ADSL2+ Router

User's Guide

Rev. 1 July 2005

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About this User’s Guide

This User’s Guide shows you how to set up the ADSL2+ Router and its configuration to meet the needs of your network and Internet connection type.

This document is organized in five major parts, each containing several chapters:

- **Part 1, “Getting Started,”** describes the product features, provides quick start setup instructions, and explains basic configuration information you will need to begin using the ADSL2+ Router.

  Read the chapters in Part 1 before attempting to use or configure the device. Depending on your LAN and Internet connection requirements, no additional configuration may be needed before you begin using the device.
- **Part 2, “Interfaces and Operating Modes,”** describes the available operating modes and how to configure them. Part 2 also provides detailed configuration instructions for each of the ADSL2+ Router’s interfaces.
- **Part 3, “Routing and IP-Related Features,”** provides configuration instructions and detailed information on using the ADSL2+ Router routing features, such as DHCP server, DNS relay, and IP routes.
- **Part 4, “Security Features,”** describes how to configure Network Address Translation (NAT) and the embedded firewall, and how to create your own data filters.
- **Part 5, “Administrative Tasks and System Monitoring,”** provides instructions for network and system administrators on controlling access to the ADSL2+ Router’s configuration software, viewing system performance statistics, diagnosing problems, upgrading the system software, managing the configuration, and configuring special features.

The document’s appendices explain basic Internet and networking concepts and provide solutions to common troubleshooting issues.

Part 1

Getting Started

About Part 1

Part 1 provides an overview of the ADSL2+ Router's features and basic setup and configuration instructions. All users are encouraged to follow these setup instructions when first installing the ADSL2+ Router on a network.

Some users may find these instructions sufficient to begin using the device on their network, with no additional changes required to the product settings.

Part 1 contains the following chapters:

- **Chapter 1, "Getting to Know"** describes the product features and provides a parts list.
- **Chapter 2, "Quick Start,"** provides instructions for setting up the hardware and for performing initial configuration of the ADSL2+ Router and your LAN PCs.
- **Chapter 3, "Getting Started with the Configuration Manager,"** provides basic instructions for using the ADSL2+ Router's configuration program. Detailed instructions for modifying each setting are provided in subsequent chapters.

1 Getting to Know

Features

- ADSL2+ modem for high-speed Internet access
- 10/100Base-T Ethernet router to provide Internet connectivity to all computers on your LAN
- USB port for connecting a USB-enabled PC
- Network address translation (NAT), firewall, and IP filtering functions to provide security for your LAN
- Network configuration through DHCP Server and DHCP Relay
- Services including IP route and DNS server configuration, RIP, and IP and DSL performance monitoring
- Configuration program you access via your Web browser

System Requirements

You must have the following:

- ADSL service up and running on your telephone line.
- One or more computers each containing an Ethernet 10Base-T/100Base-T network interface card (NIC) and/or a single computer with a USB port
- An Ethernet hub or switch, if you are connecting the device to more than one computer on an Ethernet network
- For system configuration using the supplied web-based program: a web browser such as Internet Explorer v5.0 or later, or Netscape v6.1 or later

Parts Check

- ADSL2+ Router
- Power adapter
- USB cable(Optional)
- Ethernet cable (“straight-through” type)
- RJ11 phone cable
- Quick Installation Guide
- Driver CD

2 Quick Start

This Quick Start provides basic instructions for connecting the ADSL2+ Router to a computer or LAN and to the Internet.

- Quick Start Part 1 describes setting up the hardware.
- Quick Start Part 2 describes how to configure Internet properties on your computer(s) and how to install the software for using a computer attached to the USB port (optional).
- Quick Start Part 3 shows you how to configure basic settings on the ADSL2+ Router to get your LAN or PC connected to the Internet.

After setting up and configuring the device, you can follow the instructions on page 30 to verify that it is working properly.

This Quick Start assumes that you have already established ADSL service with your Internet service provider (ISP). These instructions provide a basic configuration that should be compatible with your home or small office network setup. If necessary, refer to the subsequent chapters for additional configuration instructions.

Quick Start Part 1 — Connecting the Hardware

In Quick Start Part 1, you connect the device to the phone jack, the power outlet, and your computer or network.

WARNING

> ***Before you begin, turn the power off for all devices.*** *These include your computer(s), your LAN hub/switch (if applicable), and the ADSL2+ Router.*

Step 1. Connect the ADSL cable.

Connect one end of the provided phone cable to the port labeled ADSL(or DSL) on the rear panel of the device. Connect the other end to your wall phone jack.

Step 2. Connect the Ethernet cable.

If you are connecting a LAN to the ADSL2+ Router, attach one end of the provided Ethernet cable to a regular hub port and the other end to the Ethernet port on the ADSL2+ Router .

Step 3: Install USB software and connect the USB cable(optional).

You can attach a single computer to the device using a USB cable. The USB port is useful if you have an USB-enabled PC that does not have a network interface card for attaching to your Ethernet network. You must install software on the PC to enable communication; see Connecting a computer to the USB port on page 22.

Step 4. Attach the power connector.

Connect the AC power adapter to the Power connector on the back of the device and plug in the adapter to a wall outlet or power strip.

Step 5. Turn on the ADSL2+ Router and power up your systems.

Press the On/Off switch on the back panel of the device to the On position. Turn on and boot up your computer(s) and any connected LAN devices such as hubs or switches.

Quick Start Part 2 — Configuring Your Computers

Quick Start Part 2 provides instructions for configuring the Internet settings on your computers to work with the ADSL2+ Router.

Before you begin

By default, the ADSL2+ Router automatically assigns all required Internet settings to your PCs. You need only to configure the PCs to accept the information when it is assigned.

Note

In some cases, you may want to assign Internet information manually to some or all of your computers rather than allow the ADSL2+ Router to do so. See "Assigning static Internet information to your PCs" on page 21 for instructions.

- If you have connected your PC via the USB port, see the USB configuration instructions on page 22.
- If you have connected your PC(s) or LAN via Ethernet to the ADSL2+ Router, follow the instructions that correspond to the operating systems installed on your PCs.

Windows® XP PCs

1. In the Windows task bar, click Start, and then click **Control Panel**.
2. Double-click the Network Connections icon.
3. In the LAN or High-Speed Internet window, right-click on the icon corresponding to your network interface card (NIC) and select **Properties**. (Often, this icon is labeled *Local Area Connection*).

   The Local Area Connection dialog box displays with a list of currently installed network items.
4. Ensure that the check box to the left of the item labeled Internet Protocol TCP/IP is checked, and click Properties.
5. In the Internet Protocol (TCP/IP) Properties dialog box, click the radio button labeled **Obtain an IP address automatically**. Also click the radio button labeled **Obtain DNS server address automatically**.
6. Click OK twice to confirm your changes, and close the Control Panel.

Windows 2000 PCs

First, check for the IP protocol and, if necessary, install it:

1. In the Windows task bar, click the Start button, point to **Settings**, and then click **Control Panel**.
2. Double-click the Network and Dial-up Connections icon.
3. In the Network and Dial-up Connections window, right-click the Local Area Connection icon, and then select **Properties**.

   The Local Area Connection Properties dialog box displays with a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 10.
4. If Internet Protocol (TCP/IP) does not display as an installed component, click Install... .
5. In the Select Network Component Type dialog box, select **Protocol**, and then click Add... .
6. Select **Internet Protocol (TCP/IP)** in the Network Protocols list, and then click OK .

   You may be prompted to install files from your Windows 2000 installation CD or other media. Follow the instructions to install the files.
7. If prompted, click OK to restart your computer with the new settings.

Next, configure the PCs to accept IP information assigned by the ADSL2+ Router:

8. In the Control Panel, double-click the Network and Dial-up Connections icon.
9. In Network and Dial-up Connections window, right-click the Local Area Connection icon, and then select **Properties**.
10. In the Local Area Connection Properties dialog box, select **Internet Protocol (TCP/IP)**, and then click Properties .
11. In the Internet Protocol (TCP/IP) Properties dialog box, click the radio button labeled **Obtain an IP address automatically**. Also click the radio button labeled **Obtain DNS server address automatically**.
12. Click OK twice to confirm and save your changes, and then close the Control Panel.

Windows ME PCs

1. In the Windows task bar, click the Start button, point to **Settings**, and then click **Control Panel**.
2. Double-click the Network and Dial-up Connections icon.
3. In the Network and Dial-up Connections window, right-click the Network icon, and then select **Properties**.

   The Network Properties dialog box displays with a list of currently installed network components. If the list includes Internet Protocol (TCP/IP), then the protocol has already been enabled. Skip to step 11.
4. If Internet Protocol (TCP/IP) does not display as an installed component, click Add... .
5. In the Select Network Component Type dialog box, select **Protocol**, and then click Add... .
6. Select **Microsoft** in the Manufacturers box.
7. Select **Internet Protocol (TCP/IP)** in the Network Protocols list, and then click OK .

   You may be prompted to install files from your Windows Me installation CD or other media. Follow the instructions to install the files.
8. If prompted, click OK to restart your computer with the new settings.

Next, configure the PCs to accept IP information assigned by the ADSL2+ Router:

9. In the Control Panel, double-click the Network and Dial-up Connections icon.
10. In Network and Dial-up Connections window, right-click the Network icon, and then select **Properties**.
11. In the Network Properties dialog box, select **TCP/IP**, and then click Properties .
12. In the TCP/IP Settings dialog box, click the radio button labeled **Server assigned IP address**. Also click the radio button labeled **Server assigned name server address**.
13. Click OK twice to confirm and save your changes, and then close the Control Panel.

Windows 95, 98 PCs

First, check for the IP protocol and, if necessary, install it:

1. In the Windows task bar, click the Start button, point to **Settings**, and then click **Control Panel**.
2. Double-click the Network icon.

   The Network dialog box displays with a list of currently installed network components. If the list includes TCP/IP, and then the protocol has already been enabled. Skip to step 9.
3. If TCP/IP does not display as an installed component, click Add....

   The Select Network Component Type dialog box displays.
4. Select **Protocol**, and then click Add....

   The Select Network Protocol dialog box displays.
5. Click on **Microsoft** in the Manufacturers list box, and then click **TCP/IP** in the Network Protocols list box.
6. Click OK to return to the Network dialog box, and then click OK again.

   You may be prompted to install files from your Windows 95/98 installation CD. Follow the instructions to install the files.
7. Click OK to restart the PC and complete the TCP/IP installation.

Next, configure the PCs to accept IP information assigned by the ADSL2+ Router:

8. Open the Control Panel window, and then click the Network icon.
9. Select the network component labeled TCP/IP, and then click Properties.

   If you have multiple TCP/IP listings, select the listing associated with your network card or adapter.
10. In the TCP/IP Properties dialog box, click the IP Address tab.
11. Click the radio button labeled **Obtain an IP address automatically**.
12. Click the DNS Configuration tab, and then click the radio button labeled **Obtain an IP address automatically**.
13. Click OK twice to confirm and save your changes.

    You will be prompted to restart Windows.
14. Click Yes.

Windows NT 4.0 workstations

First, check for the IP protocol and, if necessary, install it:

1. In the Windows NT task bar, click the Start button, point to **Settings**, and then click **Control Panel**.
2. In the Control Panel window, double click the Network icon.
3. In the Network dialog box, click the Protocols tab.

   The Protocols tab displays a list of currently installed network protocols. If the list includes TCP/IP, then the protocol has already been enabled. Skip to step 9.
4. If TCP/IP does not display as an installed component, click Add... .
5. In the Select Network Protocol dialog box, select **TCP/IP**, and then click OK .

   You may be prompted to install files from your Windows NT installation CD or other media. Follow the instructions to install the files.

   After all files are installed, a window displays to inform you that a TCP/IP service called DHCP can be set up to dynamically assign IP information.
6. Click Yes to continue, and then click OK if prompted to restart your computer.

Next, configure the PCs to accept IP information assigned by the ADSL2+ Router:

7. Open the Control Panel window, and then double-click the Network icon.
8. In the Network dialog box, click the Protocols tab.
9. In the Protocols tab, select **TCP/IP**, and then click Properties .
10. In the Microsoft TCP/IP Properties dialog box, click the radio button labeled **Obtain an IP address from a DHCP server**.
11. Click OK twice to confirm and save your changes, and then close the Control Panel.

Assigning static Internet information to your PCs

In some cases, you may want to assign Internet information to some or all of your PCs directly (often called “statically”), rather than allowing the ADSL2+ Router to assign it. This option may be desirable—but not required—if:

- You have obtained one or more public IP addresses that you want to always associate with specific computers (for example, if you are using a computer as a public web server).
- You maintain different subnets on your LAN (subnets are described in Appendix A).

Before you begin, be sure to have the following information on hand. Contact your ISP if necessary:

- The IP address and subnet mask to be assigned to each PC.
- The IP address of the default gateway for your LAN. In most cases, this is the address assigned to the LAN interface on the ADSL2+ Router. By default, the LAN interface is assigned this IP address: **192.168.1.1**. (You can change this number, or another number can be assigned by your ISP. See Chapter 4 for more information.)
- The IP address of your ISP’s Domain Name System (DNS) server.

On each PC, follow the instructions on pages 16 through 20 relating only to checking for and/or installing the IP protocol. Once it is installed, continue to follow the instructions for displaying Internet Protocol (TCP/IP) properties. Instead of enabling dynamic assignment of the IP addresses for the computer, DNS server, and default gateway, click the radio buttons that enable you to enter the information manually.

Note

Your PCs must have IP addresses that place them in the same subnet as the ADSL2+ Router’s LAN interface. If the IP addresses you manually assign to your LAN PCs are in a different subnet than the LAN interface, follow the instructions in Chapter 4 to change the LAN interface IP address as needed.

Connecting a computer to the USB port

If you use the ADSL2+ Router's USB port to connect to a PC, you must install the provided USB driver software on the PC. The driver enables Ethernet-over-USB communication with the ADSL2+ Router.

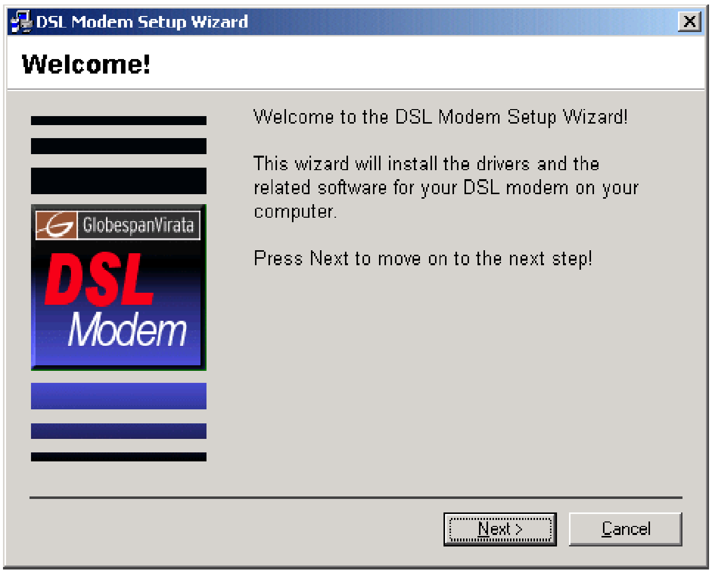
Configuring the USB computer is a two-part process:

- In USB Driver Installation Part 1, you install the USB driver on the PC.
- In USB Driver Installation Part 2, you configure the IP properties on the PC.

USB Driver Installation Part 1. Installing the USB Driver on the PC:

1. Ensure that the USB cable **is not connected** to the USB port on the PC. The installation program will prompt you when to connect the cable.
2. Copy the USB installation files to a temporary directory on the USB computer.
3. In the folder where you copied the files, double-click on *setup.exe* to start the DSL Modem Setup Wizard.

   The Welcome page for the DSL Modem Setup Wizard displays:



DSL Modem Setup Wizard

Welcome!

Welcome to the DSL Modem Setup Wizard!

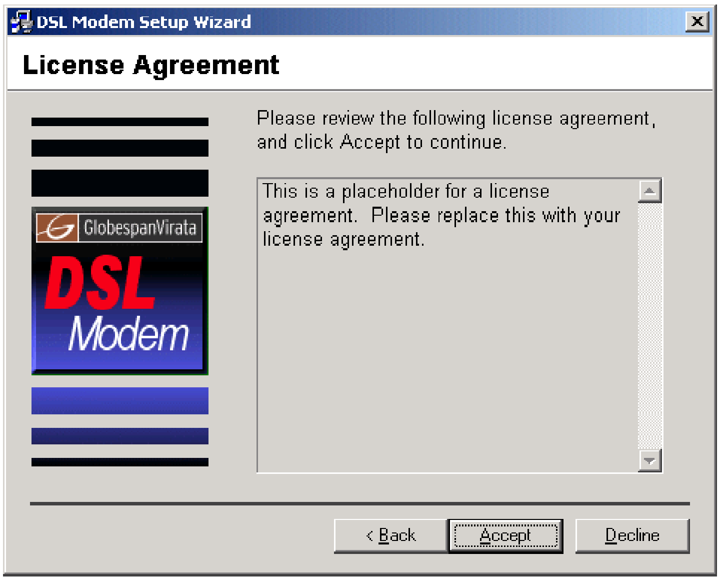
This wizard will install the drivers and the related software for your DSL modem on your computer.

Press Next to move on to the next step!

Figure 1. DSL Modem Setup Wizard—Welcome! Page

4. Click .

   The License Agreement page displays:



License Agreement

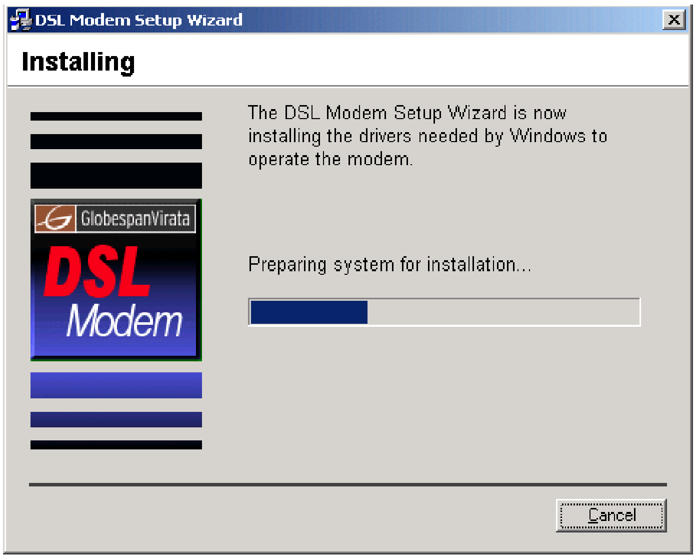
Please review the following license agreement, and click Accept to continue.

This is a placeholder for a license agreement. Please replace this with your license agreement.

Figure 2. DSL Modem Setup Wizard—License Agreement Page

5. Review the terms of the license, and if you agree to the terms, click Accept.

   The Installing window displays as the Wizard prepares your system for the installation:



Installing

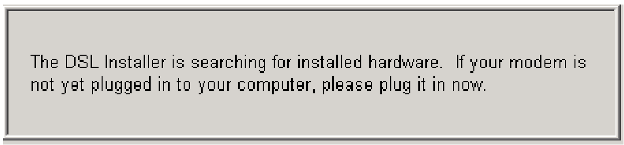
The DSL Modem Setup Wizard is now installing the drivers needed by Windows to operate the modem.

Preparing system for installation...

Figure 3. USB Setup Wizard: Installing Page

If a Microsoft digital signature dialog box displays, click Yes to continue.

The Installer begins copying the necessary installation files to the required locations. When complete, a window displays, prompting you to connect the USB cable to your computer.



The DSL Installer is searching for installed hardware. If your modem is not yet plugged in to your computer, please plug it in now.

Figure 4. USB Setup Wizard—Prompt for Hardware Plug In

6. Connect the USB cable to the ADSL-Ethernet router and to your computer.

   The provided USB cable provided has a flat connector on one end (called Type A) and a square connector on the other (Type B). Connect the flat connector to your PC and the square connector to the ADSL2+ Router. See Figure 5.

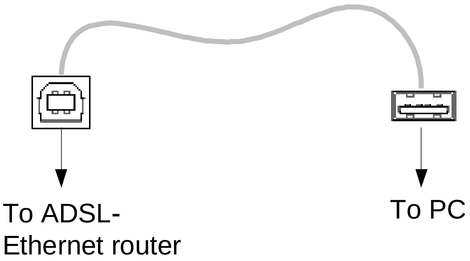
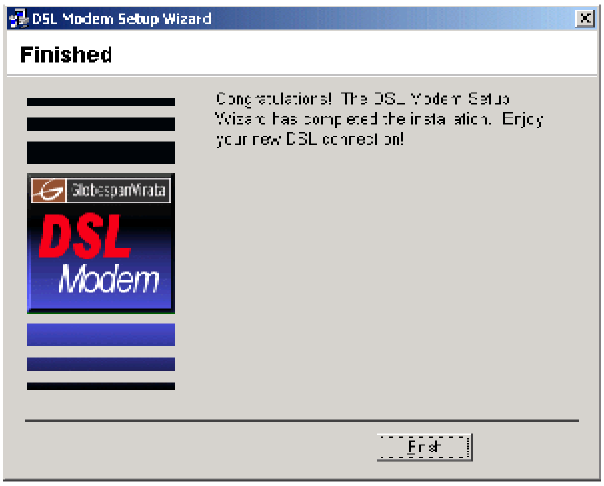


Figure 5. USB Cable Connectors

If a Microsoft digital signature dialog box again displays, click Yes to continue.

A window displays briefly, indicating that the system has found new hardware, and the Finished page displays to complete the installation:



DSL Modem Setup Wizard

Finished

Congratulations! The DSL Modem Setup Wizard has completed the installation. Enjoy your new DSL connection!

Figure 6. DSL Modem Setup Wizard—Finished Page

7. Click Finish.

You are now finished installing the driver. You do not need to restart your computer. Proceed to USB Driver Installation Part 2 to configure IP properties on the USB PC.

USB Driver Installation Part 2. Configuring IP properties on the USB PC. Now that the USB driver installation is complete, you must configure the USB PC so that its IP properties place it in the same subnet as the ADSL2+ Router's USB port. There are two ways to do this:

- The ADSL2+ Router is configured to assign an appropriate IP address to the USB PC. If you want to use this automatic assignment feature, called "DHCP server," you must configure the USB PC to accept dynamically assigned IP information. Follow the instruction on pages 16 through 20 that correspond to the operating system installed on your PC.
- If you want to assign a static IP address to the PC, follow the instructions on page 21 and use the following information:
  - In the Network and Dial-up Connections window, be sure to select the icon that corresponds to your new USB connection (not the one that corresponds to your Ethernet NIC). When you display properties for the icon, the following text should display in the Connect Using text box:

    USB IAD LAN Modem #n
  - The USB interface on the ADSL2+ Router is preconfigured with these properties:

USB interface IP address:	192.168.1.2
USB interface subnet mask:	255.255.255.0

    Therefore, your PC must be configured as follows:

IP address:	192.168.1.*n* where *n* is a number from *3* to *254*.
Subnet mask:	255.255.255.0
Default gateway:	192.168.1.2

Quick Start Part 3 — Configuring the ADSL2+ Router

In Quick Start Part 3, you log into the program on the ADSL2+ Router and configure basic settings for your Internet connection. Your ISP should provide you with the necessary information to complete this step.

Logging in to the ADSL2+ Router Quick Configuration Page

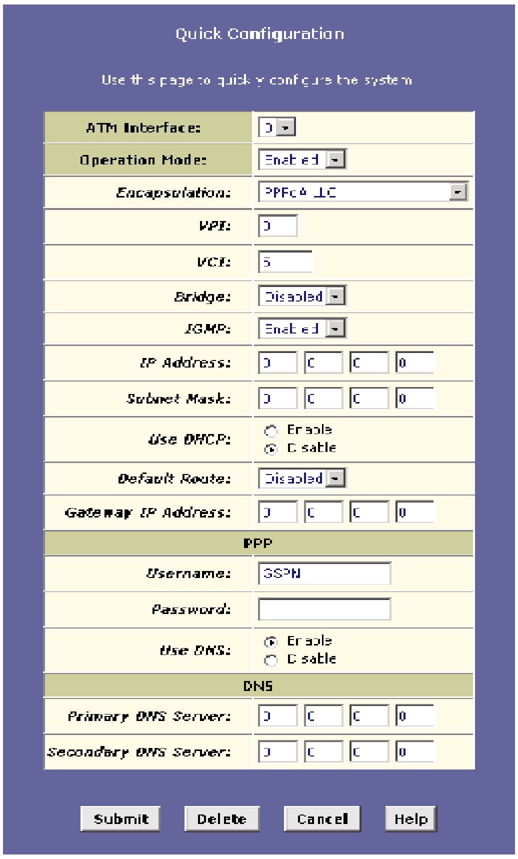
The ADSL2+ Router provides a preinstalled software program called Configuration Manager that enables you to configure the operation of the device via your Web browser. The settings that you are most likely to need to change before using the device display on the Quick Configuration page.

Follow these instructions configure the device settings:

1. At any PC connected to the ADSL2+ Router via Ethernet or USB, open your Web browser, and type the following URL in the address/location box:

   192.168.1.1

   When you press **Quick Configuration** button, the page shown in Figure 7 should display (see Appendix B, "Troubleshooting," if you receive an error message or the page does not display).



Quick Configuration

Use this page to quickly configure the system

ATM Interface:	0
Operation Mode:	Enabled
Encapsulation:	PPPoA LLC
VPI:	0
VCI:	5
Bridge:	Disabled
IGMP:	Enabled
IP Address:	0 . 0 . 0 . 0
Subnet Mask:	0 . 0 . 0 . 0
Use DHCP:	○ Enable ● Disable
Default Route:	Disabled
Gateway IP Address:	0 . 0 . 0 . 0
PPP	
Username:	GSPN
Password:	
Use DNS:	● Enable ○ Disable
DNS	
Primary DNS Server:	0 . 0 . 0 . 0
Secondary DNS Server:	0 . 0 . 0 . 0

Figure 7. Quick Configuration Page in Configuration Manager

The fields are described in the following table. Work with your ISP to determine which settings you need to change and refer to the indicated chapter for more information about each setting.

Field	Description
	General Settings
ATM Interface	Selects the ATM interface you want to use (0). Your system may be configured with more than one ATM interface if you are using different types of services with your ISP. (Chapter 5)
Operation Mode	Enables or disables the ADSL2+ Router. When set to "Disabled", the device cannot be used to provide Internet connectivity or routing services for your network.
Encapsulation	Determines the type of data link your ISP uses to communicate with your ADSL/Ethernet router. (Chapter 5)
VCI and VPI	Determine the unique data path your modem uses to communicate with your ISP. (Chapter 5)
Bridge	Enables or disables bridging between the ADSL2+ Router and your ISP. (Chapter 6)
IGMP	Used to enable the WAN interface to pass Internet Group Management Protocol messages it receives to the LAN PCs. You must also enable the LAN or USB interfaces for IGMP (Chapter 4).
IP Address and *Subnet Mask*	If your ISP has provided a public IP address to your LAN, enter the address and the associated subnet mask in the boxes provided. (Note: In bridge configurations, the public IP address may be entered on your PC rather than on the ADSL/Ethernet router; check with your ISP.) (Chapter 5)
Use DHCP	When enabled, your ISP will assign IP addresses to your WAN interface. When disabled, the WAN interface must (Chapter 5).
Default Route	When enabled, specifies that the WAN interface IP address specified above will be used as the default route for your LAN. Whenever one of your LAN computers attempts to access the Internet, the data will be sent via this interface. (Chapter 5)
Gateway IP Address	Specifies the IP address that identifies the ISP server through which your Internet connection will be routed. (Chapter 5)
	PPP Settings
PPP User Name and *Password*	The user name and password you use to log in to your ISP. (Note: this is not the same as the user name and password you used to log in to Configuration Manager.) (Chapter 5)
Use DNS	Specifies whether the DNS server addresses that your LAN will use should be supplied dynamically each time you connect to the ISP. If you click *Disable*, you must configure DNS addresses manually on each PC or on the fields below. (Chapter 5)
	DNS Settings
Primary/ Secondary DNS Server	Specifies the primary and secondary domain name system (DNS) server addresses provided by your ISP. (Chapter 9)

2. When finished customizing these settings, click Submit.

   The settings are now in effect; however, if you reboot or if the power is disconnected, your settings will be lost. In step 3, you save the changes to permanent memory:

3. Click the Admin tab, and then click **Commit & Reboot** in the task bar.

4. Click Commit.

   A page will display briefly to confirm your changes, and then you will be returned to the Commit & Reboot page.

You are now finished customizing basic settings. Read the following section to determine if you need to change additional settings.

Note

On the Quick Configuration page, you can click Delete *to remove all existing Quick Configuration settings and return to the default values.*

Default Router Settings

The ADSL2+ Router can provide a variety of services to your network. The device is preconfigured with default settings for use with a typical home or small office network.

Table 1 lists some of the most important default settings; these and other features are described fully in subsequent chapters. If you are familiar with network configuration, review the settings in Table 1 to verify that they meet the needs of your network. Refer to the Quick Configuration page instructions (on page 26) or to the document sections referenced in the table for further instructions. If you are unfamiliar with these settings, try using the device without modification, or contact your ISP for assistance.

Before you attempt to modify any settings, review Chapter 3 for general information about accessing and using the Configuration Manager program. We strongly recommend that you contact your ISP prior to changing the default configuration.

Table 1. Default Settings Summary

Option	Default Properties	Explanation/Instructions
LAN interfaces — connecting to your network		
Ethernet	Static IP address: 192.168.1.1 Subnet mask: 255.255.255.0 DHCP server pool of addresses: 192.168.1.3 through 192.168.1.34	The LAN interface connects the device to your Ethernet network. Typically, you will not need to change the IP address. See Chapter 4 for instructions. The DHCP service (see Chapter 8) is enabled for operation over this interface, with a pool of private IP addresses for dynamic assignment to your LAN computers. To use this service, you must set up your computers to accept IP information dynamically, as described in Quick Start Part 2.
USB	Static IP address: 192.168.1.2 Subnet mask: 255.255.255.0	The USB interface can connect to a single USB-enabled computer with an IP address in the same subnet. See Chapter 4 for instructions.
WAN interface — connecting to the Internet		

ATM VC	VPI = 0
	VCI = 35
		The VPI and VCI values make up a VC (virtual circuit) that determines the path your data must take to connect over the phone lines to the ISP. These values must be changed as directed by your ISP. See Chapter 5 for more information.

PPP interface	PPPoE interface Login: *guest* Password: *guest*	The PPP interface determines the method of communication with your ISP and logging in to their servers. A particular type of PPP interface – PPP over Ethernet (PPPoE) – is configured by default, with the ISP login information shown. See "Configuring PPP Interfaces" on page 53 for instructions on modifying this information as required by your ISP.
Services		
NAT (Network Address Translation)	NAPT rule enabled	Your computers' private IP addresses (see DHCP above) will be translated to your public IP address whenever they access the Internet. See Chapter 4 for a description of the NAT service.

Testing Your Setup

The Quick Start process should enable any computer on your LAN to use the ADSL2+ Router to access the Internet.

To test the connection, turn on the device, wait about 30 seconds, and then verify that its LEDs are illuminated as shown in Table 2.

Table 2. LED Indicators

LED	Behavior
PWR	Displays solid green to indicate that the device is turned on.
LAN	Displays solid green when the Ethernet connection is up. Flashes while data is being sent to and received from your LAN PCs.
DSL	Displays solid yellow when the DSL line is up. Flashes during DSL handshake.

If the LEDs illuminate as expected, test your Internet connection from a LAN computer (and from the USB computer, if applicable): Open your web browser and type the URL of any external website (such as http://www.yahoo.com). The LED labeled Internet should be blinking rapidly and may appear solid as the device connects to the site.

If the LEDs do not illuminate as expected or the web page does not display, see Appendix A for troubleshooting suggestions. Or, contact your ISP for assistance.

3 Getting Started with the Configuration Manager

The ADSL2+ Router includes a preinstalled program called the *Configuration Manager*, which provides an interface to the software installed on the device. It enables you to configure the device settings to meet the needs of your network. You access it through your web browser from any PC connected to the ADSL2+ Router via the LAN or USB ports.

This chapter provides basic information on using the Configuration Manager.

Accessing the Configuration Manager

The Configuration Manager program is preinstalled into memory on the ADSL2+ Router. To access the program, you need the following:

- A PC or laptop connected to the LAN port on the device as described in the Quick Start chapter.
- A web browser installed on the PC. The program is designed to work best with Microsoft Internet Explorer® version 5.0, Netscape Navigator® version 6.1, or later versions.

You can access the program from any computer connected to the ADSL2+ Router via the LAN or USB ports.

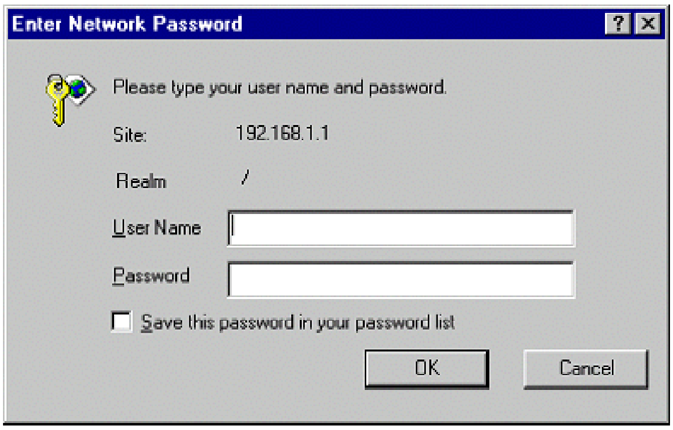
1. From a computer connected via Ethernet or USB, open your web browser, type the following URL in the web address (or location) box, and press **<Enter>**:

   `http://192.168.1.1`

   This is the predefined IP address of the Ethernet interface (however, since the USB interface is in the same subnet as the LAN interface you can use this IP address from a USB computer also).

   .

   A login screen displays:



Enter Network Password

Please type your user name and password.

Site: 192.168.1.1

Realm /

User Name

Password

□ Save this password in your password list

OK Cancel

Figure 8. Login Screen

2. Enter your user name and password, and then click OK.

The first time you log into the program, use these defaults:

Default User Name:	root
Default Password:	root

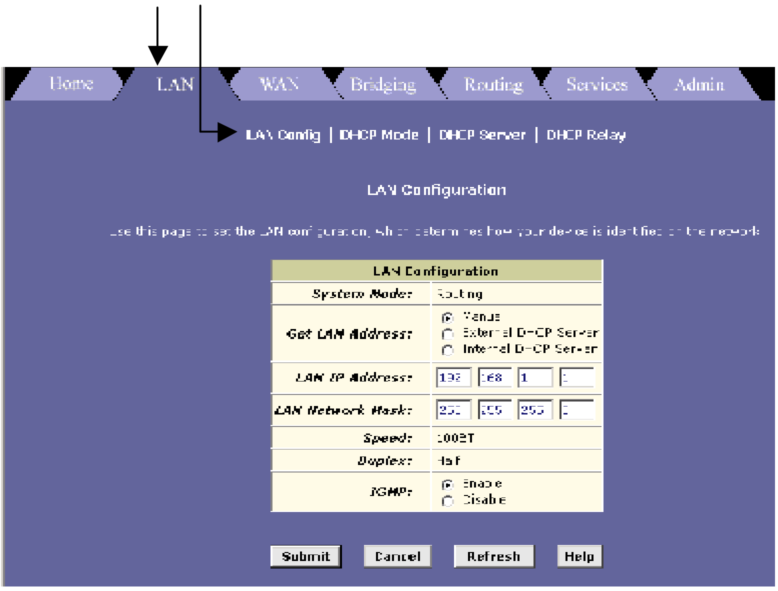
Note

> *You can change the password at any time (see Chapter 15 for instructions).*

The System View page on the Home tab displays each time you log into the program (shown in Figure 10 on page 33).

Functional Layout

Configuration Manager tasks are grouped into categories, which you can access by clicking the tabs at the top of each page. Each tab displays the available tasks in a horizontal menu at the top of the page. You can click on these menu items to display the specific configuration options.



Selected Tab

Task bar for this tab

LAN Configuration

Use this page to set the LAN configuration, which determines how your device is identified on the network

LAN Configuration	
System Mode:	Routing
Get LAN Address:	● Manual ○ External DHCP Server ○ Internal DHCP Server
LAN IP Address:	192 168 1 1
LAN Network Mask:	255 255 255 0
Speed:	100BT
Duplex:	Half
IGMP:	● Enable ○ Disable

Figure 9. Web Interface Functional Layout

A new page displays when you click each task in the task bar. The left-most task displays by default when you click on a new tab. The same task may appear in more than one tab, when appropriate. For example, the LAN Config task displays in both the LAN tab and the Routing tab.

