P2P/IM

This tab allows the system administrator to set up policies on using P2P or IM software across the Internet.

Peer to Peer

When users download files from the Internet by Peer to Peer (P2P) software, the WAN port bandwidth will be occupied. You can enable the blocking to the following P2P software applications. The defaults are **non-block** for the following applications:

GNUTELLA(EZPEER), FASTTRACK, KURO, EDONKEY2000, BITTORRECT, DIRECTCONNECT, PIGO, and WINMX.

Instant Messenger

Users might use IM software to chat with friends or transferring files (bandwidth hogging). You can enable the blocking to the following IM software applications. The defaults are **non-block** for the following applications.

MSN, ICQ, YAHOO MESSEGER, SKYPE, IRC, ODIGO, REDIFF, GOOGLE TALK, and IM QQ.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

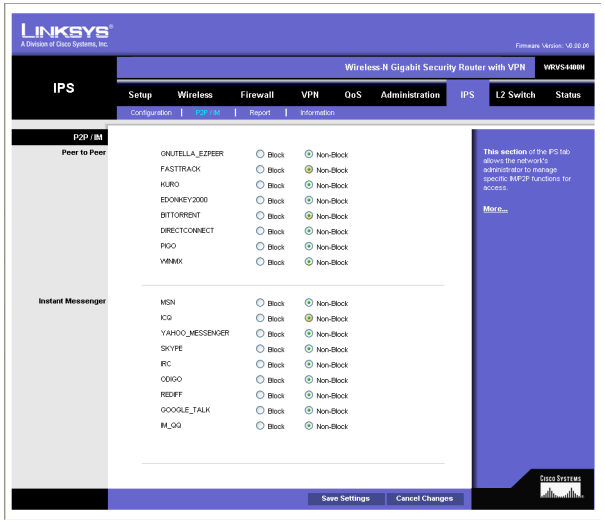


Figure 6-60: IPS - P2P / IM

Report

This screen provides the network history status, including network traffic and attack counts, through diagram and tables.

Report Diagram: Twenty-four hour diagram displays network traffic and attacks.

Attacker

Displays the IP Address of attackers and the frequency (number of times) of the attacks in a table.

Attacked Category

Displays the category (type) of attack and the frequency (number of times) of the attacks in a table.

Click the **View Log** button to view the log.

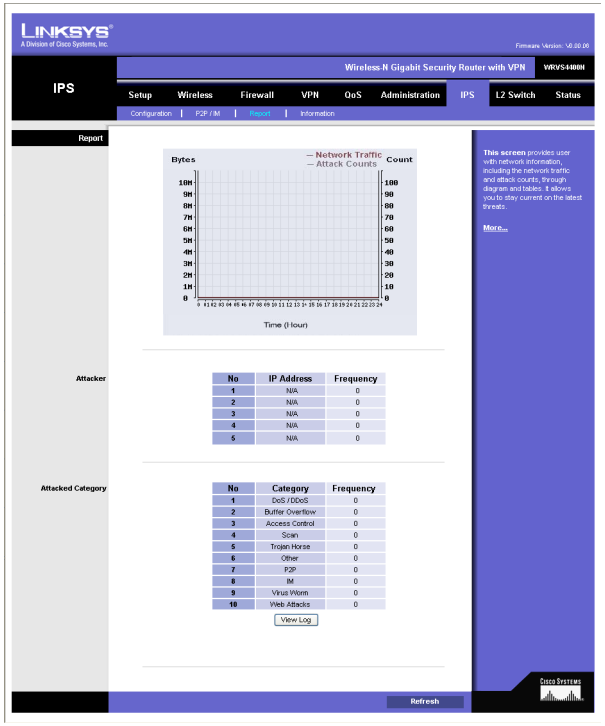


Figure 6-61: IPS - Report

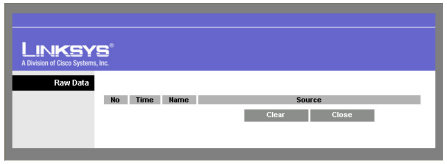


Figure 6-62: IPS Log Raw Data

Information

Signature Version. The Signature Version displays the version of the signature patterns file loaded in the Wireless Router that protects against malicious threats.

Last Time Upload. This displays when the signature patterns file in the Wireless Router were last updated.

Protect Scope. Displays a list of the categories of attacks that the IPS feature in the Router protects against. Those includes DoS/DDoS, Buffer Overflow, Web Attack, Scan, Trojan Horse, and IM / P2P.

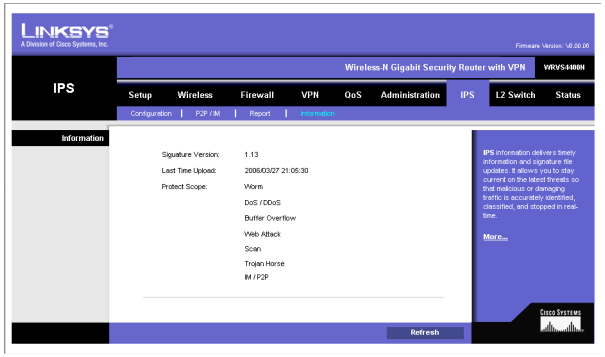


Figure 6-63: IPS - Information

L2 Switch Tab

The Layer 2 Switch Tab provides configurations to the layer 2 switching features on the four Ethernet LAN ports of the Wireless Router. They include VLAN, port configuration, cable diagnostics, and RADIUS authentication.

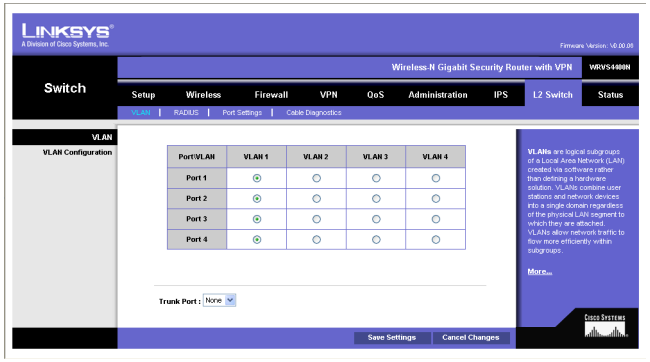


Figure 6-64: L2 Switch - VLAN

VLAN

VLAN Configuration

The Wireless Router supports Port-based VLAN. You can assign each port to one of the four VLANs or VLAN Trunk. The VLAN tags are attached internally inside the switch. No packets will leave the switch with VLAN tags.

VLANs are broadcast and multicast domains. Broadcast and multicast traffic is transmitted only within the VLAN in which the traffic is generated. The Wireless Router currently supports only one IP subnet so PCs on different VLANs cannot communicate with each other. PCs connected to the VLAN Trunk port can be accessed on all VLANs.

Trunk Port. Select one of the LAN ports to accept traffic from and to all VLANs. The default is **None**.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

RADIUS

RADIUS mode provides authentication on devices connecting to the LAN ports. It requires installation of a RADIUS server on your local network.

Mode. Select **Enabled** or **Disabled**, as desired.

RADIUS IP. Enter the RADIUS server IP address.

RADIUS UDP Port. Identifies the UDP port. The UDP port is used to verify the RADIUS server authentication.

RADIUS Secret. Indicates the Key string used for authenticating and encrypting all RADIUS communications between the Wireless Router and the RADIUS server. This key must match the RADIUS server's configuration.

Administration State. Specifies if each port needs RADIUS authentication. The defaults are **Force Authorized** so no authentication is needed. The possible field values are:

- **Auto**. The controlled port state is set by the **RADIUS Mode**.
- **Force Authorized**. The controlled port state is set to Force-Authorized (forward traffic). All connections can be made.
- **Force Unauthorized**. The controlled port state is set to Force-Unauthorized (discard traffic). All connections are blocked.

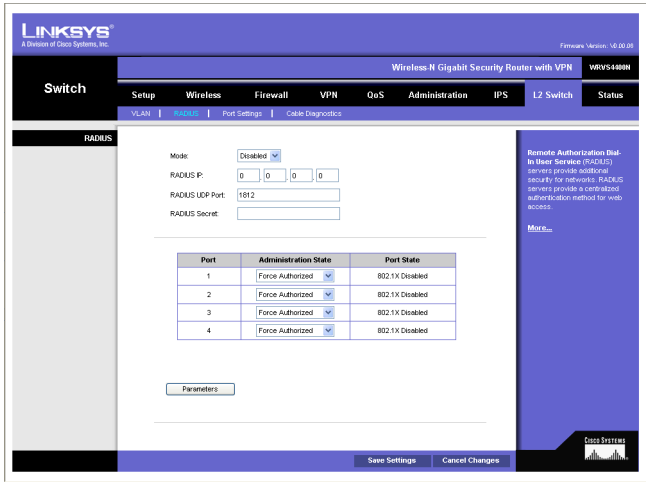


Figure 6-65: L2 Switch - RADIUS

Parameters button. Click this button to configure RADIUS re-authentication and timeout period for re-authentication and EAP.

