

MEGABIT MODEM

Model 500L User Manual



 PAIRGAIN



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ABOUT THIS USER MANUAL

Use this manual to install and configure the PairGain® Megabit Modem 500L™. The manual provides instruction on:

- information you will need to configure the modem
- unpacking and inspecting the modem for installation
- installing the modem
- setting up parameters for your applications that will be used to configure the modem
- configuring system parameters
- configuring sessions between the modem and a service provider
- monitoring and troubleshooting the modem

[Chapter 9](#) provides a reference for technology implemented in the Megabit Modem 500L. The chapter covers information about ATM over ADSL transmission, PPP over ATM operating mode, and SNMP management.

IP addresses used in this manual are for example only. You will acquire your own addresses from the service provider and your information services coordinator to configure the Megabit Modem 500L. However, you must use the IP address specified in [“Accessing Megabit Modem 500L Web Pages”](#) on [page 20](#) to access the Megabit Modem 500L from a Web browser.

DOCUMENT CONVENTIONS

Two types of messages, identified by icons, appear in the text.



Notes contain information about special circumstances.



Cautions indicate the possibility of equipment damage or the possibility of personal injury.

SUGGESTIONS AND CORRECTIONS TO THIS MANUAL

Your comments help us prepare better user documentation. If you have comments about this manual, send an email containing the comment(s), page reference, and any other pertinent information to:

`technical_publications@pairgain.com`

In the email subject area, provide the product name and the name and date of the document about which you are commenting.

If you have questions about the product or warranty, see [Appendix B on page 69](#) for information about whom to contact.

PRODUCT CERTIFICATIONS

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communication.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

UL

This product meets all safety requirements per UL-1950 standard.

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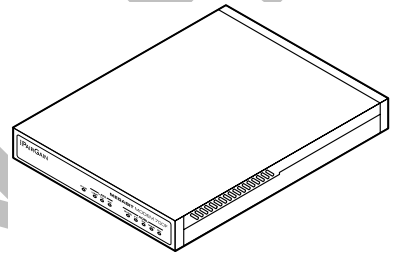
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ABOUT THE PRODUCT

You have purchased the PairGain Megabit Modem 500L that connects your Ethernet LAN to service providers for instant and high-speed access to the Internet or to other types of Wide Area Network (WAN) applications. The modem provides this service over a single-pair telephone line with downstream ADSL transmission up to 1.5 Mbps. The upstream ADSL transmission is up to 512 kbps. You can also receive telephone service over the same single-pair line as your data.



The Megabit Modem 500L uses ATM over DMT ADSL technology to provide this high-speed transmission between the modem and the service provider. Asynchronous Transfer Mode (ATM) provides transmission of fixed-size cells over preestablished connections. The Asymmetric Digital Subscriber Line (ADSL) provides rate-adaptive transmission which means the service provider can deliver the best possible transmission rate to you based on distance and line conditions.

The Megabit Modem 500L is easy to install and configure. To install the modem, you:

- connect a telephone cable from the modem to a wall phone jack for ADSL service
- connect a cable from the modem to a PC or an Ethernet hub for LAN service
- connect a power cable to a local power source

To configure the modem, launch a Web browser on your PC and load the Megabit Modem Configuration and Management Tool Web pages that guide you through configuration. Use the Web page called EasySession™ to configure up to 3 Internet or other WAN sessions with service providers (you can activate only one session at a time). You can also configure other system parameters and monitor ADSL, LAN, and other networking functions using the Web pages.

DSLview™ LEDs on the modem front panel provide continual status at-a-glance for network and modem connections.

FEATURES

The Megabit Modem 500L provides:

- rate-adaptable ADSL transmission downstream at up to 1.5 Mbps and upstream at up to 512 kbps
- Internet or other types of WAN applications and phone service over your existing phone line
- Point-to-Point Protocol (PPP) encapsulation method
- Password and Challenge-Handshake Authentication Protocols (PAP/CHAP) for authentication of PPP sessions
- Network Address Translation (NAT) protocol to map the user to the PPP session
- Dynamic Host Configuration Protocol (DHCP) server to provide network configuration information including IP addresses to LAN devices
- TFTP to download software
- AccessGain™ software to provide access through an HTTP server to configure, manage, and monitor the modem through a Web-based interface
- SNMP agent for management through any industry standard SNMP platform
- autodetecting 10/100BASE-T Ethernet port for connection to the LAN
- DSLview™ LEDs to provide continual status at-a-glance of power, LAN, and ADSL connections
- ATM technology with three virtual channels to allow one active Internet or other WAN application session at a time
- PriorityVoice™ to allow full deployment of the modem without splitters or microfilters
- InstaConnect™ to sense phone activity and optimizes performance

On a Megabit Modem 500L, you can configure three PPP over ATM sessions. However, you can enable only one of the sessions at a time. You assign the user to the session that is active.

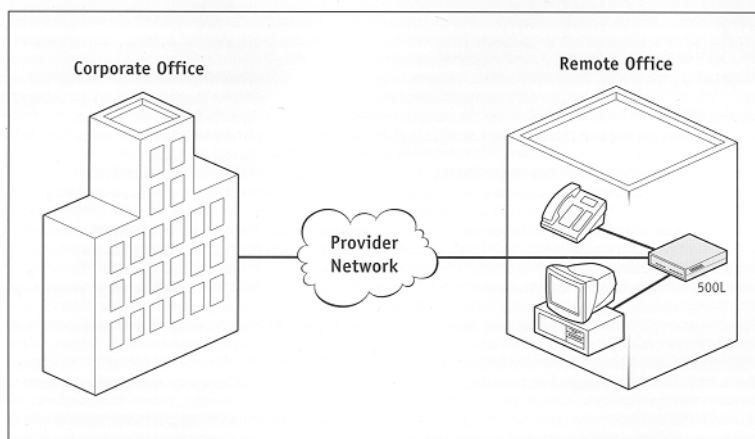
[Chapter 9 on page 55](#) provides more information about the technologies implemented in the Megabit Modem 500L.

APPLICATIONS

The Megabit Modem 500L provides a practical solution for many networking applications. The following illustrations show some of the many possible solutions when using the Megabit Modem 500L.

Connection to a Remote Office

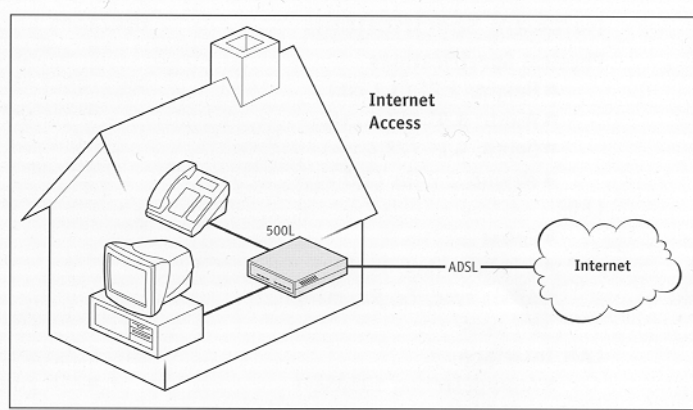
You can work at home or at a remote office and have a connection to a corporate office network.



Remote Office Connectivity

Internet Access for Users at Home

You can connect an at home user to the Internet.



Internet Access

WHAT YOU NEED TO START

This chapter identifies the preparations and prerequisites for installing the Megabit Modem 500L. To install the modem, verify that:

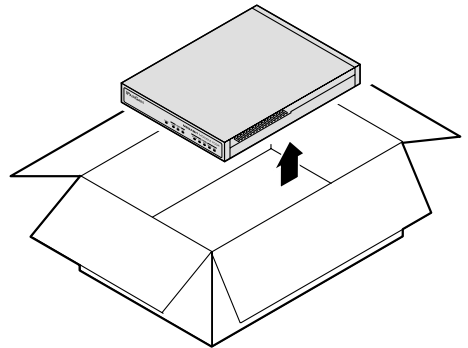
- the contents of the package are as described on this page
- your system meets requirements for connecting to and configuring the modem (see [“Requirements For Your System”](#) on page 6)
- your facility meets installation site requirements (see [“Requirements For The Installation Site”](#) on page 6)
- the configuration parameters are available from your service provider (see [“What You Need from Your Service Provider”](#) on page 9)

VERIFY PACKAGE CONTENTS

As you unpack the Megabit Modem 500L, visually inspect the container for signs of damage. If the equipment was damaged in transit, report the damage to the transportation company and to the sales representative.

Check the contents of the package for the Megabit Modem 500L and the following:

- one black cable
- one grey phone cord
- four rubber, self-adhesive feet
- two screws
- power supply and optional power cord (see [“Choose a Power Cable”](#) on page 9 for options)



If you need to store the modem for a prolonged period, store it in the original antistatic bag and packaging. Observe environmental specifications as stated on [page 63](#).

REQUIREMENTS FOR YOUR SYSTEM

You need the following hardware and software to complete the installation and configuration of the Megabit Modem 500L:

- PC with an Ethernet Network Interface Card (NIC)
- TCP/IP network protocol stack (see your documentation for your operating system)
- Web browser installed such as Netscape® or Internet Explorer® version 4.0 or higher
- Ethernet hub (optional)

REQUIREMENTS FOR THE INSTALLATION SITE

To install the Megabit Modem 500L, you must:

- select a location to install the modems as described in the section [“Location for Modem Installation”](#) on this page
- if you get phone service, identify requirements to connect phones as described in the section [“Phone Service”](#) on page 9

Location for Modem Installation

You can install the modem either:

- placed on a flat surface (shown on [page 7](#))
- mounted on a wall (shown on [page 8](#))

Your facility must have the following minimum site requirements to install each modem:

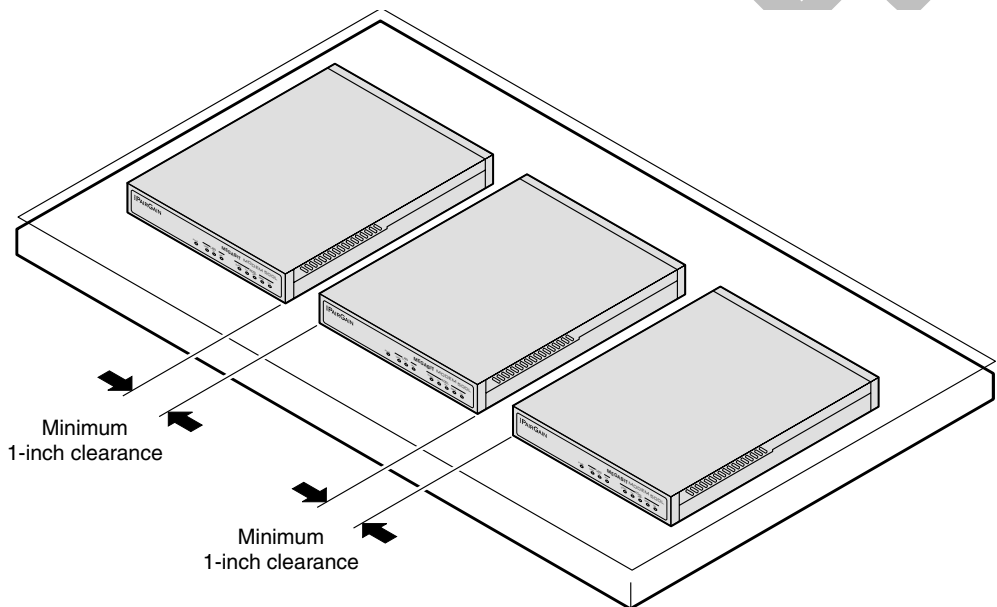
- power outlet
- RJ-11 wall jack that has DMT ADSL service available

Flat-Surface Mount



Do not stack the modems when installing on a flat surface. The modems do not dissipate heat properly when stacked.

Place the modems on a flat surface, such as on a table or in a rack.

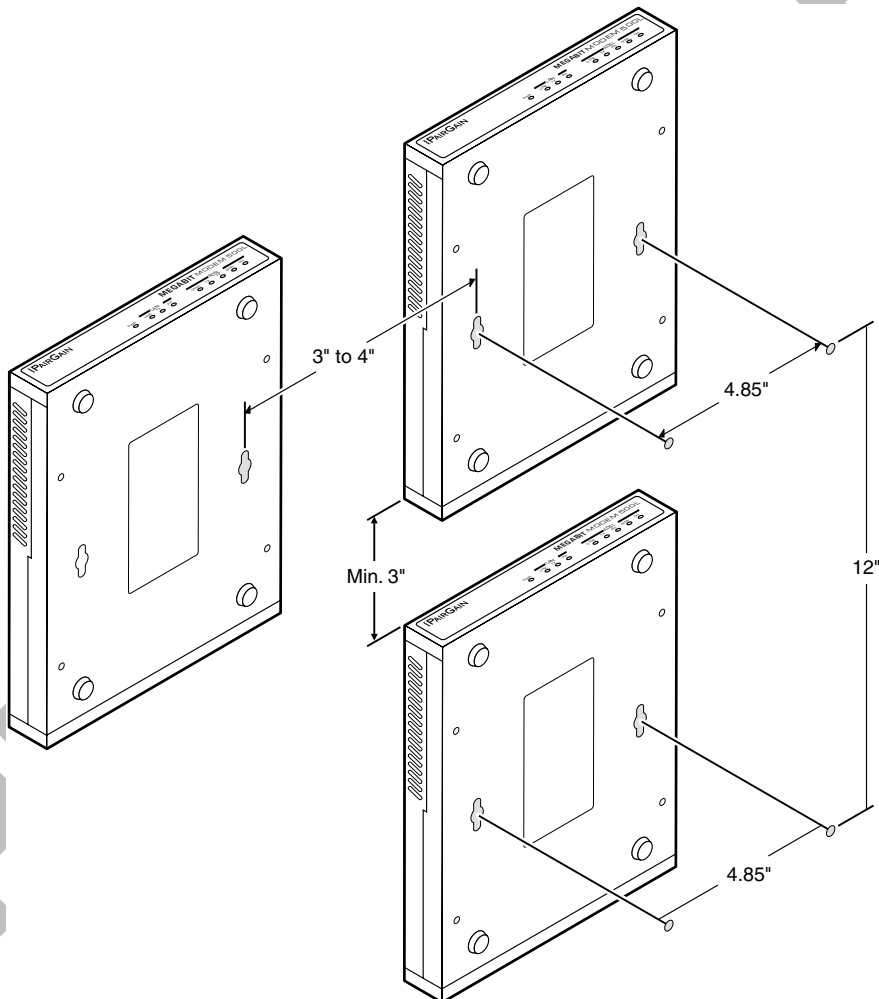


Wall Mount



Ensure the minimum dimensions (shown in the illustration) for spacing between modems are met to allow for heat dissipation, viewing of front panel LEDs, and cabling.

