP line** for the applicable Ethernet adapter. Do not choose a TCP/IP entry whose name mentions DUN, PPPoE, VPN, or AOL. If the work **TCP/IP** appears by itself, select that line. (If there is no TCP/IP line listed, refer to “Appendix C: Installing the TCP/IP Protocol.) Click the **Properties** button.



3. Click the **IP Address** tab. Select **Obtain an IP address automatically**.



4. Now click the **Gateway** tab to ensure that the Installed Gateway field is left blank. Click the **OK** button.
5. Click the **OK** button again. Windows may ask you for the original Windows installation disk or additional files. Supply them by pointing to the correct file location, e.g., D:\win98, D:\win9x, c:\windows\options\cabs, etc. (if "D" is the letter of your CD-ROM drive).
6. Windows may ask you to restart your PC. Click the **Yes** button. If Windows does not ask you to restart, restart your computer anyway.

Go to "Chapter 5: Configure the Gateway."

Configuring Windows 2000 PCs

1. Go to the Network screen by clicking the **Start** button. Click **Settings** and then **Control Panel**. From there, double-click the **Network and Dial-up Connections** icon.

2. Select the **Local Area Connection** icon for the applicable Ethernet adapter (usually it is the first Local Area Connection listed). Double-click the **Local Area Connection**. Click the **Properties** button.
3. Select **Internet Protocol (TCP/IP)**, and click the **Properties** button.
4. Select **Obtain an IP address automatically**. Once the new window appears, click the **OK** button. Click the **OK** button again to complete the PC configuration.
5. Restart your computer.

Go to “Chapter 5: Configure the Gateway.”

Configuring Windows XP PCs

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. Go to the Network screen by clicking the **Start** button and then **Control Panel**. From there, double-click the **Network Internet Connections** icon and then the **Network Connections** icon.
2. Select the **Local Area Connection** icon for the applicable Ethernet adapter (usually it is the first Local Area Connection listed). Double-click the **Local Area Connection**. Click the **Properties** button.
3. Select **Internet Protocol (TCP/IP)**, and click the **Properties** button.
4. Select **Obtain an IP address automatically**. Once the new window appears, click the **OK** button. Click the **OK** button again (or the **Close** button if any settings were changed) to complete the PC configuration.
5. Restart your computer.

Go to “Chapter 5: Configure the Gateway.”

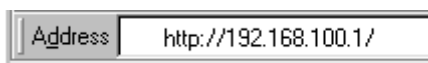
Chapter 5: Configure the Gateway

Configuring the Linksys BEFCMUH4

This chapter will show you how to configure the Gateway to function in your network and gain access to the Internet through your Internet Service Provider (ISP). Your ISP may require the use of a Host Name and Domain Name. *You will need the setup information from your ISP.* If you do not have this information, please contact your ISP before proceeding.

The instructions from your ISP will tell you how to set up your PC for Internet access. Because you are now using the Gateway to share Internet access among several computers, you will use the setup information to configure the Gateway instead of your PC. You only need to configure the Gateway once using the first computer you set up.

1. Open your web browser. (It is all right if you get an error message at this point. Continue following these directions,) Enter **http://192.168.100.1** in the browser's Address field. Press the **Enter** key.



2. An Enter Network Password window, shown in below figure, will appear (For Windows XP users, the screen may look different). Leave the User Name field empty, and enter **admin** in lowercase letters in the Password field (**admin** is the default password). Then, click the **OK** button.
3. The Gateway configuration screen will appear. Press **Basic** tab and then select **Setup** menu. Based on the setup instructions from your ISP, you may need to provide the following information.

Basic

Setup
This page allows you to modify the basic setup of the gateway.

Network Configuration

LAN IP Address: 192 . 168 . 100 . 1

MAC Address: 00:10:95:77:00:01

WAN IP Address: 111.111.2.16

Host Name: (Required by some ISPs)

Domain Name: (Required by some ISPs)

Static IP Address: 0 . 0 . 0 . 0

Static IP Mask: 0 . 0 . 0 . 0

Default Gateway: 0 . 0 . 0 . 0

Primary DNS (static IP only): 0 . 0 . 0 . 0

Secondary DNS (static IP only): 0 . 0 . 0 . 0

Spoofed MAC Address: 00 : 00 : 00 : 00 : 00 : 00

Apply

LAN IP Address: The value for the Gateway's IP address is shown on the Setup screen. The default value is 192.168.100.1. Leave these settings alone.

Host Name and Domain Name: These fields allow you to provide a host name and domain name for the Gateway. These fields are usually left blank. If requested by your ISP, complete these two fields.

Static IP Address and IP Mask: If your ISP says that you are connecting through a static or fixed IP address from your ISP, you should enter the field of **Default Gateway**, **Primary DNS** and/or **Secondary DNS** also.

