

LINKSYS[®]
A Division of Cisco Systems, Inc.



ADSL Gateway

with 4-Port Switch

User Guide



Model No. **AG041 (EU)**



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How to Use this Guide

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



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



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



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

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

word: definition.

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

Figure 0-1: Sample Figure Description

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

Table of Contents

Chapter 1: Introduction	1
Welcome	1
What's in this Guide?	2
Chapter 2: Planning your Network	4
The Gateway's Functions	4
IP Addresses	4
What is a VPN?	5
Why do I need a VPN?	6
Chapter 3: Getting to Know the ADSL Gateway	8
The Back Panel	8
The Front Panel	9
Chapter 4: Connecting the ADSL Gateway	10
Overview	10
Connecting to a Computer	10
Chapter 5: Configuring the ADSL Gateway	12
Overview	12
How to Access the Web-based Utility	13
The Setup Tab	14
The Security Tab	22
The Access Restrictions Tab	27
The Applications and Gaming Tab	29
The Administration Tab	32
The Status Tab	37
Appendix A: Troubleshooting	39
Common Problems and Solutions	39
Frequently Asked Questions	47
Appendix B: Configuring IPsec between a Windows 2000 or XP Computer and the Gateway	51
Introduction	51
Environment	51
How to Establish a Secure IPsec Tunnel	52
Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter	62

ADSL Gateway with 4-Port Switch

Windows 98 or Me Instructions	62
Windows 2000 or XP Instructions	63
Appendix D: Upgrading Firmware	64
Appendix E: Windows Help	65
Appendix F: Glossary	66
Appendix G: Specifications	70
Appendix H: Warranty Information	71
Appendix I: Regulatory Information	72
Appendix J: Contact Information	73

List of Figures

Figure 2-1: A Network with the Gateway	4
Figure 2-2: Computer-to-VPN Gateway	6
Figure 2-3: VPN Gateway-to-VPN Gateway	7
Figure 3-1: Back Panel	8
Figure 3-2: Front Panel	9
Figure 4-1: Connect your network	10
Figure 4-2: Connect your ADSL modem	10
Figure 4-3: Connect power	11
Figure 5-1: Password Screen	14
Figure 5-2: Basic Setup Tab	14
Figure 5-3: Internet Setup - Dynamic IP	15
Figure 5-4: Internet Setup - Static IP	15
Figure 5-5: Internet Setup - RFC 1483 Routed	16
Figure 5-6: Internet Setup - RFC 2516 PPPoE	16
Figure 5-7: Internet Setup - RFC 2364 PPPoA	17
Figure 5-8: Internet Setup - Bridged Mode Only	17
Figure 5-9: Setup Tab - Optional Settings	18
Figure 5-10: Setup Tab - DDNS	19
Figure 5-11: Setup Tab - Advanced Routing	20
Figure 5-12: Routing Table	21
Figure 5-13: Security Tab - Firewall	22
Figure 5-14: Security Tab - VPN	23
Figure 5-15: VPN with Manual Key Management	24
Figure 5-16: Advanced IPSec VPN Tunnel Setup	25
Figure 5-17: Access Restrictions - Internet Access	27
Figure 5-18: Internet Policy Summary	27
Figure 5-19: List of PCs	28
Figure 5-20: Port Services	28
Figure 5-21: Applications & Gaming - Single Port Forwarding	29
Figure 5-22: Applications & Gaming - Port Range Forwarding	30

Figure 5-23: Applications & Gaming - Port Triggering	30
Figure 5-24: Applications & Gaming - DMZ	31
Figure 5-25: Administration tab - Management	32
Figure 5-26: Administration tab - Reporting	34
Figure 5-27: Administration tab - Diagnostics	35
Figure 5-28: Administration tab - Factory Defaults	35
Figure 5-29: Administration tab - Firmware Upgrade	36
Figure 5-30: Status tab - Gateway	37
Figure 5-31: Status tab - Local Network	38
Figure 5-32: DHCP Active IP Table	38
Figure 5-33: Status tab - DSL Connection	38
Figure B-1: Local Security Screen	52
Figure B-2: Rules Tab	52
Figure B-3: IP Filter List Tab	52
Figure B-4: IP Filter List	53
Figure B-5: Filters Properties	53
Figure B-6: New Rule Properties	53
Figure B-7: IP Filter List	54
Figure B-8: Filters Properties	54
Figure B-9: New Rule Properties	54
Figure B-10: IP Filter List Tab	55
Figure B-11: Filter Action Tab	55
Figure B-12: Security Methods Tab	55
Figure B-13: Authentication Methods	56
Figure B-14: Preshared Key	56
Figure B-15: New Preshared Key	56
Figure B-16: Tunnel Setting Tab	57
Figure B-17: Connection Type Tab	57
Figure B-18: Properties Screen	57
Figure B-19: IP Filter List Tab	58
Figure B-20: Filter Action Tab	58
Figure B-21: Authentication Methods Tab	58
Figure B-22: Preshared Key	59

Figure B-23: New Preshared Key	59
Figure B-24: Tunnel Setting Tab	59
Figure B-25: Connection Type	60
Figure B-26: Rules	60
Figure B-27: Local Computer	60
Figure B-28: VPN Tab	61
Figure C-1: IP Configuration Screen	62
Figure C-2: MAC Address/Adapter Address	62
Figure C-3: MAC Address/Physical Address	63
Figure D-1: Upgrade Firmware	64

Chapter 1: Introduction

Welcome

Thank you for choosing the ADSL Gateway with 4-Port Switch. This Gateway will allow your computers to share a high-speed Internet connection with its built-in modem, as well as share resources, including files and printers, through its built-in Switch. Because the modem, router, and switch are all built-in, creating a network is easier than ever.

Put simply, networks are useful tools for sharing computer resources. You can access one printer from different computers and access data located on another computer's hard drive. Networks are even used for playing multiplayer video games. So, networks not only are useful in homes and offices, but also can be fun.

To create your network, install and set up the Gateway. To guide you through the process, use the instructions in the Quick Installation or the directions in this User Guide to help you. These instructions should be all you need to get the most out of the Gateway and, for more advanced users, this User Guide shows you many of the Gateway's Advanced uses as well. This User Guide also contains appendices to answer further questions and a Glossary if you're unfamiliar with terms. Basically, if you have a question about the Gateway, you should find the answers within.

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

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

router: a networking device that connects multiple networks together

What's in this Guide?

This user guide covers the steps for setting up and using the ADSL Gateway.

- **Chapter 1: Introduction**
This chapter describes the ADSL Gateway and its documentation.
- **Chapter 2: Planning your Network**
This chapter describes the basics of networking.
- **Chapter 3: Getting to Know the ADSL Gateway**
This chapter describes the physical features of the Gateway.
- **Chapter 4: Connecting the ADSL Gateway**
This chapter instructs you on how to connect the Gateway to your network.
- **Chapter 5: Configuring the Gateway**
This chapter explains how to use the Web-Based Utility to configure the settings on the Gateway.
- **Appendix A: Troubleshooting**
This appendix describes some problems and solutions, as well as frequently asked questions, regarding installation and use of the ADSL Gateway.
- **Appendix B: Configuring IPSec between a Windows 2000 Computer and the Gateway**
This appendix instructs you on how to establish a secure IPSec tunnel using preshared keys to join a private network inside the VPN Gateway and a Windows 2000 or XP computer.
- **Appendix C: Finding the MAC Address and IP Address for your Ethernet Adapter.**
This appendix describes how to find the MAC address for your computer's Ethernet adapter so you can use the MAC filtering and/or MAC address cloning feature of the Gateway.
- **Appendix D: Upgrading Firmware**
This appendix instructs you on how to upgrade the firmware on your Gateway if you should need to do so.
- **Appendix E: Windows Help**
This appendix describes how you can use Windows Help for instructions about networking, such as installing the TCP/IP protocol.
- **Appendix F: Glossary**
This appendix gives a brief glossary of terms frequently used in networking.

ADSL Gateway with 4-Port Switch

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

Chapter 2: Planning your Network

The Gateway's Functions

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

In this instance, the Gateway connects your Local Area Network (LAN), or the group of computers in your home or office, to the Internet. The Gateway processes and regulates the data that travels between these two networks.

The Gateway's NAT feature protects your network of computers so users on the public, Internet side cannot "see" your computers. This is how your network remains private. The Gateway protects your network by inspecting every packet coming in through the Internet port before delivery to the appropriate computer on your network. The Gateway inspects Internet port services like the web server, ftp server, or other Internet applications, and, if allowed, it will forward the packet to the appropriate computer on the LAN side.

Remember that the Gateway's ports connect to two sides. The LAN ports connect to the LAN, and the ADSL port connects to the Internet. The LAN ports transmit data at 10/100Mbps.

IP Addresses

What's an IP Address?

IP stands for Internet Protocol. Every device on an IP-based network, including computers, print servers, and Gateways, requires an IP address to identify its "location," or address, on the network. This applies to both the Internet and LAN connections. There are two ways of assigning an IP address to your network devices. You can assign static IP addresses or use the Gateway to assign IP addresses dynamically.

Static IP Addresses

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



Figure 2-1: A Network with the Gateway

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

FTP: a protocol used to transfer files over a TCP/IP network



NOTE: Since the Gateway is a device that connects two networks, it needs two IP addresses—one for the LAN, and one for the Internet. In this User Guide, you'll see references to the "Internet IP address" and the "LAN IP address."

Since the Gateway uses NAT technology, the only IP address that can be seen from the Internet for your network is the Gateway's Internet IP address. However, even this Internet IP address can be blocked, so that the Gateway and network seem invisible to the Internet—see the Block WAN Requests description under Security in "Chapter 5: Configuring the ADSL Gateway."

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

Dynamic IP Addresses

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

DHCP (Dynamic Host Configuration Protocol) Servers

Computers and other network devices using dynamic IP addressing are assigned a new IP address by a DHCP server. The computer or network device obtaining an IP address is called the DHCP client. DHCP frees you from having to assign IP addresses manually every time a new user is added to your network.

A DHCP server can either be a designated computer on the network or another network device, such as the Gateway. By default, the Gateway’s DHCP Server function is enabled.

If you already have a DHCP server running on your network, you must disable one of the two DHCP servers. If you run more than one DHCP server on your network, you will experience network errors, such as conflicting IP addresses. To disable DHCP on the Gateway, see the DHCP section in “Chapter 5: Configuring the Gateway.”

What is a VPN?

A VPN, or Virtual Private Network, is a connection between two endpoints - a VPN Gateway, for instance - in different networks that allows private data to be sent securely over a shared or public network, such as the Internet. This establishes a private network that can send data securely between these two locations or networks.

This is done by creating a “tunnel”. A VPN tunnel connects the two computers or networks and allows data to be transmitted over the Internet as if it were still within those networks. Not a literal tunnel, it is a connection secured by encrypting the data sent between the two networks.

VPN was created as a cost-effective alternative to using a private, dedicated, leased line for a private network. Using industry standard encryption and authentication techniques - IPSec, short for IP Security - the VPN creates a secure connection that, in effect, operates as if you were directly connected to your local network. Virtual Private Networking can be used to create secure networks linking a central office with branch offices,

dsl: an always-on broadband connection over traditional phone lines

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

dynamic ip address: a temporary IP address assigned by a DHCP server

DHCP: 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

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

VPN: a security measure to protect data as it leaves one network and goes to another over the Internet

encryption: encoding data transmitted in a network

IPSec: a VPN protocol used to implement secure exchange of packets at the IP layer

telecommuters, and/or professionals on the road (travelers can connect to a VPN Gateway using any computer with VPN client software that supports IPSec, such as SSH Sentinel.)

There are two basic ways to create a VPN connection:

- VPN Gateway to VPN Gateway
- Computer (using VPN client software that supports IPSec) to VPN Gateway

The VPN Gateway creates a “tunnel” or channel between two endpoints, so that data transmissions between them are secure. A computer with VPN client software that supports IPSec can be one of the two endpoints. Any computer with the built-in IPSec Security Manager (Microsoft 2000 and XP) allows the VPN Gateway to create a VPN tunnel using IPSec (refer to “Appendix B: Configuring IPSec between a Windows 2000 or XP computer and the VPN Gateway”). Other versions of Microsoft operating systems require additional, third-party VPN client software applications that support IPSec to be installed.

Computer (using VPN client software that supports IPSec) to VPN Gateway

The following is an example of a computer-to-VPN Gateway VPN. In her hotel room, a traveling businesswoman dials up her ISP. Her notebook computer has VPN client software that is configured with her office's VPN settings. She accesses the VPN client software that supports IPSec and connects to the VPN Gateway at the central office. As VPNs utilize the Internet, distance is not a factor. Using the VPN, the businesswoman now has a secure connection to the central office's network, as if she were physically connected.

VPN Gateway to VPN Gateway

An example of a VPN Gateway-to-VPN Gateway VPN would be as follows. At home, a telecommuter uses his VPN Gateway for his always-on Internet connection. His Gateway is configured with his office's VPN settings. When he connects to his office's Gateway, the two Gateways create a VPN tunnel, encrypting and decrypting data. As VPNs utilize the Internet, distance is not a factor. Using the VPN, the telecommuter now has a secure connection to the central office's network, as if he were physically connected.

For additional information and instructions about creating your own VPN, please visit Linksys's website at www.linksys.com or refer to “Appendix C: Configuring IPSec between a Windows 2000 or XP computer and the VPN Gateway.”

Why do I need a VPN?

Computer networking provides a flexibility not available when using a paper-based system. With this flexibility, however, comes an increased risk in security. This is why firewalls were first introduced. Firewalls help to protect



Figure 2-2: Computer-to-VPN Gateway



IMPORTANT: You must have at least one VPN Gateway on one end of the VPN tunnel. At the other end of the VPN tunnel, you must have a second VPN Gateway or a computer with VPN client software that supports IPSec.

ADSL Gateway with 4-Port Switch

data inside of a local network. But what do you do once information is sent outside of your local network, when emails are sent to their destination, or when you have to connect to your company's network when you are out on the road? How is your data protected?

That is when a VPN can help. VPNs secure data moving outside of your network as if it were still within that network.

When data is sent out across the Internet from your computer, it is always open to attacks. You may already have a firewall, which will help protect data moving around or held within your network from being corrupted or intercepted by entities outside of your network, but once data moves outside of your network - when you send data to someone via email or communicate with an individual over the Internet - the firewall will no longer protect that data.

At this point, your data becomes open to hackers using a variety of methods to steal not only the data you are transmitting but also your network login and security data. Some of the most common methods are as follows:

1) MAC Address Spoofing

Packets transmitted over a network, either your local network or the Internet, are preceded by a packet header. These packet headers contain both the source and destination information for that packet to transmit efficiently. A hacker can use this information to spoof (or fake) a MAC address allowed on the network. With this spoofed MAC address, the hacker can also intercept information meant for another user.