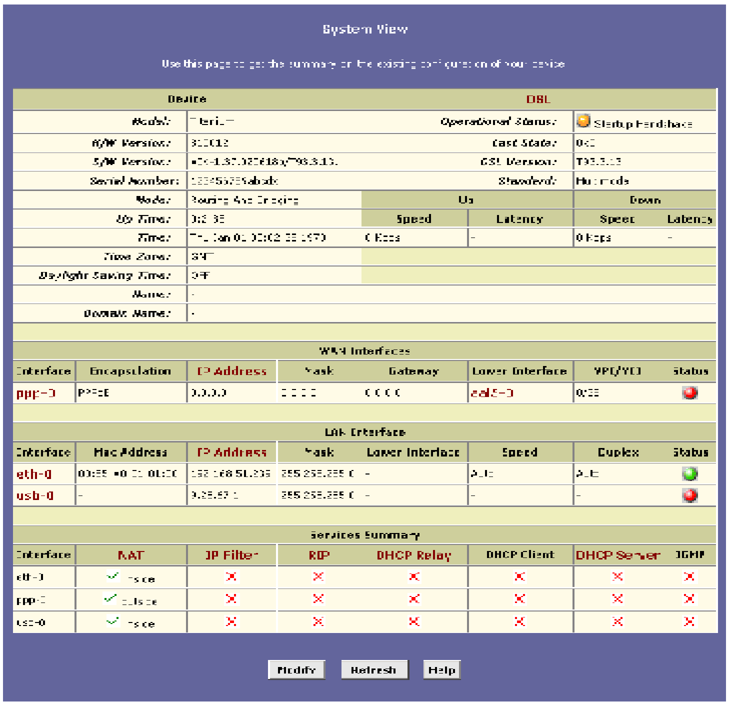
Commonly used buttons

The following buttons are used throughout the application.

Button	***Function***
Submit	Stores in *temporary* system memory any changes you have made on the current page. See "Committing Changes" on page 39 for instructions on storing changes permanently.
Refresh	Redisplays the current page with updated statistics or settings.
Clear	On pages that display accumulated statistics, this button resets the statistics to their initial values.
Help	Launches the online help for the current topic in a separate browser window. Help is available from any main topic page.

The Home Page and System View Table

The Home page displays when you first access the program or, if another tab is already displaying, when you click on the Home tab.



System View

Use this page to get the summary of the existing configuration of your device

Device		DSL			
Model:	[illegible]	Operational Status:			Startup Handshake
H/W Version:	[illegible]	Last State:			[illegible]
S/W Version:	[illegible]	DSL Version:			[illegible]
Serial Number:	[illegible]	Standard:			Multimode
Mode:	Routing And Bridging	Up		Down	
Up Time:	[illegible]	Speed	Latency	Speed	Latency
Time:	Thu Jan 01 [illegible] 1970	0 Kbps	-	0 Kbps	-
Time Zone:	GMT				
Daylight Saving Time:	OFF				
Name:	-				
Domain Name:	-				

WAN Interfaces

Interface	Encapsulation	IP Address	Mask	Gateway	Lower Interface	VPI/VCI	Status
ppp-0	PPPoE	0.0.0.0	0.0.0.0	0.0.0.0	aal5-0	0/35	●

LAN Interface

Interface	Mac Address	IP Address	Mask	Lower Interface	Speed	Duplex	Status
eth-0	[illegible]	[illegible]	255.255.255.0	-	Auto	Auto	●
usb-0	-	[illegible]	255.255.255.0	-	-	-	●

Services Summary

Interface	NAT	IP Filter	RIP	DHCP Relay	DHCP Client	DHCP Server	IGMP
eth-0	✓ Inside	✗	✗	✗	✗	✗	✗
ppp-0	✓ Outside	✗	✗	✗	✗	✗	✗
usb-0	✓ Inside	✗	✗	✗	✗	✗	✗

Figure 10. System View Table

The Home page contains the System View table, which provides a snapshot of your system configuration. Note that some settings link to the related pages in Configuration Manager where you can change the data or view details. The following table describes each section of the System View table.

Table Heading	Description
Device	Displays basic information about the ADSL2+ Router hardware and software versions, the system uptime (since the last reboot), and the preconfigured operating mode.
DSL	Displays the operational status, version, and performance statistics for the DSL line. You can click on DSL in the table heading or display the WAN tab to view additional DSL settings, which are described in Chapter 16.

Table Heading	Description
WAN Interfaces	Displays the software name(s) and various settings for the device interface(s) that communicate with your ISP via DSL. Although you only have one physical DSL port, multiple software-defined interfaces can be configured to use it. Most users need only one. See Chapter 5 for more information about configuring the WAN interfaces. For each interface, a "Lower Interface" name, such as *aal5-0*, should display. You can click on the lower interface name to view or change the ATM VC settings that this interface uses.
LAN Interface	Displays the software names and various settings for the device interfaces that communicate directly with your network. These typically include an Ethernet interface named *eth-0*, and may include a USB interface named *usb-0*. For information on modifying properties of these interfaces, see Chapter 4.
Services Summary	Displays the status of various services that the ADSL2+ Router performs to help you manage your network. A green check mark indicates the service is active and a red X indicates that it is inactive: o NAT: Translates private IP addresses to your public IP address. The type of NAT interface is indicated (inside/outside). (See Chapter 12.) o IP Filter: Allows setting up filtering rules that accept or deny incoming or outgoing data. (See Chapter 14.) o RIP: Enables router-to-router communication. (See Chapter 5.) o DHCP Relay: Enables dynamic assignment of IP information from your ISP to your computers. (See Chapter 8.) o DHCP Client: Enables dynamic assignment of IP information from your ISP or another computer on your network to the device’s LAN interface. (See Chapter 4.) o DHCP Server: Enables dynamic assignment of IP information from the device’s built-in DHCP server to your LAN computers. (See Chapter 8.) o IGMP: Enables message forwarding from external sources such as your ISP, based on the Internet Group Management Protocol.

Modifying Basic System Information

You can modify the system date and time or configure the device to acquire this information from an ISP server. You can also assign a name to the ADSL2+ Router and to the network domain in which it resides.

Modifying the Date and Time or Configuring SNTP

You can set the system date and time manually or enable the SNTP feature so that the device acquires this information from an ISP server.

- When you set the date and time manually, the information will be held only as long as the device stays on; if power is turned off or you reboot, the date and time revert to default values and must again be updated.
- When you enable SNTP (Simple Network Time Protocol), the device connects to an ISP server that provides the date and time information. You cannot use Configuration Manager to specify the IP address of this server; it must have been included as a preconfigured software setting. Verify with the ISP that they have provided an SNTP server address in the configuration before enabling this service.

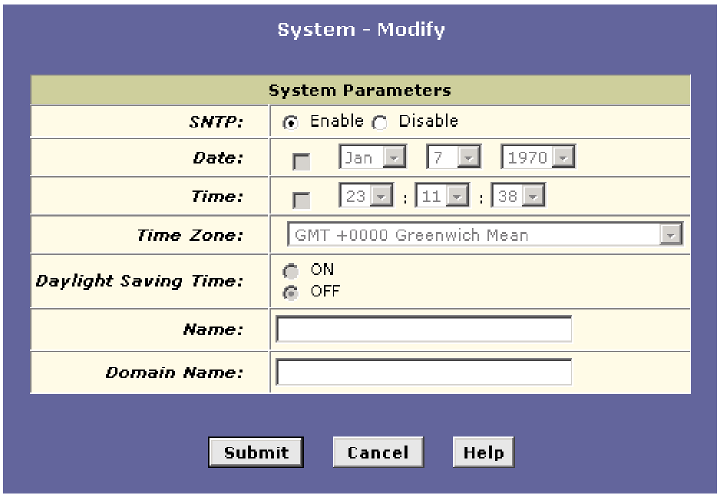
Note

Setting the ADSL2+ Router date and time, whether manually or through SNTP, does not affect the date and time on your PCs.

Follow these instructions to change the system date and time or enable SNTP:

1. At the bottom of the Home page, click **Modify**.

   The System - Modify page displays in a separate browser window:



System - Modify

System Parameters	
SNTP:	● Enable ○ Disable
Date:	□ Jan 7 1970
Time:	□ 23 : 11 : 38
Time Zone:	GMT +0000 Greenwich Mean
Daylight Saving Time:	○ ON ● OFF
Name:	
Domain Name:	

Figure 11. System - Modify Page

2. Modify the fields on this page as required. The following table describes each field:

Option	Description
SNTP	To enable SNTP, click the Enable radio button. The remaining date and time fields will be dimmed (unavailable for entry).
Date and Time	To set the date and time manually, ensure that the SNTP field is set to *Disable*. Click the date and time check boxes to select the appropriate values from the drop-down lists. The time displays in military format.
Time Zone, Daylight Savings Time	If you are setting the date and time manually, you can select your time zone from the drop-down list, and then click the appropriate radio button to indicate whether Daylight Savings Time is currently in effect. After you initially set the time, turning DST on or off will adjust the current displayed time by one hour in the appropriate direction. You must remember to change the DST option each spring and fall — it will not change automatically.

3. When you are finished modifying the settings, click Submit, and then click Close to return to the System View page.
4. To save your changes to permanent memory, click the Admin tab, and then click **Commit & Reboot** in the task bar.
5. Click Commit to save your changes to permanent memory.

Specifying theADSL2+ Router's Name and Network Domain Name

You can specify an easy-to-remember name for the ADSL2+ Router and a domain name for the network on which it resides. These are used only to simplify access to the Configuration Manager program.

The Name and Domain Name fields display on the System-Modify page, as shown in Figure 11 on page 36.

You can set a name only, or a name and domain name together.

- If you specify a name only, then the next time you want to access Configuration Manager, you can type this name in the location box in your Web browser instead of typing the numeric IP address. For example, if you named the device *myrouter* (and left the Domain Name field blank), then you could type the following in your Web browser to access Configuration Manager:

  http://myrouter

- If you also specify a domain name for the ADSL-Ethernet router, the next time you access Configuration Manager, type the domain name and the device name in your Web browser. For example, if you entered *myrouter* in the Name field and *mydomain.com* in the Domain Name field, then you would type the following in your Web browser to access Configuration Manager:

  http://myrouter.mydomain.com

After you enter information in these fields, follow steps 3 through 5 on page 37 to save your changes.

Note

Using a name/domain instead of the IP address to access Configuration Manager will work only when the DNS relay feature is enabled. DNS Relay is automatically enabled when the DNS server address configured on your PCs is also the address assigned to the LAN interface on theADSL2+ Router. See Chapter 9 for more information.

Committing Changes and Rebooting

Committing Changes

Whenever you use Configuration Manager to change system settings, the changes are initially placed in temporary storage called random access memory or RAM. Your changes are made effective when you submit them, but will be lost if the device is reset or turned off.

You can commit changes to save them permanently to flash memory.

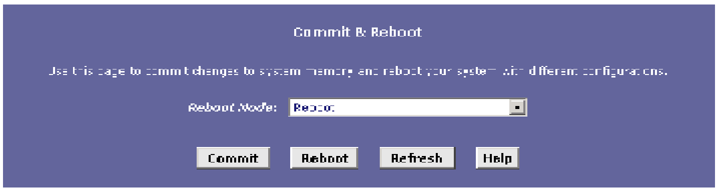
Definition

***Submitting** changes activates them immediately, but saves them only until the device is reset or powered down. **Committing** changes saves them permanently.*

Follow these steps to commit changes.

1. Click the Admin tab, and then click **Commit & Reboot** in the task bar.

   The Commit & Reboot page displays:



Commit & Reboot

Use this page to commit changes to system memory and reboot your system with different configurations.

Reboot Mode: Reboot

Figure 12. Commit & Reboot Page

2. Click Commit. (Disregard the selection in the Reboot Mode drop-down list; it does not affect the commit process.)

   The changes are saved to permanent storage.

   The previous settings are copied to backup storage so that they can be recalled if your new settings do not work properly (see the rebooting instructions on page 40).

Rebooting the device using Configuration Manager

To reboot the device, display the Commit & Reboot page, select the appropriate reboot mode from the drop-down menu, and then click

.

You can select from the following reboot options:

Option	Description
Reboot	Reboots using the settings currently in memory, including any changes you made and committed during the current session.
Reboot from Default Configuration	Reboots the device to default settings provided by your ISP or the manufacturer. Choosing this option erases any custom settings.
Reboot from Backup Configuration	Reboots the device using the settings that were in effect *prior to* the most recently committed settings.
Reboot from Last Configuration	Same as *Reboot*.
Reboot from Clean Configuration	Reboots the device with no configuration. This option will disable access to the Configuration Manager, as no LAN interface will be defined. This option is intended only for technicians who have a serial port connection to the device and knowledge of its command line interface.
Reboot from Minimum Configuration	Reboots the device with only these settings: o An Ethernet interface is configured with IP address 192.168.1.1 (mask 255.255.255.0). o The user login is set to the following: User Name: root Password: root

Rebooting may take 20-30 seconds. If your browser appears to be waiting to reconnect, press <F5> on your keyboard to refresh the connection. Or, retype the URL (192.168.1.1 by default) in your browser's address box and press <Enter>. The page should redisplay.

If you have difficulty in reconnecting to Configuration Manager after rebooting, or if the device is not providing Internet connectivity as before, reboot using the *Reboot from Backup Configuration* setting to return to the previous settings.

WARNING

If the ADSL2+ Router provides a Reconfigure button on the back panel (in addition to the power on/off button), do not use it to activate new changes. This button resets the device settings to the manufacturer's default values. Any custom settings will be lost.

Part 2

Interfaces and Operating Modes

About Part 2

Part 2 explains how to configure theADSL2+ Router’s interfaces to communicate with your LAN PC(s) and your ISP. Part 2 also describes the device’s operating modes and explains how to configure the interfaces to enable each mode.

Definitions

Interfaces *refers to those points in the various communication paths where the ADSL2+ Router exchanges data with external devices. This document distinguishes between the terms* port *and* interface*: a* ***port*** *is a hardware-based point of entry to or exit from a device. Often, several software-based interfaces can be defined to operate over the same port.*

Operating modes *determine which protocols the device can use to communicate with LAN computers and the ISP, and which product features are made available to the user.*

Part 2 contains the following chapters:

- **Chapter 4, “Configuring the LAN and USB Interfaces,”** explains how to configure the Ethernet and USB interfaces, which connect though distinct ports to your LAN hub/switch and optional USB-enabled PC. Because the Ethernet interface can be used to connect to multiple computers, it is referred to as the *LAN interface*.
- **Chapter 5, “Configuring WAN Interfaces,”** explains how to configure the ATM Virtual Circuit (VC) interface and higher-level interfaces that the device uses to communicate via the DSL port.
- **Chapter 6, “Configuring the System Operating Mode,”** describes the device’s operating modes and explains how the LAN and WAN interfaces must be configured to enable each mode.

4 Configuring the LAN and USB Interfaces

This chapter describes how to configure the interfaces on the ADSL2+ Router that communicate with your LAN and USB computers.

Connecting Your PCs via Ethernet and/or USB

If you are using the ADSL/Ethernet router with multiple PCs on your LAN, you must connect the LAN via an Ethernet hub or switch to the device's LAN port, also called the Ethernet port.

If you are using a single PC with the ADSL/Ethernet router, you have two connection options:

- You can connect the PC directly to the LAN port using a crossover Ethernet cable. See Appendix B, “Troubleshooting,” for a description of crossover versus straight-through Ethernet cables.
- If the PC is USB-enabled, you can connect it directly to the device's USB port. Only one computer can be connected in this manner.

You can also use the USB and Ethernet ports simultaneously, connecting your LAN via the Ethernet port and a standalone PC to the USB port.

Note

LAN and USB interfaces are preconfigured and cannot be created using Configuration Manager. However, you can modify the properties of an existing interface. If you require a LAN or USB interface that was not preconfigured, contact your ISP for assistance.

Configuring the LAN (Ethernet) Interface

In order to use the device as a router on your LAN, Internet Protocol (IP) properties must be assigned to the LAN interface. These properties must identify the interface as residing in the same subnet as the PCs on your LAN. (See Appendix A for an explanation of subnets.)

Default IP properties are assigned to the LAN interface to enable you to connect to it when you configure your PCs as described in the Quick Start.

Note

If the IP addresses that you want to assign to your PCs are not in the same subnet as the default LAN interface, you can use Configuration Manager to change the LAN interface IP properties accordingly. However, because you must access Configuration Manager from a PC in the same subnet as the LAN interface, initially configure one PC as indicated in the Quick Start. Then, access Configuration Manager and change the LAN IP address as required. When done, change the IP properties on the PC to so that it is also in the appropriate subnet.

If your network uses a DHCP server (other than the ADSL/Ethernet router) to assign IP addresses, you can also configure the device to accept and use a LAN IP address assigned by that server. Similarly, if your ISP performs DHCP serving for your network, you can configure the device to accept an IP address assigned from the ISP's server. In this mode, the ADSL/Ethernet router is considered a *DHCP client* of your (or your ISP's) DHCP server.

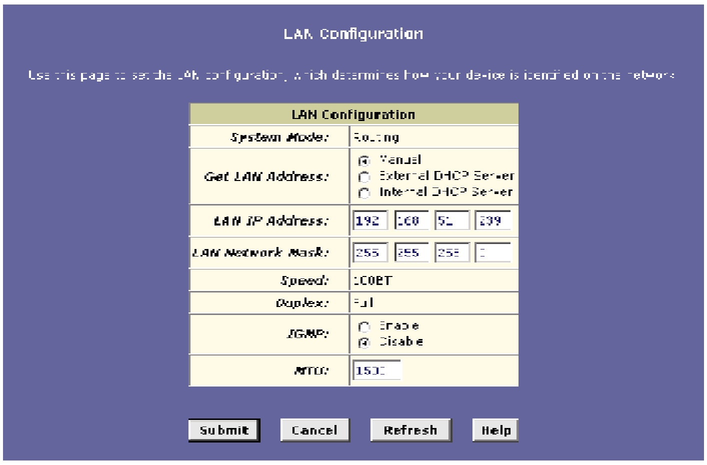
Note

*The ADSL2+ Router itself can function as a DHCP server for your LAN computers, as described in Chapter 8, **but not for its own LAN interface**.*

Follow these steps to change the default LAN IP properties or to configure the LAN interface as a DHCP client:

1. Log into Configuration Manager and click the LAN tab.

   The LAN Configuration page displays:



LAN Configuration

Use this page to set the LAN configuration, which determines how your device is identified on the network

LAN Configuration	
System Mode:	Routing
Get LAN Address:	● Manual ○ External DHCP Server ○ Internal DHCP Server
LAN IP Address:	192 . 168 . 51 . 239
LAN Network Mask:	255 . 255 . 255 . 0
Speed:	100BT
Duplex:	Full
IGMP:	○ Enable ● Disable
MTU:	1500

Figure 13. LAN Configuration Page

Note

Depending on the preconfigured settings, the LAN Configuration or USB Configuration table may not display. You cannot create these interfaces using Configuration Manager. Contact your ISP for assistance.

The LAN Configuration table displays the following settings:

Setting	Description
System Mode	Identifies the system operating mode for your device, such as Routing mode, Bridging mode, or both modes simultaneously. See Chapter 6 for information on the system operating modes.
Get LAN Address	Provides options for how the device's LAN interface is assigned an IP address: o *Manual* indicates that you will be assigning a static IP address, which you can enter in the fields below. o *External DHCP Server* indicates that your ISP will be assigning an IP address from their own DHCP server, dynamically each time you log on. o *Internal DHCP Server* indicates that you have a DHCP server device on your network that will assign an address to the port. If you choose either the internal or external server option, the LAN interface is called a DHCP client of the server. Note that the public IP address assigned to you by your ISP **is not** your LAN IP address. The public IP address identifies the WAN (ADSL) port on your ADSL/Ethernet router to the Internet. (Or, in bridge configurations, it may be assigned to your PC.)
LAN IP Address and Network Mask	The IP address and network mask for the port. See Appendix A for and overview of IP addresses and masks.

Speed/Duplex	*Speed* indicates the speed of the Ethernet communication between the ADSL/Ethernet router and the LAN PCs or hub. *Duplex* indicates the type of Ethernet communication (i.e., full duplex, or half-duplex). These settings are not user-configurable.
IGMP	Indicates whether this interface is enabled with the Internet Group Management Protocol. When enabled, the Ethernet interface collects and consolidates requests from the LAN PCs to receive IGMP messages from external computers. The interface also forwards IGMP messages it receives on its WAN interface to the appropriate hosts. The WAN interface must also be enabled for the IGMP protocol (see the Quick Configuration page and the corresponding instructions on page 26).
MTU	The Maximum Transmission Unit specifies the size in bytes of the largest Ethernet packet that the interface will accept. Packets larger than this size will be dropped.

2. Enter an IP address and mask in the fields provided or enable an external or internal DHCP server in the Get LAN Address field. Keep these points in mind:

   - **Manually specifying an address:** If you are using routing services on you LAN such as DHCP and NAT, you must assign a fixed LAN IP address and mask to the interface. The IP address must be in the same subnet as your LAN computers that connect to it. See Appendix A for an explanation of IP addresses and network masks.

     If you change the LAN IP address, you may need to update the DHCP configuration so that the addresses that the DHCP server dynamically assigns to your computers are on the same subnet as the new LAN IP address. See Chapter 8 for instructions on changing the pool of dynamically assigned addresses.

   - **Enabling DHCP:** If you choose to have the LAN interface be a DHCP client of an internal or external server, the LAN Network Mask field will be dimmed and made unavailable for entry. The LAN IP Address field will remain editable, however. The address that you specify here will be used as a request to the DHCP server. This is referred to as a *Configured IP Address* in Configuration Manager. The configured IP address is requested during communication with the DHCP server. If the configured IP address is not available, then system will accept another address from the server. Even if another number is assigned, the same configured IP address will continue to display in this field.

3. If you are using IGMP on your network, click the IGMP Enable radio button (see the explanation of IGMP on page 46).

4. Click Submit.

- If you changed the LAN IP address while working from a PC that is connected to the device via Ethernet, then your connection will be terminated.
- If you changed the LAN IP address while working from a PC connected to the device via USB, a page will display to confirm your change and your connection will remain active.
- If you enabled the DHCP service, the ADSL/Ethernet router will initiate a request for an IP address from your LAN's DHCP server. If a different IP address is assigned than was previously configured, your current connection will be terminated.

5. Reconfigure your PCs, if necessary, so that their IP addresses place them in the same subnet as the new IP address of the LAN interface. See “Quick Start Part 2 — Configuring Your Computers,” for instructions.
6. Log into Configuration Manager by typing the new IP address in your Web browser’s address/location box.
7. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Configuring the USB Interface IP Address

1. If the LAN Configuration page is not already displaying, click the LAN tab.

   If the USB Configuration table does not display below the LAN Configuration table, then your system does not support a USB connection. Contact your ISP for assistance.

2. In the USB Configuration table, enter the IP Address and Network Mask for the USB interface.

   The IP address must place the USB interface in the same subnet as the USB computer. The USB interface and USB computer can also be in the same subnet as the LAN interface and the computers attached to it.

   For example, if the LAN and USB interfaces are assigned addresses 192.168.1.1 and 192.168.1.2, respectively, then the PCs attached to either port can be assigned addresses in the range 192.168.1.3 through 192.168.1.254.

3. If you are using IGMP on your network, click the IGMP Enable radio button. (See the explanation of IGMP on page 46.)
4. In the MTU field, enter the Maximum Transmission Unit size in bytes. This specifies the largest Ethernet packet that the interface will accept. Packets larger than this size will be dropped.
5. Click .

- If you changed the USB interface IP address while working from the USB-attached computer, then the connection will be terminated.
- If you were using the Ethernet interface, a page will display to confirm your change and your connection will remain active.

6. If necessary, reconfigure your USB PC so that its IP address places it in the same subnet as the new IP address of the USB interface. See "Quick Start Part 2 — Configuring Your Computers," for instructions.
7. Log into Configuration Manager by typing the new USB interface IP address in your Web browser's address/location box.
8. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

5 Configuring WAN Interfaces

TheADSL2+ Router's WAN-side interfaces are used to communication via the DSL port.

A WAN interface comprises two layers—a lower-level ATM VC interface and a higher-level protocol interface:

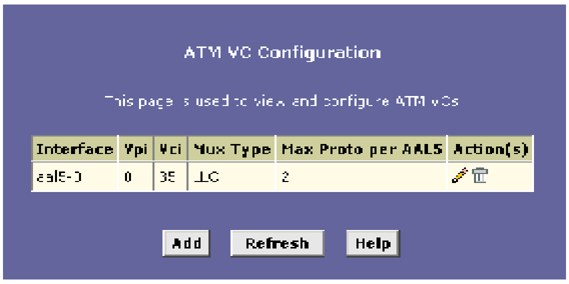
- The ATM VC interface enables the device to communicate using the *Asynchronous Transfer Mode* protocol. The ATM protocol provides a common format for transmitting data over a variety of hardware systems that make up the backbone of the Internet. The *virtual circuit* (VC) properties of the ATM VC interface identify a unique path that your ADSL/Ethernet router uses to communicate via the ATM-based network with the telephone company central office equipment.
- The higher-level protocol interface(s) operate "on top" of the ATM VC interface. The higher-level interface handles the protocols needed to log onto and exchange data with the ISP's access server. ISPs can use several different protocols, including the Point-to-Point Protocol (PPP), Ethernet-over-ATM (EoA) protocol, or the Internet Protocol-over-ATM (IPoA). Be sure to create the specific type of WAN interface your ISP requires.

The following section describes configuring the AMT interface properties. After you have defined these properties, you can configure one of the higher level WAN interfaces to enable communication with your ISP, as described in the subsequent sections.

Configuring the ATM VC

The device is preconfigured with an ATM VC interface called *aal5-0*. You may need to change the default VC values associated with the interface to values assigned by your ISP.

To view the current values, log into Configuration Manager, click the WAN tab, and then click **ATM VC** in the task bar. The ATM VC Configuration page displays:



ATM VC Configuration

This page is used to view and configure ATM VCs

Interface	Vpi	Vci	Mux Type	Max Proto per AAL5	Action(s)
aal5-0	0	35	LLC	2	✎ 🗑

Figure 14. ATM VC Configuration Page

Note

The Quick Start instructions in Chapter 2 also include ATM interface configuration via Configuration Manager's Quick Configuration page. You can use either page to configure the required values.

The ATM VC Configuration table displays the following fields.

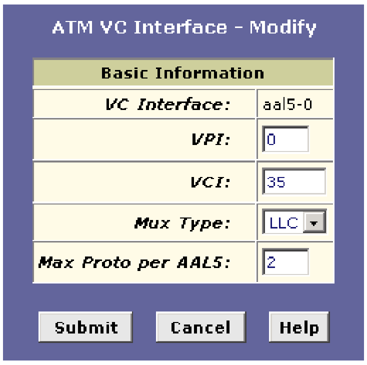
Field	Description
Interface	The name of the ATM interface to which these VC properties apply. The ATM interface names identify the type of traffic that can be supported, such as data or voice. Internet data services typically use an AAL5-type interface.
Vpi, Vci, and Mux Type	These settings identify a unique ATM data path for communication between your ADSL/Ethernet router and your ISP.
Max Proto per AAL5	If you are using an AAL5-type of interface, this setting indicates the number of higher-level interfaces that the VC can support (the higher-level interfaces can be PPP, EoA, or IPoA interfaces). Contact your ISP to determine which type they require.
Actions	Displays icons you can click on to modify (✎) and delete (🗑) the associated interface. You cannot delete an ATM interface if another protocol such as PPP, EoA, or IPoA has been defined to operate over the ATM interface. You must first delete the higher-level interface.

Modifying ATM VCs

Your device may contain placeholder values that you must change to establish an ATM connection. Contact your ISP to determine your ATM VC values. Follow these instructions to modify a preconfigured VC:

1. From the ATM VC Configuration page, click ✎ in the Actions column for the interface you want to modify.

   The ATM VC Interface – Modify page displays:

   ATM VC Interface - Modify

Basic Information	
VC Interface:	aal5-0
VPI:	0
VCI:	35
Mux Type:	LLC
Max Proto per AAL5:	2

   Figure 15. ATM VC Interface – Modify Page

2. Enter the new VPI and VCI values, select the MUX type, or change the maximum number of protocols that the VC can carry, as directed by your ISP.

3. Click Submit.

4. On the confirmation page, click Close to return to the ATM VC Configuration page.

5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

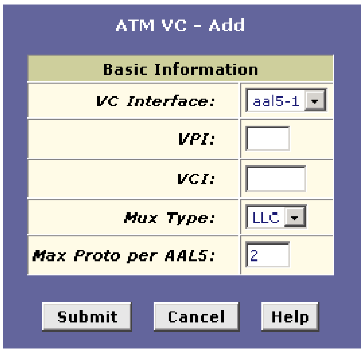
If you already have defined a higher-level PPP, EoA, or IPoA interface that uses this VC, then you can verify that the new settings work by attempting to access the Internet from a LAN/USB computer. Contact your ISP for troubleshooting assistance.

Adding ATM VCs

You can create an ATM VC interface if none has been predefined on your system or if you use multiple services with your ISP. Each service may require its own VC. Follow these instructions to add a VC:

1. From the ATM VC Configuration page, click Add.

   The ATM VC – Add page displays:



ATM VC - Add

Basic Information

VC Interface:	aal5-1
VPI:	
VCI:	
Mux Type:	LLC
Max Proto per AAL5:	2

Figure 16. ATM VC – Add Page

2. Select an interface name from the VC Interface drop-down list.

   The list begins with the next available ATM VC interface name, in sequential order.

3. Enter the VPI and VCI values assigned by your ISP, and select the mux type from the drop-down list.

4. In the Max Proto per AAL5 text box, enter the number of higher-level protocols (PPP, EoA, and IPoA) that the ISP indicated that you will need to configure to operate over this VC.

   For many users, only one is required.

5. Click Submit.

6. When the confirmation page displays, click Close to return to the ATM VC Configuration page.

   The new interface should now display in the ATM VC Configuration table.

7. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

You may need to create a new WAN interface, or modify an existing interface, so that it uses the new VC. See the instructions for configuring a PPP (page 53), EoA (page 59), or IPoA (page 63) interface, depending on the type you use to communicate with your ISP.

Configuring PPP Interfaces

The Point-to-Point Protocol (PPP) is one of several protocols used to enable communication between ISPs and their customers. PPP handles tasks such as the following:

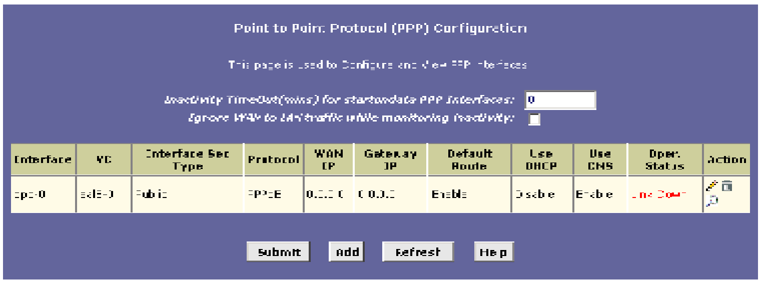
- Identify the type of service the ISP should provide to a given customer
- Identify the customer to the ISP through a username and password login
- Enable the ISP to assign an Internet address and other IP information to the customer's DSL modem

PPP can be used only when your connection with your ISP is a routed connection (i.e., it cannot be used for bridged connections). For more information on bridged and routed connections, see Chapter 6, "Configuring the System Operating Mode."

A PPP interface can be either of two types: PPP over ATM (PPPoA) and PPP over Ethernet (PPPoE). Although to the end user they function similarly, the ISP's network may be configured to handle only one protocol type. Furthermore, an ISP may not use the PPP protocol at all, instead offering EoA-type connections (described on page 59). Contact your ISP before changing the preconfigured WAN interface type.

Viewing Your Current PPP Configuration

To view your current PPP setup, log into Configuration Manager, click the WAN tab, and then click **PPP** in the task bar. The Point to Point Protocol (PPP) Configuration page displays:



Point to Point Protocol (PPP) Configuration

This page is used to Configure and View PPP Interfaces

Inactivity TimeOut(mins) for startondata PPP Interfaces: 0

Ignore WAN to LAN traffic while monitoring Inactivity: ☐

Interface	VC	Interface Sec Type	Protocol	WAN IP	Gateway IP	Default Route	Use DHCP	Use DNS	Oper. Status	Action
ppp-0	aal5-0	Public	PPPoE	0.0.0.0	0.0.0.0	Enable	Disable	Enable	LinkDown	

Figure 17. Point to Point Protocol (PPP) Configuration Page

A PPP interface is configured as a group of software settings associated with an ATM VC interface. Each PPP interface is given a name, such as *ppp-0*, *ppp-1*. Users typically need only one PPP interface; in some cases, multiple interfaces are created to allow the user to log on to more than one account with the ISP.)

You can configure the following settings on the PPP Configuration page:

- **Inactivity TimeOut...**: The time in minutes that must elapse before a PPP connection times-out due to inactivity. This setting applies only to PPP interfaces that are configured as "start-on-data" interfaces. This type of interface starts up only when it receives data, and then returns to a down state after the specified amount of time (see the status field on page 56).This setting works with the following setting to determine what type of data can activate a start-on-data interface.
- **Ignore WAN to LAN traffic while monitoring inactivity...**: When enabled, data traffic traveling in the incoming direction—from the WAN interface to the LAN interface—will not count as activity on the WAN interface for the purposes of determining whether to make it inactive; i.e., incoming traffic will not activate a start-on-data interface. Only LAN-to-WAN traffic will start the interface.

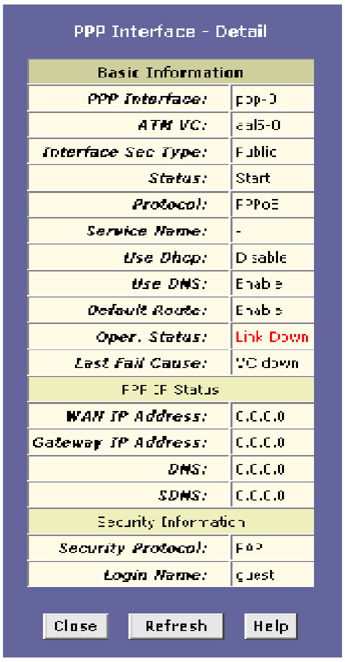
The PPP Configuration Table displays the following fields:

Field	Description
Interface	The name of the PPP interface.
VC	The virtual circuit over which this PPP data is sent. The VC identifies the physical path the data takes to reach your ISP.
Interface Sec Type	The type of firewall protections that are in effect on the interface (public, private, or DMZ): o A public interface connects to the Internet (PPP interfaces are typically public). Packets received on a public interface are subject to the most restrictive set of firewall protections defined in the software. o A private interface connects to your LAN, such as the Ethernet interface. Packets received on a private interface are subject to a less restrictive set of protections, because they originate within the network. o The term DMZ (de-militarized zone), in Internet networking terms, refers to computers that are available for both public and in-network accesses (such as a company's public Web server). Packets incoming on a DMZ interface – whether from a LAN or external source -- are subject to a set of protections that is in between public and private interfaces in terms of restrictiveness.
Protocol	The type of PPP protocol used. Your ISP may use PPP-over-Ethernet (PPPoE) or PPP-over-ATM (PPPoA).
WAN IP	The IP address currently assigned by your ISP to the interface.
Gateway IP	The IP address, provided by your ISP, of the server that provides you access to the Internet. See "Hops and gateways" on page 99 for a description of gateway addresses.

Field	Description
Default Route	Indicates whether the ADSL/Ethernet router should use the IP address assigned to this connection as its default route. Can be Enabled or Disabled. See Chapter 10 for an explanation of default routes.
Use DHCP	When set to *Enable*, the device will acquire additional IP information from the ISP's DHCP server. The PPP connection itself acquires the device's IP address, mask, DNS address, and default gateway address. With Use DHCP enabled, the device will acquire IP addresses for various other server types (WINS, SMTP, POP3, etc. – these server types are listed on the DHCP Server Configuration page in the LAN tab).
Use DNS	When set to *Enable*, the DNS address learned through the PPP connection will be distributed to clients of the device's DHCP server. This option is useful only when the ADSL/Ethernet Router is configured to act as a DHCP server for your LAN. When set to *Disable*, LAN hosts will use the DNS address(es) specified in the DHCP pool (see “Configuring DHCP Server” on page 87) and specified in the DNS configuration (see Chapter 9).
Oper. Status	Indicates whether the link is currently up or down or if a specific type of data exchange is under way (e.g., password authorization or DHCP).
Actions	You can use these icons to modify (✎), delete (🗑), and view additional details on (🔍) the PPP interface. Not all settings are available on the PPP Interface - Modify page. To modify the other settings, you must delete the interface and create a new one. Be sure to submit and commit your changes if you make modifications.

Viewing PPP Interface Details

When you click 🔍 to view additional details, the PPP Interface - Detail page displays:



PPP Interface - Detail

Basic Information	
PPP Interface:	ppp-0
ATM VC:	aal5-0
Interface Sec Type:	Public
Status:	Start
Protocol:	PPPoE
Service Name:	-
Use Dhcp:	Disable
Use DNS:	Enable
Default Route:	Enable
Oper. Status:	Link Down
Last Fail Cause:	VC down
PPP IF Status	
WAN IP Address:	0.0.0.0
Gateway IP Address:	0.0.0.0
DNS:	0.0.0.0
SDNS:	0.0.0.0
Security Information	
Security Protocol:	PAP
Login Name:	guest

Figure 18. PPP – Detail Page

In addition to the properties defined on page 54, the Detail page displays these fields:

Field	Description
Status	Indicates which of the following interface statuses has been manually selected: o Start: The connection will be established for use whenever the device is turned on or rebooted. o Stop: The PPP interface has been manually disabled and cannot currently be used. It can only be used after being manually returned to the Start state. o Start On Data: The PPP connection will be established automatically whenever data is sent to the interface (e.g., when a LAN user attempts to use the Internet), and will time-out whenever the interface is idle for a specified amount of time.
Service Name	(This feature is available with PPPoE interfaces but not with PPPoA interfaces.) The name of the ISP service you are using with this PPP connection. ISPs may offer different types of services (for example, for online gaming or business services), each requiring a different login and other connection properties.