Mount the modems on a wall using the hardware included in the installation kit.



Phone Service

If you get phone service, all you need is an RJ-11 phone jack to connect your phone. This lite-rate modem provides splitterless capability, which allows reception of phone service without special splitters or filters; simply connect your phone.

WHAT YOU NEED FROM YOUR SERVICE PROVIDER

Use the worksheets, provided in [Appendix C on page 73](#), to record your configuration information. When you begin to configure the modem in [Chapter 4 on page 17](#), the procedures refer you to the proper table for the configuration information that you recorded. This section lists the information you need to configure system settings and sessions for the modem. Contact your service provider for this information.

- 1 If using CHAP, the CHAP authentication name for each session.
- 2 Session address for Ports 1 through 3 (WAN configuration):
 - ATM VPI and ATM VCI (specified for each session)
 - when using fixed IP addresses, IP address specified for each session by the service provider
 - Login Name and Login Password (specified for each session)

For more information about the configuration choices listed above, see [Chapter 9 on page 55](#).

CHOOSE A POWER CABLE

The Megabit Modem 500L is available with a variety of power supplies and power cords. When you order your modem, choose one of the following as the last number in the product part number (150-2120-7x) for your order to indicate which power option you need:

- 2 indicates a power supply for International use and does not include a power cord.
- 3 indicates a power supply for North American use and includes a North American power cord.
- 4 indicates a Universal power supply and includes a European power cord.
- 5 indicates a Universal power supply and includes a UK/Ireland power cord.

PRELIMINARY

INSTALLING THE MODEM

The Megabit Modem 500L is easy to install by:

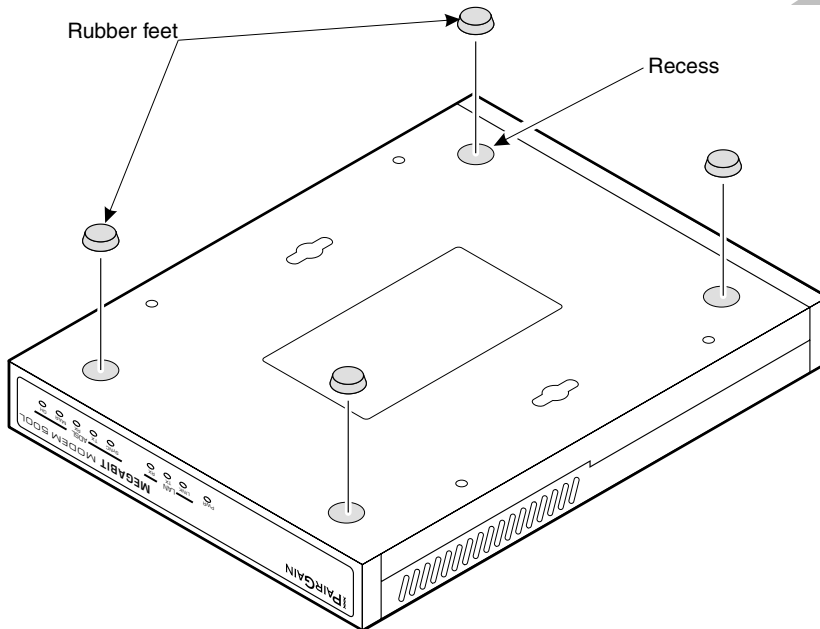
- attaching adhesive-backed feet
- setting the MDI/MDI-X switch
- connecting a cable from the modem to a PC or an Ethernet hub for LAN service
- connecting a phone cord from the modem to a wall phone jack for DMT ADSL Internet or other WAN application service
- connecting a power cable to a local power outlet

Perform the installation on the following pages (see [“Location for Modem Installation”](#) on [page 6](#) to determine where to place modems). Use the installation kit parts listed below in the installation procedures.

Part	Function
Rubber adhesive-backed feet (four)	Attaches to the base of the modem.
Black cable	Connects the modem 10/100BASE-T connector to the LAN through a hub or to a PC NIC.
Grey cord	Connects the modem ADSL connector to the RJ-11 wall jack with DMT ADSL service.
Power cable	Connects the modem Power connector to the local power source. Power supply optionally has a power cord. (See “Choose a Power Cable” on page 9 for selection options.)

ATTACHING THE FEET

Attach each of the four adhesive-backed rubber feet to a footprint recess on the bottom of the modem.

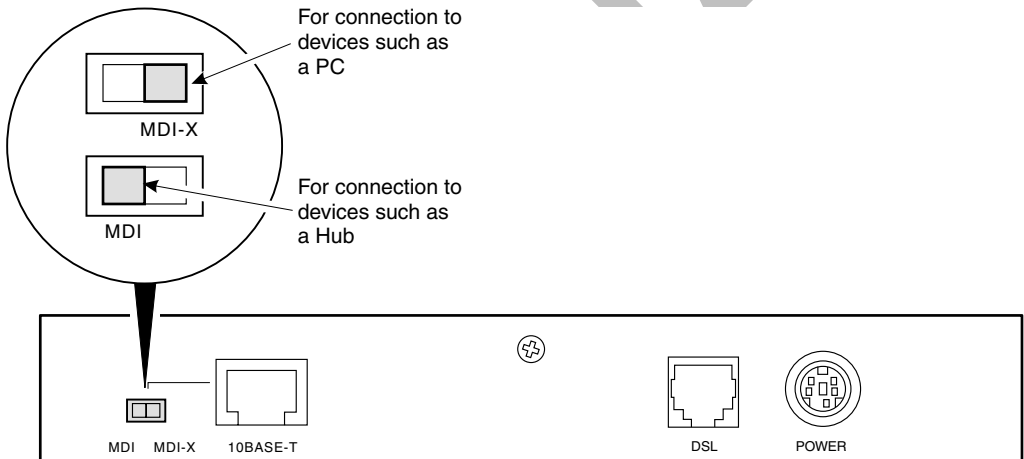


SETTING THE MDI/MDI-X SWITCH

Using the MDI/MDI-X switch, the Megabit Modem 500L can communicate with a device on the LAN that is either MDI or MDI-X without having to change the cable (a straight-through cable is supplied with the installation kit).

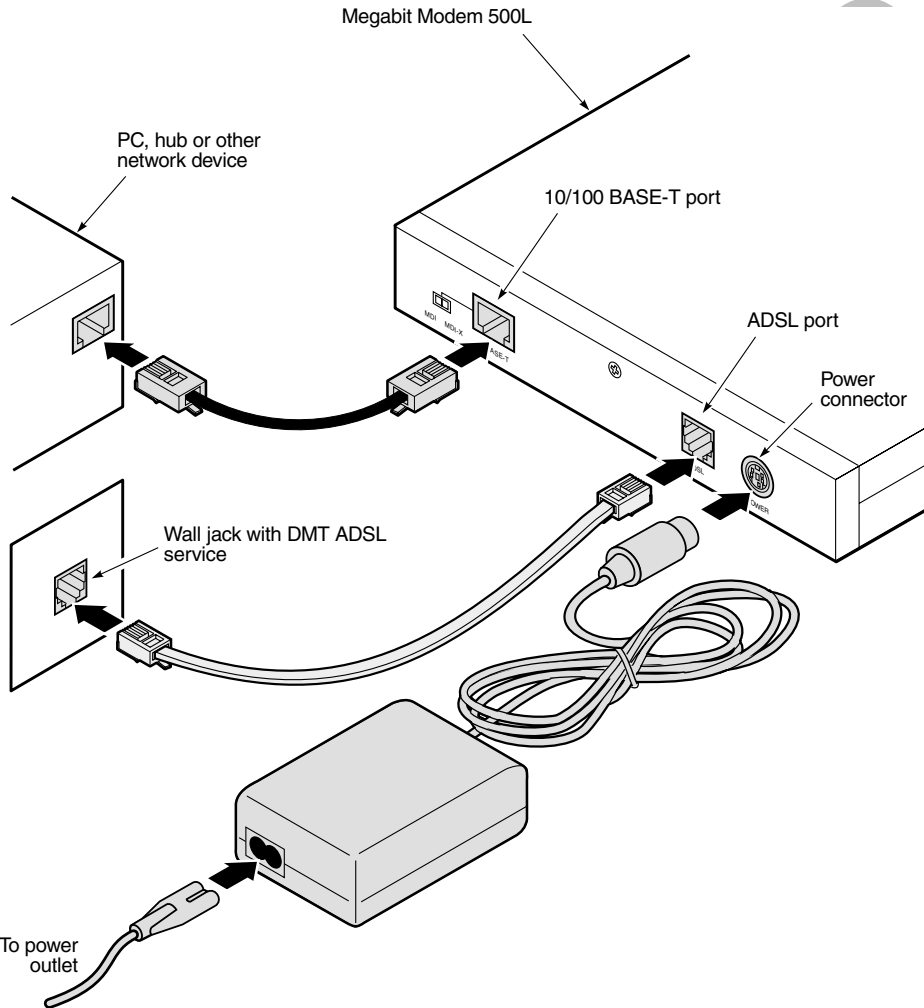
Set the switch for the 10/100BASE-T port to either:

- MDI-X when you are connecting to a device with an MDI port such as a PC with an Ethernet NIC
- MDI when you are connecting to a device with an MDI-X port such as a hub, repeater, bridge, or router



INSTALLING CABLING

Install the black cable for the 10/100BASE-T LAN connection, grey phone cord for the ADSL port WAN connection, and the power cable to the power connector.



If you need pinouts for the ADSL and 10/100BASE-T connectors, see “[Connector Pinouts](#)” on page 67.

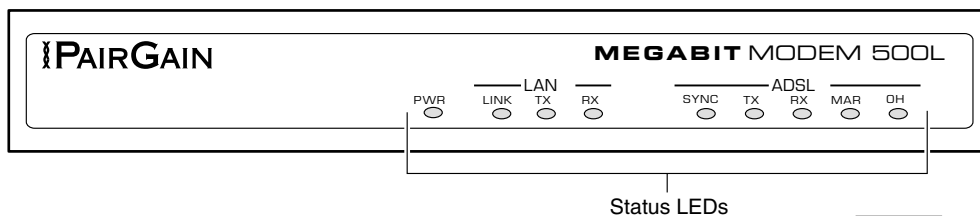
SETTING UP ADSL SERVICE

The service provider sets up the ADSL parameters for your service. The modem must have the ADSL SYNC LED lit before you can connect sessions with your service provider. Verify SYNC in the following section, “[Checking LED Indications.](#)”

CHECKING LED INDICATIONS

The following table describes LED indications for all operational modes. LEDs on the modem front panel ([page 16](#)) provide continual status at-a-glance for network and modem connections.

LED	State	Description
PWR	On green	Modem has power.
	Off	Modem does not have power.
LAN		
LINK	On green	A PC, hub, or other network device is connected to the modem 10/100BASE-T interface.
	Off	No device is connected to the modem 10/100BASE-T interface.
TX	Flashing green	Modem is transmitting data to devices on the LAN.
	Off	Modem is not transmitting data to the LAN.
RX	Flashing green	Modem is receiving data from devices on the LAN.
	Off	Modem is not receiving data from the LAN.
ADSL		
SYNC	On green	ADSL transceiver is synchronized and in normal operation mode.
	Flashing green	ADSL transceiver is in a start-up sequence.
	Off	ADSL transceiver is not synchronized or is in a mode other than normal operation or start-up.
TX	Flashing green	Modem is transmitting data to the service provider.
	Off	Modem is not transmitting data to the service provider.
RX	Flashing green	Modem is receiving data from the service provider.
	Off	Modem is not receiving data from the service provider.
MAR	On green	ADSL margin is at or above the value set by the service provider.
	Off	ADSL margin is below the value set by the service provider.
OH	On yellow	Telephone receiver is off hook.
	Off	Telephone receiver is on hook.

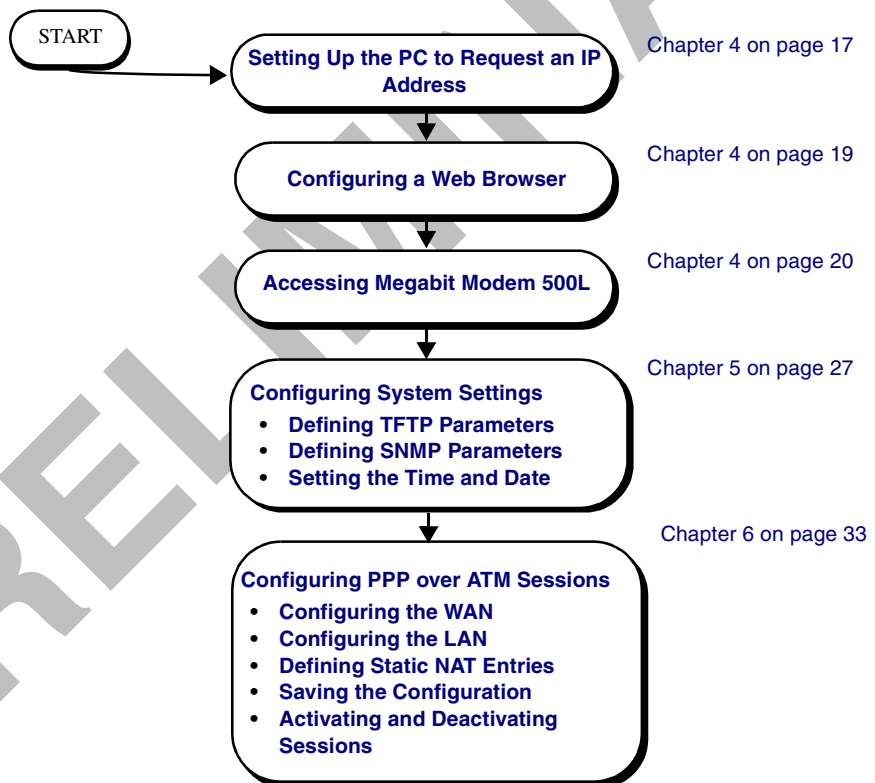


CONNECTING PHONE SERVICE

If you get phone service, all you need is an RJ-11 phone jack to connect your phone. This lite-rate modem provides splitterless capability, which allows reception of phone service without special splitters or filters; simply connect your phone.