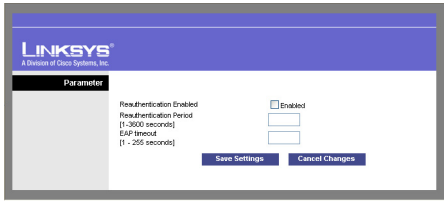


Figure 6-66: L2 Switch - RADIUS

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

Port Settings

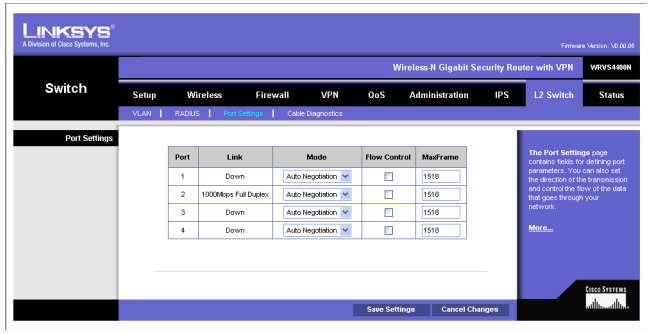


Figure 6-67: L2 Switch - Port Settings

Port. Specifies the number of the four LAN ports.

Link. Displays the port duplex mode (Full or Half) and speed (10/100/1000 Mbps). Full indicates that the interface supports transmission between the device and its link partner in both directions simultaneously. Half indicates that the interface supports transmission between the device and the client in only one direction at a time.

Mode. Specifies port duplex mode (Full or Half) and speed (10/100/1000 Mbps). Auto Negotiation is a protocol between two link partners that enables a port to advertise its transmission rate, duplex mode and flow control abilities to its partner. Default is **Auto Negotiation**.

Flow Control. Configure the flow control setting on the port. Select to enable. The default is disabled.

MaxFrame. Configure the maximum ethernet frame size sent or received on the port. Default is 1518. You can set only to a value lower than 1518.

Change these settings as described here and click **Save Settings** to apply your changes, or click **Cancel Changes** to cancel your changes. Help information is displayed on the right-hand side of the screen, and click **More** for additional details.

Cable Diagnostics

This screen provides a utility to help troubleshoot ethernet-cable-related connectivity issues.

Port. Select the port number, then click the **Apply** button and the diagnostics will start.

Pair. Each cable consists of eight pins (four pairs).

Cable Length. The length of the cable.

Status. The status of the pair.

Status Tab

The Status Tab provides current status on this Wireless Router including WAN, LAN, Wireless LAN, System Performance, VPN client connections, and IPsec VPN connections.

WAN / Gateway

This screen provides some basic information on the Wireless Router (e.g. firmware version, time) and WAN port MAC/IP address and connection status.

Firmware Version. Displays the current firmware version.

MAC Address. Displays the WAN port MAC Address, as seen by your ISP.

Current Time. Displays the time on this Wireless Router according to your settings on the Setup->Time tab.

Internet Connection

Connection Mode. Displays the Internet connection type setting on WAN port.

Interface. Displays the WAN port Interface status (Up or Down).

IP Address. Displays the WAN port IP Address.

Subnet Mask. Displays the WAN port IP subnetmask.

Default Gateway. Displays the default Router to reach Internet or other networks from the WAN port.

DNS. Shown here are the DNS (Domain Name System) IP addresses currently used by this Wireless Router.

DHCP Release button. Click this button to release IP address on WAN port if using DHCP.

DHCP Renew button. Click this button to renew IP address on the WAN port if using DHCP.

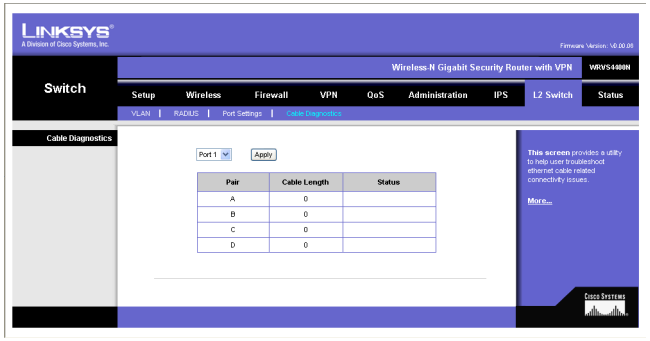


Figure 6-68: L2 Switch - Cable Diagnostics

LAN

This screen provides some basic information on the LAN ports of this Wireless Router.

IP Versions. Displays the IP versions configured on the LAN side.

MAC Address. Displays the LAN port MAC Address. All four LAN ports share the same MAC address.

IP Address. Displays the LAN port IPv4 Address. All four LAN ports share the same MAC address.

Subnet Mask. Displays the LAN port IPv4 subnetmask.

IPv6 Address. Displays the LAN port IPv6 IP address, if IPv6 is enabled.

DHCP Server. Displays the status of the Router's DHCP server.

Start IP Address. Displays the beginning of the range of IP addresses used by the DHCP Server.

End IP Address. Displays the end of the range of IP addresses used by the DHCP Server.

DHCP Client Table button. Click this button to open the DHCP Client Table screen, which shows you which PCs have been assigned an IP address from the Wireless Router's DHCP server. You will see a list of DHCP clients (PCs and other network devices) with the following information: Client Host Name, IP Address, MAC Address, and the length of time (in second) before its assigned IP address expires.

ARP Table button. Click this button will open the ARP Table screen, which shows you the ARP Table on the Wireless Router. The ARP Table provides IP address to MAC address mapping. On the ARP Table screen, you will see a list of address mapping between IP (layer 3) and MAC (layer 2).

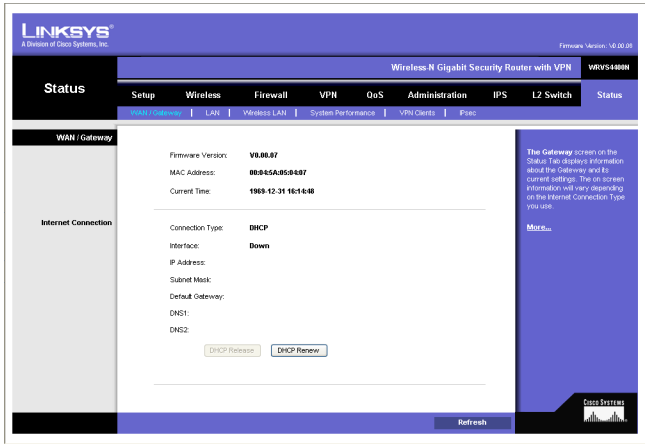


Figure 6-69: Status - WAN / Gateway

Wireless LAN

This screen provides some basic information on the Wireless LAN of this Wireless Router.

MAC Address. Displays the MAC address on the Wireless LAN interface.

Network Mode. Displays the Wireless network operating mode (e.g. B/G/N-Mixed).

Wireless SSID. Displays the Wireless network name.

Channel Bandwidth. Displays the wireless channel bandwidth setting.

Wireless Channel. Displays the radio channel number used.

Security. Displays the Wireless Security mode.

SSID Broadcast. Displays the setting on SSID Broadcast.

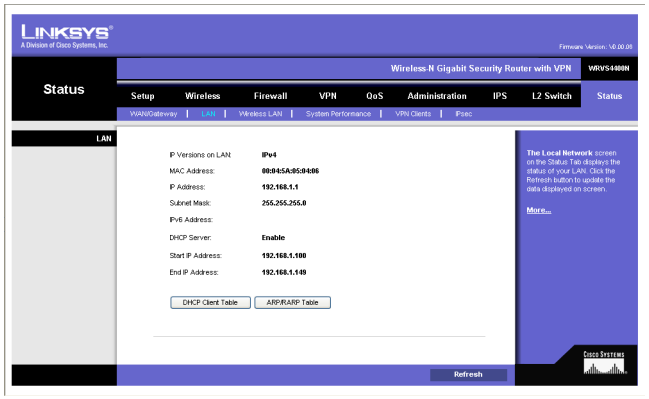


Figure 6-70: Status - LAN

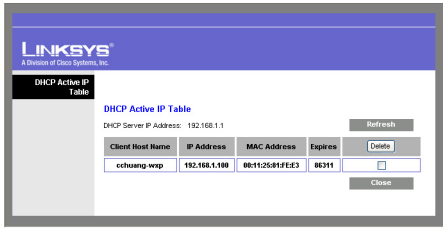


Figure 6-71: LAN DHCP Client Table

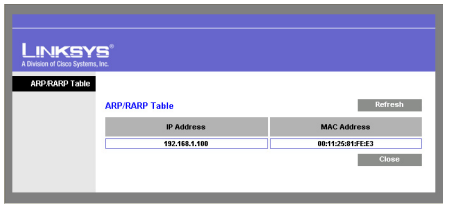


Figure 6-72: LAN ARP Table

System Performance

This screen provides data packet statistics on the LAN switch and Wireless LAN of the Router.