2) Data Sniffing

Data "sniffing" is a method used by hackers to obtain network data as it travels through unsecured networks, such as the Internet. Tools for just this kind of activity, such as protocol analyzers and network diagnostic tools, are often built into operating systems and allow the data to be viewed in clear text.

3) Man in the Middle Attacks

Once the hacker has either sniffed or spoofed enough information, he can now perform a "man in the middle" attack. This attack is performed, when data is being transmitted from one network to another, by rerouting the data to a new destination. Even though the data is not received by its intended recipient, it appears that way to the person sending the data.

These are only a few of the methods hackers use and they are always developing more. Without the security of your VPN, your data is constantly open to such attacks as it travels over the Internet. Data travelling over the Internet will often pass through many different servers around the world before reaching its final destination. That's a long way to go for unsecured data and this is when a VPN serves its purpose.



Figure 2-3: VPN Gateway-to-VPN Gateway

MAC Address: the unique address that a manufacturer assigns to each networking device

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

Chapter 3: Getting to Know the ADSL Gateway

The Back Panel

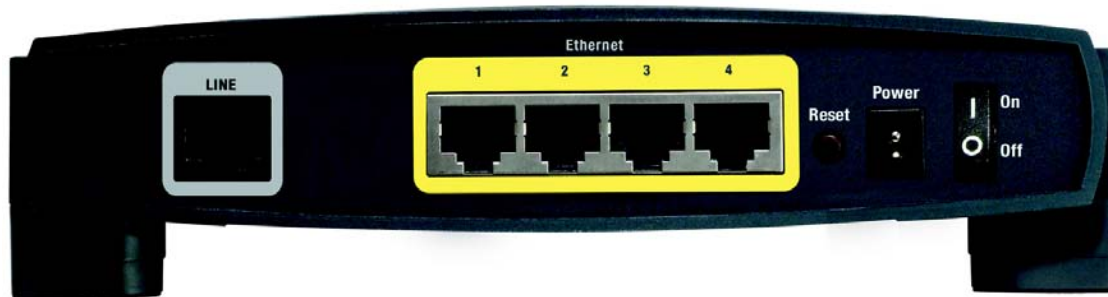


Figure 3-1: Back Panel

The Gateway's ports, where a network cable and DSL cable are connected, are located on the back panel. The Gateway's buttons are also located on the back panel.

LINE	The LINE port connects to the ADSL line.
Ethernet (1-4)	The Ethernet ports connect to your computer and other network devices.
Power	The Power port is where you will connect the power adapter.
Reset Button	There are two ways to reset the Gateway's factory defaults. Either press the Reset Button , for approximately ten seconds, or restore the defaults from the Factory Defaults screen of the Administration tab in the Gateway's Web-Based Utility.
On/Off	This switch is used to turn the Gateway on or off.



Important: Resetting the Gateway to factory defaults will erase all of your settings and replace them with the factory defaults. Do not reset the Gateway if you want to retain these settings.

With these, and many other, Linksys products, your networking options are limitless. Go to the Linksys website at www.linksys.com for more information about products that work with the Gateway.

The Front Panel



Figure 3-2: Front Panel

The Gateway's LEDs, where information about network activity is displayed, are located on the front panel.

Power	Green. The Power LED lights up when the Gateway is powered on.
Ethernet (1-4)	Green. The Ethernet LEDs serve two purposes. If an LED is continuously lit, the Gateway is successfully connected to a device through that LAN port. If an LED is blinking, it is an indication of any network activity on that port.
DSL	Green. The DSL LED lights up whenever there is a successful DSL connection. The LED blinks while establishing the ADSL connection.
Internet	Green. The Internet LED lights up green when an Internet connection to the Internet Service Provider (ISP) session is established. The Internet LED lights up red when the connection to the ISP fails.

Chapter 4: Connecting the ADSL Gateway

Overview

The Gateway's setup consists of more than simply plugging hardware together. You will have to configure your networked computers 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).

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

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

ISP: a company that provides access to the Internet

Connecting to a Computer

1. Before you begin, make sure that all of your network's hardware is powered off, including the Gateway and all computers.
2. Connect one end of an Ethernet network cable to one of the Ethernet ports (labeled 1-4) on the back of the Gateway, and the other end to an Ethernet port on a computer.
3. Repeat this step to connect more computers, a switch, or other network devices to the Gateway.



IMPORTANT: If using microfilters, make sure to only place the microfilters between the phone and the wall jack and not between the Gateway and the wall jack or your ADSL will not connect.

4. Connect a phone cable from the Line port on the Gateway's back panel to the wall jack of the ADSL line. A small device called a microfilter may be necessary between each phone and wall jack to prevent interference. Contact your ISP if you have any questions.

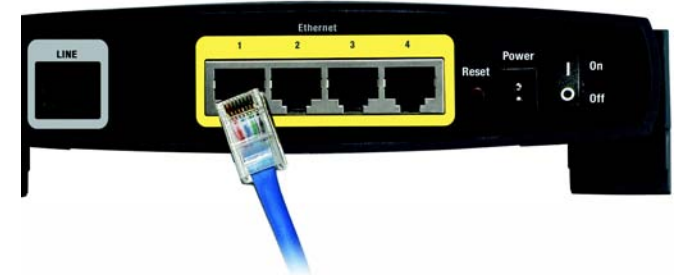


Figure 4-1: Connect your network

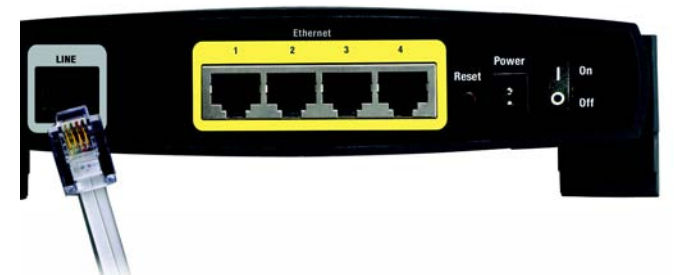


Figure 4-2: Connect your ADSL modem

ADSL Gateway with 4-Port Switch

5. Connect the power adapter to the Gateway's Power port, and then plug the power adapter into a power outlet. Turn the On/Off switch to On.
 - The Power LED on the front panel will light up green as soon as the power adapter is connected properly and the switch is turned on. The Power LED will flash for a few seconds, then it will light up steady when the self-test is complete. If the LED flashes for one minute or longer, see "Appendix A: Troubleshooting."
6. Power on one of your computers that is connected to the Gateway.

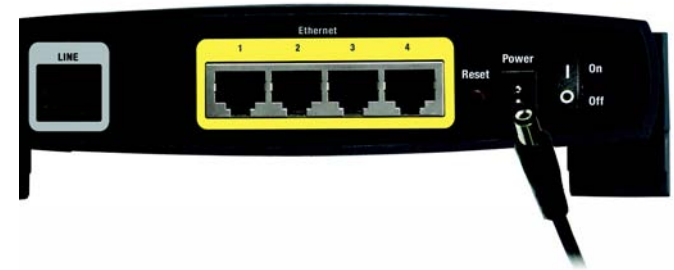


Figure 4-3: Connect power

The Gateway's hardware installation is now complete.



IMPORTANT: Before configuring the Gateway, make sure that any computer connected to the Gateway is configured to obtain its IP address from a DHCP server. Refer to Appendix E: Windows Help on how to configure TCP/IP for automatic addressing and how to obtain an IP address automatically if you haven't already done so.



NOTE: You should always plug the Gateway's power adapter into a power strip with surge protection.

TCP/IP: a set of instructions PCs use to communicate over a network

Go to "Chapter 5: Configuring the Gateway."

Chapter 5: Configuring the ADSL Gateway

Overview

Follow the steps in this chapter and use the Gateway's web-based utility to configure the Gateway. This chapter will describe each web page in the Utility and each page's key functions. The utility can be accessed via your web browser through use of a computer connected to the Gateway. For a basic network setup, most users only have to use the following screens of the Utility:

- **Basic Setup.** On the Basic Setup screen, enter the settings provided by your ISP.
- **Management.** Click the **Administration** tab and then the **Management** tab. The Gateway's default username and password is admin. To secure the Gateway, change the Password from its default.

There are six main tabs: Setup, Security, Access Restrictions, Applications & Gaming, Administration, and Status. Additional tabs will be available after you click one of the main tabs.

Setup

- **Basic Setup.** Enter the Internet connection and network settings on this screen.
- **DDNS.** To enable the Gateway's Dynamic Domain Name System (DDNS) feature, complete the fields on this screen.
- **Advanced Routing.** On this screen, you can alter Dynamic Routing, and Static Routing configurations.

Security

- **Firewall.** This screen contains Filters and Block WAN Requests. Filters block specific internal users from accessing the Internet and block anonymous Internet requests.
- **VPN.** To enable or disable IPSec and/or PPTP Pass-through, and set up VPN tunnels, use this screen.

Access Restrictions

- **Internet Access.** This screen allows you to prevent or permit only certain users from attaching to your network.

browser: an application program that provides a way to look at and interact with all the information on the World Wide Web



Have You: Enabled TCP/IP on your computers? computers communicate over the network with this protocol. Refer to Appendix E: Windows Help for more information on TCP/IP.



Note: For added security, you should change the password through the Administration tab.

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

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

WAN: the Internet

PPTP: 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

Applications & Gaming

- **Single Port Forwarding.** Use this screen to set up common services or applications on your network.
- **Port Range Forwarding.** To set up public services or other specialized Internet applications on your network, click this tab.
- **Port Triggering.** To set up triggered ranges and forwarded ranges for Internet applications, click this tab.
- **DMZ.** To allow one local user to be exposed to the Internet for use of special-purpose services, use this screen.

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

Administration

- **Management.** On this screen, alter Gateway access privileges, SNMP, and UPnP settings.
- **Reporting.** If you want to view or save activity logs, click this tab.
- **Diagnostics.** Use this screen to do a Ping Test.
- **Factory Defaults.** If you want to restore the Gateway's factory defaults, use this screen.
- **Firmware Upgrade.** Click this tab if you want to upgrade the Gateway's firmware.

SNMP: a widely used network monitoring and control protocol

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

firmware:: the programming code that runs a networking device

Status

- **Gateway.** This screen provides status information about the Gateway.
- **Local Network.** This provides status information about the local network.
- **DSL Connection.** This screen provides status information about the DSL connection.

ipgrade:: to replace existing software or firmware with a newer version

How to Access the Web-based Utility

To access the web-based utility, launch Internet Explorer or Netscape Navigator, and enter the Gateway's default IP address, 192.168.1.1, in the Address field. Then press Enter.

A password request page will appear. (non-Windows XP users will see a similar screen.) Enter **admin** (the default user name) in the User Name field, and enter **admin** (the default password) in the Password field. Then click the **OK** button.

The Setup Tab

Basic Setup

The first screen that appears is the Basic Setup tab. This tab allows you to change the Gateway's general settings. Change these settings as described here and click the **Save Settings** button to save your changes or **Cancel Changes** to cancel your changes.

Internet Setup

- **ADSL Settings.** The Gateway supports five Encapsulations: RFC 1483 Bridged, RFC 1483 Routed, RFC 2516 PPPoE, RFC 2364 PPPoA, and Bridged Mode Only. Each Basic Setup screen and available features will differ depending on what type of encapsulation you select.
- **VC Settings.** Virtual Circuits (VPI and VCI): These fields consist of two items: VPI (Virtual Path Identifier) and VCI (Virtual Channel Identifier). Your ISP will provide the correct settings for these fields. Multiplexing: Select **LLC** or **VC**, depending on your ISP.



Enter Network Password

Please type your user name and password.

Site: 192.168.1.1

Realm: Linksys AG041

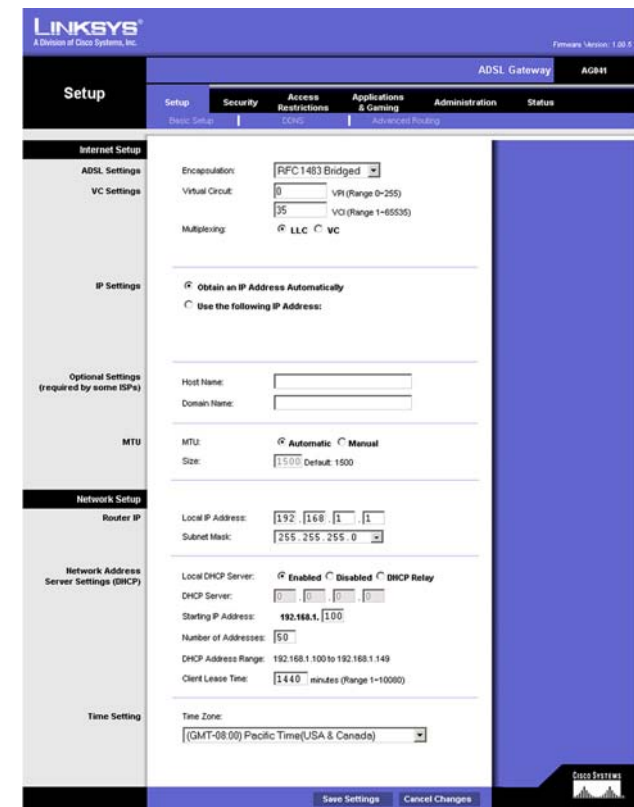
User Name: admin

Password: xxxxxx

☐ Save this password in your password list

OK Cancel

Figure 5-1: Password Screen



LINKSYS
A Division of Cisco Systems, Inc.

ADSL Gateway AG041
Firmware Version: 1.00.9

Setup

Basic Setup | Security | Access Restrictions | Applications & Gaming | Administration | Status

Internet Setup

ADSL Settings

VC Settings

Encapsulation: RFC 1483 Bridged

Virtual Circuit: 0 VPI (Range 0-255)

35 VCI (Range 1-65535)

Multiplexing: ☒ LLC ☐ VC

IP Settings

☒ Obtain an IP Address Automatically

☐ Use the following IP Address:

Host Name:

Domain Name:

Optional Settings (required by some ISPs)

MTU

MTU: ☒ Automatic ☐ Manual

Size: 1500 Default: 1500

Network Setup

Router IP

Local IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Network Address Server Settings (DHCP)

Local DHCP Server: ☒ Enabled ☐ Disabled ☐ DHCP Relay

DHCP Server: 0.0.0.0

Starting IP Address: 192.168.1.100

Number of Addresses: 50

DHCP Address Range: 192.168.1.100 to 192.168.1.149

Client Lease Time: 1440 minutes (Range 1-10000)

Time Setting

Time Zone: (GMT-08:00) Pacific Time(USA & Canada)

Save Settings Cancel Changes

Figure 5-2: Basic Setup Tab

RFC 1483 Bridged

Dynamic IP

IP Settings. Select **Obtain an IP Address Automatically** if your ISP says you are connecting through a dynamic IP address.



Figure 5-3: Internet Setup - Dynamic IP

***static ip address:** a fixed address assigned to a computer or device that is connected to a network*

Static IP

If you are required to use a permanent IP address to connect to the Internet, then select **Use the following IP Address**.