Field	Description
Last Fail Cause	Indicates the action that ended the previous PPP session: o No Valid PADO Recvd: The device initiated a PPoE handshake but did not receive a packet in reply from the ISP. o No Valid PADS Recvd: After the initial handshake, the device did not receive a confirmation packet from the ISP. o Stopped by User: The user stopped the connection (for example, by changing the Configuration Manager settings for the PPP interface.) o No Activity: The PPP communication timed out, in accordance with the timeout period specified on the PPP Configuration page. o Auth Failure: The ISP could not authorize the connection based on the user name and/or password provided. o PADT Recvd: The ISP issued a special packet type to terminate the PPP connection. o VC down: The Virtual Circuit between the device and the ISP is down. o Internal failure: A system software failure occurred.
DNS	The IP address of the DNS server (located with your ISP) used on this PPP connection.
SDNS	The IP address of the secondary DNS server (located with your ISP) used on this PPP connection.
Security Protocol	The type of PPP security your ISP uses: *PAP* (Password Authentication Protocol) or *CHAP* (Challenge Handshake Authentication Protocol).
Login Name	The name you use to log in to your ISP each time this PPP connection is established.

Adding a PPP Interface

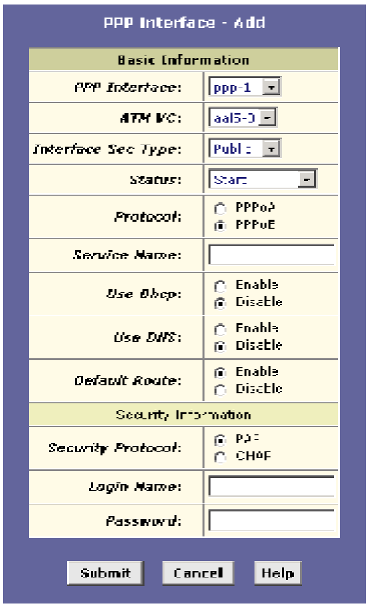
Follow this procedure to add a PPP interface.

Note

> *If you need to use more than one PPP connection, you may be able to create multiple PPP interfaces. The number and type of PPP interfaces you can create depends on the lower-level ATM VC interface type (LLC Mux or VC Mux), the Max Protocol setting for the ATM VC interface, the PPP interface type you want to create (PPPoA or PPPoE), and whether other WAN interface types have already been configured (EoA or IPoA). Contact your ISP for assistance.*

1. From the PPP Configuration Page, click **Add**.

   The PPP Interface – Add page displays:



PPP Interface - Add

Basic Information	
PPP Interface:	ppp-1
ATM VC:	aal5-0
Interface Sec Type:	Publ:
Status:	Start
Protocol:	○ PPPoA ● PPPoE
Service Name:	
Use Dhcp:	○ Enable ● Disable
Use DNS:	○ Enable ● Disable
Default Route:	● Enable ○ Disable
Security Information	
Security Protocol:	● PAP ○ CHAP
Login Name:	
Password:	

Figure 19. PPP Interface – Add Page

2. Select a PPP interface name from the drop-down list, and then enter or select data for each field.

   The fields are defined in the tables on page 54 and 56.

3. Click **Submit**.

   A page displays to confirm your changes.

4. Click **Close** to return to the PPP page and view the new interface in the table.

5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Configuring EoA Interfaces

The Ethernet-over-ATM (EoA) protocol is often referred to as *RFC1483*, which is the Internet specification that defines it. It is commonly used to carry data from an Ethernet-based local area network over the ATM-based wide area network.

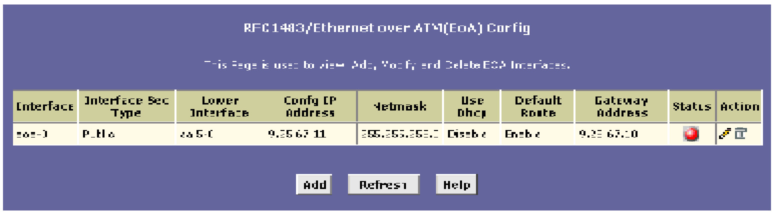
Unlike PPP, EoA can be implemented to provide a bridged connection between a DSL modem and the ISP. In a bridged connection, data is shared between the ISP's network and their customer's as if the networks were on the same physical LAN. Bridged connections do not use the IP protocol. EoA can also be configured to provide a routed connection with the ISP, which uses the IP protocol to exchange data. See Chapter 6 "Configuring the System Operating Mode," for more information on bridged and routed Internet connections.

Before creating an EoA interface or modifying the default settings, contact your ISP to determine which type of protocol they use.

Note

PPP and EoA: *Bridged Internet connections must use an EoA WAN interface. Routed Internet connections can use an EoA (if configured with an IP address) or a PPP interface. See Chapter 5 for more information.*

To view your current EoA interface configuration, log into Configuration Manager, click the WAN tab, and then click **EOA** in the task bar. The RFC1483/EoA Config page displays.



RFC1483/Ethernet over ATM(EoA) Config

This Page is used to view, Add, Modify and Delete EOA Interfaces.

Interface	Interface Sec Type	Lower Interface	Config IP Address	Netmask	Use Dhcp	Default Route	Gateway Address	Status	Action
eoa-0	Public	aal5-0	9.25.67.11	255.255.255.0	Disable	Enable	9.25.67.10	●	✎ 🗑

Figure 20. RFC1483/EoA Config Page

The EoA table contains a row for each EoA interface currently defined on the device. The table may be empty.

The following table describes the fields on this page:

Field	Description
Interface	The name the software uses to identify the EoA interface.
Interface Sec Type	The type of security protections in effect on the interface (public, private, or DMZ): o A *public* interface connects to the Internet (IPoA interfaces are typically public). Packets received on a public interface are subject to the most restrictive set of firewall protections defined in the software. o A *private* interface connects to your LAN, such as the Ethernet interface. Packets received on a private interface are subject to a less restrictive set of protections, because they originate within the network. o The term *DMZ* (de-militarized zone), in Internet networking terms, refers to computers that are available for both public and in-network accesses (such as a company's public Web server). Packets incoming on a DMZ interface—whether from a LAN or external source—are subject to a level of protection that is in between those for public and private interfaces.
Lower interface	EoA interfaces are defined in software, and then associated with lower-level software and hardware structures (at the lowest level, they are associated with a physical port —the WAN port). This field should reflect an interface name defined in the next lower level of software over which the EoA interface will operate. This will be an ATM VC interface, such as *aal5-0* .
Config IP Address and Netmask	The IP address and network mask you want to assign to the interface. If the interface will be used for bridging with your ISP and you will not be using the ADSL2+ Router as a router on your LAN, then you do not need to specify IP information. If you enable DHCP for this interface, then the Configured IP address will serve only as a request to the DHCP server. The actual address that is assigned by the ISP may differ if this address is not available.
Use DHCP	When enabled, this setting instructs the device to accept IP information assigned dynamically by your ISP's DHCP server. If the interface will be used for bridging with your ISP and you will not be routing data through it, leave this checkbox unselected.
Default Route	Indicates whether the ADSL2+ Router uses the IP address assigned to this interface, if any, as its default route for your LAN. Your system can have only one default route. See Chapter 10 for an explanation of default routes.
Gateway Address	The external IP address that the ADSL/Ethernet router communicates with via the EoA interface to gain access to the Internet. This is typically an ISP server.

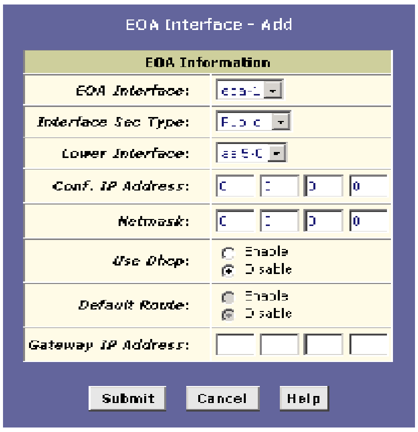
Field	Description
Status	A green or red ball will display to indicate that the interface is currently up or down, respectively. You cannot manually enable or disable the interface; a red ball may indicate a problem with the DSL connection or the connection to the ISPs access server.
Action	Icons you can click on to edit (✎) or delete (🗑) the associated EoA interface. Not all settings are available on the EoA Interface - Modify page. To modify the other settings, you must delete the interface and create a new one. Be sure to submit and commit your changes if you make modifications.

Adding EoA Interfaces

Follow these instructions to add an EoA interface:

1. Click the WAN tab, and then click **EOA** in the task bar.
2. Click **Add**.

   The EoA Interface - Add page displays:



EOA Interface - Add

EOA Information	
EOA Interface:	eoa-1
Interface Sec Type:	Public
Lower Interface:	aal5-0
Conf. IP Address:	0 . 0 . 0 . 0
Netmask:	0 . 0 . 0 . 0
Use Dhcp:	○ Enable ● Disable
Default Route:	○ Enable ● Disable
Gateway IP Address:	

Figure 21. EoA Interface - Add Page

3. Select one of the predefined interface names from the EoA Interface drop down list.
4. From the Interface Sec Type drop-down list, select the level of IP Firewall to be used on this interface, as defined on page 60.
5. In the Lower Interface field, select the lower-level interface name over which this protocol is being configured.

If the interface will be used to provide only a bridged connection to your ISP, skip to step 8.

6. If you are creating the EoA interface to provide a routed Internet connection, enter the IP address for the interface in the Conf. IP Address field, and enter the network mask.

   This address serves as the public IP address for your entire LAN and is usually assigned by your ISP.

7. If your ISP will assign the IP address from their DHCP server, click the Enable radio button in the Use DHCP field.

   When DHCP is enabled, the address you entered in the Conf. IP Address field will be requested from the DHCP server; the server many assign a different address if necessary.

8. If you are using the EoA interface to provide a routed connection to your ISP and you want the EoA interface to serve as the default route for Internet access for your LAN, ensure that the Default Route: Enable radio button is selected. (If you have more than one WAN interface, note that only one of them can be specified as the default route.)

   If you are using the interface to provide a bridged connection, then deselect this field.

9. In the Gateway IP Address field, enter the address of your ISP's access server.

10. Click Submit.

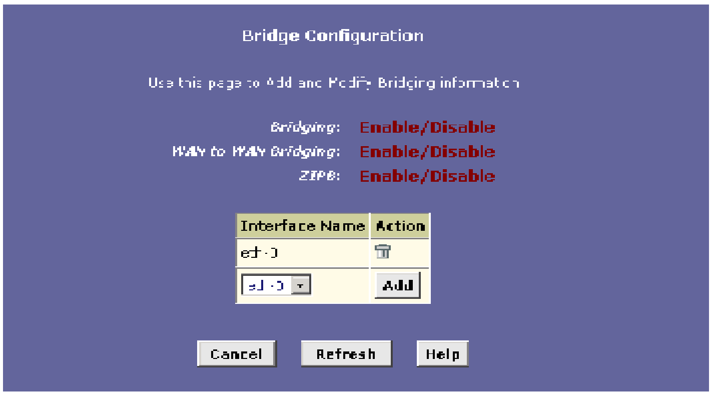
    A confirmation page displays to confirm your changes.

11. Click Close to return to the EoA page and view the new interface in the table.

    - If the interface will be used to provide a bridged-only connection or a bridged-and-routed connection to your ISP, then continue with step 12 to enable bridging.

12. Click the Bridging tab.

    The Bridge Configuration page displays:



Bridge Configuration

Use this page to Add and Modify Bridging information

Bridging: Enable/Disable
WAN to WAN Bridging: Enable/Disable
ZIPB: Enable/Disable

Interface Name	Action
eth-0	🗑
eoa-0 ▾	Add

Figure 22. Bridge Configuration Page

The Bridge Configuration page provides links (shown in red) to the System Mode page, where you can enable or disable the corresponding bridging services. The Bridge Configuration page also displays a table for specifying the interfaces that support bridging. The table may be empty if bridging has not yet been configured.

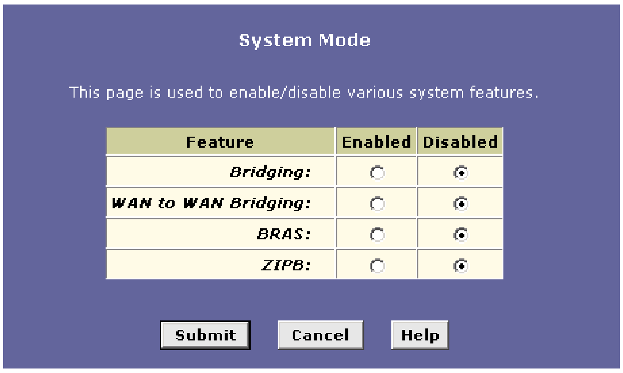
13. In the interface table, select all interface names on which you want to perform bridging and click Add.

To enable bridging with your ISP, select the EoA interface and the LAN interface(s) (eth-0 and/or usb-0).

You can enable bridging on an IP-enabled EoA interface; in this case, the same interface will be capable of handling both bridged and routed data packets.

14. Click the Bridging: Enable/Disable link.

    The System Mode page displays:



System Mode

This page is used to enable/disable various system features.

Feature	Enabled	Disabled
Bridging:	○	●
WAN to WAN Bridging:	○	●
BRAS:	○	●
ZIPB:	○	●

Figure 23. System Mode Page

You can also access the System Mode page from the task bar in the Home tab.

15. Click the Bridging: Enabled radio button (if not already selected), and then click Submit.

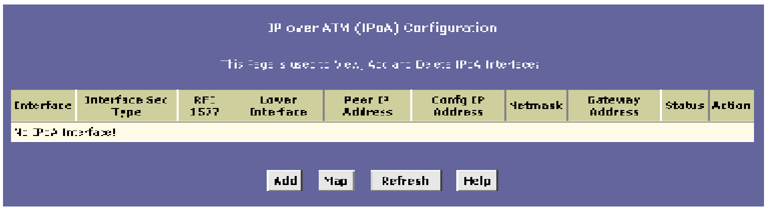
    A page will briefly display to confirm your changes, and will return you to the Bridge Configuration page.

16. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Configuring IPoA Interfaces

An IPoA interface can be used to exchange IP packets over the ATM network, without using an underlying Ethernet over ATM (EoA) connection. Typically, this type of interface is used only in product development and test environments, to eliminate unneeded variables when evaluating IP protocol processing.

To configure an IPoA interface, log into Configuration Manager, click the WAN tab, and then click **IPoA** in the task bar. The IPoA Configuration page displays:



IP over ATM (IPoA) Configuration

This Page is used to View, Add and Delete IPoA Interfaces

Interface	Interface Sec Type	RFC 1577	Lower Interface	Peer IP Address	Config IP Address	Netmask	Gateway Address	Status	Action
No IPoA Interface!									

Figure 24. IPoA Configuration Page

The table contains a row for each IPoA interface currently defined. The table may initially be empty. The following table describes the fields on this page:

Field	Description
Interface	The name the software uses to identify the IPoA interface
Interface Sec Type	The type of security protections in effect on the interface (public, private, or DMZ): o A *public* interface connects to the Internet (IPoA interfaces are typically public). Packets received on a public interface are subject to the most restrictive set of firewall protections defined in the software. o A *private* interface connects to your LAN, such as the Ethernet interface. Packets received on a private interface are subject to a less restrictive set of protections, because they originate within the network. The term *DMZ* (de-militarized zone), in Internet networking terms, refers to computers that are available for both public and in-network accesses (such as a company's public Web server). Packets incoming on a DMZ interface—whether from a LAN or external source—are subject to a level of protection that is in between those for public and private interfaces.
RFC 1577	Specifies whether the IPoA protocol to be used complies with the IEFT specification named “RFC 1577 - Classical IP and ARP over ATM" (contact your ISP if unsure).

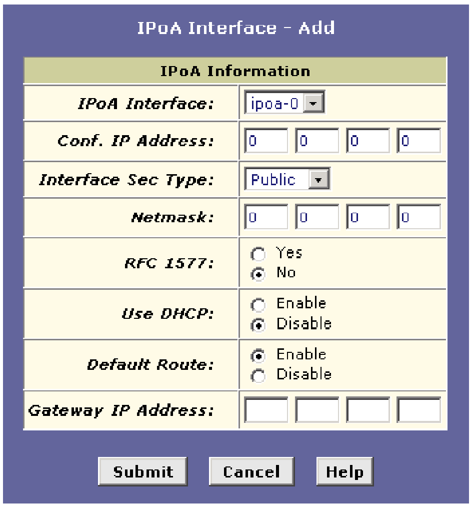
Field	Description
Lower interface	IPoA interfaces are defined in software, and then associated with lower-level software and hardware structures (at the lowest level, they are associated with a physical port – the WAN port). This field should reflect an interface name defined in the next lower level of software over which the IPoA interface will operate. This will be an ATM VC interface, such as *aal5-0*.
Peer IP Address	The IP address of the remote computer you will be connecting to via the WAN interface.
Config IP Address and Netmask	The IP address and network mask you want to assign to the interface. If DHCP is enabled, this address serves as a request to the remote computer's DHCP server, which may assign another address.
Gateway Address	The external IP address that the ADSL/Ethernet router communicates with via the IPoA interface to gain access to the Internet. This is typically an ISP server.
Status	A green or red ball will display to indicate that the interface is currently up or down, respectively. You cannot manually enable or disable the interface; a down interface may indicate a problem with the DSL connection, or with the remote IPoA computer.
Action	Icons you can click on to edit (✏) or delete (🗑) the associated IPoA interface. Not all settings are available on the IPoA Interface - Modify page. To modify the other settings, you must delete the interface and create a new one. Be sure to submit and commit your changes if you make modifications.

Adding IPoA Interfaces

Follow these instructions to add an IPoA interface:

1. Display the IPoA page and click Add.

   The IPoA Interface – Add page displays:



IPoA Interface - Add

IPoA Information	
IPoA Interface:	ipoa-0 ▾
Conf. IP Address:	0 . 0 . 0 . 0
Interface Sec Type:	Public ▾
Netmask:	0 . 0 . 0 . 0
RFC 1577:	○ Yes ● No
Use DHCP:	○ Enable ● Disable
Default Route:	● Enable ○ Disable
Gateway IP Address:	

Figure 25. IPoA Interface – Add Page

2. Select the next available interface name from the IPoA Interface drop-down list.
3. In the Configured IP Address and Net Mask text boxes, type the address and mask that you want to assign to the IPoA interface.

   If you enable the DHCP option (in step 6 below), then the IP address you enter here will serve as a requested address; the DHCP server may assign another address if necessary.
4. From the Interface Sec Type drop-down list, select the level of firewall security for the interface: *Public*, *Private*, or *DMZ* (see page 64 for definitions).
5. In the RFC 1577 field, click the Yes radio button if the interface complies with the IETF specification RFC 1577 and click Add.
6. If the remote IPoA computer provides a DHCP server, you can click the Enable radio button in the Use DHCP field to have the IP address dynamically assigned from the server.
7. If you want the IPoA interface to serve as the default route for your LAN, click the Enable radio button in the Default Route field.

   Only one WAN interface can be selected as the default route.
8. In the Gateway IP Address field, enter the address of the Internet computer to contact to gain initial access to the Internet.

9. Click Submit.

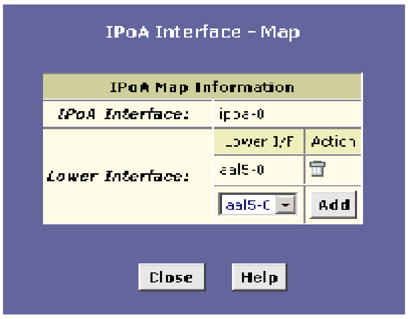
   A confirmation page will display to confirm your changes.

10. Click Close to return to the IPoA page and view the new interface in the table.

IPoA interfaces must be mapped to a lower ATM VC interface before they can be used. Follow these instructions to map and IPoA interface to an ATM VC:

11. In the IPoA interface table, click Map in the row corresponding to the IPoA interface you want to map.

    The IPoA Map Information page displays:



IPoA Interface - Map

IPoA Map Information		
IPoA Interface:	ipoa-0	
Lower Interface:	Lower I/F	Action
	aal5-0	🗑
	aal5-0 ▾	Add

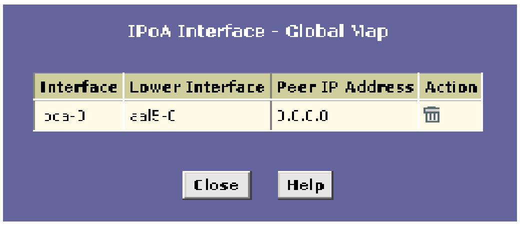
Figure 26. IPoA Interface – Map Page

12. From the Lower Interface drop-down list, select the ATM VC interface you want to map the IPoA interface to, and then click Add.

13. Click Close to return to the IPoA Configuration page.

14. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

To view all IPoA-to-ATM VC interface mappings, click Map at the bottom of the IPoA Configuration page (not in the table). The IPoA Interface – Global Map displays:



IPoA Interface - Global Map

Interface	Lower Interface	Peer IP Address	Action
ipoa-0	aal5-0	0.0.0.0	🗑

Figure 27. IPoA Interface – Global Map Page

You can click 🗑 in the Action column to delete an IPoA mapping. The IPoA interface itself is not deleted.

6 Configuring the System Operating Modes

The ADSL2+ Router can operate as a router, a bridge, or both. The system operating mode is determined by how you configure the LAN and WAN interfaces to exchange data within your network and with your ISP. This chapter provides an overview of how routers and bridges work, and explains how to configure the device interfaces and other settings to meet the needs of your network and ISP connection type.

Overview of Bridges and Routers

Both bridges and routers enable communication between two networks, such as a home network and ISP's network of Internet access servers. Although to an end-user they may appear to provide the same functionality, bridges and routers operate differently and provide different services. Some ISPs require their customers to use a bridge connection, whereas others allow a routed connection.

How Bridges Work

Bridges enable computers on two networks to communicate as if they are on two segments of the same physical LAN. A bridge learns the hardware IDs of all computers on each network it is attached to. (These hardware IDs are assigned by manufacturers to devices such as network interface cards that enable computers to connect to networks.) The bridge determines which hardware IDs are connected on each side of the bridge, and stores these associations in its *bridge forwarding table*.

For example, when the ADSL2+ Router is acting as a bridge, it learns to associate the hardware IDs of each of your LAN computers with its LAN interface (e.g., eth-0 or usb-0), and the hardware IDs of your ISP's access server(s) with its WAN interface (e.g., eoa-0).

When the bridge receives a data packet, the bridge compares the packet's destination hardware ID to the entries in its bridge forwarding table. When the packet's destination ID matches one of the entries, it forwards the packet through the associated interface, where the computer with the matching hardware ID can claim the packet. When the bridge does not recognize a packet's destination hardware ID, it broadcasts the packet through all of its interfaces – to each network it is attached to.

Hardware IDs are also referred to as *Media Access Control* (MAC) addresses. Ethernet is a commonly used "MAC-layer" network protocol. Bridges provide a simple way to allow two or more Ethernet-based networks to share data, without requiring additional internetworking protocols. Bridges generally cannot link networks that use different MAC-layer protocols.

How Routers Work

Routers use a higher-layer protocol than bridges use to determine how to pass data between two networks. Routers such as the ADSL2+ Router operate based on the Internet Protocol and use IP addresses to identify where to send data.

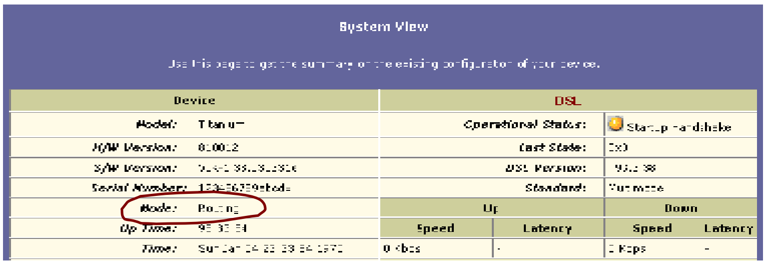
Unlike a MAC address, an IP address is not permanently associated with a particular piece of hardware, but is assigned to a computer by its user (or by an administrator or an automated mechanism called DHCP). Within a group of networked computers, a router can associate each PC's assigned IP address with its MAC address. When a PC initiates communication through the router outside the network, the router sends out IP packets to the Internet on behalf of the PC, revealing only the PC's IP address. As IP packets are received in response, the router reconciles the IP address with the PCs MAC address and sends Ethernet (MAC-layer) packets on the network for the PC to claim.

Because they use a standardized higher-layer protocol for inter-network communication, routers can connect two or more networks even when their underlying MAC-layer protocols differ. Routers are considered more intelligent and flexible devices than bridges, and often provide a variety of security and network administration services based on the IP protocols.

For a more detailed description of how routers pass data, see Chapter 10.

Overview of System Operating Modes

The ADSL2+ Router can operate in Bridging mode, Routing mode, or Routing and Bridging mode. You can view the currently configured mode in the System View table on the Home page, as shown in Figure 28.



System View

Use this page to get the summary of the existing configuration of your device.

Device		DSL			
Model:	Titanium	Operational Status:	Startup Handshake		
H/W Version:	810012	Last State:	0x0		
S/W Version:	[illegible]	DSL Version:	93.2.38		
Serial Number:	123-26729ebdde	Standard:	Multimode		
Mode:	Routing	Up		Down	
Up Time:	93:33:34	Speed	Latency	Speed	Latency
Time:	Sun Jan 04 22:39:54 1970	0 Kbps	-	0 Kbps	-

Figure 28. Viewing the Operating Mode

The system mode that displays *is not* configured using a single setting. Rather, it is determined at system startup based on whether the device’s LAN and WAN interfaces are configured with IP information (i.e., are “IP-enabled”), and whether the Bridging setting on the System Mode page is enabled or disabled. The System Mode page is located in the Home tab and is shown in Figure 30 on page 72.

- When the Bridging setting on the System Mode page is disabled, then the system mode will display as “Routing.”
- When the Bridging setting is enabled and at least one LAN or WAN interface is IP-enabled, then the system mode will display as “Routing and Bridging.”
- When the Bridging setting is enabled and no interfaces are IP enabled, then the device is considered to be in Bridging Mode. Note, however, that in this case you would not be able to access Configuration Manager; without being IP-enabled, the Ethernet interface could not communicate using the Internet protocol *HTTP* which is used to display information in your Web browser.

Instead of focusing on selecting a system mode of operation, users should ensure that the appropriate settings are in place to enable communication with the ISP and to provide the required LAN services. The correct operating mode will be selected automatically when these settings are properly configured.

The following sections describe how to configure IP-enabled and bridge-enabled interfaces and how to enable/disable the Bridging setting. Several common configurations are described on pages 73-75.

Configuring Routable and Bridgeable Interfaces

Making Interfaces Routable (IP-Enabled)

A routable or IP-enabled interface is simply one that has been assigned an IP address. IP-enabled interfaces are capable of forwarding IP packets. You can assign IP addresses to any LAN or WAN interface.

- For information about assigning IP information to LAN interfaces (e.g., eth-0 and usb-0), see Chapter 4.
- For information about assigning IP information to WAN interfaces, see Chapter 5.

Making Interfaces Bridgeable (Bridge-Enabled)

When you make an interface bridgeable, you enable the software to receive Ethernet packets through that interface, for forwarding through the device's other bridgeable interfaces. If an interface is not bridgeable, it can only forward IP packets (assuming the interface has been IP-enabled).

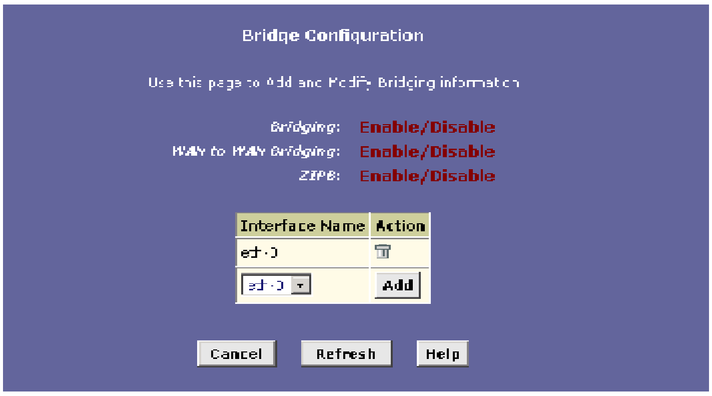
Note

If you create a LAN or WAN interface, it must be IP-enabled, bridge enabled, or both. An interface that has no IP address and is not made bridgeable will not pass any data.

Follow these instructions to specify which interfaces can perform bridging.

1. Lon into Configuration Manager and click the Bridging tab.

   The Bridge Configuration page displays:



Bridge Configuration

Use this page to Add and Modify Bridging information

Bridging: Enable/Disable
WAN to WAN Bridging: Enable/Disable
ZIPB: Enable/Disable

Interface Name	Action
eth-0	🗑
eth-0 ▾	Add

Figure 29. Bridge Configuration Page

The Bridge Configuration page provides links (shown in red) to the System Mode page, where you can enable or disable the corresponding bridging services. The Bridge Configuration page also displays a table for specifying the interfaces that support bridging. The table may be empty if bridging has not yet been configured.

2. In the interface table, select all interface names on which you want to perform bridging and click **Add**.

   To enable bridging with your ISP, select the LAN interface (eth-0 and/or usb-0) and the EoA interface you created for the bridging path.

After creating bridgeable interfaces, you must enable the bridging feature, as described in the following section, "Enabling Bridging Mode."

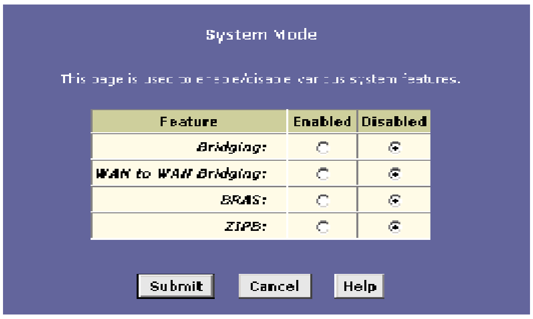
To make an interface non-bridgeable, display the Bridge Configuration page and click 🗑 next to the interface you want to delete. Click OK to confirm the deletion. The interface remains defined in the system, but is no longer capable of performing bridging.

Enabling Bridging Mode

After you have created bridgeable interfaces, you must enable the bridging service on the system as a whole.

1. Click the Home tab, and then click **System Mode** in the task bar.

   The System Mode page displays.



System Mode

This page is used to enable/disable various system features.

Feature	Enabled	Disabled
Bridging:	○	●
WAN to WAN Bridging:	○	●
BRAS:	○	●
ZIPB:	○	●

Figure 30. System Mode Page

   You can also access the System Mode page from Bridging page. Click any of the links that display in red near the top of the page.

2. Click the Bridging: Enabled radio button (if not already selected), and then click **Submit**.

   A page will briefly display to confirm your changes, and will return you to the System Mode page.

3. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

The other features shown on the System Mode page are described in "Configuring Special Bridging Features" on page on page 76.

Common Scenarios

The sections that follow describe common system configurations that use bridging, routing, or both.

Note that you can also configure several special operating modes. These are described in ”Configuring Special Bridging Features” on page 76.

Scenario 1: Routed Connection to ISP

In this scenario, the ISP requires customers to have a routed connection to their access server. For a routed connection, the LAN and WAN interfaces must be IP-enabled. No bridging services need to be enabled. This configuration would have these features:

- An Ethernet (and/or USB) interface with an IP address and network mask that identify it as being in the same subnet as your LAN PCs. See Chapter 4 for instructions.
- An IP-enabled WAN interface. The interface type can be PPP or EoA. An IPoA interface can also be used, but they are rarely used in customer settings. See Chapter 5 for instructions.
    - If an EoA interfaces is created, an IP address should be assigned to it. Or, the interface should be configured to receive an IP address through DHCP.
    - For PPP interfaces, IP information is assigned when the link is negotiated.
    - For either type of WAN interface, the Default Gateway check box is normally selected.
- Each PC’s IP properties specify the ADSL/Ethernet router's LAN interface as its gateway IP address. The PCs may also be configured to obtain IP information automatically from a DHCP server.

With this configuration, all IP packets originating from your LAN and destined for the Internet will be routed to the PCs’ default gateway (the LAN interface), then to the ADSL2+ Router’s default gateway (the WAN interface), and then to the WAN interface’s gateway (the ISP’s access server).

In the System View page in the Home tab, the Mode field will reflect *Routing*. With no bridging services enabled, non-IP packets will be ignored.

Scenario 2: Bridged Connection to ISP

In this configuration, your ISP requires you to configure a bridged Internet connection. For a bridged Internet connection, the WAN interface must be bridge-enabled. The configuration would have these features:

- A bridge-enabled EoA WAN interface. Bridged IP connections must use an EoA-type WAN interface. An IP address may or may not be specified for the interface.

  Note that even when the device communicates with your ISP as a bridge, its Ethernet interface must remain IP-enabled to allow you access to the Configuration Manager program through your Web browser. The ADSL2+ Router can also continue to provide certain IP-based services to your LAN such as DHCP server and DNS relay.
- Both the LAN (eth-0 and/or usb-0) and the WAN interfaces (eoa-0) are enabled for bridging. See “Making Interfaces Bridgeable (Bridge-Enabled)” on page 71.
- The bridging service is enabled. See “Enabling Bridging Mode” on page 72.
- The ISP should provide setup instructions for the LAN PC(s), which may involve installing software to enable logging in to their servers (called a "PPPoE client"). The PC's gateway IP address should be configured as the IP address of the ISPs access server.

In the System View page in the Home tab, the Mode field will reflect *Routing and Bridging*. Although you are exclusively using a bridging connection to your ISP, the device recognizes at least one IP-enabled interface (eth-0), and therefore regards the device as capable of both routing and bridging.

Scenario 3: Routed and Bridged Connections to ISP

In this configuration, the LAN is like that described in Scenario 1, but also includes PCs that use a bridged Internet connection. You would then need to establish bridging services in addition to routing. This would also be necessary if the LAN contains PCs that use non-IP networking protocols, such has AppleTalk or IPX. This configuration would have these features:

- An Ethernet (and/or USB) interface with an IP address and network mask that identify it as being in the same subnet as the LAN PCs. See Chapter 4 for instructions.
- An WAN interface for the routing path. This can be a PPP or EoA interface and must be IP-enabled, as described in Scenario 1.
- A WAN interface for the bridging path. This must be an EoA interface. If an EoA interface was created for the routing path, the bridging path may be able to use the same interface. Check with your ISP.
- Bridging is enabled on the LAN interface (eth-0 and/or usb-0) and on the EoA interface to be used for the bridging path. If separate interfaces are created for the bridging and routing paths, then enable bridging only on the EoA interface to be used for bridging. See “Making Interfaces Bridgeable (Bridge-Enabled)” on page 71.
- The bridging service is enabled. See “Enabling Bridging Mode” on page 72.
- For the PCs that will use the routing path, the LAN interface's IP address should be specified as the IP gateway, whether assigned statically or dynamically from a DHCP server.
- For the PCs that will use the bridging path, the ISP should provide setup instructions for the LAN PC(s), which may involve installing software to enable logging in to their servers (called a "PPPoE client"). The PC's gateway IP address should be configured as the IP address of the ISPs access server.

In the System View page in the Home tab, the Mode field will reflect you the Mode field will now reflect *Routing and Bridging*.

Configuring Special Bridging Features

Configuring WAN-to-WAN Bridging

WAN-to-WAN bridging refers to the bridging of data between WAN interfaces. This can occur only when bridging is enabled on the device and it has two or more WAN interfaces. With WAN-to-WAN bridging enabled, if a packet with an unknown destination address is received from a WAN interface, that packet is forwarded to all the other ports — including the other bridge-enabled WAN interface(s).

However, this ability may not be desirable for all users, due to security concerns and bandwidth constraints. If this is the case, WAN-to-WAN bridging should be disabled.

Follow this procedure to enable or disable WAN-to-WAN bridging:

1. Click the Bridging tab.
2. In the interface table, select all WAN interfaces and any others on which you want to perform bridging and click Add.
3. Click the WAN-to-WAN bridging: Enable/Disable link.
4. On the System Mode Page, click the WAN-to-WAN Bridging: Enabled (or Disabled) radio button, and then click Submit.

   A page will display briefly to confirm your changes, and will return you to the Bridge Configuration page.
5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Configuring Bridge/Router AutoSense (BRAS) Mode

In Bridge-Router AutoSense (BRAS) mode, the ADSl2+ Router chooses at startup whether to operate in Routing and Bridging mode or in Bridging-only mode, based on information it learns while communicating with the LAN PCs. This capability allows units to be delivered to customers with one preconfiguration for both deployment types.