Spoofed MAC Address: An essential component of penetration testing and network wargames is the ability to specify arbitrary MAC addresses. The Gateway can significantly reduce the ability of intruders to use spoofed MAC address to compromise or disrupt systems. Spoofed MAC addresses can also be used locally to redirect traffic from its intended host to the hacker's machine.

4. The Gateway also provided Security and DHCP settings in Basic tab. You

can change the access privilege and restore factory default of the Gateway. Also, you can enable/disable the DHCP Server function.

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 Internet-sharing software are Internet LanBridge, Wingate, ICS, and Sygate. To disable your Internet-sharing software:

- *If you are running Netscape Navigator: Click **Edit >> Preference >> Advanced >> Proxies** > and click **Direct Connection to the Internet**.*
- *If you are running Internet Explorer v5 or better, 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.

5. If you have already done so, click the **Apply** button to save your settings. Close the web browser.
6. Restart your computers so that they can obtain the Gateway's new settings.

Appendix A: Troubleshooting

Common Problems and Solutions

This section provides possible solutions to problems regarding the installation and operation of the Linksys BEFCMUH4. If your situation is described here, the problem should be solved by applying the corresponding solution. If you can't find an answer here, please contact with your local dealer.

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

The Gateway, by default, assigns an IP address range of 192.168.100.10 to 192.168.100.41 using the DHCP server on the Gateway. To set a static IP address, you can only use the ranges 192.168.100.2 to 192.168.100.9 and 192.168.100.42 to 192.168.100.254. 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 IP conflict error message. You can assign a static IP address to a PC by performing the following steps:

For Windows 95, 98, and Me:

- A. Click **Start**, **Settings**, 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 Gateway. You can only use an IP address in the ranges 192.168.100.2 to 192.168.100.9 and 192.168.100.42 to 192.168.100.254. 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 192.168.100.1, which is the default IP address of the Gateway. 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., Johnson 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 Gateway. You can only use an IP address in the ranges 192.168.100.2 to 192.168.100.9 and 192.168.100.42 to 192.168.100.254.
- E. Enter the Subnet Mask, **255.255.255.0**.
- F. Enter the Default Gateway, **192.168.100.1** (Gateway's default IP address).
- G. Toward the bottom of the window, select **Use the following DNS server address**, 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 NT 4.0:

- A. Click **Start**, **Settings**, and **Control Panel**. Double-click **Network** icon.
- B. Click the **Protocol** tab, and double-click **TCP/IP Protocol**.
- C. When the window appears, make sure you have selected the correct **Adapter** for your Ethernet adapter.

- D. Select **Specify an IP address**, and enter a unique **IP address** that is not used by any other computer on the network connected to the Gateway. You can only use an IP address in the ranges 192.168.100.2 to 192.168.100.9 and 192.168.100.42 to 192.168.100.254.
- E. Enter the Subnet Mask, **255.255.255.0**.
- F. Enter the Default Gateway, **192.168.100.1** (Gateway's default IP address).
- G. Click the **DNS** tab, and enter the **Host** and **Domain** names (e.g., Johnson for Host and home for Domain). Under DNS Service Search Order, click the **Add** button. Enter the **DNS IP address** in the DNS Server field, and click the **Add** button. Repeat this action for all DNS IP addresses given by your ISP.
- H. Click the **OK** button in the *TCP/IP Protocol Properties* window, and click the **Close** button in the *Network* 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 instruction 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. Click the *use the following IP address* radio button. Enter a unique **IP address** that is not used by any other computer on the network connected to the Gateway. You can only use an IP address in the ranges 192.168.100.2 to 192.168.100.9 and 192.168.100.42 to 192.168.100.254.
- F. Enter the Subnet Mask, **255.255.255.0**.
- G. Enter the Default Gateway, **192.168.100.1** (Gateway'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 95, 98, and Me:

Refer to the “Configuring Your PCs to Connect to the Linksys BEFCMUH4” section of “Connecting the Linksys BEFCMUH4 to Your Network”. Make sure **Obtain IP address automatically** is selected in the settings.

For Windows 2000:

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

- Click **Start** and **Control Panel**.
- Click the **Network and Internet Connections** icon and then the **Network Connections** icon.
- Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
- 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.

- Click the **OK** button in the *Internet Protocol (TCP/IP) Properties* window, and click the **OK** button in the *Local Area Connection Properties* window.
- Restart the computer if asked.

For Windows NT 4.0:

- Click **Start**, **Settings**, and **Control Panel**. Double-click the **Network** icon.
- Click the **Protocol** tab, and double-click on **TCP/IP Protocol**.
- When the window appears, make sure you have selected the correct **Adapter** for your Ethernet adapter and set it for **Obtain an IP address from a DHCP server**.
- Click the **OK** button in the *TCP/IP Protocol Properties* window, and click the **Close** button in the Network window.
- Restart the computer if asked.