SETTING UP FOR CONFIGURATION

You set up a PC and a Web browser to configure the Megabit Modem 500L. This chapter provides the set up procedures, then shows you how to access and navigate the Megabit Modem 500L Web pages. The configuration process flow is shown below.

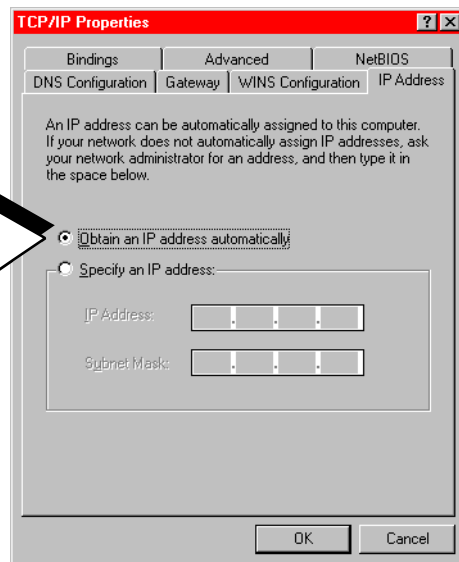
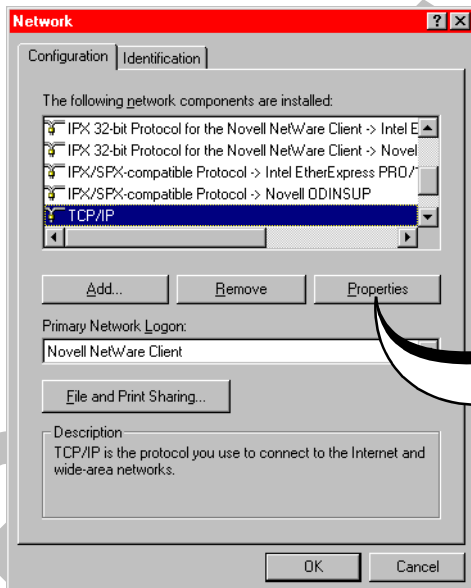


SETTING UP THE PC TO REQUEST AN IP ADDRESS

You configure the Megabit Modem 500L using a PC connected to the 10/100BASE-T port. The PC must be set to obtain an IP address automatically from the modem. The modem, as a Dynamic Host Configuration Protocol (DHCP) server, provides an IP address to this PC dynamically.

The following is an example of how to set up the PC using Microsoft® Windows® 95. If you use an application other than Windows 95, refer to the appropriate operating system user documentation.

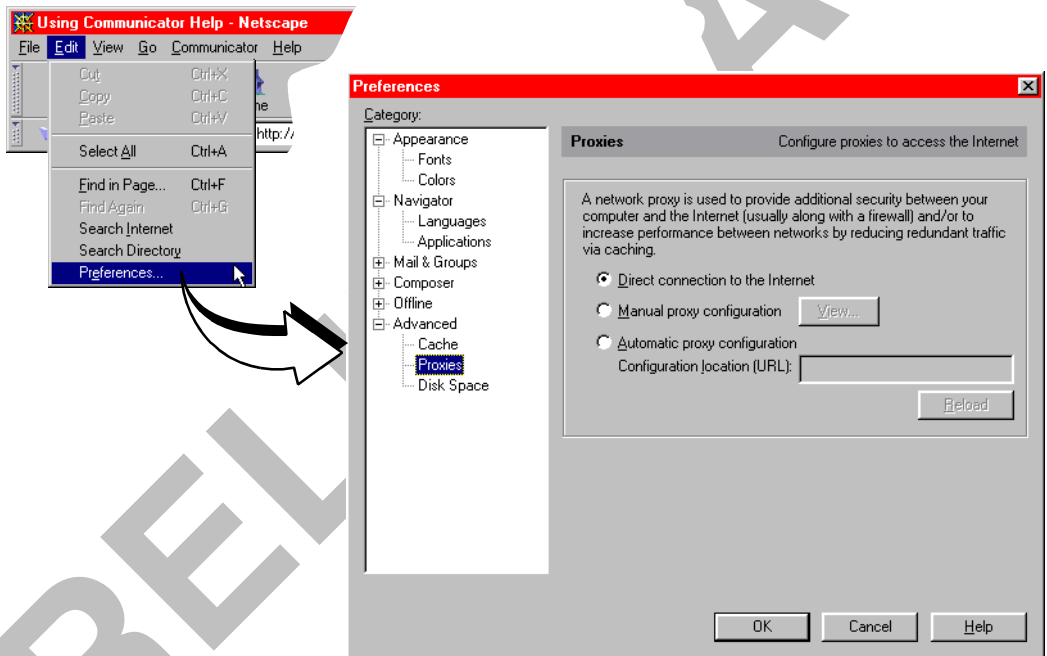
- 1 .Open the **Control Panel** window and double-click on the **Network** icon shown at right.
- 2 In the **Network** dialog (shown below), double-click **TCP/IP** under the **Configuration** tab (or highlight **TCP/IP** then click **Properties**).
- 3 On the **IP Address** tab, select **Obtain an IP address automatically**, then click **OK**.
- 4 Restart the PC.



CONFIGURING A WEB BROWSER

You access the Megabit Modem 500L Web pages through a Web browser (see [page 6](#) for Web browser versions supported). The Web browser must have the Proxies disabled. Change the Proxy for your Web browser.

- 1 Open a Web browser. (Netscape Communicator is shown in the example below.)
- 2 Select **Edit, Preferences, Proxie**.
- 3 Select **Direct connection to the Internet**, then click **OK**.



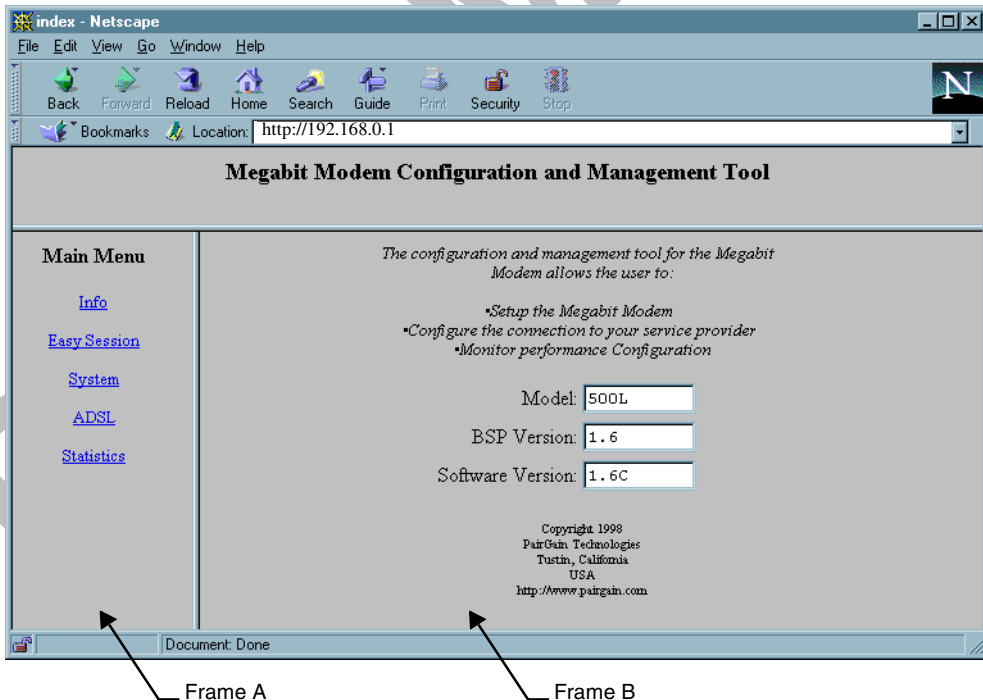
ACCESSING MEGABIT MODEM 500L WEB PAGES

Type **http://192.168.0.1/index.htm** in the **Location** field of the Web browser (as shown below), then press **ENTER**. (192.168.0.1 is the default IP address for the Ethernet port and is a private address specified for use by RFC 1918. If you change the Ethernet IP address through the management port, you will enter the new IP address in the **Location** field.)



The Megabit Modem 500L Web page displays with two primary frames:

- Frame A contains the navigation menus. Use the menus to select the configuration or management page you want to view in Frame B.
- Frame B displays the configuration or management page associated with the menu item you selected from the navigation menu in Frame A.



SAVING THE CONFIGURATION

As you make changes to the modem configuration, click the **Submit** button on the Web page to accept changes and write the changes to RAM. Some configuration changes are not permanent, however, until you write them to Non-Volatile RAM (NVRAM) and reset the modem. You must reset the modem to effect these changes:

- when defining PPP over ATM LAN settings (see [page 39](#)):
 - LAN IP address
 - LAN network mask
- when DHCP enabled (see [page 39](#)):
 - DHCP start IP address
 - primary DNS IP address
 - secondary DNS IP address

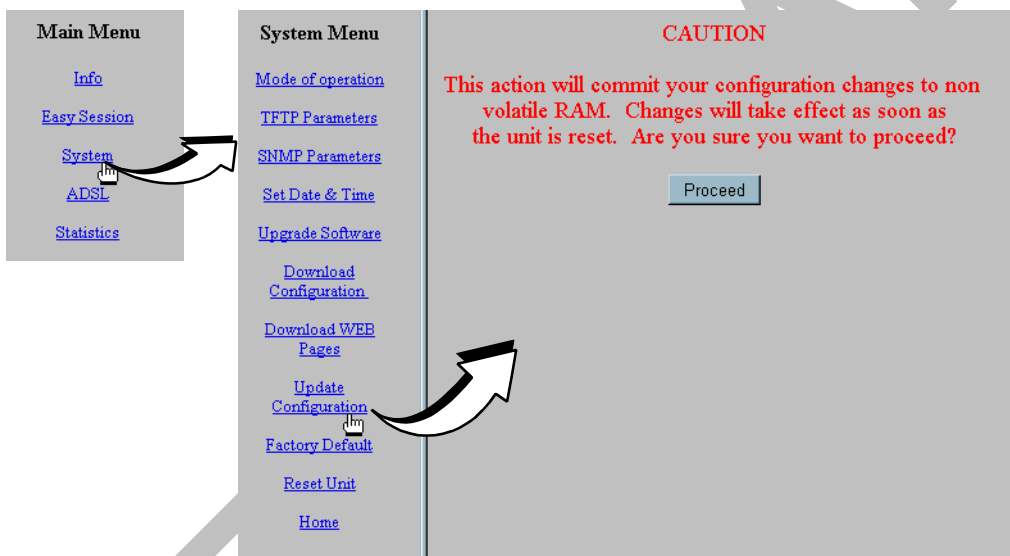
See the following sections to:

- save configuration changes to NVRAM ([page 22](#))
- reset the modem to activate the configuration ([page 25](#))
- reset the modem to restore the factory default values ([page 23](#))

Saving the Configuration to NVRAM

After clicking **Submit** to write configuration parameters to RAM, update your configuration by writing the parameters to non-volatile RAM (NVRAM).

- 1 Click **System** on the **Main Menu** to access the **System Menu**.
- 2 Click **Update Configuration** on the **System Menu**.
- 3 Click **Proceed** to save to NVRAM.
- 4 Reset the modem to effect configuration using the procedure on [page 25](#).



Resetting the Modem to Factory Defaults

You can return Megabit Modem 500L parameters to the factory default values. This provides a known starting point if you are troubleshooting the system or simply want to reconfigure parameters. The factory default values are listed on [page 24](#).

- 1 Click **System** on the **Main Menu** to access the **System Menu**.
- 2 Click **Factory Default** on the **System Menu**.



When you click **Proceed** to return to factory default values, the modem automatically resets.

- 3 Click **Proceed** to return to factory default values.

The screenshot illustrates the steps to reset the modem to factory defaults. It shows three panels:

- Main Menu:** Contains links for [Info](#), [Easy Session](#), [System](#), [ADSL](#), and [Statistics](#). An arrow points from the **System** link to the System Menu.
- System Menu:** Contains links for [Mode of operation](#), [TFTP Parameters](#), [SNMP Parameters](#), [Set Date & Time](#), [Upgrade Software](#), [Download Configuration](#), [Download WEB Pages](#), [Update Configuration](#), [Factory Default](#), [Reset Unit](#), and [Home](#). An arrow points from the **Factory Default** link to the warning dialog.
- Warning Dialog:** Titled **CAUTION**, it contains the text: "This action will restore the factory default configuration. To Proceed with this option will cause all active connections to drop and the modem to reset. Are you sure you want to proceed?". A **Proceed** button is located at the bottom of the dialog. An arrow points from the **Proceed** button back to the System Menu.

Additional annotations include an arrow pointing from the **Home** link in the System Menu back to the Main Menu, with the text "Click Home to return to the Main Menu".