If BRAS is to be used, the modem must be preconfigured with both PPPoE and EoA interfaces, and bridging must be enabled. When the modem is booted up with BRAS enabled, the mode is determined as follows:

1. The modem comes up with both bridging and routing enabled, with its own internal PPPoE client active.
2. If the modem subsequently detects PPPoE traffic from the LAN PC's PPPoE client (indicating a bridge deployment), then the modem automatically switches to bridging mode by stopping its own PPPoE client, causing PPPoE packets to be bridged from the LAN side.
3. Otherwise (no PPPoE traffic is detected) the modem continues to operate as before in bridging mode (non-PPPoE traffic) as well as routing mode.

Follow these instructions to enable Bridge-Router AutoSense:

1. Ensure that both a PPPoE and an EoA interface is established and that the EoA interface has been made bridgeable (see “Making Interfaces Bridgeable (Bridge-Enabled)” on page 71).
2. Click the Home tab to display the Home page, then select **System Mode** in the task bar.
3. Ensure that the Bridging: Enabled radio button is selected.
4. Click the BRAS: Enabled radio button, and then click

.

   A page displays briefly to confirm the change, and the System Mode page redisplays.
5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Enabling or disabling BRAS takes effect immediately; i.e., a system reboot is *not* required.

Configuring ZIPB Mode

The ADSL2+ Router offers a special type of bridging mode called ZIPB (Zero Installation PPP Bridge) mode. This mode enables the ISP to simplify the installation process for customers who will be using the device as a bridge. ZIPB mode also allows customers to use the embedded firewall features, which are normally not available on bridged connections.

Note

Contact your ISP to determine if they offer this connection type before you configure it.

With ordinary DSL modems that use a bridged connection to the ISP, the customer must install a program on their PC called a PPP client. This program enables the customer to log in to the ISP's access server and acquire IP information that the computer needs for all subsequent Internet communication. In ZIPB mode, the ADSL2+ Router uses its own PPP software to communicate at startup with the ISP. The ISP assigns the IP information to the device's PPP interface, which then uses its DHCP server to pass the information on to the user's PC. Therefore, the PPP interface and the user's PC both use the same IP address.

Working with your ISP, follow this procedure to enable ZIPB mode:

1. Ensure that your PCs are configured to accept IP information assigned by a DHCP server. See "Quick Start Part 2 — Configuring Your Computers," for instructions.
2. Ensure that at least one PPPoE or PPPoA interface has been created on theADSL2+ Router. See Chapter 5 for instructions.

   The Status field for the PPP interface must be set to *Start on Data*. You can modify an existing interface to set this property.

Note

If you have more than one computer on your LAN and your ISP provides multiple public IP addresses for those computers, you must establish a PPP interface for each public IP address.

3. If it does not already exist, create a DHCP server pool with poolid=0.

   The pool should include at least one unique private IP address for each computer on your LAN. The gateway IP address should be set to the address of the LAN interface, which must be in the same subnet (see Chapter 4 for instructions).
4. Enable DHCP server, as described in "Setting the DHCP Mode" on page 93.
5. Click the Services tab to display the NAT Configuration page. If the NAT feature is enabled, click the Disable radio button.
6. Click the Bridging tab to display the Bridging page, and then click the ZIPB: Enable radio button.
7. Click the Bridging: Disable radio button.

8. Click Submit.

   A page displays briefly to confirm the change, and the System Mode page redisplays.

9. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Part 3

Routing and IP-Related Features

About Part 3

Part 3 explains how to view information relating to Internet Protocol processing, and describes configuring theADSL2+ Router's IP routing features.

Part 3 contains the following chapters:

„ **Chapter 7, "Viewing System IP Addresses and IP Performance Statistics,"** shows how to view the IP information associated with the device interfaces and statistics related to IP packet processing.

„ **Chapter 8, "Configuring Dynamic Host Configuration Protocol,"** describes how to configure theADSL2+ Router's DHCP server and DHCP relay agent to dynamically assign IP information to your LAN PCs.

„ **Chapter 9, "Configuring DNS Server Addresses,"** describes how to specify the IP addresses for the Domain Name Servers that your LAN will use when accessing the Internet.

„ **Chapter 10, "Configuring IP Routes,"** describes how to create rules that specify the device interfaces through which data packets should be forwarded, based on their destination IP addresses.

„ **Chapter 11, "Configuring the Routing Information Protocol,"** explains how to configure a protocol that enables the ADSL2+ Router to share its routing information with other routers on your LAN or the Internet.

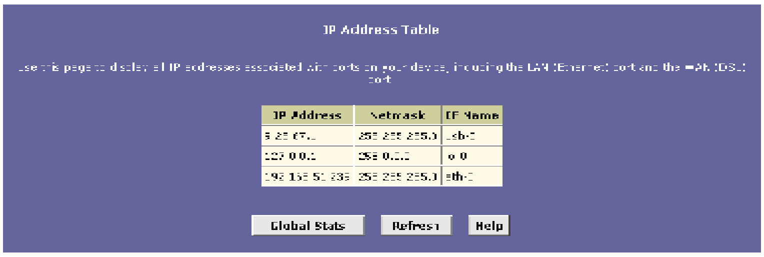
7 Viewing System IP Addresses and IP Performance Statistics

The interfaces on the ADSL2+ Router that communicate with other network and Internet devices are identified by unique Internet protocol (IP) addresses. You can use the Configuration Manager to view the list of IP addresses that your device uses, and to view other system and network performance data.

See Appendix A for a description of IP addresses and masks.

Viewing the ADSL2+ Router’s IP Addresses

To view the ADSL2+ Router’s IP addresses, click the Routing tab, and then click **IP Addr** in the task bar. The IP Address Table page displays:



IP Address Table

Use this page to display all IP addresses associated with ports on your device, including the LAN (Ethernet) port and the WAN (DSL) port

IP Address	Netmask	IF Name
5.25.67.1	255.255.255.0	usb-0
127.0.0.1	255.0.0.0	lo-0
192.168.51.235	255.255.255.0	eth-0

Figure 31. IP Address Table Page

The table lists the IP addresses, network masks (“Net Mask”), and interface names (“IF Name”) for each of its IP-enabled interfaces.

The listed IP addresses may include:

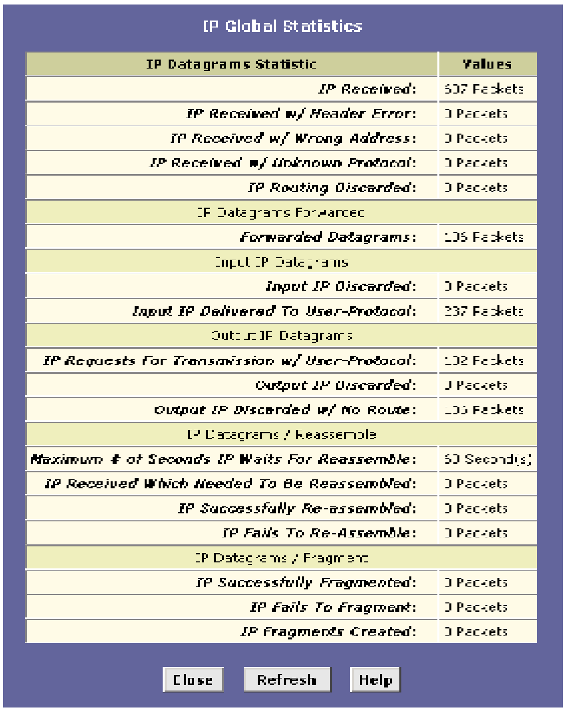
- The IP address of the device’s LAN (Ethernet) port, called *eth-0*. See Chapter 40 for instructions on configuring this address.
- The IP address of the device’s USB interface, named *usb-0*. See Chapter 40 for instructions on configuring this address.
- The IP address of the WAN (ADSL line) interface, which your ISP and other external devices use to identify your network. It may be identified in the Configuration Manager by the names *ppp-0*, *eoa-0*, or *ipoa-0*, depending on the protocol your device uses to communicate with your ISP. Your ISP may assign the same address each time, or it may change each time you reconnect.
- The “loopback” IP address, named *lo-0*, of 127.0.0.1. This special address enables the device to keep any data addressed directly to it, rather than route the data through the default interfaces.

If your device has additional IP-enabled interfaces, the IP addresses of these will also display.

Viewing IP Performance Statistics

You can view statistics on the processing of Internet protocol packets (a packet is a collection of data that has been bundled for transmission). You will not typically need to view this data, but you may find it helpful when working with your ISP to diagnose network and Internet data transmission problems.

To view global IP statistics, click **Global Stats** on the IP Address Table page. Figure 32 shows the IP Global Statistics page:



IP Datagrams Statistic	Values
IP Received:	507 Packets
IP Received w/ Header Error:	0 Packets
IP Received w/ Wrong Address:	0 Packets
IP Received w/ Unknown Protocol:	0 Packets
IP Routing Discarded:	0 Packets
IP Datagrams Forwarded	
Forwarded Datagrams:	106 Packets
Input IP Datagrams	
Input IP Discarded:	0 Packets
Input IP Delivered To User-Protocol:	237 Packets
Output IP Datagrams	
IP Requests For Transmission w/ User-Protocol:	102 Packets
Output IP Discarded:	0 Packets
Output IP Discarded w/ No Route:	106 Packets
IP Datagrams / Reassemble	
Maximum # of Seconds IP Waits For Reassemble:	60 Second(s)
IP Received Which Needed To Be Reassembled:	0 Packets
IP Successfully Re-assembled:	0 Packets
IP Fails To Re-Assemble:	0 Packets
IP Datagrams / Fragment	
IP Successfully Fragmented:	0 Packets
IP Fails To Fragment:	0 Packets
IP Fragments Created:	0 Packets

Figure 32. IP Global Statistics Page

To display updated statistics showing any new data since you opened the page, click **Refresh**.

8 Configuring Dynamic Host Configuration Protocol

You can configure your network and ADSL2+ Router to use the Dynamic Host Configuration Protocol (DHCP). This chapter provides an overview of DHCP and instructions for implementing it on your network.

Overview of DHCP

What is DHCP?

DHCP is a protocol that enables network administrators to centrally manage the assignment and distribution of IP information to computers on a network.

When you enable DHCP on a network, you allow a device — such as the ADSL2+ Router or a router located with your ISP — to assign temporary IP addresses to your computers whenever they connect to your network. The assigning device is called a *DHCP server*, and the receiving device is a *DHCP client*.

Note

> *If you followed the Quick Start instructions, you either configured each LAN PC with an IP address, or you specified that it will receive IP information dynamically (automatically). If you chose to have the information assigned dynamically, then you configured your PCs as DHCP clients that will accept IP addresses assigned from a DCHP server such as the ADSL2+ Router.*

The DHCP server draws from a defined pool of IP addresses and “leases” them for a specified amount of time to your computers when they log onto the network. It monitors, collects, and redistributes the addresses as needed.

On a DHCP-enabled network, the IP information is assigned *dynamically* rather than *statically.* A DHCP client can be assigned a different address from the pool each time it reconnects to the network.

Why use DHCP?

DHCP allows you to manage and distribute IP addresses throughout your network from a central computer. Without DHCP, you would have to configure each computer separately with IP addresses and related information. DHCP is commonly used with large networks and those that are frequently expanded or otherwise updated.

ADSL2+ Router DHCP modes

The device can be configured as a DHCP server, relay agent or client.

- If you configure the device as a DHCP server, it will maintain the pool of addresses and distribute them to your LAN computers. If the pool of addresses includes private IP addresses, you must also configure the Network Address Translation service, so that the private addresses can be translated to your public IP address on the Internet.
- If your ISP performs the DCHP server function for your network, then you can configure the device as a DHCP relay agent. When a computer logs onto the network, the ADSL2+ Router contacts the ISP for the necessary IP information, which it relays back to the computer.
- If you have another PC or device on your network already performing the DHCP server function, then you can configure the device’s LAN interface to be a DHCP client of that server (as are your PCs). This configuration is described in Chapter 4.

Note

You can input settings for both DHCP server and DHCP relay mode, and then activate either mode at any time. Deactivated settings are retained for your future use.

Configuring DHCP Server

Note

Before you begin, be sure to configure your PCs to accept DHCP information assigned by a DHCP server. See "Quick Start Part 2 — Configuring Your Computers," for instructions.

To set up DHCP server, you first define the ranges of IP addresses that you want to be distributed to your PCs, called DHCP server address pools.

Guidelines for creating DHCP server address pools

An IP address pool typically includes a range private addresses that you define. LAN administrators often define private IP addresses for use only on their networks. See "Overview of NAT" on page 109 for an explanation of private IP addresses. You can also use DHCP server pools to distribute multiple public IP addresses, if, for example, these are to be shared among a larger set of LAN computers.

You can create up to two DHCP server address pools. You can define a single pool with addresses that can be assigned to your LAN PCs (connected via the Ethernet port) and to a USB-connected computer, as long you have assigned to the USB and Ethernet interfaces static IP addresses that place them in the same subnet. See Appendix A for an explanation of subnets.

For example, assume you assigned the following addresses to the Ethernet and USB interfaces:

Ethernet interface (eth-0):	IP address 192.168.1.1 mask 255.255.255.0
USB interface (usb-0):	IP address 192.168.1.2 mask 255.255.255.0

Then you could create a single pool for assignment to all your PCs:

Pool 0:	192.168.1.3 through 192.168.1.20 mask 255.255.255.0

You can create a second pool – which must be in a different subnet than the first – if either of these circumstances apply:

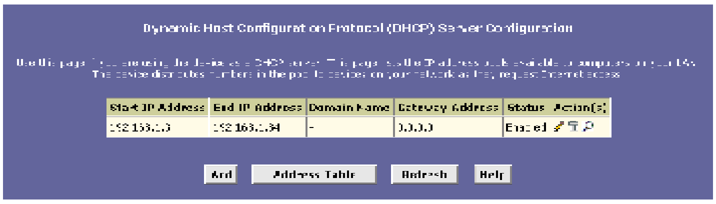
- You assigned static IP addresses to the device's Ethernet and USB interfaces that place them in different subnets (note that this is not required).

Adding DHCP Server Address Pools

Follow these instructions to create an IP address pool:

1. Log into Configuration Manager, click the LAN tab, and then click **DHCP Server** in the task bar.

   The DHCP Server Configuration page displays:



Dynamic Host Configuration Protocol (DHCP) Server Configuration

Use this page if you are using the device as a DHCP server. This page lists the IP address pools available to computers on your LAN. The device distributes numbers in the pool to devices on your network as they request Internet access.

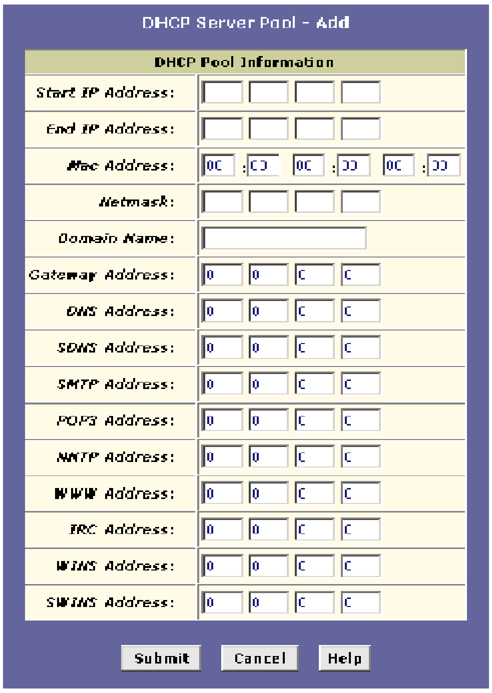
Start IP Address	End IP Address	Domain Name	Gateway Address	Status	Action(s)
192.168.1.3	192.168.1.34	-	0.0.0.0	Enabled	

Figure 33. DHCP Configuration Page

Depending on your preconfigured settings, the table may display up to two address pools, each in a row, or may be empty.

2. Click Add.

   The DHCP Server Pool – Add page displays:



DHCP Server Pool - Add

DHCP Pool Information	
Start IP Address:	
End IP Address:	
Mac Address:	00 : 00 : 00 : 00 : 00 : 00
Netmask:	
Domain Name:	
Gateway Address:	0 0 0 0
DNS Address:	0 0 0 0
SDNS Address:	0 0 0 0
SMTP Address:	0 0 0 0
POP3 Address:	0 0 0 0
NNTP Address:	0 0 0 0
WWW Address:	0 0 0 0
IRC Address:	0 0 0 0
WINS Address:	0 0 0 0
SWINS Address:	0 0 0 0

Figure 34. DHCP Server Pool – Add Page

3. Enter values for the *Start IP Address*, *End IP Address*, and *Net Mask* fields, which are required, and any others as needed:

Field	Description

Field	Description
Start/End IP Addresses	Specifies the lowest and highest addresses in the pool, up to a maximum range of 254 addresses. For example, if the LAN interface is assigned IP address 192.168.1.1, then you could create a pool with address range 192.168.1.2 – 192.168.1.254 for distribution to your LAN computers.
Mac Address	A MAC address is a manufacturer-assigned hardware ID that is unique for each device on a network. Use this field only if you want to assign a specific IP address to the computer that uses this MAC address. If you type a MAC address here, you must have specified the same IP address in both the Start IP Address and End IP Address fields.
Net Mask	Specifies which portion of each IP address in this range refers to the network and which portion refers to the host (computer). For a description of network masks and LAN network masks, see Appendix A. You can use the network mask to distinguish which pool of addresses should be distributed to a particular subnet (as explained on page 87).
Domain Name	A user-friendly name that refers to the subnet that includes the addresses in this pool. This is used for reference only.
Gateway Address	The address of the default gateway for computers that receive IP addresses from this pool. If no value is specified, then the appropriate LAN (eth-0) or USB (usb-0) port address on the device will be distributed to each PC as its gateway address, depending on how each is connected. See "Hops and gateways" on page 99 for an explanation of gateway addresses.
DNS/SDNS Address	The IP address of the Domain Name System server and Secondary Domain Name System server to be used by computers that receive IP addresses from this pool. These DNS servers translate common Internet names that you type into your web browser into their equivalent numeric IP addresses. Typically, these servers are located with your ISP.
SMTP...SWINS (optional)	The IP addresses of devices that perform various services for computers that receive IP addresses from this pool (such as the SMTP, or Simple Mail Transfer Protocol, server which handles e-mail traffic). Contact your ISP for these addresses.

4. When you are done defining the pool, click Submit.

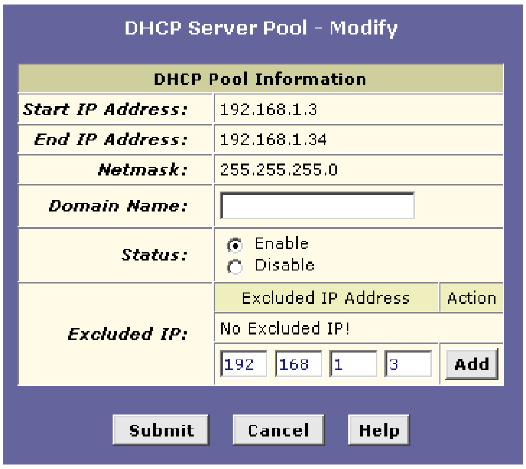
A confirmation page displays briefly to indicate that the pool has been added successfully. After a few seconds, the DHCP Server Pool – Add page displays with the newly added pool.

5. Follow the instructions in "Setting the DHCP Mode" on page 93 to enable the DHCP Server.

Viewing, modifying, and deleting address pools

To view, modify, or delete an existing address pool, display the DHCP Server Configuration page, and click the icons in the corresponding row in the address pool table.

- To delete an IP address pool, click 🗑, then submit and commit your changes.
- To view details on an IP address pool, click 🔍. A page displays with the same information that you entered when you added the pool.
- To modify the pool, click ✎ . The DHCP Server Pool – Modify page displays:



DHCP Server Pool - Modify

DHCP Pool Information

Start IP Address:	192.168.1.3
End IP Address:	192.168.1.34
Netmask:	255.255.255.0
Domain Name:	
Status:	● Enable ○ Disable
Excluded IP:	Excluded IP Address / Action No Excluded IP! 192 . 168 . 1 . 3 Add

Figure 35. DHCP Server Pool – Modify Page

You can change the domain name associated with an IP address pool or enable/disable the pool. By default, a pool is enabled when you create it.

If you want the changes to be permanent, follow the instructions on page 39 to commit them.

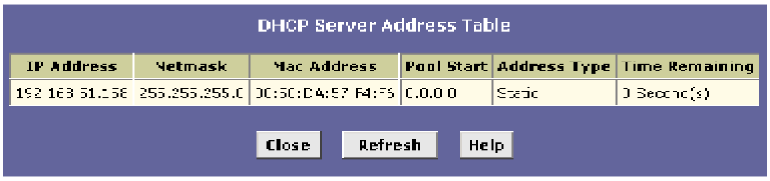
Excluding IP addresses from a pool

If you have IP addresses that are designated for fixed use with specific devices, or for some other reason you do not want to make them available to your network, you can exclude them from the pool. Display the DHCP Server Pool – Modify page, as shown in Figure 35. Type each address to be excluded in the Excluded IP field, and click Add. When you are done specifying excluded addresses, click Submit, and then use the Commit function to save your changes to permanent memory (see page 39).

Viewing current DHCP address assignments

When the ADSL2+ Router functions as a DHCP server for your LAN, it keeps a record of any addresses currently leased to your computers. To view a table of all current IP address assignments, display the DHCP Server Configuration page, and then click Address Table.

A page displays similar to that shown in Figure 36.


DHCP Server Address Table

IP Address	Netmask	Mac Address	Pool Start	Address Type	Time Remaining
192.168.51.138	255.255.255.0	00:50:D4:57:F4:F5	0.0.0.0	Static	0 Second(s)

Figure 36. DHCP Server Address Table Page

The DHCP Server Address Table lists any IP addresses that are currently leased to your computers. For each leased address, the table lists the following information:

Field	Description
IP Address	The address that has been leased from the pool.
Netmask	The network mask associated with the leased address. This identifies the network ID and host ID portions of the address (see Appendix A for an explanation of these terms).
Mac Address	The unique hardware ID of the computer to which the IP address has been assigned.
Pool Start	The lower boundary of the address pool (shown here to identify the pool from which the leased address was assigned).
Address Type	Can be *Static* or *Dynamic*. *Static* indicates that the IP number has been assigned permanently to the specific hardware device. *Dynamic* indicates that the number has been leased temporarily for a specified length of time.
Time Remaining	The amount of time left for the device to use the assigned address. The default lease time is 30 days.

Configuring DHCP Relay

Some ISPs perform the DHCP server function for their customers’ home/small office networks. In this case, you can configure the device as a DHCP relay agent. When a computer on your network requests Internet access, the ADSL2+ Router contacts your ISP to obtain an IP address (and other information), and then forwards that information to the computer. Follow these instructions to configure DHCP relay:

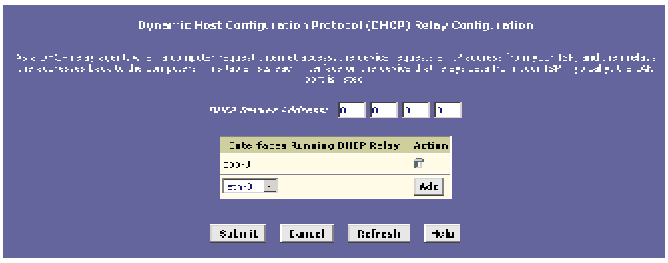
First, you must configure your PCs to accept DHCP information assigned by a DHCP server:

1. Open the Windows Control Panel and display the computer's Networking properties. Configure the TCP/IP properties to "Obtain an IP address automatically" (the actual text may vary depending on your operating system). For detailed instructions, see “Quick Start Part 2 — Configuring Your Computers,” for instructions.

Next, you specify the IP address of the DHCP server and select the interfaces on your network that will be using the relay service.

2. Log into the Configuration Manager, click the LAN tab, and then click **DHCP Relay** in the task bar.

   The DHCP Relay Configuration page displays:



Dynamic Host Configuration Protocol (DHCP) Relay Configuration

[illegible]

DHCP Server Address: 0 . 0 . 0 . 0

Interfaces Running DHCP Relay	Action
ppp-0	🗑
[illegible]	Add

Figure 37. DHCP Relay Configuration Page

3. In the DHCP Server Address fields, type the IP address of your ISP’s DHCP server.

   If you do not have this address, it is not essential to enter it here. Requests for IP information from your LAN will be passed to the default gateway, which should route the request appropriately.

4. Select the device’s WAN interface from the drop-down list and click **Add**.

   The WAN interface may be named ppp-0, eoa-0, or ipoa-0. Contact your ISP if you are unsure which type to use.

   (Note that you can also delete an interface from the table by clicking 🗑 in the right column.)

5. Click Submit.

   A page displays to confirm your changes, and the program returns to the DHCP Relay Configuration page.

6. Follow the instructions in “Setting the DHCP Mode” to set the DHCP mode to *DHCP Relay*.

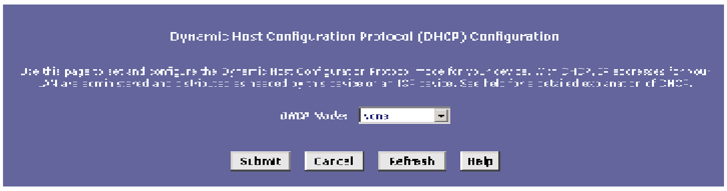
Setting the DHCP Mode

You must enable the appropriate DHCP mode to activate your DHCP relay or DHCP server settings.

Follow these instructions to set the DHCP mode:

1. Click the LAN tab, and then click **DHCP Mode** in the task bar.

   The DHCP Configuration page displays:



Dynamic Host Configuration Protocol (DHCP) Configuration

Use this page to set and configure the Dynamic Host Configuration Protocol mode for your device. With DHCP, IP addresses for your LAN are administered and distributed as needed by this device or an ISP device. See help for a detailed explanation of DHCP.

DHCP Mode: None

Figure 38. DHCP Configuration Page

2. From the DHCP Mode drop-down list, choose **DHCP Server**, **DHCP Relay**, or **None**.

   If you choose *none*, your LAN computers must be configured with static IP addresses.

3. Click Submit.

4. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

9 Configuring DNS Server Addresses

About DNS

Domain Name System (DNS) servers map the user-friendly domain names that users type into their Web browsers (e.g., "yahoo.com") to the equivalent numerical IP addresses that are used for Internet routing.

When a PC user types a domain name into a browser, the PC must first send a request to a DNS server to obtain the equivalent IP address. The DNS server will attempt to look up the domain name in its own database, and will communicate with higher-level DNS servers when the name cannot be found locally. When the address is found, it is sent back to the requesting PC and is referenced in IP packets for the remainder of the communication.

Assigning DNS Addresses to PCs

Multiple DNS addresses are useful to provide alternatives when one of the servers is down or is encountering heavy traffic. ISPs typically provide primary and secondary DNS addresses, and may provide additional addresses. Your LAN PCs learn these DNS addresses in one of the following ways:

- **Statically:** If your ISP provides you with their DNS server addresses, you can assign them to each PC by modifying the PCs' IP properties.
- **Dynamically from a DHCP pool:** You can configure the DHCP Server feature on the ADSL/Ethernet router and create an address pool that specifies the DNS addresses to be distributed to the PCs. Refer to “Configuring DHCP Server,” on page 87 for instructions on creating DHCP address pools.

In either case, you can specify the actual addresses of the ISP's DNS servers (on the PC or in the DHCP pool), or you can specify the address of the LAN interface on the ADSL/Ethernet router (e.g., 192.168.1.1). When you specify the LAN interface IP address, the device performs *DNS relay*, as described in the following section.

Note

If you specify the actual DNS server addresses on the PCs or in the DHCP pool, the DNS relay feature is not used.

Configuring DNS Relay

When you specify the ADSL2+ Router's LAN interface IP address as the DNS address, then the device automatically performs "DNS relay"; i.e., because the device itself is not a DNS server, it forwards domain name lookup requests it receives from the LAN PCs to a DNS server at the ISP. It then relays the DNS server's response to the PC.

When performing DNS relay, the ADSL2+ Router must maintain the IP addresses of the DNS servers it contacts. It can learn these addresses in either or both of the following ways:

- **Learned through PPP:** If the device uses a PPP connection to the ISP, the primary and secondary DNS addresses can be learned via the PPP protocol. To use this method, the "Use DNS" checkbox must be selected in the PPP interface properties. (See "Configuring PPP Interfaces," on page 53 for related instructions. Note that you cannot change this property by modifying an existing PPP interface; you must delete the interface and recreate it with the new setting.)

  Using this option is advantageous in that you will not need to reconfigure the PCs or the ADSL/Ethernet router if the ISP changes their DNS addresses.

- **Configured on the ADSL/Ethernet router:** You can use the device's DNS feature to specify the ISP's DNS addresses. If the device also uses a PPP interface with the "Use DNS" property enabled, then these configured addresses can be used in addition to the two addresses learned through PPP. If "Use DNS" is not enabled, or if a protocol other than PPP is used (such as EoA), then these configured addresses will be used as the primary and secondary DNS addresses.

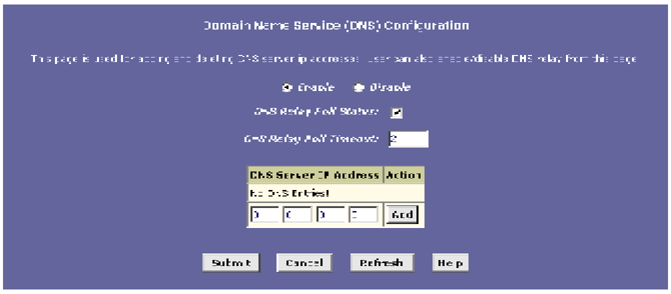
Follow these steps to configure DNS relay:

1. Configure the LAN PCs to use the ADSL/Ethernet router's LAN IP address as their DNS server address using either of the following methods:
   - by assigning the LAN IP address statically to each PC
   - by inputting the LAN IP address or the address *0.0.0.0* as the DNS address in the DHCP server pool used by the PCs.
2. If using a PPP connection to the ISP, click the "Use DNS" check box so that the DNS server addresses it learns are used for DNS relay.

   Or, ...

   If not using a PPP connection (or if you want to specify DNS addresses in addition to those learned through PPP), configure the DNS addresses on the ADSL/Ethernet router as follows:

a. Click the Services tab, and then click **DNS** in the task bar. The DNS Configuration page displays.



Domain Name Service (DNS) Configuration

This page is used for adding and deleting DNS server ip addresses. User can also enable/disable DNS relay from this page

● Enable ○ Disable

DNS Relay Poll Status: ☑

DNS Relay Poll Timeout: 2

DNS Server IP Address	Action
No DNS Entries!	
0 . 0 . 0 . 0	Add

Figure 39. DNS Configuration Page

b. Type the IP address of the DNS server in an empty row and click **Add**.

You can enter up to two addresses.

c. Click the **DNS Relay Poll Status** check box if you want the software to send regular test messages to the DNS servers to ensure that they remain up (recommended). If none of the specified DNS servers respond (including any acquired by PPP, which do not display in the table), then an alert will display in the System Log window (see the Admin tab, System Log page).

You can specify the interval in minutes between each DNS poll message in the **DNS Relay Poll Timeout** text box.

d. Click the Enable radio button, and then click **Submit**.

3. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Note

DNS addresses that are assigned to LAN PCs prior to enabling DNS relay will remain in effect until the PC is rebooted. DNS relay will only take effect when a PC's DNS address is the LAN IP address.

Similarly, if after enabling DNS relay, you specify a DNS address (other than the LAN IP address) in a DHCP pool or statically on a PC, then that address will be used instead of the DNS relay address.

10 Configuring IP Routes

You can use Configuration Manager to define specific routes for your Internet and network data. This chapter describes basic routing concepts and provides instructions for creating routes.

Note that most users do not need to define IP routes.

Overview of IP Routes

The essential challenge of a router is: when it receives data intended for a particular destination, which next device should it send that data to? When you define IP routes, you provide the rules that a computer uses to make these decisions.

IP routing versus telephone switching

IP routing decisions are similar to those made by switchboards that handle telephone calls.

When you dial a long distance telephone number, you are first connected to a switchboard operated by your local phone service carrier. All calls you initiate go first to this main switchboard.

If the phone number you dialed is outside your calling area, the switchboard opens a connection to a higher-level switchboard for long distance calls. That switchboard looks at the area code you dialed and connects you with another switchboard that serves that area. This new switchboard, in turn, may look at the prefix in the number you dialed (the middle set of three numbers) and connect to a more localized switchboard that handles numbers with that prefix. This final switchboard can then look at the last four digits of the phone number to open a connection with the person or company you dialed.

In comparison, when your computer initiates communication over the Internet, such as viewing a web page connecting to an web server, the data it sends out includes the IP address of the destination computer (the “phone number”). All your outgoing requests first go to the same router at your ISP (the first “switchboard”). That router looks at the network ID portion of the destination address (the “area code”) and determines which next router to send the request to. After several such passes, the request arrives at a router for the destination network, which then uses the host ID portion of the destination IP address (the local “phone number”) to route the request to the appropriate computer. (The network ID and host ID portions of IP addresses are explained in Appendix A.)

With both the telephone and the computer, all transactions are initially sent to the same switchboard or router, which serves as a gateway to other higher- or lower-level devices. No single device knows at the outset the eventual path the data will take, but each uses a specific part of the destination address/phone number to make a decision about which device to connect to next.

Hops and gateways

Each time Internet data is passed from one Internet address to another, it is said to take a *hop*. A hop can be a handoff to a different port on the same device, to a different device on the same network, or to a device on an entirely different network.

When a hop passes data from one type of network to another, it uses a *gateway*. A gateway is an IP address that provides initial access to a network, just as a switchboard serves as a gateway to a specific set of phone numbers. For example, when a computer on your LAN requests access to a company's web site, your ISP serves as a gateway to the Internet. As your request reaches its destination, another gateway provides access to the company's web servers.

Using IP routes to define default gateways

IP routes are defined on computers, routers, and other IP-enabled devices to instruct them which hop to take, or which gateway to use, to help forward data along to its specified destination.

If no IP route is defined for a destination, then IP data is passed to a predetermined *default gateway*. The default gateway serves like a higher-level telephone switchboard; it may not be able to connect directly to the destination, but it will know a set of other devices that can help pass the data intelligently. If it cannot determine which of these devices provides a good next hop (because no such route has been defined), then that device will forward the data to *its* default gateway. Eventually, a high level device, using a predefined IP route, will be able to forward the data along a path to its destination.

Do I need to define IP routes?

Most users do not need to define IP routes. On a typical small home or office LAN, the existing routes that set up the default gateways for your LAN computers and for the ADSL2+ Router provide the most appropriate path for all your Internet traffic.

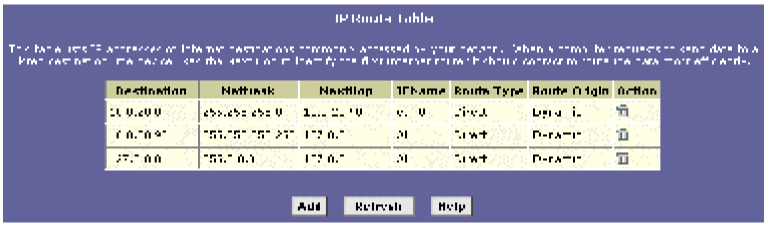
- On your LAN computers, a default gateway directs all Internet traffic to the LAN interface on the ADSL2+ Router. (assuming the device is configured in Routing mode). Your LAN computers know their default gateway either because you assigned it to them when you modified their TCP/IP properties, or because you configured them to receive the information dynamically from a server whenever they access the Internet. (Each of these processes is described in "Quick Start Part 2 — Configuring Your Computers.")
- On the ADSL2+ Router itself, a default gateway is defined to direct all outbound Internet traffic to a router at your ISP. This default gateway is assigned automatically by your ISP whenever the device negotiates an Internet connection. (The process for adding a default route is described on page 102.)

You may need to define routes if your home setup includes two or more networks or subnets, if you connect to two or more ISP services, or if you connect to a remote corporate LAN.

Viewing the IP Routing Table

All IP-enabled computers and routers maintain a table of IP addresses that are commonly accessed by their users. For each of these *destination IP addresses*, the table lists the IP address of the first hop the data should take. This table is known as the device's *routing table*.

To view the ADSL2+ Router's routing table, click the Routing tab. The IP Route page displays by default:



IP Route Table

[illegible]

Destination	Netmask	NextHop	IFName	Route Type	Route Origin	Action
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	🗑
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	🗑
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	🗑

Figure 40. IP Route Table Page

The IP Route Table displays a row for each existing route. These include routes that were predefined on the device, routes you may have added, and routes that the device has identified automatically through communication with other devices.

The routing table should reflect a default gateway, which directs outbound Internet traffic to your ISP. This default gateway is shown in the row containing destination address 0.0.0.0.

The following table defines the fields in the IP Routing Table.

