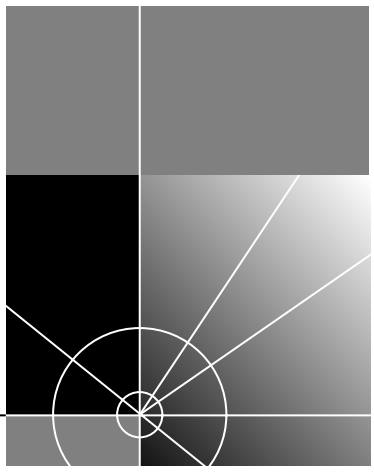
OfficeConnect®
ISDN LAN Modem
3C892

User Guide



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Part No. 984/000023-3
Published February1999

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ABOUT THIS GUIDE

About This Guide provides an overview of this guide, describes guide conventions, and tells you where to look for specific information.

This guide describes how to install and configure the OfficeConnect ISDN LAN Modem and provides descriptions of key applications and networking concepts.

Audience Description

This guide is intended for end users with no presumed level of expertise.

How to Use This Guide

Table 1 shows where to find specific information in this guide.

Table 1

If you are looking for...	Turn to...
An overview of the ISDN LAN Modem	Chapter 1
An explanation of the ISDN LAN Modem's key functionality	Chapter 2
A description of the ISDN LAN Modem's hardware components	Chapter 3
Instructions on setting up TCP/IP	Chapter 4
Instructions for the typical configuring of the ISDN LAN Modem software	Chapter 5
Instructions for advanced configuration of the ISDN LAN Modem software	Chapter 6
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Technical specifications for the ISDN LAN Modem	Appendix D
Instructions for ordering ISDN service for the ISDN LAN Modem	Appendix E
Definition of terms	Glossary

Conventions

Table 2 and Table 3 list conventions that are used throughout this guide.

Table 2 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device
	Warning	Information that alerts you to potential personal injury

Table 3 Text Conventions

Convention	Description
`Screen displays`	This typeface represents information as it appears on the screen.
`Commands`	The word "command" means that you must enter the command exactly as shown and then press Return or Enter. Commands appear in bold. Example: To remove the IP address, enter the following command: **`SETDefault !0 -IP NETaddr = 0.0.0.0`**
The words "enter" and "type"	When you see the word "enter" in this guide, you must type something, and then press Return or Enter. Do not press Return or Enter when an instruction simply says "type."
Keyboard key names	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press Ctrl+Alt+Del
Words in *italics*	Italics are used to: ■ Emphasize a point. ■ Denote a new term at the place where it is defined in the text. ■ Identify menu names, menu commands, and software button names. Examples: From the *Help* menu, select *Contents*. Click *OK*.

Year 2000 Compliance

The OfficeConnect ISDN LAN Modem is Year 2000 compliant. Specifically, its system clock is capable of accepting and storing dates including and beyond the year 2000.

For information on Year 2000 compliance and 3Com products, visit the 3Com Year 2000 Web page:

`http://www.3com.com/products/yr2000.html`

1 INTRODUCTION

This chapter provides an overview of the OfficeConnect® ISDN LAN Modem, referred to throughout this document as the ISDN LAN Modem.

Introduction

The ISDN LAN Modem is an easy to install, LAN to WAN modem. For the LAN, it provides four 10BASE-T Ethernet connections— expandable to 25 connections. Refer to Figure 1 for an example showing 10 connections by adding an 8-port 10BASE-T Ethernet hub. For WAN access, it provides a Basic Rate Interface (BRI) ISDN port.

With the ISDN LAN Modem, small office and home office users can share remote access to the Internet or to a remote office while continuing to network locally.

Applications

The primary application for the ISDN LAN Modem is:

- Local networking with shared access to the Internet and/or a remote office LAN.

Local Networking with Access to the Internet

Users can share access to the Internet while continuing to network locally.

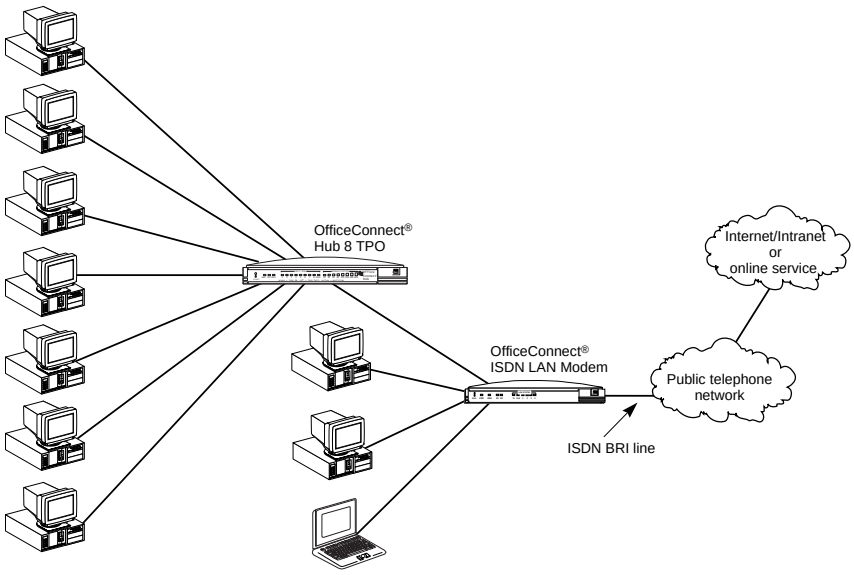


Figure 1 Local Networking with Access to the Internet

Local Networking with Access to a Remote Office

Users can share access to a remote office LAN while continuing to network locally.

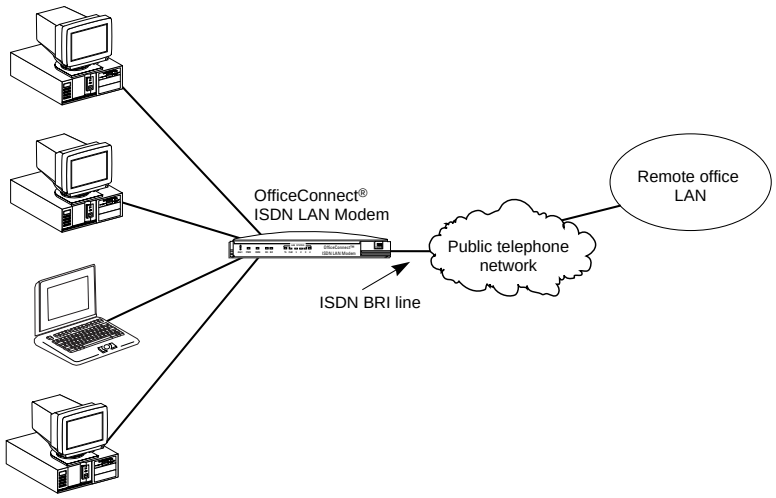


Figure 2 Local Networking with Access to a Remote Office

Local Networking with Access to the Internet and a Remote Office

Users can share access to a remote office and the Internet while continuing to network locally.

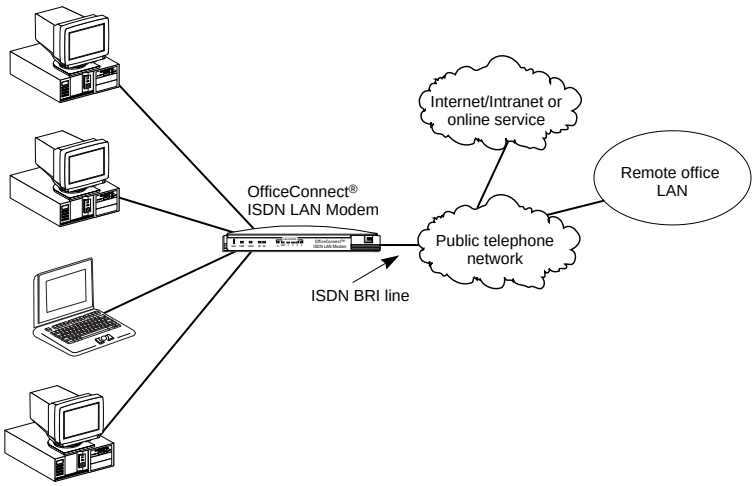


Figure 3 Local Networking with Access to a Remote Office and the Internet

Features

Ease of Installation and Use

- SPID Wizard automatic configuration for telephone company switch and service profile ID (SPID) numbers.
- Web-based, point-and-click user interface for configuration and online help.
- Automatic configuration verification with Internet connection through your Internet Service Provider (ISP).
- Firmware updates, user guides and technical notes available on the Web.

High Performance

- Hi/fn™ LZS® compression, which conforms to these IETF RFCs: *The PPP Compression Control Protocol* (RFC 1962) and *PPP Stacker LZS Compression Protocol* (RFC 1974).
- Multilink PPP (RFC 1990), which combines two PPP B channel calls to create a virtual, single 128 Kbps network connection.
- TollMizer, which places a single B channel or a Multilink PPP data call over a voice connection, saving you the additional charge for a data call.

Connectivity

- ISDN Basic Rate U interface.
- Built in four-port 10BASE-T, 10 Mbps Ethernet hub. Up to 25 users can be supported by connecting to an external eight port-hub.
- Two analog voice ports.
- Preferred Provider support which allows simultaneous connections to two different ISPs.

Routing

- IP Routing.
- Dynamic or static IP addresses supplied by the ISP (WAN side).
- WAN access for up to 25 local workstations on the LAN (10BASE-T).
- Dynamic Host Control Protocol (DHCP) server functionality on the LAN, which automatically assigns an IP address to a newly-attached computer on an IP network.
- Domain Name Service (DNS) server functionality for the LAN, which translates the common, alphanumeric name of a device to the numeric IP address of a device.
- Network Address Translation (NAT) between LAN and WAN, which allows multiple users on the LAN to share a WAN connection. Note that individual email accounts may still be maintained at the ISP.
- Multiplexing traffic from several computers to the same remote destination.

Bandwidth Management

- Automatic call connection (also known as dial-on-demand routing).
- Automatic disconnection of idle calls after a specified length of time.
- Bandwidth on Demand using Bandwidth Allocation Control Protocol (BACP)/Bandwidth Allocation Protocol (BAP) based on a specified threshold.
- Dynamic bandwidth allocation (DBA), which allows you to place or receive a voice or data call while a Multilink PPP call is active.
- Manual call connection and disconnection.

Remote Management

- Remote management using the same Web browser interface.

Voice Features

- Two analog voice ports for using analog telephone equipment such as touch-tone telephones, fax and answering machines, and analog modems.
- Flexible call routing to the two analog ports.
- Caller ID name and telephone display (supports Bellcore GR-30-CORE and SR-TSV-002476 standards).
- Caller ID Blocking
- Call Waiting
- Call Conference (Three-way calling)
- Call Transfer
- Call Forward
- Distinctive Ringing
- Voice Mail

Protocols

- IETF PPP (RFC 1661, 1662, 1663).
- IETF Multilink PPP (RFC 1990).
- PPTP (Point-to-Point Tunneling Protocol— PPTP draft-ietf-pppext-pptp-02.txt).
- IETF Password Authentication Protocol (PAP) (RFC 1334) and Challenge Handshake Authentication Protocol (CHAP) security (RFC 1994).
- MS-CHAP support (as defined in *Network Working Group Information Memo: Microsoft PPP CHAP Extensions. S. Cob, Rev. 1.3 March 1997* including only the functionality that keeps with IETF 1994).
- IP address negotiation using IPCP (RFC 1332).
- CCP (RFC 1962, 1974).
- BACP/BAP (RFC 2125).
- Network Address Translation between LAN and WAN (RFC 1631).

ISDN Standards and Interface

- Basic Rate ISDN U interface with built-in NT1.
- Full ISDN signaling support of National ISDN.
- Compatibility with Lucent, Northern Telecom and Siemens switches.

Security

- PAP, CHAP and MS-CHAP support on both single-channel and Multilink PPP calls.

Upgradability

- Flash memory for field firmware updates.
- Firmware posted on 3Com's Web site.

Diagnostics

- LED status display.
- Statistics display.

Warranty

- Lifetime Limited Warranty (refer to the back of this User Guide for details).

Internet Applications and Games

Support for applications that use the User Datagram Protocol (UDP) and the Transmission Control Protocol (TCP). The UDP protocol is used primarily by Internet games.

Look for the latest list of Internet applications and games that interoperate with the ISDN LAN Modem at
`http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html`

2 ISDN LAN MODEM FUNCTIONALITY DESCRIPTION

This chapter provides a description of the key functionality of the ISDN LAN Modem. It includes the following topics:

- Connection Types
- Call Routing Protocol and IP Address Translation
- Understanding Multilink PPP and Bandwidth on Demand
- Understanding Dynamic Bandwidth Allocation
- Understanding PPTP

For a basic understanding of ISDN and networking, refer to Appendix A.

Connection Types

The ISDN LAN Modem provides LAN side and WAN side connections.

LAN Side Connection

On the LAN side, up to four users can connect to the LAN Modem's built in Ethernet hub, or up to 25 users may connect to the LAN Modem via an external user-supplied hub, enabling users to share files and printers and to use Internet email. An example of ten workstation connections is shown in An example of 10 workstation connections is shown in Figure 4.

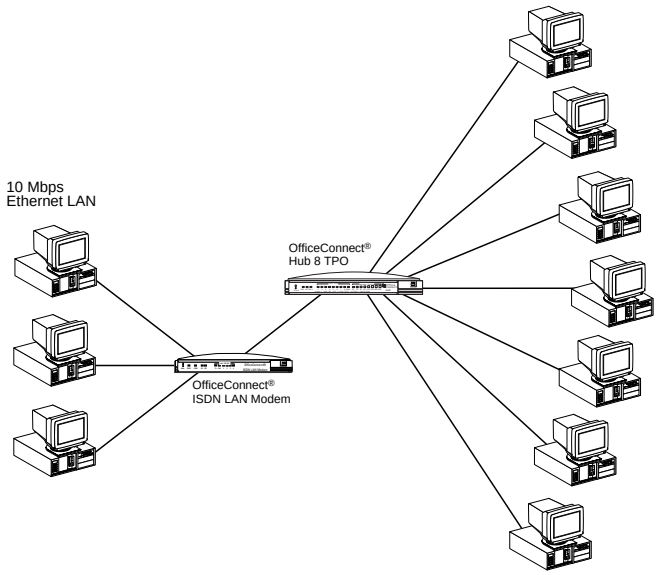


Figure 4 ISDN LAN Modem LAN Connection with 10 Workstations

An example of a single connection is shown in Figure 5.

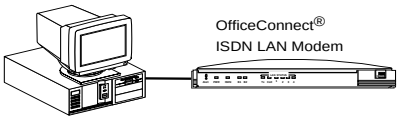


Figure 5 ISDN LAN Modem Single Workstation Connection Example

Application Sharing over the LAN

Most operating systems such as Windows 98 and 95 and Macintosh provide the capability for users on the LAN to share applications, files and printers among computers. For example, if only one computer has a Web browser, the other users on the LAN can use that Web browser to access the Internet. Note that speed will likely be reduced when applications are shared. Refer to your operating system documentation for instructions on setting up sharing between users on a LAN.

WAN Side Connection

The ISDN LAN Modem allows users to connect to a WAN using either of the following methods at one time.

- Two separate connections to two different locations (one per B channel)
- One high-speed Multilink PPP connection to a single location (combines both B channels)

Once a WAN connection is established, up to 25 users can share that connection and access the same location simultaneously. If you desire, you can also restrict access to certain users.

Two Separate Connections to Different Locations.

An ISDN BRI line has two B channels for transmitting data or voice. Because each B channel is independent, you can connect to two different locations. Once the connection is established, up to 25 users can share either connection. Figure 6 shows one user connecting to a remote office LAN while another connects to the Internet.

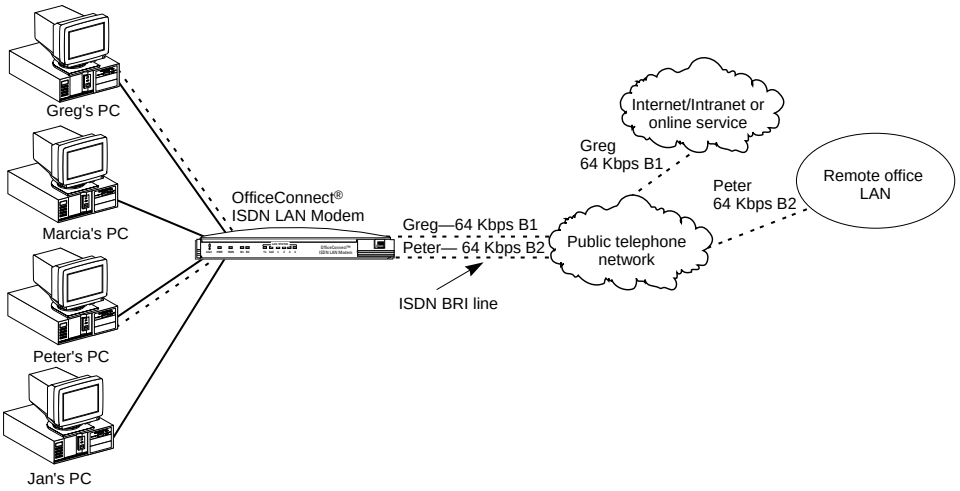


Figure 6 Two Simultaneous Remote Connections to Different Locations

One High Speed Connection to a Single Location

Alternatively, the B channels can be combined using Multilink PPP to form one high-speed connection to a single location. Figure 7 shows a single high-speed connection to a remote office LAN.

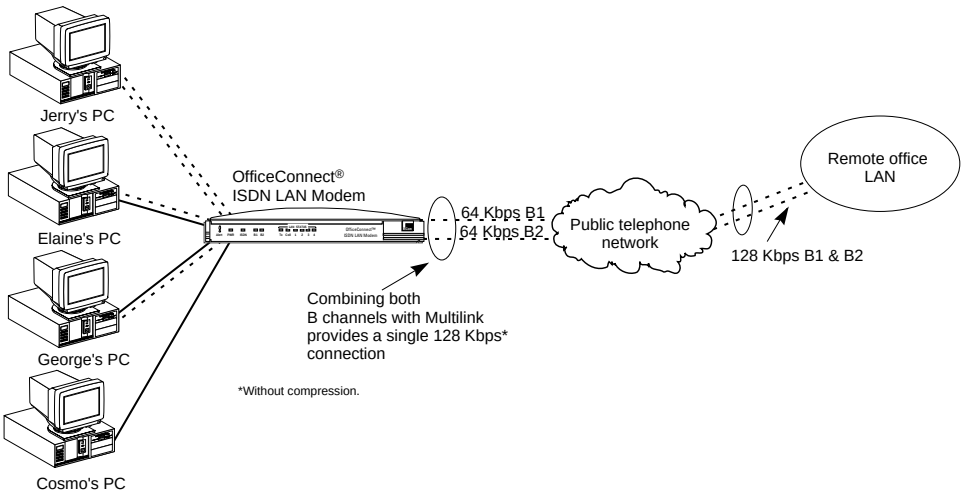


Figure 7 One High-Speed Connection to a Single Location

Up to 25 users can share a connection to the same location over the single connection created by Multilink PPP. Figure 8 shows three users on the LAN accessing the Internet through the same Internet provider and over the single high-speed connection.

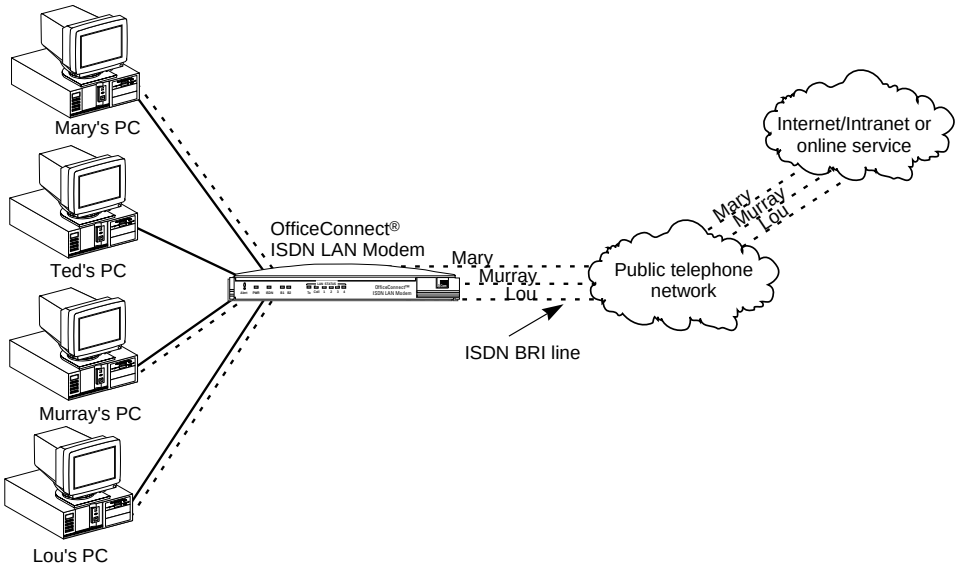


Figure 8 Shared Connection to the Same Location

Call Routing Protocol and IP Address Translation

This section describes the call routing protocol used by the ISDN LAN Modem and explains how IP addresses are translated.

Placing a Call to a Previously Defined Destination

To illustrate how the ISDN LAN Modem routes outgoing data calls, let us assume that you have set up the following types of service providers.

- A direct connection to an Internet Service Provider
- A direct connection to a remote office LAN
- A direct connection to a remote office LAN from which you can also access the Internet

If all of those connection types are configured on the ISDN LAN Modem and are associated with your computer, the following algorithm is performed for each of the following scenarios.

Call Routing While No Other Calls Are Connected

If the ISDN LAN Modem has not established any calls to a remote destination and you want to access the Internet from your computer, you simply launch your Web browser (or whichever networking application you like). When the ISDN LAN Modem receives the information packet requesting access to the WAN, it must determine which connection type to use. The ISDN LAN Modem looks at the destination Network ID (which comprises the destination IP address and subnet mask) associated with the packet. If the Network ID of the packet matches the Network ID of the remote LAN, with or without Internet access, then the call is placed to the remote LAN. If it does not match the Network ID of the remote LAN, with or without Internet access, then the call is routed to the direct ISP connection.

Once the connection is established, any authorized user on the LAN can use this connection. The ISDN LAN Modem will translate each individual user's IP address into a single, shared IP address (assigned by the remote location), thereby allowing up to 25 users to access the same remote location.

The following example shows three users sharing a connection to the Internet and depicts the IP translation as it occurs in the ISDN LAN Modem.

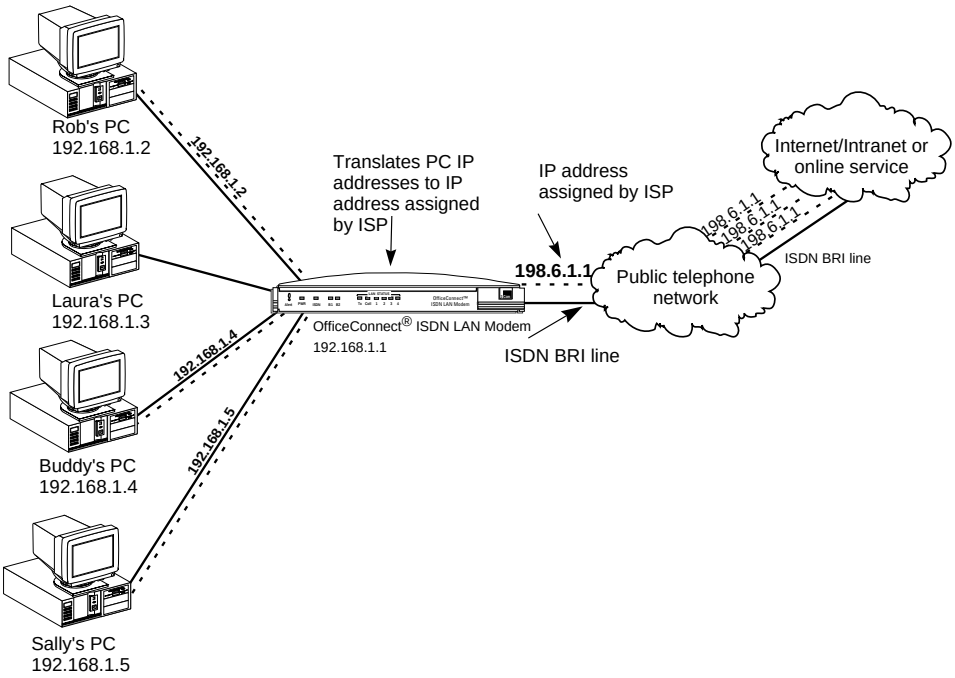


Figure 9 IP Address Translation

Call Routing While One Call Is Already Connected

If the ISDN LAN Modem has established a call to a remote destination, for instance, to an ISP, and the ISDN LAN Modem receives more packets, then the ISDN LAN Modem looks at the Network ID of the packets for proper routing. For example, if the Network ID of the packets matches that of the remote LAN and that connection has not yet been established, then the call is placed and the connection is made. If the Network ID does not match and the call type is an Internet access call, then the packets are routed to the ISP.

Note that the ISDN LAN Modem always calls the first configured ISP. If you have configured a second ISP and want to use that one instead, from the ISDN LAN Modem's configuration home page go to *Workstation Parameters*, select your computer, and then associate only the ISP that you want to use.

Understanding Multilink PPP and BACP/BAP

What is Multilink PPP?

Multilink PPP is a protocol which combines multiple point-to-point protocol (PPP) connections to form a single high-bandwidth channel. With a BRI line, Multilink PPP combines the two 56 Kbps or 64 Kbps ISDN B channels, creating a virtual, single connection of up to 112 Kbps or 128 Kbps.

What is BACP/BAP?

BACP/BAP is used in conjunction with the Multilink PPP feature and is transparent to the user (that is, it will not be visible to you as it occurs in the background). You need not configure this functionality. When Multilink PPP is negotiated, the Bandwidth Allocation Control Protocol (BACP) negotiates with the peer equipment to determine whether the peer supports BAP. If the peer supports BAP

and agrees to use BAP, then the Bandwidth Allocation Protocol (BAP) negotiates the addition and removal of the second B channel with the peer equipment based on a user-defined threshold. A key advantage of BACP/BAP is that it provides a higher probability of establishing a Multilink PPP call during high traffic conditions by providing a specific telephone number for the second B channel to call.

Multilink PPP Configuration Options

When configuring Multilink PPP, you can choose one of the following options from the ISDN LAN Modem's Service Provider Parameters window.

- Use One B Channel

  When this option is configured, only one B channel is used to connect to this service provider. Multilink PPP is thereby disabled and BACP/BAP is therefore not used.

- Use Two B Channels

  When this option is configured, both B channels are always used to connect to this service provider, regardless of the amount of traffic over each B channel. Note that when this option is selected, the DBA feature does not work because both B channels are being used. To use both DBA and Multilink PPP, select the option *Add Second B Channel as Required*.

- Add Second B Channel As Required

  When this option is configured (referred to as bandwidth on demand) only one B channel is used to connect to this service provider, and the second B channel is automatically added only when the amount of traffic on the first B channel reaches a threshold you define.

In order for you to use Multilink PPP, the destination you are calling must also support Multilink PPP. For example, if you are trying to dial in to the Internet, your ISP must also support Multilink PPP in order to successfully place a Multilink PPP call. If you attempt to place a Multilink PPP call and the location you are calling does not support Multilink PPP, then a single B channel PPP connection is established.

Understanding Dynamic Bandwidth Allocation

Dynamic Bandwidth Allocation is used in conjunction with Multilink PPP on demand (to use DBA, you should choose *Add Second B Channel As Required* when you configure Bandwidth Allocation). The Dynamic Bandwidth Allocation feature allows you to automatically and temporarily remove one of the B channels and use it either to place or receive a call (voice or data) without disturbing the original call. The only effect on the original call is that it is reduced from a Multilink PPP call to the speed of one B channel.

Once the interrupting call ends, that B channel is automatically returned to the Multilink PPP call. Although throughput is reduced while the interrupting call is active, the reliability of the Multilink PPP call is maintained.

Understanding VPNs and PPTP

Virtual private networks (VPN) are private, secure networks created in public networks such as the Internet. A VPN is essentially a secure, private tunnel within the Internet. Since VPN calls are placed through a local ISP, they eliminate long distance charges that would occur from directly dialing to a remote private network.

One of the protocols which enables a VPN to be created is PPTP. The PPTP protocol allows for multiple workstations to establish a secure multi-protocol connection to a remote, private network via a single, locally-dialed ISP account as shown in Figure 10. Any networking protocols such as IP, IPX and NetBEUI can be supported transparently through the tunnel. While the ISDN LAN Modem supports PPTP, it does not play an active role in creating or terminating a tunnel.

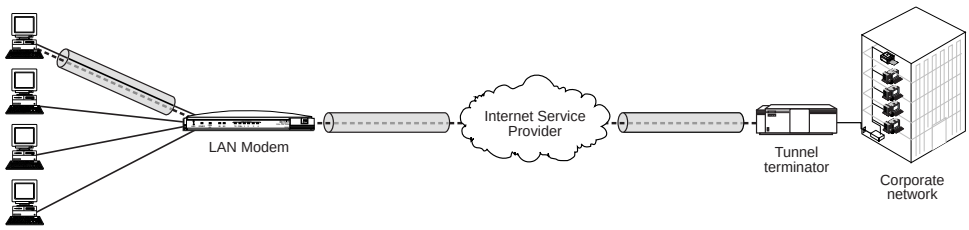


Figure 10 Connection to an Remote Private Network via an ISP

The main steps for creating a VPN are as follows. Each step is explained in detail in subsequent sections.