Parameter	Default Value	Parameter	Default Value
System Setup			
System Mode	PPP over ATM	SNMP parameters	
TFTP parameters		Enable trap sending	Not enabled
TFTP Server IP Address	0.0.0.0	Trap Server IP Address	0.0.0.0
TFTP Server Net Mask	255.255.255.0	Trap Server Net Mask	255.255.255.0
TFTP Server Path	blank field	Trap Community String	public
Set time and date	blank field	Get Community String	public
Admin IP Address	0.0.0.0	Set Community String	private
PPP Over ATM			
PPP Over ATM WAN Configuration		PPP Over ATM LAN Configuration	
Service Name	blank field	IP Address	192.168.0.1
ATM VPI	0	IP Net Mask	255.255.255.0
ATM VCI	0	DHCP	Enabled
Login Name	blank field	Start IP Address	192.168.0.2
Login Password	blank field	Primary DNS	0.0.0.0
Chap Host	blank field	Secondary DNS	0.0.0.0
Address Translation	Enabled	Gateway	192.168.0.1
Address Assignment	Dynamic	Static NAT Entries (private, proxy, and remote)	
IP Address	0.0.0.0	IP Addresses	0.0.0.0
User Assignments (for PPP WAN)		Ports	0
Service Name	blank field	Protocol	UDP
User's IP Address	0.0.0.0		

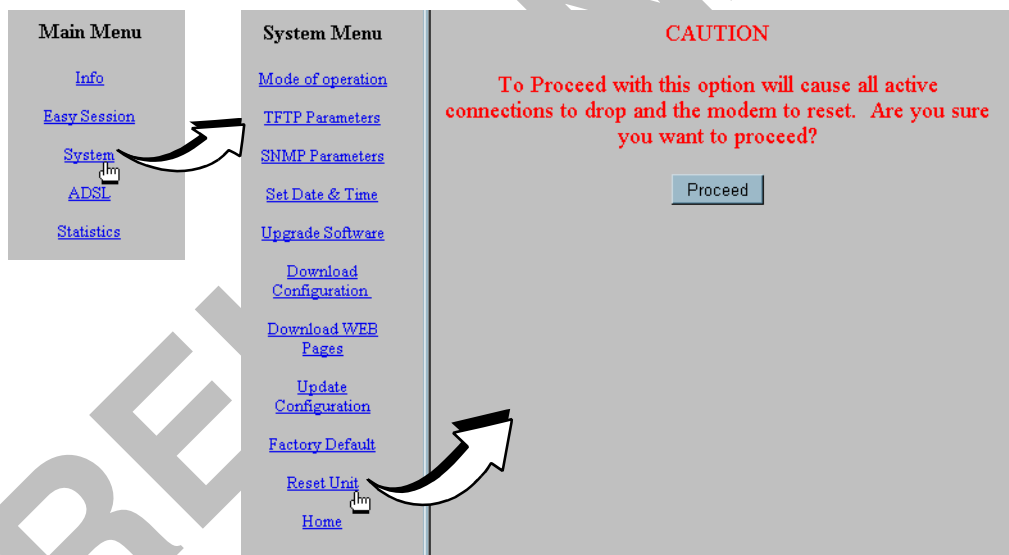
Resetting the Modem



Note that resetting the modem causes all active connections to drop.

After you make changes to the modem configuration and write the changes to NVRAM or return modem configuration to factory defaults, you must reset the modem. See [page 21](#) for a list of changes that you must reset to effect.

- 1 Click **System** on the **Main Menu** to access the **System Menu**.
- 2 Click **Reset Unit** on the **System Menu**.
- 3 Click **Proceed** to reset the modem.



PRELIMINARY

CONFIGURING SYSTEM SETTINGS

Before configuring sessions with a service provider, set up system parameters for the Megabit Modem 500L. The following sections show the Web pages you use to configure the:

- TFTP server IP address and network mask for performing functions such as software upgrades on [page 28](#), when required
- SNMP parameters on [page 29](#)
- system time and date on [page 31](#)

Unless specified otherwise, configuration parameters shown in this section are for example only.

DEFINING TFTP PARAMETERS

A TFTP server is a device on the LAN from which you can download software updates to your modem. See [page 59](#) for more information on a TFTP server. Also, see [page 51](#) for procedures on how to update the software on your modem.

- 1 Click **System** from the **Main Menu**.
- 2 Click **TFTP Parameters** on the **System Menu**.
- 3 Do the following:
 - ① Enter the **TFTP server IP address** for the device that will be the TFTP server.
 - ① Enter the **TFTP server net mask** (subnet mask) for the TFTP server.
 - ② Enter the **Path on the TFTP server** where the download files reside. You can enter a path with a maximum of 20 characters.
- 4 Click **Submit** to accept the changes.

Main Menu

- [Info](#)
- [Easy Session](#)
- [System](#)
- [ADSL](#)
- [Statistics](#)

System Menu

- [Modes of operation](#)
- [TFTP Parameters](#)
- [SNMP Parameters](#)
- [Set Date & Time](#)
- [Upgrade Software](#)
- [Download Configuration](#)
- [Download WEB Pages](#)
- [Update Configuration](#)
- [Factory Default](#)
- [Reset Unit](#)
- [Home](#)

TFTP server parameters
A TFTP server will allow for software upgrades or configuration upload from a file.

TFTP server IP address: ①

TFTP server net mask: ①

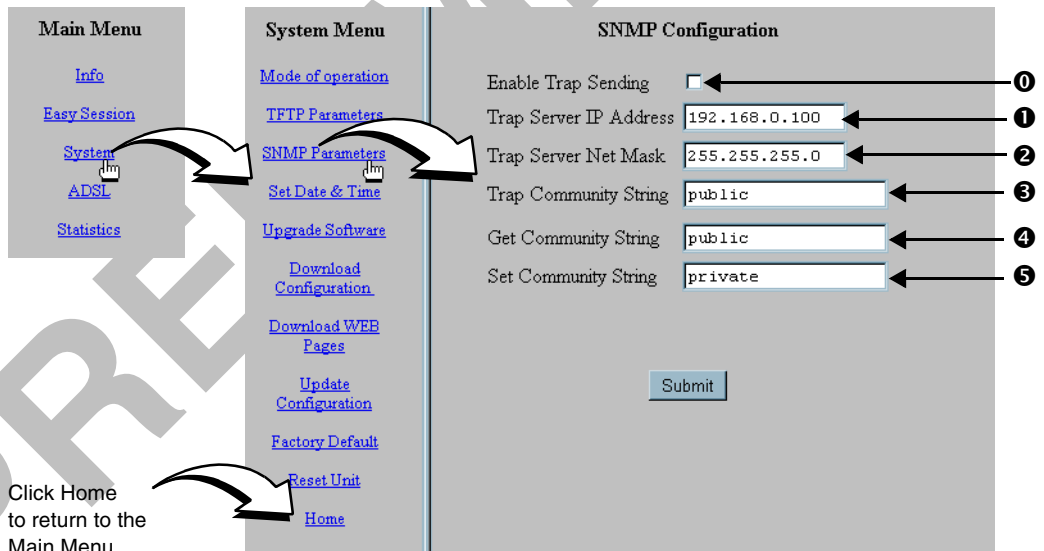
Path on the TFTP server: ②

Click Home to return to the Main Menu

DEFINING SNMP PARAMETERS

The modem has an SNMP agent that allows it to be managed remotely by a Network Management System (NMS). See [page 58](#) for more information about managing the modem through SNMP.

- 1 Click **System** from the **Main Menu**.
- 2 Click **SNMP Parameters** on the **System Menu**.
- 3 Do the following:
 - ❶ Select **Enable Trap Sending** if you want the modem to send traps to a server on your LAN.
 - ❷ Enter the **Trap Server IP Address** for the server to which the traps will be sent.
 - ❸ Enter the **Trap Server Net Mask** (subnet mask) for the server to which the traps will be sent.





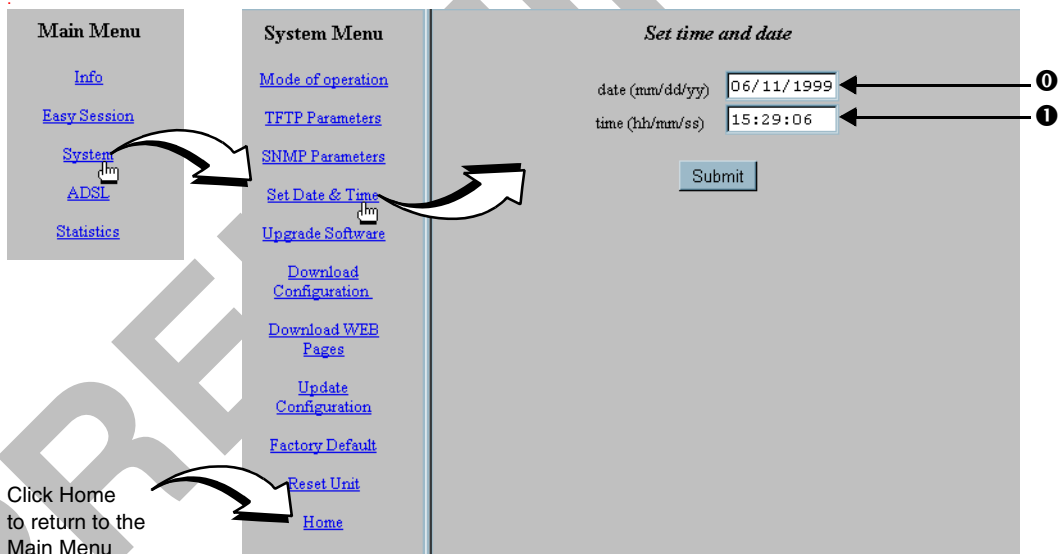
You can change the community string to a name you choose. The fields have default names as shown in the screen on [page 29](#) and are case sensitive. If you change the name, however, the community string name must match on both the manager and agent to allow access to the SNMP function.

- ③ Public is the default **Trap Community String** which is an authentication string for the trap receiver. You can change the name, using up to 19 characters.
 - ④ Public is the default **Get Community String** which is an authentication string that enables an NMS to get status from the modem agent. You can change the name, using up to 19 characters.
 - ⑤ Private is the default **Set Community String** which is an authentication string for an NMS to set or change parameters on the modem agent. You can change the name, using up to 19 characters.
- 4 Click **Submit** to accept the changes.

SETTING THE TIME AND DATE

Set the time and date for the modem.

- 1 Click **System** from the **Main Menu**.
- 2 Click **Set Date & Time** on the **System Menu**.
- 3 Do the following:
 - ❶ Enter the **date** in the format **dd/mm/yy** (for example, 03/10/1999 is June 10, 1999).
 - ❷ Enter the **time** in the 24-hour format **hh:mm:ss** (for example, 15:29:55 is 29 minutes and 6 seconds past 3 p.m.).
- 4 Click **Submit** to accept the changes.



PRELIMINARY

CONFIGURING SESSIONS

You configure sessions between the modem and a service provider using the PairGain **EasySession** pages. The Megabit Modem 500L supports one PPP over ATM session at a time.

There are many options from which to select when configuring sessions. See “[Selecting a Configuration Model](#)” on page 34 to determine the easiest and most efficient way for you to set up your session.

After you determine the configuration model, set up the connection between the modem and the service provider (WAN) and the connection between your network users and the modem (LAN). Go to [page 35](#) to configure the WAN and to [page 39](#) to configure the LAN.

Then, activate sessions in the section “[Activating and De-Activating Sessions](#)” on page 43.

SELECTING A CONFIGURATION MODEL

There are many configuration options for the Megabit Modem 500L from which you can select. Select the following options are recommended for enhanced performance:

- DHCP not selected to allow the user to manually enter an IP address to the PC
- NAT to map the public IP addresses (proxy IP addresses) acquired from the service provider to the PC IP address

The following matrix shows the recommended configuration:

DHCP	NAT	How WAN IP Address Acquired
On	On	Fixed

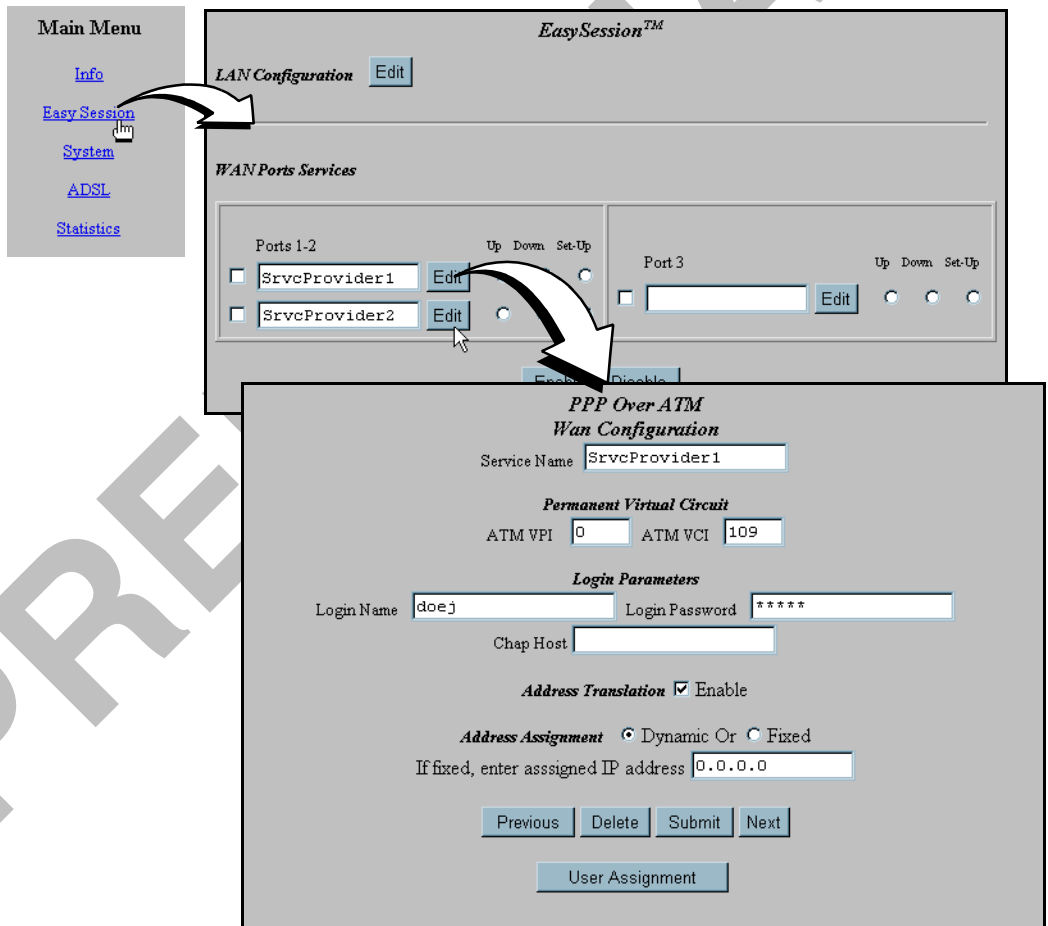
The following is a recommended procedure for configuring the Megabit Modem 500L:

- 1 Complete the WAN configuration ([page 36](#)). It is optional to map a LAN user to each PPP over ATM session at this time. You can perform this at a later time (see [Step 4](#)) after the modem dynamically serves IP addresses to LAN users or you have manually assigned IP addresses to LAN users.
- 2 On the EasySession page:
 - a Select the session you want active then click **Enable**. The modem sets up the session with the service provider. The **Up** radio button next to the session(s) will indicate that the session was successfully set up.
 - b When dynamically acquiring an IP address from the service provider, the session receives the IP address at this time.
- 3 Set up the LAN side configuration ([page 39](#)).
- 4 Map the IP address for the PC to a session ([page 38](#)).