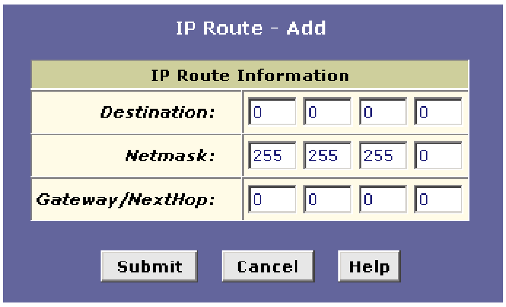
Field	Description
Destination	Specifies the IP address of the destination computer. The destination can specified as the IP address of a specific computer or an entire network. It can also be specified as all zeros to indicate that this route should be used for all destinations for which no other route is defined (this is the route that creates the default gateway).
Netmask	Indicates which parts of the destination address refer to the network and which parts refer to a computer on the network. Refer to Appendix A, for an explanation of network masks. The default gateway uses a netmask of 0.0.0.0.
NextHop	Specifies the *next* IP address to send data to when its final destination is that shown in the destination column.
IFName	Displays the name of the interface on the device through which data is forwarded to the specified next hop.
Route Type	Indicates whether the route is direct or indirect. In a *direct* route, the source and destination computers are on the same network, and the router attempts to directly deliver the data to the computer. In an *indirect* route, the source and destination computers are on different networks, and the router forwards data to a device on another network for further handling.
Route Origin	Displays how the route was defined. *Dynamic* indicates that the route was created automatically or predefined by your ISP or the manufacturer. Routes you create are labeled *Local*. Other routes may be created automatically (using RIP, as described in Chapter 11), or defined remotely through various network management protocols (LCL or ICMP).
Action	Displays an icon (🗑) you can click on to delete a route.

Adding IP Routes

Follow these instructions to add an IP route to the routing table.

1. From the IP Route Table page, click Add.

   The IP Route – Add page displays:



IP Route - Add

IP Route Information				
Destination:	0	0	0	0
Netmask:	255	255	255	0
Gateway/NextHop:	0	0	0	0

Figure 41. IP Route – Add Page

2. Specify the destination, network mask, and gateway or next hop for this route.

   For a description of these fields, refer to the table on page 101.

   To create a route that defines the default gateway for your LAN, enter *0.0.0.0* in both the Destination and Netmask fields. Enter your ISP's IP address in the Gateway/NextHop field.

   Note that you cannot specify the interface name, route type or route origin. These parameters are used only for routes that are identified automatically as the device communicates with other routing devices. For routes you create, the routing table displays system default values in these fields.

3. Click Submit.

4. On the confirmation page, click Close to return to the IP Route table.

   The IP Routing Table will now display the new route.

5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

11 Configuring the Routing Information Protocol

The ADSL2+ Router can be configured to communicate with other routing devices to determine the best path for sending data to its intended destination. Routing devices communicate this information using a variety of IP protocols. This chapter describes how to configure the ADSL2+ Router to use one of these, called the Routing Information Protocol (RIP).

RIP Overview

RIP is an Internet protocol you can set up to share routing table information with other routing devices on your LAN, at your ISP's location, or on remote networks connected via the ADSL line. Generally, RIP is used to enable communication on *autonomous* networks. An autonomous network is one in which all computers are administered by the same entity. An autonomous network may be a single network, or a grouping of several networks under the same administration. An example of an autonomous network is a corporate LAN, including devices that can access it from remote locations, such as the computers telecommuters use.

Using RIP, each device sends its routing table to its closest neighbor every 30 seconds. The neighboring device in turn passes the information on to its next neighbor and so on until all devices in the autonomous network have the same set of routes.

When should you configure RIP?

Most small home or office networks do not need to use RIP; they have only one router, such as the ADSL2+ Router, and one path to an ISP. In these cases, there is no need to share routes, because all Internet data from the network is sent to the same ISP gateway.

You may want to configure RIP if any of the following circumstances apply to your network:

- Your home network setup includes an additional router or RIP-enabled PC (other than the ADSL2+ Router). The ADSL2+ Router and the router will need to communicate via RIP to share their routing tables.
- Your network connects via the ADSL line to a remote network, such as a corporate network. In order for your LAN to learn the routes used within your corporate network, they should *both* be configured with RIP.
- Your ISP requests that you run RIP for communication with devices on their network.

Configuring the ADSL2+ Router's Interfaces with RIP

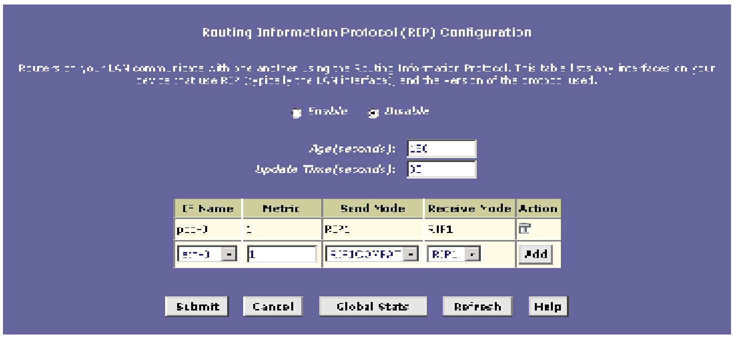
The following instructions describe how to enable RIP on the ADSL2+ Router.

Note

> *In order for the ADSL2+ Router to communicate with other devices using RIP, you must also enable the other devices to use the protocol. See the product documentation for those devices.*

1. Log into the Configuration Manager, click the Services tab, and then click **RIP** in the task bar.

   The RIP Configuration page displays:



Routing Information Protocol (RIP) Configuration

Routers on your LAN communicate with one another using the Routing Information Protocol. This table lists any interfaces on your device that use RIP (typically the LAN interface), and the version of the protocol used.

○ Enable ● Disable

Age(seconds): 180

Update Time(seconds): 30

IF Name	Metric	Send Mode	Receive Mode	Action
ppp-0	1	RIP1	RIP1	🗑
eth-0	1	RIP1COMPAT	RIP1	Add

Figure 42. RIP Configuration Page

The page contains radio buttons for enabling or disabling the RIP feature and a table listing interfaces on which the protocol is currently running. The first time you open this page, the table may be empty.

2. If necessary, change the Age and Update Time values.

   These are global settings for all interfaces that use RIP.

   „ *Age* is the amount of time in seconds that the device's RIP table will retain each route that it learns from adjacent computers.

   „ *Update Time* specifies how frequently the ADSL2+ Router will send out its routing table to its neighbors.

3. In the IFName column, select the name of the interface on which you want to enable RIP.

   For communication with RIP-enabled devices on your LAN, select the LAN interface (usually eth-0).

   For communication with your ISP or a remote LAN, select the PPP, EoA, or other WAN interface used for that connection.

   (See page 83 for a description of various interfaces and their names.)

4. Select a metric value for the interface.

   RIP uses a "hop count" as a way to determine the best path to a given destination in the network. The hop count is the sum of the metric values assigned to each port through which data is passed before reaching the destination. Among several alternative routes, the one with the lowest hop count is considered the fastest path.

For example, if you assign this port a metric of 1, then RIP will add 1 to the hop count when calculating a route that passes through this port. If you know that communication via this interface is slower than through other interfaces on your network, you can assign it a higher metric value than the others.

You can select any integer from 1 to 15.

5. Select a Send Mode and a Receive Mode.

   The Send Mode setting indicates the RIP version this interface will use when it sends its route information to other devices.

   The Receive Mode setting indicates the RIP version(s) in which information must be passed to the ADSL2+ Router in order for it to be accepted into its routing table.

   RIP version 1 is the original RIP protocol. Select RIP1 if you have devices that communicate with this interface that understand RIP version 1 only.

   RIP version 2 is the preferred selection because it supports “classless” IP addresses (which are used to create subnets) and other features. Select RIP2 if all other routing devices on the autonomous network support this version of the protocol.

6. Click Add.

   The new RIP entry will display in the table.

7. Click the Enable radio button to enable the RIP feature.

Note

If you disable the RIP feature, the interface settings you have configured will remain available for future activation.

8. Click Submit.

   A page displays to confirm your changes.

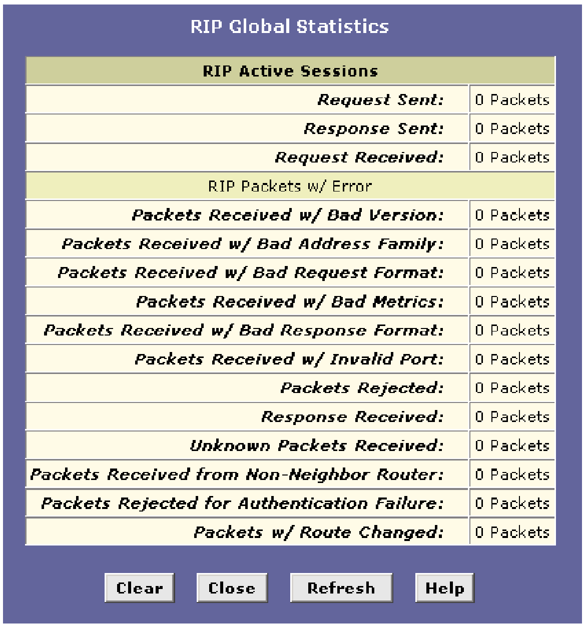
9. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Note

You can delete an existing RIP entry by clicking 🗑 in the Action column.

Viewing RIP Statistics

From the RIP Configuration page, you can click Global Stats to view statistics on attempts to send and receive route table data over RIP-enabled interfaces on the ADSL2+ Router.



RIP Global Statistics

RIP Active Sessions	
Request Sent:	0 Packets
Response Sent:	0 Packets
Request Received:	0 Packets
RIP Packets w/ Error	
Packets Received w/ Bad Version:	0 Packets
Packets Received w/ Bad Address Family:	0 Packets
Packets Received w/ Bad Request Format:	0 Packets
Packets Received w/ Bad Metrics:	0 Packets
Packets Received w/ Bad Response Format:	0 Packets
Packets Received w/ Invalid Port:	0 Packets
Packets Rejected:	0 Packets
Response Received:	0 Packets
Unknown Packets Received:	0 Packets
Packets Received from Non-Neighbor Router:	0 Packets
Packets Rejected for Authentication Failure:	0 Packets
Packets w/ Route Changed:	0 Packets

Figure 43. RIP Global Statistics Page

You can click Clear to reset all statistics to zero and Refresh to display any newly accumulated data.

Part 4

Security Features

About Part 4

Part 4 describes features you can configure to provide security to your network.

Part 4 contains the following chapters:

- **Chapter 12, “Configuring Network Address Translation,”** explains how NAT works to allow one public Internet address to be shared among multiple PCs on your LAN. This chapter explains how to configure NAT rules of various types.
- **Chapter 13, “Configuring Firewall Settings,”** describes the protections available in the embedded firewall and how to enable and disable them.
- **Chapter 14, “Configuring Filters and Blocking Protocols,”** describes how to create filters that allow or disallow various types of content and how to block certain types of protocols from entering or exiting your LAN.

12 Configuring Network Address Translation

This chapter provides an overview of Network Address Translation (NAT) and instructions for modifying theADSL2+ Router's default configuration.

Overview of NAT

Network Address Translation is a method for disguising the private IP addresses you use on your LAN as the public IP address you use on the Internet. You define NAT rules that specify exactly how and when to translate between public and private IP addresses.

Definitions

*A **private IP address** is created by a network administrator for use only on a LAN, whereas a **public IP address** is purchased from the Internet Corporation for Assigned Names and Numbers (ICANN) for use on the Internet. Typically, your ISP provides a public IP address for your entire LAN, and you define the private addresses for computers on your LAN.*

In a typical NAT setup, your ISP provides you with a single public IP address to use for your entire network. Then, you assign each computer on your LAN a unique private IP address. (Or, you define a pool of private IP addresses for dynamic assignment to your computers, as described in Chapter 8.) On the ADSL2+ Router, you set up a NAT rule to specify that whenever one of your computers communicates with the Internet, (that is, it sends and receives IP *data packets*) its private IP address—which is referenced in each packet—will be replaced by the LAN's public IP address.

Definitions

*An **IP data packet** contains bits of data bundled together in a specific format for efficient transmission over the Internet. Such packets are the building blocks of all Internet communication. Each packet contains header information that identifies the IP address of the computer that initiates the communication (the **source IP address**), the port number that the router associates with that computer (the **source port number**), the IP address of the targeted Internet computer (the **destination IP address**), and other information.*

When this type of NAT rule is applied, because the source IP address is swapped out, it appears to other Internet computers as if the data packets are actually originating from the computer assigned your public IP address (in this case, the ADSL2+ Router).

The NAT rule could further be defined to disguise the source port in the data packet (i.e., change it to another number), so that outside computers will not be able to determine the actual port from which the packet originated. Data packets that arrive in response contain the public IP address as the destination IP address and the disguised source port number. The ADSl2+ Router changes the IP address and source port number back to the original values (having kept track of the changes it made earlier), and then routes the packet to the originating computer.

NAT rules such as these provide several benefits:

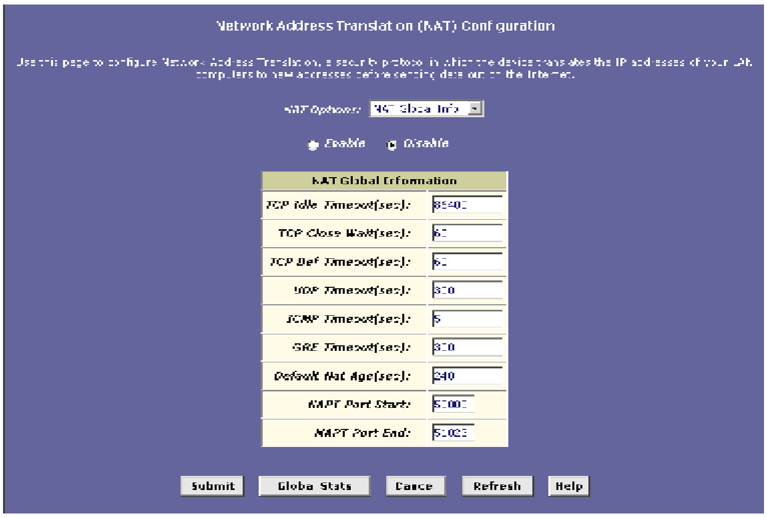
- They eliminate the need for purchasing multiple public IP addresses for computers on your LAN. You can make up your own private IP addresses at no cost, and then have them translated to the public IP address when your computers access the Internet.
- They provide a measure of security for you LAN by enabling you to assign private IP addresses and then have these and the source port numbers swapped out before your computers access the Internet.

The type of NAT function described above is called *network address port translation* (NAPT). You can use other types, called *flavors*, of NAT for other purposes; for example, providing outside access to your LAN or translating multiple private addresses to multiple public addresses.

For a description of NAPT rules, see page 117.

Viewing NAT Global Settings and Statistics

To view your NAT settings, log into Configuration Manager, and click the Services tab. The NAT Configuration page displays by default:



Network Address Translation (NAT) Configuration

Use this page to configure Network Address Translation, a security protocol in which the device translates the IP addresses of your LAN computers to new addresses before sending data out on the Internet.

NAT Options: NAT Global Info

● Enable ○ Disable

NAT Global Information	
TCP Idle Timeout(sec):	86400
TCP Close Wait(sec):	60
TCP Def Timeout(sec):	60
UDP Timeout(sec):	300
ICMP Timeout(sec):	5
GRE Timeout(sec):	300
Default Nat Age(sec):	240
NAPT Port Start:	51001
NAPT Port End:	51023

Figure 44. NAT Configuration Page

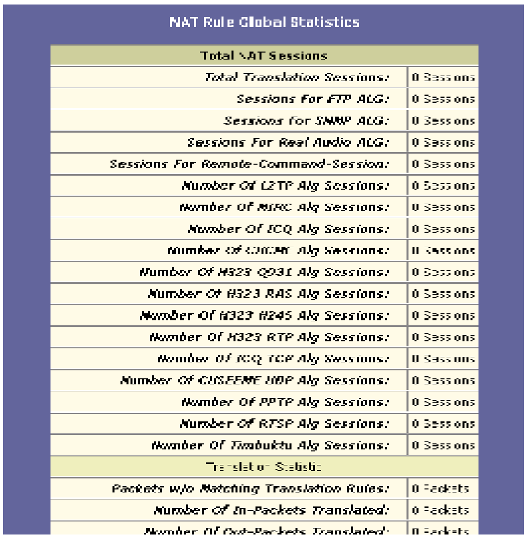
The NAT Configuration page contains the following elements:

- The NAT Options drop-down list, which provides access to the NAT Configuration page and Global Information table (shown by default and in Figure 44), the NAT Rule Configuration page (see Figure 46), and the NAT Translations page (see Figure 48).
- Enable/Disable radio buttons, which allow you to turn on or off the NAT feature.
- The NAT Global Information table, which displays the following settings that apply to all NAT rule translations:

Field	Description
TCP Idle Timeout (sec) *TCP Close Wait (sec)* *TCP Def Timeout (sec)*	When two computers communicate via the Internet, a TCP-based communication session is created between them to control the exchange of data packets. The TCP session can be viewed as being in one of three states, depending on the types of packets being transferred: the **establishing state**, where the connection is being set up, the **active state**, where the connection is being used to transfer data, and the **closing state**, in which the connection is being shut down. When a NAT rule is in effect on a TCP session in the active state, the session will timeout if no packets are received for the time specified in *TCP Idle Timeout*. When in the closing state, the session will timeout if no packets are received for the time specified in *TCP Close Wait*. When in the establishing state, the session will timeout if no packets are received for the time specified in *TCP Def Timeout*.
UDP Timeout (sec)	Same as TCP Idle Timeout, but for UDP-based communication sessions.
ICMP Timeout (sec)	Same as TCP Idle Timeout, but for ICMP-based communication sessions.
GRE Timeout (sec)	Same as TCP Idle Timeout, but for GRE-based communication sessions.
Default Nat Age (sec)	For all other NAT translation sessions, the number of seconds after which a translation session will no longer be valid if no packets are received.
NAPT Port Start/End	When an NAPT rule is defined, the source ports will be translated to sequential numbers in this range.

If you change any values, click Submit. Then click the Admin tab and commit your changes to permanent system memory (see page 39).

You can click Global Stats to view accumulated data on how many NAT rules have been invoked and how much data has been translated. A page displays similar to the one shown in Figure 45.



NAT Rule Global Statistics

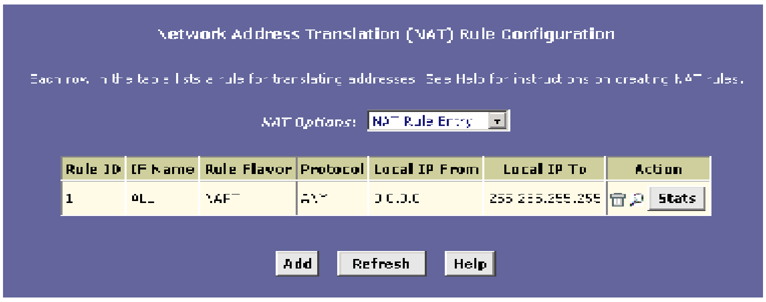
Total NAT Sessions	
Total Translation Sessions:	0 Sessions
Sessions For FTP ALG:	0 Sessions
Sessions For SNMP ALG:	0 Sessions
Sessions For Real Audio ALG:	0 Sessions
Sessions For Remote-Command-Session:	0 Sessions
Number Of L2TP Alg Sessions:	0 Sessions
Number Of MIRC Alg Sessions:	0 Sessions
Number Of ICQ Alg Sessions:	0 Sessions
Number Of CUCME Alg Sessions:	0 Sessions
Number Of H323 Q931 Alg Sessions:	0 Sessions
Number Of H323 RAS Alg Sessions:	0 Sessions
Number Of H323 H245 Alg Sessions:	0 Sessions
Number Of H323 RTP Alg Sessions:	0 Sessions
Number Of ICQ TCP Alg Sessions:	0 Sessions
Number Of CUSEEME UDP Alg Sessions:	0 Sessions
Number Of PPTP Alg Sessions:	0 Sessions
Number Of RTSP Alg Sessions:	0 Sessions
Number Of Timbuktu Alg Sessions:	0 Sessions
Translation Statistic	
Packets w/o Matching Translation Rules:	0 Packets
Number Of In-Packets Translated:	0 Packets
Number Of Out-Packets Translated:	0 Packets

Figure 45. NAT Rule Global Statistics Page

The table provides basic information for each NAT rule you have set up. You can click Clear to restart the accumulation of the statistics at their initial values.

Viewing NAT Rules and Rule Statistics

To view the NAT rules currently defined on your system, select **NAT Rule Entry** in the NAT Options drop-down list. The NAT Rule Configuration page displays:



Network Address Translation (NAT) Rule Configuration

Each row in the table lists a rule for translating addresses. See Help for instructions on creating NAT rules.

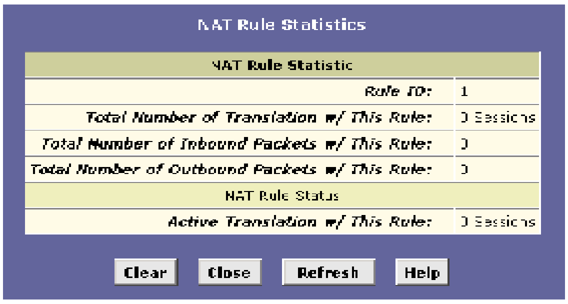
NAT Options: NAT Rule Entry

Rule ID	IF Name	Rule Flavor	Protocol	Local IP From	Local IP To	Action
1	ALL	NAPT	ANY	0.0.0.0	255.255.255.255	🗑 🔍 Stats

Figure 46. NAT Rule Configuration Page

The NAT Rule Configuration table displays a row containing basic information for each rule. For a description of these fields, refer to the instructions for adding rules (pages 117 through 126).

From the NAT Rule Configuration page, you can click **Add** to add a new rule, or use the icons in the right column to delete (🗑) or view details on (🔍) a rule. To view data on how often a specific NAT rule has been used, click **Stats** in the Action(s) column. A page displays similar to the one shown in Figure 47:



NAT Rule Statistics

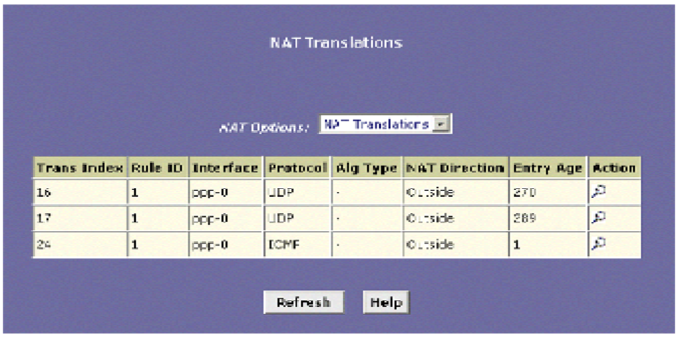
NAT Rule Statistic	
Rule ID:	1
Total Number of Translation w/ This Rule:	0 Sessions
Total Number of Inbound Packets w/ This Rule:	0
Total Number of Outbound Packets w/ This Rule:	0
NAT Rule Status	
Active Translation w/ This Rule:	0 Sessions

Figure 47. NAT Rule Statistics Page

The statistics show how many times this rule has been invoked and how many currently active sessions are using this rule. You can click **Clear** to reset the statistics to zeros and **Refresh** to display newly accumulated data.

Viewing Current NAT Translations

To view a list of NAT translations that have recently been performed and which remain in effect (for any of the defined rules), select **NAT Translations** from the NAT Options drop-down list. The NAT Translations page displays:



NAT Translations

NAT Options: NAT Translations

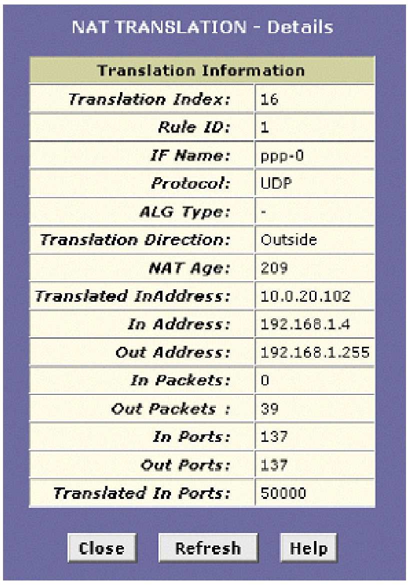
Trans Index	Rule ID	Interface	Protocol	Alg Type	NAT Direction	Entry Age	Action
16	1	ppp-0	UDP	-	Outside	270	🔍
17	1	ppp-0	UDP	-	Outside	289	🔍
24	1	ppp-0	ICMP	-	Outside	1	🔍

Figure 48. NAT Translations Page

For each current NAT translation session, the table contains the following fields:

Field	Description
Trans Index	The sequential number assigned to the IP session used by this NAT translation session.
Rule ID	The ID of the NAT rule invoked.
Interface	The device interface on which the NAT rule was invoked (from the rule definition).
Protocol	The IP protocol used by the data packets that are undergoing translations (from the rule definition) Example: TCP, UDP, ICMP.
Alg Type	The *Application Level Gateway* (ALG), if any, that was used to enable this NAT translation (ALGs are special settings that certain applications require in order to work while NAT is enabled).
NAT Direction	The direction (Inside or Outside) of the translation. A NAT direction is assigned to each interface; the Ethernet and USB interfaces are defined as *inside*, and the WAN interfaces are defined as *outside*. The NAT direction is determined by the interface on which the rule is invoked.
Entry Age	The elapsed time, in seconds, of the NAT translation session.

You can click 🔍 in the Action column to view additional details about a NAT translation session:



NAT TRANSLATION - Details

Translation Information	
Translation Index:	16
Rule ID:	1
IF Name:	ppp-0
Protocol:	UDP
ALG Type:	-
Translation Direction:	Outside
NAT Age:	209
Translated InAddress:	10.0.20.102
In Address:	192.168.1.4
Out Address:	192.168.1.255
In Packets:	0
Out Packets :	39
In Ports:	137
Out Ports:	137
Translated In Ports:	50000

Figure 49. NAT Translation – Details Page

In addition to the information displayed in the NAT Translations table, this table displays the following for the selected current translation sessions:

Field	Description
Translated InAddress	The public IP address to which the private IP address was translated.
In Address	The private IP address that was translated.
Out Address	The IP address of the outside destination (web, ftp site, etc.).
In/Out Packets	The number of incoming and outgoing IP packets that have been translated in this translation session.
In Ports	The actual port number corresponding to the LAN computer.
Out Ports	The port number associated with the destination address.
Translated In Ports	The port number to which the LAN computer's actual port number was translated.

Adding NAT Rules

This section explains how to create rules for each NAT flavor.

Note

> *You cannot edit existing NAT rules. To change a rule setup, delete it and add a new rule with the new settings.*

The NAPT rule: Translating between private and public IP addresses

Follow these instructions to create a rule for translating the private IP addresses on your LAN to your public IP address. This type of rule uses the NAT flavor *NAPT*, which was used in your default configuration. The NAPT flavor translates private source IP addresses to a single public IP address. The NAPT rule also translates the source port numbers to port numbers that are defined on the NAT Global Configuration page (see page 111). The introduction to NAT on page 109 describes how the NAPT rule works.

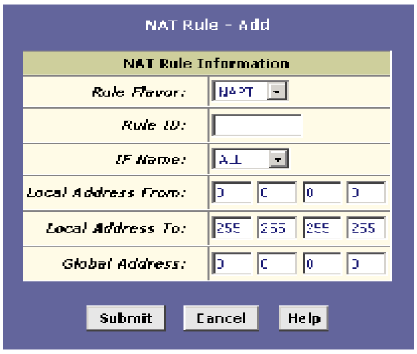
1. Click the NAT tab, and then select **NAT Rule Entry** from the NAT Options drop-down list.

   The NAT Rule entry page displays, as shown on page 114.

2. Click **Add** to display the NAT Rule – Add page.

3. From the Rule Flavor drop-down list, select *NAPT*.

   The page redisplays with only those fields that are appropriate for the NAPT rule flavor:



NAT Rule - Add

NAT Rule Information				
Rule Flavor:	NAPT			
Rule ID:				
IF Name:	ALL			
Local Address From:	0	0	0	0
Local Address To:	255	255	255	255
Global Address:	0	0	0	0

Figure 50. NAT Rule – Add Page (NAPT Flavor)

4. Enter a Rule ID.

   The Rule ID determines the order in which rules are invoked (the lowest numbered rule is invoked first, and so on). If you define two or more rules that act on the same set of IP addresses, be sure to assign the Rule ID so that the higher priority rules are invoked first. It is recommended that you specify rule IDs as multiples of 5 or 10 so that, in the future, you can insert a rule between two existing rules.

   When a data packet matches a rule, the data is acted upon according to that rule and is not subjected to higher-numbered rules.

5. From the IFName drop-down list, select the interface on the device to which this rule applies.

   Typically, NAT rules are used for communication between your LAN and the Internet. Because the device uses the WAN interface (which may be named *ppp-0*, *eoa-0*, or *ipoa-0*) to connect your LAN to your ISP, it is the usual IFName selection.

6. In the Local Address From field and Local Address To fields, type the starting and ending IP addresses, respectively, of the range of private address you use on your network that you want to be translated.

   You can specify that data from all LAN addresses should be translated by typing 0 (zero) in each From field and 255 in each To field. Or, type the same address in both fields if the rule only applies to one computer.

7. In the Global Address From and Global Address To fields, type the public IP address assigned to you by your ISP.

   If you have multiple WAN interfaces, in both fields type the IP address of the interface to which this rule applies. This rule will not be enforced for data that arrives on other WAN interfaces.

   If you have multiple WAN interfaces and want the rule to be enforced on a range of them, type the starting and ending IP addresses of the range.

8. Click Submit.

9. When a page displays to confirm your change, click Close to return to the NAT Configuration page.

   The new rule should display in the NAT Rule Configuration table.

10. Ensure that the Enable radio button is selected, and then click Submit.

    A page displays to confirm your changes.

11. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

The RDR rule: Allowing external access to a LAN computer

You can create an RDR rule to make a computer on your LAN, such as a Web or FTP server, available to Internet users without having to obtain a public IP address for that computer. The computer's private IP address is translated to your public IP address in all incoming and outgoing data packets.

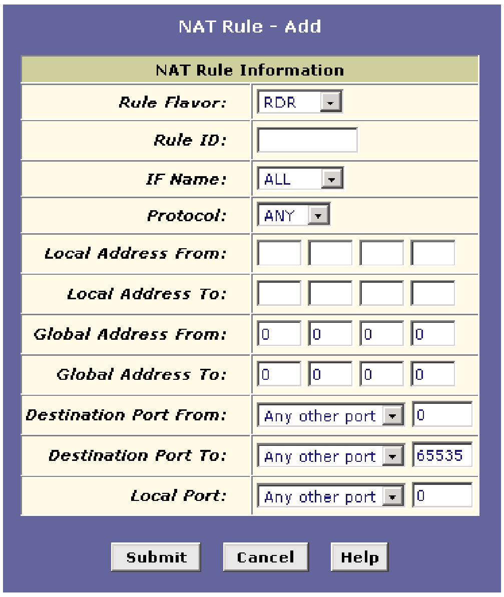
Note

Without an RDR rule (or Bimap rule described on page 125), the ADSL2+ Router blocks attempts by external computers to access your LAN computers.

The following example illustrates using the RDR rule to provide external access to your web server:

> Your ADSL/Ethernet router receives a packet containing a request for access to your Web server. The packet header contains the public address for your LAN as the destination IP address, and a destination port number of 80. Because you have set up an RDR rule for incoming packets with destination port 80, the device recognizes the data as a request for Web server access. The device changes the packet's destination address to the private IP address of your Web server and forwards the data packet to it.
>
> Your Web server sends data packets in response. Before the ADSL/Ethernet router forwards them on to the Internet, it changes the source IP address in the data packets from the Web server's private address to your LAN's public address. To an external Internet user then, it appears as if your Web server uses your public IP address.

Figure 51 shows the fields used to establish an RDR rule:



NAT Rule - Add

NAT Rule Information

Rule Flavor:	RDR
Rule ID:	
IF Name:	ALL
Protocol:	ANY
Local Address From:	
Local Address To:	
Global Address From:	0 . 0 . 0 . 0
Global Address To:	0 . 0 . 0 . 0
Destination Port From:	Any other port 0
Destination Port To:	Any other port 65535
Local Port:	Any other port 0

Figure 51. NAT Rule – Add Page (RDR Flavor)

Follow these instructions to add an RDR rule (see steps 1-4 under "The NAPT rule" on page 117 for specific instructions corresponding to steps 1 and 2 below):

1. Display the NAT Rule – Add Page, select **RDR** as the Rule Flavor, if necessary, and enter a Rule ID.
2. Select the interface on which this rule will be effective.
3. Select a protocol to which this rule applies, or choose **ANY**.

   This selection specifies which type of Internet communication will be subject to this translation rule. You can select ANY if the rule applies to all data. Or, select TCP, UDP, ICMP, or a number from 1-255 that represents the Internet Assigned Numbers Authority (IANA)-specified protocol number.
4. In the Local Address From and Local Address To fields, type the same private IP address, or the lowest and highest addresses in a range:

   - If you type the same IP address in both fields, incoming traffic that matches the criteria you specify in steps 5 and 6 will be redirected to that IP address.
   - If you type a range of addresses, incoming traffic will be redirected to any available computer in that range. This option would typically be used for load balancing, whereby traffic is distributed among several redundant servers to help ensure efficient network performance.

   These addresses should correspond to private addresses already in use on your network (either assigned statically to your PCs or assigned dynamically using DHCP, as discussed in "Quick Start Part 2 — Configuring Your Computers").
5. In the Global Address From and Global Address To fields, type the public IP address assigned to you by your ISP.

   If you have multiple WAN (PPP) interfaces, note that this rule will not be enforced for data that arrives on WAN interfaces not specified here.

   If you have multiple WAN interfaces and want the rule to be enforced on more than one of them (or all), enter a range of IP addresses that includes them.
6. From the Destination Port From and Destination Port To drop-down lists, select the port type of the computer you are making publicly available, or leave them set to **Any other port**.

   If you want to specify a port type that is not available in the drop-down lists, you can instead type the port ID number in text boxes to the right. You can specify a range using the From/To fields if you want the rule to apply to a range of port types, or enter the same port number in both fields.

   If you leave the selection set to *Any other port*, then incoming data will not be checked for the destination port type.

A port ID identifies the specific function of the computer connected to it, and therefore can limit the types of data that pass to and from the computer. For example, Web (HTTP) servers are usually identified by port number 80; packets containing traffic destined for a Web server will contain this port ID. The Internet Assigned Numbers Authority (IANA) assigns port numbers for common types of servers and functions.

7. If the LAN computer that you are making publicly available is configured to use a non-standard port number for the type of traffic it receives, type the non-standard port number in the Local Port field.

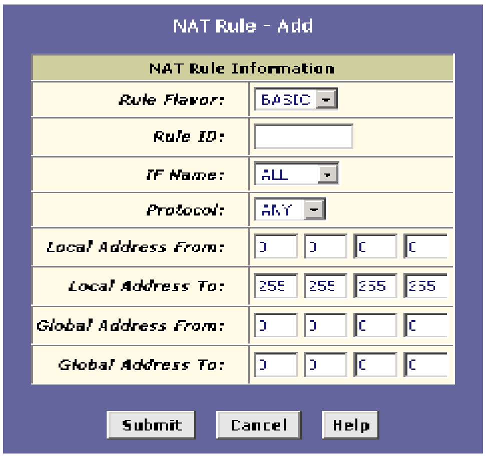
   This option translates the standard port number in packets destined for your LAN computer to the non-standard number you specify. For example, if your Web server uses (non-standard) port 2000, but you expect incoming data packets to refer to (standard) port 80, you would enter 2000 here (and select HTTP or type 80 in the Destination Port fields). The headers of incoming packets destined for port 80 will be modified to refer to port 2000. The packet will then be routed appropriately to the web server.

8. Follow steps 8-11 under "The NAPT rule" on page 117 to submit your changes.

The Basic rule: Performing 1:1 translations

The Basic flavor translates the private (LAN-side) IP address to a public (WAN-side) address, like NAPT rules. However, unlike NAPT rules, Basic rules do not also translate the port numbers in the packet header; they are passed through untranslated. Therefore, the Basic rule does not provide the same level of security as the NAPT rule.

Figure 52 shows the fields used for adding a Basic rule.



NAT Rule - Add

NAT Rule Information				
Rule Flavor:	BASIC			
Rule ID:				
IF Name:	ALL			
Protocol:	ANY			
Local Address From:	0	0	0	0
Local Address To:	255	255	255	255
Global Address From:	0	0	0	0
Global Address To:	0	0	0	0

Figure 52. NAT Rule – Add Page (Basic Flavor)

Follow these instructions to add a Basic rule (see steps 1-4 under "The NAPT rule" on page 117 for specific instructions corresponding to steps 1 and 2 below):

1. Display the NAT Rule – Add Page, select **BASIC** as the Rule Flavor, and enter a Rule ID.
2. Select the interface on which this rule will be effective.
3. Select a protocol to which this rule applies, or choose **ANY**.

   This selection specifies which type of Internet communication will be subject to this translation rule. You can select ALL if the rule applies to all data. Or, select TCP, UDP, ICMP, or a number from 1-255 that represents the Internet Assigned Numbers Authority (IANA)-specified protocol number.
4. In the Local Address From and Local Address To fields, type the starting and ending IP addresses that identify the range of private address you want to be translated. Or, type the same address in both fields.

   If you specify a range, each address will be translated in sequence to a corresponding address in a range of global addresses (which you specify in step 5).