- Set up the server side of the tunnel connection
- Set up the client side of the tunnel connection
- Initiate a tunnel between client and server using your client software

Setting Up the Server Side of the Tunnel

In order to establish a tunnel, the client side must be able to dial into a PPTP tunnel server on the remote private network such as 3Com's NETBuilder, PathBuilder, and Total Control Hub as well as Microsoft's Windows NT server version 4.0 or later. If you use Windows NT 4.0, then Service Pack 3 or greater and RAS must be installed. Also, the protocols required for the private network must be installed on the PPTP tunnel server. It is recommended that an experienced network administrator set up the server side. Note that protocols required for the private network must be installed on each PPTP tunnel client as well as the PPTP tunnel server.

Setting Up the Client Side of the Tunnel

In order to establish a tunnel, the client side must have PPTP tunnel client software such as Windows Dial-Up Networking version 1.2 or higher which includes the required software VPN adapter or Windows NT operating system with Service Pack 3, or Network TeleSystem's TunnelBuilder™ VPN software for Windows 3.11 and Macintosh operating systems. This software should reside on all workstations that wish to create a tunnel to the tunnel server. Follow instructions provided for installation and set up.

For Windows Dial-Up Networking Users

If you are using Windows Dial-Up Networking version 1.2 or higher, the basic set up steps are as follows. (Refer to Windows user documentation for details.)

- Install the PPTP protocol
- Create a RAS phone book entry for the VPN

  A RAS phone book entry is similar to other phone book entries except there is an IP address in the Phone number field. Once the Phone book entry is complete, you can double-click the icon to dial into a server that supports PPTP via any ISP.

Note that protocols required for the private network must be installed on each PPTP tunnel client as well as PPTP tunnel server.

Establishing a Tunnel via the ISDN LAN Modem

As with PPP, no configuration is required on the LAN Modem to use PPTP. However, you must have an ISP configured on the LAN Modem.

Once the client side and server side are configured, you are ready to create a tunnel. The steps required for creating a tunnel vary depending on which client software you are using. Refer to the user documentation provided with your PPTP software to determine how to establish a tunnel. For instance, if you are using Windows Dial-Up Networking version 1.2 or higher, double-click the phone book entry for the VPN.

Once you attempt to create a tunnel, the ISDN LAN Modem detects this attempt and automatically places a call to your ISP. Once the call is connected, a tunnel is established between your workstation and the tunnel server.

You are ready to access a remote private network LAN as if you were connected locally. Each workstation that wishes to have access to the remote private LAN will need to create its own tunnel.

For more information, refer to: **`http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html`** *For specific instructions on how to configure a VPN adapter in Windows 98, 95 or Windows NT, refer to Microsoft's Web site at* **`http://www.microsoft.com`***. and then enter PPTP in the search field.*

3 HARDWARE DESCRIPTION AND INSTALLATION

Package Contents

The ISDN LAN Modem package includes:

- OfficeConnect ISDN LAN Modem
- Power cable with an AC wall transformer
- RJ-11 ISDN telephone cable
- 10BASE-T Ethernet cable
- *3Com Companion Programs* CD-ROM
- *OfficeConnect ISDN LAN Modem Getting Started Guide*
- Rubber feet and stacking clips

Before You Install the ISDN LAN Modem

To install, configure and use the ISDN LAN Modem successfully, you must have the following:

- Correct ISDN service installed at your location with an available ISDN RJ-11 or RJ-45 outlet. If you have not yet ordered ISDN service, refer to Appendix E.
- A JavaScript-enabled and frames-capable Web browser. A Web browser is provided on the *3Com Companion Programs* CD-ROM. (For more information refer to Appendix B.) If you use a different Web browser, make sure that it supports frames such as Netscape 2.1 and later and Internet Explorer 3.0 and later.

If you already have a version of the Internet Explorer Web browser installed and would like to install a later version, you should first uninstall the previous version. If you are asked to replace the older files, it is recommended that you do so.

- A personal computer with TCP/IP and Ethernet connectivity that meets UL standards in the United States or is certified to CSA standards in Canada.
  - For a PC, a 386 or higher processor is recommended and a 10BASE-T Ethernet card is required.
  - For an Apple Macintosh computer, system 7.6 or later operating system and Open Transport (provided as part of system 7.5). Built-in Ethernet connectivity is provided through an Apple Ethernet port in all Power Macintosh computers.
  - TCP/IP is provided as part of the Windows 98, 95, NT and Macintosh System 7.6 and later operating systems. For Windows 3.11 users, TCP/IP software is provided on the *3Com Companion Programs* CD-ROM.

You do not have to have available storage space on your computer's hard drive because nothing is copied as part of the ISDN LAN Modem installation. If you want to copy any programs or documents from the CD-ROMs, ensure that you have available hard disk space.

Front Panel LED Description

The front panel provides the following LEDs.

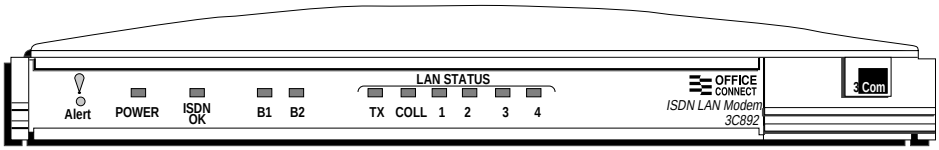


Figure 11 ISDN LAN Modem Front Panel

The functions of the front panel LEDs are described in Table 4. These front panel LEDs show whether or not the unit is functioning properly and indicate the status of the activity over the 10BASE-T and ISDN ports.

Table 4 Front Panel LED Indicator Definitions

LED	Color	Description
Alert	Amber	**Operational Status.** Lit during power-on self-test diagnostic or after pressing the reset button.
		Off indicates the unit has passed the diagnostic tests and is working properly.
		Flashes (four times per second) if one or more of the diagnostics have failed or after the unit is placed in firmware download mode and is waiting for a firmware upgrade.Flashes (once per second) to indicate there are pending voice mail messages.
POWER	Green	**Power Indicator.** Remains lit as long as power is supplied to the unit.
ISDN OK	Green	**D Channel Status.** Indicates the status of the ISDN physical network interface and D channel.
		Remains lit once the physical ISDN interface and D channel signaling are synchronized.
		Off indicates the physical ISDN interface is not synchronized or is disconnected.
		Flashes when the physical interface attempts synchronization or when the ISDN D channel parameters have changed.
B1/B2	Amber or Green	**B1/B2 Channel Activity.** Green indicates a data call in progress. Amber indicates a voice call in progress. If a call is in a dialing state, the LED flashes. When the call is disconnected, the LED goes off.
Tx	Green	**Ethernet Transmit Status.** Flashes green when data is being transmitted to the Ethernet LAN from the ISDN LAN Modem.
		Off indicates no data is being transmitted to the Ethernet LAN from the ISDN LAN Modem.
Coll	Amber	**Ethernet Collision Status.** Flashes amber when some collisions are taking place on the Ethernet LAN.
		Off indicates no collisions are taking place on the Ethernet LAN.
Ports1—4	Green	**Ethernet LAN Port Status.** On indicates the unit detects the Ethernet link integrity signal from an attached computer and operation is normal.
		Flashes when the LAN Modem is receiving data on that port.
		Off indicates the unit does not detect the Ethernet link integrity signal. The Ethernet cable may not be properly connected or the cable may be the wrong polarity.

Back Panel Connector Description

The back panel provides the following components.

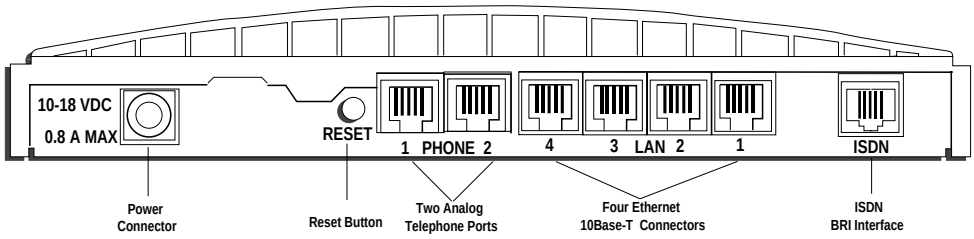


Figure 12 ISDN LAN Modem Back Panel

From left to right the back panel consists of the following.

- Power: Connect the power module cable to this port.
- Reset: Press this button for no more than a couple of seconds if you have to reset the unit. This causes the software to restart while maintaining your configuration profile which includes service provider information and ISDN line telephone numbers.
- Two Analog Telephone Ports: You can connect analog equipment such as a fax machine or telephone to these ports.
- Four 10BASE-T Ethernet Ports: Connect the computers to these ports or another Ethernet hub to add up to 25 users.
- ISDN Basic Rate Interface Port: Connect the ISDN cable to this port.

Installing the ISDN LAN Modem

This section describes how to do the following.

- Install the ISDN cable
- Connect to a 10BASE-T Ethernet LAN
- Install analog equipment
- Install the power cable

Before You Begin

Before you begin, you will need the following in addition to the ISDN LAN Modem which was provided in the package:

- RJ-45 (8-pin) to RJ-11 (6-pin) cable labeled ISDN which was provided in the package.
- 10BASE-T Ethernet cable (8-pin to 8-pin connectors) labeled Ethernet which was provided in the package. It is recommended that you use the cable provided. If, however, you choose to use another cable it must be a straight-through 10BASE-T Ethernet cable. It cannot be a crossover cable.
- Power adapter provided (you must use the power adapter provided in the package).

Installing the ISDN Cable

To install the ISDN cable:

1. Connect the RJ-45 (8-pin) connector end of the ISDN cable to the port labeled ISDN on the back panel, as shown in Figure 13.

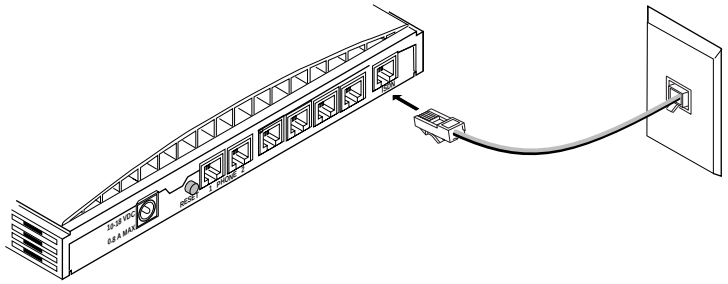


Figure 13 ISDN Cable Connection

2. Connect the RJ-11 (6-pin) connector end of the RJ-45/RJ-11 ISDN cable to the RJ-11 or RJ-45 ISDN wall jack.

CAUTION: *An NT1 (that is, a network termination device) is built into the ISDN LAN Modem. Never connect the ISDN LAN Modem ISDN port to a standard analog telephone jack or to an external NT1 device. Make sure that the ISDN cable is connected directly to the ISDN jack.*

Connecting to a 10BASE-T Ethernet Port

To connect a computer to the ISDN LAN Modem, do the following.

1. Insert one end of the 10BASE-T Ethernet cable into one of the four LAN ports on the back of the ISDN LAN Modem, as shown in Figure 14.

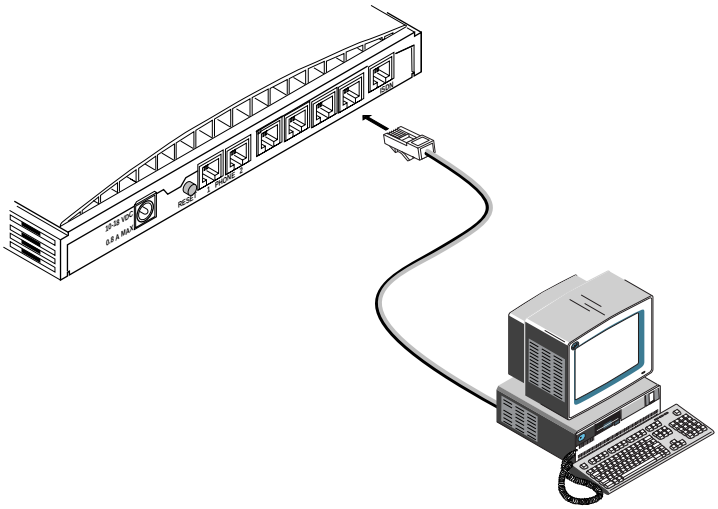


Figure 14 10BASE-T Ethernet LAN Connection

2. Insert the opposite end of the cable into your computer's 10BASE-T Ethernet port.

CAUTION: *You should only have one computer physically connected to the ISDN LAN Modem during configuration. Once you complete the configuration process, connect any other computers you would like to have on the LAN and then power cycle each computer. If the newly-added computers cannot communicate with the ISDN LAN Modem, refer to "Evaluating Symptoms and Solutions" in Chapter 9.*

Connecting to Another Ethernet Hub

You can connect to another Ethernet hub to allow up to 25 users to access the WAN. Instructions for adding another Ethernet hub to allow 10 users, a more common scenario, is as follows.

Before You Begin

In addition to an external 10BASE-T Ethernet hub, you will need a 10BASE-T Ethernet cable, which may have been provided with the additional hub. If the hub to which you are connecting your LAN Modem does not have an MDI/X switch, you must use a crossover cable.

1 Insert one end of the 10BASE-T Ethernet cable into one of the four LAN ports on the back of the ISDN LAN Modem, as shown in Figure 15.

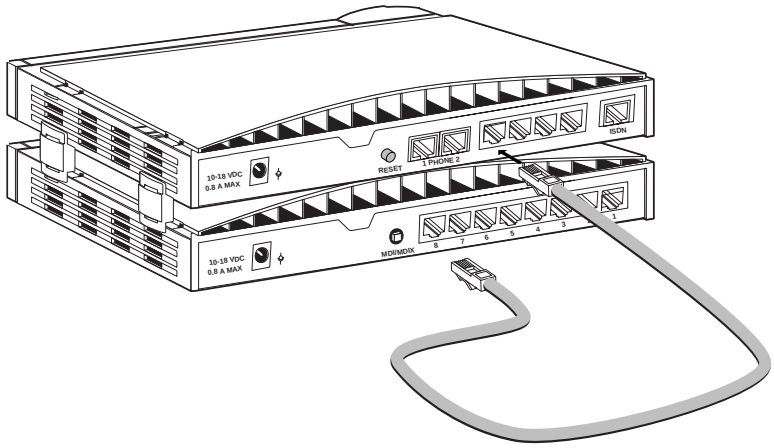


Figure 15 10BASE-T Hub-to-Hub Connection

2 Insert the opposite end of the cable into a 10 BASE-T Ethernet port on the other Ethernet hub.

If you are connecting to an OfficeConnect Hub 8/TPO, insert the opposite end of the Ethernet cable into port 8 and then set the MDI/X switch to MDI (that is, pressed in). Make sure that the LED associated with that Ethernet port is lit. If it is not, try changing the MDI/X switch setting.

Installing Analog Equipment

You can connect an analog touch-tone telephone, answering machine, fax machine, or external analog modem to the ISDN LAN Modem. You will need an RJ-11 to RJ-11 cable that is supplied with the analog device for each analog phone port connection.

To install an analog device:

1. Insert one end of an RJ-11 cable into one of the two analog ports labeled Phone on the back of the ISDN LAN Modem, as shown in Figure 16.

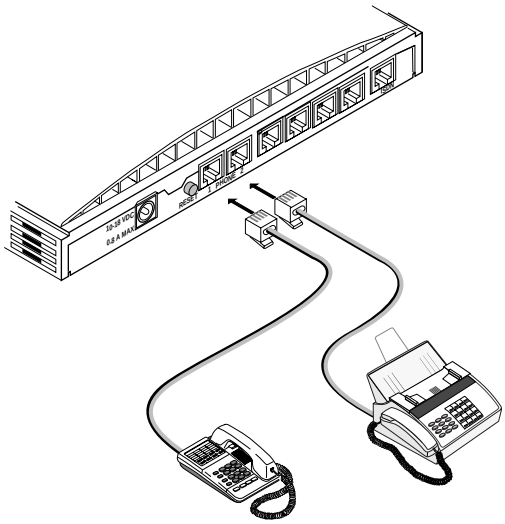


Figure 16 Analog Equipment Connection

2. Insert the other end of the RJ-11 cable into the appropriate RJ-11 port on the analog device.
3. If you have another analog device to install, repeat steps 1 and 2.

CAUTION: *The ISDN LAN Modem is designed to operate with touch-tone telephones that collectively do not exceed a ringer equivalence number (REN) of three per analog phone port. The ISDN LAN Modem is designed to provide power (25 mA loop current per phone port) and ringing for these devices on up to 61 meters (200 feet) of AWG 26 or heavier AWG wiring. Although the ISDN LAN Modem may function satisfactorily at longer cable distances with more than two attached telephones, proper operation at longer cable distances is not guaranteed in all situations.*

Specialized telephone equipment such as speaker phones that draw large amounts of power may not work on the ISDN LAN Modem's Phone port. Because these devices do not conform to the power specification of the touch-tone telephone standard, their operation is not guaranteed.

Installing the Power Cable

To install the power cable:

1 Connect the ISDN LAN Modem power module cable to the 10-18 VDC power connector on the back panel of the ISDN LAN Modem, as shown in Figure 17.

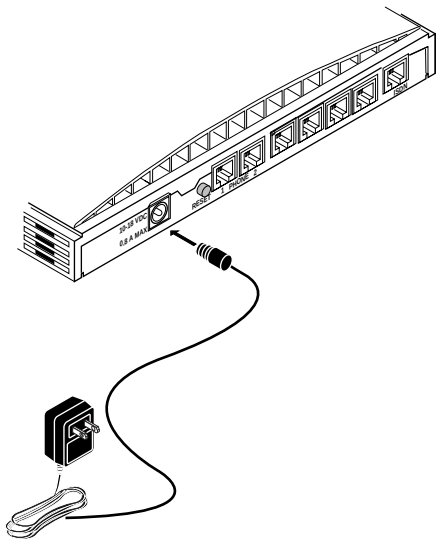


Figure 17 Power Cable Connection

2 Plug the other end of the power module into a surge-protected standard 110 VAC wall outlet.

The indicator LEDs on the front panel flash momentarily as the unit undergoes a power-up self-test diagnostic. The Power LED remains lit.

This completes the ISDN LAN Modem installation. In addition to the Power LED, the ISDN LED remains lit indicating the line is configured and ready for use. The LAN port LEDs associated with workstations connected to those ports also remain lit indicating the LAN Modem can communicate with the workstation(s).

If you do not have TCP/IP installed and set up on your computer, refer to Chapter 4, "Setting Up TCP/IP for Windows and Macintosh." If you already have TCP/IP installed and set up on your computer, refer to Chapter 5, "Configuring the ISDN LAN Modem."

Wall Mounting the ISDN LAN Modem

There are two slots on the underside of the ISDN LAN Modem which are used for wall mounting. You will need two suitable screws. Ensure that the wall you are going to use is smooth, flat, dry and sturdy. Make two screw holes which are 5 7/8 in (150 mm) apart. Insert the screws into the wall, leaving their heads 1/8 in (3 mm) clear of the wall surface.

Remove any connections to the ISDN LAN Modem and position the unit over the screw heads. When the unit is in line, gently push it onto the wall and move it downward to secure. When making connections, be careful not to push the ISDN LAN Modem up and off the wall.

WARNING: *Only wall mount single units. Do not wall mount stacked OfficeConnect units.*

Using Rubber Feet and Stacking Clips

Attach the feet to the marked areas at each corner of the underside of your ISDN LAN Modem to stabilize your ISDN LAN Modem and prevent sliding.

Use the four clips to stack OfficeConnect units together. You can stack up to four units. Stack small units above large units.

1. Place your existing unit on a flat surface. Your clips fit in these positions on the side of the unit.

2. Position a clip over one of these holes and push it until it clicks into place. Repeat this for the other clip position on the same side.

3. Keeping the front of the units aligned, rest the bottom of the new unit on the clips' spikes. Push the clips firmly into the new unit until they click into place.

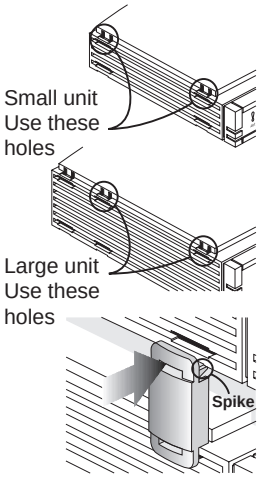


Figure 18 Using Stacking Clips

4 SETTING UP TCP/IP FOR WINDOWS AND MACINTOSH

This chapter describes how to set up the Windows and Macintosh operating system (OS) TCP/IP stack. Your computer must have a TCP/IP stack in order to use the ISDN LAN Modem. If you already have TCP/IP installed and set up on your computer, then go on to Chapter 5. These instructions vary depending upon which operating system you are using. Refer to the appropriate section.

- TCP/IP Setup Using Windows 98 and Windows 95
- TCP/IP Setup Using Windows NT 4.0
- TCP/IP Setup Using Mac OS 7.6 or later
- TCP/IP Setup Using Windows 3.11

TCP/IP Setup Using Windows 98 and Windows 95

TCP/IP is provided as part of the standard Windows 98 and Windows 95 operating systems. To set up TCP/IP for the ISDN LAN Modem, do the following.

You may be prompted for your installation disks or CD-ROM.

1 From the Control Panel, double click *Network*.

The Network dialog box appears.

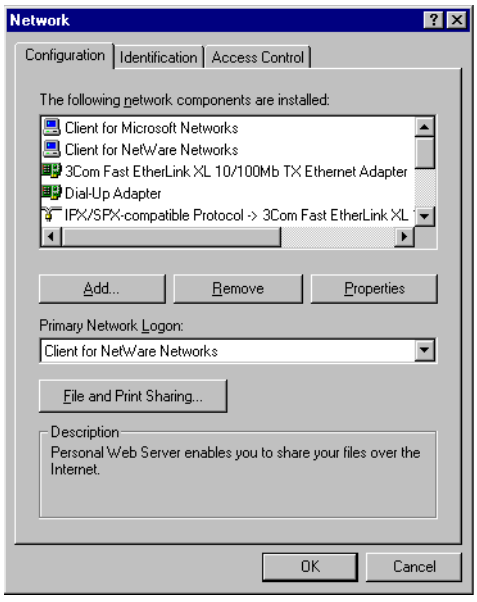


Figure 19 Network Dialog Box

2 Click *Add*.

The Select Network Component Type dialog box appears.

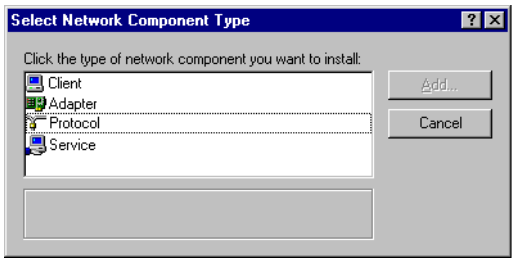


Figure 20 Select Network Component Type Dialog Box

3 Select *Protocol* and then click *Add*.

The Select Network Protocol dialog box appears.

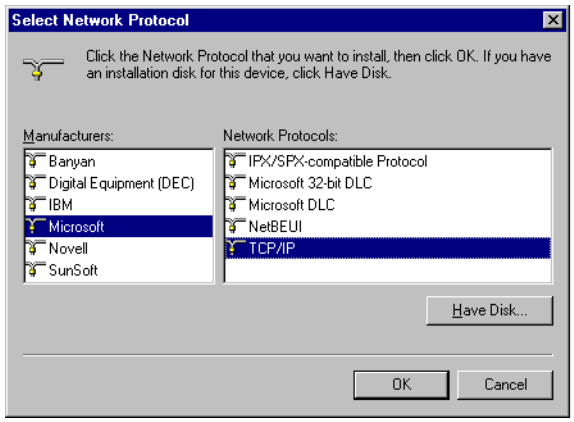


Figure 21 Select Network Protocol Dialog Box

4 From the Manufacturers list box, select *Microsoft*, and then from the Network Protocols list box, select *TCP/IP*.

5 Click *OK*.

6 Select the Configuration tab.

The Network Configuration dialog box appears.

7 Select *TCP/IP* and then click *Properties*.

If you have multiple TCP/IP entries, select TCP/IP *for the Ethernet card associated with the ISDN LAN Modem.*

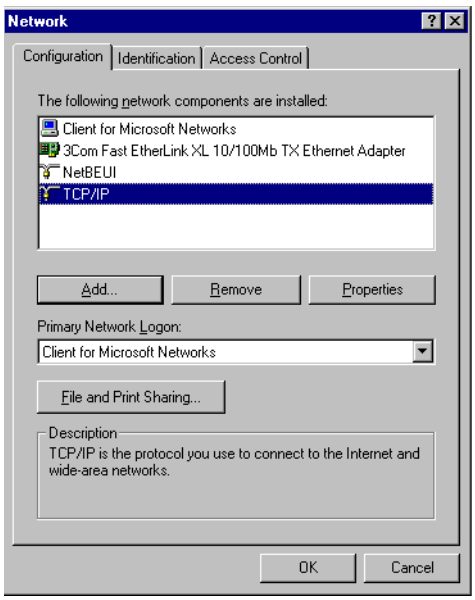


Figure 22 Network Dialog Box

8 From the TCP/IP Properties dialog box, select the *IP Address* tab.

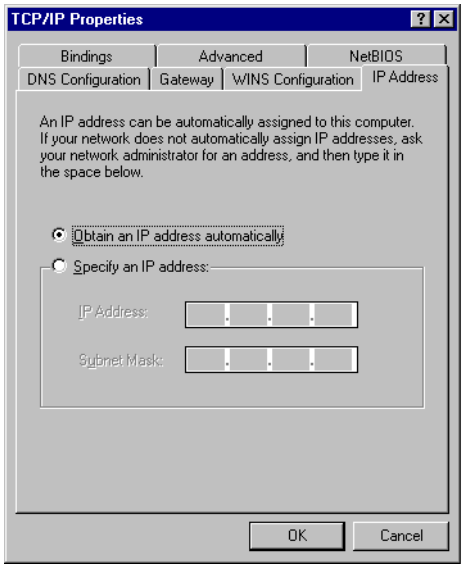


Figure 23 TCP/IP Properties Dialog Box

9 Most users need to select *Obtain an IP address automatically* because most LANs use dynamic IP addresses. If your LAN uses static IP addresses, enter the IP address and subnet mask. (You can obtain this information from your system administrator or ISP.)

10 Select *Advanced* and then check the box to set TCP/IP as the default protocol.

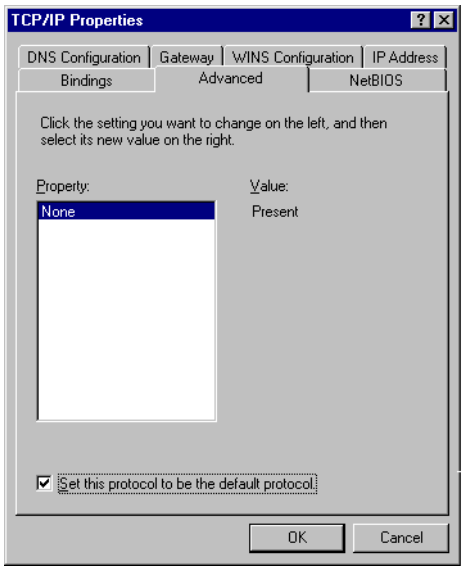


Figure 24 Advanced Parameters of TCP/IP Properties

11 Click *OK* to close the TCP/IP Properties dialog box.

12 Click *OK* to close the Network dialog box.

13 Restart Windows 98 or 95 to let these changes take effect.

TCP/IP Setup Using Windows NT 4.0

Windows NT 4.0 provides TCP/IP as part of its standard operating system. If you have not already set up TCP/IP, do the following.

You will need your Windows NT 4.0 installation CD-ROM.

1 From the Control Panel, double-click *Network*.

The Network dialog box appears.

2 Select the *Protocols* tab, as shown in Figure 25.

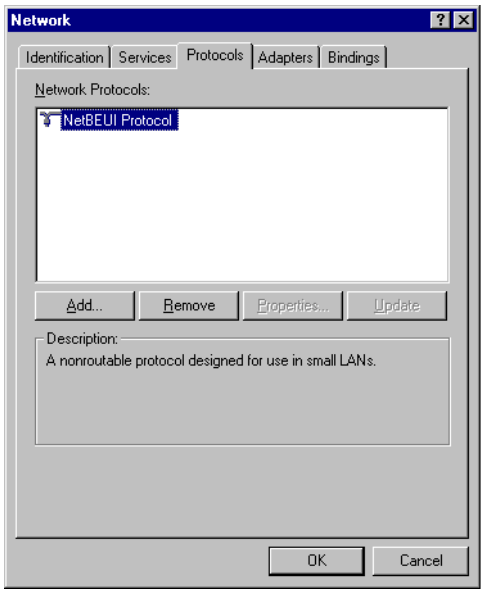


Figure 25 Windows NT Protocols Configuration Window

3 Click *Add*.

The Select Network Protocol dialog box appears as shown in Figure 26.

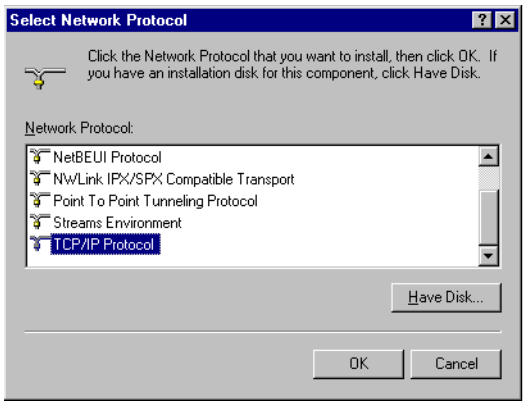


Figure 26 Select Network Protocol Dialog Box

4 Select *TCP/IP Protocol* and then click *OK*.

The following message appears.