- **IP Address.** This is the Gateway's IP address, when seen from the WAN, or the Internet. Your ISP will provide you with the IP Address you need to specify here.
- **Subnet Mask.** This is the Gateway's Subnet Mask. Your ISP will provide you with the Subnet Mask.
- **Default Gateway.** Your ISP will provide you with the Default Gateway Address, which is the ISP server's IP address.
- **Primary DNS.** (Required) and **Secondary DNS** (Optional). Your ISP will provide you with at least one DNS (Domain Name System) Server IP Address.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.



Figure 5-4: Internet Setup - Static IP

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

***dns:** the IP address of your ISP's server, which translates the names of websites into IP addresses*

RFC 1483 Routed

If you are required to use RFC 1483 Routed, then select **RFC 1483 Routed**.

- **IP Address.** This is the Gateway's IP address, when seen from the WAN, or the Internet. Your ISP will provide you with the IP Address you need to specify here.
- **Subnet Mask.** This is the Gateway's Subnet Mask. Your ISP will provide you with the Subnet Mask.
- **Default Gateway.** Your ISP will provide you with the Default Gateway Address, which is the ISP server's IP address.
- **Primary DNS. (Required) and Secondary DNS (Optional).** Your ISP will provide you with at least one DNS (Domain Name System) Server IP Address.

Figure 5-5: Internet Setup - RFC 1483 Routed

***PPPoE:** a type of broadband connection that provides authentication (username and password) in addition to data transport*

RFC 2516 PPPoE

Some DSL-based ISPs use PPPoE (Point-to-Point Protocol over Ethernet) to establish Internet connections. If your ISP uses a PPPoE connection, enable PPPoE.

- **Service Name.** Enter the Service Name, if required by your ISP.
- **User Name and Password.** Enter the User Name and Password provided by your ISP.
- **Connect on Demand: Max Idle Time.** You can configure the Gateway to disconnect the Internet connection after it has been inactive for a specified period of time (Max Idle Time). If your Internet connection has been terminated due to inactivity, Connect on Demand enables the Gateway to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate **Connect on Demand**, click the radio button. In the Max Idle Time field, enter the number of minutes you want to have elapsed before your Internet connection terminates.
- **Keep Alive: Redial Period.** If you select this option, the Gateway will periodically check your Internet connection. If you are disconnected, then the Gateway will automatically re-establish your connection. To use this option, click the radio button next to **Keep Alive**. In the Redial Period field, you specify how often you want the Gateway to check the Internet connection. The default Redial Period is 30 seconds.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Figure 5-6: Internet Setup - RFC 2516 PPPoE

RFC 2364 PPPoA

Some DSL-based ISPs use PPPoA (Point-to-Point Protocol over ATM) to establish Internet connections. If your ISP uses a PPPoA, enable PPPoA.

- **User Name and Password.** Enter the User Name and Password provided by your ISP.
- **Connect on Demand: Max Idle Time.** You can configure the Gateway to cut the Internet connection after it has been inactive for a specified period of time (Max Idle Time). If your Internet connection has been terminated due to inactivity, Connect on Demand enables the Gateway to automatically re-establish your connection as soon as you attempt to access the Internet again. If you wish to activate **Connect on Demand**, click the radio button. In the Max Idle Time field, enter the number of minutes you want to have elapsed before your Internet connection terminates.
- **Keep Alive Option: Redial Period.** If you select this option, the Gateway will periodically check your Internet connection. If you are disconnected, then the Gateway will automatically re-establish your connection. To use this option, click the radio button next to **Keep Alive**. In the Redial Period field, you specify how often you want the Gateway to check the Internet connection. The default Redial Period is 30 seconds.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Figure 5-7: Internet Setup - RFC 2364 PPPoA

Bridged Mode Only

If you are using your Gateway as a bridge, which makes the Gateway act like a standalone modem, select **Bridged Mode Only**. All NAT and routing is disabled in this mode.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Figure 5-8: Internet Setup - Bridged Mode Only

NAT: translates IP addresses of a local area network to a different IP address for the Internet

Optional Settings (Required by some ISPs)

- **Host Name and Domain Name.** These fields allow you to supply a host and domain name for the Gateway. Some ISPs require these names as identification. You may have to check with your ISP to see if your broadband Internet service has been configured with a host and domain name. In most cases, leaving these fields blank will work.
- **MTU.** The MTU (Maximum Transmission Unit) setting specifies the largest packet size permitted for network transmission. Select **Manual** and enter the value desired. You should leave this value in the 1200 to 1500 range. By default, MTU is configured automatically.

Network Setup

- **Router IP.** The values for the Gateway's Local IP Address and Subnet Mask are shown here. In most cases, keeping the default values will work.
 - **Local IP Address.** The default value is 192.168.1.1.
 - **Subnet Mask.** The default value is 255.255.255.0.
- **Network Address Server Settings (DHCP).** A Dynamic Host Configuration Protocol (DHCP) server automatically assigns an IP address to each computer on your network for you. Unless you already have one, it is highly recommended that you leave the Gateway enabled as a DHCP server.
 - **Local DHCP Server.** DHCP is already enabled by factory default. If you already have a DHCP server on your network, set the Gateway's DHCP option to **Disable**. Only use **DHCP Relay** if requested by your ISP; your ISP will supply you with the IP Address
 - **DHCP Server.** If you enable the DHCP Server or DHCP Relay for the Local DHCP server, enter the IP address for the DHCP server in the fields.
 - **Starting IP Address.** Enter a value for the DHCP server to start with when issuing IP addresses. This value must be 192.168.1. 2 or greater, because the default IP address for the Gateway is 192.168.1.1.
 - **Number of Address.** Enter the maximum number of computers that you want the DHCP server to assign IP addresses to. This number cannot be greater than 253. By default, the range is 192.168.1.100 to 192.168.1.149.
 - **DHCP Address Range.** The range of DHCP addresses is displayed here.
 - **Client Lease Time.** Enter the minutes in the field.

domain: a specific name for a network of computers

packet: a unit of data sent over a network

Figure 5-9: Setup Tab - Optional Settings

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

ADSL Gateway with 4-Port Switch

- **Time Setting.** This is where you set the time zone for your Gateway.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

DDNS

The Gateway offers a Dynamic Domain Name System (DDNS) feature. DDNS lets you assign a fixed host and domain name to a dynamic Internet IP address. It is useful when you are hosting your own website, FTP server, or other server behind the Gateway.

Before you can use this feature, you need to sign up for DDNS service at DynDNS.org.

DDNS

DDNS Service. If your DDNS service is provided by DynDNS.org, then select **DynDNS.org** in the drop-down menu. To disable DDNS Service, select **Disabled**.

DynDNS.org

- **User Name, Password, and Host Name.** Enter the User Name, Password, and Host Name of the account you set up with DynDNS.org.
- **Internet IP Address.** The Gateway's current Internet IP Address is displayed here. Because it is dynamic, it will change.
- **Status.** The status of the DDNS service connection is displayed here.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

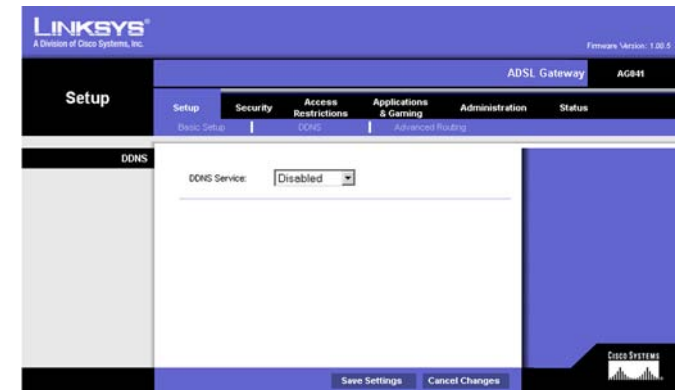


Figure 5-10: Setup Tab - DDNS

Advanced Routing

The Advanced Routing screen allows you to configure the dynamic routing and static routing settings.

Advanced Routing

- **Dynamic Routing.** With Dynamic Routing you can enable the Gateway to automatically adjust to physical changes in the network's layout. The Gateway, using the RIP protocol, determines the network packets' route based on the fewest number of hops between the source and the destination. The RIP protocol regularly broadcasts routing information to other Gateways on the network. To enable RIP, click **Enabled**. To disable RIP, click **Disabled**.
- **Receive RIP Version.** To receive RIP messages, select the protocol you want: **RIP1** or **RIP2**. If you don't want to receive RIP messages, select **None**.
- **Transmit RIP Version.** To transmit RIP messages, select the protocol you want: **RIP1**, **RIP1-Compatible**, or **RIP2**. If you don't want to transmit RIP messages, select **None**.

Static Routing

If the Gateway is connected to more than one network, it may be necessary to set up a static route between them. A static route is a pre-determined pathway that network information must travel to reach a specific host or network. To create a static route, change the following settings:

- **Select Entry.** Select the number of the static route from the drop-down menu. The Gateway supports up to 20 static route entries. If you need to delete a route, after selecting the entry, click the **Delete Entry** button.
- **Destination IP Address.** The Destination IP Address is the address of the remote network or host to which you want to assign a static route. Enter the IP address of the host for which you wish to create a static route. If you are building a route to an entire network, be sure that the network portion of the IP address is set to 0.
- **Subnet Mask.** The Subnet Mask (also known as the Network Mask) determines which portion of an IP address is the network portion, and which portion is the host portion.
- **Gateway.** This IP address should be the IP address of the gateway device that allows for contact between the Gateway and the remote network or host.
- **Hop Count.** This determines the maximum number of steps between network nodes that data packets will travel. A node is any router in the path to the remote network.
- **Interface.** Select **LAN** or **Internet**, depending on the location of the static route's final destination.

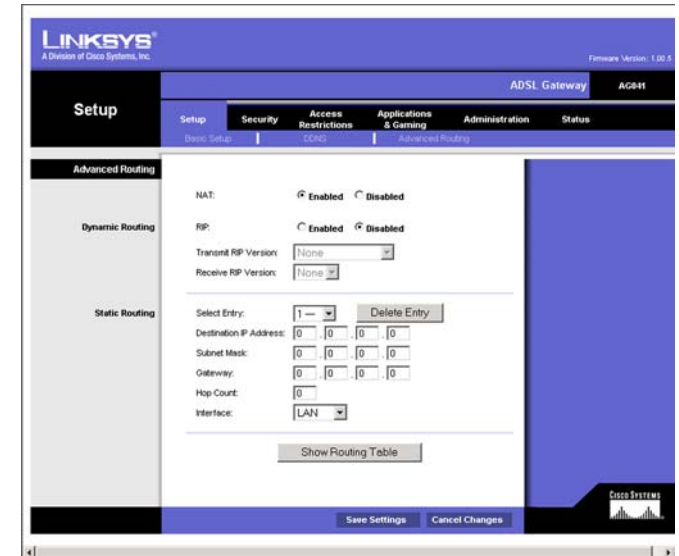


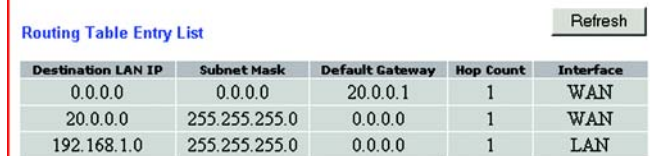
Figure 5-11: Setup Tab - Advanced Routing

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

ADSL Gateway with 4-Port Switch

- **Show Routing Table.** Click the **Show Routing Table** button to open a screen displaying how data is routed through your LAN. For each route, the Destination IP address, Subnet Mask, Gateway, and Interface are displayed. Click the **Refresh** button to update the information.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.



Routing Table Entry List

Destination LAN IP	Subnet Mask	Default Gateway	Hop Count	Interface
0.0.0.0	0.0.0.0	20.0.0.1	1	WAN
20.0.0.0	255.255.255.0	0.0.0.0	1	WAN
192.168.1.0	255.255.255.0	0.0.0.0	1	LAN

Figure 5-12: Routing Table

The Security Tab

Firewall

When you click the Security tab, you will see the Firewall screen. This screen contains Filters and the option to Block WAN Requests. Filters block specific Internet data types and block anonymous Internet requests.

- Firewall. To add Firewall Protection, click **Enabled**. If you do not want Firewall Protection, click **Disabled**.

Additional Filters. Select the filter(s) you want to enable.

- Filter Proxy. Use of WAN proxy servers may compromise the Gateway's security. Denying Filter Proxy will disable access to any WAN proxy servers.
- Filter Cookies. A cookie is data stored on your computer and used by Internet sites when you interact with them.
- Filter Java Applets. Java is a programming language for websites. If you deny Java Applets, you run the risk of not having access to Internet sites created using this programming language.
- Filter ActiveX. ActiveX is a programming language for websites. If you deny ActiveX, you run the risk of not having access to Internet sites created using this programming language.
- Filter Multicast. IP Multicasting occurs when a single data transmission is sent to multiple recipients at the same time. Using this feature, the Router allows IP multicast packets to be forwarded to the appropriate computers.

Block WAN requests

- Block Anonymous Internet Requests. This keeps your network from being “pinged” or detected and reinforces your network security by hiding your network ports, so it is more difficult for intruders to discover your network. Select **Block Anonymous Internet Requests** to block anonymous Internet requests or de-select it to allow anonymous Internet requests.

Click **View Logs** to view a log of any firewall events.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

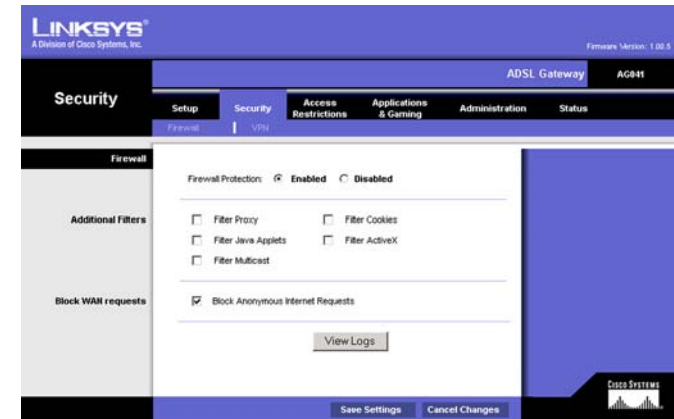


Figure 5-13: Security Tab - Firewall

multicasting: sending data to a group of destinations at once

VPN

Virtual Private Networking (VPN) is a security measure that basically creates a secure connection between two remote locations. The VPN screen allows you to configure your VPN settings to make your network more secure.

VPN Passthrough

- **IPSec Passthrough.** Internet Protocol Security (IPSec) is a suite of protocols used to implement secure exchange of packets at the IP layer. To allow IPSec Passthrough, click the **Enabled** button. To disable IPSec Passthrough, click the **Disabled** button.
- **PPTP Passthrough.** Point-to-Point Tunneling Protocol Passthrough is the method used to enable VPN sessions to a Windows NT 4.0 or 2000 server. To allow PPTP Passthrough, click the **Enabled** button. To disable PPTP Passthrough, click the **Disabled** button.