   You can create a Basic rule for each specific address translation to occur. The range of addresses should correspond to private addresses already in use on your network, whether assigned statically to your PCs, or assigned dynamically using DHCP.

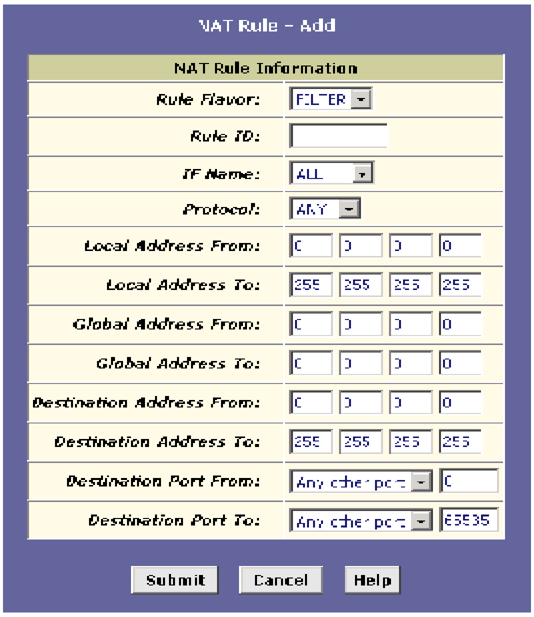
5. In the Global Address From and Global Address To fields, type the starting and ending addresses that identify the pool of public IP addresses that the private addresses should be translated to. Or, type the same address in both fields (if you also specified a single address in step 4).
6. Follow steps 8-11 under "The NAPT rule" on page 117 to submit your changes.

The Filter rule: Configuring a Basic rule with additional criteria

Like the Basic flavor, the Filter flavor translates public and private IP addresses on a one-to-one basis. The Filter flavor extends the capability of the Basic rule. Refer to “The Basic Rule” on page 122 for a general description.

You can use the Filter rule if you want an address translation to occur only when your LAN computers initiate access to specific destinations. The destinations can be identified by their IP addresses, port type (which identifies it as a FTP or Web server, for example), or both.

Figure 53 shows the fields used to establish a Filter rule.



NAT Rule - Add

NAT Rule Information

Rule Flavor:	FILTER			
Rule ID:				
IF Name:	ALL			
Protocol:	ANY			
Local Address From:	0	0	0	0
Local Address To:	255	255	255	255
Global Address From:	0	0	0	0
Global Address To:	0	0	0	0
Destination Address From:	0	0	0	0
Destination Address To:	255	255	255	255
Destination Port From:	Any other port	0		
Destination Port To:	Any other port	65535		

Figure 53. NAT Rule ¾ Add Page (Filter Flavor)

Follow these instructions to add a Filter rule (see steps 1-4 under "The NAPT rule" on page 117 for specific instructions corresponding to steps 1 and 2 below):

1. Display the NAT Rule – Add Page, select **FILTER** as the Rule Flavor, and enter a Rule ID.
2. Select the interface on which this rule will be effective.

3. Select a protocol to which this rule applies, or choose **ANY**.

   This selection specifies which type of Internet communication will be subject to this translation rule. You can select ANY if the rule applies to all data. Or, select TCP, UDP, ICMP, or a number from 1-255 that represents the Internet Assigned Numbers Authority (IANA)-specified protocol number.

4. In the Local Address From and Local Address To fields, type the starting and ending IP addresses that identify the range of private address you want to be translated. Or, type the same address in both fields.

   If you specify a range, each address will be translated in sequence to a corresponding address in a range of global addresses (which you specify in step 5).

   The address (or range of addresses) should correspond to private address (or addresses) already in use on your network. These may be assigned statically to your PCs or dynamically using DHCP, as discussed in the Quick Start chapter.

5. In the Global Address From and Global Address To fields, type the starting and ending address that identify the range of public IP addresses to translate your private addresses to. Or, type the same address in both fields (if you also specified a single address in step 4).

6. In the Destination Address From/To fields, specify a destination address (or range) if you want this rule to apply only to outbound traffic to the address (or range).

   If you enter only the network ID portion of the destination address, then the rule will apply to outbound traffic from all computers on network.

7. From the Destination Port From/To drop-down lists, select a port type if you want the rule to apply only to outbound traffic to servers of this type. Otherwise, leave them set to **Any other port**.

   If you want to specify a port type that is not available in the drop-down lists, you can instead type the port ID number in the text boxes to the right. You can specify a range using the From/To fields if you want the rule to apply to a range of port types, or enter the same port number in both fields.

   If you leave the selection set to *Any other port*, then outbound data will not be checked for the destination port type.

   See step 6 for creating an RDR rule on page 120 for an explanation of port IDs.

8. Follow steps 8-11 under "The NAPT rule" on page 117 to submit your changes.

The Bimap rule: Performing two-way translations

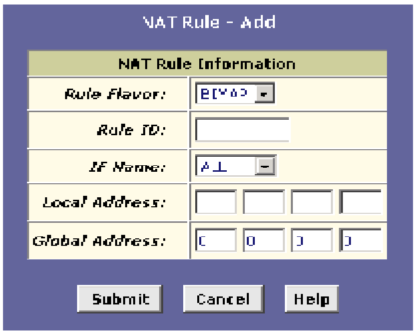
Unlike the other NAT flavors, the Bimap flavor performs address translations in both the outgoing and incoming directions.

In the incoming direction, when the specified ADSL2+ Router interface receives a packet with your public IP address as the destination address, this address is translated to the private IP address of a computer on your LAN. To the external computer, it appears as if the access is being made to the public IP address, when, in fact, it is communicating with a LAN computer.

In the outgoing direction, the private source IP address in a data packet is translated to the LAN's public IP address. To the rest of the Internet, it appears as if the data packet originated from the public IP address.

Bimap rules can be used to provide external access to a LAN device. They do not provide the same level of security as RDR rules, because RDR rules also reroute incoming packets based on the port ID. Bimap rules do not account for the port number, and therefore allow external access regardless of the destination port type specified in the incoming packet.

Figure 54 shows the fields used to establish a Bimap rule.



NAT Rule - Add

NAT Rule Information	
Rule Flavor:	BIMAP
Rule ID:	
IF Name:	a1
Local Address:	
Global Address:	0 . 0 . 0 . 0

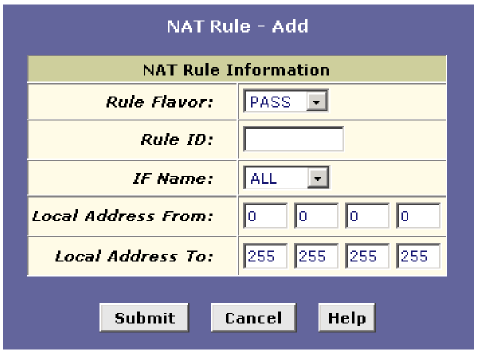
Figure 54. NAT Rule – Add Page (Bimap Flavor)

Follow these instructions to add a Bimap rule (see steps 1-4 under "The NAPT rule" on page 117 for specific instructions corresponding to steps 1 and 2 below):

1. Display the NAT Rule – Add Page, select **BIMAP** as the Rule Flavor, and enter a Rule ID.
2. Select the interface on which this rule will be effective.
3. In the Local Address field, type the private IP address of the computer to which you are granting external access.
4. In the Global Address field, type the address that you want to serve as the publicly known address for the LAN computer.
5. Follow steps 8-11 under "The NAPT rule" on page 117 to submit your changes.

The Pass rule: Allowing specific addresses to pass through untranslated

You can create a Pass rule to allow a range of IP addresses to remain untranslated when another rule would otherwise do so.



NAT Rule - Add

NAT Rule Information	
Rule Flavor:	PASS
Rule ID:	
IF Name:	ALL
Local Address From:	0 0 0 0
Local Address To:	255 255 255 255

Figure 55. NAT Rule – Add Page (Pass Flavor)

The Pass rule must be assigned a rule ID that is a lower number than the ID assigned to the rule it is intended to pass. In you want a specific IP address or range of addresses to not be subject to an existing rule, say rule number 5, then you can create a Pass rule with an ID number from 1 to 4.

Follow these instructions to add a Pass rule (see steps 1-4 under "The NAPT rule" on page 117 for detailed instructions corresponding to steps 1 and 2 below):

1. Display the NAT Rule – Add Page, select **PASS** as the Rule Flavor, and enter a Rule ID.
2. Select the interface on which this rule will be effective.
3. In the Local Address From and Local Address To fields, type the lowest and highest IP addresses that define the range of private address you want to be passed without translation.

   If you want the Pass rule to act on only one address, type that address in both fields.
4. Follow steps 7-12 under "The NAPT rule" on page 117 to submit your changes.

13 Configuring Firewall Settings

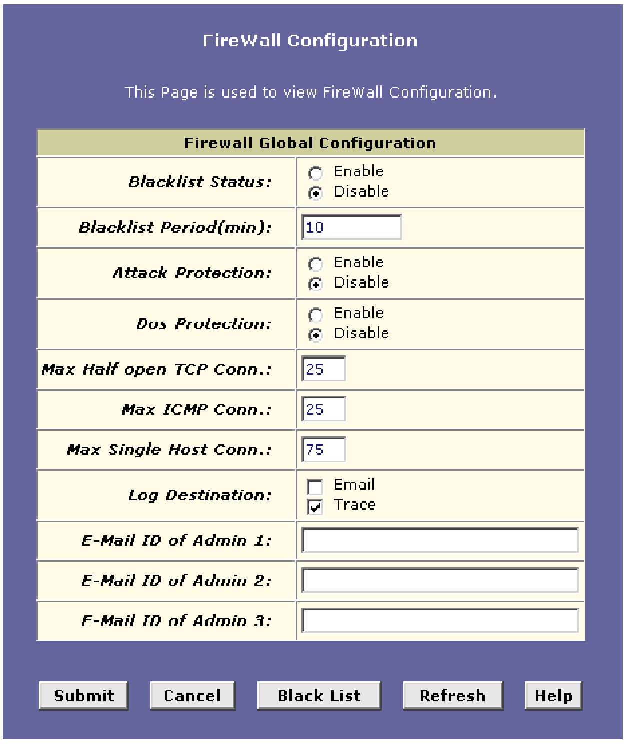
Configuration Manager provides built-in firewall functions, enabling you to protect the system against denial of service (DoS) attacks and other unwelcome or malicious accesses to your LAN. You can also specify how to monitor attempted attacks, and who should be automatically notified.

Configuring Global Firewall Settings

Follow these instructions to configure global firewall settings:

1. Log into Configuration Manager, click the Services tab, and then click **Firewall** in the task bar.

   The Firewall Configuration page displays:



FireWall Configuration

This Page is used to view FireWall Configuration.

Firewall Global Configuration

Blacklist Status:	○ Enable ● Disable
Blacklist Period(min):	10
Attack Protection:	○ Enable ● Disable
Dos Protection:	○ Enable ● Disable
Max Half open TCP Conn.:	25
Max ICMP Conn.:	25
Max Single Host Conn.:	75
Log Destination:	□ Email ☑ Trace
E-Mail ID of Admin 1:	
E-Mail ID of Admin 2:	
E-Mail ID of Admin 3:	

Figure 56. Firewall Configuration Page

2. Configure the following settings as needed:

Field	Description
Black List Status	If you want the device to maintain a blacklist, click the Enable radio button. Click the Disable radio button if you do not want to maintain a list. For more information, see "Managing the Blacklist" on page 130.
Black List Period(min)	Specifies the number of minutes that a computer's IP address will remain on the blacklist (i.e., all traffic originating from that computer will be blocked from passing through any interface on the ADSL/Ethernet router).
Attack Protection	Click the Enable radio button to use the built-in firewall protections that prevent the following common types of attacks: o IP Spoofing: Sending packets over the WAN interface using an internal LAN IP address as the source address. o Tear Drop: Sending packets that contain overlapping fragments. o Smurf and Fraggle: Sending packets that use the WAN or LAN IP broadcast address as the source address. o Land Attack: Sending packets that use the same address as the source and destination address. o Ping of Death: Illegal IP packet length.
DoS Protection	Click the Enable radio button to use the following denial of service protections: o SYN DoS o ICMP DoS o Per-host DoS protection
Max Half open TCP Connection	Sets the percentage of concurrent IP sessions that can be in the half-open state. In ordinary TCP communication, packets are in the half-open state only briefly as a connection is being initiated; the state changes to active when packets are being exchanged, or closed when the exchange is complete. TCP connections in the half-open state can use up the available IP sessions. If the percentage is exceeded, then the half-open sessions will be closed and replaced with new sessions as they are initiated.
Max ICMP Connection	Sets the percentage of concurrent IP sessions that can be used for ICMP messages. If the percentage is exceeded, then older ICMP IP sessions will be replaced by new sessions as the are initiated.
Max Single Host Connection	Sets the percentage of concurrent IP session that can originate from a single computer. This percentage should take into account the number of hosts on the LAN.

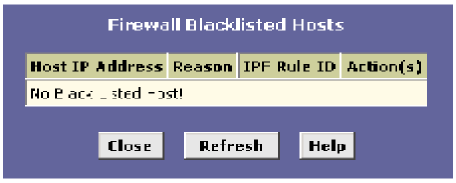
Field	Description
Log Destination	Specifies how attempted violations of the firewall settings will be tracked. Records of such events can be sent via Ethernet to be handled by a system utility (*Trace*) or can e-mailed to specified administrators.
E-mail ID of Admin 1/2/3	Specifies the e-mail addresses of the administrators who should receive notices of any attempted firewall violations. Type the addresses in standard internet e-mail address format, e.g., *jxsmith@onecompany.com*. The e-mail message will contain the time of the violation, the source address of the computer responsible for the violation, the destination IP address, the protocol being used, the source and destination ports, and the number violations occurring the previous 30 minutes. If the ICMP protocol is being used, then instead of the source and destination ports, the e-mail will report the ICMP code and type.

3. Click Submit.
4. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Managing the Blacklist

If data packets are received that violate the firewall settings or any of the IP filter rules, then the source IP address of the offending packets can be blocked from such accesses for a specified period of time. You can enable or disable use of the black list using the settings described above. The source computer remains on the black list for the period of time that you specify.

To view the list of currently blacklisted computers, click **Black List** at the bottom of the Firewall Configuration page. The Firewall Blacklisted Hosts page displays:



Firewall Blacklisted Hosts

Host IP Address	Reason	IPF Rule ID	Action(s)
No Blacklisted Host!			

Figure 57. Firewall Blacklisted Hosts Page

The table displays the following information for each entry:

Field	Description
Host IP Address	The IP address of the computer that sent the packet(s) that caused the violation
Reason	A short description of the type of violation. If the packet violated an IP filter rule, the custom text from the Log Tag field will display. (See "Creating IP Filter Rules" on page 134.)
IPF Rule ID	If the packet violated an IP filter rule, this field will display the ID assigned to the rule.
Action(s)	Displays an icon (🗑) you can click on to delete the entry from the list, if you want it to be removed prior to its automatic timed expiration.

14 Configuring Filters and Blocking Protocols

This chapter describes Configuration Manager features that enable you to control the data passing through your network:

- The **IP filter** feature enables you to create rules to block attempts by certain computers on your LAN to access certain types of data or Internet locations. You can also block incoming access to computers on your LAN. Although IP filter rules provide a very flexible and powerful tool to enhance network security and control user activity, they can also be complex and generally require an advanced understanding of IP protocols.
- The **bridge filter** feature is similar to the IP filter feature but operates at a lower protocol level. While IP filter rules act on IP data packets (known as “layer 3” data), bridge filter rules act on Ethernet and similar packets (often referred to as “layer 2” or “MAC layer” data).
- The **blocked protocols** feature enables you to select from a predefined list the protocol that you want to block. All data passed to the ADSL/Ethernet router using a blocked protocol will be discarded, without consideration of the source computer, destination computer, or the device interface on which it was received.

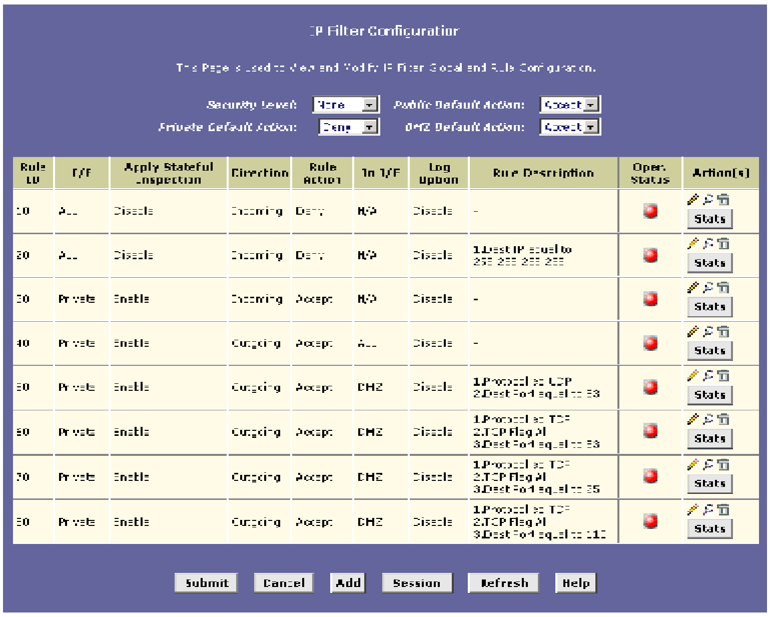
Configuring IP Filters

When you define an IP filter rule and enable the feature, you instruct the ADSL2+ Router to examine each data packet it receives to determine whether it meets criteria set forth in the rule. The criteria can include the size of the packet, the network or internet protocol it carries, the direction in which it is traveling (for example, from the LAN to the Internet or vice versa), the IP address of the sending computer, the destination IP address, and other characteristics of the packet data.

If the packet matches the criteria established in a rule, the packet can either be accepted (forwarded towards its destination), or denied (discarded), depending on the action specified in the rule.

Viewing Your IP Filter Configuration

To view your current IP filter configuration, log into Configuration Manager, click the Services tab, and then click **IP Filter** in the task bar. The IP Filter Confirmation page displays:



IP Filter Configuration

This Page is used to View and Modify IP Filter Global and Rule Configuration.

Security Level: None
Public Default Action: Accept
Private Default Action: Deny
DMZ Default Action: Accept

Rule ID	I/F	Apply Stateful Inspection	Direction	Rule Action	In I/F	Log Option	Rule Description	Oper. Status	Action(s)
10	ALL	Disable	Incoming	Deny	N/A	Disable	-	●	✎ ⌕ 🗑 Stats
20	ALL	Disable	Incoming	Deny	N/A	Disable	1.Dest IP equal to 255.255.255.255	●	✎ ⌕ 🗑 Stats
30	Private	Enable	Incoming	Accept	N/A	Disable	-	●	✎ ⌕ 🗑 Stats
40	Private	Enable	Outgoing	Accept	ALL	Disable	-	●	✎ ⌕ 🗑 Stats
50	Private	Enable	Outgoing	Accept	DMZ	Disable	1.Protocol eq UDP 2.Dest Port equal to 53	●	✎ ⌕ 🗑 Stats
60	Private	Enable	Outgoing	Accept	DMZ	Disable	1.Protocol eq TCP 2.TCP Flag All 3.Dest Port equal to 53	●	✎ ⌕ 🗑 Stats
70	Private	Enable	Outgoing	Accept	DMZ	Disable	1.Protocol eq TCP 2.TCP Flag All 3.Dest Port equal to 25	●	✎ ⌕ 🗑 Stats
80	Private	Enable	Outgoing	Accept	DMZ	Disable	1.Protocol eq TCP 2.TCP Flag All 3.Dest Port equal to 110	●	✎ ⌕ 🗑 Stats

Figure 58. IP Filter Confirmation Page

The IP Filter Configuration page displays global settings that you can modify and the IP filter rule table, which shows all currently established rules. See "Creating IP Filter Rules" on page 134 for a description of the items that make up a rule. When rules are defined, you can use the icons that display in the Actions column to edit (✎), delete (🗑), and view details on (⌕) the corresponding rule.

Configuring IP Filter Global Settings

The IP Filter Configuration page enables you to configure the following global IP filter settings.

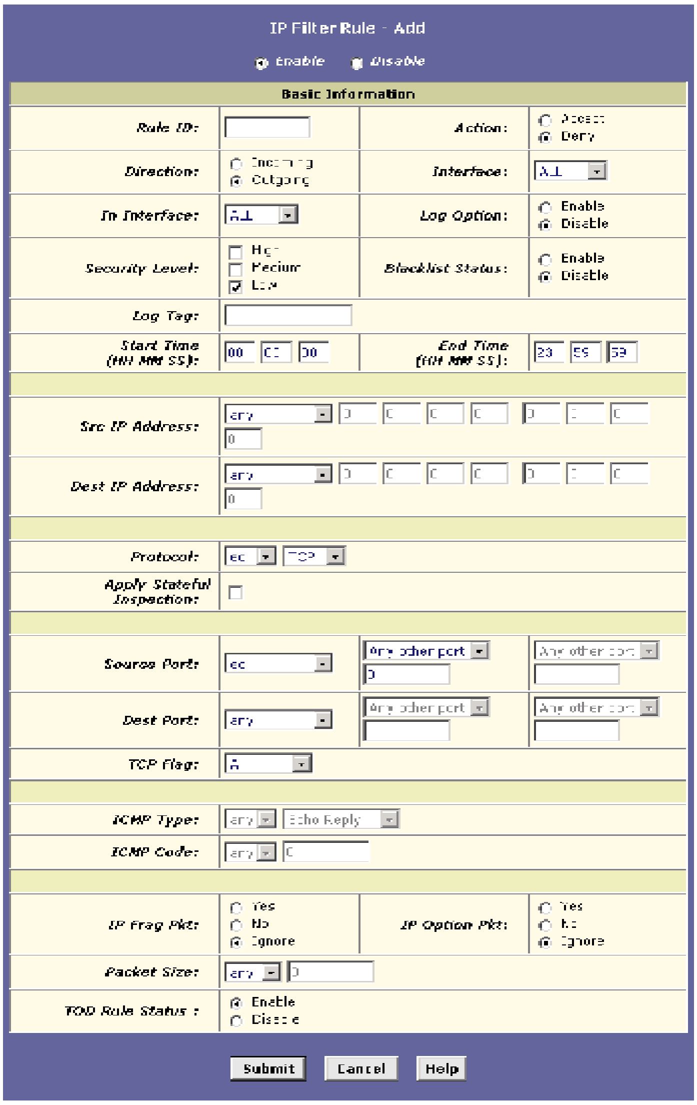
- **Security Level:** This setting determines which IP filter rules take effect, based on the security level specified in each rule. For example, when *High* is selected, only those rules that are assigned a security value of *High* will be in effect. The same is true for the *Medium* and *Low* settings. When *None* is selected, IP filtering is disabled.
- **Private/Public/DMZ Default Action:** This setting specifies a default action to be taken (Accept or Deny) on private, public, or DMZ-type device interfaces when they receive packets that *do not* match any of the filtering rules. You can specify a different default action for each interface type. (You specify an interface's type when you create the interface; see the PPP configuration page, for example.)
  - A *public* interface typically connects to the Internet. PPP, EoA, and IPoA interfaces are typically public. Packets received on a public interface are subject to the most restrictive set of firewall protections defined in the software. Typically, the global setting for public interfaces is *Deny*, so that all accesses to your LAN initiated from external computers are denied (discarded at the public interface), except for those allowed by a specific IP filter rule.
  - A *private* interface connects to your LAN, such as the Ethernet interface. Packets received on a private interface are subject to a less restrictive set of protections, because they originate within the network. Typically, the global setting for private interfaces is *Accept*, so that LAN computers have access to the ADSL/Ethernet routers' Internet connection.
  - The term *DMZ* (de-militarized zone), in Internet networking terms, refers to computers that are available for both public and in-network accesses (such as a company's public Web server). Packets received on a DMZ interface — whether from a LAN or external source—are subject to a set of protections that is in between public and private interfaces in terms of restrictiveness. The global setting for DMZ-type interfaces may be set to *Deny* so that all attempts to access these servers are denied by default; the administrator may then configure IP filter rules to allow accesses of certain types.

Creating IP Filter Rules

To create an IP filter rule, you set various criteria that must be met in order for the rule to be invoked. Use these instructions to add a new IP filter rule. Also refer to the examples on page 139:

1. On the IP Filter Configuration page, click **Add**.

   The IP Filter Rule – Add page displays:



IP Filter Rule - Add

● Enable ○ Disable

Basic Information			
Rule ID:		Action:	○ Accept ● Deny
Direction:	○ Incoming ● Outgoing	Interface:	All
In Interface:	All	Log Option:	○ Enable ● Disable
Security Level:	□ High □ Medium ☑ Low	Blacklist Status:	○ Enable ● Disable
Log Tag:			
Start Time (HH MM SS):	00 00 00	End Time (HH MM SS):	23 59 59
Src IP Address:	any 0 0 0 0 0 0 0 0		
Dest IP Address:	any 0 0 0 0 0 0 0 0		
Protocol:	eq TCP		
Apply Stateful Inspection:	□		
Source Port:	eq	Any other port 0	Any other port
Dest Port:	any	Any other port	Any other port
TCP Flag:	All		
ICMP Type:	any Echo Reply		
ICMP Code:	any 0		
IP Frag Pkt:	○ Yes ○ No ● Ignore	IP Option Pkt:	○ Yes ○ No ● Ignore
Packet Size:	any 0		
TOD Rule Status :	● Enable ○ Disable		

Figure 59. IP Filter Rule - Add Page

2. Enter or select data for each field that applies to your rule. The following table describes the fields:

Field	Description
Rule ID	Each rule must be assigned a sequential ID number. Rules are processed from lowest to highest on each data packet, until a match is found. It is recommended that you assign rule IDs in multiples of 5 or 10 (e.g., *10*, *20*, *30*) so that you leave enough room between them for inserting new rules if necessary.
Action	The action that will be taken when a packet matches the rule criteria. The action can be *Accept* (forward to destination) or *Deny* (discard the packet).
Direction	Specifies whether the rule should apply to data packets that are incoming or outgoing on the selected interface. *Incoming* refers to packets coming from the LAN, and *outgoing* refers to packets going to the Internet. You can use rules that specify the incoming direction to restrict external computers from accessing your LAN.
Interface	The interface on the ADSL2+ Router on which the rule will take effect. See the examples on page 139 for suggestions on choosing the appropriate interface for various rule types.
In Interface	The interface from which packets must have been forwarded to the interface specified in the previous selection. This option is valid only for the outgoing direction.
Log Option	When *Enabled* is selected, a log entry will be created on the system each time this rule is invoked. The log entry will include the time of the violation, the source address of the computer responsible for the violation, the destination IP address, the protocol being used, the source and destination ports, and the number violations occurring in the previous x minutes. (Logging may be helpful when troubleshooting.) This information can also be e-mailed to designated administrators. See Chapter 13, “Configuring Firewall Settings” for instructions.
Security Level	The security level that must be enabled globally for this rule to take affect. A rule will be active only if its security level is the same as the globally configured setting (shown on the main IP Filter Configuration page). For example, if the rule is set to *Medium* and the global firewall level is set to *Medium*, then the rule will be active; but if the global firewall level is set to *High* or *Low*, then the rule will be inactive.

Field	Description
Black List Status	Specifies whether or not a violation of this rule will result in the offending computer's IP address being added to the blacklist, which blocks the ADSL/Ethernet router from forwarding packets from that source for a specified period of time. See Chapter 13, "Configuring Firewall Settings" for instructions.
Log Tag	A description of up to 16 characters to be recorded in the log in the event that a packet violates this rule. Be sure to set the Log Option to *Enable* if you configure a Log Tag.
Start/End Time	The time range during which this rule is to be in effect, specified in military units.
Src IP Address/Dest IP Address	IP address criteria for the source computer(s) (from which the packet originates) and the destination computer. In the drop-down list, you can configure the rule to be invoked on packets containing: **any**: *any* source IP address. **lt**: *any* source IP address that is numerically *less than* the specified address. **lteq**: any source IP address that is numerically *less than or equal to* the specified address. **gt**: any source IP address that is numerically *greater than* the specified address. **eq**: any source IP address that is numerically *equal to* the specified address. **neq**: any source IP address that is *not equal to* the specified address. **range**: any source IP address that is within the specified range, including its endpoints. **out of range**: any source IP address that is outside the specified range. **self**: the IP address of the ADSL/Ethernet router interface on which this rule takes effect. **bcast**: (destination address only) Specifies that the rule will be invoked for any packets sent to the broadcast address for the receiving interface. (The broadcast address is used to send packets to all hosts on the LAN or subnet connected to the specified interface.) When you select this option, you do not need to specify the address, so the address fields are dimmed.

Field	Description
Protocol	The basic IP protocol criteria that must be met for rule to be invoked. Using the options in the drop-down list, you can specify that packets must contain the selected protocol (*eq*), that they must not contain the specified protocol (*neq*), or that the rule can be invoked regardless of the protocol (*any*). TCP, UDP, and ICMP are common IP protocols; others can be identified by number from 0-255, as defined by the Internet Assigned Numbers Authority (IANA).
Apply Stateful Inspection	When this option is enabled, packets are monitored for their state (i.e., whether a packet is the initiating packet or a subsequent packet in an ongoing communication, etc). This option provides a degree of security by blocking/dropping packets that are not received in the anticipated state. Such packets can signify an unwelcome attempt to gain access to a network.
Source/Destination Port	Port number criteria for the source computer(s) (from which the packet originates) and destination computer(s). Port numbers identify the type of traffic that the computer or server can handle and are specified by the Internet Assigned Numbers Authority (IANA). For example, port number 80 indicates a Web server, 21 indicates an FTP server. You can choose a port type by name from the drop-down lists or, if not available in the list, specify the IANA port number in the text boxes. Select *Any other port* if this criteria will not be used. These fields will be dimmed (unavailable for entry) unless you have selected TCP or UDP as the protocol. See the description of Src IP Address for the statement options (any, eq, gt, etc.)
TCP Flag	Specifies whether the rule should apply only to TCP packets that contain the synchronous (*SYN*) flag, only to those that contain the non-synchronous (*NOT-SYN*) flag, or to all TCP packets. This field will be dimmed (unavailable for entry) unless you selected TCP as the protocol.
ICMP Type	Specifies whether the value in the type field in ICMP packet headers will be used as criteria. The code value can be any decimal value from 0-255. You can specify that the value must equal (*eq*) or not equal (*neq*) the specified value, or you can select *any* to enable the rule to be invoked on all ICMP packets. This field will be dimmed (unavailable for entry) unless you specify ICMP as the protocol.

Field	Description
ICMP Code	Specifies whether the value in the code field in ICMP packet headers will be used as criteria. The code value can be any decimal value from 0-255. You can specify that the value must equal (*eq*) or not equal (*neq*) the specified value, or you can select *any* to enable the rule to be invoked on all ICMP packets. This field will be dimmed (unavailable for entry) unless you specify ICMP as the protocol.
IP Frag Pkt	Determines how the rule applies to IP packets that contain fragments. You can choose from the following options: o **Yes**: The rule will be applied only to packets that contain fragments. o **No**: The rule will be applied only to packets that do not contain fragments. o **Ignore**: (Default) The rule will be applied to packets whether or not they contain fragments, assuming that they match the other criteria.
IP Option Pkt	Determines whether the rule should apply to IP packets that have options specified in their packet headers. O **Yes:** The rule will be applied only to packets that contain header options. o **No:** The rule will be applied only to packets that do not contain header options. o **Ignore:** (Default) The rule will be applied to packets whether or not they contain header options, assuming that they match the other criteria.
Packet Size	Specifies that the IP filter rule will take affect only on packets whose size in bytes matches this criterion. (*lt* = less than, *gt* = greater than, *lteq* = less than or equal to, etc.)
TOD Rule Status	The Time of Day Rule Status determines how the Start Time/End Time settings are used. o **Enable:** (Default) The rule is in effect for the specified time period. o **Disable:** The rule is not in effect for the specified time period, but is effective at all other times.

3. When you are done selecting criteria, ensure that the Enable radio button is selected at the top of the page, and then click Submit.

   After a confirmation page displays, the IP Filter Configuration page will redisplay with the new rule showing in the table.

   If the security level of the rule matches the globally configured setting, a green ball displays in the Status column for that rule, indicating that the rule is now in effect. A red ball displays when the rule is disabled or if its security level is different from the globally configured level.

4. Ensure that the Security Level and Private/Public/DMZ Default Action settings on the IP Filter Configuration page are configured as needed, then click Submit.

   A page displays to confirm your changes.

5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

IP filter rule examples

Example 1. Blocking a specific computer on your LAN from accessing Web servers on the Internet:

1. Add a new rule for outgoing packets on the ppp-0 interface from any incoming interface (this would include the eth-0 and usb-0 interfaces, for example).
2. Specify the source IP address of the computer you want to block.
3. Specify the Protocol as *TCP* and enable the Store State setting.
4. Specify the destination port as *80*, which is the well-known port number for web servers.
5. Enable the rule by clicking the radio button at the top of the page.
6. Click Submit to create the rule.
7. On the IP Filter Configuration page, set the Security Level to the same level you chose for the rule, and set both the Private Default Action and the Public Default Action to *Accept*.
8. Click Submit.
9. and commit your changes.

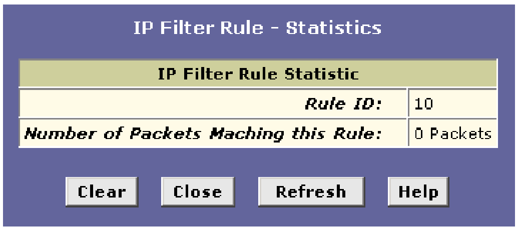
With this configuration, the specified computer will not be able to access the Web, but will be able to access FTP Internet sites (and any others that use destination port numbers other than 80).

Example 2. Blocking Telnet accesses to the ADSL2+ Router:

1. Add a new rule for packets incoming on the ppp-0 interface.
2. Specify that the packet must contain the TCP protocol, and must be destined for port 23, the well-known port number used for the Telnet protocol.
3. Enable the rule by clicking the radio button at the top of the page.
4. Click Submit to create the rule, and commit your changes.

Viewing IP Filter Statistics

For each rule, you can view statistics on how many packets were accepted or denied. Display the IP Filter Configuration page, and then click Stats in the row corresponding to the rule. The IP Filter Rule – Statistics page displays:



IP Filter Rule - Statistics

IP Filter Rule Statistic	
Rule ID:	10
Number of Packets Maching this Rule:	0 Packets

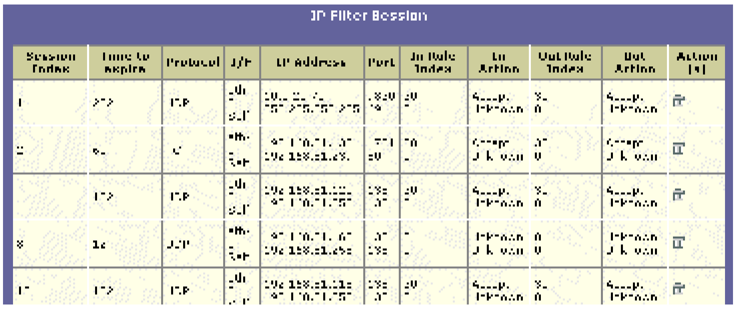
Figure 60. IP Filter Rule – Statistics Page

You can click Clear to reset the count to zero and Refresh to display newly accumulated data.

Managing Current IP Filter Sessions

When two computers communicate using the IP protocol, an IP session is created for the duration of the communication. The ADSL2+ Router allows a fixed number of concurrent IP sessions. You can view information about each current IP session and delete sessions (for security reasons, for example).

To view all current IP sessions, display the IP Filters Configuration page, and then click Session. The IP Filter Sessions displays:



IP Filter Session

Session Index	Time to expire	Protocol	I/F	IP Address	Port	In Rule Index	In Action	Out Rule Index	Out Action	Action [x]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Figure 61. IP Filter Sessions Page

The IP Filter Session table displays the following fields for each current IP session:

Field	Description
Session Index	The ID assigned by the system to the IP session (all sessions, whether or not they are affected by an IP filter rule, are assigned a session index)
Time to expire	The number of seconds in which the connection will automatically expire
Protocol	The underlying IP protocol used on the connection, such as TCP, UDP, IGMP, etc.)
I/F	The interface on which the IP filter rule is effective
IP Address	The IP addresses involved in the communication. The first one shown is the initiator of the communication.
Port	The hardware addresses of the ports involved in the communication
In/Out Rule Index	The number of the IP filter rule that applies to this session (assigned when the rule was created)
In/Out Action	The action (accept, deny, or unknown), being taken on data coming into or going out from the interface. This action is specified in the rule definition.
Actions	Provides an icon you can click on (🗑) to delete the IP session. When you delete a session, the communication is discontinued.

You can click Refresh to display newly accumulated data.

Configuring Bridge Filters

Bridge filter rules can be created to control the forwarding of incoming and outgoing data between your LAN and the Internet and within your LAN. Bridge filter rules make decisions based on the structure of the "layer 2" data packets (e.g., Ethernet packets) sent or received on the device interfaces, unlike IP filter rules, which are based on the structure of "layer 3" (e.g., IP) packets.

Bridge filtering is also referred to as *raw filtering*.