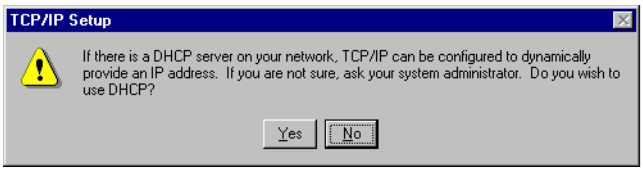


Figure 27 DHCP Message Box

5 Select the appropriate response for your network.

6 You are then prompted to insert your installation CD-ROM. Insert the Windows NT 4.0 CD ROM and then click *Continue*.

For users who have Remote Access Service (RAS) installed on their PC, after the appropriate files are copied to your PC, a message box asks whether or not you would like TCP/IP installed for RAS. If you select Yes, *you must select the device you want to access remotely and then click* Close.

7 After the appropriate files are copied to your PC, you will see TCP/IP Protocol listed in the Network Protocols group box, as shown in Figure 28.

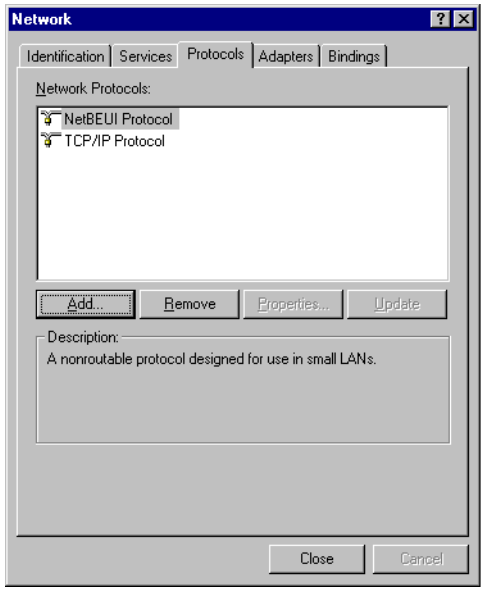


Figure 28 Network Protocols Group Box

8 Click *Close*.

The Microsoft TCP/IP Properties window appears, as shown in Figure 29.

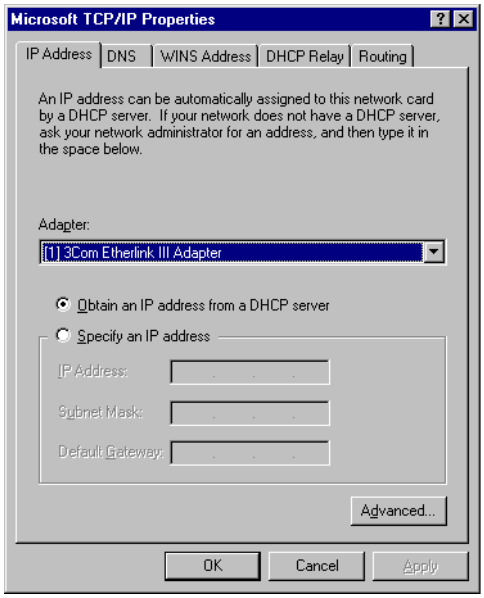


Figure 29 Microsoft TCP/IP Properties Window

9 From the Adapter drop down list box, select the Ethernet card that is connected to the ISDN LAN Modem.

10 If this LAN uses dynamic IP addresses, select *Obtain an IP address from a DHCP server*. If this LAN uses static IP addresses, enter the IP address and subnet mask.

11 Click *OK*.

12 Click *Yes* to restart your PC and allow the changes to take effect.

TCP/IP Setup Using Mac OS 7.6 or later

If you are using Macintosh operating system version 7.6 or later, Open Transport (OT) PPP is provided and installed by default. If you did not install OT PPP when you installed your system software, perform a custom installation of your system software and install OT PPP version 1.1 or later.

To set up TCP/IP for Mac, do the following.

1 From the Apple menu, select *Control Panels* and then select *TCP/IP*.

The TCP/IP dialog box appears.

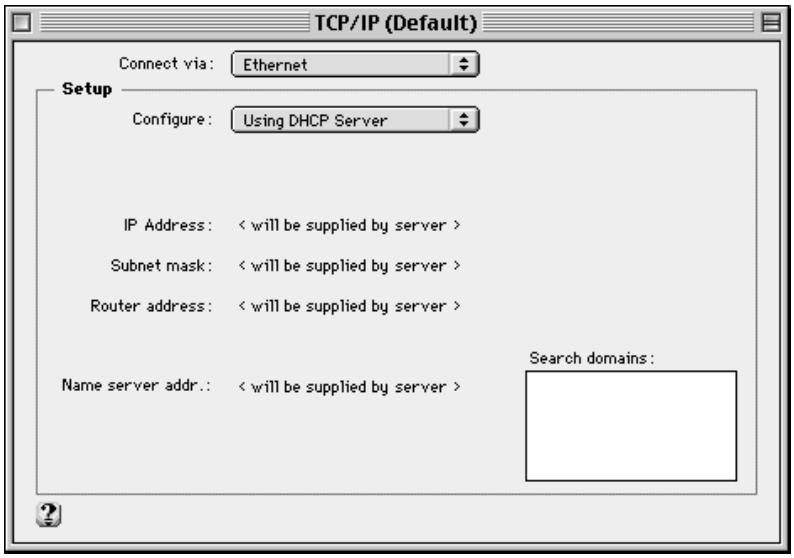


Figure 30 TCP/IP Dialog Box for Macintosh Computers

2 Select *Ethernet* or *Ethernet built in from* the Connect via drop down list box.

3 If this LAN uses dynamic IP addresses, select *Using DHCP Server* from the Configure drop-down list box. If this LAN uses static IP addresses, select *Manually* from the Configure drop-down list box and then enter the IP address.

TCP/IP Setup Using Windows 3.11

If you are using Windows 3.11, a TCP/IP stack is not provided as part of the operating system. If you do not have a TCP/IP stack, you can use MS TCP which is provided on the *3Com Companion Programs* CD-ROM.

Setting Up TCP/IP Using MS TCP

To set up MS_TCP, do the following.

1. Install MS_TCP, located on the *3Com Companion Programs* CD-ROM, onto your hard drive.
2. From the Program Manager, click *Network*.

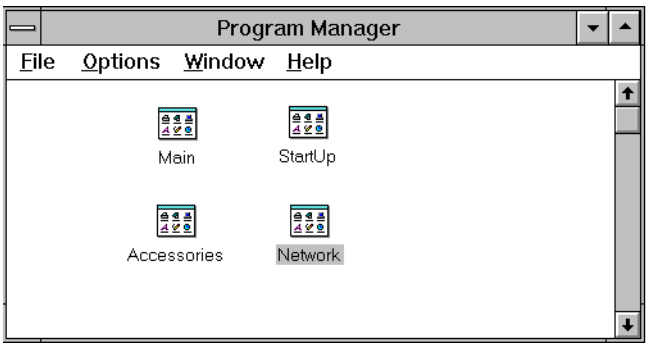


Figure 31 Program Manager Group Box

3. From the Network group box, click *Network Setup*.

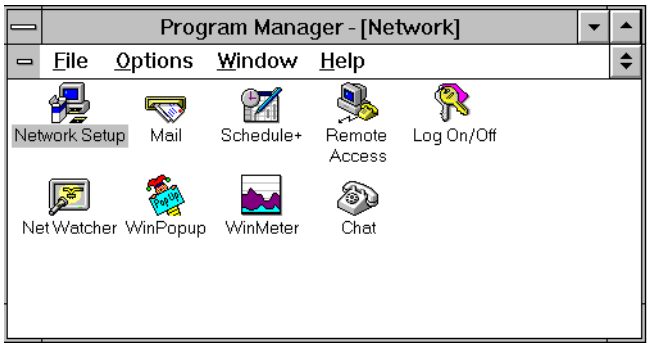


Figure 32 Network Group Box

4. From the Network Setup dialog box, click the *Drivers* button.
5. From the Network Drivers dialog box, click *Add Protocol*.
6. Select *Unlisted or Update Protocol* and then click *OK*.
7. From the Install Driver dialog box, enter the path to the MS TCP directory.

   For example, if you installed MS TCP on your C: drive in a directory called MSTCP, you would enter C:\MSTCP.
8. Select MS TCP/IP-32.X and then click *OK* to install.

   The protocol is added to the list as shown in Figure 33.

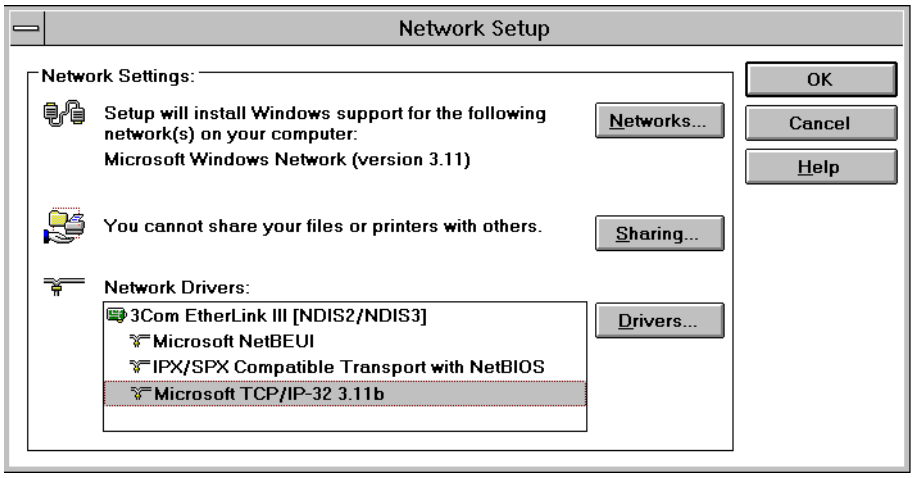


Figure 33 Network Setup Dialog Box

9 After the installation is complete, click *Close*.

10 Click *OK*.

11 From the MS TCP/IP Configuration dialog box, check the *Enable Automatic DHCP Configuration* check box and then click *OK*.

12 Restart your PC to allow the changes to take effect.

5 CONFIGURING THE ISDN LAN MODEM

This chapter describes how to configure the ISDN LAN Modem for the typical configuration. The typical configuration covers the basic setup and includes what most users need to get up and running. It provides instructions for setting up your ISDN line and connecting to the Internet. If you followed the instructions in the *Getting Started Guide*, you have already set up the typical configuration. To see if there are any additional changes you would like to make, you may want to look over Chapter 6, "Advanced Configuration."

The configuration windows shown in this chapter may differ slightly from what is displayed on your computer.

Typical Configuration

The typical configuration covers the following main steps.

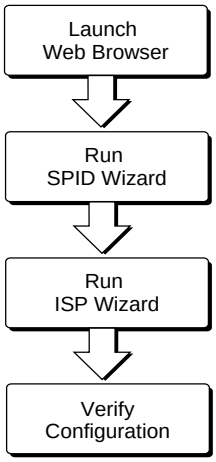


Figure 34 Main Steps for Typical Configuration

Before You Begin

Make sure that you have done the following.

You Should Have Done This

Before you configure the ISDN LAN Modem, you should have already done the following:

- Installed the hardware as described in Chapter 3, "Hardware Description and Installation."
- Installed and set up TCP/IP on all computers you intend to connect to the ISDN LAN Modem. If TCP/IP is not installed and set up, refer to Chapter 4.

CAUTION: *You should only have one computer physically connected to the ISDN LAN Modem during configuration. Once you complete the configuration process, connect any other computers you would like to have on the LAN and then power cycle each computer. If the newly-added computers cannot communicate with the ISDN LAN Modem, refer to "Evaluating Symptoms and Solutions" in Chapter 9.*

You Should Have This Information

- Telephone number(s) for your ISDN line provided by your telephone company.
- If you want to set up a connection to an ISP, you will also need the telephone number to call for access to your ISP, as well as your user name, password and DNS address (if your service provider requires a DNS address to be configured).

Determine Whether You Use Dynamic or Static IP Addresses

Your setup procedure will vary depending upon whether you are using a dynamic or a static IP address.

A static IP address is a permanent, manually-assigned address recognized by a remote server, such as a corporate LAN or an ISP. By default, your ISDN LAN Modem dynamically assigns an IP address to each computer. If you have been accessing a remote server via a static IP address prior to installing your ISDN LAN Modem, you may be required to perform additional configuration steps. The first step is to determine your static versus dynamic IP addressing scenario.

If you determine that your computer has a static IP address, refer to "Setting Up Your Computer If You Have a Static IP Address." If your computer has a dynamic IP address, you may begin configuring the ISDN LAN Modem directly. Refer to "Configuring the ISDN LAN Modem for the Typical Configuration."

Determine your IP address type as follows:

- **For Windows 98, 95 and NT 4.0 Users:** From the *Start* menu, select *Settings* and then *Control Panel*. Double-click *Network*. Select *TCP/IP* for the Ethernet card you will attach to the ISDN LAN Modem and then click *Properties*. Select the *IP Address* tab. If the radio button labeled *Obtain an IP address automatically* (Windows 98 and 95) or labeled *Obtain an IP address from a DHCP server* (Windows NT 4.0) is selected, your computer has a dynamic IP address. If the radio button labeled *Specify an IP address* is selected, your computer has a static IP address.
- **For Mac Users:** From the Apple menu, open *Control Panels*. Double-click *TCP/IP*. Choose *Ethernet* or *Ethernet built in* from the Connect via drop-down list box, if it is not already chosen. If the Configure drop down list box is set to *Using DHCP Server,* then you are on a dynamic network and are ready to continue directly with "Installing the ISDN LAN Modem." If Configure is not set to *Using DHCP Server* and you have specific values listed in any of the following fields: IP Address, Subnet mask, Router address, or Name server addr., then your computer has a static IP address.
- **For Windows 3.11 Users:** From the Program Manager, double-click the *Network* program group icon. Double-click the *Network Setup* icon. Click the *Drivers* button. Highlight the *Microsoft TCP/IP - 32.X* entry and click *Setup*. If Enable DHCP Configuration is checked, then your computer has a dynamic IP address. If an IP address is entered in the IP Address box, then your computer has a static IP address.

Setting Up Your Computer If You Have a Static IP Address

If your computer has a static IP address, you must verify and possibly change some settings on your computer before you begin the configuration procedure. The ISDN LAN Modem must be your gateway and one of your DNS servers. Follow the procedure in the appropriate section to make sure that this is the case. Note that if your computer has a dynamic IP address, this configuration would occur automatically and you can go on to "Configuring the ISDN LAN Modem for the Typical Configuration."

*These instructions assume that the LAN Modem configuration is set the factory default. If you are moving the LAN Modem from a different LAN, reset the LAN Modem before you begin. To do so, connect a telephone to one the LAN Modem phone ports and then enter **3266# from the keypad.*

For Windows 98 and 95 Users

1. From the Start menu, select *Settings* and then *Control Panel*.
2. Double-click *Network* and then select *TCP/IP*.

If you have multiple TCP/IP entries, select TCP/IP *for the Ethernet card associated with the ISDN LAN Modem.*

3. Click *Properties* and then select the *Gateway* tab and write down the first IP address in the Installed Gateways box.

If nothing is entered in the Installed Gateway list, enter an IP address that does not belong to any workstation on your LAN, but is in the subnet that you have chosen for your LAN. Write this IP address down for later use.

4. Click the *DNS Configuration* tab.
5. In the DNS Server Search Order edit box, enter the gateway IP address you wrote down as part of the previous step and then click *Add*.
6. Click *OK* to close the TCP/IP Properties box.
7. Click *OK* to close the Network control panel.

   You are asked to restart your computer.
8. Click *OK*.

For Windows NT 4.0 Users

1. From the *Start* menu, select *Settings* and then *Control Panel*.
2. Double-click *Network* and then select the *Protocols* tab.
3. Highlight *TCP/IP* and then click *Properties*.
4. Click the *IP Address* tab and then select the Ethernet card associated with the ISDN LAN Modem from the Adapter drop-down list box.
5. Write down the IP address in the Installed Gateways box.
6. Click the *DNS* tab.
7. Click *Add*.
8. In the TCP/IP DNS Server box, enter the gateway IP address you wrote down previously and then click *Add*.
9. Click *OK* to close the Microsoft TCP/IP Properties dialog box.
10. Click *OK* to close the Network Control Panel box.

You are asked to restart your computer.

11 Click *OK*.

For Macintosh Users

1 From the Apple menu, open *Control Panels*. Double-click *TCP/IP*.

2 Choose *Ethernet* from the Connect via drop-down list box, if not already chosen.

The Configure drop down list box should be set to *Manually* if you are on a static network.

3 Note the series of numbers entered in the Router address box. Write this number down.

4 Enter this number into the Name server addr. box. (If you already have existing address(es) listed, add the new address below the last entry.)

5 Choose *File* and *Close*.

6 When asked to save your changes, do so by choosing *Save*.

You may want to rename this configuration so that your previous configuration is not overwritten.

For Windows 3.11 Users

1 From the Program manager, click *Network*.

2 From the Network group box, click *Network Setup*.

3 From the Network Setup dialog box, click the *Drivers* button.

4 From the Network Drivers dialog box, double-click *Microsoft TCP/IP-32*.

5 Uncheck *Enable Automatic DHCP Configuration*.

6 Write down the number in the Default Gateway field.

7 Click *OK*.

8 Restart your PC to allow the changes to take effect.

You are now ready to install your ISDN LAN Modem. Refer to "Configuring the ISDN LAN Modem for the Typical Configuration" to continue.

Configuring the ISDN LAN Modem for the Typical Configuration

To configure the ISDN LAN Modem for the typical configuration, do the following. If you are using static IP addressing, you may need the IP address which you recorded previously in the "Setting Up Your Computer If You Have a Static IP Address"section.

1 Launch your Web browser.

The ISDN LAN Modem attempts to use its default IP address to communicate with the computer. If communication cannot be established, the ISDN LAN Modem will change its default IP address. If this occurs, the ISDN LAN Modem will reset itself and then function as described in this section.

Regardless of the start page to which your Web browser is set, your Web browser will go to the ISDN LAN Modem configuration setup.

A welcome message appears, as shown in Figure 35.

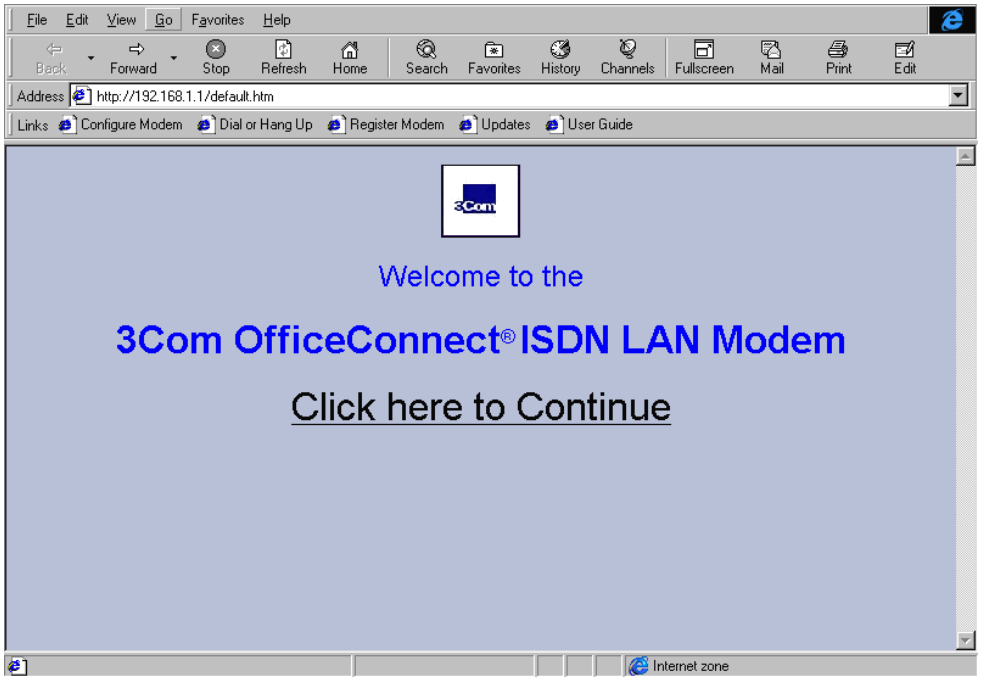


Figure 35 Initial SetUp Welcome Window

2 Click *Continue*.

A message box appears and indicates that the ISDN LAN Modem clock is being synchronized to the date and time on your workstation.

The Set Password window appears. This password is used to guard access to the ISDN LAN Modem's configuration program. If you would like to restrict access to the configuration program, select a password and record it in a safe place.

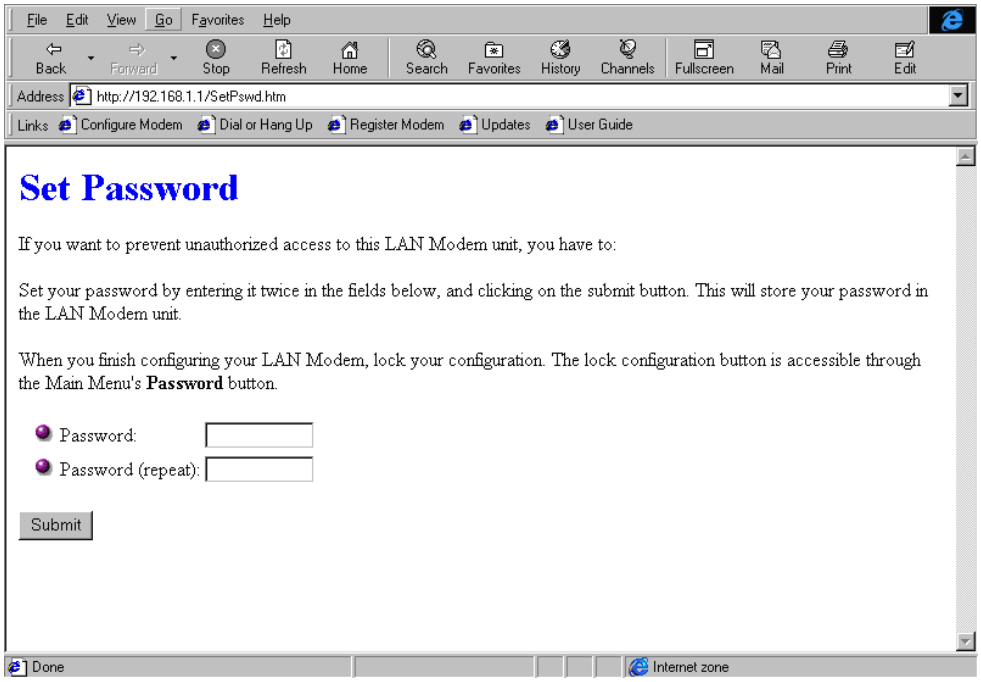


Figure 36 Set Password Window

3 Enter a password in the Password field and then enter the same password in the Password (repeat) field to confirm it. If you do not wish to enter a password, leave the fields empty.

4 Click *Submit*.

A message box indicates that your password has been set. The SPID Wizard window appears.

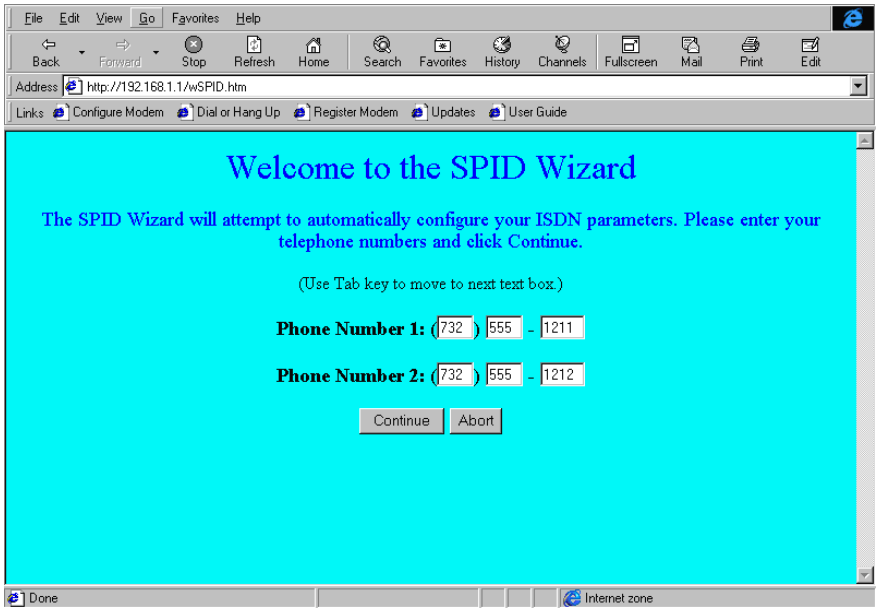


Figure 37 SPID Wizard Window

If you have not ordered your ISDN line, click Abort *and then Click* Yes *to confirm* that you want to abort the SPID Wizard program. The ISDN LAN Modem *configuration main page appears. After you have an ISDN line installed, refer to* "Setting Up Your ISDN Line Manually" *for instructions on configuring your ISDN connection manually.*

5 Enter the first telephone number for your ISDN line.

6 If you have another telephone number associated with your ISDN line, enter it in the second telephone number field. Otherwise, leave this field blank.

7 Click *Continue*.

The SPID Wizard configures the switch type and SPIDs of your ISDN line. When the SPID Wizard is done, the ISP Wizard appears

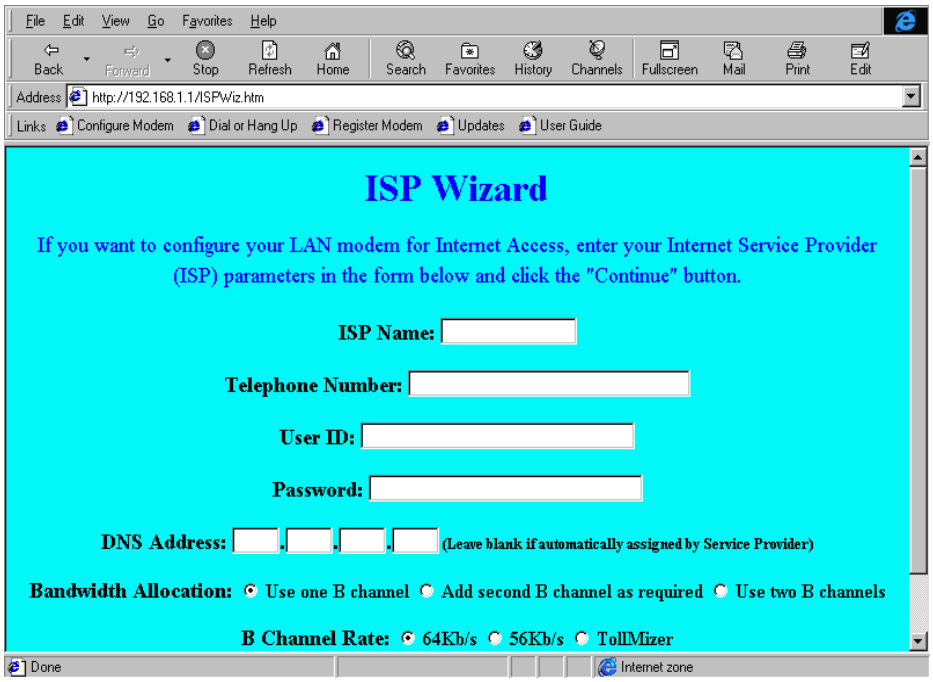


Figure 38 ISP Wizard Window

If you do not want to use the ISP Wizard, click Abort. *The ISDN LAN Modem configuration main page appears. Refer to* "Setting Up Additional Service Providers" *for instructions on configuring your ISP connection manually.*

8 In the Name field, enter the name of your ISP.

9 In the Telephone Number field, enter the telephone number of your ISP.

If you want to enter another telephone number to connect to your ISP or change these settings, refer to "Editing Service Provider Profiles" after you have completed this typical installation procedure.

10 In the User ID and Password fields, enter your user ID and password for your ISP account.

11 If your ISP requires a DNS address, enter it in the DNS Address(es) field.

12 Specify how you want the bandwidth allocated for this connection.

- **Use one B channel:** When selected, one B channel is used to connect to this service provider.
- **Add second B channel as required:** When selected, the second B channel is added when the first B channel reaches a certain threshold. The threshold default is 60%. To change the threshold default, refer to "Changing Data Call Parameters" in Chapter 6. The second B channel is temporarily removed when you place or answer another call.
- **Use two B channels:** When selected, both B channels are used to connect to this service provider (that is, always use Multilink PPP). Note that this prevents another call, data or voice to be placed or received as there is no available bandwidth (that is, the second B channel cannot be temporarily removed).

13 Specify the B channel rate or select *TollMizer*.

Leave the B channel rate set to 64 Kbps unless your telephone company and the locations to which you will be connecting only support 56 Kbps.

TollMizer makes a 56 Kbps data call over a voice circuit allowing you to save the typical cost difference between a voice and data call. Note that the destination you are calling must also support this feature (also referred to as Switched 56 Permissive or Data Over Voice). Check with your telephone company and ISP to make sure that they support TollMizer.

14 Click *Continue*.

A call is launched to your ISP. A congratulations message appears when you successfully connect to your ISP. This verifies the correct configuration of your ISDN line and ISP connection.