All LAN Ports / WLAN

The All LAN Ports column shows the aggregate traffic statistics from all four LAN ports.

Packets Received. This shows the number of packets received.

Packets Sent. This shows the number of packets sent.

Bytes Received. This shows the number of bytes received.

Bytes Sent. This shows the number of bytes sent.

Error Packets Received. This shows the number of error packets received.

Drop Received Packets. This shows the number of packets being dropped after they were received.

L2 Switch Ports

Tx Bytes. Displays the number of Bytes transmitted from the selected port.

Tx Frames. Displays the number of Ethernet Frames transmitted from the selected port.

Rx Bytes. Displays the number of Bytes received on the selected port.

Rx Frames. Displays the number of Ethernet frames received on the selected port.

Tx Errors. Displays the number of error frames transmitted from the selected port.

Rx Errors. Displays the number of error frames received from the selected port.

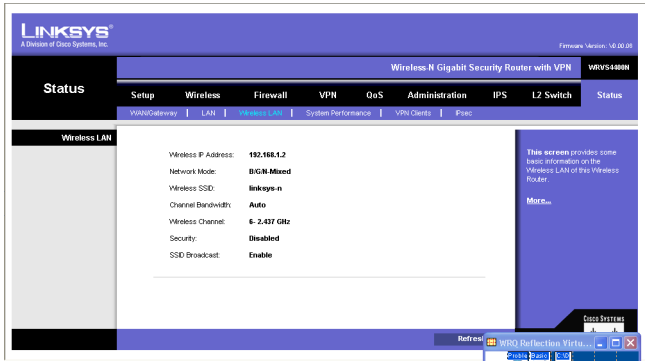


Figure 6-73: Status - Wireless LAN

VPN Clients

This screen displays the VPN Clients' connection status. VPN Clients are configured under VPN->VPN Client Accounts and provide users that are running Linksys QuickVPN to establish a IPsec connection with a remote Wireless Router.

Username. Displays the username of the VPN Client.

Status. Displays the connection status of the VPN Client.

Start Time. Displays the start time of the most recent VPN session for the specified VPN Client.

End Time. Displays the end time of a VPN session, if the VPN Client has disconnected.

Duration. Displays the total connection time of the latest VPN session.

Refresh button. Updates the screen with the latest VPN Client information.

Disconnect button. Select the Disconnect box at the end of each row in the VPN Clients Table and then click the **Disconnect** button to disconnect a VPN Client session.

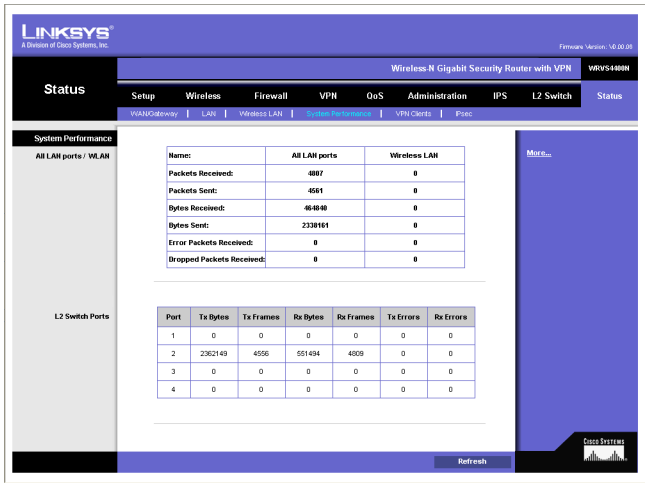


Figure 6-74: Status - System Performance

IPsec VPN

This screen displays the IPsec VPN (gateway to gateway) connection status. IPsec VPN are configured under VPN->IPsec VPN to establish a IPsec connection with a remote Linksys VPN Router.

Tunnel Name. Displays the Tunnel Name of the IPsec VPN connection.

Status. Displays the connection status of the VPN Client.

Action. Use the **Connect** and **Disconnect** button to manage your IPsec VPN connection.

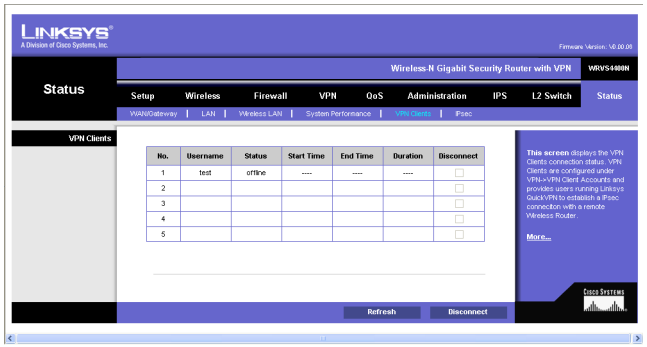


Figure 6-75: Status - VPN Clients

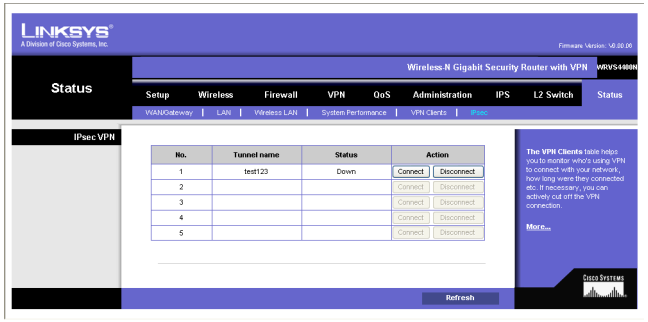


Figure 6-76: Status - IPsec VPN

Appendix A: Troubleshooting

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

Common Problems and Solutions

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

   For Windows 98 and Millennium:

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

For Windows 2000:

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

For Windows XP:

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

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

2. I want to test my Internet connection.

A. Check your TCP/IP settings.

For Windows 98 and Millennium:

Refer to Windows Help for details. Make sure **Obtain IP address automatically** is selected in the settings.

For Windows 2000:

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

For Windows XP:

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

1. Click **Start** and **Control Panel**.
2. Click the **Network and Internet Connections** icon and then the **Network Connections** icon.
3. Right-click the **Local Area Connection** that is associated with the Ethernet adapter you are using, and select the **Properties** option.
4. In the *This connection uses the following items* box, highlight **Internet Protocol (TCP/IP)**, and click the **Properties** button. Make sure that **Obtain an IP address automatically** and **Obtain DNS server address automatically** are selected.

B. Open a command prompt.

- For Windows 98 and Millennium, click **Start** and **Run**. In the *Open* field, type **command**. Press the **Enter** key or click the **OK** button.

- For Windows 2000 and XP, click **Start** and **Run**. In the *Open* field, type **cmd**. Press the **Enter** key or click the **OK** button.

C. In the command prompt, type **ping 192.168.1.1** and press the **Enter** key.
   - If you get a reply, the computer is communicating with the Router.
   - If you do NOT get a reply, check the cable, and make sure **Obtain an IP address automatically** is selected in the TCP/IP settings for your Ethernet adapter.

D. In the command prompt, type **ping** followed by your Internet IP address and press the **Enter** key. The Internet IP Address can be found in the web interface of the Router. For example, if your Internet IP address is 1.2.3.4, you would enter **ping 1.2.3.4** and press the **Enter** key.
   - If you get a reply, the computer is connected to the Router.
   - If you do NOT get a reply, try the ping command from a different computer to verify that your original computer is not the cause of the problem.

E. In the command prompt, type **ping www.linksys.com** and press the **Enter** key.
   - If you get a reply, the computer is connected to the Internet. If you cannot open a webpage, try the ping command from a different computer to verify that your original computer is not the cause of the problem.
   - If you do NOT get a reply, there may be a problem with the connection. Try the ping command from a different computer to verify that your original computer is not the cause of the problem.