When the bridge filtering feature is enabled, the bridge/router examines each incoming layer 2 packet and compares it to the bridge filter rules. The bridge filter rules specify which bits of the packet are to be examined, and what criteria those bits must meet in order to qualify as a match for the rule.

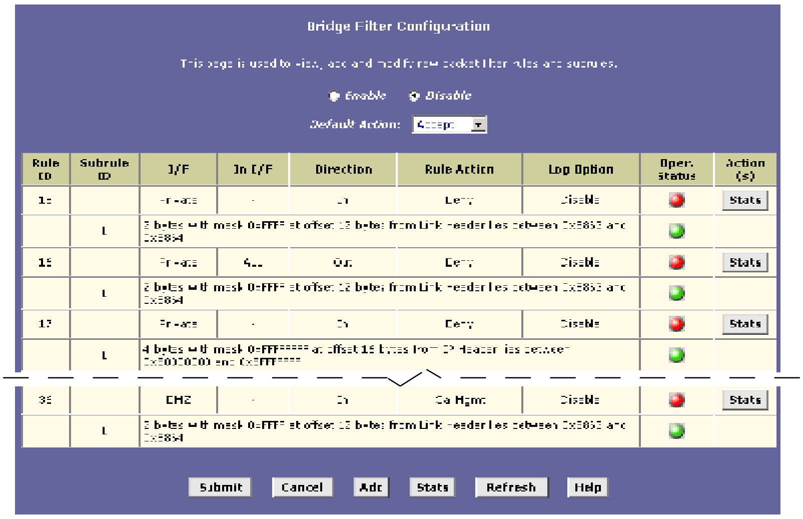
When a packet matches a rule, it can either be accepted (forwarded towards its destination), or denied (discarded), depending on the action specified in the rule.

Note

Bridge filters can be used when the unit is configured in either bridge or router mode.

Configuring Global Bridge Filter Settings

To display the Bridge Filter Configuration page, click the Services tab, and then click **Bridge Filter** in the task bar.



Bridge Filter Configuration

This page is used to view, add and modify raw packet filter rules and subrules.

○ Enable ● Disable

Default Action: Accept

Rule ID	Subrule ID	I/F	In I/F	Direction	Rule Action	Log Option	Oper. Status	Action (s)
15		Private	-	In	Deny	Disable	●	Stats
	1	2 bytes with mask 0xFFFF at offset 12 bytes from Link header lies between 0x8863 and 0x8864					●	
16		Private	ALL	Out	Deny	Disable	●	Stats
	1	2 bytes with mask 0xFFFF at offset 12 bytes from Link header lies between 0x8863 and 0x8864					●	
17		Private	-	In	Deny	Disable	●	Stats
	1	4 bytes with mask 0xFFFFFFFF at offset 16 bytes from IP header lies between 0xE0000000 and 0xEFFFFFFF					●	
35		DMZ	-	In	Ca Mgmt	Disable	●	Stats
	1	2 bytes with mask 0xFFFF at offset 12 bytes from Link header lies between 0x8863 and 0x8864					●	

Figure 62. Bridge Filter Configuration Page

The Bridge Filter Configuration page displays a table for viewing, adding, and managing rules, and enables you to configure global bridge filter settings. For descriptions of the items in the table, see "Adding Bridge Filter Rules on page 143".

You can also configure the following global settings on this page:

Field	Description
Enable/Disable	You can click the Enable and Disable radio buttons to activate/deactivate the service. Although each rule can be independently enabled and disabled, no rules will be effective unless the Enable radio button is selected here.
Default Action	Your selection in the Default Action drop-down list determines the action to be taken on all packets that do not match a bridge filter rule. The available options are: o Accept: All packets are accepted on all interfaces — except those specifically denied by a bridge filter rule. (Packets may still be denied due to firewall or IP filter restrictions.) o Deny: All packets are denied on all interfaces — except those specifically accepted by a bridge filter rule. Do not select CallMgt option — it is for manufacturer use only.

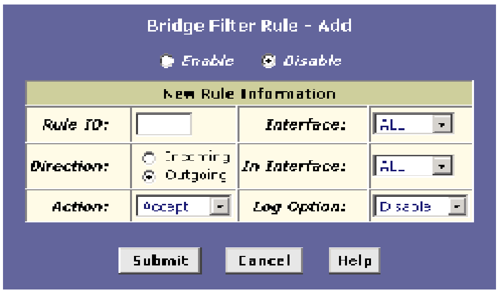
Adding Bridge Filter Rules

Adding and enabling a new bridge filter rule is a multi-step process:

- First, you add the rule, which defines general information such as the rule number, the direction of traffic it applies to, and the action to be taken when a match is detected.
- Next, you add one or more subrules, which specify the specific criteria that the bits in the packet must meet. A packet must match the rule criteria and all criteria in its subrules in order for the rule action to taken.
- Finally, you enable the rule and any subrules that you want to be in effect, and then enable the bridge filtering service.

Follow this process to add a rule, then proceed to the next set of steps to add subrules:

1. On the main Bridge Filter page, click **Add** to display the Bridge Filter Rule - Add page:



Bridge Filter Rule - Add

○ Enable ● Disable

New Rule Information			
Rule ID:		Interface:	ALL
Direction:	○ Incoming ● Outgoing	In Interface:	ALL
Action:	Accept	Log Option:	Disable

Figure 63. Bridge Filter Rule – Add Page

2. Enter or select data for each field that applies to your rule, defined as follows:

Field	Description
Rule ID	Each rule must be assigned an ID number. Rules are processed from lowest to highest on each data packet, until a match is found. Rule numbers up to 99 are reserved for preconfigured system rules. Rule IDs must start at 1000 or above so that they do not interfere with system-defined rules. It is also recommended that you assign rule IDs in multiples of 5 or 10 (e.g., 1000, 1010, 1020) so that you leave enough room between them for inserting new rules if necessary.
Interface	The interface on which the rule will take effect.
Direction	Specifies whether the rule should apply to packets that are incoming or outgoing on the selected interface. Incoming refers to packets coming in to the LAN on the interface, and Outgoing refers to packets going out from the LAN. You can use rules that specify the incoming direction to restrict external computers from accessing your LAN.
In Interface	The interface from which packets must be forwarded in order for this rule to be invoked. For example, if the Interface criteria is set to *ppp-0*, then the In Interface could be set to *usb-0*. This specifies that the rule applies only to packets passed from the USB computer through the router's PPP interface. This option is valid only for rules defined for the outgoing direction.
Action	Specifies what the rule will do to a packet when the packet matches the rule criteria. The action can be Accept (forward to destination) or Deny (discard the packet). Do not select the CallMgt option.
Log Option	When Enabled is selected, a log entry will be created on the system each time this rule is invoked. Logging may be helpful when troubleshooting. You can also disable logging, log only packets that match rules, or log only packets that do not match rules. This information can be e-mailed to designated administrators. See "Configuring Firewall Settings" on page 127 for instructions.

3. When you are finished, you can enable the rule by clicking the Enable radio button at the top of the Bridge Filter Rule - Add page.

   Note, however, that a newly created rule, even when enabled, will not have any effect on traffic until at least one subrule has been added and enabled. You can leave the rule disabled for now (the default) and enable it after configuring subrules.

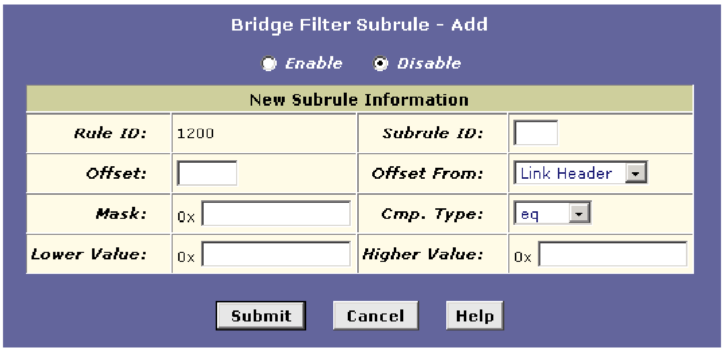
4. Click Submit and then click Close on the confirmation page.

   The Bridge Filter Configuration page displays with the new rule at the bottom of the table.

Now, you can add subrules to specify criteria for the rule:

5. On the Bridge Filter Configuration page, click Add Subrule in the Action(s) column of the rule for which you want to created a subrule.

   The Bridge Filter Subrule - Add page displays:



Bridge Filter Subrule - Add

○ Enable ● Disable

New Subrule Information			
Rule ID:	1200	Subrule ID:	
Offset:		Offset From:	Link Header
Mask:	0x	Cmp. Type:	eq
Lower Value:	0x	Higher Value:	0x

Figure 64. Bridge Filter Subrule – Add Page

The page displays Enable and Disable radio buttons you use to determine whether this sub rule is in effect. A rule will be in effect if the rule itself and at least one of its subrules is enabled.

6. In the New Subrule Information table, specify the criteria for the rule, as follows:

Field	Description
Subrule ID	A unique ID number for this subrule. These numbers are independent from the main rule number. The bridge filter processes subrules in sequential order; if a packet fails to match the criteria of any subrule, then the rule will not be invoked and bridge filter processing will continue to the next rule.
Offset	The number of bits into a packet, starting from a designated location where the subrule comparison should begin.
Offset from	The location in a Layer 2 packet where the subrule comparison should begin, taking into account any offset bits specified in the previous setting. The comparison can start at the beginning of: o a Link header (i.e., the start of an Ethernet packet) o an IP header o a TCP, UPD, or ICMP header
Mask	The bits of the packet, specified in hexadecimal, starting at the header and offset location, that should be used when comparing data to this rule. A mask of F0FF, for example, would look only at the 1st, 3rd, and 4th bits from the starting location.

Field	Description
Cmp. Type	Comparison Type - The method for comparing the selected bits, after the mask is applied, to a reference value (or range of values) that you specify (see the next setting). Compared to the reference value, the selected bits can be: o eq: equal to o neq: not equal to o lt: less than o lteq: less than or equal to o gt: greater than o gteq: greater than or equal to o range: any source IP address that is within the specified range, including its endpoints. o any: all packets of any type will match this subrule. This selection makes irrelevant any other criteria in the subrule. WARNING: The comparison type any should only be used when all packets of any type are to be accepted or denied. This selection, combined with a rule type that denies matching packets, may disable your access to the Web interface.
Lower Value/Higher Value	The reference values, in hexadecimal, to which the selected bits will be compared. If range is selected as the comparison type, enter values in both fields; otherwise enter a value only in the Lower Value field.

7. When you are finished entering criteria and are ready to make this subrule effective, you can click the Enable radio button at the top of the Bridge Filter Subrule - Add page and then click Submit. (You could also leave it disabled and edit the subrule to enable it later.)

   A page displays to confirm your changes.

8. Click Close to return to the Bridge Filter Configuration Page. The subrule should now display in the table beneath the general rule it was added to.

Next, if you have not already done so, you can enable the rule, any of its subrules, and the bridge filtering service in order to make the rule effective.

On the Bridge Filter Configuration page, a red ball displays in the Oper. Status column of the table for rules and subrules that are disabled, and a green ball displays for rules that are enabled. (When creating rules and their subrules, you may have chosen to leave them disabled - the default.)

To make a rule active, enable the following three settings:

- **The Bridge Filter service**: At the top of the Bridge Filter Configuration page, click the Enable radio button.
- **The rule**: On the Bridge Filter Configuration page, click ✎ in the Actions column in the row for the rule. On the Bridge

Filter Rule - Modify page, select the Enable radio button and click Submit.

- **At least one subrule**: On the Bridge Filter Configuration page, you can enable a subrule by editing it. Click ✏ in the Actions column in the row for the subrule. On the Bridge Filter Subrule - Modify page, select the Enable radio button and click Submit.

If a rule is enabled but none of its subrules are enabled, then the rule will have no effect on network traffic. A rule can be in effect, however, when some of its subrules are disabled.

If want your changes to be permanent, be sure to commit them (see “Committing Changes” on page 39).

Bridge Filter Rule Example

The following instructions create a rule for preventing Telnet access to the device from a specific WAN interface:

1. Add rule #100 with the following settings:
   - Interface: ppp-0
   - Direction: Incoming
   - Action: Accept
2. Click the Enable radio button at the top of the Bridge Filter Rule - Add page, and then click Submit.
3. Add subrule #1 with the following settings:
   - Offset = 2
   - Offset from = TCP Header
   - Mask = 0x0FFF
   - Cmp Type = eq
   - Lower Value = 0x0017

     (The hexadecimal number *0x0017* is binary port number *23*, the well-known port number for Telnet packets.)
4. Click the Enable radio button at the top of the Bridge Filter Subrule - Add page, and then click Submit.
5. If necessary, enable the Bridge Filter Service by clicking the Enable radio button at the top of the Bridge Filter Configuration page.

All TCP packets incoming on the ppp-0 interface will now be dropped.

Editing and Deleting Rules and Subrules

In the table on the Bridge Filter Rule page, the following items display in the Actions column for each rule and subrule:

Button	Description
✏	Edits the rule or subrule. The Bridge Filter Rule - Modify or Bridge Filter Subrule - Modify page displays. See Adding Bridge Filter Rules for a description of the items on these pages.
🗑	Deletes the rule or subrule. Before deleting a rule, you must first delete all of its subrules. A page displays to enable you to confirm or cancel the deletion.

The above icons do not display for rules that are preconfigured by the ISP; these rules and related statistics can be viewed but not otherwise accessed via the Web-based interface.

Viewing Rule Statistics

You can view statistics for each rule and total statistics for all rules:

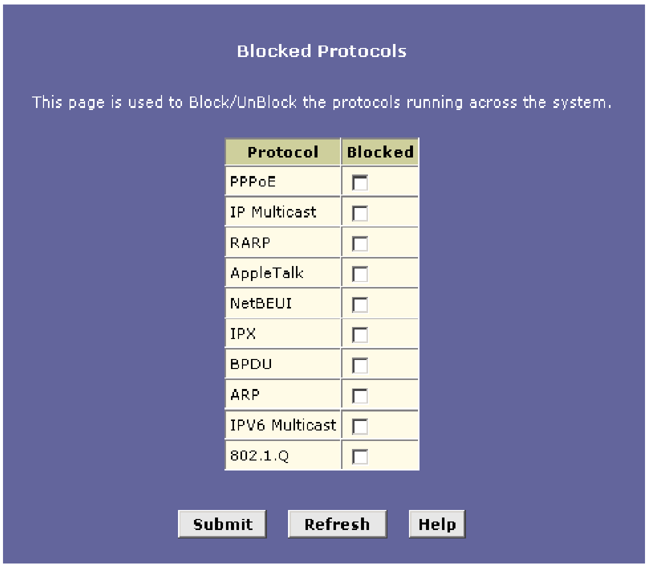
- To view statistics for an individual rule, click Stats in the corresponding Action(s) column on the Bridge Filter Configuration page. The Bridge Filter Rule - Stats page reports the accumulated number of packets that have been received that match this rule.
- To view the total number of packets received that match any of the rules, click Stats at the bottom of the Bridge Filter Configuration page. The Bridge - Filter Rule Stats page, which shows the number of packets that have been received that match any of the rules.

On either page, you can click Clear to reset the count to zero and Refresh to display newly accumulated data.

Blocking Protocols

The Blocked Protocols feature enables you to prevent the ADSL/Ethernet router from passing any data that uses a particular protocol. Unlike the IP filter feature, you cannot specify additional criteria for blocked protocols, such as particular users or destinations. However, when you are certain that a particular protocol is not needed or wanted on your network, this feature provides a convenient way to discard such data before it is passed.

To display the Blocked Protocols page, click the Services tab, and then click **Blocked Protocols** in the task bar. The Blocked Protocols page displays:



Blocked Protocols

This page is used to Block/UnBlock the protocols running across the system.

Protocol	Blocked
PPPoE	☐
IP Multicast	☐
RARP	☐
AppleTalk	☐
NetBEUI	☐
IPX	☐
BPDU	☐
ARP	☐
IPV6 Multicast	☐
802.1.Q	☐

Figure 65. Blocked Protocols Page

WARNING

Blocking certain protocols may disrupt or disable your network communication or Internet access. If you are unfamiliar with how your network or Internet connection uses these protocols, contact your ISP before disabling.

The following list describes each of the available protocols.

Protocol	Description
PPoE	Point-to-Point Protocol over Ethernet. Many DSL modems use PPoE to establish and maintain a connection with a service provider. PPoE provides a means of logging in to the ISPs servers so that they can authenticate you as a customer and provide you access to the Internet. Check with your ISP before blocking this protocol.

Protocol	Description
IP Multicast	IP Multicast is an extension to the IP protocol. It enables individual packets to be sent to multiple hosts on the Internet, and is often used for handling e-mail mailing lists and teleconferencing/videoconferencing.
RARP	Reverse Address Resolution Protocol. This IP protocol provides a way for computers to determine their own IP addresses when they only know their hardware address (i.e., MAC addresses). Certain types of computers, such as diskless workstations, must use RARP to determine their IP address before communicating with other network devices.
AppleTalk®	A networking protocol used in for Apple Macintosh® networks.
NetBEUI	NetBIOS Enhanced User Interface. On many LAN operating systems, the NetBEUI protocol provides the method by which computers identify themselves to and communicate with each other.
IPX	Internetwork Packet Exchange. A networking protocol used on Novell Netware®-based LANs.
BPDU	Bridge Protocol Data Unit. BPDUs are data messages that are exchanged across the switches between LANs that are connected by a bridge. BPDU packets contain information on ports, addresses, priorities, and costs, and are exchanged across bridges to detect and eliminate loops in a network.
ARP	Address Resolution Protocol. Computers on a LAN use ARP to learn the hardware addresses (i.e., MAC addresses) of other computers when they know only their IP addresses.
IPV6 Multicast	IP Multicasting under IP Protocol version 6. See *IP Multicast* above.
802.1.Q	This IEEE specification defines a protocol for *virtual LANs* on Ethernet networks. A virtual LAN is a group of PCs that function as a local area network, even though the PCs may not be physically connected. They are commonly used to facilitate administration of large networks.

To block a protocol, click the appropriate check box, and click Submit. After you have verified that the device continues to function as expected, if you want the changes to be permanent, follow the instructions on page 39 to commit them.

Part 5

Administrative Tasks and System Monitoring

About Part 5

Part 5 describes tools that LAN administrator can use to monitor the system performance and control access to the Configuration Manager program.

Part 5 contains the following chapters:

- **Chapter 15, "Managing Access,"** describes how to manage user IDs and passwords for logging in to Configuration Manager and how to enable your ISP to configure the device remotely.
- **Chapter 16, "Monitoring System Status and Performing Diagnostics,"** describes how to view information on system events and DSL line performance, how to run the diagnostic utility to troubleshoot system problems, and how to use the ping and traceroute utilities.
- **Chapter 17, "Upgrading the Software,"** explains how to upgrade the system by uploading new software files.
- **Chapter 18, "Modifying Port Settings,"** describes how to change the Port ID numbers associated with the embedded Web, FTP, and Telnet servers.
- **Chapter 19, "Configuring Autodetect,"** describes how to configure the Autodetect service, which enables the modem to automatically detect and configure a valid ATM VC at startup.

15 Managing Access to the Configuration Program

This chapter describes how to manage access to the Configuration Manager program, including creating user logins and passwords and enabling or disabling external access through the WAN port.

Managing User Logins

The ADSL2+ Router is configured with a default user name and password combination, or login, for accessing Configuration Manager. If you want to allow other users to access the program, you can create additional user logins and specify their privilege levels. You can also change the password for the default login or for any logins you create.

The default login allows the user full access to all Configuration Manager features, including creating up to four additional user logins. You can assign one of the following privilege levels to each additional login:

„ *Root-level* privileges enable users to modify all the features available in Configuration Manager. The default login has root-level privileges.

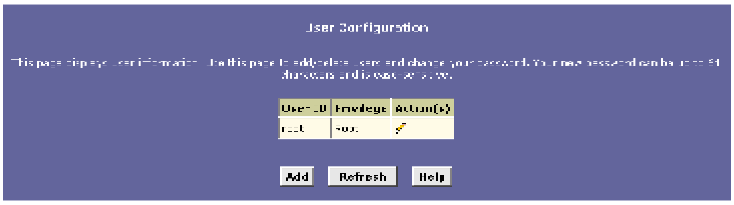
„ *Intermediate-level* privileges enable users to change their own passwords. They can also change the PPP interface username and password, and the ATM VC interface values. (Note, however, that Intermediate users can change these only on the PPP and ATM VC pages – not on the Quick Configuration page.) These users can view—but not create or modify— all other system information.

„ *User-level* privileges enable users to change their own passwords. They can view—but not create or modify— all other system information.

To create additional logins or modify existing logins, follow these instructions:

1. Log into Configuration Manager using the default user name and password, and then click the Admin tab.

   The User Configuration page displays by default:



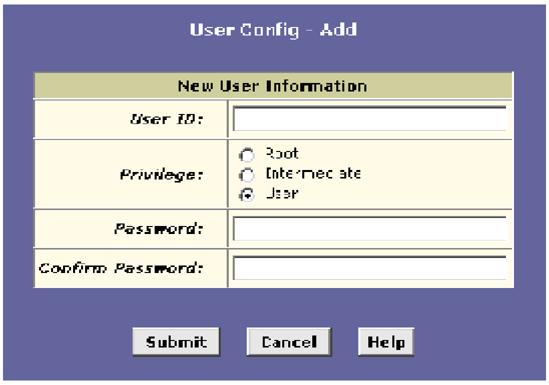
User Configuration

This page displays user information. Use this page to add/delete users and change your password. Your new password can be up to 51 characters and is case-sensitive.

User ID	Privilege	Action(s)
root	Root	✎

Figure 66. User Configuration Page

2. Click **Add** to display the User Config-Add page:



User Config - Add

New User Information	
User ID:	
Privilege:	○ Root ○ Intermediate ● User
Password:	
Confirm Password:	

Figure 67. User Config-Add Page

3. Type the User ID and Password in the text boxes provided, and then select the privilege level for this user, as described on 153.

   The user name can be up to 128 characters, but cannot contain spaces or special characters.

   The password can also be up to 128 characters. Be sure to retype the password in the Confirm Password text box, exactly as before, including lowercase and uppercase characters.

4. Click **Submit**.

5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

You cannot change or delete the default login. To delete a subsequently created login, click 🗑 in the corresponding Action(s) column in the table on the User Configuration page.

Changing Login Passwords

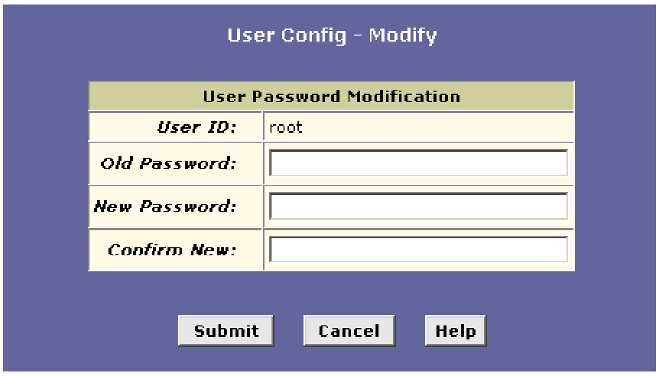
Users of all privilege levels can modify their own password. Only users with Root privileges can modify other users' passwords. Follow these instructions to change a login password.

Note

This user ID and password are used only for logging into the Configuration Manager; it is not the same as the PPP login you may use to connect to your ISP (described in Chapter 5).

1. From the User Configuration page, click ✏ next to the login whose password you want to modify.

   The User Config-Modify page displays:



User Config - Modify

User Password Modification	
User ID:	root
Old Password:	
New Password:	
Confirm New:	

.

Figure 68. User Config-Modify Page

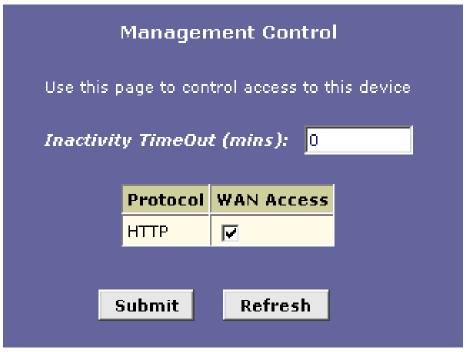
2. Type your current password in the Old Password text box.
3. Type your new password in both the New Password and Confirm New text boxes.

   The password can be up to 128 ASCII characters long. When logging in, you must type the new password in the same uppercase and lowercase characters that you use here.
4. Click Submit.
5. If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Enabling Management through the WAN Port

You can enable access to Configuration Manager via the WAN port so that the ISP can perform configuration tasks.

To enable WAN access, display the Management Control page by clicking **Management Control** in the Admin tab.



Management Control

Use this page to control access to this device

Inactivity TimeOut (mins): 0

Protocol	WAN Access
HTTP	☑

Figure 69. Management Control Page

The table on this page provides a check box to enable or disable HTTP (i.e., Web browser-based) access to the configuration program through the WAN port. In the Inactivity TimeOut text box, you can specify a length of time in minutes after which external access will be blocked, assuming that there is no access during that time.

If you want your changes to be in effect the next time you log in, click **Submit**.

If you want the changes to be permanent, follow the instructions on page 39 to commit them.

Configuring SNMP

The Simple Network Management Protocol (SNMP) enables a host computer to access configuration, performance, and other system data that resides in a database on the modem. The host computer is called a *management station* and the modem is called an *SNMP agent*. The data that can be accessed via SNMP is stored in a Management Information Database (or *MIB*) on the modem.

When SNMP is enabled, the modem responds to SNMP requests from the host. The host may ask to read data from the MIB or, when its privileges allow, write data to it.

Privilege levels are defined by the SNMP *communities* configured on the modem. A community is a named group of IP addresses. These addresses identify the hosts that are permitted to act as SNMP management stations for accessing the MIB. Each community is defined as having either read-only or read/write privileges.

The data stored in the MIB includes the standard items defined for the SNMP protocol and custom items defined by the ISP. The MIB contents are preconfigured by the ISP and cannot be managed via the Web-based interface.

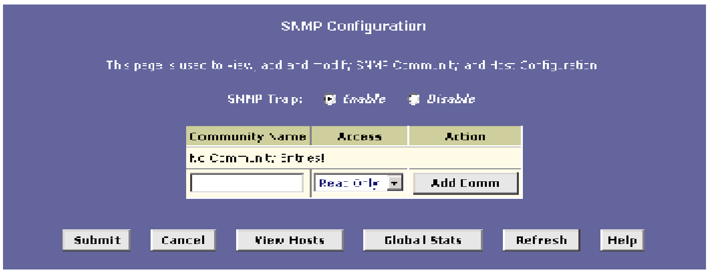
A complete SNMP setup includes the following items:

- A management station equipped with an SNMP manager client that enables sending messages to an SNMP agent (e.g., the modem). This configuration is not described here.
- A MIB stored in the modem's memory. This must be preconfigured in the software image by the ISP.
- The SNMP service enabled on the modem, including defined communities that allow read-only or read/write accesses from specific hosts. This configuration is described below.

Creating Communities

1. Log into Configuration Manager, click the Admin tab, and then click **SNMP Config** in the task bar.

   The SNMP Configuration page displays:



SNMP Configuration

This page is used to view, add and modify SNMP Community and Host Configuration

SNMP Trap: ● Enable ○ Disable

Community Name	Access	Action
No Community Entries!		
	Read Only ▾	Add Comm

Figure 70. SNMP Configuration

2. On the SNMP Configuration page, type a community name in the empty text box in the left column of the table.

3. From the Access column of the table, select the privileges (Read-Only or Read/Write) to assign to all hosts that are part of this community.

4. Click Add Comm.

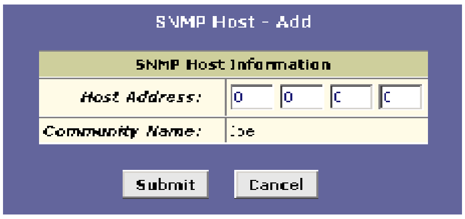
   A page displays briefly to confirm your changes, and then the SNMP Configuration page redisplays with the new entry.

Now, you can add hosts to the new community:

Adding Hosts to Communities

1. In the Action column, click Add Host.

   The SNMP - Add Host page displays in a separate window:



SNMP Host - Add

SNMP Host Information	
Host Address:	0 0 C C
Community Name:	:be

Figure 71. SNMP Host – Add Page

2. Enter the IP address of the host computer you want to add and click Submit.

   A page displays briefly to confirm the addition, and the SNMP - Add Host page redisplays.

3. Continue adding hosts as required and click Submit when done.

The newly added hosts now have access to the MIB with the privilege level associated with the community.

Viewing Hosts

To view all hosts and the communities to which they are assigned, click View Hosts on the main SNMP Configuration page.

Viewing Global SNMP Statistics

To view statistics relating to SNMP packets received and sent and packet errors, click Global Stats on the main SNMP Configuration page. The SNMP Global Statistics page shows the number and type of packets transmitted.

16 Monitoring System Status and Performing Diagnostics

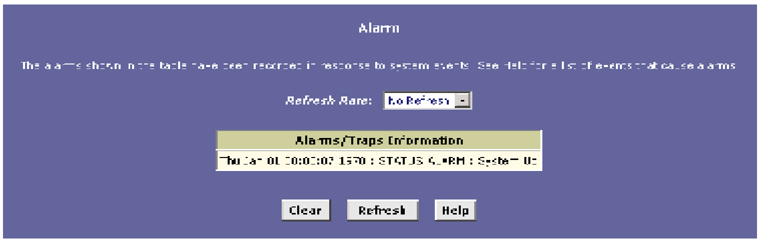
This chapter shows you where to find information related to system events (alarms) and DSL line performance, and how to run a diagnostic program to troubleshoot problems.

Viewing System Alarms

You can use the Configuration Manager to view information about alarms that occur in the system. Alarms, also called traps, are caused by a variety of system events, including connection attempts, resets, and configuration changes. This information may be helpful in working with your ISP to troubleshoot problems you encounter with the device. (Despite their name, not all alarms indicate problems in the functioning of the system.)

Viewing the Alarm Table

To display the Alarm page, log into the Configuration Manager, click the Admin tab, and then click **Alarm** in the task bar. The Alarm page is shown in Figure 72.



Alarm

The alarms shown in the table have been recorded in response to system events. See Help for a list of events that cause alarms

Refresh Rate: No Refresh

Alarms/Traps Information
Thu Jan 01 00:00:07 1970 : STATUS ALARM : System Up

Figure 72. Alarm Page

Each row in the table displays the time and date that an alarm occurred, the type of alarm, and a brief statement indicating its cause.

You can click on the Refresh Rate drop-down list to select a recurring time interval after which the page will redisplay with new data.

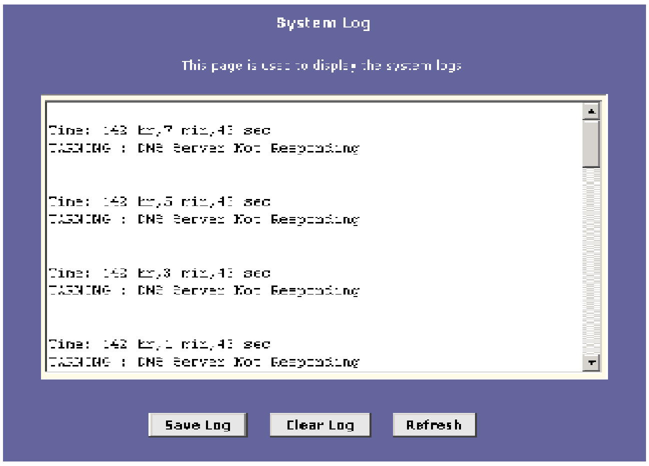
You can click Save Alarm to display a Windows File Download dialog box that enables opening or saving the contents of the log to your PC. The file is assigned the default name *alarm.vlf*, and can be viewed with any text editor.

To remove all entries from the list, click Clear. New entries will begin accumulating and will display when you click Refresh.

Viewing the System Log

You can view data generated or acquired by routine system communication with other devices, such as the results of negotiations with the ISP's computers for DNS and gateway IP addresses. This information does not necessarily represent unexpected or improper functioning and is not captured by the system traps that create alarms.

This information accumulates and displays in a system log window. To view the system log, click the Admin tab, and then click **System Log** in the task bar.



System Log

This page is used to display the system logs

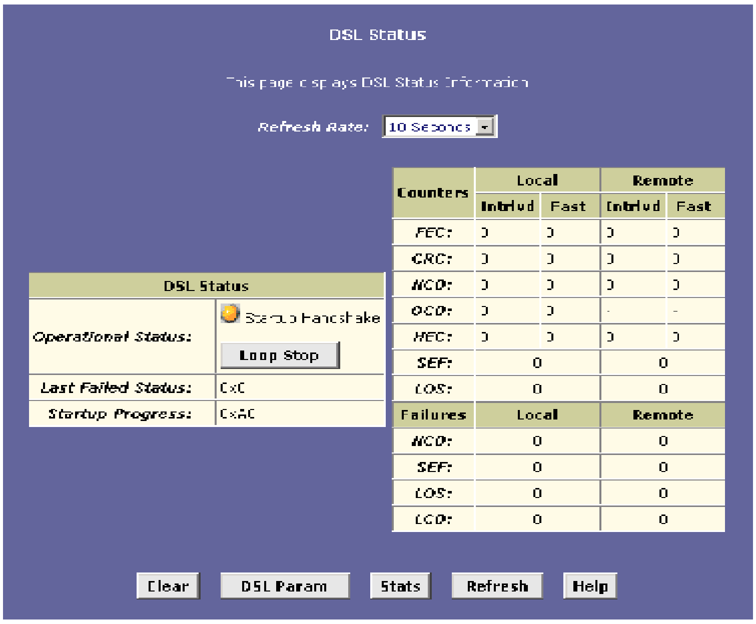
```
Time: 143 hr,7 min,43 sec
WARNING : DNS Server Not Responding


Time: 143 hr,5 min,43 sec
WARNING : DNS Server Not Responding


Time: 143 hr,3 min,43 sec
WARNING : DNS Server Not Responding


Time: 142 hr,1 min,43 sec
WARNING : DNS Server Not Responding
```

Figure 73. System Log page

You can click **Save Log** to display a Windows File Download dialog box that enables opening or saving the contents of the log to your PC. The file is assigned the default name *syslog.vlf*, and can be viewed with any text editor.

Viewing DSL Information

To view configuration parameters and performance statistics for the ADSL2+ Router's DSL line, log into Configuration Manager, and then click the WAN tab. The DSL Status page displays by default:



DSL Status

This page displays DSL Status Information

Refresh Rate: 10 Seconds

DSL Status	
Operational Status:	Startup Handshake Loop Stop
Last Failed Status:	0x0
Startup Progress:	0xA0

Counters	Local		Remote	
	Intrlvd	Fast	Intrlvd	Fast
FEC:	0	0	0	0
CRC:	0	0	0	0
NCD:	0	0	0	0
OCD:	0	0	-	-
HEC:	0	0	0	0
SEF:	0		0	
LOS:	0		0	

Failures	Local	Remote
NCD:	0	0
SEF:	0	0
LOS:	0	0
LCD:	0	0

Figure 74. DSL Status Page

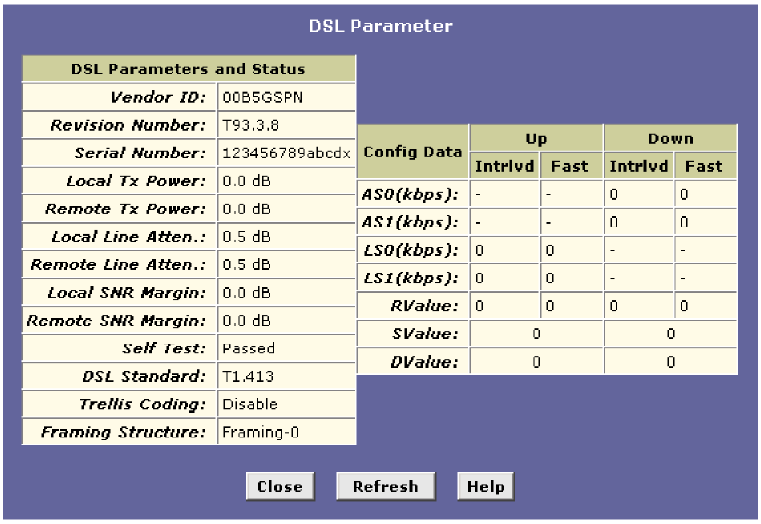
The DSL Status page displays current information on the DSL line performance. The page refreshes according to the setting in the Refresh drop-down list, which you can configure.

In the DSL Status table, the Operational Status setting displays a red, orange, or green ball to indicate that the DSL line is idle, starting up, or up-and-running, respectively. You can click **Loop Stop** to end the DSL connection. To restart the connection, you can click **Loop Start**.

Although you generally will not need to view the remaining data, it may be helpful when troubleshooting connection or performance problems with your ISP.

You can click **Clear** to reset all counters to zero, and **Refresh** to redisplay the page with newly accumulated values.