B. Open a command prompt.

- For **Windows 95, 98, and Me**, please click **Start** and **Run**. In the Open field, type in **command**. Press the **Enter** key or click the **OK** button.
- For Windows **NT, 2000, and XP**, please 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 192.168.100.1 and press the **Enter** key.**

- If you get a reply, the computer is communicating with the Gateway.
- If you do NOT get a reply, please 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 WAN IP address and press the **Enter** key. The WAN IP Address can be found in the web interface of the Gateway. For example, if your WAN 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 Gateway.
- 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.yahoo.com** and press the **Enter** key.

- If you get a reply, the computer is connected the Internet. If you can not open a web page, 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 WAN with my Internet connection.

- A. Refer to “Problem #2, I want to test my Internet connection” to verify that you have connectivity.
- B. Make sure you are using the right WAN settings. Contact your ISP to see if your WAN connection type is DHCP, Static IP Address.
- C. Make sure you have the right cable. Check to see if the Cable Modem column has a solidly lit Link LED.
- D. Make sure the cable connecting from your ISP is connected to the Gateway’s Cable port. Verify that the Status page of the Gateway’s web interface shows a valid IP address from your ISP.
- E. Turn off the computer, Gateway. Wait 30 seconds, and then turn on the Gateway and computer. Check the Status tab of the Gateway’s web-based utility to see if you get an IP address.

4. I am not able to access the Gateway’s web interface Configuration page.

- A. Refer to “Problem #2, I want to test my Internet connection” to verify that your computer is properly connected to the Gateway.
- B. Refer to “Appendix D: 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 #9: I need to remove the proxy settings or the dial-up pop-up windows (for PPPoE users).”

5. I need to set up a server behind my Gateway.

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 Gateway's web-based utility. We will be setting up web, ftp, and mail servers.

- A. Access the Gateway's web-based utility by going to **http://192.168.100.1** or **IP address** of the Gateway. Go to the **Advanced => Forwarding** tab.
- B. Enter the **Port range** of the service you are using. For example, if you have a web server, you would enter the range 80 to 80.
- C. Check the **protocol** you will be using, **TCP**, **UDP** or **Both**.
- D. Enter the **IP address** of the PC or network device that you want the port server to go to. For example, if the web server's Ethernet adapter IP address is 192.168.100.2, you would enter 2 in the field provided. The 0 is to disable port service.

When you have completed the configuration, click the **Apply** button.

6. 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 Gateway 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 Gateway's web-based utility by going to **http://192.168.100.1** or **IP address** of the Gateway. Go to the **Advanced => Forwarding** tab.
- B. Enter the **Port range** of the service you are using. For example, if you want to host Unreal Tournament (UT), you would enter the range 7777 to 27900.
- C. Check the **protocol** you will be using, **TCP**, **UDP** or **Both**.

- D. Enter the **IP address** of the PC or network device that you want the port server to go to. For example, if the web server's Ethernet adapter IP address is 192.168.100.2, you would enter 2 in the field provided. The 0 is to disable port service.

When you have completed the configuration, click the **Apply** button.

7. 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 Gateway will be checked first by the forwarding settings. If the port number that the data enters from does not have port forwarding, then the Gateway 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 Gateway's web-based utility by going to **http://192.168.100.1** or the **IP address** of the Gateway. Go to the **Advanced => Forwarding** tab.
- B. Disable or remove the entries you have entered for forwarding. 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 firewall for that computer.

Once completed with the configuration, click the **Apply** button.

8. I forgot my password, or the password prompt always appears when saving settings to the Gateway.

Reset the Gateway to factory default by pressing the Reset button for 5 seconds and then releasing it. If you are still getting prompted for a password when saving settings, then perform the following steps:

- A. Access Gateway's web interface by going to **http://192.168.100.1** or the **IP address** of the Gateway. Enter the default password **admin**, and then go

to **Basic** => **Security** page.

- B. Enter a different password in the Password field, and enter the same password in the second field to confirm the password.
- C. Click the **Apply** button.

9. 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 Gateway 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.

10. To start over, I need to set the Gateway to factory default.

Hold the Reset button for up to 5 seconds and then release it. This will return the password, forwarding, and other settings on the Gateway to the factory default settings. In other words, the Gateway will revert to its original factory configuration.

11. I need to use port triggering.

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

- A. To connect to the Gateway, go to the web browser, and enter **http://192.168.100.1** or the **IP address** of the Gateway.
- B. Enter the password, if asked. (The default password is **admin**.)
- C. Click the **Advanced => Port Triggering** tab.
- D. Enter the **Trigger Range**. Check with your Internet application provider for more information on which outgoing port services it is using.
- E. Enter the **Target Range**. Check with your Internet application provider for more information on which incoming port services are required by the Internet application.