3. I am not getting an IP address on the Internet with my Internet connection.

A. Refer to "Problem #2, I want to test my Internet connection" to verify that you have connectivity.
B. If you need to register the MAC address of your Ethernet adapter with your ISP, please see "Appendix E: Finding the MAC Address and IP Address for Your Ethernet Adapter." If you need to clone the MAC address of your Ethernet adapter onto the Router, see the MAC Address Clone section of "Chapter 6: Setting Up and Configuring the Router" for details.
C. Make sure you are using the right Internet settings. Contact your ISP to see if your Internet connection type is DHCP, Static IP Address, or PPPoE (commonly used by DSL consumers). Please refer to the Basic Setup section of "Chapter 6: Setting Up and Configuring the Router" for details on Internet Connection Type settings.
D. Make sure you use the right cable. Check to see if the Internet LED is solidly lit.
E. Make sure the cable connecting from your cable or DSL modem is connected to the Router's Internet port. Verify that the Status page of the Router's Web-based Utility shows a valid IP address from your ISP.
F. Turn off the computer, Router, and cable/DSL modem. Wait 30 seconds, and then turn on the Router, cable/DSL modem, and computer. Check the System Summary tab of the Router's Web-based Utility to see if you get an IP address.

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

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

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

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

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

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

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

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

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

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

To use a server like a web, ftp, or mail server, you need to know the respective port numbers they are using. For example, port 80 (HTTP) is used for web; port 21 (FTP) is used for FTP, and port 25 (SMTP outgoing) and port 110 (POP3 incoming) are used for the mail server. You can get more information by viewing the

documentation provided with the server you installed. Follow these steps to set up port forwarding through the Router's Web-based Utility. We will be setting up web, ftp, and mail servers.

A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Firewall** => **Single Port Forwarding** tab.
B. Enable one of the pre-defined applications in the Table or you can add or modify existing entries for your application.
C. Enter the IP Address of the server that you want the Internet users to access. For example, if the web server's Ethernet adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check "Appendix E: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address. Then check the **Enable** checkbox for the entry. Consider the examples below:

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

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

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

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

A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Firewall** => **Port Range Forwarding** tab.
B. Enter the Service Application Name, Range of Port used by this Application, and Layer 4 Protocol used by this Application to the Table.
C. Enter the IP Address of the server that you want the Internet users to access. For example, if the web server's Ethernet adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check

"Appendix E: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address. Then check the **Enable** checkbox for the entry. Consider the examples below:

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

D. Configure as many entries as you like.

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

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

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

A. Access the Router's Web-based Utility by going to **http://192.168.1.1** or the IP address of the Router. Go to the **Firewall** => **Single Port 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. Go to the **Setup** => **DMZ** tab.
D. Enter the Ethernet adapter's IP address of the computer you want exposed to the Internet. This will bypass the NAT security for that computer. Please refer to "Appendix E: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.

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

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

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

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

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

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

For Microsoft Internet Explorer 5.0 or higher:

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

For Netscape 4.7 or higher:

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

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

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

12. I need to upgrade the firmware.

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

A. Go to the Linksys website at **http://www.linksys.com** and download the latest firmware. Select the Router from the pull-down menu and choose the firmware from the options.
B. Extract the firmware file on your computer.
C. To upgrade the firmware, follow the steps in the Upgrade section found in "Chapter 6: Setting Up and Configuring the Router".

13. The firmware upgrade failed.

The upgrade could have failed for a number of reasons. Follow these steps to upgrade the firmware:

A. Use the Linksys TFTP program to upgrade the firmware. Go to the Linksys website at **http://www.linksys.com** and download the TFTP program, which will be listed with the firmware.
B. Set a static IP address on the PC; refer to "Problem #1, I need to set a static IP address." Use the following IP address settings for the computer you are using:

   IP Address: 192.168.1.50
   Subnet Mask: 255.255.255.0
   Gateway: 192.168.1.1

C. Perform the upgrade using the TFTP utility.

If the firmware upgrade failed, the Router will still work using its current firmware.

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

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

A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
B. Enter the password, if asked. (The default password is admin.)
C. On the **Setup** => **WAN** tab, select the option **Keep Alive**, and set the *Redial Period* option at **20** (seconds).
D. Click the **Save Settings** button.

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

15. I can't access my email, web, or VPN, or I am getting corrupted data from the Internet.

The Maximum Transmission Unit (MTU) setting may need to be adjusted. By default, the MTU is set at 1500. For most DSL users, it is strongly recommended to use MTU 1492. If you are having some difficulties, perform the following steps:

A. To connect to the Router, go to the web browser, and enter **http://192.168.1.1** or the IP address of the Router.
B. Enter the password, if asked. (The default password is **admin**.)
C. Go to Setup => WAN tab.
D. Look for the MTU option, and select **Enable**. In the *Size* field, enter 1492.
E. Click the **Save Settings** button to continue.

If your difficulties continue, change the Size to different values. Try this list of values, one value at a time, in this order, until your problem is solved:
1462
1400
1362
1300

16. I need to use port triggering.

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

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

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

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

- Check if other PCs work. If they do, ensure that your workstation's IP settings are correct (IP Address, Subnet Mask, Default Gateway, and DNS). Restart the computer that is having a problem.

- If the PCs are configured correctly, but still not working, check the Router. Ensure that it is connected and powered on. Connect to it and check its settings. (If you cannot connect to it, check the LAN and power connections.)
- If the Router is configured correctly, check your Internet connection (DSL/cable modem, etc.) to see if it is working correctly. You can remove the Router to verify a direct connection.
- Manually configure the TCP/IP with a DNS address provided by your ISP.
- Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools**, **Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is set to **Never dial a connection**. For Netscape Navigator, click **Edit**, **Preferences**, **Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

18. I'm trying to access the Router's Web-based Utility, but I do not see the login screen. Instead, I see a screen saying, "404 Forbidden."

If you are using Windows Explorer, perform the following steps until you see the Web-based Utility's login screen (Netscape Navigator will require similar steps):

A. Click **File**. Make sure *Work Offline* is NOT checked.
B. Press **CTRL + F5**. This is a hard refresh, which will force Windows Explorer to load new webpages, not cached ones.
C. Click **Tools**. Click **Internet Options**. Click the **Security** tab. Click the **Default level** button. Make sure the security level is Medium or lower. Then click the **OK** button.

Frequently Asked Questions

What is the maximum number of IP addresses that the Router will support?

The Router will support up to 253 IP addresses if the subnetmask is set to 255.255.255.0.

Is IPSec Passthrough supported by the Router?

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

Where is the Router installed on the network?

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

Does the Router support IPX or AppleTalk?

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

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

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

I set up an Unreal Tournament Server, but others on the LAN cannot join. What do I need to do?
If you have a dedicated Unreal Tournament server running, you need to create a static IP for each of the LAN computers and forward ports 7777, 7778, 7779, 7780, 7781, and 27900 to the IP address of the server. You can also use a port forwarding range of 7777 to 27900. If you want to use the UT Server Admin, forward another port (8080 usually works well but is used for remote admin. You may have to disable this.), and then in the [UWeb.WebServer] section of the server.ini file, set the ListenPort to 8080 (to match the mapped port above) and ServerName to the IP assigned to the Router from your ISP.

Can multiple gamers on the LAN get on one game server and play simultaneously with just one public IP address?
It depends on which network game or what kind of game server you are using. For example, Unreal Tournament supports multi-login with one public IP.

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

How can I block corrupted FTP downloads?
If you are experiencing corrupted files when you download a file with your FTP client, try using another FTP program.

The web page hangs; downloads are corrupt, or nothing but junk characters are being displayed on the screen. What do I need to do?
Force your Ethernet adapter to 10Mbps or half duplex mode, and turn off the "Auto-negotiate" feature of your Ethernet adapter as a temporary measure. (Please look at the Network Control Panel in your Ethernet adapter's

Advanced Properties tab.) Make sure that your proxy setting is disabled in the browser. Check our website at *www.linksys.com* for more information.

If all else fails in the installation, what can I do?
Reset the Router by holding down the Reset button for ten seconds. Reset your cable or DSL modem by powering the unit off and then on. Obtain and flash the latest firmware release that is readily available on the Linksys website, *www.linksys.com*.

How can I be notified of new Router firmware upgrades?
All Linksys firmware upgrades are posted on the Linksys website at *www.linksys.com*, where they can be downloaded for free. The Router's firmware can be upgraded using the Web-based Utility. If the Router's Internet connection is working well, there is no need to download a newer firmware version, unless that version contains new features that you would like to use. Downloading a more current version of Router firmware will not enhance the quality or speed of your Internet connection, and may disrupt your current connection stability.