IPSec VPN Tunnel

The VPN Gateway creates a tunnel or channel between two endpoints, so that the data or information between these endpoints is secure.

- To establish this tunnel, select the tunnel you wish to create in the Select Tunnel Entry drop-down box. It is possible to create up to five simultaneous tunnels. Then click **Enabled** to enable the IPSec VPN tunnel. Once the tunnel is enabled, enter the name of the tunnel in the Tunnel Name field. This is to allow you to identify multiple tunnels and does not have to match the name used at the other end of the tunnel.
- **Local Secure Group and Remote Secure Group.** The Local Secure Group is the computer(s) on your LAN that can access the tunnel. The Remote Secure Group is the computer(s) on the remote end of the tunnel that can access the tunnel. These computers can be specified by a Subnet, specific IP address, or range.
- **Remote Security Gateway.** The Remote Security Gateway is the VPN device, such as a second VPN Gateway, on the remote end of the VPN tunnel. Enter the IP Address or Domain of the VPN device at the other end of the tunnel. The remote VPN device can be another VPN Gateway, a VPN Server, or a computer with VPN client software that supports IPSec. The IP Address may either be static (permanent) or dynamic (changing), depending on the settings of the remote VPN device. Make sure that you have entered the IP Address correctly, or the connection cannot be made. Remember, this is NOT the IP Address of the local VPN Gateway, but the IP Address of the remote VPN Gateway or device with which you wish to communicate. If you enter an IP address, only the specific IP Address will be able to access the tunnel. If you select **Any**, any IP Address can access the tunnel.
- **Encryption.** Using Encryption also helps make your connection more secure. There are two different types of encryption: DES or 3DES (3DES being more secure). You may choose either of these, but it must be the same

The screenshot displays the Linksys ADSL Gateway configuration interface, specifically the Security Tab - VPN section. The interface is divided into several sections:

- VPN Passthrough:** Includes checkboxes for "IPSec Pass-Through" and "PPTP Pass-Through", both of which are currently set to "Enabled".
- IPSec VPN Tunnel:** This section contains configuration options for a specific tunnel.
 - Select Tunnel Entry:** A dropdown menu showing "Tunnel 1" with "Delete" and "Summary" buttons.
 - IPSec VPN Tunnel:** Checkboxes for "Enabled" (selected) and "Disabled".
 - Tunnel Name:** A text input field.
 - Local Secure Group:** Includes a "Subnet" dropdown and IP/Mask input fields.
 - Remote Secure Group:** Includes a "Subnet" dropdown and IP/Mask input fields.
 - Remote Security Gateway:** Includes an "IP Addr:" dropdown and an IP address input field.
 - Encryption:** A dropdown menu set to "DES".
 - Authentication:** A dropdown menu set to "MD5".
 - Key Management:** Includes a "PFS:" dropdown set to "Auto (IKE)", and checkboxes for "Enabled" (selected) and "Disabled".
 - Pre-shared Key:** A text input field with a "(x)" button.
 - Key Lifetime:** A numeric input field set to "3600" with a "Sec." label.
- Status:** Shows the current status as "Disconnected". Below this are buttons for "Connect", "View Logs", and "Advanced Settings".

At the bottom of the page, there are "Save Settings" and "Cancel Changes" buttons, and a "Cisco Systems" logo.

Figure 5-14: Security Tab - VPN

software: instructions for the computer

type of encryption that is being used by the VPN device at the other end of the tunnel. Or, you may choose not to encrypt by selecting Disable. In the screen shown, DES (which is the default) has been selected.

- **Authentication.** Authentication acts as another level of security. There are two types of authentication: MD5 and SHA (SHA being more secure). As with encryption, either of these may be selected, if the VPN device at the other end of the tunnel is using the same type of authentication. Or, both ends of the tunnel may choose to Disable authentication. In the screen shown, MD5 (the default) has been selected.
- **Key Management.** Select **Auto (IKE)** or **Manual** from the drop-down menu. The two methods are described below.

Auto (IKE)

Select **Auto (IKE)** and enter a series of numbers or letters in the Pre-shared Key field. Based on this word, which **MUST** be entered at both ends of the tunnel if this method is used, a key is generated to scramble (encrypt) the data being transmitted over the tunnel, where it is unscrambled (decrypted). You may use any combination of up to 24 numbers or letters in this field. No special characters or spaces are allowed. In the Key Lifetime field, you may select to have the key expire at the end of a time period. Enter the number of seconds you'd like the key to be useful, or leave it blank for the key to last indefinitely. Check the box next to PFS (Perfect Forward Secrecy) to ensure that the initial key exchange and IKE proposals are secure.

Manual

Select **Manual**, then select the Encryption Algorithm from the drop-down menu. Enter the Encryption Key in the field (if you chose DES for your Encryption Algorithm, enter 16 hexadecimal characters, if you chose 3DES, enter 48 hexadecimal characters). Select the Authentication Algorithm from the drop-down menu. Enter the Authentication Key in the field (if you chose MD5 for your Authentication Algorithm, enter 32 hexadecimal characters, if you chose SHA1, enter 40 hexadecimal characters). Enter the Inbound and Outbound SPIs in the respective fields.

- **Status.** The status of the connection is shown.

Click the **Connect** button to connect your VPN tunnel. Click the View Logs button to view logs. Click the **Advanced Setting** button and the Advanced IPsec VPN Tunnel Setup screen will appear.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

The screenshot shows the Linksys ADSL Gateway AG041 web interface. The 'Security' tab is selected, and the 'IPsec VPN Tunnel' sub-tab is active. The configuration is as follows:

- VPN Passthrough:** IPsec Pass-Through: ☒ Enabled; PPTP Pass-Through: ☒ Enabled.
- IPsec VPN Tunnel:** Select Tunnel Entry: Tunnel 1; IPsec VPN Tunnel: ☒ Enabled; Tunnel Name: (empty).
- Local Secure Group:** Subnet: (empty); IP: 0.0.0.0; Mask: 0.0.0.0.
- Remote Secure Group:** Subnet: (empty); IP: 0.0.0.0; Mask: 255.255.255.0.
- Remote Security Gateway:** IP Addr: (empty); IP Address: 0.0.0.0.
- Encryption:** DES.
- Authentication:** MD5.
- Key Management:** Manual; Encryption Key: (empty); Authentication Key: (empty); Inbound SPI: 0x0; Outbound SPI: 0x0.
- Status:** Disconnected.

Buttons at the bottom: Connect, View Logs, Advanced Settings, Save Settings, Cancel Changes.

Figure 5-15: VPN with Manual Key Management

Advanced VPN Tunnel Setup

From the Advanced IPsec VPN Tunnel Setup screen, you can adjust the settings for specific VPN tunnels.

Phase 1

- Phase 1 is used to create a security association (SA), often called the IKE SA. After Phase 1 is completed, Phase 2 is used to create one or more IPsec SAs, which are then used to key IPsec sessions.
- Operation Mode. There are two modes: Main and Aggressive, and they exchange the same IKE payloads in different sequences. Main mode is more common; however, some people prefer Aggressive mode because it is faster. Main mode is for normal usage and includes more authentication requirements than Aggressive mode. Main mode is the more secure of the two. No matter which mode is selected, the VPN Gateway will accept both Main and Aggressive requests from the remote VPN device. Select Username, then enter the user name.
- Encryption. Select the length of the key used to encrypt/decrypt ESP packets. There are two choices: DES and 3DES. 3DES is the more secure of the two.
- Authentication. Select the method used to authenticate ESP packets. There are two choices: MD5 and SHA. SHA is the more secure of the two.
- Group. There are two Diffie-Hellman Groups to choose from: 768-bit and 1024-bit. Diffie-Hellman refers to a cryptographic technique that uses public and private keys for encryption and decryption.
- Key Life Time. In the Key Lifetime field, you may optionally select to have the key expire at the end of a time period of your choosing. Enter the number of seconds you'd like the key to be used until a re-key negotiation between each endpoint is completed.

Phase 2

- Encryption. The encryption method selected in Phase 1 will be displayed.
- Authentication. The authentication method selected in Phase 1 will be displayed.
- PFS. The status of PFS will be displayed.
- Group. There are two Diffie-Hellman Groups to choose from: 768-bit and 1024-bit. Diffie-Hellman refers to a cryptographic technique that uses public and private keys for encryption and decryption.

The screenshot shows the 'Advanced IPsec VPN Tunnel Setup' window. The title bar is blue with the text 'Advanced IPsec VPN Tunnel Setup'. The main content area is white and contains the following settings:

Tunnel 1

Phase 1:

Operation mode: ☒ Main mode ☐ Aggressive mode

☐ Username:

Proposal 1:

Encryption:

Authentication:

Group:

Key Lifetime: seconds

(Note: Following three additional proposals are also proposed in Main mode: DES/MD5/768, 3DES/SHA/1024 and 3DES/MD5/1024.)

Phase 2:

Proposal:

Encryption:

Authentication:

PFS:

Group:

Key Lifetime: seconds

Other Setting:

☐ NetBIOS broadcast

☐ Anti-replay

☐ Keep-Alive

☐ If IKE failed more than times, block this unauthorized IP for seconds

At the bottom right, there are two buttons: 'Save Settings' and 'Cancel Changes'.

Figure 5-16: Advanced IPsec VPN Tunnel Setup

ADSL Gateway with 4-Port Switch

- **Key Life Time.** In the Key Lifetime field, you may select to have the key expire at the end of a time period of your choosing. Enter the number of seconds you'd like the key to be used until a re-key negotiation between each endpoint is completed.

Other Setting

- **NetBIOS broadcast.** Check the box next to NetBIOS broadcast to enable NetBIOS traffic to pass through the VPN tunnel.
- **Anti-replay.** Check the box next to Anti-replay to enable the Anti-replay protection. This feature keeps track of sequence numbers as packets arrive, ensuring security at the IP packet-level.
- **Keep-Alive.** If you select this option, the Gateway will periodically check your Internet connection. If you are disconnected, then the Gateway will automatically re-establish your connection.
- Check this box to block unauthorized IP addresses. Enter in the field to specify how many times IKE must fail before blocking that unauthorized IP address. Enter the length of time that you specify (in seconds) in the field.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

The Access Restrictions Tab

Internet Access

The Access Restrictions tab allows you to block or allow specific kinds of Internet usage. You can set up Internet access policies for specific computers and set up filters by using network port numbers.

- Internet Access Policy. Multiple Filters can be saved as Internet Access Policies. When you wish to edit one, select the number of the Policy from the drop-down menu. The tab will change to reflect the settings of this Policy. If you wish to delete this Policy, click the **Delete** button. To see a summary of all Policies, click the **Summary** button.

The summaries are listed on this screen with their name and settings. To return to the Filters tab, click the **Close** button.

- Enter Policy Name. Policies are created from the fields presented here.

To create an Internet Access policy:

- Enter a Policy Name in the field provided. Select **Internet Access** as the Policy Type.

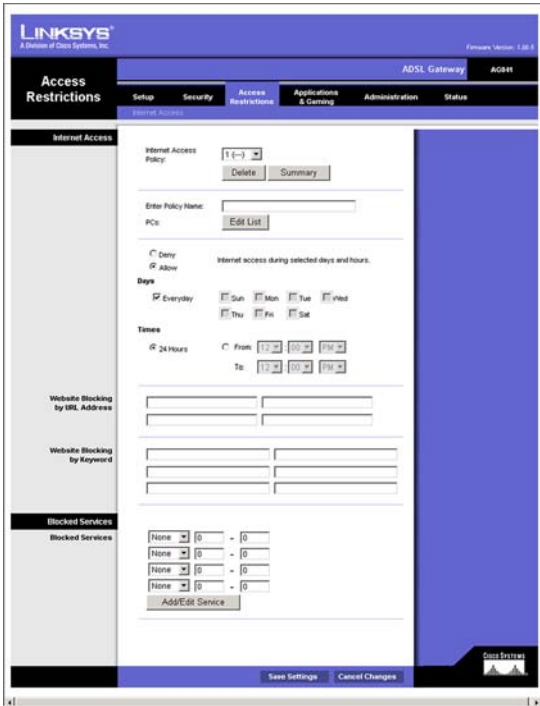


Figure 5-17: Access Restrictions - Internet Access

Internet Policy Summary

No.	Policy Name	Days	Time of Day	Delete
1.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
2.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
3.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
4.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
5.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
6.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
7.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
8.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
9.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
10.	---	SMTWTFSS	24 Hours	<input type="checkbox"/>
				Close

Figure 5-18: Internet Policy Summary

2. Click the **Edit List** button. This will open the List of computers screen. From this screen, you can enter the IP address or MAC address of any computer to which this policy will apply. You can even enter ranges of computers by IP address. Click the **Apply** button to save your settings, the **Cancel** button to undo any changes, and the **Close** button to return to the Filters tab.
3. If you wish to Deny or Allow Internet access for those computers you listed on the List of PCs screen, click the option.
4. You can filter access to various services accessed over the Internet, such as FTP or Telnet, by selecting a service from the drop-down menus next to Blocked Services. If a service isn't listed, you can click the **Add/Edit Service** button to open the Port Services screen and add a service to the list. You will need to enter a Service name, as well as the Protocol and Port Range used by the service.
5. By selecting the appropriate setting next to Days and Time, choose when Internet access will be filtered.
6. Click the **Save Settings** button to activate the policy.

Internet Access can also be filtered by URL Address, the address entered to access Internet sites, by entering the address in one of the Website Blocking by URL Address fields. If you do not know the URL Address, filtering can be done by Keyword by entering a keyword in one of the Website Blocking by Keyword fields.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Figure 5-19: List of PCs

Figure 5-20: Port Services

The Applications and Gaming Tab

Single Port Forwarding

The Single Port Forwarding screen provides options for customization of port services for common applications.

When users send this type of request to your network via the Internet, the Gateway will forward those requests to the appropriate computer. Any computer whose port is being forwarded should have its DHCP client function disabled and should have a new static IP address assigned to it because its IP address may change when using the DHCP function.