This configuration covers the typical parameters needed to connect to your ISP. There are additional parameters for this ISP connection which have been set to a typical default. These parameters include Domain Name, Compression, NAT, and WAN Link IP Address. In addition, you can enter a second telephone for connection to your ISP. For information on these parameters and instructions for changing their default values, refer to "Editing Service Provider Profiles."

15 Click *Continue* to connect to the ISDN LAN Modem Web site where you should register the product and view the ReadMe file which contains the latest information.

For all the latest, up to date information about your ISDN LAN Modem, visit **`http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html`**

If you cannot access a Web site and your computer has a static IP address, refer to "Configuring a Static IP Address on the ISDN LAN Modem." If you experience any other problems, refer to Chapter 9, "Troubleshooting and Maintenance."To return to the LAN Modem's main configuration page, click *Configure Modem* from the Web page.

Configuring a Static IP Address on the ISDN LAN Modem

If you followed the steps in "Configuring the ISDN LAN Modem for the Typical Configuration" and were not able to connect to a Web site and your computer has a static IP address, there may be an incompatibility between the IP address on your computer and the IP address on the ISDN LAN Modem. To correct this, do the following.

1. Enter the following URL in your Web browser: **`http://3com.oc.lanmodem/`**
2. From the ISDN LAN Modem's main configuration page click on the ISDN LAN Modem icon in the illustration.

   The LAN (Ethernet) Parameters page appears.
3. In the IP Address field, enter the default gateway address you entered as described in "Setting Up Your Computer If You Have a Static IP Address".
4. Click *Submit*.

   The ISDN LAN Modem will reset.
5. Click *Refresh* from your Web browser's menu bar.

   The Enter Password window appears.
6. Enter your password and then click *Submit*.

   The ISDN LAN Modem's main configuration page appears.
7. Click the *ISP Wizard* button.

   You will see the information you entered previously.
8. Click *Continue*.

   A call is launched to your ISP. A congratulations message appears when you successfully connect to your ISP. This verifies the correct configuration of your ISDN line and ISP connection.

This configuration covers the typical parameters needed to connect to your ISP. There are additional parameters for this ISP connection which have been set to a typical default. These parameters include Domain Name, Compression, NAT, and WAN Link IP Address. In addition, you can enter a second telephone for connection to your ISP. For information on these parameters and instructions for changing their default values, refer to "Editing Service Provider Profiles" on page 64.

9. Click *Continue* to go to the ISDN LAN Modem Web site where you should register the product and view the ReadMe file which contains the latest information.

For all the latest, up to date information about your ISDN LAN Modem, visit **`http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html`**

ISDN LAN Modem Main Page

The ISDN LAN Modem main page is shown in Figure 39. From this page you can access configuration parameters as well as place and receive calls.

Bookmark this page for easy access. Alternatively, if you are using the ISDN LAN Modem Web browser, click Configure Modem *from the* Links *menu bar.*

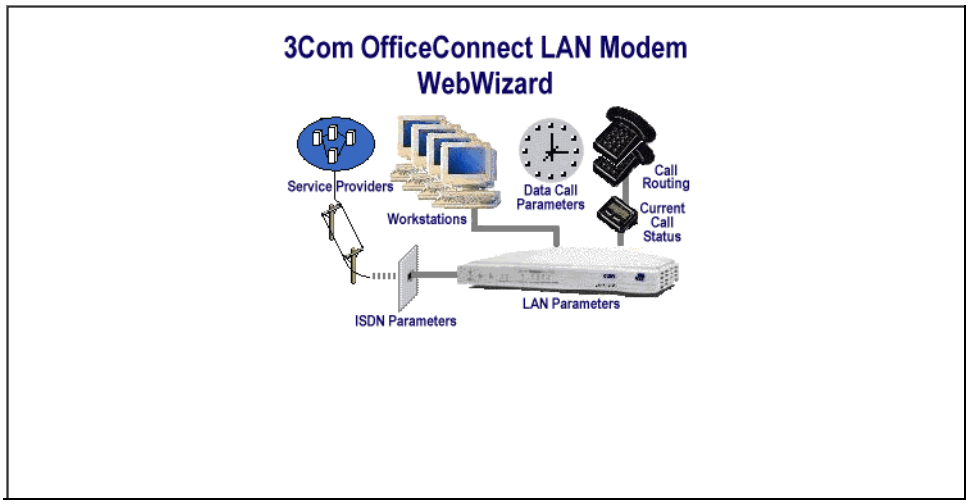


Figure 39 ISDN LAN Modem WebWizard Main Page

The ISDN LAN Modem main configuration page, also called the WebWizard, provides links to configuration, dialing, statistics screens and help. Once you click to a configuration screen, the bottom frame provides help for that configuration as well as links to other help topics. There are links from the illustration as well as links from the buttons listed in the left vertical frame.

Links from the Illustration

By clicking on the icons in the illustration, you can jump to the following locations.

- **Service Providers:** Jumps to the Service Providers page where you can configure a connection to an ISP or a private network.
- **Workstations:** Jumps to the Workstation Selection page where you can view a workstation's IP address and can change its associations with service providers.
- **ISDN Parameters:** Jumps to the ISDN Parameters page where you can manually configure ISDN parameters if you prefer not to run the SPID Wizard. Also, supplementary voice services are configurable from this page.
- **LAN Parameters:** Jumps to the LAN Parameters page where you can configure Ethernet parameters for the ISDN LAN Modem.
- **Data Call Parameters:** Jumps to the Data Call Timeout Parameters page. From here you may set inactivity timers, which allow calls to be disconnected due to network inactivity, keeping telephone usage and Internet access costs down.
- **Call Routing:** Jumps to the Voice Call Routing page where you can configure how you would like voice calls routed to the analog equipment such as a telephone or fax machine attached the ISDN LAN Modem's Phone ports.
- **Current Call Status:** Jumps to the Call Statistics page where the latest call information is displayed.

Links from the Buttons

- **Home:** Jumps to the main configuration page of the ISDN LAN Modem.
- **SPID Wizard:** Activates the SPID Wizard if you need to run it again.
- **ISP Wizard:** Allows you to configure an ISP. If you already configured an ISP using the ISP Wizard, and then you run ISP Wizard again, the latest ISP will overwrite the previous one. To add a second ISP, go to the Service Providers page.
- **Manual Calling:** Jumps to the Manual Calling page where you can connect and disconnect calls.
- **Statistics:** Jumps to the Statistics page where you can view statistics regarding the following: system, ISDN, current call, last call and service provider.
- **Maintenance:** Jumps to the Maintenance page where you can reset the ISDN LAN Modem as well as place the ISDN LAN Modem in firmware download mode in order to download the latest firmware.
- **Password:** Jumps to the Password page restrict access to the LAN Modem WebWizard by configuring a password.

Context-sensitive help is available in the bottom frame of each configuration screen. To increase the size of the help frame, drag the pane separator up.

This chapter covers the typical configuration steps required for a basic understanding of your ISDN LAN Modem functionality. For further configuration options, refer to Chapter 6, "Advanced Configuration."

6 ADVANCED CONFIGURATION

This chapter describes how to configure advanced settings for the ISDN LAN Modem. For instance, setting up a connection to a private network such as a remote office LAN, and changing default settings. You should follow the typical configuration steps first so that you can have your ISDN line parameters set up before you configure the advanced parameters.

Specifically, this section provides instructions for doing the following.

- Setting up additional service providers
- Editing service provider profiles
- Associating service providers with workstations
- Configuring LAN parameters
- Changing data call parameters
- Changing voice call routing
- Reserving DHCP addresses
- Changing your password
- Locking the configuration

The configuration windows shown in this chapter may differ slightly from that displayed on your computer.

Before you Begin

Before you begin advanced configuration, access the ISDN LAN Modem's WebWizard. To access the WebWizard (also referred to as the ISDN LAN Modem main configuration page), do the following.

If you are using the ISDN LAN Modem custom Web browser, click *Configure Modem* to configure additional parameters. If you are not using the ISDN LAN Modem Web browser, enter: **`http://3com.oc.lanmodem/`**

Setting Up Additional Service Providers

A service provider is a location outside of your LAN that you would like to access from your LAN, such as an ISP for access to the Internet or a private network such as a remote office LAN. You can define up to four service providers (that is, remote destinations) on the ISDN LAN Modem.

This section describes how to do the following:

- Differentiate between an ISP and private network
- Set up a connection to an ISP
- Set up a connection to a private network
- Associate computers on the LAN with selected service providers
- Edit service provider profiles

If you set up a connection to an ISP as part of the typical (that is, initial) setup (via the ISP Wizard), then you already have one service provider defined. Because this is considered a typical configuration, some default values have been assumed. For example, the connection to an ISP is associated with all of the computers connected to your LAN. In other words, all computers on the LAN can connect to that ISP and therefore the Internet. You may want to review the profile for this ISP to see if you want to make any changes. For instructions, refer to "Editing Service Provider Profiles."

ISP versus Private Network

There are two types of service providers you may configure, an ISP and a private network. A description of each follows.

When to Select ISP

Choose ISP when you want to set up a direct connection to the public Internet (via an Internet Service Provider) as shown in Figure 40.

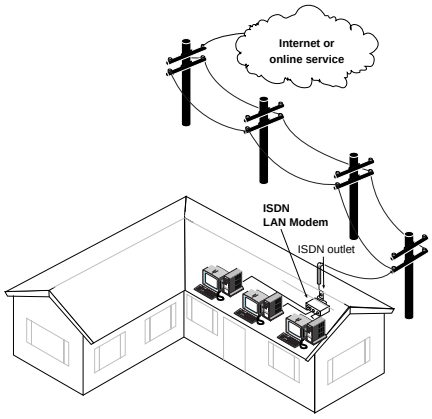


Figure 40 Direct Connection to an ISP

When to Select Private Network

Select private network when you want to connect directly to a remote, private LAN such as a corporate network, shown in Figure 41. For instance, if you want to dial into your main office from home in order to access the servers at your office for e-mail, printing, and so on, then select private network as the type of service provider you want to configure. If the private network you are dialing into provides the option of accessing the Internet and you want to be able to reach the Internet through your corporate LAN (as opposed to through a direct connection to an ISP), then choose that option when configuring your private network parameters.

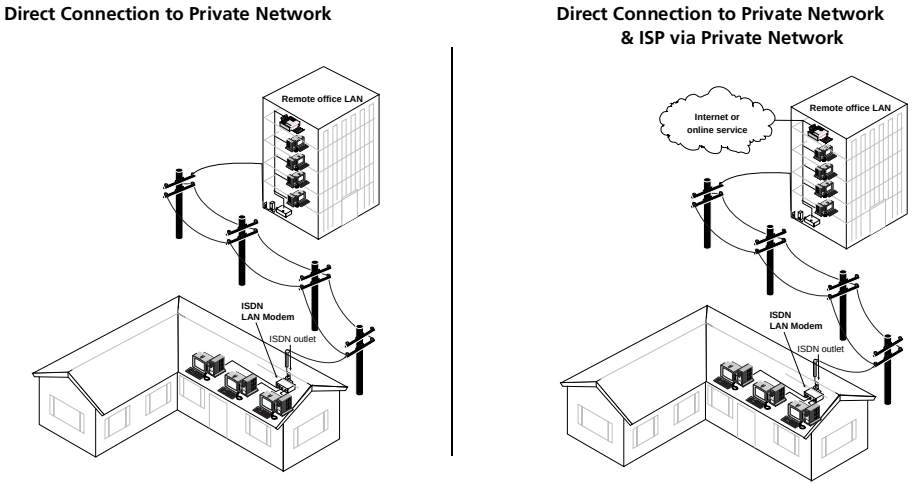


Figure 41 Direct Connection to a Private Network

Setting Up a Connection to an ISP

This section describes how to set up your ISDN LAN Modem for access to the Internet.

Before You Begin

Before you begin, you will need the following information from your ISP:

- Telephone number(s) you must dial to access this ISP
- User ID and password
- DNS IP address(es)

  This information is required only if your ISP does not provide the IP address dynamically.

Setting Up a Connection to the Internet

To set up a connection to an ISP, do the following.

1. From the ISDN LAN Modem main page, click the *Service Providers* graphic.
2. Select *New (Internet Service Provider)* from the drop down list box.

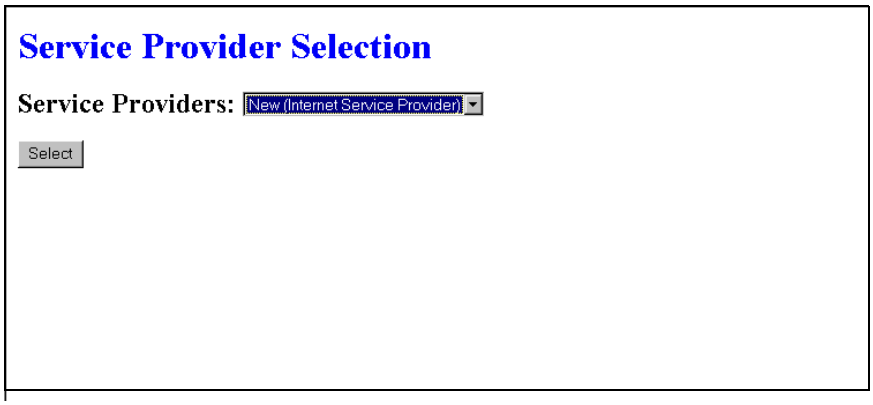


Figure 42 ISP Service Provider Selection Window

3 Click *Select*.

The Internet Service Provider Parameters window appears.

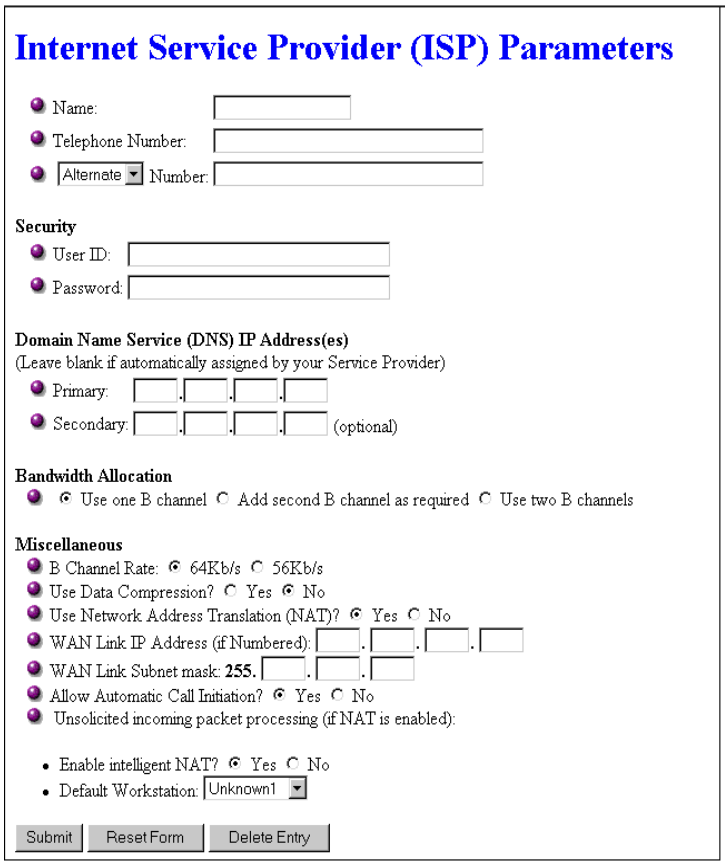


Figure 43 ISP Parameters Window

4 In the Name field, enter a name for this remote destination, such as the name of the ISP. You may want to add an additional description if you have more than one account with this particular ISP.

5 In the Telephone Number 1 field, enter the telephone number you must dial in order to reach your ISP.

6 In the Alternate Number field, you can either enter an alternative number or, if required by your ISP, a second telephone number to establish a Multilink PPP call.

   To enter a second, alternative telephone number for your ISP that will be automatically dialed (if, for example the first number is busy) select *Alternate* and then enter the telephone number in the Number field.

   Some ISPs may require that you dial two telephone numbers to establish a Multilink PPP call. If so, select *Multilink* from the drop down list box and then enter the telephone number in the Number field.

7 Under Security, enter your User ID and Password.

8 Under DNS IP Address(es), if your ISP uses static IP addresses (that is, your ISP does not supply these addresses when a dial up connection is established), enter the primary DNS IP address of your ISP in the Primary field. If there is a secondary address, enter it in the Secondary field.

9 Specify Bandwidth Allocation.

   - **Use one B channel:** When selected, one B channel is used to connect to this service provider.
   - **Add second B channel as required:** When selected, the second B channel is added when the first B channel reaches a certain threshold. The threshold default is 60%. To change the threshold default, refer to "Changing Data Call Parameters." The second B channel is temporarily removed when you place or answer another call.
   - **Use two B channels:** When selected, both B channels are used to connect to this service provider (that is, always use Multilink PPP). Note that this prevents another call, data or voice to be placed or received as there is no available bandwidth (that is, the second B channel cannot be temporarily removed).

10 Under Miscellaneous, specify the B channel rate or select TollMizer.

   Leave the B channel rate set to 64 Kbps unless your telephone company and the locations to which you will be connecting require 56 Kbps.

   TollMizer makes a 56 Kbps data call over a voice circuit, allowing you to save the typical cost difference between a voice and data call. Note that the destination you are calling must also support this feature (also referred to as Switched 56 Permissive or Data Over Voice). Check with your telephone company and ISP to make sure that they support TollMizer.

11 Under Miscellaneous, leave the default, NAT enabled, unless you are certain you want to disable it. With NAT enabled, the ISDN LAN Modem translates IP addresses between the computers on the LAN and the ISP, allowing all LAN users access to a single ISP. Only disable NAT when static IP addresses are provided by your ISP for users on the LAN.

12 Under Miscellaneous, if the ISP to which you want to connect does not assign a dynamic IP address and wants you to use a static IP address, enter the IP address and the subnet mask in the WAN link fields. Otherwise, leave these fields empty.

13 Under Miscellaneous, indicate whether or not you would like to use compression when transferring data by selecting the appropriate radio button.

14 For Allow Automatic Call Initiation, leave the default setting, which is *Yes*.

   If you select *No*, you will have to manually launch a call to this service provider every time you want to connect. You may want to set this field to *No* if your calls

are being connected unintentionally as a result of packets generated by your workstations.

15 For Enable Intelligent NAT, leave the default setting, which is *Yes,* in order for the LAN Modem to better support Internet applications and games.

The ISDN LAN Modem delivers all unsolicited TCP/UDP packets to the workstation that is currently communicating with the remote host that has generated these packets. If you set this field to *No*, all unsolicited TCP/UDP packets are delivered to the default workstation.

16 In the Default Workstation for Incoming Packets field, specify the workstation to which all unsolicited TCP/UDP packets should be delivered.

Note that if the Enable Intelligent NAT field is set to *Yes*, the ISDN LAN Modem first attempts to deliver the unsolicited TCP/UDP packets to the workstation that is currently communicating with the remote host that has generated these packets. Only if no such workstation is found are the packets delivered to the specified default workstation.

17 Click *Submit*.

18 If you would like to configure a connection to another ISP, repeat steps 1—17. You can configure up to a total of four remote destinations.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration".

Setting Up a Connection to a Private Network

This section describes how to set up your ISDN LAN Modem for access to a private network such as a remote office LAN.

Before You Begin

Before you begin, you will need the following information from your MIS department:

- Telephone number(s) you must dial to access this private network
- User ID and password
- IP address/subnet mask of the remote LAN you want to access

In addition, you may need the following, depending on your particular network setup. Check with your network administrator.

- Domain name of the remote LAN you want to access
- DNS IP address(es)
- WAN Link IP address

Setting Up a Connection to a Remote LAN

To set up a connection to a remote LAN, do the following.

1 From the ISDN LAN Modem main page, click the *Service Providers* graphic.

The Service Provider Selection window appears.

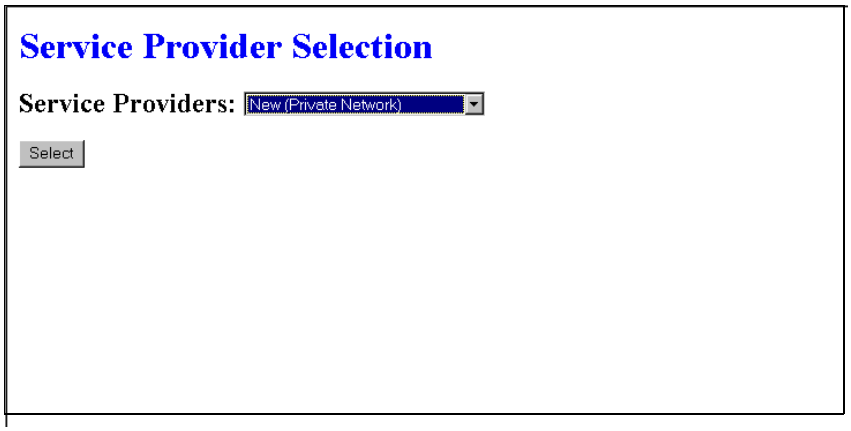


Figure 44 Private Network Service Provider Selection Window

2 Select *New Private Network* from the drop-down list box and then click *Select*. The Private Network Parameters window appears.

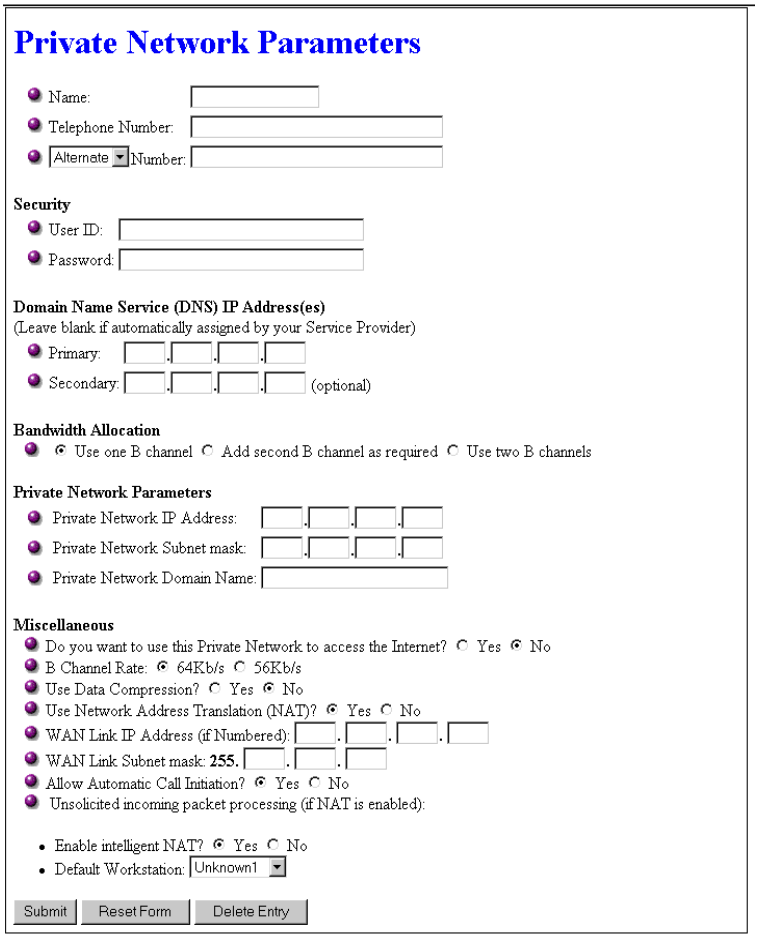


Figure 45 Private Network Parameters Window

3 In the Name field, enter a name for this remote destination, such as the name of the location of the office. You may want to add an additional description if you have more than one account with this private network.

4 In the Telephone Number 1 field, enter the telephone number you must dial in order to reach this remote office.

5 In the Alternate Number field, you can either enter an alternative number or, if required by this private network, a second telephone number to establish a Multilink PPP call.

   To enter a second, alternative telephone number for this private network that will be automatically dialed (if, for example the first number is busy) select *Alternate* and then enter the telephone number in the Number field.

   If your private network requires that you dial two telephone numbers to establish a Multilink PPP call, select *Multilink* from the drop-down list box and then enter the telephone number in the Number field.

6 Under Security, enter your User ID and password.

7 Under DNS IP Address(es), if this private network uses static IP addresses (that is, these IP addresses are not supplied when a dial-up connection is established) enter the primary DNS IP address of your private network in the Primary field. If there is a secondary address, enter it in the Secondary field.

8 Specify Bandwidth Allocation.

   - **Use one B channel:** When selected, one B channel is used to connect to this service provider.
   - **Add second B channel as required:** When selected, the second B channel is added when the first B channel reaches a certain threshold. The threshold default is 60%. To change the threshold default, refer to "Changing Data Call Parameters." The second B channel is temporarily removed when you place or answer another call.
   - **Use two B channels:** When selected, both B channels are used to connect to this service provider (that is, always use Multilink PPP). Note that this prevents another call, data or voice to be placed or received as there is no available bandwidth (that is, the second B channel cannot be temporarily removed).

9 Under Private Network Parameters, enter the IP address, subnet mask and domain name of the private network. You must enter an IP address and subnet mask.

10 Under Miscellaneous, if you want to be able to access the Internet from this private network, select the *Yes, I want to access the Internet* radio button. Otherwise, select the *No* radio button.

11 Under Miscellaneous, specify the B channel rate or select TollMizer.

   Leave the B channel rate set to 64 Kbps unless your telephone company and the locations to which you will be connecting require 56 Kbps.

   TollMizer makes a 56 Kbps data call over a voice circuit, allowing you to save the typical cost difference between a voice and data call. Note that the destination you are calling must also support this feature (also referred to as Switched 56 Permissive or Data Over Voice). Check with your telephone company and ISP to make sure that they support TollMizer.

12 Under Miscellaneous, indicate whether or not you would like to use data compression when transferring data by selecting the appropriate radio button.

13 Under Miscellaneous, leave the default, NAT enabled, unless you are certain you want to disable it. With NAT enabled, the ISDN LAN Modem translates IP addresses between the computers on the LAN and the ISP, allowing all LAN users access to a single ISP. Only disable NAT when static IP addresses are provided by your ISP for users on the LAN.

14 Under Miscellaneous, if the private network to which you want to connect does not assign a dynamic IP address and wants you to use a static IP address, enter the IP address and the subnet mask in the WAN link fields. Otherwise, leave these fields empty.

15 For Allow Automatic Call Initiation, leave the default setting which is *Yes*.

If you select *No*, you will have to manually launch a call to this service provider every time you want to connect. You may want to set this field to *No* if your calls are being connected unintentionally as a result of packets generated by your workstations.

16 For Enable Intelligent NAT, leave the default setting, which is *Yes,* in order for the LAN Modem to better support Internet applications and games.

The ISDN LAN Modem delivers all unsolicited TCP/UDP packets to the workstation that is currently communicating with the remote host that has generated these packets. If you set this field to *No*, all unsolicited TCP/UDP packets are delivered to the default workstation.

17 In the Default Workstation for Incoming Packets field, specify the workstation to which all unsolicited TCP/UDP packets should be delivered.

Note that if the Enable Intelligent NAT field is set to *Yes*, the ISDN LAN Modem first attempts to deliver the unsolicited TCP/UDP packets to the workstation that is currently communicating with the remote host that has generated these packets. Only if no such workstation is found are the packets delivered to the specified default workstation.

18 Click *Submit*.

19 If you would like to configure a connection to another remote office, repeat steps 1 through 18. You can configure up to four remote destinations.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

Associating Service Providers with Workstations on the LAN

Once you have configured the service providers to which you would like to connect, they will be associated with all (up to 25) of the workstations on your LAN by default. You can change these associations if desired. For example, if only one workstation on the LAN should have Internet access, you can associate that ISP connection with one workstation exclusively. This will prevent all other users on the LAN from accessing the Internet from their computers. You can change these associations from the Workstation Parameters window which provides the following information for each workstation:

- **Name:** This field contains the name of the workstation you selected. If you have Macintosh computers on your LAN, the name does not automatically appear in the Name field. You should enter the name for the Macintosh in the Name field.

- **IP Address:** This field contains the IP address of the workstation you selected. You should not have to make any changes to this field unless you are using static IP addresses (that is, IP addresses which are not dynamically assigned by the ISDN LAN Modem).
- **Service Provider Usage:** Under *Enable the use of the following Service Providers*, you can see which service providers can be accessed from this workstation.
- **IP Address Statically Configured on Workstation:** This field allows you to reserve a workstation's static IP address in the DHCP server to ensure that it is not dynamically assigned to another workstation. It is recommended that you do this if you have workstations on your LAN with static IP addresses and other workstations on the same LAN with dynamic IP addresses.

If you have more than one ISP configured, all calls will be routed to the first ISP listed. To connect to another ISP that you have configured, uncheck the box(es) of the ISP(s) that you do not wish to use at this time.

To change the association between service provider connections and a particular computer on the LAN, do the following.

1. From the ISDN LAN Modem main page, click *Workstations.*
2. From the Workstations drop down list box, select the Workstation for which you would like to change the accessible service providers.
3. Check or clear the boxes of the service providers you would like to associate or disassociate.
4. Click *Submit*.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

Editing Service Provider Profiles

Edit a service provider profile you have previously configured as follows.

1. From the ISDN LAN Modem main page, click the *Service Providers* graphic.

   A drop down list box appears which contains the names of the service providers you have configured.
2. Select the name of the service provider connection profile you would like to edit.

   The connection profile page appears.
3. Edit the fields as desired.

   For more information on the fields, refer to the appropriate section, "Setting Up a Connection to an ISP" or "Setting Up a Connection to a Private Network", or refer to the online help located in the frame at the bottom of the web page.
4. When finished, click *Submit*.