CONFIGURING PPP OVER ATM SESSIONS

Point-to-Point Protocol (PPP) runs over ATM virtual circuits (VCs). From the **EasySession** pages, configure parameters for communicating between the modem and the service provider over the WAN (page 36). Then, configure parameters for communicating between the LAN and the modem (page 39). After setting up all appropriate WAN and LAN parameters for PPP over ATM sessions, select the sessions that you want to activate (see page 43).

- 1 Click **EasySession** on the **Main Menu** to access the **EasySession** page.
- 2 Click **Edit** next to any **Port 1-3** to display the **PPP Over ATM WAN Configuration** page for that port.



Configuring the WAN

Configure the WAN parameters for PPP over ATM sessions between the Megabit Modem 500L and the service provider.

- 1 Do the following to configure the WAN:



Select a name for the service that is descriptive. The service name is an identifier you use for the session and is not used for anything else. Each service name must be unique. When you enter a service name, it displays as the Port name for that session on the EasySession page.

- 1 Enter a descriptive name for the **Service Name**. The name you enter here also displays in the **Port** field on the **EasySession** page (the fields are linked). Use a maximum of 19 characters for the service name, with no spaces allowed in the name.
- 1 Enter the **ATM VPI** and **ATM VCI** values provided by the service provider. The addresses are the virtual path identifier and virtual channel identifier for the session connection (ATM) between the modem and the service provider. (See [page 74](#) for the VPI and VCI values you recorded from the service provider. Also, see “[Mapping an ATM Session](#)” on [page 56](#) for information on VPI and VCI values.)
- 2 Enter your **Login Name** and **Login Password** supplied by the service provider. (See “[Login Name / Login Password Worksheet](#)” on [page 74](#).)

The screenshot shows the 'PPP Over ATM Wan Configuration' web page. It contains several sections: 'Service Name' with a text box containing 'SvcProvider1' (callout 1); 'Permanent Virtual Circuit' with 'ATM VPI' (0) and 'ATM VCI' (109) text boxes (callout 1); 'Login Parameters' with 'Login Name' (doej) and 'Login Password' (*****) text boxes (callout 2), and a 'Chap Host' text box (callout 3); 'Address Translation' with a checked 'Enable' checkbox (callout 4); 'Address Assignment' with 'Dynamic' selected and 'Fixed' unselected radio buttons (callout 5), and an 'If fixed, enter assigned IP address' text box (0.0.0.0) (callout 5); a row of buttons: 'Previous', 'Delete', 'Submit', and 'Next'; and a 'User Assignment' button (callout 6).

- 3 Enter the **Chap Host** name provided by the service provider. The name is used for CHAP authentication of this session. The name must be identical for the user session and for the service provider. See [page 73](#) for the CHAP name you recorded from the service provider.
- 4 Select the **Enable** checkbox when you want to use NAT protocol (**Address Translation**) to translate the session IP address to private IP addresses. It is recommended that you always enable NAT.

You can choose, however, not to use NAT for address translation. If you do not use NAT, you can assign only one LAN user (one PC) to the session. The IP address for the LAN user PC must be the same **IP Address Assignment** given to the session by the service provider (shown in field 5 on [page 36](#)). See [page 18](#) to configure the PC to accept the entry of a manual IP address (select **Specify an IP address** then manually enter the session IP address).

- 5 Select **Dynamic** as the **Address Assignment** if the service provider will automatically assign an IP address for this session during set up. When the address is dynamically assigned, the address field will display the assigned value after the session comes up.

Select **Fixed** as the **Address Assignment** if the service provider gave you an IP address for the session. If the address is fixed, type in the fixed IP addresses you recorded on [page 74](#) into the field “**If fixed, enter assigned IP address.**”

This IP address is also referred to as the proxy address for the session.

- 6 Click **User Assignment** to open a dialog in which you can map LAN users to each session. Go to the section “[Defining User Assignment Parameters](#)” on [page 38](#) to configure the user assignments.

2 Click **Submit** to accept the WAN PPP session configuration.

3 To configure other sessions:

- a Click **EasySession** on the **Main Menu**. then click **Edit** by the **Port 1-3** that you want to configure. (Or, if you want to modify an existing session, click **Previous** or **Next** to locate the session you want to modify).
- b Repeat [Step 1](#) to configure the session.

Deleting a PPP over ATM WAN Session Configuration

- 1 From the **PPP over ATM WAN Configuration** page, click **Previous** or **Next** to access the session configuration you want to delete.
- 2 Click **Delete** to remove a configuration that is displayed on the current Web page.

Defining User Assignment Parameters



You can map your PC to only one of the three sessions at a time. If you want to use a different session, select **User Assignment** on the **PPP over ATM WAN Configuration** page and move the user assignment to another session.

Enter the IP address for the PC that is assigned to this session.

1 Do the following to define **Users' Assignments**:

- ① Enter the **Service Name** you entered for the session shown in field ① on page 36.
- ① Enter the **User's IP Address** for the LAN-side user that you assign to this session. (If the PC is mapped to one of the other two sessions, you must remove it from that session to map it to this session.)
- ② Displays the **Service Name** and **User's IP Address** for the configured session.

The screenshot shows the 'Users' Assignment' configuration window. At the top, there are two input fields: 'Service Name' (containing 'SvcProvider1') and 'User's IP Address' (containing '0.0.0.0'). Below these fields is a 'Done' link and two buttons: 'Add' and 'Delete'. Underneath the buttons, it says 'Maximum Number of User Assignments Allowed: 1'. At the bottom, there is a table with two columns: 'Service Name' and 'User's IP Address'. An arrow labeled ② points to the 'User's IP Address' column header.

- 2 Click **Add** to accept a user assignment you entered in [Step 1](#).

Delete a user assignment as follows:

- 1 Highlight the user assignment listed in ② (see figure above) then click **Delete**. (When you highlight the user assignment, it automatically displays in the **Service Name** and **User's IP Address** fields.)
- 2 After adding or deleting all user assignments, click **Done** to return to the **EasySession** page.

Configuring the LAN

- 1 Click **EasySession** on the **Main Menu** to access the **EasySession** page.
- 2 At the top of the **EasySession** page, click **Edit** next to **LAN Configuration** to display the **PPP Over ATM LAN Configuration** page.
- 3 Do the following to configure the LAN:
 - ① Enter the **IP Address** and **IP Net Mask** (subnet mask) for the modem Ethernet 10/100BASE-T LAN port. The IP address will not take effect, however, until the modem is reset.
 - ② Select **DHCP Enable** if you want to enable the modem to act as a DHCP server to automatically assign IP addresses to devices on the LAN. If you enable DHCP, ensure that all devices on the LAN have the TCP/IP stack set to **Obtain an IP address automatically** (see page 18).

EasySession™

LAN Configuration [Edit](#)

WAN Ports Services

Ports 1-
 Srvce
 Srvce

**PPP Over ATM
LAN Configuration**

Lan IP Address

IP Address IP Net Mask

DHCP Enable

Start IP Address Primary DNS

Secondary DNS Gateway

[Static Nat Table](#)

- ② The modem automatically assigns the **Start IP Address** for the first device on the LAN as one address higher than the Ethernet port on the modem, when DHCP is enabled. You cannot edit this field.
 - ③ Enter the IP address for a device that will be the **Primary DNS**. The primary Domain Name System (DNS) device translates human-readable machine names into IP addresses. (See [page 59](#) for more information on DNS resolution.)
 - ④ Enter the IP address for a device that will be the **Secondary DNS**. The DNS device translates human-readable machine names into IP addresses. (See [page 59](#) for more information on DNS resolution.)
 - ⑤ The modem automatically enters the **Gateway** IP address which is the same IP address as the LAN (Ethernet) 10/100BASE-T port of the modem. You cannot edit this field.
 - ⑥ Click **Static NAT Table** to open a dialog in which you can map inbound Internet traffic to specific sessions. Go to the section on “[Defining Static NAT Entries](#)” on [page 41](#) to configure these parameters. Configuring Static NAT entries is optional.
- 4 Click **Submit** after completing the LAN configuration page.
 - 5 After changing a LAN IP address and subnet mask (or changing the IP address and subnet mask), effect the configuration by completing the procedures for “[Saving the Configuration](#)” on [page 21](#).

Defining Static NAT Entries

Static NAT entries are required only for applications that use TCP/UDP connections initiated from the remote end (WAN). Through the **Static NAT Table**, you can map inbound traffic from a remote user to a user on your LAN. You can enter a maximum of 32 static NAT entries.

1 Do the following to map static NAT entries:

- ① Enter the **Private IP Address** for a user on the LAN that is mapped to the Proxy IP Address you will enter in field ① of the **Static NAT Entry** shown below. **Port** is the logical port for the protocol (UDP or TCP) you select for this NAT entry. Your system administrator will provide the protocol port number.
- ② Enter the **Proxy IP Address** which is the IP address assigned to a particular session by the service provider (see the ⑤ field on page 36 for where to find the proxy IP address). **Port** is the logical port for the protocol (UDP or TCP) you select for this NAT entry. Your system administrator will provide the protocol port number.

Static NAT Entry

Private		Proxy		Remote		Protocol
IP Address	Port	IP Address	Port	IP Address	Port	
0.0.0.0	0	0.0.0.0	0	0.0.0.0	0	UDP UDP TCP

[Done](#)

[Add](#) [Delete](#)

Maximum Number of Static NAT Entries Allowed: 32

Private IP Address	Port	Proxy		Remote		Protocol
		IP Address	Port	IP Address	Port	
192.168.30.1	1	192.168.30.2	2	210.137.0.13	0	UDP
192.168.31.1	1	192.168.31.2	2	210.190.10.19	0	UDP

- ② Enter the **Remote IP Address** for a user at a remote site that you are mapping to a user on the LAN (LAN user was entered in field ① of the **Static NAT Entry** shown above). **Port** is the logical port for the protocol (UDP or TCP) you select for this NAT entry. Your system administrator will provide the protocol port number.
If you do not have the information for the remote user and port, enter 0.0.0.0 for the **Remote IP Address** and/or 0 for the **Port Address**.
 - ③ Select a **Protocol** (UDP or TCP) for the transport used between the LAN and the remote user for this static NAT entry. (See “[NAT](#)” on page 57 for more information about the transport protocols.)
 - ④ This field lists the **IP Address**, **Port**, and **Protocol** for the **Private**, **Proxy** and **Remote** fields defined. You can have up to 32 static entries.
- 2 Click **Add** to accept the **Static NAT Entry**.
 - 3 Repeat [Step 1](#) and [Step 2](#) to add up to 32 static NAT entries.
 - 4 To delete a **Static NAT Entry**, highlight the entry in field ④ then click **Delete**.
 - 5 Click **Done** to return to the **PPP over ATM LAN Configuration** page.

SAVING THE CONFIGURATION

Although you have submitted new settings, the parameters are not permanent until you write them to NVRAM. See “[Saving the Configuration](#)” on page 21 to save the WAN and LAN configurations to NVRAM.

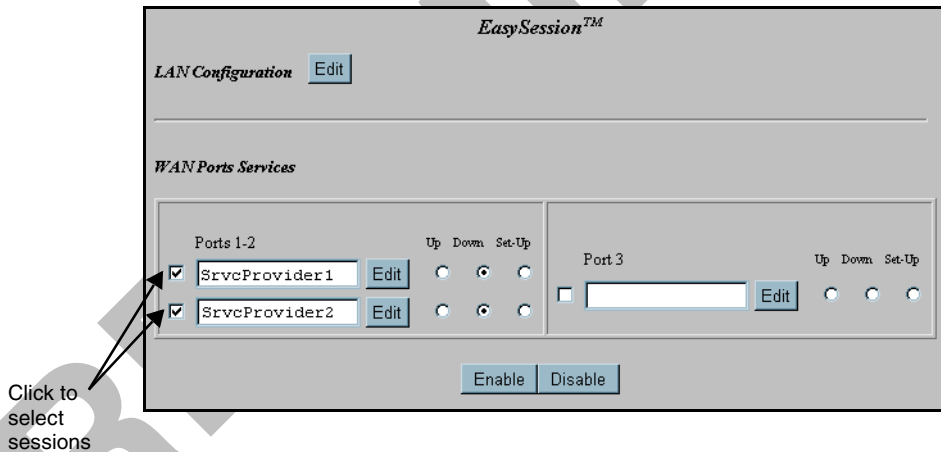
ACTIVATING AND DEACTIVATING SESSIONS

After you configure sessions, you will activate sessions as you want to use them. Additionally, you may want to deactivate some sessions while leaving other sessions active. The following procedure shows you how to activate and deactivate sessions. Also, if you power down the modem with sessions enabled, those same sessions will be enabled when you power up the modem.

Activating Sessions

The **EasySession** page provides status for each session. **Up** means the connection is active. **Down** means the connection is not active. **Set-Up** means the modem is negotiating the link with the service provider.

- 1 On the **EasySession** main page, select the checkbox next to each session that you want to activate.



- 2 Click **Enable** at the bottom of the **EasySession** page to activate the selected sessions.

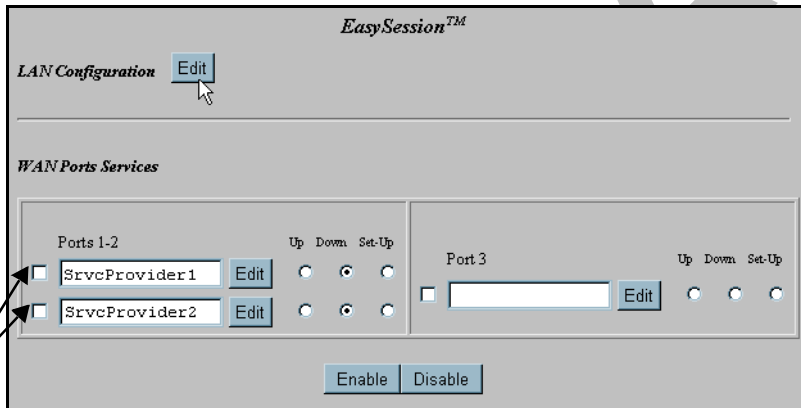
Deactivating Sessions

On the Web browser, click the Reload icon (shown to the right) to refresh the screen.