12. The Diag LED stays lit continuously.

- The Diag LED lights up when the device 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 flash the firmware by assigning a static IP address to the computer, then upgrade the firmware. Try using the following settings, IP Address: 192.168.1.50 and Subnet Mask: 255.255.255.0. To set a static IP address, refer to "Problem #1: I need to set a static IP address."

13. When I enter a URL or IP address, I get a time-out error or a 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 Gateway. Ensure that it is connected and ON. Connect to it and check its settings. (If you cannot connect to it, check the LAN and power connections.)
- If the Gateway is configured correctly, check your Internet connection to see if it is working correctly.
- 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 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.**

14. The Full/Col LED keeps flickering continuously.

- Check the Category 5 Ethernet cable and its RJ-45 connectors.
- There may be interference with other network devices. Try removing other PCs or network devices to see if the problem persists. Eliminate each network device one at a time to determine the cause.

Frequently Asked Questions

What is the maximum number of IP addresses that the Gateway will support? The Gateway will support up to 253 IP addresses.

Is IPSec Pass-Through supported by the Gateway? Yes, it is a build-in feature that the Gateway automatically enables.

Does the Gateway 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 WAN to 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 Gateway to be used with low cost Internet accounts, 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 Gateway support any operating system other than Windows 95, Windows 98, Windows 2000, Windows NT, or Windows XP? Yes, but we does not, at this time, provide technical support for setup, configuration or troubleshooting of any non-Windows operating systems.

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 7777~27900. 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 Gateway 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 Gateway? 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 207015 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.

Will the Gateway function in a Macintosh environment? Yes, but the Gateway's setup pages are accessible only through Internet Explorer 4.0 or Netscape Navigator 4.0 or higher for Macintosh.

I am not able to get the web configuration screen for the Gateway. 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. 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.

If DMZ Hosting is used, does the exposed user share the public IP with the Gateway? No.

Is the Gateway cross-platform compatible? Any platform that supports Ethernet and TCP/IP is compatible with the Gateway.

How many ports can be simultaneously forwarded? Theoretically, the Gateway can establish 520 sessions at the same time, but you can only forward 10 ranges of ports.

What are the advanced features of the Gateway? The Gateway's advanced features include Filters, Forwarding, DMZ Hosting.

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

Appendix B: Glossary

10BaseT – An Ethernet standard that uses twisted wire pairs.

100BaseTX – IEEE physical layer specification for 100 Mbps over two pairs of Category 5 UTP or STP wire.

Adapter – Printed circuit board that plugs into a PC to add to capabilities or connectivity to a PC. In a network environment, a network interface card (NIC) is the typical adapter that allows the PC or server to connect to the intranet and/or Internet.

Bridge – A device that interconnects different networks together.

Browser – A browser is an application program that provides a way to look at and internet with all the information on the World Wide Web or PC. The word “browser” seems to have originated prior to the Web as a generic term for user interfaces that let you browse text files online.

CAT 5 – ANSI/EIA (American National Standards Institute/Electronic Industries Association) Standard 568 is one of several standards that specify “categories” (the singular is commonly referred to as “CAT”) of twisted pair cabling systems (wires, junctions, and connectors) in terms of the data rates that they can sustain. CAT5 cable has a maximum throughput of 100 Mbps and is usually utilized for 100BaseTX networks.

Default Gateway – The routing device used to forward all traffic that is not addressed to a station within the local subnet.

DHCP (Dynamic Host Configuration Protocol) – A protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization’s network. Using the Internet’s set of protocol (TCP/IP), each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP, the IP address must be entered manually at each computer and, if computers move to another location in another part of the network, a

new IP address must be entered. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

DHCP uses the concept of a “lease” or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It’s especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses.

DHCP supports static addresses for computers containing Web servers that need a permanent IP address.

DMZ – A DMZ (**De**Militarized **Z**one) is a computer host or small network inserted as a “neutral zone” between a company’s private network and the outside public network. It prevents outside users from getting direct access to a server that has company data.

DNS – The domain name system (DNS) is the way that Internet domain names are located and translated into Internet Protocol (IP) addresses. A domain name is a meaningful and easy-to-remember “handle” for an Internet address.

Domain – A sub-network comprised of a group of clients and servers under the control of one security database. Dividing LANs into domains improves performance and security.

DSSS – Also known as “Direct Sequence Spread Spectrum”, this is a variety of radio transmission methods that continuously change frequencies or signal patterns. Direct sequence spread spectrum (DSSS), which is used in CDMA, multiplies the data bits by a very fast pseudo-random bit pattern (PN sequence) that “spreads” the data into a large coded stream that takes the full bandwidth of the channel.

Dynamic IP Address – An IP address that is automatically assigned to a client station in a TCP/IP network, typically by a DHCP server. Network

devices that serve multiple users, such as servers and printers, are usually assigned static IP address.

Ethernet – IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium. Has a transfer rate of 10 Mbps. Forms the underlying transport vehicle used by several upper-level protocols, including TCP/IP and XNS.