Choose or enter the Application in the field. Then, enter the External and Internal Port numbers in the fields. Select the type of protocol you wish to use for each application: **TCP** or **UDP**. Enter the IP Address in the field. Click **Enabled** to enable UPnP Forwarding for the chosen application.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Application	External Port	Internal Port	Protocol	IP Address	Enabled
FTP	21	21	TCP	192.168.1.0	<input type="checkbox"/>
Telnet	23	23	TCP	192.168.1.0	<input type="checkbox"/>
SMTP	25	25	TCP	192.168.1.0	<input type="checkbox"/>
DNS	53	53	UDP	192.168.1.0	<input type="checkbox"/>
TFTP	69	69	UDP	192.168.1.0	<input type="checkbox"/>
Finger	79	79	TCP	192.168.1.0	<input type="checkbox"/>
HTTP	80	80	TCP	192.168.1.0	<input type="checkbox"/>
POP3	110	110	TCP	192.168.1.0	<input type="checkbox"/>
NNTP	119	119	TCP	192.168.1.0	<input type="checkbox"/>
SNMP	161	161	UDP	192.168.1.0	<input type="checkbox"/>
	0	0	TCP	192.168.1.0	<input type="checkbox"/>
	0	0	TCP	192.168.1.0	<input type="checkbox"/>
	0	0	TCP	192.168.1.0	<input type="checkbox"/>
	0	0	TCP	192.168.1.0	<input type="checkbox"/>
	0	0	TCP	192.168.1.0	<input type="checkbox"/>

Save Settings Cancel Changes

Figure 5-21: Applications & Gaming - Single Port Forwarding

TCP: a network protocol for transmitting data that requires acknowledgement from the recipient of data sent

UDP: a network protocol for transmitting data that does not require acknowledgement from the recipient of the data that is sent

Port Range Forwarding

The Port Forwarding screen sets up public services on your network, such as web servers, ftp servers, e-mail servers, or other specialized Internet applications. (Specialized Internet applications are any applications that use Internet access to perform functions such as videoconferencing or online gaming. Some Internet applications may not require any forwarding.)

When users send this type of request to your network via the Internet, the Gateway will forward those requests to the appropriate computer. Any computer whose port is being forwarded should have its DHCP client function disabled and should have a new static IP address assigned to it because its IP address may change when using the DHCP function.

- **Application.** Enter the name you wish to give each application.
- **Start and End.** Enter the starting and ending numbers of the port you wish to forward.
- **TCP UDP.** Select the type of protocol you wish to use for each application: **TCP**, **UDP**, or **Both**.
- **IP Address.** Enter the IP Address and Click **Enabled**.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Port Triggering

Port Triggering is used for special applications that can request a port to be opened on demand. For this feature, the Gateway will watch outgoing data for specific port numbers. The Gateway will remember the IP address of the computer that sends a transmission requesting data, so that when the requested data returns through the Gateway, the data is pulled back to the proper computer by way of IP address and port mapping rules.

- **Application.** Enter the name you wish to give each application.
- **Start Port and End Port.** Enter the starting and ending Outgoing Triggered Range numbers and the Incoming Forwarded Range numbers of the port you wish to forward.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

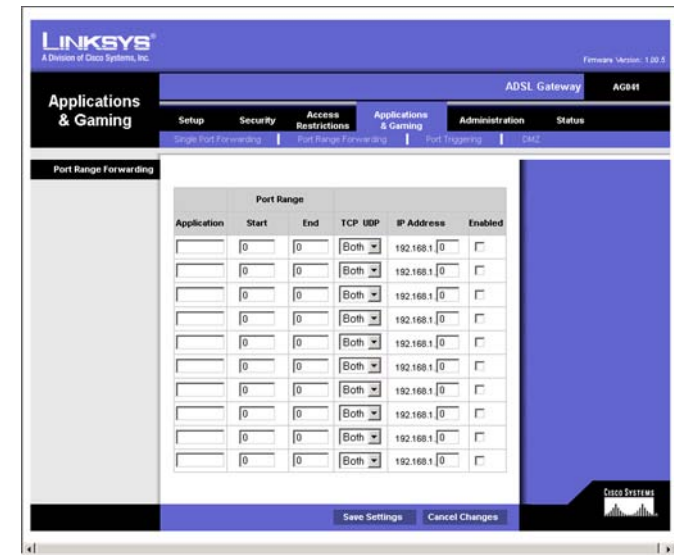


Figure 5-22: Applications & Gaming - Port Range Forwarding

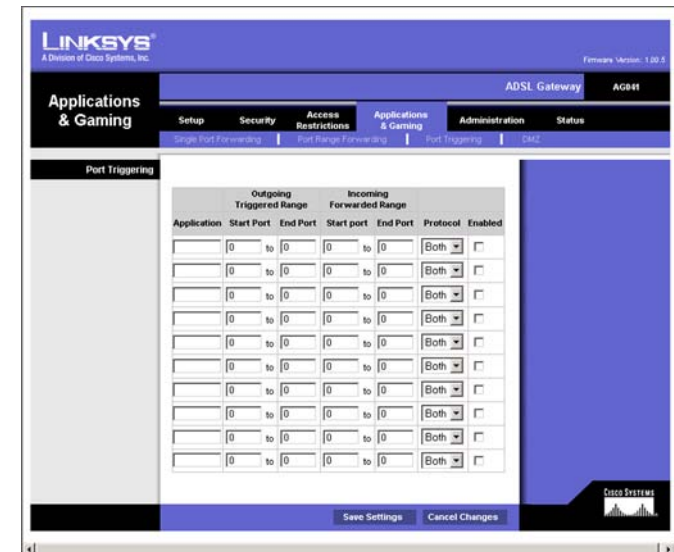


Figure 5-23: Applications & Gaming - Port Triggering

DMZ

The DMZ screen allows one local user to be exposed to the Internet for use of a special-purpose service such as Internet gaming and videoconferencing through DMZ Hosting. DMZ hosting forwards all the ports for one computer at the same time, which differs from Port Range Forwarding, which can only forward a maximum of 10 ranges of ports.

- **DMZ Hosting.** This feature allows one local user to be exposed to the Internet for use of a special-purpose service such as Internet gaming and videoconferencing. To use this feature, select **Enabled**. To disable DMZ, select **Disabled**.
- **DMZ Host IP Address.** To expose one computer, enter the computer's IP address. To get the IP address of a computer, refer to "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter."

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

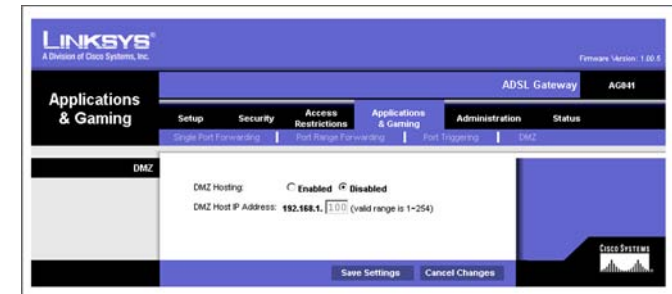


Figure 5-24: Applications & Gaming - DMZ

The Administration Tab

Management

The Management screen allows you to change the Gateway's access settings as well as configure the SNMP (Simple Network Management Protocol) and UPnP (Universal Plug and Play) features.

Gateway Access

Local Gateway Access. To ensure the Gateway's security, you will be asked for your password when you access the Gateway's Web-based Utility. The default username and password is admin.

- **Gateway Username.** Enter the default **admin**. You should change the default username to one of your choice.
- **Gateway Password.** You should change the password from its default.
- **Re-enter to confirm.** Re-enter the Gateway's new Password to confirm it.

Remote Gateway Access. This feature allows you to access the Gateway from a remote location, via the Internet.



IMPORTANT: Enabling remote Administration allows anyone with access to your password to configure the Gateway from somewhere else on the Internet.

Figure 5-25: Administration tab - Management

- **Remote Administration.** This feature allows you to manage the Gateway from a remote location via the Internet. To enable Remote Administration, click **Enabled**.
- **Administration Port.** Enter the port number you will use to remotely access the Gateway.

SNMP

SNMP is a popular network monitoring and management protocol.

Identification. To enable SNMP, click **Enabled**. To disable SNMP, click **Disabled**.

- **In the Device Name field,** enter the name of the Gateway.
- **Get Community.** Enter the password that allows read-only access to the Gateway's SNMP information.
- **Set Community.** Enter the password that allows read/write access to the Gateway's SNMP information.

UPnP

UPnP allows Windows XP to automatically configure the Gateway for various Internet applications, such as gaming and videoconferencing.

UPnP. To enable UPnP, click **Enabled**.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

Reporting

The Reporting tab provides you with a log of all incoming and outgoing URLs or IP addresses for your Internet connection. It also provides logs for VPN and firewall events.

Log

Log. To enable log reporting, click **Enabled**.

- Logviewer IP Address. Enter the IP Address to receive logs into the field.

Email Alerts

E-Mail Alerts. To enable E-Mail Alerts, click **Enabled**.

- Denial of Service Thresholds. Enter the thresholds of events you want to receive.
- SMTP Mail Server. Enter the IP Address of the SMTP server in the field.
- E-Mail Address for Alert Logs. Enter the e-mail address for alert logs in the field.
- Return E-Mail address. Enter the address for the return e-mail.

To view the logs, click the **View Logs** button.

When finished making your changes on this tab, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.

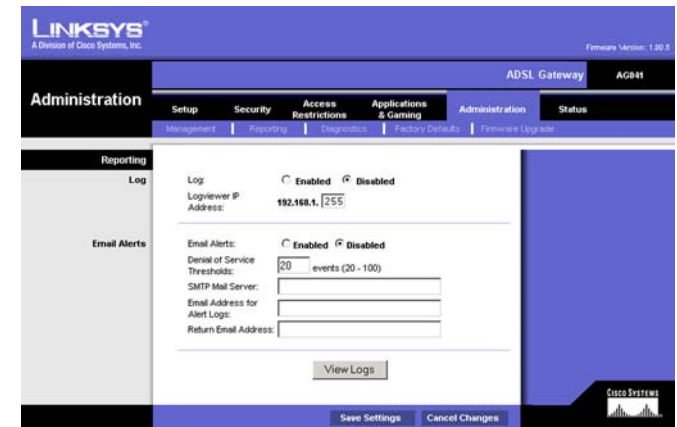


Figure 5-26: Administration tab - Reporting

***SMTP:** the standard e-mail protocol on the Internet*

Diagnostics

Ping Test

Ping Test Parameters

- Ping Target IP. Enter the IP Address that you want to ping in the field. This can be either a local (LAN) IP or an Internet (WAN) IP address.
- Ping Size. Enter the size of the ping packets.
- No. of Pings. Enter the number of times that you want to ping.
- Ping Interval. Enter the ping interval in milliseconds.
- Ping Timeout. Enter the time in milliseconds.
- Ping Result. The results of the ping test will be shown here.

Click the **Start Test** button to start the Ping Test.



Figure 5-27: Administration tab - Diagnostics

Factory Defaults

Restore Factory Defaults. If you have exhausted all other options and wish to restore the Gateway to its factory default settings and lose all your settings, click **Yes**.

To begin the restore process, click the **Save Settings** button to save these changes, or click the **Cancel Changes** button to undo your changes.



Figure 5-28: Administration tab - Factory Defaults

Firmware Upgrade

To upgrade the Gateway's firmware:

1. Click the **Browse** button to find the firmware upgrade file that you downloaded from the international Linksys website and then extracted.
2. Double-click the firmware file you downloaded and extracted. Click the **Upgrade** button, and follow the instructions there.



Figure 5-29: Administration tab - Firmware Upgrade

The Status Tab

Gateway

This screen displays information about your Gateway and its WAN (Internet) Connections.

Gateway Information

Gateway Information displays the Software Version, MAC Address, and Current Time.

Internet Connections

The Internet Connections displayed are the ADSL Link, PPP Login, Internet IP Address, Public Subnet Mask, Default Gateway, and Primary DNS Server.

System Statistics

System Statistics displays the Packets Sent and Packets Received.

Click the **Refresh** button if you want to Refresh your screen.

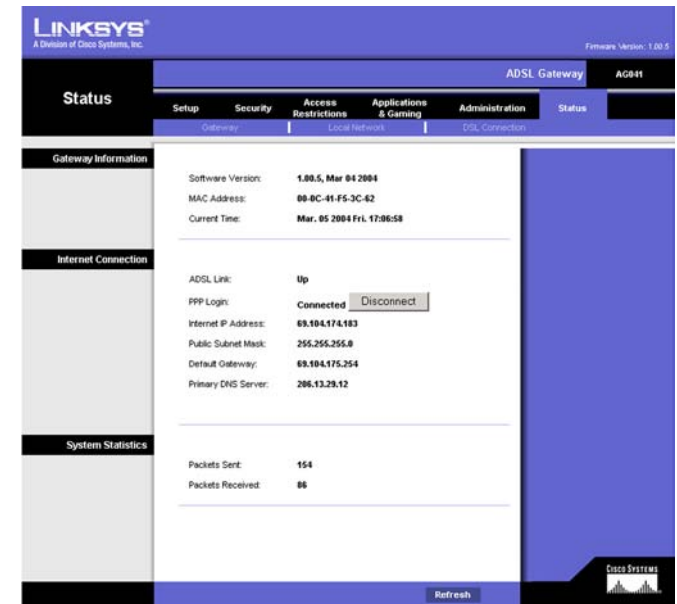


Figure 5-30: Status tab - Gateway

Local Network

The Local Network information that is displayed is the Local Mac Address, IP Address, Subnet Mask, and DHCP Server. To view the DHCP Clients Table, click the **DHCP Clients** button.

DHCP Clients Table. Click the **DHCP Clients Table** button to show the current DHCP Client data. You will see the MAC address, computer name, and IP address of the network clients using the DHCP server. (This data is stored in temporary memory and changes periodically.) To remove a client from the DHCP server, select the client from the list, then click **Release**.

Click the **Refresh** button if you want to Refresh your screen.

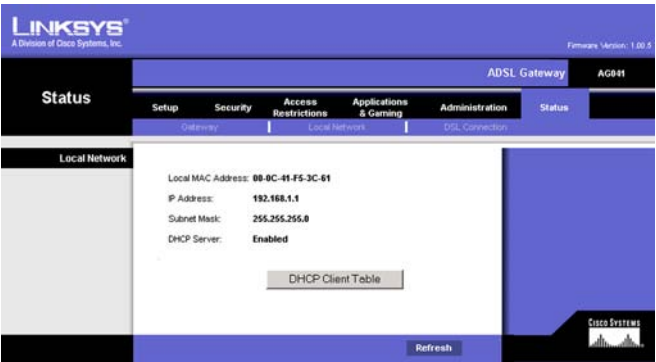


Figure 5-31: Status tab - Local Network

DHCP Active IP Table Refresh

DHCP Server IP Address: 192.168.1.1

Client Hostname	IP Address	MAC Address	Interface	Lease Expires	Release
gbs	192.168.1.101	00:04:5a:6c:c1e	Ethernet	Tuesday, February 03, 2004 12:11:00 PM	<input type="checkbox"/>

Figure 5-32: DHCP Active IP Table

DSL Connection

The DSL Connection information that is displayed is the Status, Downstream Rate, Upstream Rate, Encapsulation, VPI, VCI, and Multiplexing.

Click the **Refresh** button if you want to Refresh your screen.