- 1 On the **EasySession** main page, select the box next to each session that you want to disable.



Up, Down, and Set-Up are read-only fields that provide status for the session.



Click to select sessions

- 2 Click **Disable** at the bottom of the **EasySession** page to disable the selected sessions.

VIEWING STATISTICS

You can view status for the ADSL link (“[Viewing ADSL Status](#)” shown below) and for WAN and LAN statistics (“[Viewing Network Statistics](#)” on [page 48](#)).

VIEWING ADSL STATUS

The Megabit Modem 500L displays the status of the ADSL link. From the **Main Menu**, select **ADSL** to display the **ADSL Menu** and **ADSL Statistics** page (see [page 46](#)). **Reset** on the **ADSL Menu** will bring down the ADSL loop between the modem and the service provider.

Description of the **ADSL Statistics** fields are on [page 46](#).

Click Home to return to Main Menu

The screenshot shows the ADSL Statistics page. On the left, there is an 'ADSL Menu' with links for 'Statistics', 'Reset', and 'Home'. Below it is a 'Main Menu' with links for 'Info', 'Easy Session', 'System', 'ADSL', and 'Statistics'. The main content area is titled 'ADSL Statistics' and shows 'Sync' and 'No Connection' radio buttons. Below this are two columns of statistics: 'DownStream' and 'Upstream'. Each column has eight rows of data with corresponding input fields. A 'Clear' button is at the bottom right. Numbered callouts (1-9) and arrows point to specific elements: 1 points to the 'No Connection' radio button; 2 points to the 'Alarms' field; 3 points to the 'Current SNR margin' field; 4 points to the 'Min SNR margin' field; 5 points to the 'Errored seconds' field; 6 points to the 'Unavailable seconds' field; 7 points to the 'Line Attenuation' field; 8 points to the 'Data rate' field; and 9 points to the 'Clear' button. A large 'PRELIMINARY' watermark is overlaid diagonally across the page.

	DownStream	Upstream
Alarms	NONE	NONE
Current SNR margin	6.4	5.9
Min SNR margin	2.7	-9.1
Errored seconds	0	0
Unavailable seconds	0	0
Line Attenuation	-5.4	6.2
Data rate	7040	864



Clicking **Reset** on the ADSL Menu will bring down the ADSL loop between the modem and the service provider.

View the following ADSL link information:

- ① System time and date and total hours link is up.
- ① ADSL link is synchronized between the modem and the service provider or the link has no connection.
- ② Any alarm conditions such as Loss of Sync (LOS), Loss of Frame (LOF), Loss of Margin (LOM), or Loss of Cell Delineation (LCD).
- ③ The SNR margin at which the modem is currently operating (dependent on parameters selected by the service provider).
- ④ Minimum SNR margin allowed before the MAR LED on the modem front panel illuminates.
- ⑤ Total number of seconds that the ADSL link had errors in a 24-hour span.
- ⑥ Total amount of time that the lines were not available for transmission since power on occurred or the modem statistics were last cleared (total unavailable seconds).
- ⑦ Line attenuation in decibels from -10 to +80 db.
- ⑧ The upstream and downstream data transmission rates.
- ⑨ Click **Clear** to reset all statistics.

VIEWING NETWORK STATISTICS

The Megabit Modem 500L displays the status for the LAN and WAN links. From the **Main Menu**, select **Statistics** to display the **Statistics Menu**.

LAN Statistics

The Megabit Modem 500L displays status for the LAN. Click **LAN Statistics** from the **Statistics Menu**.

The screenshot shows the web interface of the Megabit Modem 500L. On the left is the **Main Menu** with links for [Info](#), [Easy Session](#), [System](#), [ADSL](#), and [Statistics](#). The **Statistics Menu** is open, showing [LAN Statistics](#), [WAN Statistics](#), and [Home](#). A callout box says "Click Home to return to Main Menu". The **LAN Statistics** page displays the following information:

- Date:** 06/11/199
- Time:** 11:47:18
- Hours Up:** 1536
- IP Address:** 95.4.14.62
- Ethernet Address:** 00:20:a7:70:95:01
- IP Statistics:**
 - Total: 39454
 - Badsum: 0
 - Bad packets: 0
 - Forward: 0
 - Reassembled: 0
 - No route: 90
- Ethernet Statistics:**
 - Rx packets: 32880
 - Tx packets: 21050
 - Dropped packets: 0
 - Collisions: 0
- Clear** button

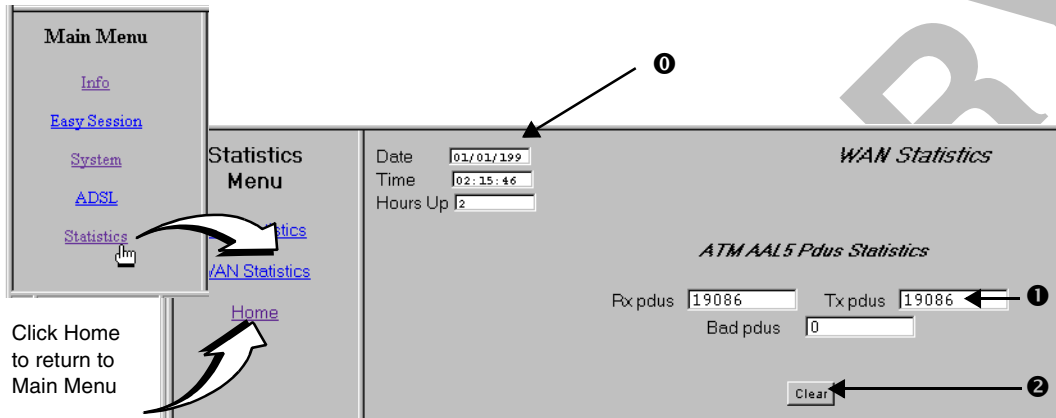
Numbered callouts (1-7) point to: 1. Ethernet Address field, 2. Badsum field, 3. Forward field, 4. No route field, 5. Tx packets field, 6. Collisions field, 7. Clear button.

View the following LAN information:

- ① System time and date and total hours link is up.
- ① IP and Ethernet addresses for the modem LAN port.
- ② Total number of IP packets processed.
- ③ Number of errored packets detected at this port and the number of packets forwarded.
- ④ Number of packets reassembled at this port and the number of transmissions where a route was not found in router table.
- ⑤ Total number packets received and transmitted.
- ⑥ Total number of packets dropped and the number of collisions of devices on segment.
- ⑦ Clicking **Clear** resets all statistics.

WAN Statistics

The Megabit Modem 500L displays status for the WAN. Click **WAN Statistics** from the **Statistics Menu**. The values in the statistics fields are a total for all VCs configured.



View the following WAN information:

- ❶ System time and date and total hours link is up.
- ❷ Statistics for the ATM layer including how many Protocol Data Units (PDUs) were transmitted and received on the session and how many PDUs were corrupted (Bad PDUs).
- ❸ Clicking **Clear** resets all statistics.

MAINTENANCE AND TROUBLESHOOTING

MAINTENANCE

You can update software in the modem by specifying a device on the LAN where you will place new software for the update (see [“Defining TFTP Parameters” on page 28](#)). Then, use the procedure [“Updating Software” on page 51](#) to download the new software from the TFTP device to the Megabit Modem 500L.

Updating Software

You can download software upgrades to your system. Use the Web page shown on [page 52](#) to initiate the upgrade. To download software, you must have a host on your network that has been configured as a TFTP server. You set the IP address for the TFTP server and a directory path to the software when you configure system parameters in [Chapter 5 on page 27](#).

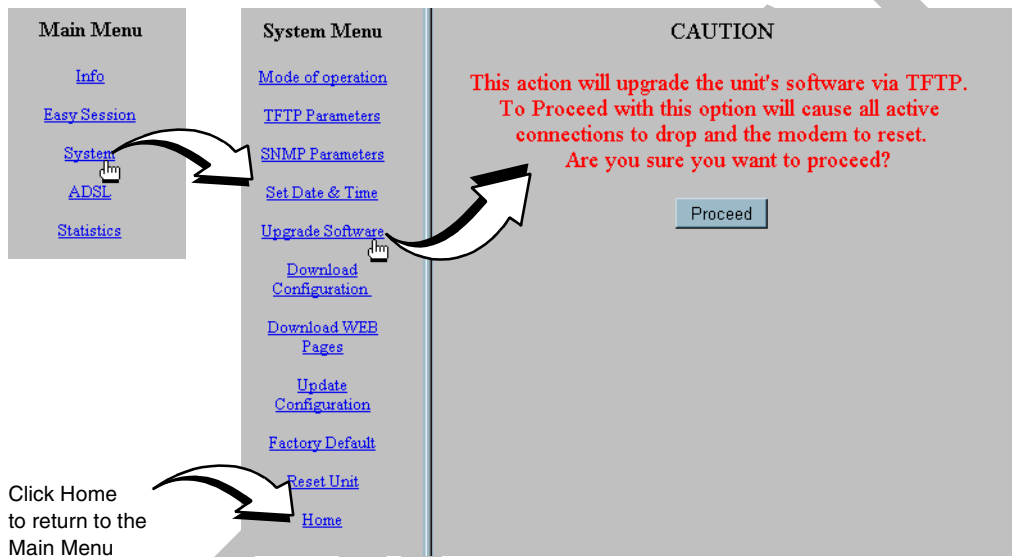
To update the Megabit Modem 500L software, ensure these files are available to download from a TFTP server. You can download any of these files separately:

- .bin (binary) image files for software updates
- .ini (initialization) files for modem configuration
- .htm (html) files for Web page updates



Before initiating a software upgrade, ensure that all files are in the directory you specified on the TFTP server when you configured system parameters.

- 1 Click **System** on the **Main Menu** to access the **System Menu**.
- 2 Click **Upgrade Software** on the **System Menu** then click **Proceed**. The modem software upgrade for binary files (.bin) automatically begins.



- 3 Click **Download WEB pages** on the **System Menu** then click **Proceed**. The modem software upgrade for html files (.htm) automatically begins.
- 4 Click **Download Configuration** on the **System Menu** then click **Proceed**. The modem software upgrade for initialization files (.ini) automatically begins.

TROUBLESHOOTING

If this occurs:	Try this:
PC or hub not communicating with the modem	<ul style="list-style-type: none"> • Check the LINK LED. If it is off, check the cabling to the 10/100BASE-T port and to the hub or the NIC card in the PC to ensure it is secure. • Check the position of the MDI/MDI-X switch. Set the switch to MDI when connecting to a PC. Set the switch to MDI-X when connecting to a hub or router. • Check that you are using a Web browser (Netscape or Internet Explorer) version 4.0 or newer. • Check that you have a TCP/IP protocol stack installed on your PC. • If this is the initial installation, check that you set the IP address on your PC to obtain an IP address automatically. See “Setting Up the PC to Request an IP Address” on page 18. • Check the NIC card installation for correct IRQ, drivers, and adapter setup. See appropriate documentation for the NIC card. <p>If none of the above corrects your problem, contact your service provider.</p>
SYNC ADSL LED	<p>Contact the service provider when the LED remains off indicating that the modem is not detecting a transceiver at the far end. Flashing green indicates that the modem is attempting to bring up the link. Solid green indicates that the loop is up.</p> <p>The modem synchronizes at a minimum transmission rate of 64 kbps. The modem rate adapts in increments of 32 kbps.</p>
MARGIN ADSL LED lights green	<p>Contact the service provider when the LED is off indicating that the margin is below that specified by the service provider.</p>
LAN TX and RX LEDs are not on	<p>Check that the LINK LED is on. If it is on, you are simply not transmitting or receiving data on the LAN 10/100BASE-T port. If, however, the LINK LED is not on, check the section “PC or hub not communicating with the modem” in this table.</p>
ADSL TX and RX LEDs are not on	<p>Check that the SYNC LED is on. If it is on, you are not transmitting or receiving data on the WAN ADSL port. If, however, the SYNC LED is not on, contact your service provider.</p>

PRELIMINARY

TECHNICAL REFERENCE

This chapter provides technical information about how your modem transmits data between users on your LAN and a service provider over the WAN.

TRANSMISSION ON THE WIDE AREA NETWORK

The technology is ATM over DMT ADSL that provides the high-speed transmission between the modem and the service provider. This transmission occurs over a single-pair telephone line. The following sections describe these technologies.

ADSL

Asymmetric Digital Subscriber Line (ADSL) is the technology used to transmit data between the modem and service provider at the physical layer. It provides data at asymmetric rates so that downstream traffic from a service provider to you is faster than upstream traffic from you to the service provider. The downstream transmission rate is up to 7.552 Mbps, while the upstream rate is up to 928 kbps. Analog POTS can coexist with ADSL on the same line.

Discrete Multitone (DMT) is the line coding used for ADSL. Basically, it divides the bandwidth into subchannels. Some of the subchannels are reserved for analog POTS. The other subchannels are allocated to upstream and downstream traffic. Within the upstream and downstream subchannels, some subchannels are used for management and performance functions.

DMT ADSL provides rate-adaptive transmission that allows the service provider to deliver you the best transmission rate determined by distance and line conditions.

ATM

Asynchronous Transfer Mode (ATM) is a technology that can simultaneously transmit voice, data, and video over ADSL. ATM uses fixed-size cells that transmit over a preestablished connection called a Permanent Virtual Circuit (PVC). Quality of Services can also be specified.

ATM cells are 53 bytes that comprise a 5-byte header and 48-byte payload. The header includes the Virtual Path Identifier (VPI) and Virtual Channel Identifier (VCI) that you entered when you configured each session in [Chapter 4](#). The VPI and VCI provide the virtual connection between the modem and the service provider. The VPI identifies the Virtual Path (VP) that transports ATM cells in a Virtual Channel (VC). The Megabit Modem 500L has three VCs in the VP, which provide the three sessions for the Internet or for other WAN applications. You can, however, activate only one session at a time.