Firewall – A firewall is a set of related programs, located at a network gateway server, that protects the resources of a network from users from other networks. (The term also implies the security policy that is used with the programs.) An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources to which its own users have access.

Basically, a firewall, working closely with a Gateway program, examines each network packet to determine whether to forward it toward its destination.

Firmware – Programming that is inserted into programmable read-only memory (programmable read-only memory), thus becoming a permanent part of a computing device.

FTP (File Transfer Protocol) – A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a website on a local machine, they are typically uploaded to the Web server using FTP.

FTP includes functions to log onto the network, list directories, and copy files. It can also convert between the ASCII and EBCDIC character codes. FTP operations can be performed by typing commands at a command prompt or via an FTP utility running under a graphical interface such as Windows, FTP transfers can also be initiated from within a Web browser by entering the URL preceded with ftp://..

Unlike e-mail programs in which graphics and program files have to be “attached,” FTP is designed to handle binary files directly and does not add the overhead of encoding and decoding the data.

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

Hub – The device that serves as the central location for attaching wires from workstations. Can be passive, where there is no amplification of the signals; or active, where the hubs are used like repeaters to provide an extension of the cable that connects to a workstation.

IEEE – The Institute of Electrical and Electronics Engineers. The IEEE describes itself as “the world’s largest technical professional society – promoting the development and application of electro-technology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members.”

The IEEE fosters the development of standards that often become national and international standards. The organization publishes a number of journals, has many local chapters, and several large societies in special areas, such as the IEEE Computer Society.

IP Address – In the most widely installed level of the IP (Internet Protocol) today, an IP address is a 32-binary digit number that identifies each sender or receiver of information that is sent in packet across the Internet. When you request an HTML page or send e-mail, the Internet Protocol part of TCP/IP includes your IP address in the message (actually in each of the packets if more than one is required) and sends it to the IP address that is obtained by looking up the domain name in the Uniform Resource Locator you requested or in the e-mail address you’re sending a note to. At the other end, the recipient can see the IP address of the Web page requestor or the e-mail sender and can respond by sending another message using the IP address it received.

IPSec – IPSec (Internet Protocol Security) is a developing standard for security at the network or packet processing layer of network communication. A big advantage of IPSec is that security arrangements can be handled without requiring changes to individual user computers.

ISP – An ISP (Internet service provider) is a company that provides individuals

and companies access to the Internet and other related services such as Web site building and virtual hosting.

LAN – A local area network (LAN) is a group of computers and associated devices that share a common communications line and typically share the resources of a single processor or server within a small geographic area (for example, within an office building).

MAC Address – The MAC (Media Access Control) address is your computer's unique hardware number.

Mbps (MegaBits Per Second) – One million bits per second; unit of measurement for data transmission.

NAT – NAT (Network Address Translation) is the translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the inside network and the other is the outside.

NIC (Network Interface Card) – A board installed in a computer system, usually a PC, to provide network communication capabilities to and from that computer system. Also called an adapter.

Packet Filtering – Discarding unwanted network traffic based on its originating address or range of addresses or its type (e-mail, file transfer, etc.).

Ping (Packet INternet Groper) – An internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

Port – A pathway into and out of the computer or a network device such as a switch or router. For example, the serial and parallel ports on a personal computer are external sockets for plugging in communications lines, modems, and printers.

PPPoE (Point to Point Protocol over Ethernet) – PPPoE is a method for the encapsulation of PPP packets over Ethernet frames from the user to the ISP over the Internet. One reason PPPoE is preferred by ISPs is because it

provides authentication (username and password) in addition to data transport. A PPPoE session can be initiated by either a client application residing on a PC, or by client firmware residing on a modem or router.

PPTP (Point-to-Point Tunneling Protocol) – A protocol (set of communication rules) that allows corporations to extend their own corporate network through private “tunnels” over the public Internet. Effectively, a corporation uses a wide-area network as a single large local area network. A company no longer needs to lease its own lines for wide-area communication but can securely use the public networks. This kind of interconnection is known as a virtual private network.

RJ-11 (Registered Jack-11)- A telephone connector that holds up to six wires. The RJ-11 is the common connector used to plug a telephone into a wall.

RJ-45 – A connector similar to a telephone connector that holds up to eight wires, used for connecting Ethernet devices.

Roaming – The ability to use a wireless device and be able to move from one access point’s range to another without losing the connection.

Router – Protocol-dependent device that connects sub-networks together. Routers are useful in breaking down a very large network into smaller sub-networks; they introduce longer delays and typically have much lower throughput rates than bridges.

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

Static IP Address – A permanent IP address that is assigned to a node in a TCP/IP network.

STP (Shielded Twisted Pair) – Telephone wire that is wrapped in a metal sheath to eliminate external interference.