You can click **DSL Param** to display the DSL Parameters page, which provides data about the configuration of the DSL line:



DSL Parameter

DSL Parameters and Status	
Vendor ID:	00B5GSPN
Revision Number:	T93.3.8
Serial Number:	123456789abcdx
Local Tx Power:	0.0 dB
Remote Tx Power:	0.0 dB
Local Line Atten.:	0.5 dB
Remote Line Atten.:	0.5 dB
Local SNR Margin:	0.0 dB
Remote SNR Margin:	0.0 dB
Self Test:	Passed
DSL Standard:	T1.413
Trellis Coding:	Disable
Framing Structure:	Framing-0

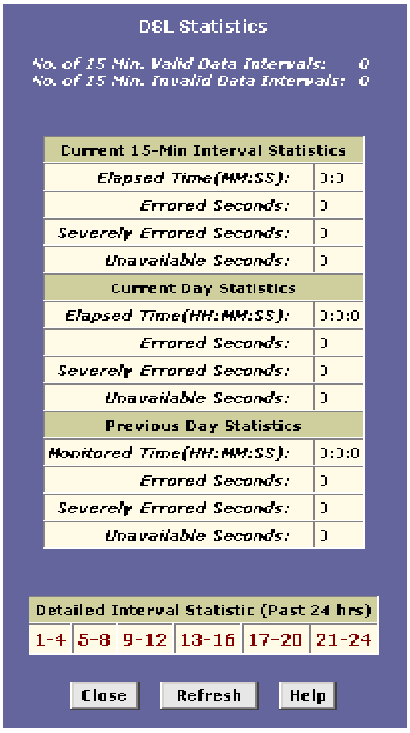
Config Data	Up		Down	
	Intrlvd	Fast	Intrlvd	Fast
AS0(kbps):	-	-	0	0
AS1(kbps):	-	-	0	0
LS0(kbps):	0	0	-	-
LS1(kbps):	0	0	-	-
RValue:	0	0	0	0
SValue:	0		0	
DValue:	0		0	

Figure 75. DSL Parameters Page

- The DSL Parameters and Status table displays settings preconfigured by the product manufacturer or your ISP.
- The Config Data table lists various types of error and defects measurements found on the DSL line.

You cannot modify this data.

From the DSL Status page, you can also click **Stats** to display DSL line performance statistics.



DSL Statistics

No. of 15 Min. Valid Data Intervals: 0
No. of 15 Min. Invalid Data Intervals: 0

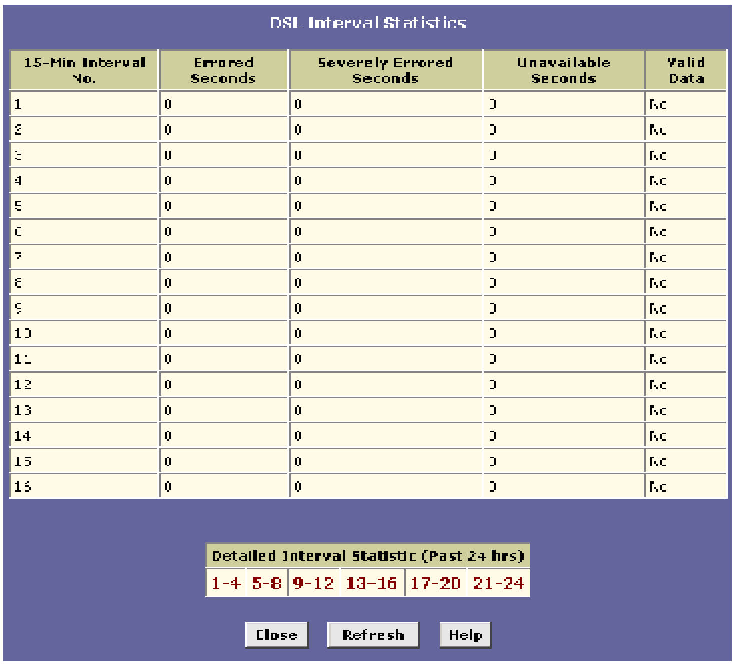
Current 15-Min Interval Statistics	
Elapsed Time(MM:SS):	0:0
Errored Seconds:	0
Severely Errored Seconds:	0
Unavailable Seconds:	0
Current Day Statistics	
Elapsed Time(HH:MM:SS):	0:0:0
Errored Seconds:	0
Severely Errored Seconds:	0
Unavailable Seconds:	0
Previous Day Statistics	
Monitored Time(HH:MM:SS):	0:0:0
Errored Seconds:	0
Severely Errored Seconds:	0
Unavailable Seconds:	0

Detailed Interval Statistic (Past 24 hrs)					
1-4	5-8	9-12	13-16	17-20	21-24

Figure 76. DSL Statistics Page

The DSL Statistics page reports error data relating to the last 15-minute interval, the current day, and the previous day.

At the bottom of the page, the Detailed Interval Statistic table displays links you can click on to display detailed data for each 15-minute interval in the past 24 hours. For example, when you click on 1-4, data displays for the 16 intervals (15-minutes each) that make up the previous 4 hours. Figure 77 shows an example.



DSL Interval Statistics

15-Min Interval No.	Errored Seconds	Severely Errored Seconds	Unavailable Seconds	Valid Data
1	0	0	0	No
2	0	0	0	No
3	0	0	0	No
4	0	0	0	No
5	0	0	0	No
6	0	0	0	No
7	0	0	0	No
8	0	0	0	No
9	0	0	0	No
10	0	0	0	No
11	0	0	0	No
12	0	0	0	No
13	0	0	0	No
14	0	0	0	No
15	0	0	0	No
16	0	0	0	No

Detailed Interval Statistic (Past 24 hrs)					
1-4	5-8	9-12	13-16	17-20	21-24

Figure 77. DSL Interval Statistics Page

Using Diagnostics

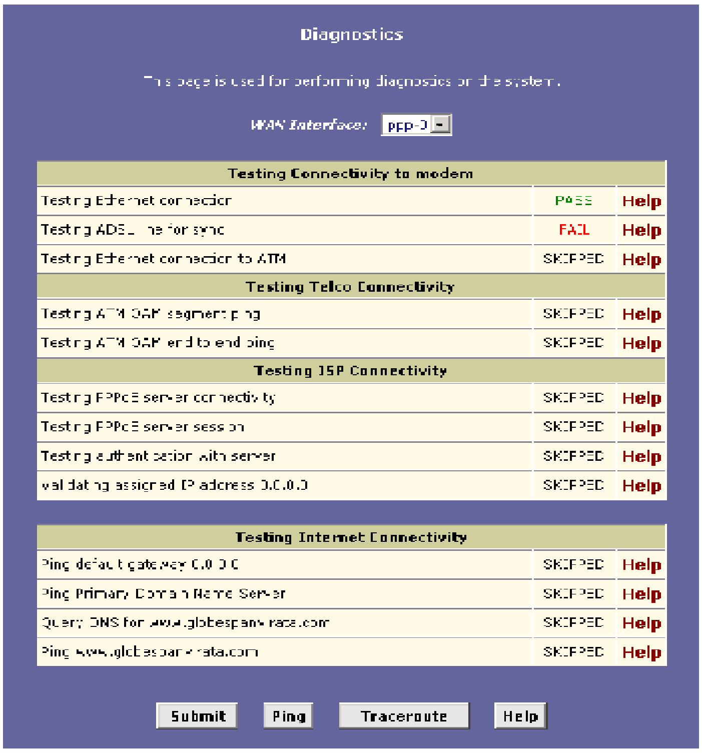
The diagnostics feature executes a series of test of your system software and hardware connections. Use this feature when working with your ISP to troubleshoot problems.

Running the Diagnostics Program

Follow these instructions to begin the diagnostics program:

1. Log into Configuration Manager, click the Admin tab, and then click **Diagnostics** in the task bar.

   The Diagnostics page displays.



Diagnostics

This page is used for performing diagnostics on the system.

WAN Interface: ppp-0

Testing Connectivity to modem		
Testing Ethernet connection	PASS	Help
Testing ADSL line for sync	FAIL	Help
Testing Ethernet connection to ATM	SKIPPED	Help
Testing Telco Connectivity		
Testing ATM OAM segment ping	SKIPPED	Help
Testing ATM OAM end to end ping	SKIPPED	Help
Testing ISP Connectivity		
Testing PPPoE server connectivity	SKIPPED	Help
Testing PPPoE server session	SKIPPED	Help
Testing authentication with server	SKIPPED	Help
validating assigned IP address 0.0.0.0	SKIPPED	Help

Testing Internet Connectivity		
Ping default gateway 0.0.0.0	SKIPPED	Help
Ping Primary Domain Name Server	SKIPPED	Help
Query DNS for www.globespanvirata.com	SKIPPED	Help
Ping www.globespanvirata.com	SKIPPED	Help

Figure 78. Diagnostics Page

2. From the WAN Interface drop-down list, select the name of the WAN interface you want to test.

3. Click Submit.

The diagnostics utility runs a series of test to check whether the device's connections are up and working. This takes only a few seconds and the results for each test are displayed on screen (*Pass*, *Fail*, or *Skipped*). A test may be skipped if the program determines that no suitable interface is configured on which to run the test.

You can click **Help** to display an explanation of each test. Work with your ISP to interpret the results of the diagnostic tests.

Using the Ping Utility

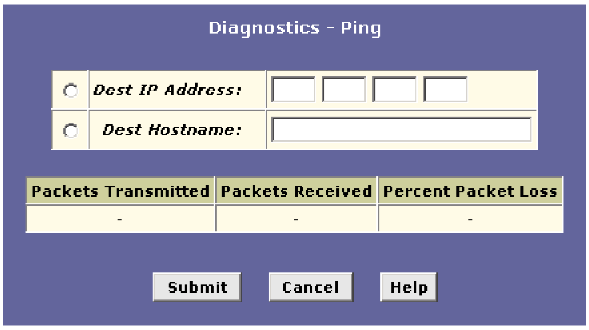
Ping is a command you can use to check whether your PC can recognize other computers on your network and the Internet. A ping command sends a message to the computer you specify. If the computer receives the message, it sends messages in reply. To use ping, you must know the IP address or domain name of the computer you want to communicate with.

For example, you can test whether the path to the ISP is working if you know the IP address of their access server.

The Diagnostics page provides a utility for executing ping. Follow these steps:

1. Display the WAN tab, click **Diagnostics** in the task bar, and click **Ping** at the bottom of the Diagnostics page.

   The Diagnostics - Ping page displays:



Diagnostics - Ping

○ *Dest IP Address:* [ ] [ ] [ ] [ ]

○ *Dest Hostname:* [ ]

Packets Transmitted	Packets Received	Percent Packet Loss
-	-	-

Figure 79. Diagnostics – Ping Page

2. In the Dest IP Address text boxes, type the IP address of the computer you want to ping.

   Or, in the Dest Hostname text box, type the domain name of the target site (such as *yahoo.com* or *mydomain.net*).

3. Click **Submit**.

   In a few seconds, the lower table will display values indicating the results after 4 ping packets have been transmitted. If a connection is detected, the Packets Received value will also equal 4. If no connection can be detected after 4 attempts, then the Packets Received value will be 0 and the Percent Packet Loss will be 100%.

Using the Traceroute Utility

You can use the traceroute utility to view the IP addresses of all the hops that an IP packet makes from the ADSL2+ Router on its way to an Internet destination. You can use the results of a traceroute to determine where a delay or transmission error is occurring.

The traceroute utility sends a specified number of ping or UDP packets (3, by default) to the first router in the path toward the specified destination computer. These packets carry a time-to-live (TTL) value of 1. The TTL value is a counter which is reduced by 1 by each router that receives the packet. The first receiving router reduces the TTL from 1 to 0 and responds with an ICMP message indicating that the packet has been discarded. The receipt of this message enables the ADSL2+ Router to determine:

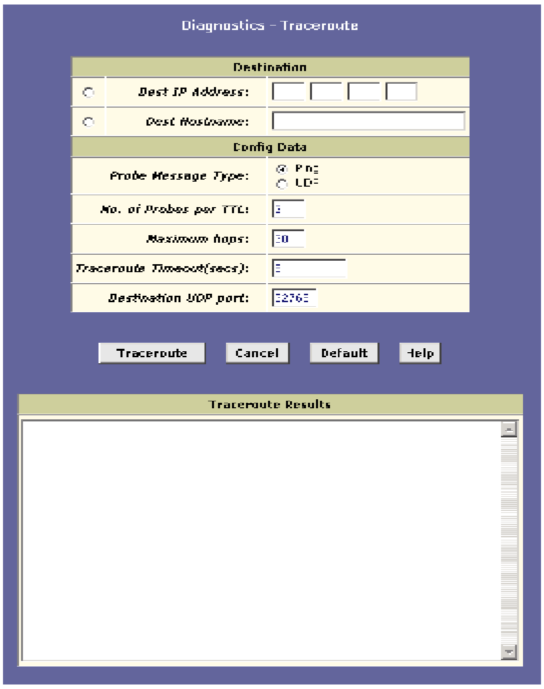
- that the ping/UDP packets reached the initial router, and
- the packet's approximate time in transit.

The traceroute utility then sends out packets with a TTL of 2. The First router that receives the packet reduces the TTL to 1 and routes the packet to the next hop. The second router that receives the packet reduces the TTL to 0 and responds with an ICMP timeout reply. The next set of traceroute packets has a TTL of 3, and so on, until the traceroute packets reach the destination computer. The destination computer replies with an error message that signals the completion of the traceroute.

To perform a traceroute, you must know the destination IP address or host name. Follow these steps to perform a traceroute:

1. From the Diagnostics page, click **Traceroute**.

   The Diagnostic – Traceroute page displays:



Diagnostics - Traceroute

Destination		
○	Dest IP Address:	
○	Dest Hostname:	
Config Data		
	Probe Message Type:	● Ping ○ UDP
	No. of Probes per TTL:	3
	Maximum hops:	30
	Traceroute Timeout(secs):	3
	Destination UDP port:	32763

Figure 80. Diagnostics Page - Traceroute

2. Click either the Destination IP Address or Dest Hostname radio button, and then type the appropriate data in the corresponding text box.

   The destination host name must be in the form of a fully qualified domain name, such as *yahoo.com*.

3. In the Config Data section, change any of the following parameters, as needed:

Field	Description
Probe Message Type	The traceroute can use ping/UDP messages to conduct the traceroute. Some routers in the path may not support one or the other method. Try one, and if not working, try the other.
No. of Probes per TTL	The number of redundant packets that will be sent in each transmission (to account for packets dropped due to connection or server problems).
Maximum hops	The maximum number of hops that can be discovered in a traceroute before it terminates.
Traceroute Timeout (secs)	The number of seconds after sending ping/UDP packets that the traceroute will timeout if no reply is received.
Destination UDP port	When the Probe Message Type is specified as *UDP*, the traceroute commands includes an invalid destination UDP port address in the UDP packets. When a packet reaches the destination, it is dropped and the computer replies with an error message. This error message is used to identify the completion of the traceroute. This field specifies the invalid UDP port number to use. This field is not used if the Probe Message Type is *ping*.

4. Click to begin the trace.

   The results display in the window at the bottom of the page and include the IP address of each router or computer reached, from the first to last hop, and the access time for each packet sent.

17 Upgrading the Software and Storing and Restoring the Configuration Data

All system software is contained in a single file, called an *image*. The image is stored in system flash memory and contains the operating system, device drivers, application code, and configuration data. The configuration data includes all the customizable settings described in this User's Guide.

You can upgrade the image by installing a new one provided by your ISP. You can also save the current configuration data to a file, which you can later restore to system flash.

Upgrading the Image

Your ISP may from time to time notify you that a software upgrade is available. Upgrade files may be provided to you in two ways:

- On a CD-ROM or other media. You can use Configuration Manager to upload the file from the CD-ROM drive or your PC's hard drive (or shared network drive) to system flash.
- On remote ISP server. You can use Configuration Manager download the file and load it to system flash.

Upgrading Using an Image Stored Locally

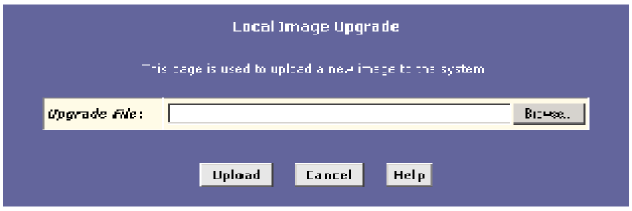
Follow this procedure if you have obtained an updated image from your ISP and stored the file on your PC, CD-ROM, or other media.

1. Insert the media containing the file in your PC's CD-ROM/disk drive. You can access the file from there or copy it to your hard drive or to any shared network drive.

   The name of the upgrade file must be either *TEImage*.bin* or *TEPatch*.bin*, where * represents any number of characters.

2. Log into Configuration Manager, click the Admin tab, and then click **Local Image Upgrade** in the task bar.

   The Local Image Upgrade page displays.

   Local Image Upgrade

   This page is used to upload a new image to the system

   Upgrade File:

   Figure 81. Local Image Upgrade Page

3. In the Upgrade File text box, type the path and file name of the file. You can click Browse... to search for it.

4. Select the file, and then click Upload.

   The following message box displays at the bottom of the page:

   Loading New Software
   Please do not interrupt the upgrade process. A status page will appear automatically when loading is completed (about 1 minute).

   When loading is complete, the following message displays (the file name may differ):

   File: TEImage.bin successfully saved to flash. Please reboot for the new image to take effect.

5. Turn off power to the unit, wait a few seconds, and turn it on again.

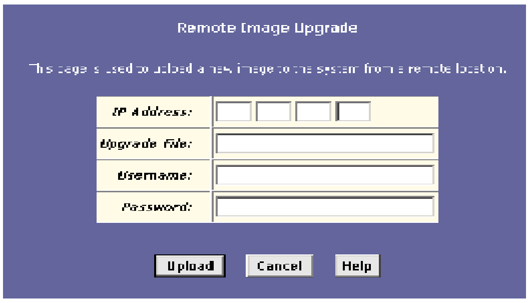
The new software will now be in effect. If the system fails to boot or is not working properly, contact your ISP for assistance.

Uploading an Image Stored Remotely

Follow this procedure if the upgrade file is available by downloading from your ISP. Contact your ISP to obtain the server and logon information required.

1. Log into Configuration Manager, click the Admin tab, and then click **Remote Image Upgrade** in the task bar.

   The Remote Image Upgrade page displays.



Remote Image Upgrade

This page is used to upload a new image to the system from a remote location.

IP Address:	
Upgrade File:	
Username:	
Password:	

Figure 82. Remote Image Upgrade Page

Note

If the page does not display a table as shown in Figure 82, but displays only the Upload button, skip to step 5. In this case, the download server IP address, filename, and logon information has already been hard-coded into your system.

2. In the IP Address text boxes, type the IP address of the server from which the file is to be downloaded.

3. In the Upgrade File text box, type the complete name of the file to be downloaded and installed.

   The file name can be either TEImage*.bin or TEPatch*.bin, where * represents any number of characters.

4. In the Username and Password fields, type the logon information to the ISP's server (if the ISP requires it).

5. Click Upload.

   An alert window pops up displaying the following message:

   Image upgrade may take a few minutes after which the system will reboot.

6. Click OK to start the image upgrade.

   The file begins downloading from the ISP's server and loading the image into flash. When image upgrade is complete, the following message displays:

   Remote Image Upgrade Successful...

   The system will proceed to reboot itself automatically. Wait 1 minute to allow the reboot to complete. You must refresh your browser and log in again if you want to continue using Configuration Manager.

Storing and Restoring Configuration Settings

Many of theADSL2+ Router's software features, such as those documented in this User's Guide, can be configured in various ways to address your needs or your ISP's requirements. This configuration data becomes part of the software image. You can extract configuration data from the software image and save it on your PC as a text file. If you later change the system configuration, but then want to revert to the previous settings, you can load the configuration file back to the system.

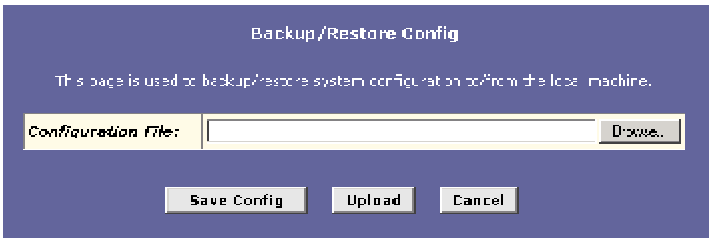
This feature may be especially useful when you receive an image upgrade file from your ISP containing software updates. Uploading the new image may overwrite your settings with default values. Before you load the new image, you can store the configuration settings. Then, after you load the image, you can restore your previous configuration.

Follow these instructions to save and restore the configuration file:

1. Ensure that any changes you have made in the current session have been committed (click the Admin tab, click **Commit & Reboot** in the task bar, and then click Commit.)

2. In the Admin tab, click **Backup/Restore Config** in the task bar.

   The Backup/Restore Config page displays:



This page is used to backup/restore system configuration to/from the local machine.

Figure 83. Backup/Restore Config Page

3. Perform either of the following:

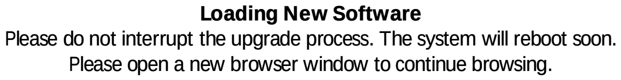
„ To save the current configuration, click Save Config.

A Windows dialog box will display to enable you to choose where to save the file. The file is named *commitedcfg.cfg* and can be opened with any text editor.

You can change the file name to identify the date or characteristics of the configuration; however, you must change it back to *commitedcfg.cfg* before restoring it.

„ To restore a saved configuration file, click Browse....

A Windows dialog box will display to enable you to select the file, which must be named *commitedcfg.cfg*, from your PC or network. Double-click the file and then click Upload. The following message displays while the file is being uploaded:



Loading New Software

Please do not interrupt the upgrade process. The system will reboot soon.
Please open a new browser window to continue browsing.

When the system reboots, your connection to the Configuration Manager will be suspended and may appear to hang. If you want to continue to use Configuration Manager, wait about 30 seconds and Refresh the browser window (e.g., press **<F5>** if using Internet Explorer). You may need to log in again.

18 Modifying Port Settings

This chapter describes how to modify the Port ID numbers associated with theADSL2+ Router's Web, FTP, and Telnet servers.

Overview of IP port numbers

The header information in an IP data packet specifies a destination port number. Routers use the port number along with the IP addresses to forward the packet to its intended recipient.

For example, all IP data packets that the ADSL/Ethernet router receives from the Internet specify the same IP address (your public IP address) as the destination. However, depending on the port number contained in a data packets, the ADSL/Ethernet router may pass the packet on to its embedded Web or Telnet servers, or to another computer on the network.

The Internet community has developed a list of common server types such as HTTP, Telnet, e-mail, and many others, and has defined port numbers that can be assigned each. This is not a mandatory scheme, but is useful in promoting communication between separately administered LANs.

Modifying the ADSL2+ Router's Port Numbers

In some cases, you may want to assign non-standard port numbers to the HTTP and Telnet servers that are embedded on the ADSL2+ Router. The following scenario is one example in which changing the HTTP port number may be necessary:

> You have an externally visible Web server on your LAN, with a NAT rule (RDR flavor) that redirects incoming HTTP packets to that Web server. When incoming packets contain a destination IP address of your public IP address (which is assigned to the ADSL/Ethernet router's WAN interface) and the standard Web server port number of 80, the NAT rule recognizes the port number and redirects the packets to your Web server's local IP address.
>
> Assume in this scenario that you also want to enable external access to the ADSL2+ Router's Configuration Manager, so that your ISP can log in and manager your system, for example. Accessing Configuration Manager requires accessing the ADSL2+ Router's own Web server (also called its HTTP server). In this case, you would want to use the Port Settings feature to assign a non-standard port number to the ADSL2+ Router's HTTP server. Without a non-standard port number, the NAT rule would redirect your ISP's log in attempt to your LAN HTTP server rather than to the HTTP server on the ADSL2+ Router.

Thereafter, when your ISP wants to log on to your Configuration Manager, they would type your IP address in their browser, followed by a colon and the non-standard port number, as shown in this example:

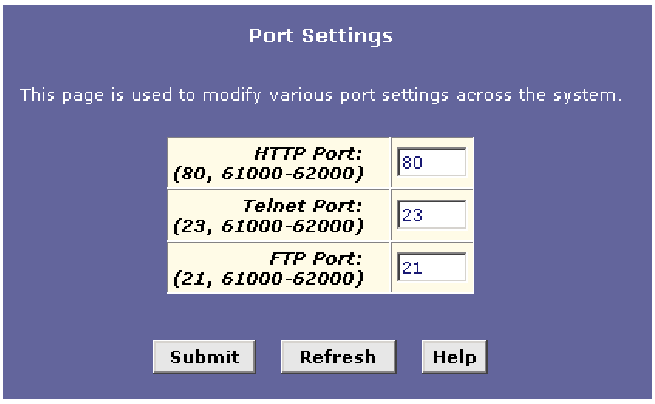
http://10.0.1.16:61000

Your ISP may also have special circumstances that require changing the port numbers; contact them before making any changes here.

Follow these steps to modify port settings:

1. Log into Configuration Manager, click the Admin tab, and then click **Port Settings** in the task bar.

   The Port Settings page is shown in Figure 84.



Port Settings

This page is used to modify various port settings across the system.

HTTP Port: (80, 61000-62000)	80
Telnet Port: (23, 61000-62000)	23
FTP Port: (21, 61000-62000)	21

Figure 84. Port Settings Page

2. Type the new port number(s) in the appropriate text box(es) and click **Submit**.

   The default port numbers are shown in Figure 84. You can enter non-standard port numbers in the range 61000-62000.

3. Click **Commit & Reboot** in the task bar, and click **Commit** to save your changes to permanent memory.

4. On the Commit & Reboot page, click **Reboot**.

Note that the new settings will not be effective until you reboot the system.

19 Configuring Autodetect

Autodetect enables the modem to automatically detect and configure a valid ATM VC at startup. Autodetect eliminates the need to have users configure VC values as described in “Configuring the ATM VC” on page 50.

How Autodetect Works

When enabled, Autodetect attempts to establish a DSL connection with the ISP using VC values (VPI/VCI) selected in either of two ways:

- from a pre-determined list preconfigured on the modem
- from the complete range of valid values

Note

The method of operation is preconfigured by the ISP and cannot be changed using the Web-based interface.

A valid connection is found when a PPP, EoA, or IPoA interface is found on the ISP's access server. If the initial VPI/VCI values do not detect a valid connection, then Autodetect tries again using the next set of available values. When a successful connection is discovered, that connection is used for the current session and the VPI/VCI values are "remembered" for initial use the next time the modem starts up.

Autodetect Modes

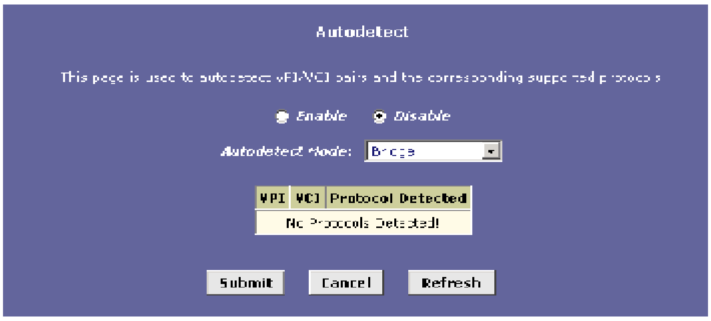
Autodetect can be used to establish PPPoE, PPPoA, IPoA-1577 and EoA connections and can be configured in either of two modes: bridging mode and routing mode. These modes are specific to the Autodetect feature and are configured in addition to the system operating mode defined on the modem.

- When Autodetect is configured in bridging mode, it can detect the presence of PPPoE and EoA interfaces on the access server. In this mode, the modem must be configured as a bridge and a PPPoE or DHCP client is expected to be running on the LAN PC (behind the modem).
- When configured in routing mode, Autodetect can detect PPPoE, EoA, PPPoA, or IPoA-1577 interfaces on the access server. Autodetect searches for these interfaces in the order stated. Depending on the interface detected, Autodetect creates a PPP, an EoA, or an IPoA interface on the modem. In this mode, the modem is expected to be configured as a router.

Configuring Autodetect

Follow these steps to configure Autodetect:

1. Log into Configuration Manager, click the Admin tab and then click **Autodetect** to display the Autodetect page:



Autodetect

This page is used to autodetect VPI/VCI pairs and the corresponding supported protocols

○ Enable ● Disable

Autodetect Mode: Bridge

VPI	VCI	Protocol Detected
No Protocols Detected!		

Figure 85. Autodetect Page

2. Select the appropriate Autodetect mode of operation, as described in the previous section, from the Autodetect Mode drop-down list.
3. Click the Enable radio button.
4. Click **Submit**.

   A page will display briefly to confirm your changes. Autodetect will not start searching for a valid connection until the modem is rebooted.
5. Click **Reset**.

   A warning message will display to inform you that the current configuration will be lost.
6. Click OK.

The modem will reboot and the Web interface will be temporarily unavailable. Upon reboot, Autodetect will begin searching for a valid VC and will create a PPP, an EoA, or an IPoA interface on your modem corresponding to the type of interface detected on the access server. You can monitor the success or failure of the Autodetect process by displaying the System Log page, located in the Admin tab.

If you disable Autodetect, be sure to commit your changes. Also, when Autodetect is disabled, you must manually configure ATM VC information as described in “Configuring the ATM VC” on page 50.

A IP Addresses, Network Masks, and Subnets

IP Addresses

Note

This section pertains only to IP addresses for IPv4 (version 4 of the Internet Protocol). IPv6 addresses are not covered.

IP addresses, the Internet's version of telephone numbers, are used to identify individual nodes (computers or devices) on the Internet. Every IP address contains four numbers, each from 0 to 255 and separated by dots (periods), e.g. 20.56.0.211. These numbers are called, from left to right, field1, field2, field3, and field4.

This style of writing IP addresses as decimal numbers separated by dots is called *dotted decimal notation*. The IP address 20.56.0.211 is read "twenty dot fifty-six dot zero dot two-eleven."

Structure of an IP address

IP addresses have a hierarchical design similar to that of telephone numbers. For example, a 7-digit telephone number starts with a 3-digit prefix that identifies a group of thousands of telephone lines, and ends with four digits that identify one specific line in that group.

Similarly, IP addresses contain two kinds of information.

- *Network ID*
  Identifies a particular network within the Internet or intranet
- *Host ID*
  Identifies a particular computer or device on the network

The first part of every IP address contains the network ID, and the rest of the address contains the host ID. The length of the network ID depends on the network's *class* (see following section). Table 3 shows the structure of an IP address.

Table 3. IP Address structure

	Field1	**Field2**	**Field3**	**Field4**
Class A	Network ID	Host ID		
Class B	Network ID		Host ID	
Class C	Network ID			Host ID

Here are some examples of valid IP addresses:

Class A: 10.30.6.125 (network = 10, host = 30.6.125)
Class B: 129.88.16.49 (network = 129.88, host = 16.49)
Class C: 192.60.201.11 (network = 192.60.201, host = 11)

Network classes

The three commonly used network classes are A, B, and C. (There is also a class D but it has a special use beyond the scope of this discussion.) These classes have different uses and characteristics.

Class A networks are the Internet's largest networks, each with room for over 16 million hosts. Up to 126 of these huge networks can exist, for a total of over 2 billion hosts. Because of their huge size, these networks are used for WANs and by organizations at the infrastructure level of the Internet, such as your ISP.

Class B networks are smaller but still quite large, each able to hold over 65,000 hosts. There can be up to 16,384 class B networks in existence. A class B network might be appropriate for a large organization such as a business or government agency.

Class C networks are the smallest, only able to hold 254 hosts at most, but the total possible number of class C networks exceeds 2 million (2,097,152 to be exact). LANs connected to the Internet are usually class C networks.

Some important notes regarding IP addresses:

- The class can be determined easily from field1:

field1 = 1-126:	Class A
field1 = 128-191:	Class B
field1 = 192-223:	Class C

  (field1 values not shown are reserved for special uses)

- A host ID can have any value except all fields set to 0 or all fields set to 255, as those values are reserved for special uses.

Subnet masks

Definition
mask

> *A* mask *looks like a regular IP address, but contains a pattern of bits that tells what parts of an IP address are the network ID and what parts are the host ID: bits set to 1 mean "this bit is part of the network ID" and bits set to 0 mean "this bit is part of the host ID."*

Subnet masks are used to define *subnets* (what you get after dividing a network into smaller pieces). A subnet's network ID is created by "borrowing" one or more bits from the host ID portion of the address. The subnet mask identifies these host ID bits.

For example, consider a class C network 192.168.1. To split this into two subnets, you would use the subnet mask:

255.255.255.128

It's easier to see what's happening if we write this in binary:

11111111. 11111111. 11111111.10000000

As with any class C address, all of the bits in field1 through field 3 are part of the network ID, but note how the mask specifies that the first bit in field 4 is also included. Since this extra bit has only two values (0 and 1), this means there are two subnets. Each subnet uses the remaining 7 bits in field4 for its host IDs, which range from 0 to 127 (instead of the usual 0 to 255 for a class C address).

Similarly, to split a class C network into four subnets, the mask is:

255.255.255.192 or 11111111. 11111111. 11111111.11000000

The two extra bits in field4 can have four values (00, 01, 10, 11), so there are four subnets. Each subnet uses the remaining six bits in field4 for its host IDs, ranging from 0 to 63.

Note

Sometimes a subnet mask does not specify any additional network ID bits, and thus no subnets. Such a mask is called a default subnet mask*. These masks are:*

Class A:	*255.0.0.0*
Class B:	*255.255.0.0*
Class C:	*255.255.255.0*

These are called default *because they are used when a network is initially configured, at which time it has no subnets.*

B Troubleshooting

This appendix suggests solutions for problems you may encounter in installing or using the ADSL2+ Router, and provides instructions for using several IP utilities to diagnose problems.

Contact Customer Support if these suggestions do not resolve the problem.

Problem	Troubleshooting Suggestion
LEDs	
POWER LED does not illuminate after product is turned on.	Verify that you are using the power cable provided with the device and that it is securely connected to the ADSL2+ Router and a wall socket/power strip.
INTERNET LED does not illuminate after phone cable is attached.	Verify that a standard telephone cable (called an RJ-11 cable) like the one provided is securely connected to the ADSL port and your wall phone jack. Allow about 30 seconds for the device to negotiate a connection with your ISP.
Ethernet LED does not illuminate after Ethernet cable is attached.	Verify that the Ethernet cable is securely connected to your LAN hub or PC and to the ADSL2+ Router. Make sure the PC and/or hub is turned on. Verify that you are using a straight-through type Ethernet cable to the uplink port on a hub or a cross-over type cable to a stand-alone PC. If you connected the device to an ordinary hub port (not Uplink), you must use a straight-through cable. (To check: hold the connectors at each end of the cable side-by-side with the plastic spring facing down. Looking at the wires from left to right, if the first, second, third, and sixth wires are the same color on the two connectors, then it is a straight-through type. On a cross-over type, wire 1 on one connector should be the same color as wire 3 on the other. The same is true of wires 2 and 6.) Verify that your cable is sufficient for your network requirements. A 100 Mbit/sec network (10BaseTx) should use cables labeled CAT 5. A 10Mbit/sec network may tolerate lower quality cables.
Internet Access	
My PC cannot access Internet	Use the ping utility, described on page 165, to check whether your PC can communicate with the ADSL2+ Router's LAN IP address (by default 192.168.1.1). If it cannot, check the Ethernet cabling. If you statically assigned a private IP address to the computer, (not a registered public address), verify the following: • Check that the gateway IP address on the computer is your public IP address (see "Quick Start Part 2 — Configuring Your Computers," for instructions). If it is not, correct the address or configure the PC to receive IP information automatically. • Verify with your ISP that the DNS server

Problem	Troubleshooting Suggestion
	specified for the PC is valid. Correct the address or configure the PC to receive this information automatically. • Verify that a Network Address Translation rule has been defined on the ADSL2+ Router to translate the private address to your public IP address. The assigned IP address must be within the range specified in the NAT rules (see Chapter 4). Or, configure the PC to accept an address assigned by another device (see "Quick Start Part 2 — Configuring Your Computers"). The default configuration includes a NAT rule for all dynamically assigned addresses within a predefined pool (see the instructions in Chapter 8 to view the address pool).
My LAN PCs cannot display web pages on the Internet.	Verify that the DNS server IP address specified on the PCs is correct for your ISP, as discussed in the item above. If you specified that the DNS server be assigned dynamically from a server, then verify with your ISP that the address configured on the ADSL2+ Router is correct, then You can use the ping utility, described on page 165, to test connectivity with your ISP's DNS server.
Configuration Manager Program	
I forgot/lost my Configuration Manager user ID or password.	If you have not changed the password from the default, try using "root" as both the user ID and password. Otherwise, you can reset the device to the default configuration by pressing the Reset button on the back panel of the device three times (using a pointed object such as a pen tip). Then, type the default User ID and password shown above. **WARNING:** Resetting the device removes any custom settings and returns all settings to their default values.
I cannot access the Configuration Manager program from my web browser.	Use the ping utility, discussed in the following section, to check whether your PC can communicate with the ADSL2+ Router's LAN IP address (by default 192.168.1.1). If it cannot, check the Ethernet cabling. Verify that you are using Internet Explorer v5.0 or later, or Netscape Navigator v6.1 or later. Support for Javascript® must be enabled in your browser. Support for Java® may also be required. Verify that the PC's IP address is defined as being on the same subnet as the IP address assigned to the LAN interface on the ADSL2+ Router.
My changes to Configuration Manager are not being retained.	Be sure to use the Commit function after any changes. This function is described on page 39.