Mapping an ATM Session

Your service provider will give you a VCI and VPI address for each session. The VCI address, for each session (each session is a VC), can be a number up to a maximum of 255 (32 to 255), with the first 32 numbers (0 through 31) reserved. The VCI value for each VC must be unique for each of the three sessions. The VPI value must always be 0.

PPP

PPP runs over ATM virtual circuits. PPP exists between the hardware layer and the network-layer interface protocols. It is a widely used protocol for establishing connections on the Internet. PPP provides the set up and release of connections for each session. PAP/CHAP provide the authentication for the PPP sessions.

You can configure three sessions, but only one session can be established between the service provider and the modem at a time. The user is mapped to the session that is active.

PAP/CHAP Authentication Security

Password Authentication Protocol (PAP) and Challenge-Handshake Authentication Protocol (CHAP) are two ways to authenticate PPP sessions. PAP and CHAP are both offered since some systems support only PAP. With PAP, the modem sends authentication requests to the service provider and authentication occurs only once during the life of the link.

In CHAP, the service provider returns an authentication challenge to the modem during authentication. CHAP can be renegotiated during the life of the link. Also, both the modem and the service provider must support clear text versions of the password. The CHAP host field must be the same on both ends of the session.

NAT

RFC 1631 Network Address Translation (NAT) provides the means to map private IP addresses to the public IP addresses (proxy addresses) that are set up for the PPP sessions. Essentially, you hide your private addresses behind the public IP address assigned to a session.

You can map one LAN user IP address to one of the three sessions you set up. If you want to activate a different session, move the LAN user to the new session.

Static NAT entries are required only for applications that involve TCP/UDP connections initiated from the remote end (WAN). An example is the RealPlayer™ application. The RealPlayer (client) initiates a TCP connection to the RealServer™, which then initiates a UDP connection back to RealPlayer. RealPlayer can then tell the server to use a specific UDP port for the UDP connection. The user should set up a static NAT entry for the UDP connection for RealPlayer to work properly through NAT.

UDP is connectionless where TCP is connection-oriented protocol. Both UDP and TCP use protocol port numbers to distinguish services and sessions.

MANAGEMENT PROTOCOLS

SNMP is used to configure system parameters, to monitor statistics, and to perform advanced management tasks.

SNMP

This management protocol specifies how to send information between a network management system (NMS) and managed devices on a network. Managed devices run a program called an agent. The agent interprets SNMP requests and responds to them. The NMS communicates with the agents in the managed devices to:

- set configuration
- get configuration
- get status

A Management Information Base (MIB) defines the configuration and status parameters. The Internet Engineering Task Force (IETF) specifies standard MIBs for certain types of devices, ensuring any NMS can manage them. Additionally, vendors can issue proprietary MIBs for their devices to fit specific needs.

Megabit Modem 500L SNMP Agent

The Megabit Modem 500L provides an SNMP agent that supports several MIBs for management of the system. The SNMP agent can process datagrams received from the Ethernet interface. The agent and the protocol stack complies with the following Request for Comments (RFCs):

- RFC 1155 Structure of Management Information (SMI)
- RFC 1157 Simple Network Management Protocol (SNMP)
- RFC 826 Address Resolution Protocol (ARP)
- RFC 792 Internet Control Message Protocol (ICMP)
- RFC 791 Internet Protocol (IP)
- RFC 768 User Datagram Protocol (UDP)

MIB and Trap Support

Each managed device has configuration, status, and statistical information that defines its functionality and operational capabilities. These elements make up the MIB for the device being managed. The MIB defines the kind of information an NMS can retrieve from a managed device, and the settings an NMS can control in a managed device.

Megabit Modem 500L supports the following MIBs:

- RFC 1213: "Management Information Base for Network Management of TCP/IP-Based Internet: MIB-II" Supported groups: system, interfaces, IP, ICMP, UDP, and SNMP groups.
- RFC 1215: "A Convention for Defining Traps for Use with the SNMP" Supported groups: ColdStart, linkUp, linkDown, and authenticationFailure traps. Link status traps are sent for events related to Ethernet.
- ADSL MIB
- ATM MIB
- PairGain Agent MIB
- PairGain Tiger MIB

DNS RESOLUTION

If you want Domain Name System (DNS) resolution, you need to specify the IP address for a device to be the DNS resolver. You can also specify another IP address to designate a second device for a secondary DNS resolver. The DNS device maps human-readable addresses to IP addresses. A human-readable address is one such as `maggie.copro.company.com` that contains a host name and domain. The DNS resolver maps that name to the IP address that is a numeric (four octet) value such as `192.168.30.25` (see [page 39](#) for the example on how to configure a DNS address).

TFTP SERVER

Trivial File Transfer Protocol (TFTP) is a standard for file transfer. It provides the service with minimal capability and minimal overhead. TFTP uses UDP for connectionless delivery.

PRELIMINARY

SPECIFICATIONS AND DATA

WAN INTERFACE SPECIFICATIONS

ADSL (Asymmetric Digital Subscriber Line)

Maximum transmission rate:

Downstream 1.5 Mbps

Upstream 512 kbps

Minimum transmission rate to sync 64 kbps

Rate-adaptive data rate resolution 32 kbps increments

Signal Format DMT (Discrete Multitone) line code

Connector RJ-11

ATM (Asynchronous Transfer Mode)

ATM Adaptation Layer AAL5 (ITU I.363.5) - Supports encapsulation and de-encapsulation of AAL5 Protocol Data Units (PDUs) for convergence. Segmentation and Reassembly (SAR) layer segments and reassembles AAL5 PDUs into ATM cells that are 48-byte SAR-PDUs.

ATM Layer Attaches or strips the 5-byte header to the 48-byte SAR-PDU. Performance is a maximum line rate of 17,812 cells per second downstream and 2,189 cells per second upstream.

Cell Format Format complies with ITU I.361 ATM cell format. Cell delineation complies with ITU I.432 Cell Delineation and HEC. Cells are fixed length (53 bytes), including 5 bytes of header and 48 bytes of payload. Included in the header are the VPI and VCI number.

Virtual Circuit type Permanent Virtual Circuit (PVC) per ATM forum UNI version 3.1.

Maximum Virtual Circuits Three virtual circuits, with one that is actively connected to a service provider; encapsulated as PPP.

PPP OVER ATM

You can configure each of the three sessions with the following parameters:

Link Control Protocol (LCP)	Provides a phase of the PPP negotiation by setting up the physical link (RFC 1661).
Network Control Protocol (NCP)	Occurs after LCP, negotiating parameters for each network interface and uses Internet Protocol Control Protocol (IPCP) which is defined in RFC 1332.
Authentication (PAP/CHAP)	Provides authentication of PPP sessions for security through Password and Challenge-Handshake Authentication Protocols (RFC 1994).
Network Address Translation	Network Address Port Translation (NAPT) maps a LAN side private IP address to the public IP address assigned to one of the three virtual channels (RFC 1631).

LAN INTERFACE

Connector	RJ-45 Ethernet with auto-detecting 10/100BASE-T (IEEE 802.3I for 10BASE-T and IEEE 802.3u for 100BASE-T)
-----------	----------------------------------------------------------------------------------------------------------

PHYSICAL SPECIFICATIONS

Height	1.2 inches (3.1 cm)
Width	6.9 inches (17.5 cm)
Depth	9.2 inches (23.4 cm)
Weight	2.2 pounds (1.0 kg)

POWER SUPPLY

Voltage	100 to 240 Vac
Frequency	50 to 60 Hz
Current	0.3 Amps

ENVIRONMENTAL

Operational Temperature	32 to 122 °F (0 to 50°C)
Relative Humidity	up to 95% non-condensing
Altitude	between -200 and 13,000 feet (-61 to 3.962 meters)

COMPLIANCE

Emissions and Immunity Compliance	<ul style="list-style-type: none">• FCC Part 15, Subpart B, Class B• CENELEC/ETSI (IEC 555 and 801)• CE (EN 55022 and EN 50082-1)
Operations and Safety Compliances	<ul style="list-style-type: none">• UL and cUL (UL-1950)• CE (EN 60950)

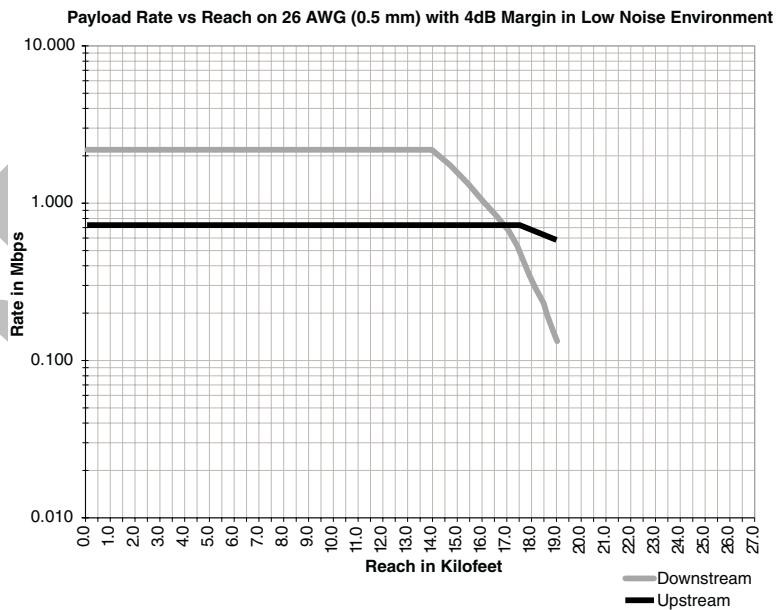
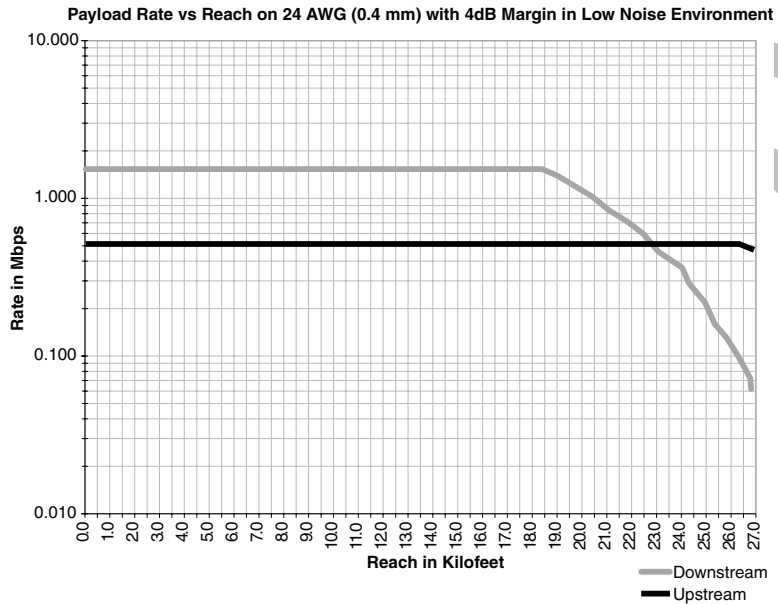
RFCs

- RFC 2364 PPP Encapsulation over ATM
- RFC 1661 for PPP LCP
- RFC 1994 for PAP/CHAP Authentication
- RFC 1631 IP Network Address Translator (for NAT)
- RFC 1350 for TFTP client

MIBs

- TR-006 ADSL Forum ADSL Line MIB
- T1.413 section 8.2

RATE VS. REACH



HARDWARE

The following provides additional information about Megabit Modem 500L such as the installation kit and modem connectors pinouts.

Installation Kit

The following items are included in the installation kit and are used to install the Megabit Modem 500L as shown in [Chapter 3 on page 11](#).

Part	Description	Function
Rubber feet	Four black rubber feet	Attaches to the base of the modem.
Grey cable	Silver-satin phone cord with 4-pin modular plugs (straight-through)	Connects the modem ADSL connector to the wall phone jack for access to the Internet.
Black cable	CAT 5, cable with 8-pin modular plugs (straight-through)	Connects the modem 10/100BASE-T connector to the LAN through a hub or to a PC NIC.
Power cable	Power supply with optional power cord (this item is ordered dependent on the type of power supply and cord required for your location)	Connects the modem POWER connector to the local power source.
Screws	Two 6x $\frac{1}{2}$ -inch sheet metal screws	Installs into a wall for wall-mounting modems.

Connector Pinouts

You can make your own cables for the ADSL RJ-11 connector and the 10/100BASE-T Ethernet connector on the rear of the modem. The following sections provide the pinout information.

ADSL Port

The following table shows the signal on each pin for the ADSL port. The connector for this interface is an RJ-11. See [page 14](#) for the location of this port.

Pin	Signal
1	Not used
2	No connection
3	Ring
4	Tip
5	No connection
6	Not used

10/100BASE-T Port

The following table shows the signal on each pin when the switch is in either the MDI or the MDI-X position for the 10/100BASE-T port. The connector for this interface is an RJ-45. See [page 14](#) for the location of this port.

MDI	MDI-X	Signal	Description
1	3	TX+	Transmit Data (+)
2	6	TX-	Transmit Data (-)
3	1	RD+	Receive Data (+)
4	4	Not used	Not used
5	5	Not used	Not used
6	2	RD-	Receive Data (-)
7	7	Not used	Not used
8	8	Not used	Not used

PRELIMINARY

TECHNICAL ASSISTANCE AND WARRANTY

This chapter describes how to contact PairGain for technical support and warranty service.

TECHNICAL SUPPORT

PairGain Technical Assistance is available 24 hours a day, 7 days a week by contacting PairGain's Customer Service Engineering group at one of the following numbers:

- Telephone: (800) 638-0031
(714) 832-9922
- Fax: (714) 832-9924
- Email: support@pairgain.com

A Customer Service Engineer answers technical assistance calls Monday through Friday between 7:30 AM and 5:30 PM, Pacific Time, excluding holidays. At all other times, an on-duty Customer Service Engineer returns technical assistance calls within 30 minutes.

WORLD-WIDE WEB

PairGain product, company, and application information can be found at <http://www.pairgain.com> using any Web browser.

LIMITED WARRANTY

PairGain Technologies, Inc. ("PairGain") warrants that, for a period of 12 months from the date of shipment, the hardware portion of its products will be free of material defects and faulty workmanship, under normal use. PairGain's obligation, under this warranty, is limited to replacing or repairing, at PairGain's option, any such hardware product which is returned during the 12-month warranty period per PairGain's instructions and which product is confirmed by PairGain not to comply with the foregoing warranty.