Restricting Workstations from Accessing Service Provider(s)

If you want to restrict a workstation(s) on the LAN from accessing a service providers(s), do the following.

1. click *Workstation Parameters* from the ISDN LAN Modem home page.
2. Select the workstation from which you want to limit access.
3. Clear the check boxes located next to the names of the service provider(s) you want to restrict from accessing that service provider over the LAN.
4. When finished, click *Submit*.
5. Repeat the previous steps for additional workstation access restrictions.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

Configuring Your LAN Parameters

This section describes how to configure the parameters of your LAN. (LAN refers to that section of the network comprising your ISDN LAN Modem and all the computers or other devices attached to it by means of Ethernet cabling.) This section describes the LAN parameters and then provides configuration steps.

Understanding LAN Parameters

The LAN Parameters window, shown in Figure 46, contains the following fields.

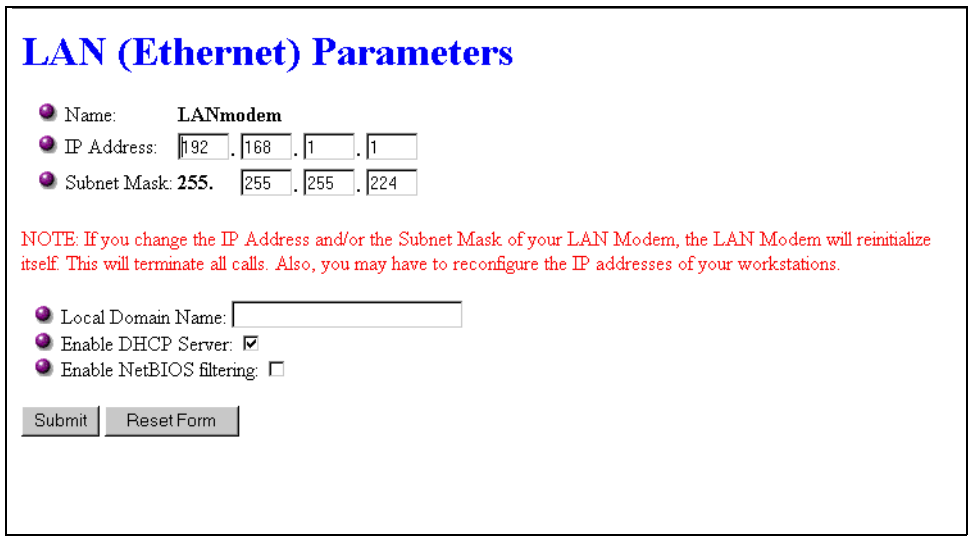


Figure 46 LAN Parameters Window

Name

Displays the name for the ISDN LAN Modem. This name is used for DNS. For example, the name LANmodem is translated to its IP address 192.168.1.1.

IP Address and Subnet Mask

The IP address is a unique address which identifies the ISDN LAN Modem on a network. The default address (192.168.1.1) is a private IP address which will be translated automatically by the ISDN LAN Modem for Internet access. You should leave the default unless you are certain that this value must be changed.

The ISDN LAN Modem attempts to use its default IP address to communicate with the computer. If communication cannot be established, the ISDN LAN Modem will change its default IP address. If this occurs, the IP address shown in Figure 46 and the subnet mask will be different.

The subnet mask identifies the subnetwork to which your computer is connected. You should leave the default unless you are certain that this value must be changed.

WARNING: *If you change the IP address and/or the subnet mask, the ISDN LAN Modem will re-initialize itself to make the new settings work. All calls will be terminated and you may need to reconfigure the IP addresses of the computers connected to the ISDN LAN Modem. For a LAN using static IP addresses, you must manually reconfigure the IP addresses of the workstations on the LAN via the Workstation Parameters window. For a LAN using dynamic IP addresses, if you have Windows 98 or 95, launch* `Winipcfg.exe` *(probably located in your Windows directory), click* Release All *and then click* Renew All*.*

Local Domain Name

The local domain name identifies your LAN. LAN refers to the network created by the ISDN LAN Modem and the devices attached to it.

Enable DHCP Server

The ISDN LAN Modem provides DHCP server functionality for the LAN which automatically assigns a network or IP address to a newly attached workstation on an IP network. If another device on your LAN is providing this functionality, or if you are using static IP addresses, then you should disable the DHCP server.

Enable NetBIOS Filtering

For Windows Users: NetBIOS is primarily used by Windows 98, 95 and NT for local file and printer sharing, note that NetBIOS may also be used on other operating systems. This protocol can make spurious DNS requests which can inadvertently cause the LAN Modem to establish unwanted calls to your Service Provider and results in subsequent charges to your phone bill. When this box is checked, NetBIOS packets cannot initiate a call, but they will be passed if the call is already established. If you have no need to perform file or printer sharing over your ISDN connection, you should enable NetBIOS filtering (that is, check the box). Note that enabling the NetBIOS filter will not affect your ability to share files and printers over your LAN. NetBIOS filtering is disabled by default.

Configuring the LAN Parameters

To configure LAN parameters, do the following.

1. From the ISDN LAN Modem main page, click the *ISDN LAN Modem* graphic.
2. In the IP Address field, review the default and enter a different IP address if required.
3. In the Subnet Mask field, review the default and enter a different subnet mask if required.
4. In the Local Domain Name field, if desired, enter a name you would like to use for your local domain. This field is not required. If you do not know what to enter, leave it blank.
5. Check the Enable DHCP server box to enable DHCP or clear the box to disable it.

WARNING: *If you changed the IP address and/or the subnet mask of your ISDN LAN Modem, the ISDN LAN Modem will re-initialize itself when you submit the changes by clicking* Submit*. When the re-initialization occurs, all calls are terminated, and you may have to reconfigure the IP addresses on the computers on the LAN.*

6. In the Enable NetBIOS filtering field, if desired, check the box to enable filtering.
7. Click *Submit*.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration".

Changing Data Call Parameters

This section describes how to change the default settings for the data call parameters. The data call parameters consist of time-out values and a threshold setting for bandwidth on demand.

The timeout values are a useful means of using bandwidth efficiently and keeping telephone usage and Internet access costs down. If there is no activity on a call for an amount of time you specify, the call is disconnected.

The threshold parameters also provide a useful means of using bandwidth efficiently by automatically adding a second B channel only when there is enough traffic to justify the extra bandwidth, and by automatically removing the second B channel when one B channel is sufficient.

Understanding Data Call Parameters

The Data Call Parameters window, shown in Figure 47, contains the following fields.

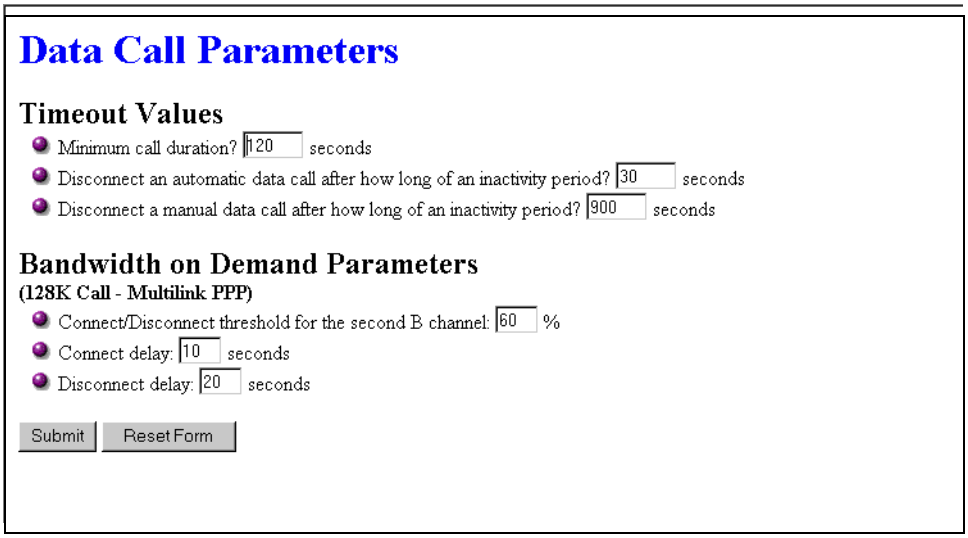


Figure 47 Data Call Parameters Window

Minimum Call Duration

The minimum call duration is the minimum length of a call that is measured and must be satisfied before a call is disconnected. The default for the minimum call duration is 2 minutes.

Disconnecting an Automatic Data Call

An automatic data call is a call made automatically by the LAN Modem because of activity on the LAN to the WAN. An example would be a user launching his or her Web browser. Because the parameters for the call, such as the telephone number and user name, have been previously defined, a call (to an ISP, for example) may be automatically and transparently launched with a click of your Web browser.

You can define the amount of time the LAN Modem should wait before disconnecting this type of data call because of inactivity. The inactivity timer runs simultaneously with the minimum call duration. For example, if the minimum call duration is set to 2 minutes and the inactivity timer is set to 30 seconds, the call will be connected for at least 2 minutes even if there has been no activity for 30 seconds or more. To prevent a data call from being disconnected because of inactivity, enter 0 (note that you must then manually disconnect the call via the Manual Calling screen). The default is 30 seconds.

Disconnecting a Manual Data Call

A manual call is established using the *Manual Calling* option from the LAN Modem's main page. You can define the amount of time the LAN Modem should wait before disconnecting this type of data call because of inactivity. This inactivity timer is activated once the minimum call duration is satisfied and no further activity is detected. For example, if the minimum call duration is set to 2 minutes and the inactivity timer is set to 15 minutes, the call will be connected for at least 15 minutes. To prevent a manual call from being disconnected because of inactivity, enter 0. The default is 15 minutes.

Connect/Disconnect Threshold for the Second B Channel

If you specified that you want to use the second B channel only when needed, indicate the percentage of bandwidth utilization on the first B channel which must be reached before the second B channel is allocated, or below which the first B channel must fall before the second B channel is removed. By default the threshold is 60%.

Connect Delay

This field defines the length of time the ISDN LAN Modem should wait before adding the second B channel. The default is 10 seconds. This default, in combination with the Connect/Disconnect Threshold default, means that after a B channel reaches over 60% throughput for ten seconds, a second B channel is added, if not in use by another call.

Disconnect Delay

This field defines the length of time the ISDN LAN Modem should wait before removing the second B channel. The default is 20 seconds. This default, in combination with the Connect/Disconnect Threshold default, means that if throughput falls below 60% for 20 seconds, a B channel is removed.

Configuring the Data Call Parameters

To configure data call parameters, do the following.

1. From the ISDN LAN Modem main page, click Data Call Parameters.
2. Specify the minimum call duration.
3. Specify the inactivity period for an automatic data call.
4. Specify the inactivity period for a manual data call.
5. If you specified that you want to use the second B channel only when needed, enter the percentage of bandwidth that must be reached on the first B channel before the second B channel is added or removed.
6. If you specified that you want to use the second B channel only when needed, enter the length of time the ISDN LAN Modem should wait before adding the second B channel after the percentage in the Connect/Disconnect Threshold field is reached.
7. If you specified that you want to use the second B channel only when needed, enter the length of time the ISDN LAN Modem should wait before removing the second B channel after it falls below the threshold defined in the Connect/Disconnect Threshold field.
8. Click *Submit*.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

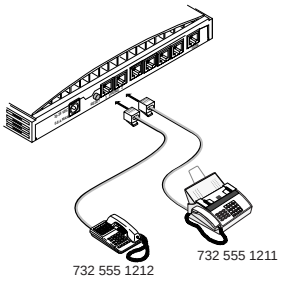
Changing Voice Call Routing

This section describes how calls are routed to analog equipment attached to the ISDN LAN Modem's voice ports and provides instructions for changing the way voice calls are routed.

Understanding How Calls Are Routed

By default, incoming voice calls to telephone number 1 are routed to Phone port 1, and incoming voice calls to telephone number 2 are routed to Phone port 2.

This default setting is illustrated in Figure 48. Voice calls to 732 555 1212 will only be routed to the telephone, while voice calls to 732 555 1211 will only be routed to the fax machine.



Telephone Numbers	Phone Port 1	Phone Port 2
7325551212	☑	☐
7325551211	☐	☑

Figure 48 Default Voice Call Routing Configuration

Changing Voice Call Routing

To change the voice call routing setting, do the following.

1 From the ISDN LAN Modem's home page, select Call Routing.

The Call Routing window appears.

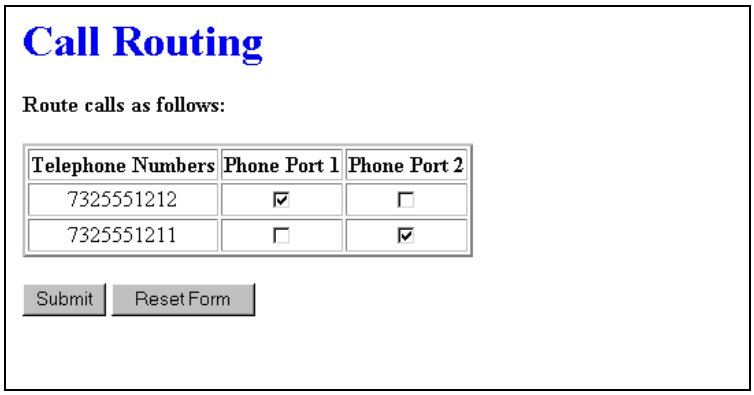


Figure 49 Call Routing Window

2 Specify which Phone port should handle calls associated with Telephone Number 1 by checking the appropriate phone port box.

3 If your ISDN line has two telephone numbers, specify which phone port should handle calls associated with Telephone Number 2.

4 Click *Submit*.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

Reserving DHCP Addresses

If you have workstations on your LAN with static IP addresses and other workstations on the same LAN with dynamic IP addresses, it is recommended that you reserve the static IP addresses in the DHCP server to ensure that they are not dynamically assigned to another workstation.

Reserve DHCP addresses as follows.

1 From the ISDN LAN Modem main page, click the *Workstations* graphic.

The Workstation Selection window appears.

2 From the Workstations drop-down list box, select the Workstation for which you would like to reserve the IP address on the DHCP server.

3 Check the box labeled *IP Address Statically Configured on Workstation*.

4 Click *Submit*.

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

Selective Password Protection

You can set up partial password protection so that workstations may access only the manual calling page allowing them to place and receive calls. All other WebWizard pages remain inaccessible.

Note that enabling selective password protection also allows all users to access the LAN Modem main page which they can use to navigate to the Manual Calling page. If users attempt to access any other page except Manual Calling or online help, the LAN Modem prompts the user to enter a password.

To set up selective password protection, do the following.

1 From the ISDN LAN Modem main page, click the *Password* button.

2 Check the box labeled *Disable password protection for Manual Calling screen.*

3 Click *Submit*.

All workstations are now able to access the Manual calling screen by clicking the Manual Calling button from the main configuration screen. For instructions about placing manual calls, refer to Chapter 8, "Placing, Receiving and Disconnecting Calls."

Changing Your Password

To change the password you defined as part of the initial setup to restrict access to the ISDN LAN Modem, do the following.

1. From the ISDN LAN Modem main page, click the *Password* button.
2. Enter your new password in the Password field.
3. Enter your new password in the Password (repeat) field to verify the new password.
4. Click *Submit*.

Once a password is configured, an automatic protection feature is invoked if the WebWizard configuration program is open and there is inactivity for at least five minutes. After 5 minutes of inactivity, you are locked out of the Web Wizard configuration program. The password must be entered to gain access.

If you forget your password, you can reset the ISDN LAN Modem to the factory default which allows you to enter a new password. Note that when the ISDN LAN Modem is restored to the factory default settings, you will lose your configuration which includes all service provider profiles and ISDN parameters. For instructions, refer to Chapter 9, "Resetting the ISDN LAN Modem."

Setting Up Your ISDN Line Manually

This section describes how to set up your ISDN line manually. During initial setup, the SPID Wizard will already have configured these parameters for you unless you aborted the SPID Wizard. If you aborted the SPID Wizard, or if you have to change your ISDN parameter settings, do the following. Before you set up your ISDN line, you will need the following information about your ISDN line from your telephone company.

- ISDN switch type
- Telephone number(s) for your ISDN line
- SPID for each telephone number

Indicate this information in the information sheet shown in Figure 50 for easy reference.

OfficeConnect ISDN LAN Modem

ISDN Information Sheet

ISDN Switch Type
____Lucent 5ESS NI1 ____Lucent 5ESS Custom
____Northern Telecom DMS 100 ____Siemens EWSD

Phone #1_____
SPID# for Phone#1_____
Phone #2 _____
SPID# for Phone #2_____

Figure 50 ISDN Information Sheet

To set up your ISDN connection, do the following.

1 From the ISDN LAN Modem main page, click ISDN Parameters.

The ISDN Parameters window appears.

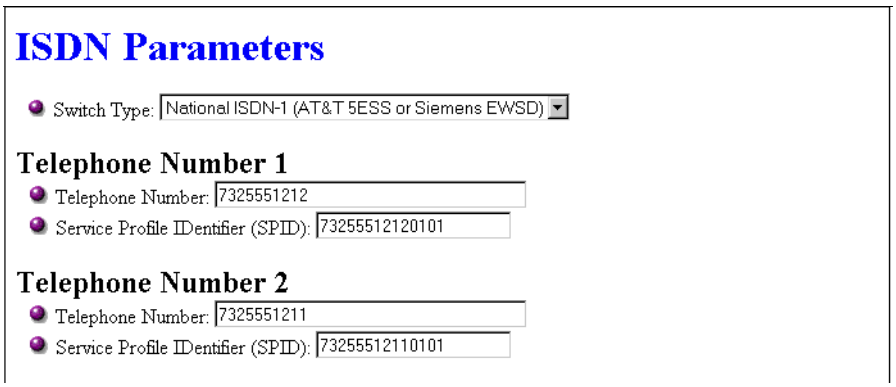


Figure 51 ISDN Parameters Screen

2 From the ISDN Switch Type drop-down list box, select the ISDN Switch Type required by your telephone company.

3 In the Telephone Number 1 field, enter the first telephone number associated with your ISDN line.

4 In the Service Profile ID (SPID) 1 field, enter the SPID associated with Telephone Number 1.

5 In the Telephone Number 2 field, enter the second telephone number associated with your ISDN line. If you do not have a second telephone number associated with your ISDN line, leave this field empty.

6 In the Service Profile ID (SPID) 2 field, enter the SPID associated with Telephone Number 2.

7 Click *Submit*.

Note that supplementary voice services may also be configured from the ISDN Parameters page. For more information, refer to Chapter 7, "Supplementary Voice Call Services."

If you want to password protect the configuration profile of the ISDN LAN Modem, refer to "Locking and Unlocking the Configuration."

Locking and Unlocking the Configuration

Once you have completed configuration of the ISDN LAN Modem, you can establish password protection over your ISDN LAN Modem's configuration parameters.

To lock the configuration, do the following.

1 Click *Password* from the ISDN LAN Modem's main page.

2 Under the Lock Configuration section, click the *Lock Configuration* button.

You may need to scroll down to see the Lock Configuration section. A message indicates that the configuration is locked.

To unlock the configuration, do the following.

1 Click *Continue*.

The Enter Password window appears.

2 Enter your password to access the ISDN LAN Modem configuration program.

3 Click *Submit*. The ISDN LAN Modem main configuration page appears.

Configuring the ISDN LAN Modem from a Remote Location

This section provides instructions for dialing into to your ISDN LAN Modem from a remote location using either another LAN Modem or an ISDN modem, in order to make configuration changes. In addition to another LAN Modem or ISDN modem, you will need a Web browser, and any PPP dialer software, such as Windows 98/95's Dial-Up Networking, installed on your local computer.

Configuring the ISDN LAN Modem Remotely via Another LAN Modem

To dial into a LAN Modem from a remote location using another LAN Modem, do the following:

1 Ensure that the two LAN Modems are on different networks.

For instance, one LAN Modem can be on the 192.168.1.x network, and the other one can be on the 192.168.2.x network.

2 Create a Private Network entry for the remote router.

No user name or password is needed. You must use an arbitrary numbered WAN link that is different from the two networks.

3 Run your web browser, and enter the IP address of the remote LAN Modem as the URL.

Once an ISDN connection is established, you can remotely manage your LAN Modem.

Configuring the ISDN LAN Modem Remotely via an ISDN Modem

To dial into a LAN Modem from a remote location using an ISDN modem and Windows 98/95 Dial-Up Networking, do the following:

1 Click *Start*, *Programs*, *Accessories*, (Windows 98 users select *Communications*) and select *Dial-Up Networking*.

2 Double-click *Make New Connection*.

The Make New Connection window opens.

3 Enter a name to designate this dial-up profile, such as *LAN Modem*.

4 Select the ISDN modem attached to your local PC from the drop down list box and click *Next*.

The Make New Connection phone number window will open.

5 Enter the phone number of the remote ISDN LAN Modem to which you wish to connect and click *Next*.

6 Click *Finish* to complete the Make New Connection setup.

You will now have a new icon for the connection just created.

7 Right click this new icon with your right mouse button and choose *Properties*.

8 Click the *Server Type* tab.

For Windows 95 users: *PPP, Windows 95, Windows NT 3.5, Internet* should be chosen in the Type of Dial-Up Server list box.

For Windows 98 users: *PPP, Internet, Windows NT Server, Windows 98,* should be chosen in the Type of Dial-Up Server list box.

9 Under *Advanced Options*, uncheck all boxes.

10 Choose the TCP/IP check box for *Allowed Network Protocols*. Uncheck the boxes for *NetBEUI* and *IPX/SPX Compatible*.

11 Click *TCP/IP Settings*.

The TCP/IP Settings window opens.

12 Click *Specify an IP address* and enter an IP address for your computer. Enter *192.168.2.1* if you are not sure.

13 Leave the other options for this window at their default settings, including the radio button for *Server assigned name server addresses*.

14 Click *OK* to close the TCP/IP Settings window.

15 Click *OK* to close the Server Types window.

16 Click *OK* to close your connection window.

17 Double-click your new connection icon created via Dial-Up Networking.

The Connect To window will open. You may choose to leave the Username and Password fields blank at this time.

18 Click *Connect*.

Your local computer will dial and establish a connection with your remote ISDN LAN Modem.

19 Once your call has been established, launch a Web browser on your local computer.

The Web browser attempts to load its default Start Page. Click *Stop* to cancel this procedure.

20 Enter the following address in your Web browser's address bar: **`http://192.168.1.1/`** to go to the remote ISDN LAN Modem's main configuration page.

If you previously set your ISDN LAN Modem's IP address to something other than the factory default address, enter this IP address in your Web browser's address bar in place of the address shown in the URL above.

21 Enter your password if required and then click *Submit*.

The ISDN LAN Modem main configuration page appears. You now have full access and can make any configuration changes as if you were connected via your local LAN. Note that you are limited to configuration of the LAN Modem when dialing in from a remote location. For instance, you cannot access the Web when during a remote dial in session.

7 SUPPLEMENTARY VOICE CALL SERVICES

Supplementary Voice Services

The ISDN LAN Modem supports the following supplementary voice services.

- Call Waiting
- Caller ID
- Call Conference (Three-Way Calling)
- Call Transfer
- Voice Mail (Message Service)
- Caller ID Name Display
- Call Forwarding

Before You Begin

In order to use these services, they must also be supported on your ISDN line. Refer to Appendix E for ordering codes which support these features and then call your telephone company if you want to have these services added.

To use Call Conference, as well as Call Transfer, your ISDN line must support Flexible Calling. To use ISDN Call Waiting, your ISDN line must support Additional Call Offering (ACO). Additional line configuration may also be required for Caller ID Blocking, Call Forwarding and Voice Mail. Check with your telephone company to determine whether or not these services are supported. Note that there may be an extra charge to support these features.

Supplementary voice services are configured from the ISDN Parameters page. The default settings are shown in Figure 52.

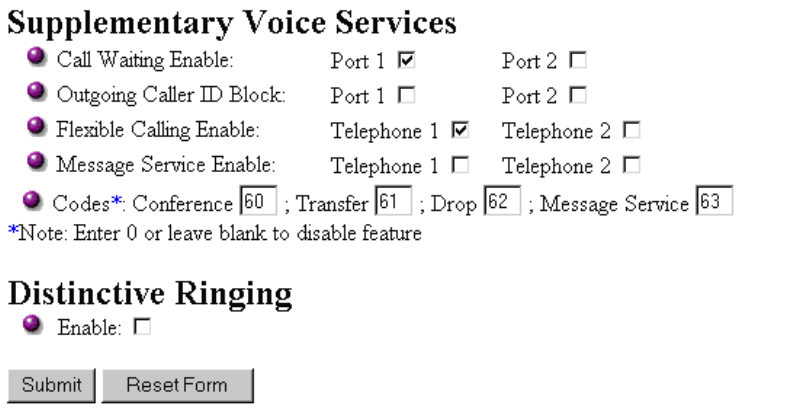


Figure 52 Supplementary Voice Services

Descriptions of each supplementary voice service follow.

Call Waiting

Call Waiting allows you to place an active call on hold in order to answer another incoming call on the same telephone number. By default, Call Waiting is enabled on port 1 and disabled on port 2.

Telephone companies typically provide Call Waiting support on telephone number 1 only. For Call Waiting support on telephone number 2, you will have to have this capability added to your ISDN line. For more information refer to Appendix E.

How to Configure Call Waiting

To change the default setting, do the following.

1. Go to the ISDN LAN Modem's main configuration page (**`http://3com.oc.lanmodem/`**).
2. Click *ISDN Parameters*.
3. Locate *Call Waiting Enable*, and then clear the check box for the port(s) for which you want Call Waiting disabled, or check the box for the port(s) for which you want Call Waiting enabled.

   You should disable Call Waiting on a port(s) to which a fax machine is connected so that any fax calls are not interrupted.
4. Click *Submit*.

How to Use Call Waiting

To use Call Waiting, do the following.

Table 1 How to Use Call Waiting

How Do I	Do This
Answer a call using Call Waiting?	When you hear the Call Waiting tone, press and release the switch hook button to put the first call on hold and connect to the second call.
	If you do not answer the second call, the caller will hear a ring.
Switch back to the first call?	To put the second call on hold and switch back to the first call, press and release the switch hook button.
Toggle back and forth between the two calls?	Press and release the switch hook button.
End a call when I hear the Call Waiting tone (instead of putting the call on hold)?	Hang up the phone and wait for it to ring. (The phone rings to indicate that there is an incoming call and the B-channel LED flashes.)
	You are connected to the second call when you pick up. Or, if you already have a call on hold while on an active call and you want to end the active call before returning to the call on hold, hang up the phone and wait for it to ring back. Pick up the phone to reconnect to the call on hold.
Disconnect a call on hold?	To disconnect a call on hold, make the call on hold active by pressing and releasing the switch hook button. Then, simply hang up the phone to drop the active call. If the other caller is still waiting on the line, the phone will ring.
What if the active caller hangs up from the far end?	If the active caller hangs up from the far end, the call on hold will remain on hold until you retrieve it by either pressing and releasing the switch hook button or by hanging up the phone and then answering it when it rings.
What if the caller on hold hangs up from the far end?	If the caller on hold on the far end hangs up, you will receive no notice. When you try to access that caller, either you will remain on the same call (if you do not have Flexible Calling) or you will get a dial tone (if you have Flexible Calling and it is enabled).

The ISDN LAN Modem can support a maximum of two simultaneous voice calls per phone port. If you already have two calls up (one active and one on hold) and a third call comes in, that caller hears the "user busy" tone unless you have Voice Mail, in which case the call is sent to your voice mail box.

Caller ID

The ISDN LAN Modem supports Caller ID and Caller ID Blocking.

Caller ID

Caller ID is supported on the ISDN LAN Modem. If you subscribe to this service, the telephone number of the calling party is displayed on the caller ID device connected to the ISDN LAN Modem's phone port that is called.

The name of the caller may or may not be displayed even if your caller ID device and service support this feature. Not all telephone companies display the Caller ID name on a residential ISDN line. Check with your telephone company.

When both B channels are in use, Caller ID is not available. One B channel must be available to provide the Caller ID information.

Caller ID Date and Time

The date and time displayed by your Caller ID unit is set according to the date and time on the workstation connected to the ISDN LAN Modem when the ISDN LAN Modem is powered on. If the date and time is incorrect, connect a workstation to the ISDN LAN Modem that has the correct date and time and then power cycle the ISDN LAN Modem. Once it is powered up, launch your Web browser and go to the ISDN LAN Modem's main page at **`http://3com.oc.lanmodem/`**

Caller ID Blocking

To allow or prevent your telephone number from being displayed on a remote Caller ID device, do the following. By default your telephone number is displayed.

Not all telephone companies support Caller ID Blocking. Check with your telephone company. If Caller ID Blocking is not provided on your ISDN line, then you cannot use this feature.

1. Go to the ISDN LAN Modem's main page (**`http://3com.oc.lanmodem/`**).
2. Click *ISDN Parameters*.
3. Next to *Outgoing Caller ID Block*, select the port number box(es) for which you would like Caller ID Blocking enabled. Clear the port number box(es) for which you would like Caller ID Blocking disabled.

   For instance, if you check the box labeled Port 1, calls made from the telephone connected to that port will not display the telephone number to the user at the far end.
4. Click *Submit*.

Flexible Calling

Flexible Calling (also known as Flexible Call Offering (FCO)) is an additional service added to your ISDN line to allow you to use voice features such as Call Conference (Three Way Calling), Hold, Drop, Transfer and Message Service on telephones connected to the ISDN LAN Modem's phone ports. If you are not sure whether your ISDN line supports Flexible Calling, check with your telephone company.

In some cases your telephone company may enable Flexible Calling on your first telephone number only. You may need to specifically request that these services be enabled on your second telephone number as well.