Figure 5-33: Status tab - DSL Connection

Appendix A: Troubleshooting

This appendix consists of two parts: “Common Problems and Solutions” and “Frequently Asked Questions.” Provided are possible solutions to problems that may occur during the installation and operation of the Gateway. Read the descriptions below to help you 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 computer.*

You can assign a static IP address to a computer by performing the following steps:

- For Windows 98 and Me:
 1. Click **Start**, **Settings**, and **Control Panel**. Double-click **Network**.
 2. 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.
 3. 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. Make sure that each IP address is unique for each computer or network device.
 4. Click the **Gateway** tab, and in the New Gateway prompt, enter 192.168.1.1, which is the default IP address of the Gateway. Click the Add button to accept the entry.
 5. 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.
 6. Click the **OK** button in the TCP/IP properties window, and click Close or the OK button for the Network window.
 7. Restart the computer when asked.
- 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. Select **Use the following IP address** option.
 4. Enter a unique IP address that is not used by any other computer on the network connected to the Gateway.
 5. Enter the Subnet Mask, 255.255.255.0.
 6. Enter the Default Gateway, 192.168.1.1 (Gateway’s default IP address).

7. 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.
8. Click the **OK** button in the Internet Protocol (TCP/IP) Properties window, and click the **OK** button in the Local Area Connection Properties window.
9. 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)**. Click the **Properties** button.
 5. Enter a unique IP address that is not used by any other computer on the network connected to the Gateway.
 6. Enter the Subnet Mask, 255.255.255.0.
 7. Enter the Default Gateway, 192.168.1.1 (Gateway's default IP address).
 8. 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.
 9. 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, Me, 2000, and XP:

- Refer to "Appendix E: Windows Help" for details on how to configure your computers. Make sure that *Obtain IP address automatically* is selected in your settings for each computer.

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 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 98 and Me:

- 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:

- Click **Start** and **Run**. In the Open field, type cmd. Press the **Enter** key or click the **OK** button. 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 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.
- C. In the command prompt, type ping followed by your Internet or WAN IP address and press the **Enter** key. The Internet or WAN IP Address can be found on the Status screen of the Gateway's web-based utility. For example, if your Internet or 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.
- D. In the command prompt, type ping www.yahoo.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.

- Refer to "Problem #2, I want to test my Internet connection" to verify that you have connectivity.
 1. Make sure you are using the right Internet connection settings. Contact your ISP to see if your Internet connection type is RFC 1483 Bridged, RFC 1483 Routed, RFC 2516 PPPoE, or RFC 2364 PPPoA. Please refer to the Setup section of "Chapter 5: Configuring the Gateway" for details on Internet connection settings.
 2. Make sure you have the right cable. Check to see if the Gateway column has a solidly lit ADSL LED.
 3. Make sure the cable connecting from your Gateway's ADSL port is connected to the wall jack of the ADSL service line. Verify that the Status page of the Gateway's web-based utility shows a valid IP address from your ISP.
 4. Turn off the computer and 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 Setup page of the Gateway's web-based utility.

- Refer to “Problem #2, I want to test my Internet connection” to verify that your computer is properly connected to the Gateway.
 1. Refer to “Appendix C: Finding the MAC Address and IP address for Your Ethernet Adapter” to verify that your computer has an IP Address, Subnet Mask, Gateway, and DNS.
 2. Set a static IP address on your system; refer to “Problem #1: I need to set a static IP address.”
 3. 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) working through the Gateway.

Access the Gateway's web interface by going to <http://192.168.1.1> or the IP address of the Gateway, and go to the Security tab. Make sure you have IPsec passthrough and/or PPTP pass-through 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 Gateway; 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 Gateway. AH has limitations due to occasional incompatibility with the NAT standard.
- Change the IP address for the Gateway 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 Gateway will have difficulties routing information to the right location. If you change the Gateway's IP address to 192.168.2.1, that should solve the problem. Change the Gateway's IP address through the Setup tab of the web interface.
- 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 for more information at www.linksys.com/international or www.linksys/support (English only).

6. I need to set up a server behind my Gateway and make it available to the public.

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.
 1. Access the Gateway's web-based utility by going to <http://192.168.1.1> or the IP address of the Gateway. Go to the Applications and Gaming => Port Range Forwarding tab.
 2. Enter any name you want to use for the Customized Application.
 3. Enter the External Port range of the service you are using. For example, if you have a web server, you would enter the range 80 to 80.
 4. Check the protocol you will be using, TCP and/or UDP.
 5. Enter the IP address of the computer or network device that you want the port server to go to. For example, if the web server's Ethernet Adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.
 6. Check the Enable option for the port services you want to use. Consider the example below:

Customized Application	External Port	TCP	UDP	IP Address	Enable
Web server	80 to 80	X		192.168.1.100	X
FTP server	21 to 21	X		192.168.1.101	X
SMTP (outgoing)	25 to 25	X		192.168.1.102	X
POP3 (incoming)	110 to 110	X		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 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:

1. Access the Gateway's web interface by going to <http://192.168.1.1> or the IP address of the Gateway. Go to the Applications and Gaming => Port Range Forwarding tab.
2. Enter any name you want to use for the Customized Application.
3. Enter the External 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.
4. Check the protocol you will be using, TCP and/or UDP.

5. Enter the IP address of the computer or network device that you want the port server to go to. For example, if the web server's Ethernet Adapter IP address is 192.168.1.100, you would enter 100 in the field provided. Check "Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter" for details on getting an IP address.
6. Check the **Enable** option for the port services you want to use. Consider the example below:

Customized Application	External Port	TCP	UDP	IP Address	Enable
UT	7777 to 27900	X	X	192.168.1.100	X
Halflife	27015 to 27015	X	X	192.168.1.105	X
PC Anywhere	5631 to 5631		X	192.168.1.102	X
VPN IPSEC	500 to 500		X	192.168.1.100	X

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 computer 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 computer or network device you set for DMZ hosting.)

- Follow these steps to set DMZ hosting:
 1. Access the Gateway's web-based utility by going to <http://192.168.1.1> or the IP address of the Gateway. Go to the Applications and Gaming => DMZ tab. Click Enabled and enter the IP of the computer.
 2. Check the Port Forwarding pages and disable or remove the entries you have entered for forwarding. Keep this information in case you want to use it at a later time.
- Once completed with the configuration, click the **Save Settings** button.

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

- Reset the Gateway to factory default by pressing the Reset button for 10 seconds and then releasing it. If you are still getting prompted for a password when saving settings, then perform the following steps:
 1. Access the Gateway's web-based utility by going to <http://192.168.1.1> or the IP address of the Gateway. Enter the default username and password **admin**, and click the **Administrations => Management** tab.
 2. Enter a different password in the Gateway Password field, and enter the same password in the second field to confirm the password.
 3. 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 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:
 1. Click **Start**, **Settings**, and **Control Panel**. Double-click Internet Options.
 2. Click the **Connections** tab.
 3. Click the **LAN settings** button and remove anything that is checked.
 4. Click the **OK** button to go back to the previous screen.
 5. Click the option **Never dial a connection**. This will remove any dial-up pop-ups for PPPoE users.
- For Netscape 4.7 or higher:
 1. Start **Netscape Navigator**, and click **Edit**, **Preferences**, **Advanced**, and **Proxies**.
 2. Make sure you have Direct connection to the Internet selected on this screen.
 3. Close all the windows to finish.

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

Hold the **Reset** button for 10 seconds and then release it. This will return the Internet settings, 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.

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/international.

- Follow these steps:
 1. Go to the Linksys website at <http://www.linksys.com/international> and download the latest firmware.
 2. To upgrade the firmware, follow the steps in the Administration section found in "Chapter 5: Configuring the Gateway."

13. The firmware upgrade failed, and/or the Power LED is flashing.

The upgrade could have failed for a number of reasons. Follow these steps to upgrade the firmware and/or make the Power LED stop flashing:

- If the firmware upgrade failed, use the TFTP program (it was downloaded along with the firmware). Open the pdf that was downloaded along with the firmware and TFTP program, and follow the pdf's instructions.
- Set a static IP address on the computer; 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

- Perform the upgrade using the TFTP program or the Gateway's web-based utility through its Administration tab.

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.
 1. To connect to the Gateway, go to the web browser, and enter <http://192.168.1.1> or the IP address of the Gateway.
 2. Enter the username and password, if asked. (The default username and password is admin.)
 3. On the Setup screen, select the option **Keep Alive**, and set the Redial Period option at 20 (seconds).
 4. Click the **Save Settings** button. Click the **Status** tab, and click the **Connect** button.
 5. You may see the login status display as Connecting. Press the F5 key to refresh the screen, until you see the login status display as Connected.
 6. Click the **Save Settings** button to continue.
- If the connection is lost again, follow steps 1- 6 to re-establish connection.

15. I can't access my e-mail, 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 automatically.

- If you are having some difficulties, perform the following steps:
 1. To connect to the Gateway, go to the web browser, and enter <http://192.168.1.1> or the IP address of the Gateway.
 2. Enter the username and password, if asked. (The default username and password is admin.)
 3. Look for the MTU option, and select **Manual**. In the Size field, enter 1492.
 4. 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. The Power LED flashes continuously.

The Power LED lights up when the device is first powered up. In the meantime, the system will boot up itself and check for proper operation. After finishing the checking procedure, the LED remains steady to show that the system is working fine. If the LED continues to flash after this time, the device is not working properly. Try to flash the firmware by assigning a static IP address to the computer, and then upgrade the firmware. Try using the following settings, IP Address: 192.168.1.50 and Subnet Mask: 255.255.255.0.

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

- Check if other computers work. If they do, ensure that your computer's IP settings are correct (IP Address, Subnet Mask, Default Gateway, and DNS). Restart the computer that is having a problem.
- If the computers are configured correctly, but still not working, check the Gateway. 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 Gateway is configured correctly, check your Internet connection (DSL/cable modem, etc.) to see if it is working correctly. You can remove the Gateway to verify a direct connection.
- Manually configure the TCP/IP settings with a DNS address provided by your ISP.
- Make sure that your browser is set to connect directly and that any dial-up is disabled. For Internet Explorer, click **Tools, Internet Options**, and then the **Connection** tab. Make sure that Internet Explorer is set to **Never dial a connection**. For Netscape Navigator, click **Edit, Preferences, Advanced**, and **Proxy**. Make sure that Netscape Navigator is set to **Direct connection to the Internet**.

Frequently Asked Questions

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

The Gateway will support up to 253 IP addresses.

Is IPSec Passthrough supported by the Gateway?

Yes, it is a built-in feature that is enabled by default.

Where is the Gateway installed on the network?

In a typical environment, the Gateway is installed between the ADSL wall jack and the LAN.

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 the Internet to a LAN.

Does the LAN connection of the Gateway support 100Mbps Ethernet?

The Gateway supports 100Mbps over the auto-sensing Fast Ethernet 10/100 switch on the LAN side of the Gateway.

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 computer 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 98SE, Windows Millennium, Windows 2000, or Windows XP?

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

Does the Gateway support ICQ send file?

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

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. (Port 8080 usually works well but is used for remote admin. You may have to disable this.) 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 27015 to the local IP address of the server computer.

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, 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/international for more information.

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

Reset the Gateway by holding down the reset button until the Power LED fully turns on and off. Reset your 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/international.

How will I be notified of new Gateway firmware upgrades?

All Linksys firmware upgrades are posted on the Linksys website at www.linksys.com, where they can be downloaded for free. To upgrade the Gateway’s firmware, use the Administration tab of the Gateway’s web-based utility. If the Gateway’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.

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. 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. You should set your computer with a static IP if you want to use DMZ Hosting. To get the LAN IP address, see “Appendix C: Finding the MAC Address and IP Address for Your Ethernet Adapter.”

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

No.

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

The Gateway allows PPTP packets to pass through.

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, Port Forwarding, Routing, and DDNS.

What is the maximum number of VPN sessions allowed by the Gateway?

The maximum number depends on many factors. At least one IPSec session will work through the Gateway; 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?

Consult your ISP to obtain this information.

How do I get mIRC to work with the Gateway?

Under the Port Forwarding tab, set port forwarding to 113 for the computer on which you are using mIRC.

Can the Gateway act as my DHCP server?

Yes. The Gateway has DHCP server software built-in.

What is a MAC Address?

The Media Access Control (MAC) address is a unique number assigned by the manufacturer to any Ethernet networking device, such as a network adapter, that allows the network to identify it at the hardware level. For all practical purposes, this number is usually permanent. Unlike IP addresses, which can change every time a computer logs onto the network, the MAC address of a device stays the same, making it a valuable identifier for the network.

How do I reset the Gateway?

Press the Reset button on the back panel for about ten seconds. This will reset the Gateway to its default settings.

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

Appendix B: Configuring IPSec between a Windows 2000 or XP Computer and the Gateway

Introduction

This document demonstrates how to establish a secure IPSec tunnel using preshared keys to join a private network inside the Gateway and a Windows 2000 or XP computer. You can find detailed information on configuring the Windows 2000 server at the Microsoft website:

Microsoft KB Q252735 - How to Configure IPSec Tunneling in Windows 2000
<http://support.microsoft.com/support/kb/articles/Q252/7/35.asp>

Microsoft KB Q257225 - Basic IPSec Troubleshooting in Windows 2000
<http://support.microsoft.com/support/kb/articles/Q257/2/25.asp>



NOTE: Keep a record of any changes you make. Those changes will be identical in the Windows “secpol” application and the Router’s Web-Based Utility.

Environment

The IP addresses and other specifics mentioned in this appendix are for illustration purposes only.

Windows 2000 or Windows XP

IP Address: 140.111.1.2 <= User ISP provides IP Address; this is only an example.

Subnet Mask: 255.255.255.0

AG041

WAN IP Address: 140.111.1.1 <= User ISP provides IP Address; this is only an example.

Subnet Mask: 255.255.255.0

LAN IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0



NOTE: This section’s instructions and figures refer to the Router. Substitute “Gateway” for “Router”. Also, the text on your screen may differ from the text in your instructions for “OK or Close”; click the appropriate button on your screen.

How to Establish a Secure IPSec Tunnel

Step 1: Create an IPSec Policy

1. Click the **Start** button, select **Run**, and type **secpol.msc** in the **Open** field. The *Local Security Setting* screen will appear.
2. Right-click **IP Security Policies on Local Computer** (Win XP) or **IP Security Policies on Local Machine** (Win 2000), and click **Create IP Security Policy**.
3. Click the **Next** button, and then enter a name for your policy (for example, to_Router). Then, click **Next**.
4. Deselect the **Activate the default response rule** check box, and then click the **Next** button.
5. Click the **Finish** button, making sure the **Edit** check box is checked.

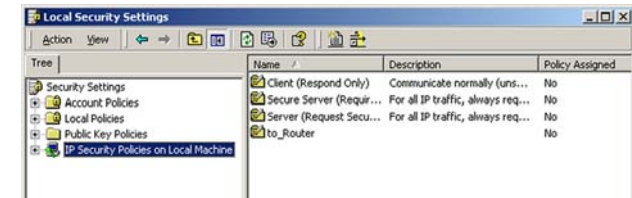


Figure B-1: Local Security Screen



NOTE: The references in this section to “win” are references to Windows 2000 and XP. Substitute the references to “Router” with “Gateway”. Also, the text on your screen may differ from the text in your instructions for “OK or Close”; click the appropriate button on your screen.