Will the Router function in a Macintosh environment?
Yes, but the Router's setup pages are accessible only through Internet Explorer 5.0 or Netscape Navigator 5.0 or higher for Macintosh.

I am not able to get the web configuration screen for the Router. What can I do?
You may have to remove the proxy settings on your Internet browser, e.g., Netscape Navigator or Internet Explorer. Or remove the dial-up settings on your browser. Check with your browser documentation, and make sure that your browser is set to connect directly and that any dial-up is disabled. Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools**, **Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is set to **Never dial a connection**. For Netscape Navigator, click **Edit**, **Preferences**, **Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

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

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

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

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

How many ports can be simultaneously forwarded?
Theoretically, the Router can establish 4,000 sessions at the same time, but you can only forward 30 ranges of ports.

Does the Router replace a modem? Is there a cable or DSL modem in the Router?
No, this version of the Router must work in conjunction with a cable or DSL modem.

Which modems are compatible with the Router?
The Router is compatible with virtually any cable or DSL modem that supports Ethernet.

What is the maximum number of VPN sessions allowed by the Router?
The maximum number depends on many factors. At least one IPSec session will work through the Router; however, simultaneous IPSec sessions may be possible, depending on the specifics of your VPNs.

How can I check whether I have static or DHCP IP addresses?
Ask your ISP to find out.

How do I get mIRC to work with the Router?
Under the **Firewall** => **Single Port Forwarding** tab, set port forwarding to **113** for the PC on which you are using mIRC.

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

Appendix B: Using the Linksys QuickVPN Software for Windows 2000 or XP

Overview

The Linksys Wireless-N Gigabit Security Router with VPN offers a free QuickVPN software program for computers running Windows 2000 or XP. (Computers running other operating systems will have to use a third-party VPN software program.) This guide describes how to install and use the Linksys QuickVPN software.

vpn *(virtual private network): a security measure to protect data as it leaves one network and goes to another over the Internet.*

software*: instructions for the computer.*

Before You Begin

The QuickVPN software program only works with a 4-Port Gigabit Security Router with VPN that is properly configured to accept a QuickVPN connection. Follow these instructions for configuring the VPN client settings for the Router:

1. Click the **VPN** tab.
2. Click the **VPN Client Accounts** tab.
3. Enter the username in the *Username* field.
4. Enter the password in the *Password* field, and enter it again in the *Re-enter to confirm* field.
5. Click the **Add/Save** button.
6. Click the **Active** checkbox for VPN Client No. 1.

Click the **Save Settings** button.

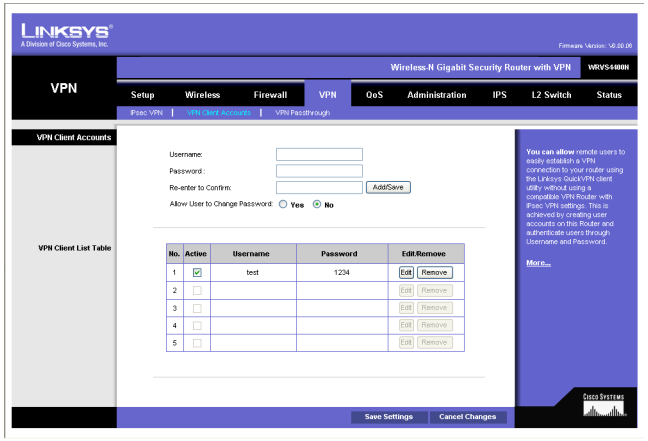


Figure B-1: VPN Client Accounts Screen

Installing the Linksys QuickVPN Software

Installing from the CD-ROM

1. Click Install QuickVPN and follow the on-screen instructions.

Downloading and Installing from the Internet

1. Go to *www.linksys.com* and select **Products**.
2. Click **Business Solutions**.
3. Click **Router/VPN Solutions**.
4. Click **WRVS4400N**.
5. Click **Linksys QuickVPN Utility** in the More Information section.
6. Save the zip file to your PC, and extract the .exe file.
7. Double-click the .exe file, and follow the on-screen instructions. Then proceed to the next section, “Using the Linksys QuickVPN Software.”

Using the Linksys QuickVPN Software

NOTE: You can change your password only if you have been granted that privilege by your system administrator.

1. Double-click the Linksys QuickVPN software icon on your desktop or in the system tray.

Figure B-2: QuickVPN Desktop Icon

Figure B-3: QuickVPN Tray Icon - No Connection

2. The login screen will appear. Enter a name for your profile.

   Then enter the User Name and Password you have been assigned.

   In the *Server Address* field, enter the IP address or domain name of the Wireless-G VPN Router with RangeBooster. To save this profile, click the **Save** button. Multiple profiles can be set up if you want to establish a tunnel to multiple sites. Note that only one tunnel can be active at a time. To delete this profile, click the **Delete** button. For information, click the **Help** button.

Figure B-4: QuickVPN Software - Profile

3. To begin your QuickVPN connection, click the **Connect** button and the Connecting, Activating Policy, and Verifying Network screens appear.

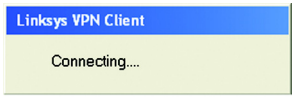


Figure B-5: Connecting

Figure B-6: Activating Policy

Figure B-7: Verifying Network

4. When your QuickVPN connection is established, the status screen will appear, and the QuickVPN tray icon will turn green. It will display the IP address of the remote end of the VPN tunnel, the time and date the VPN tunnel began, and the total length of time the VPN tunnel has been active.

   To terminate the VPN tunnel, click the **Disconnect** button. If you want to change your password, click the **Change Password** button. For information, click the **Help** button.

Figure B-8: QuickVPN Software - Status

5. If you clicked the Change Password button and have permission to change your own password, you will see the *Connect Virtual Private Connection* screen. Enter your password in the *Old Password* field. Enter your new password in the *New Password* field. Then enter the new password again in the *Confirm New Password* field. Click the **OK** button to save your new password. Click the **Cancel** button to cancel your change. For information, click the **Help** button.

Figure B-9: QuickVPN Tray Icon - Connection

Figure B-10: QuickVPN Tray Icon - No Connection

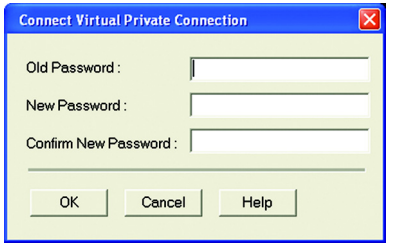


Figure B-11: QuickVPN Software - Change Password

Appendix C: Configuring a Gateway-to-Gateway IPSec Tunnel

Overview

This appendix explains how to configure an IPSec VPN tunnel between two VPN Routers by example. Two PCs are used to test the liveliness of the tunnel. You can think of the VPN Router1, Internet, VPN Router2 as a big virtual router that connects PC1 on LAN1 and PC2 on LAN2.

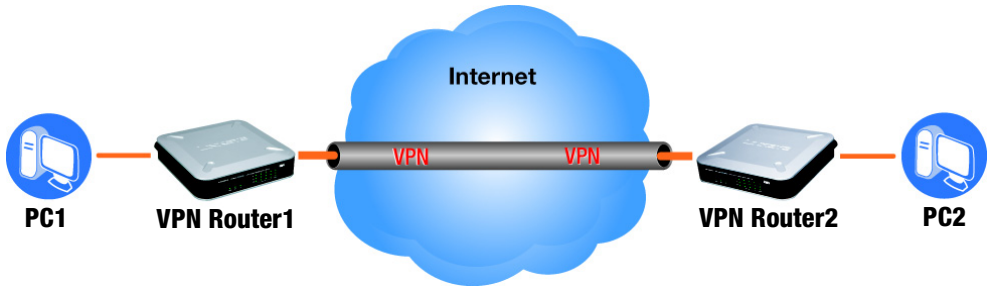


Figure C-1: Diagram of Gateway-to-Gateway VPN Tunnel

Before You Begin

The following is a list of equipment you need:

- Two Windows desktop PCs (each PC will be connected to a VPN Router)
- Two VPN Routers that are both connected to the Internet

NOTE: Each computer must have a network adapter installed.

Configuring the VPN Settings for the VPN Routers

Configuring VPN Router 1

Follow these instructions for the first VPN Router, designated VPN Router 1. The other VPN Router is designated VPN Router 2.