PairGain warrants that, for a period of 90 days from the date of purchase, the software furnished with its products will operate substantially in accordance with the PairGain published specifications and documentation for such software. PairGain's entire liability for software that does not comply with the foregoing warranty and is reported to PairGain during the 90-day warranty period is, at PairGain's option, either (a) return of the price paid or (b) repair or replace of the software. PairGain also warrants that, for a period of 30 days from the date of purchase, the media on which software is stored will be free from material defects under normal use. PairGain will replace defective media at no charge if it is returned to PairGain during the 30-day warranty period along with proof of the date of shipment.

The transportation charges for shipment of returned products to PairGain will be prepaid by the Buyer. PairGain will pay transportation charges for shipment of replacement products to Buyer, unless no trouble is found (NTF), in which case the Buyer will pay transportation charges.

PairGain may use reconditioned parts for such repair or replacement. This warranty *does not* apply to any product which has been repaired, worked upon, or altered by persons not authorized by PairGain or in PairGain's sole judgment has subjected to misuse, accident, fire or other casualty, or operation beyond its design range.

The warranty for repaired products shall remain in effect until the end of the original warranty period.

PAIRGAIN DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ITS PRODUCTS AND ANY ACCOMPANYING WRITTEN MATERIALS. FURTHER, PAIRGAIN DOES NOT WARRANT THAT SOFTWARE WILL BE FREE FROM BUGS OR THAT ITS USE WILL BE UNINTERRUPTED OR REGARDING THE USE, OR THE RESULTS OF THE USE, OF THE SOFTWARE IN TERMS OF CORRECTNESS, ACCURACY, RELIABILITY OR OTHERWISE.

ADVANCE REPLACEMENT

Any product determined by PairGain not to comply with the applicable warranty within 30 calendar days from the date of shipment to the Buyer, or as otherwise authorized, are eligible for advance replacement free of charge. A replacement product will be shipped to the Buyer within 24 hours of PairGain's receipt of notification from the Buyer.

If products returned to PairGain for advance replacement are not received by PairGain within 30 calendar days of shipment of the replacement product or if no trouble is found (NTF) as determined by PairGain, the Buyer will be responsible for payment of the cost of the replacement product.

BILLING

PairGain's repair of products returned for repair, replacement, or credit, whether in warranty or out of warranty, which is found to be damaged due to customer negligence or which has had parts removed will be billed on a time and material basis.

In the event that the returned equipment is not covered by warranty, PairGain will contact the customer with estimated repair or replacement charges and obtain customer disposition of the product if a purchase order has not been provided.

Equipment returned for repair or replacement is subject to a \$70 per unit no trouble found (NTF) charge in the event that diagnostic evaluation reveals no evidence of functional failure or physical defects.

RETURNING A PRODUCT

To return equipment to PairGain:

- 1 Locate the number of the purchase order under which the equipment was purchased. You will need to provide this number to PairGain Customer Service to obtain a return authorization.
- 2 Call or write PairGain Customer Service to ask for a Return Material Authorization (RMA) number and any additional instructions. Use the telephone or fax number listed below:
 - Telephone: (714) 730-2800
 - Fax: (714) 730-2961
- 3 Include the following information, in writing, along with the equipment you're returning:
 - Your company name, address, and the name of a person PairGain can contact regarding this equipment.
 - The same purchase order number you gave to Customer Service when you requested an RMA number.
 - A description of the equipment, as well as the number of units you're returning to us. **Be sure** to include the model and part number of each unit.
 - The shipping address to which PairGain should return the repaired equipment.
 - The reason for your return:
 - a The equipment is defective.



If the equipment is defective, please tell us what you observed just before the equipment malfunctioned. Be as detailed in your description as possible.

- b If there's another reason for returning the equipment, please let us know so we can determine how best to help you.
- 4 Pack the equipment in a shipping carton.
- 5 Write PairGain's address and the Return Material Authorization Number you received from Customer Service clearly on the outside of the carton:

PairGain Technologies, Inc.
14352 Franklin Ave.
Tustin, CA 92780-7013
Attention: **CRF RMA (Number)**

CONFIGURATION WORKSHEETS

This chapter provides worksheets where you can record your system settings and system sessions configuration information prior to executing the procedures in [Chapter 4](#) through [Chapter 7](#).

The information that you need to configure the modem is listed below. Contact your service provider for this information. Use the worksheets in this appendix to record your configuration information. When you begin configuration of the modem in [Chapter 4](#), the procedures refer you to the proper table so you can use the information you have recorded.

CONFIGURATION INFORMATION

- 1 If using CHAP, the CHAP authentication name for each session.
- 2 Session address for Ports 1 through 3 (WAN configuration):
 - ATM VPI and ATM VCI (specified for each session)
 - when using fixed IP addresses, IP address specified for each session by the service provider
 - Login Name and Login Password (specified for each session)

CHAP Host Name Worksheet

From Service Provider	Configuration Information	
If using CHAP for authentication, enter CHAP host name for each session	1	2
		3

WAN Configuration Worksheet

From Service Provider	Configuration Information	
ATM Configuration (VPI/VCI for each session)	VPI	VCI
	1 _____	1 _____
	2 _____	2 _____
	3 _____	3 _____

Login Name / Login Password Worksheet

From Service Provider	Login Information	
Login Name and Login Password (for each session)	Login Name	Login Password
	1 _____	1 _____
	2 _____	2 _____
	3 _____	3 _____

Fixed IP Addresses Worksheet


From Service Provider	Fixed IP Addresses
Fixed IP Addresses (for each session)	1 _____ . _____ . _____ . _____
	2 _____ . _____ . _____ . _____
	3 _____ . _____ . _____ . _____
Not applicable if service provider dynamically assigns IP addresses.	

GLOSSARY

10/100BASE-T	The Institute of Electrical and Electronic Engineers (IEEE) 802.3 specification for Ethernet over thin coaxial cable.
AAL5	ATM Adaptation Layer 5, TBS
ADSL	Asymmetric Digital Subscriber Line is a technology in which data is transferred from the service provider to the subscriber at up to 7.552 Mbps, and transferred from subscriber to service provider at up to 928 Kbps. ADSL is the implementation of the physical layer for transmission of data.
ATM	Asynchronous Transfer Mode is a high bandwidth, low delay, connection-oriented, packet-like switching and multiplexing technique that uses 53-byte fixed-size cells to transmit voice, video and data over a network. ATM layers define how cells are formatted and provides the transport of the fixed length cells between the modem and the service provider (or endpoints of the virtual connection).
attenuation	The dissipation of the power of a transmitted signal as it travels over copper wire, measured in decibels (dB).
authentication	Security feature offered through PAP and CHAP with PPP sessions.
BER	Bit Error Rate is a measure of transmission quality. The ratio of error bits to the total number of bits transmitted.
bps	bit-per-second is the number of bits transferred during each second of data transmission.
CBR	Constant Bit Rate is a Service Class for the modem. It provides constant bit rate data with a timing relationship between the source and the destination. Also, a traffic class that carries a guaranteed constant bandwidth. Best suited for applications that require fixed bandwidth, such as uncompressed voice, video and circuit emulation. CBR is a Quality of Service class defined by the ATM Forum for ATM networks.
cell	A fixed-length packet. Also, the unit of data transmission used in ATM. Each ATM cell contains a fixed-size frame (53 bytes) consisting of a five-byte header and a 48-byte payload.

CHAP	See PAP/CHAP.
community string	A text string required for an SNMP trap to be received by a trap receiver(s). Also, a text string that identifies an SNMP community and is associated with specific access rights (read-only or read/write).
CRC	Cyclic Redundancy Check is a method used to verify the accuracy of data transmission.
DMT	Discrete Multi-Tone is a modulation coding for an ADSL line. DMT is the modulation technology used for the Megabit Modem 500L ADSL.
downstream traffic	Communications from a service provider to a user.
encapsulation	The inclusion of data in a protocol header prior to transmission, which enables successful data transmission between different protocol networks.
ES	Errored Seconds is the seconds during which errors occur that prevent the payload from being corrected.
Ethernet	A protocol used for LAN traffic, which has a transfer rate of 10 or 100 Mbps.
flash memory	Non-volatile memory that can be erased and reprogrammed.
gateway	A device (generally a router) that provides translation services to allow communication between two dissimilar networks.
IP	Internet Protocol is a TCP/IP protocol that controls packet transmission.
IP address	A 32-bit address used in IP routing. The address consists of four octets separated by decimals. The octets comprise a network section, a subnet section (optional) and a host section.
LAN	Local Area Network is a physically connected group of devices between which data transmission occurs at high speeds over relatively short distances.
LLC	Logical Link Control is an encapsulation protocol for data that you transmit from the modem over the WAN in 1483 Bridging/Routing mode.
LOF	Loss Of Frame is an error indicating that the receiving equipment has lost a frame.
LOS	Loss Of Signal is an error indicating that the receiving equipment has lost the signal.
MAC	Media Access Control is a physical address associated with a device such as a NIC. For modem configuration, the MAC is used to map inbound traffic (from a remote IP address) to an internal (LAN) IP address. Used with 1483 Bridging/Routing Mode.

margin	The noise margin in decibels that the modem must achieve with a BER of 10^{-7} or better to successfully complete initialization.
MIB	Management Information Base is a set of variables that define the configuration and status parameters for network management. Network management stations can retrieve information from and write information to an MIB. The Internet Engineering Task Force (IETF) specifies standard MIBS for certain types of devices, ensuring any NMS can manage the devices. Vendors can specify proprietary MIBs for their devices to fit specific needs.
NAT	Network Address Translation provides the means to map private IP addresses to the public IP addresses (proxy addresses) that are set up for the PPP sessions. Used with PPP Mode. NAT is Network Address and Port Translation.
NVRAM	Non-Volatile Random Access Memory is a medium for storing system configuration information, so the information is not lost when the system is reset.
octet	A TCP/IP term indicating eight bits.
PAP/CHAP	Password Authentication Protocol and Challenge Handshake Authentication Protocol are two ways to authenticate PPP sessions. With PAP, the modem sends authentication requests to the service provider and authentication occurs only once during the life of the link. In CHAP, the service provider returns an authentication challenge to the modem during authentication. CHAP can be renegotiated during the life of the link. Also, both the modem and the service provider must support clear text versions of the password. The CHAP host field must be the same on both ends of the session.
PDU	Protocol Data Unit is data as it appears at the interface between a particular sublayer and the sublayer immediately below.
POTS	Plain Old Telephone Service.
PPP	Point-to-Point Protocol exists between the hardware layer and the network-layer interface protocols. It is a widely used protocol for establishing connections on the Internet. PPP provides the set up and release of connections for each session. PAP/CHAP provide the authentication for the PPP sessions.
proxy IP address	The proxy IP address is the WAN IP address for one of the 32 sessions. The proxy IP address is used to enter static NAT entries. See IP address.
PVC	Permanent Virtual Circuit is a logical connection comprised of a predefined static route across a packet-switched network that is always in place and always available.
QoS	Quality of Service is the configured traffic parameters that are assigned to a virtual circuit, which specifies how quickly and how accurately data is transferred from the sender to the receiver.



RFC	Request For Comment is a series of notes that contain surveys, measurements, ideas, techniques, and observations, as well as proposed and accepted TCP/IP protocol standards. RFCs are available on the Internet.
RIP	Routing Information Protocol allows routers to update the routing tables automatically (for example with information such as how many hops between destinations). The version of RIP you select for the session must match the version supported by the service provider. Versions RIP1 and RIP-1 compatible are used for broadcast. Version RIP 2 is used for multicast.
SEF	Severely Errored Frames is the incoming signal has at least four consecutive errored framing patterns.
SES	Severely Errored Seconds is the seconds during which more than 2,500 bipolar errors are detected on the line.
session	The time during which two computers maintain a communication connection. An example is a connection configured between the Megabit Modem 500L and the service provider.
SNMP	Simple Network Management Protocol is a protocol that specifies how to send information between a NMS and managed devices on a network. The managed devices run a program called an agent. The agent interprets SNMP request and responds to them. SNMP is used to set device configurations, read device configurations or read the device status.
Spanning Tree	A bridging protocol that detects and prevents loops from occurring in a system containing multiple bridges.
subnet mask	A type of IP address that allows a site to use a single IP address for multiple physical networks.
TCP	Transmission Control Protocol is a transport protocol used to map inbound traffic (from a remote IP address) to an internal (LAN) IP address. Establishes connection with remote user before data transmission.
TCP/IP	Transmission Control Protocol/Internet Protocol is a protocol used for communications between computers over networks and the internet.
TFTP	Trivial File Transfer Protocol is a protocol used to download card images or other files from an external TFTP server to the NVRAM of any installed cards, or to upload files from an installed card to an external TFTP server.
trap receivers	PCs configured to receive SNMP traps (messages).
traps	Autonomous, interrupt-driven, SNMP messages sent from a managed node to a network management station to indicate that an event has occurred.
UAS	UnAvailable Seconds is the number of seconds during which the line is unavailable.

UBR	Unspecified Bit Rate is an ATM traffic type used for LAN traffic. When network congestion occurs, the data is stored in a buffer until it can be sent.
UDP	User Datagram Protocol is a transport protocol used to map inbound traffic (from a remote IP address) to an internal (LAN) IP address. Uses a protocol port number for the destination at the remote location.
upstream traffic	Communications from a user to a service provider.
VCI	Virtual Channel Identifier is a 16-bit field addressing identifier in the header of an ATM cell used to route cell traffic. It identifies a particular VC link for a given VP.
VCMUX	Virtual Channel Multiplexer-based encapsulation used for networks with large numbers of virtual channels making it practical to carry a single protocol per virtual channel.
VCs	Virtual Circuits are logical connections in the ATM network over which ATM cells are transmitted.
VPI	Virtual Path Identifier is an 8-bit field addressing identifier in the header of an ATM cell that is used to route cell traffic. It identifies a particular VP link.
VPs	Virtual Paths are groups of VCs carried between two points. The VP provides a means of bundling traffic traveling in the same direction. VPs are defined by a unique VPI value.
WAN	Wide Area Network is a network consisting of nodes located across a large geographical area. Also, the connection between a service provider and Megabit 700F Modem.

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Corporate Office
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