Subnet Mask – The method used for splitting IP networks into a series of sub-groups, or subnets. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

Switch – 1. A data switch 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 method (protocol) used along with the Internet Protocol to send data in the form of message units between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data (called packet) that a message is divided into for efficient routing through the Internet.

TCP/IP – Transmission Control Protocol/Internet Protocol (TCP/IP) is the basic communication language or protocol of the Internet. It can also be used as a communications protocol is a private network (either an intranet or an extranet). When you are set up with direct access to the Internet, your computer is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP.

UDP (User Datagram Protocol) – A method (protocol) used along with the IP (Internet Protocol) to send data in the form of message units (datagram) between network devices over a LAN or WAN. While IP takes care of handling the actual delivery of the data (routing), UDP takes care of keeping track of the individual units of data (called packets) that a message is divided into for efficient delivery over the network. UDP is known as a “connection-less” protocol due to NOT requiring the receiver of a packet to return an acknowledgment of receipt to the sender of the packet (as opposed to TCP).

URL (Uniform Resource Locator) – The address that defines the route to a file on the Web or any other Internet facility. URLs are typed into the browser to access Web pages, and URLs are embedded within the pages themselves to provide the hypertext links to other pages.

UTP – Unshielded twisted pair is the most common kind of copper telephone wiring. Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company. To reduce crosstalk or

electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other. Each signal on twisted pair requires both wires. Since some telephone sets or desktop locations require multiple connections, twisted pair is sometimes installed in two or more pairs, all within a single cable.

WAN – A communications network that covers a wide geographic area, such as state or country.

WEP (Wired Equivalent Privacy) – A data privacy mechanism based on a 64-bit shared key algorithm, as described in the IEEE 802.11 standard.

WINIPCFG – Configuration utility based on the Win32 API for querying defining and managing IP addresses within a network. A commonly used utility, under Windows 95, 98, and Millennium, for configuring networks with static IP addresses.

Appendix C: 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, Windows 98, and Windows Me. For TCP/IP setup under Windows NT, 2000, and XP, see your Windows documentation.

1. Click the **Start** button. Choose **Settings** and then **Control Panel**.
2. Double-click on the **Network** icon to bring up your Network window. Select the **Configuration** tab.

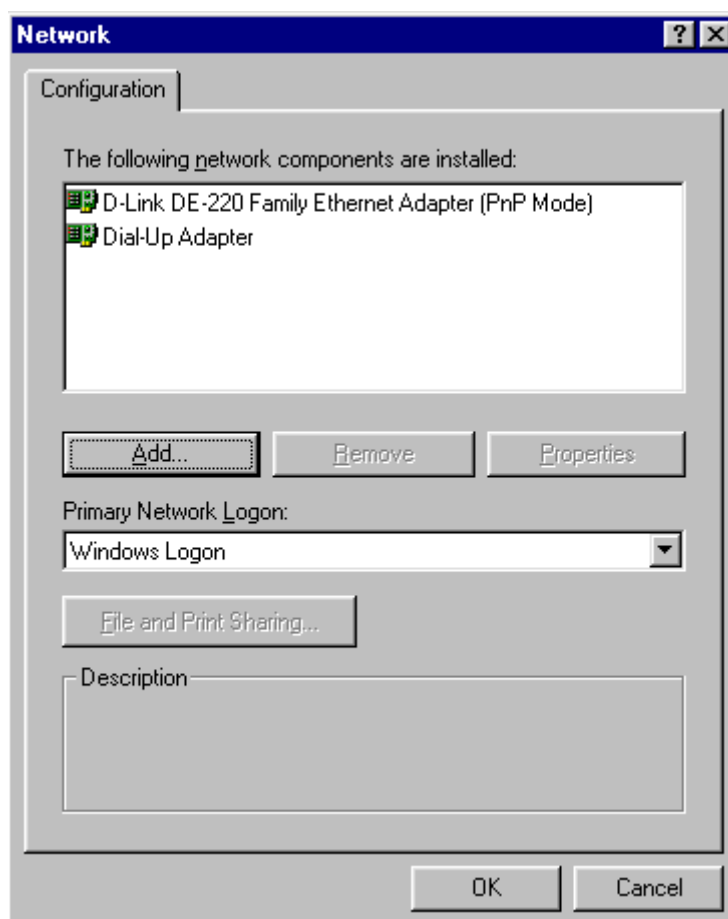


Figure D-1

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 (see Figure D-2).