Configuring FCO on the ISDN LAN Modem

Once Flexible Calling is provided on your ISDN line, you can either enable or disable Flexible Calling (that is, all of the associated voice features) on the ISDN LAN Modem on a telephone number basis.

By default, Flexible Calling is enabled on telephone number 1 and disabled on telephone number 2. If your ISDN line supports Flexible Calling only on the first telephone number, you should leave this default setting as is. If your ISDN line supports Flexible Calling on both telephone numbers, you may want to enable Flexible Calling on telephone number 2 so that you can use Call Conference and Call Transfer from telephones connected to either ISDN LAN Modem phone port.

To enable or disable Flexible Calling, do the following.

1. Go to the ISDN LAN Modem's main configuration page (**`http://3com.oc.lanmodem/`**).
2. Click *ISDN Parameters*.
3. Next to *Flexible Calling Enable*, select the telephone number check box(es) for which you would like Flexible Calling enabled. Or, clear the telephone number check box(es) for which you would like Flexible Calling disabled.
4. Click *Submit*.

Flexible Calling Codes

Each Flexible Calling feature (that is, Conference, Transfer, Drop and Message Service) has a code associated with it that allows that particular feature to be enabled or disabled. By default these features are all enabled. The value displayed is the code required for this service to work between the ISDN LAN Modem and your telephone company. It is recommended that you leave the defaults set to the standard, national values.

To change these values, do the following.

1. Go to the ISDN LAN Modem's main configuration page (**`http://3com.oc.lanmodem/`**).
2. Click *ISDN Parameters*.
3. To disable a feature, next to *Codes*, enter 0 in the box to the right of the feature you want to disable. To change the values, enter the appropriate value (provided by your ISDN service provider) in the appropriate box.
4. Click *Submit*.

Call Conference (Three-Way Calling)

Call Conference (also referred to as Three-Way Calling or TWC) allows you to add another party to an existing call. This feature can be used whether you have received or have placed the first call.

You cannot conference two incoming calls. You must initiate the second call in order to activate Call Conference.

Table 2 How to Use Call Conference

How Do I	Do This
Place a new conference call?	While the first call is active, press and release the switch hook button. The B channel LED light flashes to indicate that the first call is on hold, and you will hear a dial tone. Then dial a third party number. After the third party has answered, press and release the switch hook button to connect all three parties.
Drop the last party added to the conference call?	To drop the last party added to the conference call, press and release the switch hook button.
Abort the second call and switch back to the first call?	If the dialed party is busy, press and release the switch hook button to cancel the call and reconnect to the first call. If you dialed a wrong number, or the far end does not answer, hang up the phone to abort the attempted call. The phone will then ring, indicating that the first call is on hold. Answer the phone to reconnect to the first call.
What if I hear a dial tone when I attempt to conference all three parties?	A dial tone indicates that one of the parties has dropped their call. Press and release the switch hook button to return to the previously active call. You can then conference a third party as described previously.
What if the telephone rings after I hang up?	While you try to conference a call, the active call will be put on hold to allow you to dial a new call. If you hang up the phone before the call is connected, the telephone will ring to let you know that you still have a call on hold.

Call Transfer

Call Transfer is a voice call feature that allows you to transfer a call to a third party. This feature can be used whether you have received or have placed the first call.

Table 3 How to Use Call Transfer

How Do I	Do This
Place a new call?	While the first call is active, press and release the switch hook button, wait for the dial tone, and then dial a third party number. After the third party has answered, press and release the switch hook button to conference all three parties, and then hang up the telephone to transfer the call.
Cancel the second call and switch back to the first call?	If the dialed party is busy, press and release the switch hook button to cancel the attempted call and reconnect to the first call. If you hang up, the phone will ring back, indicating that you have a call on hold. If you dialed a wrong number, or the far end does not answer, hang up the phone to abort the attempted call. The phone will then ring, indicating that the first call is on hold. Answer the phone to reconnect to the first call.

Message Service/Voice Mail

If you subscribe to Voice Mail on your ISDN line, then you have Message Service which tells you that you have new messages in your voice mail box. By default, Message Service is disabled. You must enable this feature on the ISDN LAN Modem to use it.

The Alert LED on the front of the ISDN LAN Modem flashes when there are new messages in your voice mail box. Note that the Alert LED also flashes during firmware download. The flash sequence distinguishes the difference— faster during firmware download and slower for message indication.

You are also notified when you lift the receiver and hear a stutter tone (that is, multiple short tones in quick succession). Note that this tone may be provided by either your telephone company or the ISDN LAN Modem.

To change the default setting, do the following.

1. Go to the ISDN LAN Modem's main configuration page (**`http://3com.oc.lanmodem/`**).
2. Click *ISDN Parameters*.
3. Locate *Message Service Enable*, and then select the check box for the telephone number(s) for which you want Message Service enabled, or clear the boxes for the telephone number(s) for which you want Message Service disabled.
4. Click *Submit*.

If you do not subscribe to Voice Mail, make sure that the Message Service Enabled feature is disabled. If it is enabled and you do not have Voice Mail on your ISDN line, then callers always hear a ringing signal whenever that number is dialed whether or not you are on the line.

Call Forwarding

Call Forwarding is a voice service provided by your telephone company that lets you forward your incoming calls to another telephone number. To use this feature, enter the appropriate touch-tone key(s) (as described by your telephone company) from the telephone attached to your ISDN LAN Modem. These tones are passed through the ISDN LAN Modem.

When a call is placed to a phone connected to the ISDN LAN Modem, the forwarded call is announced by a short ring on the telephone from which the Call Forwarding tones were entered. Note that you cannot answer the call. The ring is a reminder that Call Forwarding is still in effect.

To use Call Forwarding successfully, it is recommended that you configure each phone port to be associated with only one ISDN telephone number. For instance, associate telephone number 1 with port 1 exclusively and telephone number 2 with port two exclusively. You can make this change by clicking Call Routing *from the ISDN LAN Modem main page and then checking/clearing the appropriate boxes. If you have more than one telephone number routed to a single port, this can cause confusion regarding which telephone number has been forwarded. Note that this also applies if you have Voice Mail.*

8 PLACING, RECEIVING AND DISCONNECTING CALLS

This chapter covers the following main topics:

- Placing calls automatically and manually
- Receiving calls
- Disconnecting data calls

Placing Calls

You can place calls from your computer through the ISDN LAN Modem to a remote location either automatically by using one of the service provider connections you set up or manually by entering the telephone number of the destination.

3Com assumes no liability for phone charges or other expenses incurred in connection with the use of this product.

Placing a Call Automatically

To place a call using one of the service provider connections you set up, simply launch the application. For example, if an ISP was configured, simply launch your Web browser on your computer to connect to the default location configured in your Web browser.

Telephone Number Selection for Data Calls

When you place a data call, the ISDN LAN Modem tries to use the second telephone number assigned to your ISDN line in order to leave the first telephone number free for voice calls. In many instances when voice services are added to an ISDN line, they are added only to the first telephone number and not the second telephone number. Because of this, the ISDN LAN Modem tries to use the second telephone number, when available, for data calls.

Call Routing Among Service Providers

The ISDN LAN Modem automatically calls the first configured service provider. If you configure a second remote connection, such as an additional ISP, and want to use that second profile for an automatic data call, do the following.

1. Access the ISDN LAN Modem's configuration main page.
2. Choose the *Workstation* graphic.
3. Select your computer.
4. Associate only the Service Provider that you want to use.

Placing a Call Manually

You can also manually place a call to an existing service provider or to a destination that has not been previously defined as long as the remote location provides an IP address dynamically during call setup.

Placing a Call Manually to an Existing Service Provider

To place a call manually to a service provider that is already configured, do the following.

The existing service provider must be associated with your workstation in order for you to place a manual call to it. By default all service providers are associated with all workstations. If you are unsure, click Workstations from the main page and then select your workstation. Make sure the service provider you want to call is associated with your workstation.

1. From the ISDN LAN Modem home page, click the *Manual Calling* button.

   The Manual Call Control window appears.

2. In the table, locate the name of the service provider to which you want to connect and then verify that the call is not already connected to that destination by looking under the *Status of Call* column.

3. Click *Place Call*.

   A message indicates that the call is being placed. A B channel LED on the ISDN LAN Modem front panel illuminates green when a connection is established. Once connected you are ready to run any desired application appropriate for that location, such as FTP to transfer files, or you may enter a different URL in your Web browser to access the Internet.

Placing a Call Manually to a Temporary Service Provider

To place a call manually to a service provider that has not been previously configured, do the following. Note that for this type of manual call, the service provider must supply a dynamic IP address.

This call profile will remain under TempSvcProvider *until you change the settings of these fields.*

1. From the ISDN LAN Modem's home page, click *Manual Calling*.

   The Manual Call Control window appears.

2. In the table, locate *TempSvcProvider*.

3. Click *Place Call*.

4. Enter the telephone number of the destination in the Telephone Number field.

5. Enter your User ID for the remote destination.

6. Enter your Password for the remote destination.

7. Enter the DNS address if the remote destination does not automatically provide an IP address. Otherwise, leave this field empty.

8. Specify how you would like the bandwidth allocated for this connection.

   You can choose always to use just one B channel for this connection, always to use two B channels for this connection (that is, always use Multilink PPP), or you can specify that you only want the second B channel added when the first B channel reaches the threshold. The threshold default is 60%. To change the threshold default, refer to "Changing Data Call Parameters" in Chapter 5.

9 Specify the B channel rate or select *TollMizer*.

Leave the B channel rate set to 64 Kbps unless your telephone company and the locations you will be connecting to only support 56 Kbps.

TollMizer sends a data call over a voice circuit allowing you to save the typical cost difference between a voice and data call. Note that the destination you are calling must also support this feature (also referred to as Switched 56 Permissive or Data Over Voice). Check with your telephone company to ensure that they support Data Over Voice.

10 Click *Make Call*.

A message indicates that the call is being placed. A B channel LED on the ISDN LAN Modem front panel illuminates green when a connection is established. Once connected, you are ready to run any desired application appropriate for that location, such as ftp to transfer files, or you may enter a different URL in your Web browser to access the Internet.

Once a temporary call is established, other workstations may also connect to this service provider by clicking TempSvcProvider*. Note that if multiple parties are connected to* TempSvcProvider*, the call is disconnected as soon as one party hangs up.*

Participating in a Temporary Call

Unlike calls to configured service providers, temporary call connections cannot be shared by other users automatically. For instance, if one workstation is connected to an ISP that is configured as one of the four service providers and you want to use the same ISP, you simply launch your Web browser. However, if a temporary call has been placed, in order for another workstation to use that connection, that other workstation user must go to the Manual Calling page and then click *Participate in existing call to (telephone number)*.

Placing Multilink PPP Calls

Before you place a call, ensure that either the *Use Two B Channels* or *Add Second B Channel* check box on the ISDN LAN Modem's Service Provider Parameters window is checked as described in "Setting Up Additional Service Providers" in Chapter 5. Also, the destination you are calling must also support Multilink PPP. For example, if you are trying to dial into the Internet, your ISP must also support Multilink PPP in order to successfully place a Multilink PPP call.

If you place a Multilink PPP call and the remote location you are calling does not support Multilink PPP, a single B channel call will be established.

Receiving Calls

This sections describes how the ISDN LAN Modem receives data calls and voice calls and how distinctive ringing may be used to differentiate voice calls.

Receiving Data Calls

The ISDN LAN Modem can receive incoming data calls for the following purposes:

- Making changes to the previously defined connection types

  Refer to Chapter 6, "Configuring the ISDN LAN Modem from a Remote Location," for instructions.

- Downloading the latest firmware

  Refer to Chapter 9, "Downloading Firmware to Your ISDN LAN Modem," for instructions.

- Reviewing ISDN LAN Modem statistics

  Refer to Chapter 9, "Reviewing Statistics," for instructions.

Incoming calls for data transfer are not supported. For example, you cannot call into the ISDN LAN Modem to use a computer as a server that others would dial into and use for downloading information.

Receiving Voice Calls

Voice calls received by the ISDN LAN Modem will be routed to the analog equipment connected to the voice ports. By default, incoming voice calls to telephone number one are routed to Phone port one, and incoming voice calls to telephone number two are routed to Phone port two.

To change the default routing, refer to "Changing Voice Call Routing" in Chapter 6.

Specialized telephone equipment such as some speakerphones, answering machines, and fax machines that require more than 42 VAC ringing voltage may not detect incoming calls.

Distinctive Ringing

You can configure the ISDN LAN Modem to distinguish between telephone rings for calls to telephones connected to the ISDN LAN Modem's phone ports. When this feature is enabled, the ringing pattern for calls to telephone number one changes to distinguish between calls to telephone number one and calls to telephone number two.

By default this feature is disabled. To enable, do the following.

1. Go to the ISDN LAN Modem's main configuration page:
   `http://3com.oc.lanmodem/`
2. Click *ISDN Parameters*.
3. Locate *Distinctive Ringing* and then click the box labeled *Enable*.
4. Click *Submit*.

Disconnecting Data Calls

You can disconnect data calls manually or use timers to disconnect calls automatically.

Disconnecting Data Calls Manually

To disconnect calls manually, do the following:

1. From the ISDN LAN Modem home page, click *Manual Calling*. Alternatively, if you are using the custom browser, click *Dial/Hang Up* from the Links menu bar.

   The Manual Call Control window appears.
2. In the table, locate the name of the service provider from which you wish to disconnect and then verify that the call is up under the *Status of Call* column.
3. Click *Hangup Call*.

   A message indicates that the call is being disconnected.

Disconnecting Calls Automatically Using Timers

There are a number of ways by which you can configure calls to be disconnected automatically. You can set timers and disconnect thresholds from the Data Call Parameters window. Specifically, the parameters you can set are as follows.

Minimum Call Duration

Enter the minimum length of a call that is measured before the ISDN LAN Modem detects inactivity on the connection and then starts an inactivity timer. The default is 2 minutes.

Idle Timeout

In the field *Disconnect a data call after how long of an inactivity period?*, enter the number of seconds after which a call should be disconnected because of inactivity. Once the minimum call duration is satisfied and then no activity is detected for a call, this timer is started. To prevent a data call from being disconnected because of inactivity, enter 0. The default for an automatic call is 30 seconds. The default for a manual call is 15 minutes.

Bandwidth on Demand Parameters

You can specify when you want a second B channel to be added automatically based on the utilization of the first B channel.

Connect/Disconnect threshold for the second B channel

If you specified that you want to use the second B channel only when needed, indicate the percentage of bandwidth on the first B channel which must be reached before the second B channel is allocated. By default the threshold is 60%.

Connect Delay

This field defines the length of time the ISDN LAN Modem should wait before adding the second B channel. By default the length of time is 10 seconds. Therefore, this default, in combination with the Connect/Disconnect Threshold default means that after a B channel reaches over 60% throughput for 10 seconds, a second B channel is added, if not already in use.

Disconnect Delay

This field defines the length of time the ISDN LAN Modem should wait before removing the second B channel. By default the length of time is 20 seconds. Therefore, this default, in combination with the Connect/Disconnect Threshold default means that if throughput falls below 60% for 20 seconds, a B channel is removed.

9 TROUBLESHOOTING AND MAINTENANCE

This chapter explains how to isolate and solve problems encountered with the ISDN LAN Modem. Problems may stem from incorrect option settings or improper installation.

This chapter covers the following main topics.

- Checking the basics
- Monitoring the LEDs
- Evaluating symptoms and solutions
- Finding more information
- Contacting technical support
- Downloading firmware
- Resetting the ISDN LAN Modem
- Reviewing statistics

CAUTION: *There are no user-serviceable parts inside your ISDN LAN Modem. Unauthorized opening of the unit will void the warranty.*

Checking the Basics

Before you monitor the LEDs or refer to the section on symptoms and solutions, check the following:

- Verify that the cables are not physically damaged. If damage is apparent, replace the cable.
- Verify that you have a proper 10BASE-T Ethernet cable (8-pin to 8-pin)
- Verify that the power cord is connected to the ISDN LAN Modem and an electrical outlet.
- Verify that the ISDN cable is properly connected to the ISDN LAN Modem and the ISDN wall outlet.

The ISDN LAN Modem will not operate if connected to an analog telephone wall jack. Make sure that the ISDN LAN Modem is connected directly into the ISDN wall outlet without connection to any intermediate telephone equipment (an NT1 device is not required with the ISDN LAN Modem).

Monitoring LEDs

If you are experiencing operational inconsistencies, monitor the ALERT, ISDN, B channel and LAN port status LEDs to isolate problems. Refer to Table 5 for instructions to resolve the problem.

Monitoring the ALERT LED

Press and release the *Reset* button and observe the ALERT LED. During power-up self-test, the ALERT LED will remain lit.

- If the ALERT LED goes out, the test has been successful.
- If the ALERT LED flashes for more than several seconds, this indicates one of the following:
  - Voice Mail messages pending (if you subscribe to Voice Mail)
  - ISDN LAN Modem is in firmware download mode
  - The DHCP server is full and cannot assign any more IP addresses
  - There is an internal failure (the ISDN LAN Modem also resets itself)

  Voice Mail message indication uses a slower flash than firmware download and internal failure indication. If the ISDN LAN Modem is neither in firmware download mode nor do you have voice mail messages, notify your reseller that the ISDN LAN Modem has failed the self-test and order a replacement.

Monitoring the ISDN LED

Place a call and then observe the ISDN LED. One of the following three conditions may occur:

If the ISDN flashes and then remains lit, your ISDN line is functioning properly.

If the ISDN LED never turns on, check the ISDN cable. Ensure that it is connected securely to the wall outlet and the ISDN LAN Modem's ISDN port. If the ISDN LED still is not lit, there may be a problem with your ISDN line.

If the ISDN LED flashes but does not remain lit, first make sure that your ISDN telephone numbers and SPIDs are configured accurately (click *ISDN Parameters* from the WebWizard main page). If your telephone numbers are configured correctly, check with your telephone company. There may be a problem with your ISDN line.

Monitoring the B Channel LEDs

If the ISDN LED is illuminated, attempt to place a call and observe the B channel LED(s). The B1 and B2 LEDs flash amber for a voice call or green for a data call during the call establishment phase and then blinks faster during the PPP establishment phase. They then remain solid amber or green once the connection is established. If they do not remain solid amber or green, refer to the "Troubleshooting Problems Indicated by LEDs" section.

Monitoring the LAN Port Status LEDs

Observe the LAN port status LED labeled 1, 2, 3, or 4 depending on the port number to which your computer is connected. If the LED(s) is lit, the ISDN LAN Modem detects the Ethernet link signal and operation is normal. When the computer attached to that port is transmitting data to the LAN, this LED flashes.

If the port status LED is Off, the ISDN LAN Modem does not detect the Ethernet link integrity signal. Refer to the "Troubleshooting Problems Indicated by LEDs" section. First ensure that the workstation is powered on. If so, then the Ethernet cable may not be properly connected, or it may be the wrong polarity.

Troubleshooting Problems Indicated by LEDs

Table Table 5 lists the states of ISDN LAN Modem LEDs which indicate errors and also provides possible causes and solutions.

Table 5 Troubleshooting Problems Indicated by LEDs

LED	LED State	Possible Cause	Solution
ALERT LED	ALERT LED remains lit.	An internal failure.	Notify your reseller or technical support that the ISDN LAN Modem has failed the self-test.
	ALERT LED continues to flash.	Self test failure or ISDN LAN Modem is in firmware download mode.	Power cycle the ISDN LAN Modem. If the ALERT LED continues to flash, the ISDN LAN Modem has failed the self test. Contact your network supplier. If the ALERT LED is not flashing, then the ISDN LAN Modem is now operating correctly.
		ISDN LAN Modem has received new voice mail messages.	Lift the telephone handset and listen for the stutter tone that indicates new messages are waiting for you.
		DHCP server is full and cannot assign any more IP addresses	Release the last IP address assigned by pressing **3265# from a telephone connected to a LAN Modem phone port
	Upon power up, both the ALERT and ISDN LEDs flash.	A previous firmware download was not completed successfully.	Download the firmware. Refer to **`http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html`** for firmware download instructions.
	ALERT, ISDN OK, B1, and B2 LEDs alternately flash.	Firmware download process was aborted.	**Do not remove power plug.** Wait until the LEDs stop flashing (about 1 minute) to allow the ISDN LAN modem to cancel the firmware download. Once the LEDs stop flashing, you may restart firmware download.
B1/B2	B channel LED(s) do not remain green or amber.	Problem with your computer or application software or incompatible local or toll telephone company.	Carefully monitor the B1 and B2 LEDs while attempting a call. These LEDs flash during call establishment and then remain green or amber once the connection is established.
			If neither LED flashes, make sure that your computer is turned on and operational.
			If you are able to place a voice call but not a data call, then there may be an incompatible local or toll telephone company. Contact your local telephone company and have it verify that you can dial a data call to the destination telephone number.
ISDN LED	ISDN LED does not light.	Poor physical connection to the local telephone equipment.	Check the cables to ensure that they are securely connected to the appropriate ports.
			If the telephone wires at your site appear to be satisfactory, call your local telephone company for assistance.
	ISDN LED continues to flash for more than a few minutes	A mismatch between the settings of the ISDN line and the ISDN LAN Modem configuration.	Check the ISDN statistics screen to determine whether the SPIDs are properly configured. If not, go to the ISDN Parameters screen to enter the correct SPIDs.
			Call the telephone company and have it verify that your line is configured for circuit-switched voice and data service.
LAN STATUS	LAN port status LED is off (that is, not illuminated).	Ethernet cable is not securely connected.	Check the Ethernet cable connection and make sure it is inserted properly in a port labeled 1,2,3,or 4 on the back of the ISDN LAN Modem and in the Ethernet port on the back of your computer. Also, your computer should be turned on and your network software should be running.
		Ethernet card is not set up properly.	Make sure your Ethernet card is set up properly (proper drivers are loaded). Refer to the documentation provided with your Ethernet card for instructions.

Evaluating Symptoms and Solutions

Table 6 lists symptoms of common problems, possible causes, and possible solutions.

Table 6 Symptoms, Causes, and Solutions

Symptom	Possible Cause	Solution
Upon initial setup, communication between the ISDN LAN Modem and my computer cannot be established.	Incompatible IP address on your computer.	Reset the IP address on your computer. For Windows 98 and 95 users, run **`Winipcfg.exe`**. Select the Ethernet adapter connected to the ISDN LAN Modem. Click *Release All* and then click *Renew All*. For Windows NT 4.0 and Windows 3.11 users, run ipconfig /release and ipconfig /renew. For Mac users, from the Apple menu, select *Control Panels* and then select *TCP/IP*. Make sure *Ethernet* is selected in the Connect via field. From the Configure field, select *Using BootP Server* to clear the fields, then close and save changes to the Control Panel. Open the TCP/IP control panel and select *Using DHCP Server*. The fields should now read `<will be supplied by server>`. Select *File* and then *Close* and save changes when prompted.
	Your Web browser needs the IP address of the ISDN LAN Modem.	Enter the following URL in your Web browser: **`http://192.168.1.1/mainpage`** or **`http://3com.oc.lanmodem/`**
	There is a configuration problem.	Reset the ISDN LAN Modem to the factory default setting. Disconnect the ISDN cable from the ISDN LAN Modem and then connect an analog telephone to one of the phone ports. Lift the handset and press **3266# and then replace the handset. Reconnect the ISDN cable, restart your computer and then launch your Web browser.
	The wrong cable may be connected to the LAN port on the ISDN LAN Modem and your PC.	Make sure you are using the 8-pin to 8-pin cable labeled *Ethernet* that was provided with your ISDN LAN Modem. If you are using another 10BASE-T Ethernet (Category 5) cable, it must be a straight-through cable.
	Web browser may not be set to a default start page.	Enter a default URL from within your Web browser. If you are using Internet Explorer, launch your Web browser. From the *View* menu select *Options*. From Page, select *Start Page* and then enter an address in the address field such as **`http://www.3com.com`**. If you are using Netscape, launch your Web browser. From the *Options* menu, select *General Preferences*. From Browser Starts With, select *Home Page Location* and then enter a URL such as **`http://www.3com.com`**. Your Web browser may be configured to use a proxy server, instead of the LAN Modem. **Internet Explorer users:** Launch your Web browser. From the *View* menu, select *Internet Options*, and then the *Connection* tab. Under the Proxy Server header, uncheck the box labeled *Accessing the Internet using a proxy server*. **Netscape users:** Launch your web browser. From the *Edit* menu, select *Preferences*. Double-click *Advanced*, and then click *Proxies*. Check the box labeled *Direct Connection to the Internet*.

(continued)

Table 6 Symptoms, Causes, and Solutions

Symptom	Possible Cause	Solution
	ISDN LAN Modem has assigned all available IP addresses.	From another computer attached to the ISDN LAN Modem, go to the LAN Modem's main configuration page. Click *Workstations*. Select the name of computer you removed and then click *Select*. Click *Release Workstation Entry*. Reboot the workstation. The newly-added workstation can now be assigned an IP address. If you cannot release a workstation entry, connect a telephone to one of the ISDN LAN Modem's phone ports and press **3265# from the keypad to release the last IP address assigned by the LAN Modem.
The LAN Modem seems to be placing calls inadvertently.	NetBIOS is making DNS requests causing the LAN Modem to initiate a call.	Enable NetBIOS filtering. From the ISDN LAN Modem's home page, click *LAN Parameters*. Check the box labeled Enable NetBIOS filtering.
Although multiple service providers are configured, all calls are going to the same service provider which is a private network.	You may not have configured the IP address and the subnet mask in the Private Network Parameters window.	From the ISDN LAN Modem's home page, click *Service Providers* and then select the private network profile you already configured. Enter the IP address and the subnet mask for the private network.
Clicking *Submit* in the LAN Modem's configuration pages does not take you to the next screen.	JavaScript may not be enabled in your Web browser.	Enable JavaScript via your Web browser's configuration options.
The Windows 95 "Connect To" window opens upon launching a Web browser.	Networking is setup for use with a serial port modem.	To bypass the "Connect To" window: **1** Double-click the *Internet* icon in the control panel. **2** Clear the check box labeled "Connect to the Internet as needed." **3** Click *OK*. This allows all outgoing connections to run directly through your ISDN LAN Modem.
Calls cannot be placed from analog equipment	If you cannot place calls, there may be a problem with the configuration of your ISDN line.	Call the telephone company and have them verify your telephone number(s) and SPID(s) and that your line is configured for circuit-switched voice and data service.
	Calls from the analog port may be blocked.	From the Call Routing window, check the Phone Port 1 and Phone Port 2 boxes which are used for voice call routing. Make sure that the correct Phone Port box for that port is checked.
When the handset of a telephone attached to the ISDN LAN Modem is lifted, a dial tone cannot be heard.	There may be two active calls to different locations thus using both B channels and leaving no bandwidth for the voice call.	If there are two independent data calls connected, go to Manual calling to disconnect one of the active calls.
	Bandwidth allocation for this service provider may be set to *Always use 2 B channels* and a call is currently up.	Either go to Manual calling and disconnect the current call or go to service providers and change bandwidth allocation to either *Add second B channel as required* or *Use one B channel*.
	The ISDN line cable, power cable and/or phone cable may not be firmly connected.	Check all cables and connectors to ensure that they are inserted securely.
	If you cannot place calls, there may be a problem with the configuration of your ISDN line.	Call the telephone company and have them verify your telephone number(s) and SPID(s) and that your line is configured for circuit-switched voice and data service.

(continued)

Table 6 Symptoms, Causes, and Solutions

Symptom	Possible Cause	Solution
	Calls from the analog port may be blocked.	From the Call Routing window, check the Phone Port 1 and Phone Port 2 boxes which are used for voice call routing. Make sure that the correct Phone Port box for that port is checked.
A computer on the LAN was replaced with another one and now the newly added computer cannot communicate with the ISDN LAN Modem.	The ISDN LAN Modem has not released the IP address for the previous computer and therefore will not assign a new one because it allows a maximum of 25.	From another computer attached to the ISDN LAN Modem, go to the LAN Modem's main configuration page. Click *Workstations*. Select the name of computer you removed and then click *Select*. Click *Release Workstation Entry*. Reboot the workstation. The newly-added workstation can now be assigned an IP address. If you cannot release a workstation entry, connect a telephone to one of the ISDN LAN Modem's phone ports and press **3265# from the keypad to release the last IP address assigned by the LAN Modem.
Some application software doesn't work properly.	Application may have an embedded IP address which causes a problem when NAT is enabled on the ISDN LAN Modem.	If you have a static network, disable NAT and try using the application again. Do not disable NAT if your network is dynamic.
	The user name and/or password for this service provider may not be entered properly.	Make sure that the user name and password for this service provider are entered accurately.
A connection has been established (B1 or B2 green LED remains lit) but data cannot be sent.	There is an interoperability mismatch between the local and remote applications.	Make sure that the local and remote data applications have communications capability and are properly configured.
Calls continue to reconnect or calls do not timeout and disconnect.	An application or LAN device is sending IP packets.	Go to Current or Last Call Statistics and check *Reason for call coming up*. Or, set the workgroup on each PC to workgroup. Check applications to see if any are running in the background. Or, turn off Microsoft's print/file sharing or use NetBEUI for local service (that is, within the LAN). To turn off print/file sharing, from *Control Panel* select *Network* and then the *Configuration* tab. Click the *File and Print Sharing* button. Clear both check boxes and then click *OK*. Make sure that the timeout value is not set to zero. Check the timeouts configured for the ISDN LAN Modem as explained in "Changing Data Call Parameters" in Chapter 6. If the situation persists, disconnect each attached LAN device to locate the source of the IP packet generation. Or you can turn off Automatic Call Initiation, located on each service provider parameter page.
A Multilink PPP call cannot be placed. Only one B channel connects.	Multilink PPP may not be configured properly.	Refer to "Editing Service Provider Profiles" in Chapter 6 for details.
	There may not be enough traffic to reach the threshold for adding the second B channel.	If you configured bandwidth allocation for this service provider to add the second B channel as needed, there may not be enough traffic to reach the threshold defined. Refer to "Changing Data Call Parameters" in Chapter 6 for the threshold value and instructions on how to change this value, if desired.