1. Launch the web browser for a networked PC, designated PC 1.
2. Enter the VPN Router's local IP address in the *Address* field (default is **192.168.1.1**). Then press **Enter**.
3. A password request page will appear. (Non-Windows XP users will see a similar screen.) Complete the *User Name* and *Password* fields (**admin** is the default user name and password). Then click the **OK** button.
4. Click the **VPN** tab.
5. Click the **IPSec VPN** tab.
6. For the VPN Tunnel setting, select **Enabled**.
7. Enter a name in the *Tunnel Name* field.
8. For the Local Secure Group, select **Subnet**. Enter VPN Router 1's local network settings in the *IP Address* and *Mask* fields.
9. For the Remote Secure Group, select **Subnet**. Enter VPN Router 2's local network settings in the *IP Address* and *Mask* fields. Note that the subnet of Router 2 must be different than the subnet of Router 1.
10. For the Remote Secure Gateway, select **IP Addr**. Enter VPN Router 2's WAN IP address in the *IP Address* field.
11. Click the **Save Settings** button.

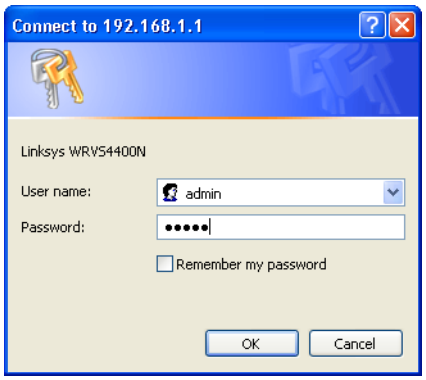


Figure C-2: Login Screen

Figure C-3: VPN - IPsec VPN Configuration

Configuring VPN Router 2

Follow similar instructions for VPN Router 2.

1. Launch the web browser for a networked PC, designated PC 2.
2. Enter the VPN Router's local IP address in the *Address* field (default is **192.168.1.1**). Then press **Enter**.
3. A password request page will appear. (Non-Windows XP users will see a similar screen.) Complete the *User Name* and *Password* fields (**admin** is the default user name and password). Then click the **OK** button.
4. If the LAN IP address is still the default one, change it to 172.168.1.1 and save the setting.
5. Click the **VPN** tab.
6. Click the **IPSec VPN** tab.
7. For the VPN Tunnel setting, select **Enabled**.
8. Enter a name in the *Tunnel Name* field.
9. For the Local Secure Group, select **Subnet**. Enter VPN Router 2's local network settings in the *IP Address* and *Mask* fields.
10. For the Remote Secure Group, select **Subnet**. Enter VPN Router 1's local network settings in the *IP Address* and *Mask* fields.
11. For the Remote Secure Gateway, select IP Addr. Enter VPN Router 1's WAN IP address in the *IP Address* field.
12. Click the **Save Settings** button.

Configuring the Key Management Settings

Configuring VPN Router 1

Following these instructions for VPN Router 1.

1. On the *IPSec VPN* screen, select **3DES** from the *Encryption* drop-down menu.
2. Select **MD5** from the *Authentication* drop-down menu.
3. Keep the default Key Exchange Method, **Auto(IKE)**.
4. Select **Pre-Shared Key**, and enter a string for this key., e.g. 13572468.
5. For the PFS setting, select **Enabled**.
6. If you need more detailed settings, click the **Advanced Settings** button. Otherwise, click the **Save Settings** button and proceed to the next section, "Configuring VPN Router 2."
7. On the *Advanced VPN Tunnel Setup* screen, keep the default Operation Mode, **Main**.
8. For Phase 1, select 3**DES** from the *Encryption* drop-down menu.
9. Select **MD5** from the *Authentication* drop-down menu.
10. Select **1024-bit** from the *Group* drop-down menu.
11. Enter **3600** in the *Key Life Time* field.
12. For Phase 2, the Encryption, Authentication, and PFS settings were set on the *VPN* screen.

    Select **1024-bit** from the *Group* drop-down menu.
13. Keep the default Key Life Time value, **28800**.
14. Click the **Save Settings** button on the *Advanced VPN Tunnel Setup* screen.
15. Click the **Save Settings** button on the *IPSec VPN* screen.

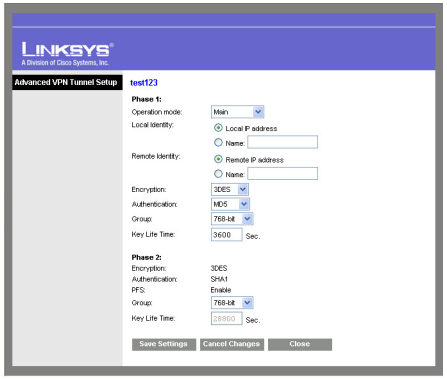


Figure C-4: Advanced IPsec VPN Tunnel Settings

Configuring VPN Router 2

For VPN Router 2, follow the same instructions in the previous section, “Configuring VPN Router 1.”

Configuring PC 1 and PC 2

1. Set PC 1 and PC 2 to be DHCP clients (refer to Windows Help for more information).

2. Verify that PC 1 and PC 2 can ping each other (refer to Windows Help for more information).

If the computers can ping each other, then you know the VPN tunnel is configured correctly. You can select different algorithms for the encryption, authentication, and other key management settings for VPN Routers 1 and 2. Refer to the previous section, “Configuring the Key Management Settings,” for details.

Congratulations! You have successfully configured a VPN tunnel between two VPN Routers.

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

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

Windows 98 or Me Instructions

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

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

   The example in Figure D-2 shows the Ethernet adapter's IP address as 192.168.1.100. Your computer may show something different.

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

Windows 2000 or XP Instructions

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

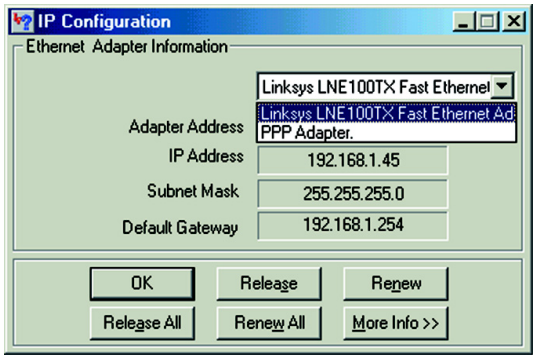


Figure D-1: IP Configuration Screen

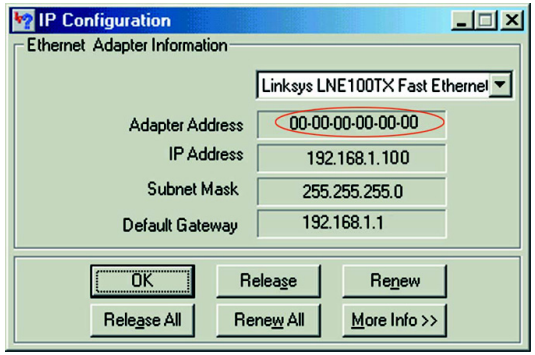


Figure D-2: MAC Address/Adapter Address

3. Write down the Physical Address as shown on your computer screen (Figure D-3); it is the MAC address for your Ethernet adapter. This appears as a series of numbers and letters.

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

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

   The example in Figure D-3 shows the Ethernet adapter's IP address as 192.168.1.100. Your computer may show something different.

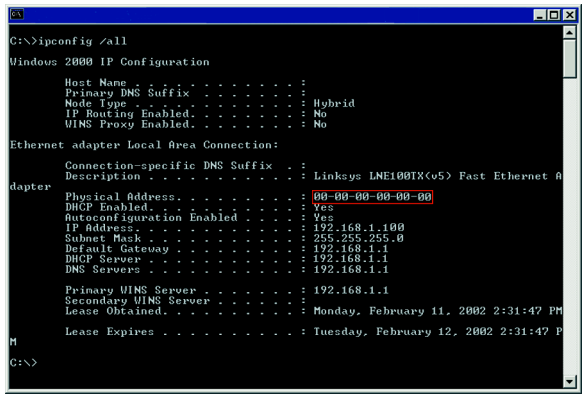


Figure D-3: MAC Address/Physical Address

For the Router's Web-based Utility

For MAC address cloning, enter the MAC Address in the MAC Address field or select **Clone My PCs MAC**. See Figure D-4.

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

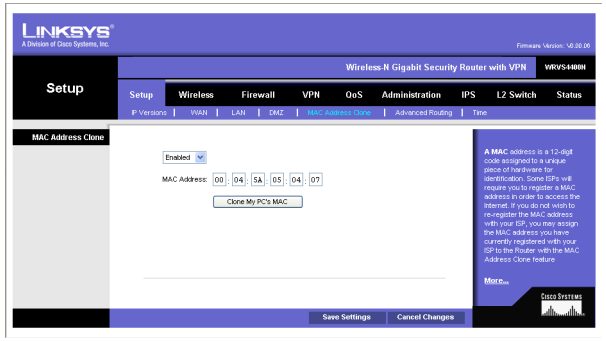


Figure D-4: MAC Address Clone

Appendix E: Glossary

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

AES (**A**dvanced **E**ncryption **S**tandard) - A security method that uses symmetric 128-bit block data encryption.