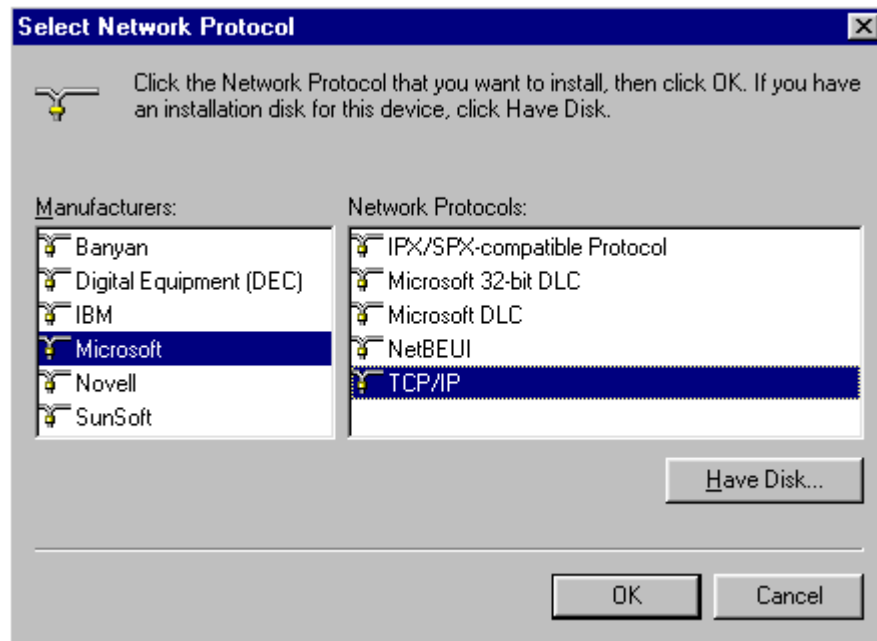


Figure D-2

7. After a few seconds, the main Network window will appear. The TCP/IP Protocol should now be listed.

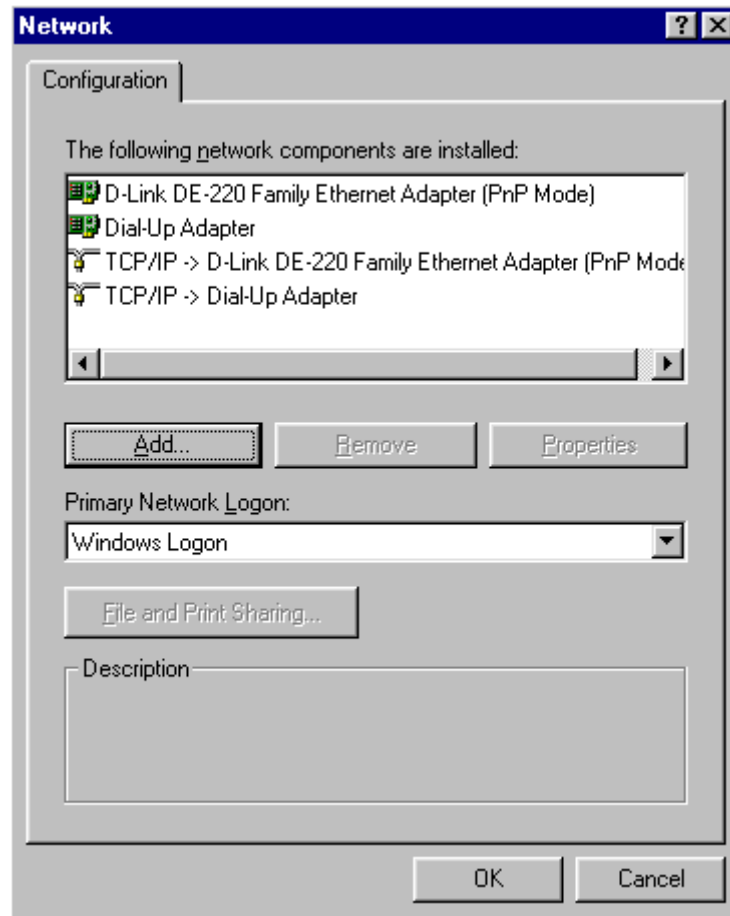


Figure D-3

8. Click the **OK** button. Windows may ask for original Windows installation files. Supply them as needed, e.g., c:\windows\options\cabs, D:\win98, D:\win95, D:\win9x.
9. Windows will ask you to restart the PC. Click the **Yes** button.

The TCP/IP installation is now complete.

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

This section describes how to find the MAC address for your Ethernet adapter. You can also find the IP address of your computer's Ethernet adapter. The IP address is used for filtering, forwarding, and DMZ. Follow the steps in this appendix to find the MAC address or IP address for your adapter in Windows 95, 98, Me, NT, 200, and XP.

For Windows 95, 98, and Me:

1. Click on Start and Run. In the Open field, enter **winipcfg**. Then press the Enter key or the OK button.

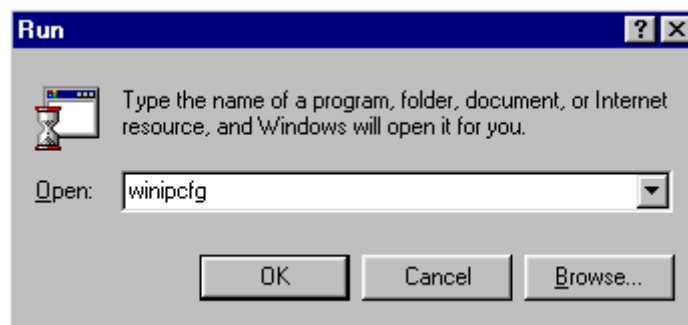


Figure E-1

2. When the IP Configuration window appears, select the Ethernet adapter you are using to connect to the Gateway via a CAT 5 Ethernet cable.