(continued)

Table 6 Symptoms, Causes, and Solutions

Symptom	Possible Cause	Solution
	May be an incompatibility with the router into which you are dialing. Some remote routers split the two B channels of a Multilink PPP call between different routing devices, preventing the channels from being linked.	Try reconnecting your call during off peak hours. If you are still unable to establish a Multilink PPP call, contact your ISP to confirm that they support this feature.
A Multilink PPP call was established but did not remain connected.	When the LAN Modem is configured to *Use 2 B channels* and the remote end disconnects one of the 2 B channels, the LAN Modem will disconnect the now single B channel call since it's configured to use 2 B channels.	From the ISDN LAN Modem's home page, click *Service Providers* and then select the provider you were connecting to using Multilink PPP. For Bandwidth Allocation, select *Add second B channel as required*.
	A voice or data call may already be connected leaving only one B channel available.	Place the Multilink PPP call when both B channels are available.
Although only one data call is connected, another voice or data call cannot be placed.	The connected call may be configured to always use two B channels, leaving no bandwidth available for another call.	Check the bandwidth allocation setting for that service provider. Refer to "Editing Service Provider Profiles" in Chapter 6 for details.
Caller ID date and time are not accurate.		Connect a workstation that has the correct time to the ISDN LAN Modem and then turn the LAN Modem power off and then on again. Once it is powered up, launch your web browser and go to the LAN Modem's main page at **`http://3Com.oc.lanmodem/`**
Cannot place a call over the LAN Modem's phone port using a Sportster PC Card modem.	Modem mistakes analog phone line for digital line.	Add the following command to the Sportster modem init string: AT ~~L0.
Cannot place or receive two simultaneous voice calls.	Your ISDN line may not support simultaneous voice and data on both B channels.	Check with your ISDN line provider to determine whether or not your ISDN line supports simultaneous voice and data on both B channels. For a Lucent 5ESS switch, your ISDN line must have *Max B Channel Limit*=2 for simultaneous voice and data. For a Siemens switch, your ISDN line must have *Number of B Channels Per Call Type Per Office Equipment Directory Number* (NBCCTOEDN) =2.
After placing a Multilink PPP call, you lift the handset of a telephone to place a call and do not hear a dial tone.	The handset was lifted to place a call while the ISDN LAN Modem was negotiating the Multilink PPP call. Negotiation must be complete before a call can be placed.	Hang up the handset, wait a few seconds, and then try again.
Not receiving message indication for Voice Mail or any voice mail messages.	Message Service box is not checked.	From the ISDN LAN Modem's main configuration page, click *ISDN Parameters*. Under Supplementary Services, check the box labeled Message Service.
Cannot hear dial tone when attempting to place a call using an ISDN LAN Modem phone port.	Bandwidth Allocation may be set to *Use two B Channels*.	Go to the appropriate Service Providers page and change the Bandwidth Allocations setting to *Add second B channel as required*.

(continued)

Table 6 Symptoms, Causes, and Solutions

Symptom	Possible Cause	Solution
	Attempted to place a voice call over a directory number that is already in use for a data call. If this is the case, your ISDN line is configured to allow only one B channel per directory number.	Contact you telephone company if you want to have simultaneous voice and data on both B channels. For a Lucent 5ESS switch, your ISDN line must have *Max B Channel Limit*=2 for simultaneous voice and data. For a Siemens switch, your ISDN line must have *Number of B Channels Per Call Type Per Office Equipment Directory Number* (NBCCTOEDN) =2.
Cannot receive an incoming call.	Bandwidth Allocation may be set to *Use two B Channels*.	
	Two separate data calls are up. Your ISDN line does not support simultaneous voice and data on both B channels.	Contact you telephone company if you want to have simultaneous voice and data on both B channels. For a Lucent 5ESS switch, your ISDN line must have *Max B Channel Limit*=2 for simultaneous voice and data. For a Siemens switch, your ISDN line must have *Number of B Channels Per Call Type Per Office Equipment Directory Number* (NBCCTOEDN) =2.
	Your ISDN line does not have ACO.	Contact you telephone company to have ACO added.
The analog modem connected to the ISDN LAN Modem is unable to detect dial tone when attempting to place an analog call while a Multilink PPP call is established.	The standard period of time most modems are set to wait for a dial tone before hanging up the call is 2 seconds, which is about the same amount of time it takes the ISDN Modem to drop the second B channel from a Multilink PPP call and re-establish a dial tone.	Adjust the analog modem setting as follows: Change S-Register 6 (Wait Time for Blind Dialing) on the analog modem to a value of 3 or higher (the default is usually 2) to increase the period of time your analog modem is set to wait before hanging up the call.
Cannot conference, transfer, or drop voice calls.	Flexible calling is not enabled.	From the ISDN LAN Modem's main configuration page, click *ISDN Parameters*. Under Flexible Calling Enabled, check the telephone number check box for which you want Flexible Calling enabled. If Flexible Calling is enabled on the ISDN LAN Modem, check with your telephone company to make sure it is enabled on your ISDN line.
	Your telephone company uses older codes for these services.	From the ISDN LAN Modem's main configuration page, click *ISDN Parameters*. Under Supplementary Services, enter the following in the Codes field: 6 for Conference, 7 for Transfer, 8 for Drop and 9 for Message Service.
Caller always hears a ringing signal even when line is busy.	Message service is enabled on the ISDN LAN modem but you do not subscribe to voice mail from the telephone company.	From the ISDN LAN Modem's main configuration page, click *ISDN Parameters*. Under *Message Service Enable*, make sure both boxes are clear.

(continued)

Table 6 Symptoms, Causes, and Solutions

Symptom	Possible Cause	Solution
Sending e-mail is occasionally slow when more than one workstation is sending e-mail to the same SMTP server.	A limitation of NAT, the SMTP server uses a different port number than the one requested by the workstations sending e-mail so the LAN Modem does not know which of the 2 (or more) workstations to forward the response to. Therefore, the request is discarded.	Co-ordinate the sending of your e-mail with the other workstations, or have each workstation use a different SMTP mail server.
	After 30 seconds, the SMTP server responds, this time using the port number specified by the workstation allowing the e-mail to be sent.	
Compression does not work	Compression is not configured.	Go to the appropriate Service Provides page and ensure compression is enabled.
	Compression negotiation was not successful.	Although compression is enabled on the LAN Modem, the device the LAN Modem is dialing into must also have compression enabled and also support the same type of compression (hi/fn LZS) otherwise compression negotiation will not be successful.

Finding More Information

For more information about the ISDN LAN Modem, such as frequently asked questions and specific technical notes go to the following URL: **http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html** and then bookmark this site for quick and easy access. If you are using the ISDN LAN Modem custom browser, click *Updates* from the menu bar.

Contacting Technical Support

For technical support, refer to the technical support card that was included with your ISDN LAN Modem for the telephone number for your location.

Downloading Firmware to Your ISDN LAN Modem

Your ISDN LAN Modem has been designed to be user-upgradable. Firmware upgrades and instructions will be available at **http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html**

Resetting the ISDN LAN Modem

There are two types of resets you can perform, a normal reset and a factory reset.

- A normal reset resets the ISDN LAN Modem without affecting any of the configuration that has already been done. Any active calls, however, will be terminated.

A normal reset can also be performed using the reset button located on the back of the ISDN LAN Modem.

- A factory reset restores the ISDN LAN Modem configuration to the factory default settings listed in Appendix C. All previously configured settings are cleared and current calls are terminated.

To reset the ISDN LAN Modem, do the following.

1. From the ISDN LAN Modem's home page, select *Maintenance*.
2. Select the type of reset you would like to perform, normal or factory.

Resetting the ISDN Modem Using a Telephone

If your computer cannot communicate with the ISDN LAN Modem and therefore you cannot get to the ISDN LAN Modem's home page, you can restore the ISDN LAN Modem to the factory defaults using a telephone connected to one of the phone ports.

Once you've connected an analog telephone to one of the ISDN LAN Modem's phone ports, do the following.

1. Disconnect the ISDN cable from the ISDN LAN Modem.
2. Lift the handset of the telephone.

   You may hear a fast busy tone.
3. Press the following keys: **3266#

   The ISDN LAN Modem reinitializes itself. Wait at least 10 seconds to ensure initialization is complete and then go on to step 4.

4 Reconnect the ISDN cable.

5 Restart your computer.

6 Launch your Web browser.

The ISDN LAN Modem begins its initial setup sequence.

Reviewing Statistics

Various statistics about LAN and WAN parameters are stored and available for review.

To view statistics, do the following.

1 From the ISDN LAN Modem's home page, select *Statistics.*

2 Select the type of statistics you would like to review.

You can view the following types of statistics.

- System
- ISDN
- Current Call
- Last Call
- Service Provider

Refer to the appropriate section for a list and description of the information provided.

Click the Update button on each of the statistics screens to see the latest information.

Understanding System Statistics

The system statistics provided are as follows.

Table 7 Description of System Statistics

System Statistics	Description
Product ID	Displays product identification number such as 3C892.
Serial Number	Displays the serial number of the ISDN LAN Modem.
Ethernet Address	Displays the MAC address of the ISDN LAN Modem.
System software version number	Displays the firmware version of the ISDN LAN Modem.
Boot software version number	For internal use only.
The LAN modem has been up for	Displays the length of time the ISDN LAN Modem has been running. Timer is reset either when the unit is power-cycled or reset.
Date (Month/Day/Year)	Lists the current date of the ISDN LAN Modem*
Time (Hour:Minute:Second)	Lists the current time of the ISDN LAN Modem*

* This date and time is based on the date of the computer used to initially set up the ISDN LAN Modem.

Understanding ISDN Information

The ISDN statistics provided are as follows.

Layer 1 status: Indicates whether layer 1, the physical connection, of the ISDN line is up or down. If layer 1 remains down after you attempt to place a call, there may be a problem with your ISDN line. First, check to ensure that the correct cable (labeled ISDN) is firmly connected to the ISDN LAN Modem and the wall jack. If the problem remains, you should contact your telephone company.

Table 9

ISDN Line Information	Description
Layer 1 status	Indicates whether layer 1 of your ISDN line is up or down.
SPID 1 status	Indicates whether SPID 1 is initialized.
SPID 2 status	Indicates whether SPID 2 is initialized.

Understanding Current Call Information

The current call information provided is as follows.

Table 10 Current Call Information Description

Current Call Information	For This Call Type	Description
Call type	Data or voice	Indicates the type of call (data or voice) and the B channel rate (56 Kbps or 64 Kbps).
Call direction	Data or voice	Indicates whether the current call is incoming or outgoing.
Service provider name	Outgoing data	Indicates the destination to which the current call is connected.
IP address in use	Data call	Indicates the IP address assigned by the service provider.
Primary DNS address	Outgoing data	Indicates the primary DNS address of the service provider to which the current call is connected.
Secondary DNS address	Outgoing data	If a secondary DNS address is needed, indicates the secondary DNS address of the service provider to which the current call is connected. This field will be empty if a secondary DNS address is not needed.
Data call options	Data call	If the current call is a data call, indicates the type of data call, (Multilink PPP or PPP); number of B channels in use for the call; whether compression is on or off, authentication type, and whether BACP was negotiated (on) or not (off). For example, `Multilink(2B)No-BACP/PAP/Compression-On`.
Call start time	Voice or data	Displays the date and time the call began.
The call has been up for (seconds)	Data call	Indicates the length of time the current call has been connected.
The connection has been idle for (seconds)	Data call	Indicates the length of time the current call has been idle.
Number of octets received	Data call	Indicates the number of octets (bytes) received by the ISDN LAN Modem.
Number of octets transmitted	Data call	Indicates the number of octets (bytes) transmitted by the ISDN LAN Modem.

(continued)

Table 10 Current Call Information Description

Current Call Information	For This Call Type	Description
Calling telephone or port number	Voice or data	For an incoming voice or data call, indicates the telephone number of the calling party. For an outgoing voice call, indicates the port from which the call was placed. (For outgoing data calls, no information is provided.)
Called telephone number	Voice or data	For an outgoing data call, indicates the telephone number dialed to reach the service provider for the current call. For an incoming voice or data call, indicates the telephone number dialed from the far end. (For outgoing voice calls, no information is provided.)
Reason for call coming up	Data	Indicates how the call was placed and which workstation placed the call. Depending on how the call was placed you should see something similar to the following: "**`Manual dial by Workstation A`**." "**`DNS query from Workstation A for http://www.xxx.xxx`**." If the call was automatically launched and the workstation does not know the IP address. "**`Packet from Workstation A to IP address xxxx.`**" If the call was automatically launched and the workstation knows the IP address.

Understanding Last Call Information

The last call information for both B channels (that is, call 1 and call 2) is as follows.

Table 11 Understanding Last Call Information

Last Call Information	For This Call Type	Description
Call type	Data or voice	Indicates the type of call (data or voice) and the B channel rate (56 Kbps or 64 Kbps) or TollMizer.
Call direction	Data or voice	Indicates whether the last call is incoming or outgoing.
Service provider name	Outgoing data	Indicates the destination to which the last call is connected.
(continued)		
Data call options	Data call	If the last call was a data call, indicates the type of data call, (Multilink PPP or PPP); and number of B channels in use for the call: `Data Multilink(2B)`
Call start time	Voice or data	Displays the date and time the call began.
The call was up for (seconds)	Data call	Indicates the length of time this last call has been connected.
Number of octets received	Data call	Indicates the number of octets (bytes) received by the ISDN LAN Modem.
Number of octets transmitted	Data call	Indicates the number of octets (bytes) transmitted by the ISDN LAN Modem.
Calling telephone or port number	Voice or data	For the last incoming voice or data call, indicates the telephone number of the calling party. For the last outgoing voice call, indicates the port from which the call was placed. (For outgoing data calls, no information is provided.)

(continued)

Last Call Information	For This Call Type	Description
Called telephone number	Voice or data	For the last outgoing data call, indicates the telephone number dialed to reach the service provider for the current call. For the last incoming voice or data call, indicates the telephone number dialed from the far end. (For outgoing voice calls, no information is provided.)
Reason for call going down	Voice or data	Indicates why the last call was disconnected. For example, idle timer expired, or manual disconnect.
Reason for call coming up	Data	Indicates how the call was placed and which workstation placed the call. Depending on how the call was placed you should see something similar to the following: "**`Manual dial by Workstation A`**." "**`DNS query from Workstation A for http://www.xxx.xxx`**." If the call was automatically launched and the workstation does not know the IP address. "**`Packet from Workstation A to IP address xxxx.`**" If the call was automatically launched and the workstation knows the IP address.

Understanding Service Provider Information

The following Service Provider information is provided after a call has ended.

Table 12 Service Provider Information Description

Service Provider Information	Description
Number of successful connections	Indicates the total number of successful connections to each service provider.
Number of failed connections	Indicates the total number of unsuccessful connections to each service provider.
Total number of octets received	Indicates the total number of octets (bytes) received by the ISDN LAN Modem.
Total number of octets transmitted	Indicates the total number of octets (bytes) transmitted by the ISDN LAN Modem.
Total connection time (seconds)	Indicates the collective amount of time connected to each service provider so far.

A

NETWORKING PRIMER

This chapter provides a description of basic networking concepts and terminology to help you better understand the key functionality of the ISDN LAN Modem.

What is a network?

A network is a set of computers and other devices such as printers, modems, and scanners that are connected together either directly via physical cables or indirectly via dial-up telephone services. A network can be in the same room, the same building covering a local area, or geographically dispersed covering a wide area.

What is a LAN?

A Local Area Network (LAN) is two or more computers linked together in a contained location such as an office building. By linking the computer together, and creating a LAN, users can share files and share access to printers.

To physically create a LAN, each computer must be linked together using some type of cabling. Typically, Ethernet cabling is used. There are three main types of Ethernet networks: 10BASE-T, 10BASE-2 and 10BASE-5. The ISDN LAN Modem supports four 10BASE-T connections.

A 10BASE-T Ethernet network is used in small networks with only a few dozen devices closely located. The physical connection for a 10BASE-T Ethernet network is over a twisted pair cable. The connector used for 10BASE-T looks similar to the connector used for your telephone. A 10BASE-5 Ethernet network is used in large networks with many devices where transmissions occur over distant geographic areas. A 10BASE-2 (Thin) Ethernet network is used in smaller networks with all devices being relatively close together.

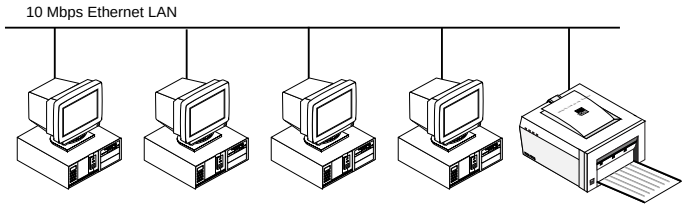


Figure 53 Example of a LAN

What is a WAN?

A Wide Area Network is the result of the connection of two or more LANs, typically using dial up telephone services via a modem and usually over far geographic distances.

How does a LAN connect to a WAN?

You can connect a LAN to a WAN through a number of devices such as a router or a bridge that can place a call to the remote LAN using a dial-up telephone service such as ISDN. Routers and bridges are devices that link networks. A bridge sends every bit of information across the WAN while a router is considered a more sophisticated device because of its ability to route only the desired bits of information across the WAN while checking the integrity of the data and transmission path.

What is a LAN modem?

A LAN modem is a hybrid between a modem that combines the dial-up capabilities of a modem with an Ethernet hub. This eliminates the computer COM port speed bottleneck (the LAN runs at 10 Mbps) while providing local networking between the attached computers on the LAN. Even with this sophisticated functionality, a LAN modem is easy to install and use, making it ideal for small networks.

What is ISDN?

The Integrated Services Digital Network (ISDN) provides a digital telephone service which allows both data and voice communication over the same telephone line and at significantly faster speeds than the traditional Plain Old Telephone Service (POTS) or analog service. There are two types of lines which provide access to ISDN, Basic Rate Interface (BRI) and Primary Rate Interface (PRI). The ISDN LAN Modem supports a BRI interface.

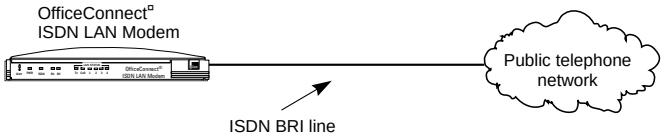


Figure 54 ISDN BRI Line

Each BRI telephone line consists of two 64 Kbps bearer or B channels and one 16 Kbps D channel for each ISDN line. The D channel is the signaling channel; it carries messages between the ISDN LAN Modem and your telephone company's ISDN switch. Note that while the ISDN standard is to have 64 Kbps B channels, some telephone companies or the equipment you are connecting to may use 56 Kbps channels.

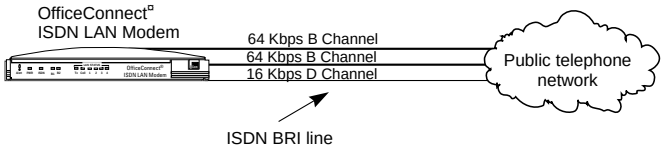


Figure 55 ISDN BRI Line in Detail

A single B channel transmits data or voice traffic at a rate of up to 64 Kbps. The B channels may be used independently to allow two simultaneous connections to different locations as shown in Figure 56.

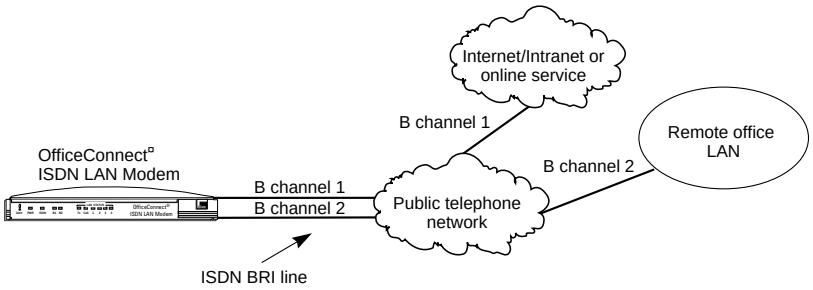


Figure 56 Two Simultaneous Connections

The B channels may also be combined using the Multilink PPP feature to allow one higher speed connection to a single location as shown in Figure 57.

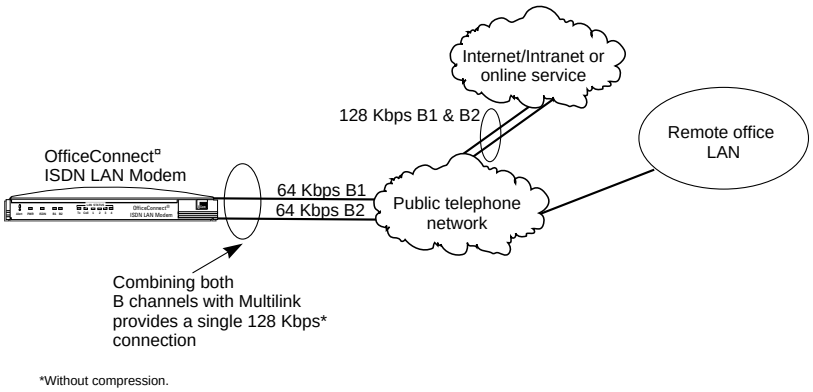


Figure 57 Using Multilink to Combine B Channels for a Single High-Speed Link

How do different devices communicate with each other?

Once the computers are physically connected in a network, they must run some type of standard communications software that allows different types of computers to communicate with each other. Transmission Control Protocol/Internet Protocol (TCP/IP) is becoming the most common software used to accomplish this.

What is TCP/IP?

TCP/IP is a standardized communications protocol that works across LANs and WANs, allowing different devices to communicate with each other. As its name indicates, TCP/IP has two main components, TCP and IP. TCP manages the transfer of data and corrects any errors that occur during transmission. It ensures that data is reliably transferred. IP routes the data in packets from one location to another across a network using the source and destination information within each data packet to determine routing and destinations.

Note that TCP/IP encompasses more than the two protocols which define its name. It comprises a set of software applications that allow various network services such as remote file transfer protocol (FTP), remote login (Telnet), and e-mail Simple Mail Transfer Protocol (SMTP) and Post Office Protocol (POP) 3.

What is an IP Address?

An IP address is a 32 bit address used by TCP/IP to uniquely identify the location of a device on a network. Note that the IP address does not refer to the device itself. If, for example, you relocate a PC to another area of the same network, you may need a new IP address.

The structure of this 32-bit address varies depending upon the size of the network on which the device is located. From largest to smallest, network types are referred to as Class A, Class B, Class C, and Class D. Within each class, a certain number of bits identifies the class, the network and the local address. For example, in a Class C network, the first three bits (110) identify the network type as Class C. The next 21 bits identify the network and the last eight represent the local or host address limiting the number of devices to 256. In contrast, a Class A network allocates 24 bits for local addresses, allowing for many more devices.

IP addresses are composed of four sets of eight bits usually separated by a period.

The IP address of the ISDN LAN Modem identifies the ISDN LAN Modem itself and the network it creates when devices are connected to the Ethernet ports.

What is a Subnet Mask?

Many networks are divided further into smaller sub networks. A subnet mask is a number that identifies the sub network to which your computer is connected. The subnet mask differentiates the part of the IP address that represents the network and the part that represents the host.

The bits of the subnet mask are set to 1 if the host should treat the corresponding bit in the IP address as part of the original network number. These bits in the mask are set to 0 if the host should treat the bits as part of the device number as shown in Figure 58.

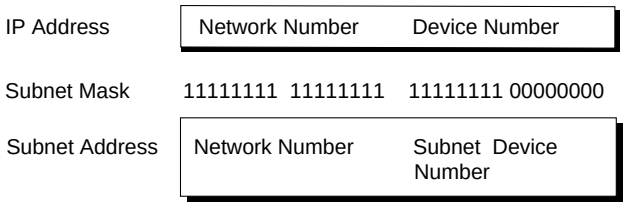


Figure 58 Subnet Mask

Dynamic and Static IP Addresses

IP addresses for public networks must be unique and provided by the Network Information Center (NIC). Because of the increasing popularity of the Internet, the NIC is running out of permanent IP addresses. It is therefore becoming more common to use dynamic IP addresses which are assigned temporarily and then reused, instead of static IP addresses which are permanent. For example, when you access the Internet, your ISP has a pool of IP addresses it uses to provide temporary connections to multiple users. Once you disconnect from the Internet, the IP address you were using is placed back in the pool for use by another user.

If your LAN will not connect to the public Internet, you can set up your own unique (that is, private) IP address numbering. IP addresses for private networks such as an office LAN must also be unique but only within that LAN.

What is DHCP?

Dynamic Host Configuration Protocol automatically assigns a unique, temporary IP address to a newly attached computer on an IP network.

What is DNS?

Domain Name Service translates the common alphabetic name into the numeric IP address. For example, floyds_PC is translated to 192.168.1.2. If you do not use the DHCP functionality of the ISDN LAN Modem, you will have to manually configure the following parameters for each computer on the LAN: IP address, subnet mask, DNS address and default gateway.

What is NAT?

Network Address Translation, also known as IP address sharing, allows multiple users to share a single connection such as an Internet connection. For example, with the ISDN LAN Modem, when users on the LAN launch their Web browser for Internet access, their computer's IP address is translated into the IP address provided by the ISP for access.

You will probably not want to use NAT If your LAN network is static; that is, an IP address is assigned to your computer by your MIS department or ISP and manually configured.

What are numbered and unnumbered links?

Some networks require an IP address to be assigned to a WAN in addition to the LAN(s). If a WAN has an IP address assigned to it, it is considered to be a numbered link. If there is not an IP address assigned to a WAN, it is considered to be an unnumbered link.

How is overall throughput determined?

The performance of all linked devices must be considered to determine end-to-end throughput. Connection performance is affected by each device in the chain. Therefore, the slowest link in the chain determines the maximum throughput. On the LAN side, computers on a typical network can communicate with each other at up to 10 Mbps. When dialing up to a long distance location using ISDN, you can establish a network connection speed of up to 128 Kbps without compression or up to 384 Kbps with compression. If you are dialing into the Internet, the speed of the router providing access must also be considered. In addition, the Internet itself may have speed limitations.

B

USING THE CUSTOM WEB BROWSER

An Internet Explorer Web browser tailored for use with your ISDN LAN Modem is provided on the *3Com Companion Programs* CD-ROM. You may prefer to use this browser as it has been customized for your ISDN LAN Modem, as shown in Figure 59, making it easier to use.

If you use a different Web browser, make sure that it supports frames. (Netscape 3.0 and later and Internet Explorer 3.0 and later both support frames.)

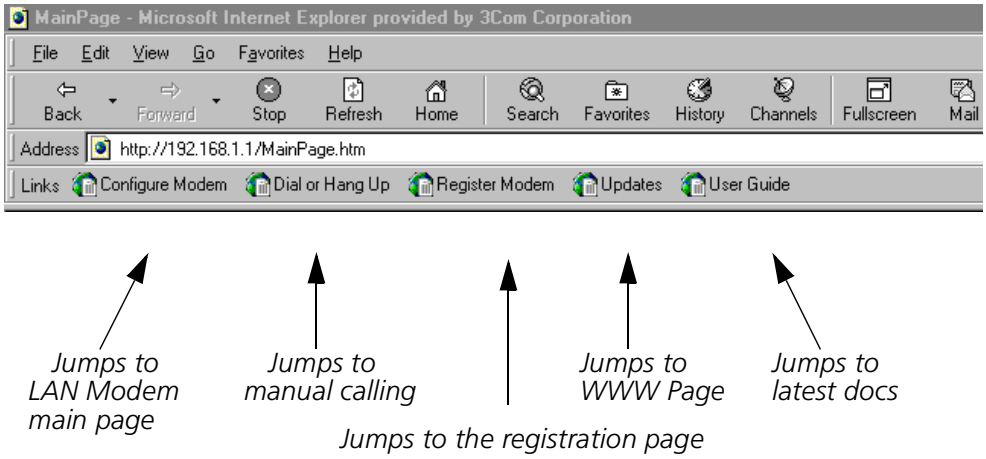


Figure 59 ISDN LAN Modem Custom Internet Explorer Browser

Custom Links

The following custom buttons provide direct links to ISDN LAN Modem configuration and information Web sites.

- Configure Modem

  Click here to jump to the ISDN LAN Modem configuration main page.

- Dial/Hang Up

  Click here to jump to the ISDN LAN Modem's Manual Calling page where you can connect to and disconnect from the service providers you configured.

- Register Modem

  Click here to jump to the ISDN LAN Modem registration page.

- Updates

  Click here to jump to the site where you will find the latest information on the ISDN LAN Modem such as the latest firmware version and user documentation.

- User Guide

  Click here to jump to the Internet location of the *OfficeConnect ISDN LAN Modem User Guide*.

Using Favorites

Under the *Favorites* menu, a subcategory labeled *3Com sites* lists several helpful sites already bookmarked for you. These include:

- 3Com Corporate

  This takes you to the 3Com Corporate Web site.

- 3Com Remote Access

  This takes you to the 3Com Remote Access Web site.

- 3Com Shopping

  This takes you to the 3Com Shopping Network.