Backbone - The part of a network that connects most of the systems and networks together, and handles the most data.

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

Beacon Interval - Data transmitted on your wireless network that keeps the network synchronized.

Bit - A binary digit.

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

Bridge - A device that connects different networks.

Broadband - An always-on, fast Internet connection.

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

Buffer - A shared or assigned memory area that is used to support and coordinate different computing and networking activities so one isn't held up by the other.

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

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

CSMA/CA (**C**arrier **S**ense **M**ultiple **A**ccess/**C**ollision **A**voidance) - A method of data transfer that is used to prevent data collisions.

Daisy Chain - A method used to connect devices in a series, one after the other.

Database - A collection of data that is organized so that its contents can easily be accessed, managed, and updated.

DDNS (**D**ynamic **D**omain **N**ame **S**ystem) - Allows the hosting of a website, FTP server, or e-mail server with a fixed domain name (e.g., www.xyz.com) and a dynamic IP address.

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

DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol) - A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

DMZ (**Dem**ilitarized **Z**one) - Removes the Router's firewall protection from one PC, allowing it to be "seen" from the Internet.

DNS (**D**omain **N**ame **S**erver) - The IP address of your ISP's server, which translates the names of websites into IP addresses.

Domain - A specific name for a network of computers.

Download - To receive a file transmitted over a network.

DSL (**D**igital **S**ubscriber **L**ine) - An always-on broadband connection over traditional phone lines.

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

EAP (**E**xtensible **A**uthentication **P**rotocol) - A general authentication protocol used to control network access. Many specific authentication methods work within this framework.

EAP-PEAP (**E**xtensible **A**uthentication **P**rotocol-**P**rotected **E**xtensible **A**uthentication **P**rotocol) - A mutual authentication method that uses a combination of digital certificates and another system, such as passwords.

EAP-TLS (**E**xtensible **A**uthentication **P**rotocol-**T**ransport **L**ayer **S**ecurity) - A mutual authentication method that uses digital certificates.

Encryption - Encoding data transmitted in a network.

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

Finger - A program that tells you the name associated with an e-mail address.

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

Firmware - The programming code that runs a networking device.

Fragmentation -Breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

FTP (**F**ile **T**ransfer **P**rotocol) - A protocol used to transfer files over a TCP/IP network.

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

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

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

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

HTTP (**H**yper**T**ext **T**ransport **P**rotocol) - The communications protocol used to connect to servers on the World Wide Web.

Infrastructure - A wireless network that is bridged to a wired network via an access point.

IP (**I**nternet **P**rotocol) - A protocol used to send data over a network.

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

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

IPSec (**I**nternet **P**rotocol **Sec**urity) - A VPN protocol used to implement secure exchange of packets at the IP layer.

ISP (**I**nternet **S**ervice **P**rovider) - A company that provides access to the Internet.

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

LEAP (**L**ightweight **E**xtensible **A**uthentication **P**rotocol) - A mutual authentication method that uses a username and password system.

MAC (**M**edia **A**ccess **C**ontrol) **Address** - The unique address that a manufacturer assigns to each networking device.

Mbps (**M**ega**B**its **P**er **S**econd) - One million bits per second; a unit of measurement for data transmission.

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

Multicasting - Sending data to a group of destinations at once.

NAT (**N**etwork **A**ddress **T**ranslation) - NAT technology translates IP addresses of a local area network to a different IP address for the Internet.

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

NNTP (**N**etwork **N**ews **T**ransfer **P**rotocol) - The protocol used to connect to Usenet groups on the Internet.

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

Packet - A unit of data sent over a network.

Ping (**P**acket **IN**ternet **G**roper) - An Internet utility used to determine whether a particular IP address is online.

POP3 (**P**ost **O**ffice **P**rotocol **3**) - A standard mail server commonly used on the Internet.

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

Power **o**ver **E**thernet (**PoE**) - A technology enabling an Ethernet network cable to deliver both data and power.

PPPoE (**P**oint to **P**oint **P**rotocol **o**ver **E**thernet) - A type of broadband connection that provides authentication (username and password) in addition to data transport.

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

RADIUS (**R**emote **A**uthentication **D**ial-**I**n **U**ser **S**ervice) - A protocol that uses an authentication server to control network access.

RJ-45 (**R**egistered **J**ack-**45**) - An Ethernet connector that holds up to eight wires.

Router - A networking device that connects multiple networks together.

RTS (**R**equest **T**o **S**end) - A networking method of coordinating large packets through the RTS Threshold setting.

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

SMTP (**S**imple **M**ail **T**ransfer **P**rotocol) - The standard e-mail protocol on the Internet.

SNMP (**S**imple **N**etwork **M**anagement **P**rotocol) - A widely used network monitoring and control protocol.

Software - Instructions for the computer. A series of instructions that performs a particular task is called a "program".

SOHO (**S**mall **O**ffice/**H**ome **O**ffice) - Market segment of professionals who work at home or in small offices.

SPI (**S**tateful **P**acket **I**nspection) **Firewall** - A technology that inspects incoming packets of information before allowing them to enter the network.

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

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

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

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

TCP (**T**ransmission **C**ontrol **P**rotocol) - A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

TCP/IP (**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol) - A set of instructions PCs use to communicate over a network.

Telnet - A user command and TCP/IP protocol used for accessing remote PCs.

TFTP (**T**rivial **F**ile **T**ransfer **P**rotocol) - A version of the TCP/IP FTP protocol that has no directory or password capability.

Throughput - The amount of data moved successfully from one node to another in a given time period.

Topology - The physical layout of a network.

TX Rate - Transmission Rate.

UDP (**U**ser **D**atagram **P**rotocol) - A network protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent.

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

Upload - To transmit a file over a network.

URL (**U**niform **R**esource **L**ocator) - The address of a file located on the Internet.

VPN (**V**irtual **P**rivate **N**etwork) - A security measure to protect data as it leaves one network and goes to another over the Internet.

WAN (**W**ide **A**rea **N**etwork)- The Internet.

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

Appendix F: Specifications

Model	WRVS4400N
Standards	IEEE802.11n draft, 802.11g, 802.11b, 802.3u, 802.1X
Ports	10/100/1000 Base-T Ethernet, 12VDC Power
Buttons	Reset
Cabling Type	UTP CAT 5
LEDs	Power, Diag, IPS (Blinks RED - Internal attack, Blinks Green - external attack), Wireless, LAN 1-4, Internet
Wireless	
Radio Transmit Power	19dBm for 802.11b, 16dBm for 802.11g and 802.11n
Wireless Securities	WEP, WPA-Personal, WPA-Enterprise, WPA2-Personal, WPA2-Enterprise
Antenna	3 external 2dBi omni-directional antennas, 2x3 MIMO diversity
Performance	
NAT Throughput	800 Mb/s
Setup/Config	
WebUI	Built in Web UI for Easy browser-based configuration (HTTP/HTTPS)
Management	
SNMP Version	SNMP Version 1, 2c

Event Logging	Event Logging: Local, Syslog, E-mail Alerts
Web F/W upgrade	Firmware Upgradable Through Web-Browser
Diagnostics	DIAG LED for Flash and RAM failure; Ping Test for network diagnostics

Security

VPN	5 QuickVPN Tunnels for remote client access 5 IPSec Gateway-to-Gateway Tunnels for branch office connectivity 3DES Encryption MD5/SHA1 Authentication IPSec NAT-T VPN Passthrough of PPTP, L2TP, IPSec
Access Control	IP-based ACL, Internet Access Policy Control
Firewall	SPI stateful packet inspection firewall
Content Filtering	URL blocking, keyword blocking
IPS (Intrusion Prevention System)	IP Sweep Detection, Application Anomaly Detection (HTTP, FTP, Telnet, RCP), P2P Control, Instant Messenger Control, L3-L4 Protocol (IP, TCP, UDP, ICMP) Normalization, L7 Signature Matching
Signature Update	Manual download from the web (Free download for 1 year)
Secure Management	HTTPS, Username/Password
802.1x	Port-based Radius Authentication (EAP-MD5, EAP-PEAP)
NAT	PAT, NAPT, ALG support, NAT Traversal