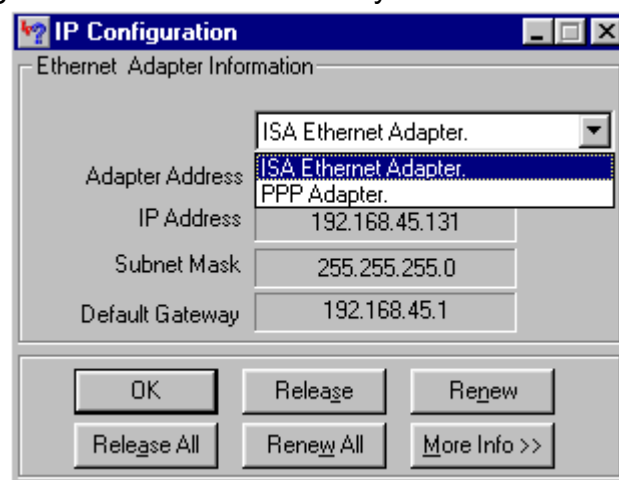


Figure E-2

3. Write down the Adapter Address as shown on your computer screen (see Figure E-3). This is the MAC address for your Ethernet adapter and will be shown as a series of numbers and letters.

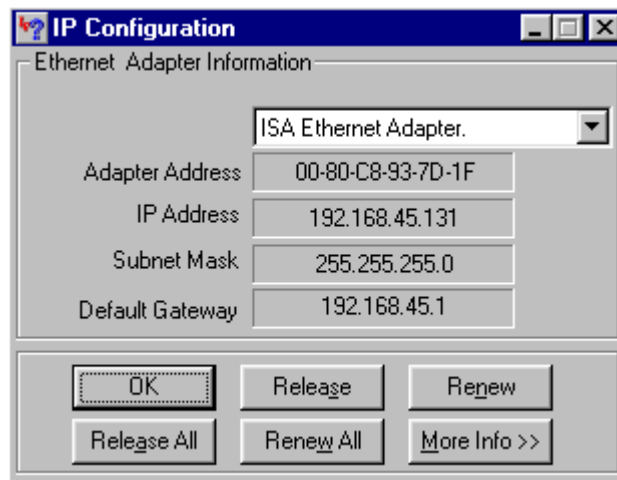


Figure E-3

The example in Figure E-3 shows the IP address of your Ethernet adapter as 192.168.45.131. Your computer may show something different.

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

For Windows NT, 2000, and XP:

The following steps show an alternative way of obtaining the MAC address and IP address for your Ethernet adapter.

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

```

C:\>ipconfig /all

Windows 2000 IP Configuration

    Host Name . . . . . : 
    Primary DNS Suffix . . . . . : 
    Node Type . . . . . : Hybrid
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No

Ethernet adapter:

    Connection-specific DNS Suffix . : 
    Description . . . . . : PCMCIA 10/100 Ethernet Card
    Physical Address. . . . . : 00-A0-0C-3F-E8-E3
    DHCP Enabled. . . . . : No
    IP Address. . . . . : 192.168.100.10
    Subnet Mask . . . . . : 255.255.255.0
    IP Address. . . . . : 192.168.45.55
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.45.1
    DNS Servers . . . . . : 192.168.28.68

    Primary WINS Server . . . . . : 192.168.28.68
    Secondary WINS Server . . . . . : 

C:\>

```

Figure E-4

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

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

The example in Figure E-4 shows the IP address of your Ethernet adapter as 192.168.100.10. Your computer may show something different.

Appendix E: Specifications

WAN	Cable Interface F type female 75ohm
LAN	4 10/100 BASE-T 1 USB 1.1 Connector Type B 1 HomePNA2.0 RJ-11 1 IEEE 802.11b (2.4 GHz Unlicensed ISM radio band)
CPU	140 MHz MIPS32-ISA
SDRAM	32Mb
Flash ROM	16Mb
System Power	12V/700mA
Power Supply	12V/1.25A
EMI/EMC	FCC Class B, CE Class B, VCCI Class B.
Operation Requirement	Operating Temp. 0°C to 40°C (32°F to 104°F) Storage Temp. -20°C to 70°C (-4°F to 158°F) Operating Humidity 10% to 85% Non-Condensing Storage Humidity 5% to 90% Non-Condensing
Dimensions	186 x 155 x 63 (mm)