- 3Com Small Business

  This takes you to the 3Com Small Business Networking Web site.

- 3Com Support

  This takes you the 3Com Support Web site.

Installing the Custom Internet Explorer Browser

If you already have a version of the Internet Explorer Web browser installed and you would like to install a later, customized version, you should first uninstall the previous version. Also, while installing the later version, you may be asked to replace the older files. It is recommended that you do so.

To install the custom web browser, do the following

1. Insert the *3Com Companion Programs* CD-ROM into your computer's CD-ROM drive.
2. From the main screen, click *Internet Explorer.*
3. Follow the instructions on the screen.

Installing Future Releases of Internet Explorer

Once you install the ISDN LAN Modem custom Internet Explorer Web browser, you can install future release of standard Internet Explorer while maintaining the links listed under Favorites. However, any customized buttons may be removed from the newer version.

C

ISDN LAN MODEM FACTORY DEFAULTS

Table 13 ISDN LAN Modem Factory Defaults

LAN Parameters	
LAN Modem IP Address*	192.168.1.1
Subnet Mask	255.255.255.224
DHCP Server	Enabled
NetBIOS filtering	Disabled
Voice Call Routing	
Calls to Telephone 1	Routed to Phone Port 1 only
Calls to Telephone 2	Routed to Phone Port 2 only
Use Data Compression	No
Use NAT	Yes
Bandwidth on Demand	
Connect/Disconnect Threshold for 2nd B channel	60%
Connect Delay	10 seconds
Disconnect Delay	20 seconds
Supplementary Voice Services	
Call Waiting	Enabled on port 1; Disabled on port 2
Caller ID Blocking	Disabled
Flexible Calling which includes: Call Conference, Hold, Drop, Transfer	Enabled on telephone number 1; Disabled on telephone number 2
Codes	Conference = 60; Transfer = 61; Drop = 62; Message Service = 63.
Message Service for Voice Mail	Disabled on both telephone numbers
Distinctive Ringing	Disabled on both telephone numbers
Data Call Timeout Values	
Minimum Call Duration	2 minutes
Automatic Data Call Inactivity Disconnect	30 seconds
Manual Data Call Inactivity Disconnect	15 minutes

* The ISDN LAN Modem attempts to use this default IP address to communicate with the computer during initial configuration. If communication cannot be established initially, the ISDN LAN Modem will change its default IP address. If this occurs, the IP address will be different from the default shown here.

D

ISDN LAN MODEM SPECIFICATIONS

Refer to Table 14 for the ISDN LAN Modem specifications.

Table 14 ISDN LAN Modem Specifications

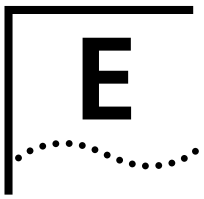
Network Interface	ISDN Basic rate telephone service provided by the telephone company
Network (ISDN) Connector	RJ49C
Facility Interface Code	02IS5
ISDN Interface Type	U (integrated NT1)
LAN Interface	Ethernet IEEE 802.3 10BASE-T standard
Physical Dimensions	
Length	8.66 in (22.0 cm)
Width	5.44 in (13.8 cm)
Height	1.56 in (4.0 cm)
Environmental Operating Range	
Operating temperature	50° to 122°F (10° to 50°C)
Relative humidity	Up to 90% noncondensing
Power	
Input	120 VAC *
Output	13 VDC
Ringer Equivalence Number (REN)	3 per analog phone port on up to 200 feet of AWG 26 or heavier AWG wiring
Phone Port Loop Current	25 mA per port
Ringing Voltage	42 VAC
EMI Certification	FCC Part 15, Part 68, Class B

* You must use the power supply provided with your ISDN LAN Modem.

Year 2000 Compliance

The OfficeConnect ISDN LAN Modem is Year 2000 compliant. Specifically, its system clock is capable of accepting and storing dates including and beyond the year 2000.

For information on Year 2000 compliance and 3Com products, visit the 3Com Year 2000 web page:
http://www.3Com.com/products/yr2000.html



ORDERING ISDN SERVICE

This appendix describes how to order ISDN service. Refer to the appropriate section.

- If you are ordering ISDN for the first time, refer to "If You Place Your ISDN Order Through 3Com" to have 3Com order ISDN service for you, free of charge.
- To call your telephone company and order ISDN yourself, refer to "If You Place Your ISDN Order Through the Telephone Company."
- If you already have ISDN, refer to "What If I Already Have ISDN Service?".

ISDN line provisioning information is subject to change. Visit **`http://www.remoteaccess.3com.com/support/docs/lanmodem/welcome.html`** *for the latest information.*

If You Place Your ISDN Order Through 3Com

Simply call 1-800-343-3266 to have your ISDN line ordered for you. 3Com's SupernetAccess service will provide the appropriate line parameters to your telephone company and schedule installation of your ISDN line wherever possible. Be sure to ask for the order code or order confirmation number.

If You Place Your ISDN Order Through the Telephone Company

To simplify the many features available for ISDN, Bellcore has created several packages, called ISDN Ordering Codes (IOC), for choosing an ISDN line configuration that best fits your needs. Of these packages, 3Com has two recommendations, each of which allows you to take the fullest advantage of the supplementary voice features supported by the ISDN LAN Modem. The ISDN LAN Modem has completed the ISDN Ordering Codes Translations Review and is registered with EZ-ISDN 1 and EZ-ISDN 1A.

Your choice will depend on whether or not you want Voice Mail capability on your line:

- For ISDN without Voice Mail, 3Com recommends **Capability Package U or EZ-ISDN 1.**
- For ISDN with Voice Mail, 3Com recommends **Capability Package V or EZ-ISDN 1A.**

For a complete explanation of these Capability Packages, the specific supplementary services included with each, and certain limitations in their coverage which relate to the ISDN LAN Modem, refer to the two sections, "Supplementary Voice Features Included with U, EZ-ISDN-1, V and EZ-ISDN 1A" and "Limitations of ISDN Ordering Codes U, EZ-ISDN 1, V and EZ-ISDN 1A."

Placing Your Order To order ISDN service from the telephone company for the ISDN LAN Modem:

1. Call the telephone company and ask for the ISDN representative.
2. Tell the representative that you would like to place an order for ISDN service for an OfficeConnect ISDN LAN Modem.
   - For ISDN service without Voice Mail, request that your line be provisioned according to Bellcore **Capability Package U or EZ-ISDN 1.**
   - For ISDN service with Voice Mail, request that your line be provisioned according to Bellcore **Capability Package V or EZ-ISDN 1A.**

If your telephone company does not recognize these Bellcore Capability Packages or ISDN Codes, call 1-800-343-3266 and have 3Com order your ISDN line for you.

3. Ask to have the following extra services enabled on your second line if you want support on both telephone numbers for the service indicated (automatic support for these services is provided on your first telephone number only. For a complete explanation, refer to "Supplementary Voice Features Included with U, EZ-ISDN-1, V and EZ-ISDN 1A").
   - **Additional Call Offering (ACO)** -- this adds Call Waiting (and Dynamic Bandwidth Allocation) to your second line.
   - **Flexible Call Offering (FCO)** -- this adds Call Conference (Three-Way Calling) and Call Transfer to your second line.
   - **Call Forwarding Variable** -- this adds Call Forwarding to your second line.
   - **Voice Mail** (if you are ordering V or EZ-ISDN 1A) -- this adds Voice Mail to your second line.
4. If you would like outgoing Caller ID Blocking, ask to have **Calling Number Privacy** enabled on either line, or both.
5. Ask the representative which ISDN switch type your ISDN line will be using. Place a check mark on the appropriate line on the ISDN Information Sheet, Figure 50 in Chapter 6.

The ISDN LAN Modem does not support supplementary voice services for Lucent Technologies 5ESS® Custom switches. If you would like to use these services, ask the representative if another switch type is available for your ISDN line.

6. Ask the ISDN representative to provide the information you need to fill out the rest of the ISDN Information Sheet, Figure 50 in Chapter 6. You will need the phone numbers provided by your ISDN representative when you configure your ISDN LAN Modem. (The rest of the information is not necessary for the configuration itself, but you may find it helpful to have this information on hand.)

   This completes the procedure for ordering your ISDN line.

Supplementary Voice Features Included with U, EZ-ISDN-1, V and EZ-ISDN 1A

Package U or EZ-ISDN 1 includes automatic support on telephone number 1 for the following supplementary voice features, which are also supported by the ISDN LAN Modem:

- Call Waiting
- Call Conference (or Three-Way Calling)
- Call Transfer
- Call Forwarding
- Caller ID

Package V or EZ-ISDN 1A includes automatic support on telephone number 1 for all of the above features, plus Voice Mail.

For the purposes of ordering your ISDN line, Packages U and EZ-ISDN 1 are equivalents. Both offer support for the same set of supplementary voice services. In some regions you will encounter the term ***IOC U*** *or* ***Package U****; in others, you will encounter the term* ***EZ-ISDN 1.***

Packages V and EZ-ISDN 1A are also equivalents. They differ from U and EZ-ISDN 1 only by the addition of Voice Mail to the list of their services.

Limitations of ISDN Ordering Codes U, EZ-ISDN 1, V and EZ-ISDN 1A

Although IOC U, EZ-ISDN 1, V and EZ-ISDN 1A are the ISDN Ordering Codes which will best allow you to take advantage of the ISDN LAN Modem's supplementary voice features, certain limitations do exist in the way your ISDN line is provisioned under them, as described here:

Simultaneous Voice and Data on the Same Telephone Number

- Under U, EZ-ISDN 1, V and EZ-ISDN 1A, support for simultaneous voice and data on the same telephone number is not provided. This means that while you are on a circuit-switched data call, you will not be able to place or receive a telephone or fax call on telephone number 2. A circuit-switched data call always uses telephone number 2 for the first B channel; therefore, whenever you are on a data call, telephone number 2 becomes unavailable for incoming or outgoing voice calls (telephone or fax). Telephone number 1, however, will remain available for a voice call while you are on a data call.

  When your ISDN LAN Modem is set to its default settings, telephone number 1 is routed to Port 1 as a telephone line, while telephone number 2 is routed to Port 2 as a fax line. If a data call is launched to the Internet, you will be able to receive a telephone call but not a fax call while you are connected. Likewise, if a fax happens to come in while you are dialing in to the Internet, you will be unable to place the call to the Internet.

  If you must have simultaneous data and voice capability on the same telephone number, refer to the section, "If You Must Have Simultaneous Voice and Data Capability on Both Numbers."

For a complete list of the capabilities of ISDN Ordering Codes U, EZ-ISDN 1, V, and EZ-ISDN 1A, refer to "Table of ISDN Ordering Code Capabilities."

Supplementary Voice Services on Telephone Number 1 Only

- Under IOC U, EZ-ISDN 1, V and EZ-ISDN 1A, automatic support for the following features applies only to telephone number 1:
  - Call Waiting
  - Call Conference
  - Call Transfer
  - Call Forwarding
  - Voice Mail (for V and EZ-ISDN 1A)

  If you want support for these features on your second telephone number in addition to your first, you must ask your telephone company to enable the following extra services on your second line:
  - **Additional Call Offering (ACO)** -- for Call Waiting (and Dynamic Bandwidth Allocation)
  - **Flexible Call Offering (FCO)** -- for Call Conference (Three-Way Calling) and Call Transfer
  - **Call Forwarding Variable** -- for Call Forwarding
  - **Voice Mail** (if you are ordering V or EZ-ISDN 1A) for Voice Mail

  Also under U, EZ-ISDN 1, V, and EZ-ISDN 1A, there is no automatic support for **Outgoing Caller ID Blocking**, a supplementary voice feature which is supported by the ISDN LAN Modem. You can, however, request to have Outgoing Caller ID Blocking added to either telephone number, or both, by asking for **Calling Number Privacy**.

  Only **Caller ID** is automatically supported on both telephone numbers under packages U, EZ-ISDN 1, V and EZ-ISDN 1A.

There may be a charge for adding these services to your line. Check with your telephone company.

If You Must Have Simultaneous Voice and Data Capability on Both Numbers

If you must have the ability to place a circuit-switched data and voice call simultaneously on the same telephone number, you can do the following, depending upon the ISDN switch type used by your telephone company:

For Lucent Technologies 5ESS® Switches

When you call your telephone company to order ISDN, ask for Capability Package U or EZ-ISDN 1 (or V or EZ-ISDN 1A, if you want Voice Mail). In addition to any extra supplementary voice services you ask to have added to your line(s), ask to have the parameter called "Maximum B Channel" (MAXBCHL) set to 2 for both telephone numbers.

For Siemens EWSD Switches

When you call your telephone company to order ISDN, ask for Capability Package U or EZ-ISDN 1 (or V or EZ-ISDN 1A, if you want Voice Mail). In addition to any extra supplementary voice services you ask to have added to your line(s), ask to have the following parameter set to 2 for both telephone numbers: "Number of B Channels Per Call Type Per Office Equipment Directory Number" (NBCCTOEDN) -- also known as "BCHCT."

For Nortel DMS-100® Switches

If your line is provisioned on a Nortel DMS-100® switch, then regardless of the ISDN Ordering Code you choose, you cannot have simultaneous voice and data on the same phone number because of a limitation with the central office switches.

What If I Already Have ISDN Service?

If you already have ISDN service installed for your ISDN LAN Modem and you used an ISDN Ordering Code (IOC) other than U/EZ-ISDN 1 or V/EZ-ISDN 1A (for example, you may have ordered Capability Package S1, 3Com's prior recommendation for ISDN LAN Modem firmware version 5.00, which did not include support for supplementary voice services), you will need to make changes to your line if you wish to use all the supplementary voice services supported by ISDN LAN Modem, firmware version 5.1.0 or later.

How S1 Differs from U/EZ-ISDN 1 and V/EZ-ISDN 1A

Capability Package S1 is a special ordering code which provides support for simultaneous voice and data on the same Directory Number where Packages U/EZ-ISDN 1 and V/EZ-ISDN 1A do not. S1 also provides Additional Call Offering (ACO) -- which allows for Call Waiting and Dynamic Bandwidth Allocation -- on both telephone numbers, whereas U/EZ-ISDN 1 and V/EZ-ISDN 1A provide ACO automatically on Directory Number 1 only.

S1 does not, however, provide support for the other supplementary voice features supported by the ISDN LAN Modem (Call Conference, Call Transfer, and Call Forwarding) which are available under U/EZ-ISDN 1 and V/EZ-ISDN 1A. (Note, also, that S1 does not support Voice Mail.)

All three ordering codes, S1, U/EZ-ISDN 1, and V/EZ-ISDN 1A, provide automatic support for Caller ID on both Directory Numbers. None of them provides automatic support for Caller ID Blocking.

If You Are Currently Using Capability Package S1 and Would Like to Add Supplementary Voice Services

If you are currently using Capability Package S1 and would like to use all or some of the supplementary voice services supported by the ISDN LAN Modem, firmware version 5.1.0 or later, 3Com recommends that you call your telephone company and ask to have the following extra services added to Directory Number 1, Directory Number 2, or both, on your existing line (Note that there may be an additional charge to have these services added.):

- For Voice Mail, ask for Voice Mail
- For Call Conference (Three-Way Calling) and Call Transfer, ask for Flexible Call Offering (FCO)
- For Call Forwarding, ask for Call Forwarding Variable
- For outgoing Caller ID Blocking, ask for Calling Number Privacy

Some telephone companies may choose to refer to the Flexible Calling features by unique terminology.

If You Are Unable to Have Supplementary Voice Services Added to S1

If your telephone company does not allow piecemeal additions to your line provisioning (for example, ACO and FCO are not available on a Lucent 5ESS Custom Switch), 3Com recommends that you change your line to Package U or

EZ-ISDN 1 (if you do not want Voice Mail) or Package V or EZ-ISDN 1A (if you want Voice Mail).

If you make this change, however, you should be aware that certain constraints apply to both U/EZ-ISDN 1 and V/EZ-ISDN 1A -- in particular, that these codes do not provide support for simultaneous voice and data on the same Directory Number. For a full explanation of these constraints, refer to the section, "What Are the Supplementary Voice Services Included in U/EZ-ISDN 1 and V/EZ-ISDN 1A?" If you must have simultaneous voice and data on the same Directory Number, refer to the section, "What If I Need Simultaneous Voice and Data Capability on Both Numbers?"

Table of ISDN Ordering Code Capabilities

Table 15 lists the exact supplementary voice services included under Capability Packages U, EZ-ISDN 1, V and EZ-ISDN 1A, 3Com's recommended ISDN Ordering Codes for use with the ISDN LAN Modem.

Table 15

	Package U or EZ-ISDN 1		***Package V or EZ-ISDN 1A***	
Supplementary Voice Service	**Automatic Support on Telephone Number1?**	**Automatic Support on Telephone Number2?**	**Automatic Support on Telephone Number1?**	**Automatic Support on Telephone Number2?**
Call Waiting and Dynamic Bandwidth Allocation (Additional Call Offering)	YES	NO	YES	NO
Call Conference and Call Transfer (Flexible Call Offering)	YES	NO	YES	NO
Call Forwarding (Call Forwarding Variable)	YES	NO	YES	NO
Caller ID	YES	YES	YES	YES
Outgoing Caller ID Blocking (Calling Number Privacy)	NO	NO	NO	NO
Voice Mail	NO	NO	YES	NO

GLOSSARY

B channel Bearer channel. In ISDN communications, a B channel transmits data or voice traffic at a rate of up to 64 Kbps.

BRI Basic Rate Interface. A BRI line is one of two access methods to the ISDN; PRI is the other. Each BRI consists of two 64 Kbps B channels and one 16 Kbps D channel for each ISDN line.

BACP/BAP Bandwidth Allocation Control Protocol (BACP) and Bandwidth Allocation Protocol (BAP) are used in conjunction with the Multilink PPP feature. When Multilink PPP is negotiated, the BACP negotiates with the peer equipment to determine whether the peer supports BAP. If the peer supports BAP and agrees to use BAP, then the BAP negotiates the addition and removal of the second B channel with the peer equipment based on a user-defined threshold. A key advantage of BACP/BAP is that it provides a higher probability of establishing a Multilink PPP call during high traffic conditions by providing a specific telephone number for the second B channel to call.

CHAP Challenge Handshake Authentication Protocol. CHAP is one of two PPP authentication protocols supported by the ISDN LAN Modem; PAP is the other. An authentication protocol requests information to verify a valid user. CHAP is a stronger authentication method because it uses encryption and may repeatedly request verification of the identity of the user any time after link establishment.

compression Compression is a method of reducing the size of data packets without losing any information. The ISDN modem automatically compresses data for PPP calls to improve data transfer times using a compression method called Hi/fn LZS.

D channel The signaling channel on an ISDN line used to carry messages between the ISDN LAN Modem and the public switch.

DBA Dynamic Bandwidth Allocation. DBA is a method of reallocating bandwidth (such as a B channel) automatically. DBA allows you to place or receive a voice call while a Multilink PPP call is active.

DHCP Dynamic Host Configuration Protocol. DHCP allows a server to automatically assign an IP address to a newly-attached computer on an IP network.

default Value set at the factory.

domain A domain is a unique name which refers to a single entity on the Internet and is used for organizational purposes.

DNS Domain Name Server. DNS translates the common alphabetic name into the numeric IP address. For example, floyds_PC is translated to 192.168.1.2.

firmware Firmware is the code which resides in the ISDN Modem and controls its behavior. It differs from software in the form of programs that run on your computer.

IP address An IP address is a set of numbers that uniquely identifies each device in a network.

ISDN Integrated Services Digital Network. ISDN provides a digital telephone service which allows both data and voice communication over the same telephone line and at significantly faster speeds than the traditional POTs service. There are two types of lines which provide access to ISDN, BRI and PRI.

ISP Internet Service Provider. A business that supplies access to the Internet such as your telephone company or AOL.

Kbps Kilobits per second. Kbps is the rate at which data is transmitted between communication equipment such as ISDN modems.

Layer 1 In ISDN communications, the physical layer of communication between the communications equipment. If layer one is down, there is no ISDN connection between the devices.

MS-CHAP Microsoft's proprietary version of CHAP. See also CHAP.

Multilink PPP Multilink Point-to-Point Protocol. Multilink PPP is a protocol which provides a method for combining multiple PPP connections. With a BRI line, Multilink PPP aggregates the two 56 Kbps or 64 Kbps ISDN B channels, creating a virtual single digital connection of 112 Kbps or 128 Kbps.

National ISDN An ISDN standard that enables consistency in ISDN service features across different vendors' equipment and switches for North America.

NetBIOS Filtering NetBIOS filtering is a LAN Modem feature that helps prevent the LAN Modem from establishing unwanted calls by filtering the DNS requests made by NetBIOS that inadvertently cause the LAN Modem to place a call. NetBIOS is a protocol primarily used by Windows 98, 95 and NT for local file and printer sharing.

Network terminator (NT1) A network termination device that terminates the ISDN line.An NT1 is built into the ISDN LAN Modem with the U interface. An NT1 is built into the ISDN LAN Modem with the U interface (3C892).

PAP Password Authentication Protocol. PAP is one of two PPP authentication protocols supported by the ISDN LAN Modem; CHAP is the other. An authentication protocol requests information to verify a valid user. PAP requests the user's name and password for verification.

PC/TCP PC/TCP is a PC version of TCP/IP created by FTP software.

POTS Plain old telephone service.

PPP Point-to-Point Protocol. PPP provides a standard method of transmitting data through the Internet. PPP is used for communication between a computer and an Internet service provider.

PPTP Point-to-Point Tunneling Protocol. A protocol that allows a workstation to establish a secure multi-protocol connection to a remote, private network via a locally-dialed ISP account. See also VPN.

PRI Primary Rate Interface. A PRI line is one of two access methods to the ISDN; BRI is the other. In North America, each PRI consists of twenty-three 64 Kbps B channels and one 64 Kbps D channel.

router A router is a device that links networks.

SPID Service Profile Identifier. If required, this number is supplied to you by the telephone company. Typically, if your ISDN line has only one telephone number, a SPID is not required.

TCP/IP Transmission Control Protocol/Internet Protocol. TCP/IP is a standardized communications protocol which allows different types of devices to communicate with each other over LANs and WANs.

TollMizer TollMizer (also referred to as Switched 56 Permissive or Data Over Voice) makes a 56 Kbps data call over a voice circuit, allowing you to save the typical cost difference between a voice and data call. Note that the destination you are calling must also support this feature.

UDP User Datagram Protocol. A connectionless protocol within TCP/IP that converts application-generated data messages into packets that can be sent via IP. UDP does not check for transmission errors therefore it does not perform retransmission. Reliability is dependent upon the application. Note that because it does not perform checking, UDP is more efficient than TCP. UDP is commonly used for Internet games.

VPN A virtual private network is a secure, private data network that is established over the Internet resulting in significant cost savings from using local, toll free access numbers. Also, because the existing Internet backbone is used, there is less investment needed in private network infrastructure. See also PPTP.

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3Com Corporation LIMITED WARRANTY

OfficeConnect ISDN LAN Modem

HARDWARE

3Com warrants this hardware product to be free from defects in workmanship and materials, under normal use and service, for the following length of time from the date of purchase from 3Com or its authorized reseller:

Lifetime, except that the fan and power supply hardware (if any) are warranted for one (1) year.

3Com's sole obligation under this express warranty shall be, at 3Com's option and expense, to repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or if neither of the two foregoing options is reasonably available, 3Com may, in its sole discretion, refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned. 3Com warrants any replaced or repaired product or part for ninety (90) days from shipment, or the remainder of the initial warranty period, whichever is longer.

SOFTWARE

3Com warrants that each software program licensed from it will perform in substantial conformance to its program specifications, for a period of ninety (90) days from the date of purchase from 3Com or its authorized reseller. 3Com warrants the media containing software against failure during the warranty period. No updates are provided. 3Com's sole obligation under this express warranty shall be, at 3Com's option and expense, to refund the purchase price paid by Customer for any defective software product, or to replace any defective media with software which substantially conforms to applicable 3Com published specifications. Customer assumes responsibility for the selection of the appropriate applications program and associated reference materials. 3Com makes no warranty or representation that its software products will meet Customer's requirements or work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third party products listed in the 3Com software product documentation or specifications as being compatible, 3Com will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a "bug" or defect in the third party's product or from use of the software product not in accordance with 3Com's published specifications or user manual.

YEAR 2000 WARRANTY

In addition to the Hardware Warranty and Software Warranty stated above, 3Com warrants that each product sold or licensed to Customer on and after January 1, 1998 that is date sensitive will continue performing properly with regard to such date data on and after January 1, 2000, provided that all other products used by Customer in connection or combination with the 3Com product, including hardware, software, and firmware, accurately exchange date data with the 3Com product, with the exception of those products identified at 3Com's Web site, http://www.3com.com/products/yr2000.html, as not meeting this standard. If it appears that any product that is stated to meet this standard does not perform properly with regard to such date data on and after January 1, 2000, and Customer notifies 3Com before the later of April 1, 2000, or ninety (90) days after purchase of the product from 3Com or its authorized reseller, 3Com shall, at its option and expense, provide a software update which would effect the proper performance of such product, repair such product, deliver to Customer an equivalent product to replace such product, or if none of the foregoing is feasible, refund to Customer the purchase price paid for such product.

Any software update or replaced or repaired product will carry a Year 2000 Warranty for ninety (90) days after purchase or until April 1, 2000, whichever is later.

OBTAINING WARRANTY SERVICE

Customer must contact a 3Com Corporate Service Center or an Authorized 3Com Service Center within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase from 3Com or its authorized reseller may be required. Products returned to 3Com's Corporate Service Center must be pre-authorized by 3Com with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment, and it is recommended that they be insured or sent by a method that provides for tracking of the package. The repaired or replaced item will be shipped to Customer, at 3Com's expense, not later than thirty (30) days after 3Com receives the defective product.

Dead- or Defective-on-Arrival. In the event a product completely fails to function or exhibits a defect in materials or workmanship within the first forty-eight (48) hours of installation but no later than thirty (30) days after the date of purchase, and this is verified by 3Com, it will be considered dead- or defective-on-arrival (DOA) and a replacement shall be provided by advance replacement. The replacement product will normally be shipped not later than three (3) business days after 3Com's verification of the DOA product, but may be delayed due to export or import procedures. When an advance replacement is provided and Customer fails to return the original product to 3Com within fifteen (15) days after shipment of the replacement, 3Com will charge Customer for the replacement product, at list price.

3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com for repair, whether under warranty or not.

WARRANTIES EXCLUSIVE

IF A 3COM PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY, CORRESPONDENCE WITH DESCRIPTION, AND NON-INFRINGEMENT, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. 3COM NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE OR USE OF ITS PRODUCTS.

3COM SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT OR MALFUNCTION IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO OPEN, REPAIR OR MODIFY THE PRODUCT, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, OTHER HAZARDS, OR ACTS OF GOD.

LIMITATION OF LIABILITY

TO THE FULL EXTENT ALLOWED BY LAW, 3COM ALSO EXCLUDES FOR ITSELF AND ITS SUPPLIERS ANY LIABILITY, WHETHER BASED IN CONTRACT OR TORT (INCLUDING NEGLIGENCE), FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE, OR INTERRUPTION OF ITS PRODUCTS, EVEN IF 3COM OR ITS AUTHORIZED RESELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND LIMITS ITS LIABILITY TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. THIS DISCLAIMER OF LIABILITY FOR DAMAGES WILL NOT BE AFFECTED IF ANY REMEDY PROVIDED HEREIN SHALL FAIL OF ITS ESSENTIAL PURPOSE.

DISCLAIMER

Some countries, states, or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights which may vary depending on local law.

GOVERNING LAW

This Limited Warranty shall be governed by the laws of the State of California, U.S.A. excluding its conflicts of laws principles and excluding the United Nations Convention on Contracts for the International Sale of Goods.

3Com Corporation
5400 Bayfront Plaza
Santa Clara, CA 95054
(408) 326-5000

DECLARATION OF CONFORMITY

3Com Corporation
5400 Bayfront Plaza
Santa Clara, CA USA 95052-8145

3Com Corporation declares that the product OfficeConnect ISDN LAN modem conforms to the FCC's specifications:

Part 15

Operation is subject to the following conditions:

1this device may not cause harmful interference, and

2this device must accept any interference received, including interference that may cause undesired operation.

FCC PART 68 STATEMENT

3Com Corporation
Model No: 3C891
Made in U.S.A.

This device complies with Part 68 of the FCC Rules. On the back of this equipment is a label that contains, among their information, the FCC registration number for this equipment. If requested, this information must be provided to the telephone company.

An FCC compliant telephone cord with a modlular plug is provided with this equipment. This device connects to the telephone network via an RJ45 plug and jack. The plug and jack also comply with FCC part 68 rules.

If this device causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But, if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could effect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this device, for repair and warranty information, please refer to the Technical Support insert.

In the event of device malfunction, all repairs should be performed by 3Com or an authorized agent. It is the responsibility of users requiring service to report the need for service to our company or to one of our authorized agents. In the event service is required, refer to the Technical Support insert for information.

If the device is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

This registered device is capable of providing users access to interstate providers of operator services through those of equal access codes.

This registered device provides proper answer supervision to the PSTN when DID calls are answered by the called station, answered by the attendant, routed to a recorded announcement that can be administered by the CPE user, or routed to a dial prompt and this is device returns answer supervision on all DID calls forwarded to the PSTN. Permissible exceptions are as follows: a call is unanswered, a busy tone is received, a recorded tone is received.

CANADIAN NOTICE

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operation, and safety requirements. The Department does not guarantee the equipment will operate to the users' satisfaction.

Before installing this equipment, users should ensure that is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.