QoS

Prioritization types	Port-based and Application-based Priority

Queues	4 queues
Network	
VLAN Support	Port-based VLAN
DHCP	DHCP Server, DHCP Client, DHCP Relay Agent
DNS	DNS Relay, Dynamic DNS (DynDNS, TZO)
DMZ	Any host IP address on LAN side
Routing	Static and RIP v1,v2
Environmental	
Device Dimensions (W x H x D)	7.8 x 5.16 x 7.8 inches 198 x 131 x 198 mm
Weight	0.99 lbs (0.45kg)
Power	12V 1A
Certification	FCC class B, CE, ICES-003
Operating Temp.	0ºC to 40ºC (32ºF to 104ºF)
Storage Temp.	-20ºC to 70ºC (-4ºF to 158ºF)
Operating Humidity	10% to 85% Non-Condensing
Storage Humidity	5% to 90% Non-Condensing

Appendix G: Warranty Information

LIMITED WARRANTY

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

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

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

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

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

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

Appendix H: Regulatory Information

FCC Statement

This product has been tested and complies with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

FCC Radiation Exposure Statement

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

Safety Notices

Caution: To reduce the risk of fire, use only No.26 AWG or larger telecommunication line cord.
Do not use this product near water, for example, in a wet basement or near a swimming pool.
Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Industry Canada (Canada)

This device complies with Canadian ICES-003 and RSS210 rules. Cet appareil est conforme aux normes NMB-003 et RSS210 d'Industrie Canada.

IC Statement

Operation is subject to the following two conditions:

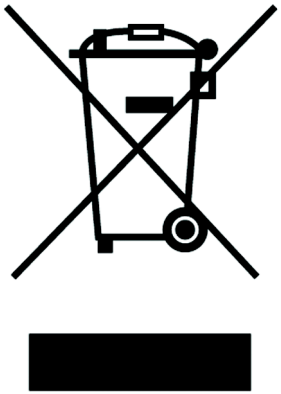
1. This device may not cause interference and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Règlement d'Industry Canada

Le fonctionnement est soumis aux conditions suivantes :
1. Ce périphérique ne doit pas causer d'interférences;
2. Ce périphérique doit accepter toutes les interférences reçues, y compris celles qui risquent d'entraîner un fonctionnement indésirable.

User Information for Consumer Products Covered by EU Directive 2002/96/EC on Waste Electric and Electronic Equipment (WEEE)

This document contains important information for users with regards to the proper disposal and recycling of Linksys products. Consumers are required to comply with this notice for all electronic products bearing the following symbol:



English

Environmental Information for Customers in the European Union

European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

Ceština/Czech

Informace o ochraně životního prostředí pro zákazníky v zemích Evropské unie

Evropská směrnice 2002/96/ES zakazuje, aby zařízení označené tímto symbolem na produktu anebo na obalu bylo likvidováno s netříděným komunálním odpadem. Tento symbol udává, že daný produkt musí být likvidován odděleně od běžného komunálního odpadu. Odpovídáte za likvidaci tohoto produktu a dalších elektrických a elektronických zařízení prostřednictvím určených sběrných míst stanovených vládou nebo místními úřady. Správná likvidace a recyklace pomáhá předcházet potenciálním negativním dopadům na životní prostředí a lidské zdraví. Podrobnější informace o likvidaci starého vybavení si laskavě vyžádejte od místních úřadů, podniku zabývajícího se likvidací komunálních odpadů nebo obchodu, kde jste produkt zakoupili.

Dansk/Danish

Miljøinformation for kunder i EU

EU-direktiv 2002/96/EF kræver, at udstyr der bærer dette symbol på produktet og/eller emballagen ikke må bortskaffes som usorteret kommunalt affald. Symbolet betyder, at dette produkt skal bortskaffes adskilt fra det almindelige husholdningsaffald. Det er dit ansvar at bortskaffe dette og andet elektrisk og elektronisk udstyr via bestemte indsamlingssteder udpeget af staten eller de lokale myndigheder. Korrekt bortskaffelse og genvinding vil hjælpe med til at undgå mulige skader for miljøet og menneskers sundhed. Kontakt venligst de lokale myndigheder, renovationstjenesten eller den butik, hvor du har købt produktet, angående mere detaljeret information om bortskaffelse af dit gamle udstyr.

Deutsch/German

Umweltinformation für Kunden innerhalb der Europäischen Union

Die Europäische Richtlinie 2002/96/EC verlangt, dass technische Ausrüstung, die direkt am Gerät und/oder an der Verpackung mit diesem Symbol versehen ist nicht zusammen mit unsortiertem Gemeindeabfall entsorgt werden darf. Das Symbol weist darauf hin, dass das Produkt von regulärem Haushaltmüll getrennt entsorgt werden sollte. Es liegt in Ihrer Verantwortung, dieses Gerät und andere elektrische und elektronische Geräte über die dafür zuständigen und von der Regierung oder örtlichen Behörden dazu bestimmten Sammelstellen zu entsorgen. Ordnungsgemäßes Entsorgen und Recyceln trägt dazu bei, potentielle negative Folgen für Umwelt und die menschliche Gesundheit zu vermeiden. Wenn Sie weitere Informationen zur Entsorgung Ihrer Altgeräte benötigen, wenden Sie sich bitte an die örtlichen Behörden oder städtischen Entsorgungsdienste oder an den Händler, bei dem Sie das Produkt erworben haben.

Eesti/Estonian

Keskkonnaalane informatsioon Euroopa Liidus asuvatele klientidele

Euroopa Liidu direktiivi 2002/96/EÜ nõuete kohaselt on seadmeid, millel on tootel või pakendil käesolev sümbol, keelatud kõrvaldada koos sorteerimata olmejäätmetega. See sümbol näitab, et toode tuleks kõrvaldada eraldi tavalistest olmejäätmevoogudest. Olete kohustatud kõrvaldama käesoleva ja ka muud elektri- ja elektroonikaseadmed riigi või kohalike ametiasutuste poolt ette nähtud kogumispunktide kaudu. Seadmete korrektne kõrvaldamine ja ringlussevõtt aitab vältida võimalikke negatiivseid tagajärgi keskkonnale ning inimeste tervisele. Vanade seadmete kõrvaldamise kohta täpsema informatsiooni saamiseks võtke palun ühendust kohalike ametiasutustega, jäätmekäitlusfirmaga või kauplusega, kust te toote ostsite.

Español/Spanish

Información medioambiental para clientes de la Unión Europea

La Directiva 2002/96/CE de la UE exige que los equipos que lleven este símbolo en el propio aparato y/o en su embalaje no deben eliminarse junto con otros residuos urbanos no seleccionados. El símbolo indica que el producto en cuestión debe separarse de los residuos domésticos convencionales con vistas a su eliminación. Es responsabilidad suya desechar este y cualesquiera otros aparatos eléctricos y electrónicos a través de los puntos de recogida que ponen a su disposición el gobierno y las autoridades locales. Al desechar y reciclar correctamente estos aparatos estará contribuyendo a evitar posibles consecuencias negativas para el medio ambiente y la salud de las personas. Si desea obtener información más detallada sobre la eliminación segura de su aparato usado, consulte a las autoridades locales, al servicio de recogida y eliminación de residuos de su zona o pregunte en la tienda donde adquirió el producto.

Ξλληνικά/Greek

Στοιχεία περιβαλλοντικής προστασίας για πελάτες εντός της Ευρωπαϊκής Ένωσης

Η Κοινοτική Οδηγία 2002/96/EC απαιτεί ότι ο εξοπλισμός ο οποίος φέρει αυτό το σύμβολο στο προϊόν και/ή στη συσκευασία του δεν πρέπει να απορρίπτεται μαζί με τα μικτά κοινοτικά απορρίμματα. Το σύμβολο υποδεικνύει ότι αυτό το προϊόν θα πρέπει να απορρίπτεται ξεχωριστά από τα συνήθη οικιακά απορρίμματα. Είστε υπεύθυνος για την απόρριψη του παρόντος και άλλου ηλεκτρικού και ηλεκτρονικού εξοπλισμού μέσω των καθορισμένων εγκαταστάσεων συγκέντρωσης απορριμμάτων οι οποίες παρέχονται από το κράτος ή τις αρμόδιες τοπικές αρχές. Η σωστή απόρριψη και ανακύκλωση συμβάλλει στην πρόληψη πιθανών αρνητικών συνεπειών για το περιβάλλον και την υγεία. Για περισσότερες πληροφορίες σχετικά με την απόρριψη του παλιού σας εξοπλισμού, παρακαλώ επικοινωνήστε με τις τοπικές αρχές, τις υπηρεσίες απόρριψης ή το κατάστημα από το οποίο αγοράσατε το προϊόν.