Step 2: Build Filter Lists

Filter List 1: win->Router

1. In the new policy's properties screen, verify that the **Rules** tab is selected. Deselect the **Use Add Wizard** check box, and click the **Add** button to create a new rule.
2. Make sure the **IP Filter List** tab is selected, and click the **Add** button. The *IP Filter List* screen should appear. Enter an appropriate name, such as win->Router, for the filter list, and de-select the **Use Add Wizard** check box. Then, click the **Add** button.

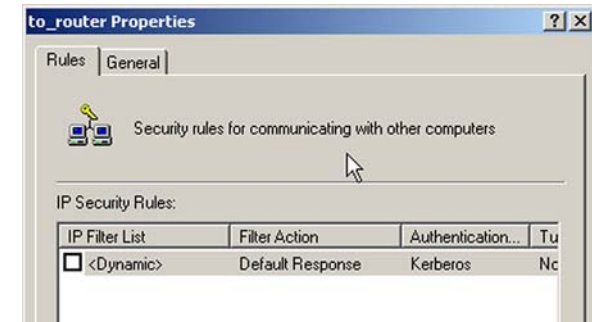


Figure B-2: Rules Tab

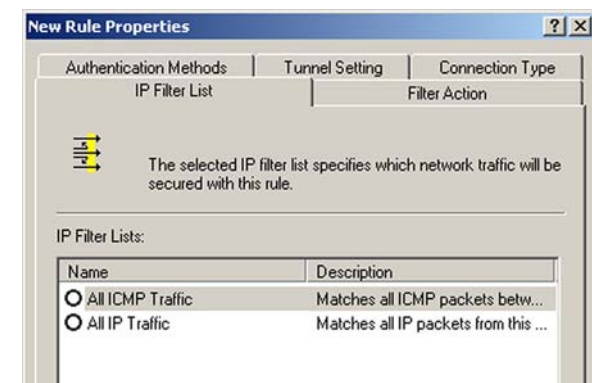


Figure B-3: IP Filter List Tab

ADSL Gateway with 4-Port Switch

3. The *Filters Properties* screen will appear. Select the **Addressing** tab. In the *Source address* field, select **My IP Address**. In the *Destination address* field, select **A specific IP Subnet**, and fill in the IP Address: 192.168.1.0 and Subnet mask: 255.255.255.0. (These are the Router's default settings. If you have changed these settings, enter your new values.)
4. If you want to enter a description for your filter, click the **Description** tab and enter the description there.
5. Click the **OK** button. Then, click the **OK** or **Close** button on the *IP Filter List* window.

Filter List 2: Router ->win

6. The *New Rule Properties* screen will appear. Select the **IP Filter List** tab, and make sure that **win -> Router** is highlighted. Then, click the **Add** button.

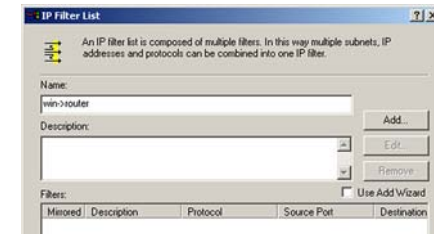


Figure B-4: IP Filter List

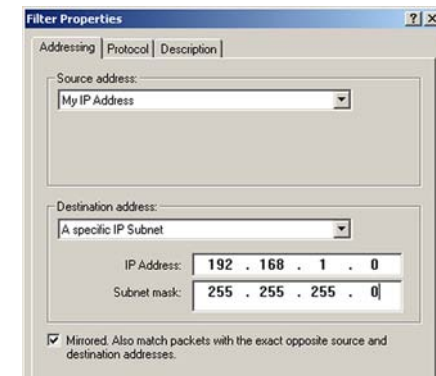


Figure B-5: Filters Properties

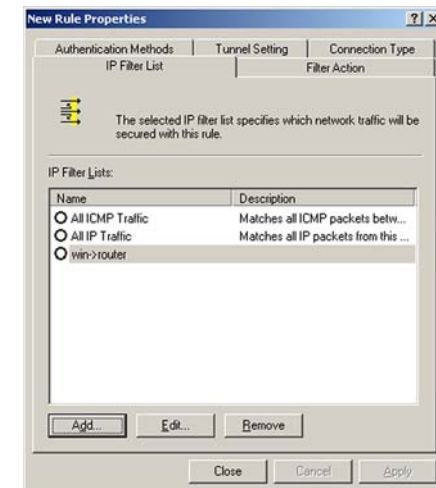


Figure B-6: New Rule Properties

7. The *IP Filter List* screen should appear. Enter an appropriate name, such as Router->win for the filter list, and de-select the **Use Add Wizard** check box. Click the **Add** button.
8. The *Filters Properties* screen will appear. Select the *Addressing* tab. In the *Source address* field, select **A specific IP Subnet**, and enter the IP Address: 192.168.1.0 and Subnet mask: 255.255.255.0. (Enter your new values if you have changed the default settings.) In the *Destination address* field, select **My IP Address**.
9. If you want to enter a description for your filter, click the *Description* tab and enter the description there.
10. Click the **OK** or **Close** button and the *New Rule Properties* screen should appear with the IP Filter List tab selected. There should now be a listing for "Router -> win" and "win -> Router". Click the **OK** (for WinXP) or **Close** (for Win2000) button on the *IP Filter List* window.

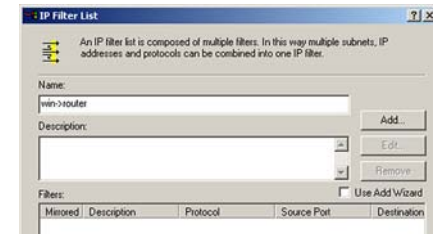


Figure B-7: IP Filter List

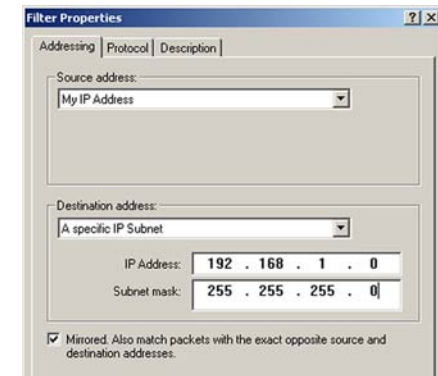


Figure B-8: Filters Properties

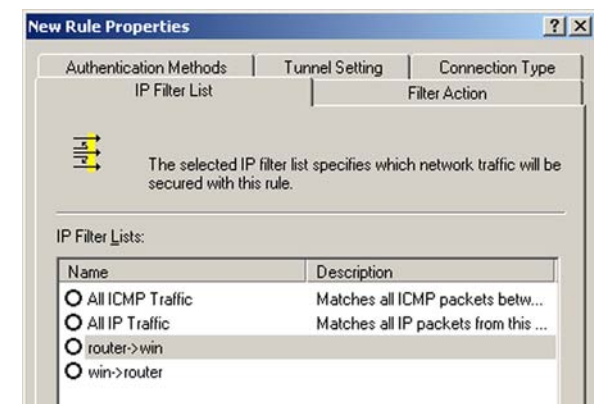


Figure B-9: New Rule Properties

Step 3: Configure Individual Tunnel Rules

Tunnel 1: win->Router

1. From the *IP Filter List* tab, click the filter list win->Router.
2. Click the **Filter Action** tab, and click the filter action **Require Security** radio button. Then, click the **Edit** button.
3. From the *Security Methods* tab, verify that the **Negotiate security** option is enabled, and deselect the **Accept unsecured communication**, but always respond using IPSec check box. Select **Session key Perfect Forward Secrecy**, and click the **OK** button.

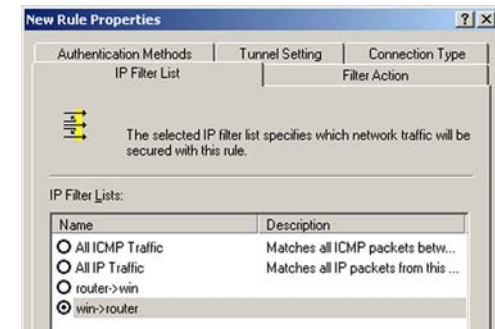


Figure B-10: IP Filter List Tab

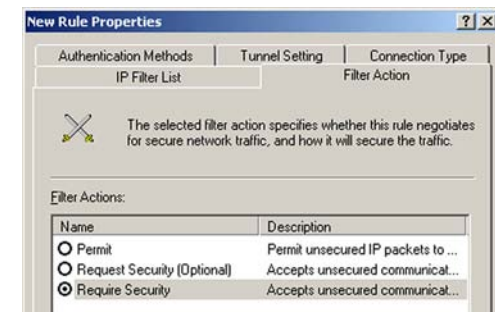


Figure B-11: Filter Action Tab

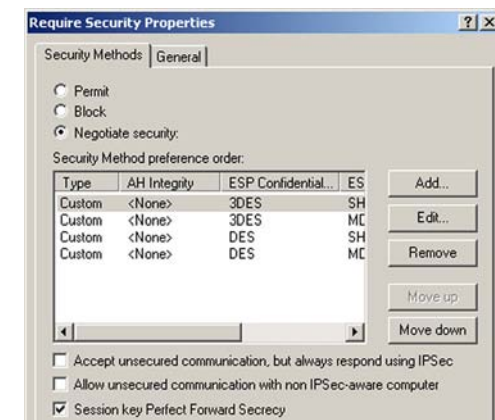


Figure B-12: Security Methods Tab

4. Select the **Authentication Methods** tab, and click the **Edit** button.
5. Change the authentication method to **Use this string to protect the key exchange (preshared key)** and enter the preshared key string, such as XYZ12345. Click the **OK** button.
6. This new Preshared key will be displayed. Click the **Apply** button to continue, if it appears on your screen, otherwise proceed to the next step.



Figure B-13: Authentication Methods



Figure B-14: Preshared Key

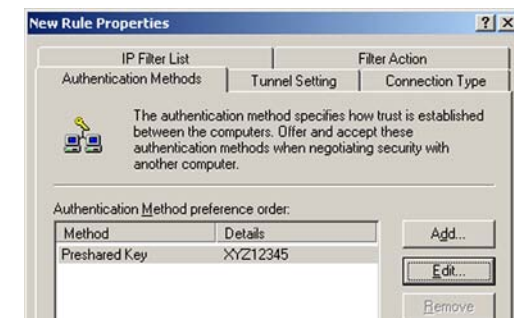


Figure B-15: New Preshared Key

ADSL Gateway with 4-Port Switch

7. Select the **Tunnel Setting** tab and click **The tunnel endpoint is specified by this IP Address** radio button. Then, enter the Router's WAN IP Address.
8. Select the **Connection Type** tab and click **All network connections**. Then, click the **OK** or **Close** button to finish this rule.

Tunnel 2: Router->win

9. In the new policy's properties screen, make sure that "win -> Router" is selected and deselect the **Use Add Wizard** check box. Then, click the **Add** button to create the second IP filter.

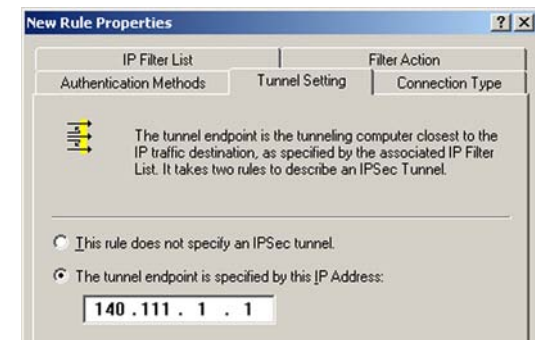


Figure B-16: Tunnel Setting Tab



Figure B-17: Connection Type Tab

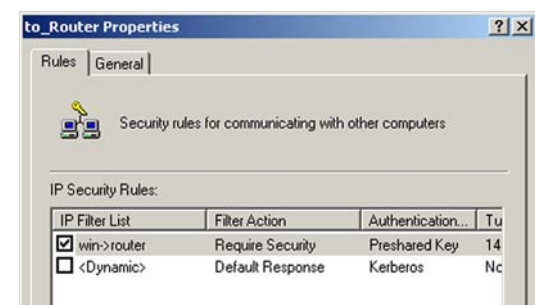


Figure B-18: Properties Screen

10. Go to the **IP Filter List** tab, and click the filter list **Router->win**.

11. Click the **Filter Action** tab, and select the filter action **Require Security**. Then, click the **Edit** button. From the *Security Methods* tab, verify that the **Negotiate security** option is enabled, and deselect the **Accept unsecured communication**, but always respond using IPSec check box. Select **Session key Perfect Forward Secrecy**, and click the **OK** button.

12. Click the **Authentication Methods** tab, and verify that the authentication method **Kerberos** is selected. Then, click the **Edit** button.

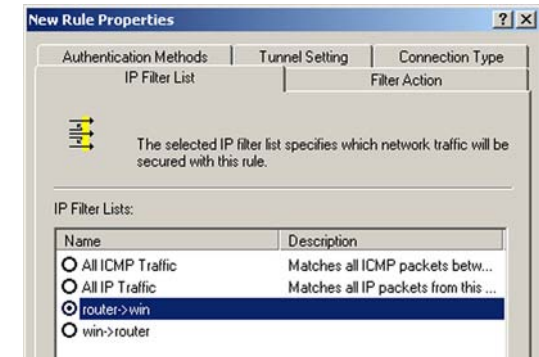


Figure B-19: IP Filter List Tab

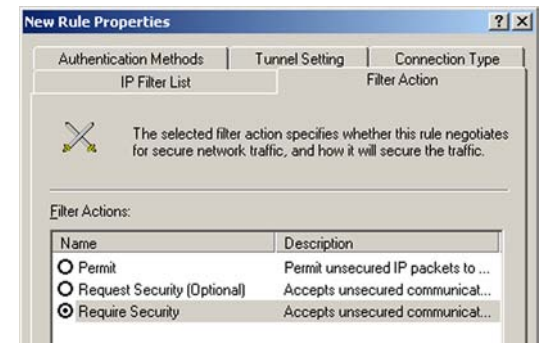


Figure B-20: Filter Action Tab



Figure B-21: Authentication Methods Tab

13. Change the authentication method to **Use this string to protect the key exchange (preshared key)**, and enter the preshared key string, such as XYZ12345. (This is a sample key string. Yours should be a key that is unique but easy to remember.) Then click the **OK** button.
14. This new Preshared key will be displayed. Click the **Apply** button to continue, if it appears on your screen, otherwise proceed to the next step.
15. Click the **Tunnel Setting** tab, click the radio button for **The tunnel endpoint is specified by this IP Address**, and enter the Windows 2000/XP computer's IP Address.

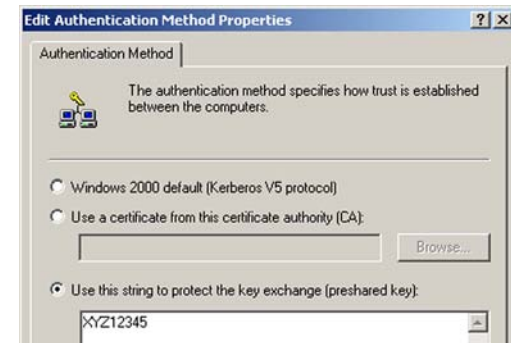


Figure B-22: Preshared Key

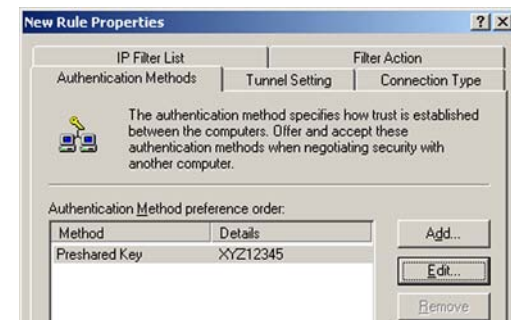


Figure B-23: New Preshared Key

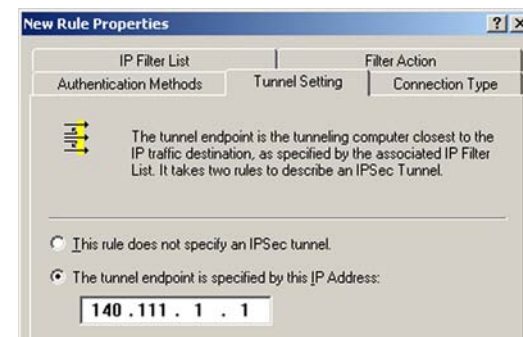


Figure B-24: Tunnel Setting Tab

16. Click the **Connection Type** tab, and select **All network connections**. Then click the **OK** or **Close** button to finish.

17. From the *Rules* tab, click the **OK** or **Close** button to return to the secpol screen.

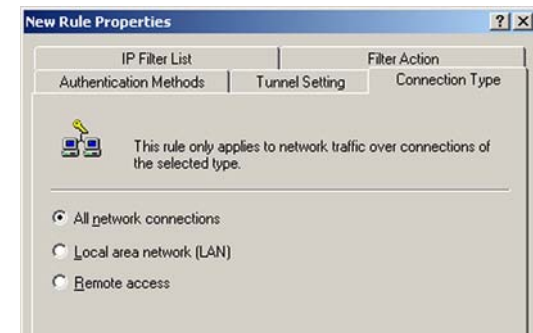


Figure B-25: Connection Type

Step 4: Assign New IPSec Policy

In the IP Security Policies on *Local Computer* window, right-click the policy named *to_Router*, and click **Assign**. A green arrow appears in the folder icon.

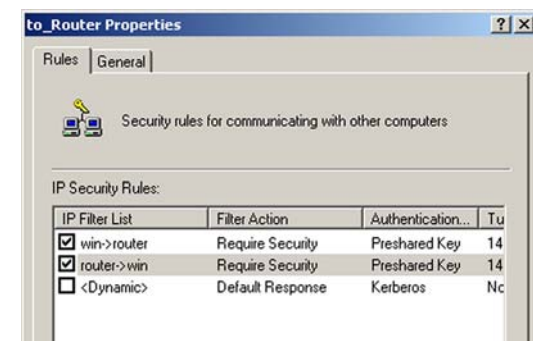


Figure B-26: Rules

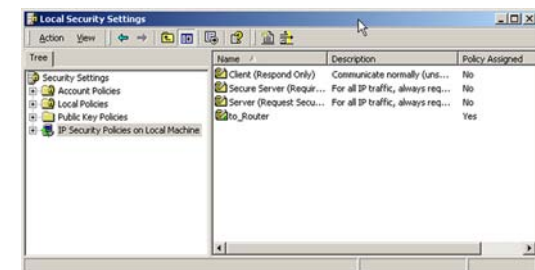


Figure B-27: Local Computer

Step 5: Create a Tunnel Through the Web-Based Utility

1. Open your web browser, and enter **192.168.1.1** in the Address field. Press the **Enter** key.
2. When the User name and Password field appears, enter the default user name and password **admin**. Press the **Enter** key.
3. From the *Setup* tab, click the **VPN** tab.
4. From the *VPN* tab, select the tunnel you wish to create in the *Select Tunnel Entry* drop-down box. Then click **Enabled**. Enter the name of the tunnel in the *Tunnel Name* field. This is to allow you to identify multiple tunnels and does not have to match the name used at the other end of the tunnel.
5. Enter the IP Address and Subnet Mask of the local VPN Router in the *Local Secure Group* fields. To allow access to the entire IP subnet, enter 0 for the last set of IP Addresses. (e.g. 192.168.1.0).
6. Enter the IP Address and Subnet Mask of the VPN device at the other end of the tunnel (the remote VPN Router or device with which you wish to communicate) in the *Remote Security Router* fields.
7. Select from two different types of encryption: **DES** or **3DES** (3DES being more secure). You may choose either of these, but it must be the same type of encryption that is being used by the VPN device at the other end of the tunnel. Or, you may choose not to encrypt by selecting Disable.
8. Select from two types of authentication: **MD5** and **SHA** (SHA being more secure). As with encryption, either of these may be selected, provided that the VPN device at the other end of the tunnel is using the same type of authentication. Or, both ends of the tunnel may choose to **Disable** authentication.
9. Select the Key Management. Select **Auto (IKE)** and enter a series of numbers or letters in the *Pre-shared Key* field. Check the box next to **PFS** (Perfect Forward Secrecy) to ensure that the initial key exchange and IKE proposals are secure. You may use any combination of up to 24 numbers or letters in this field. No special characters or spaces are allowed. In the *Key Lifetime* field, you may optionally select to have the key expire at the end of a time period of your choosing. Enter the number of seconds you'd like the key to be useful, or leave it blank for the key to last indefinitely.
10. Click the **Save Settings** button to save these changes.

Your tunnel should now be established.

The screenshot shows the Linksys ADSL Gateway web interface. The top navigation bar includes 'Setup', 'Security', 'Access Restrictions', 'Applications & Gaming', 'Administration', and 'Status'. The 'Security' tab is selected, and the 'VPN' sub-tab is active. The 'IPSec VPN Tunnel' section is expanded, showing configuration options for a tunnel named 'Tunnel 1'. The 'IPSec VPN Tunnel' is set to 'Enabled'. The 'Local Secure Group' fields show IP '0.0.0.0' and Mask '0.0.0.0'. The 'Remote Secure Group' fields show IP '0.0.0.0' and Mask '255.255.255.0'. The 'Remote Security Gateway' field shows IP Address '0.0.0.0'. The 'Encryption' is set to 'DES' and 'Authentication' is set to 'MD5'. The 'Key Management' is set to 'Auto (IKE)'. The 'PFS' checkbox is checked. The 'Pre-shared Key' field is empty, and the 'Key Lifetime' is set to '3600' seconds. The 'Status' section shows 'Disconnected'. At the bottom, there are buttons for 'Connect', 'View Logs', 'Advanced Settings', 'Save Settings', and 'Cancel Changes'.

Figure B-28: VPN Tab

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

This section describes how to find the MAC address for your computer's Ethernet Adapter so you can use the MAC filtering feature of the Gateway. You can also find the IP address of your computer's Ethernet Adapter. This IP address is used for the Gateway'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 Gateway via a CAT 5 Ethernet network cable.
3. Write down the Adapter Address as shown on your computer screen. This is the MAC address for your Ethernet Adapter and is shown in hexadecimal as a series of numbers and letters.

The MAC address/Adapter Address is what you will use for MAC filtering. The example shows the Ethernet Adapters's MAC address as 00-00-00-00-00-00. Your computer will show something different.

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

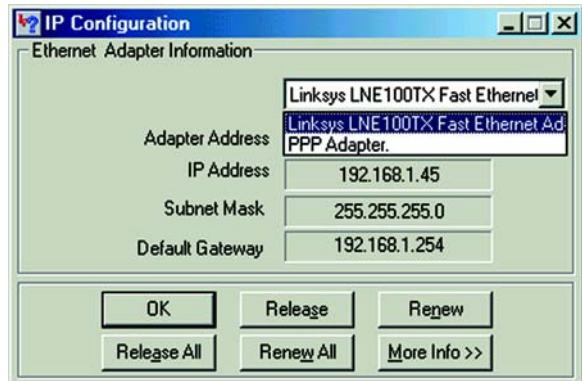


Figure C-1: IP Configuration Screen

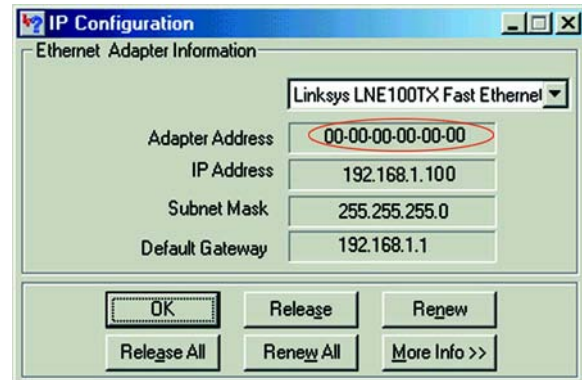


Figure C-2: MAC Address/Adapter Address



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.



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

2. At the command prompt, enter **ipconfig /all**. Then press the **Enter** key.
3. Write down the Physical Address as shown on your computer screen; it is the MAC address for your Ethernet Adapter. This appears as a series of numbers and letters.

The MAC address/Physical Address is what you will use for MAC filtering. The example shows the Ethernet Adapters's MAC address as 00-00-00-00-00-00. Your computer will show something different.

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

```

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 Local Area Connection:

   Connection-specific DNS Suffix  : 
   Description . . . . . : Linksys LNE100TX(v5) Fast Ethernet A
   dapter
   Physical Address. . . . . : 00-00-00-00-00-00
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IP Address. . . . . : 192.168.1.100
   Subnet Mask . . . . . : 255.255.255.0
   Default Gateway . . . . . : 192.168.1.1
   DHCP Server . . . . . : 192.168.1.1
   DNS Servers . . . . . : 192.168.1.1

   Primary WINS Server . . . . . : 192.168.1.1
   Secondary WINS Server . . . . . : 
   Lease Obtained. . . . . : Monday, February 11, 2002 2:31:47 PM
   Lease Expires . . . . . : Tuesday, February 12, 2002 2:31:47 PM
  
```

Figure C-3: MAC Address/Physical Address

Appendix D: Upgrading Firmware

The Gateway's firmware is upgraded through the Web-Utility's Firmware Upgrade tab from the Administration tab. Follow these instructions:

1. Click the Browse button to find the firmware upgrade file that you downloaded from the Linksys international website and then extracted.
2. Double-click the firmware file you downloaded and extracted. Click the Upgrade button, and follow the instructions there.

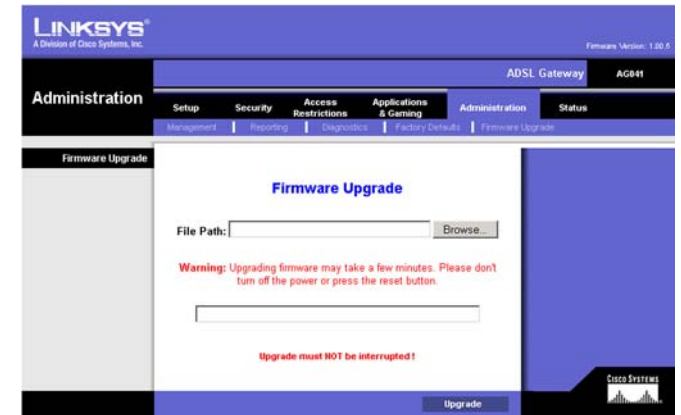


Figure D-1: Upgrade Firmware

Appendix E: Windows Help

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

TCP/IP

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

Shared Resources

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

Network Neighborhood/My Network Places

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

Appendix F: Glossary

Adapter - This is a device that adds network functionality to your computer.

Bit - A binary digit.

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

Bridge - A device that connects two different kinds of local networks, such as a wireless network to a wired Ethernet network.

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.

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

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

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

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

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

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

Domain - A specific name for a network of computers.

Download - To receive a file transmitted over a network.

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

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

Encryption - Encoding data transmitted in a network.

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

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

Firmware - The programming code that runs a networking device.

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

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

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

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

IEEE (The Institute of Electrical and Electronics Engineers) - An independent institute that develops networking standards.

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

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

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

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

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

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

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

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

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

NAT (Network Address Translation) - 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.

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

Packet - A unit of data sent over a network.

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

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

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

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

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

RJ-45 (Registered Jack-45) - An Ethernet connector that holds up to eight wires.

Router - A networking device that connects multiple networks together.

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

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

SNMP (Simple Network Management Protocol) - 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".

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.

ADSL Gateway with 4-Port Switch

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

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

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

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

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

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

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

WAN (Wide Area Network)- The Internet.

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

Appendix G: Specifications

Standards	IEEE 802.3, IEEE 802.3u, G.992.1 (G.dmt), G.992.2 (G.lite), T1.413i2
Ports	Power, LINE (ADSL), Ethernet (1-4)
Buttons	Reset, Power Switch
Cabling Type	CAT 5 UTP (Ethernet), Standard Telephone (ADSL)
LEDs	Power, Ethernet (1-4), DSL, Internet
Security features	Stateful Packet Inspection (SPI) Firewall
Dimensions	186 mm x 154 mm x 48 mm
Unit Weight	0.395 kg
Power	External, 12V DC, 1A
Certifications	FCC, CE, UL
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

Appendix H: 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.

This Warranty is valid and may be processed only in the country of purchase.

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

Appendix I: Regulatory Information

FCC Statement

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

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

FCC Radiation Exposure Statement

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

Industry Canada (Canada)

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

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

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

Appendix J: Contact Information

Need to contact Linksys?

Visit us online for information on the latest products and updates to your existing products at:
<http://www.linksys.com/international>

If you experience problems with any Linksys product, you can e-mail us at:

In Europe	E-mail Address
Austria	support.at@linksys.com
Belgium	support.be@linksys.com
Denmark	support.dk@linksys.com
France	support.fr@linksys.com
Germany	support.de@linksys.com
Italy	support.it@linksys.com
Netherlands	support.nl@linksys.com
Norway	support.no@linksys.com
Portugal	support.pt@linksys.com
Spain	support.es@linksys.com
Sweden	support.se@linksys.com
Switzerland	support.ch@linksys.com
United Kingdom & Ireland	support.uk@linksys.com

Outside of Europe	E-mail Address
Latin America	support.la@linksys.com
U.S. and Canada	support@linksys.com