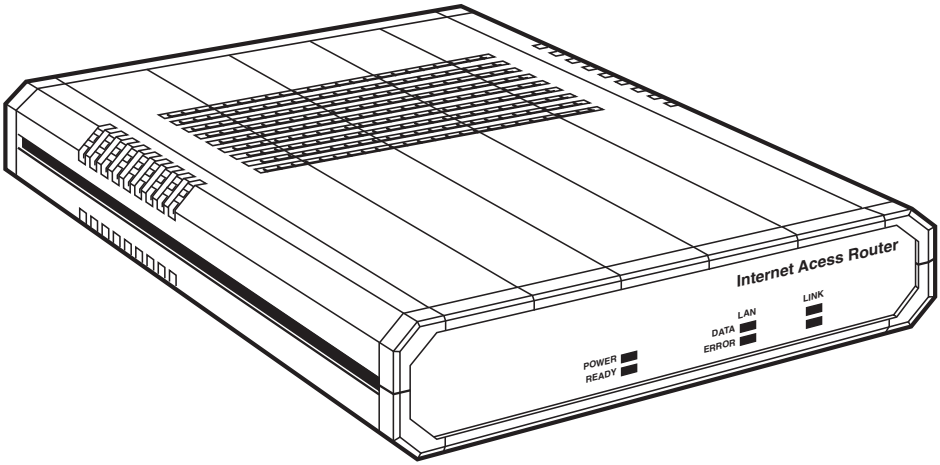
JANUARY 1997

LR0002A-BSDN	LR0002A-BV35	LR0002A-TSDN	LR0002A-TV35
LR0002A-BUDN	LR0002A-BV36	LR0002A-TUDN	LR0002A-TV36
LR0002A-BCSU	LR0002A-BX21	LR0002A-TCSU	LR0002A-TX21
LR0002A-BV24	LR0002A-B530	LR0002A-TV24	LR0002A-T530

Internet Access Router



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AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industry Canada.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

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CONTENTS

CONTENTS (continued)

CONTENTS (continued)

1. Specifications

LAN Interface

Standard — Conforms to IEEE 802.3

Type — *B models:* 10BASE2 (BNC) (Thin Ethernet);
T models: 10BASE-T (UTP)

Link Interface

Model	Interface	Connectors	Data Rates
LR0002A-BSDN	ISDN "S" Interface	RJ-45	Up to 64 Kbps
LR0002A-BUDN	ISDN "U" Interface	RJ-45	Up to 64 Kbps
LR0002A-BCSU	CSU/DSU	RJ-45	Up to 56 Kbps
LR0002A-BV24	V.24/RS-232	DB25 female	Up to 64 Kbps (asynchronous) 2.4 to 115.2 Kbps (synchronous)
LR0002A-BV35	V.35	34-pin female	Up to T1
LR0002A-BV36	V.36/RS-422	DB37 female	Up to T1
LR0002A-BX21	X.21	DB15 female	Up to T1
LR0002A-B530	RS-530	DB25 female	Up to T1
LR0002A-TSDN	ISDN "S" Interface	RJ-45	Up to 64 Kbps
LR0002A-TUDN	ISDN "U" Interface	RJ-45	Up to 64 Kbps
LR0002A-TCSU	CSU/DSU	RJ-45	Up to 56 Kbps
LR0002A-TV24	V.24/RS-232	DB25 female	Up to 64 Kbps (asynchronous) 2.4 to 115.2 Kbps (synchronous)
LR0002A-TV35	V.35	34-pin female	Up to T1
LR0002A-TV36	V.36/RS-422	DB37 female	Up to T1
LR0002A-TX21	X.21	DB15 female	Up to T1
LR0002A-T530	RS-530	DB25 female	Up to T1

Protocol — Synchronous/asynchronous PPP, SLIP, CSLIP, Multi-link PPP

Control Interface

Type — V.24/RS-232

Connector — DB9 (rear panel)

Data Rate — 2.4 to 19.2 Kbps, 8 bits, no parity, automatic rate detection

LED Indicators

Power — ON when unit is powered

Ready — ON when packets can be transferred

LAN Data — ON when a packet is received or transmitted on the LAN side

LAN Err — ON when LAN interface indicates an error

Link Data — ON when a packet is received or transmitted on the LINK side

Link Err — ON when LINK interface indicates an error

Panel Controls

Power ON/OFF — Rear-panel power supply

Voltage — 100-230 VAC

Frequency — 47 to 63 Hz

Power — 10 VA Max.

Environment

Temperature — 32 to 122 °F (0 to 50 °C)

Humidity — 0 to 90%, non-condensing

Physical

Size — 1.8”H x 8.5”W x 9.6”D (4.4 x 21.6 x 24 cm)

Weight — 2.1 lb. (0.96 kg)

2. Introduction

2.1 Internet Access Router Description

The Internet Access Router is a standalone IP router for the small office. It connects a small or medium-sized network to the Internet or Intranet. Quick setup and configuration menus provide on-screen instructions that guide you through installation and configuration procedures. The following models are available:

Table 2-1. Internet Access Router Models.

Model	LAN Interface	Link Interface
LR0002A-BSDN	10BASE2 (BNC)	ISDN “S” Interface
LR0002A-BUDN	10BASE2 (BNC)	ISDN “U” Interface
LR0002A-BCSU	10BASE2 (BNC)	CSU/DSU
LR0002A-BV24	10BASE2 (BNC)	V.24/RS-232
LR0002A-BV35	10BASE2 (BNC)	V.35
LR0002A-BV36	10BASE2 (BNC)	V.36/RS-422
LR0002A-BX21	10BASE2 (BNC)	X.21
LR0002A-B530	10BASE2 (BNC)	RS-530
LR0002A-TSDN	10BASE-T (UTP)	ISDN “S” Interface
LR0002A-TUDN	10BASE-T (UTP)	ISDN “U” Interface
LR0002A-TCSU	10BASE-T (UTP)	CSU/DSU
LR0002A-TV24	10BASE-T (UTP)	V.24/RS-232
LR0002A-TV35	10BASE-T (UTP)	V.35
LR0002A-TV36	10BASE-T (UTP)	V.36/RS-422
LR0002A-TX21	10BASE-T (UTP)	X.21
LR0002A-T530	10BASE-T (UTP)	RS-530

The Internet Access Router includes a feature called Single IP, which allows users in a small office to connect to the Internet/Intranet quickly and transparently. Connection can be made via ISDN, PSTN, Frame Relay, or Leased Lines. A description of the Single IP features can be found in **Section 2.5**.

2.2 Features

- Connects a small office to the Internet/Intranet.
- Supports Single IP, which allows a user to connect to the Internet/Intranet quickly and transparently.
- PPP multi-link support enables maximum use of ISDN lines.
- Integral Frame Relay operating at data rates up to T1.
- Supports asynchronous, synchronous, ISDN, and CSU/DSU WAN interfaces.
- Supports 10BASE2 or 10BASE-T LAN interface.
- Supports TELNET, allowing configuration and control of the device over WAN and LAN.
- Fast installation can be performed from a terminal emulator or via TELNET.
- PAP/CHAP provides access authentication.
- Solid Firewall feature allows the user to block all access from the outside into the LAN.
- Undesired access to the Router via TELNET or SNMP can be blocked.
- Connection on demand feature reduces WAN costs.
- An SNMP agent provides management by any standard SNMP management station.
- Software downloading is available using XMODEM or TFTP.

2.3 Application

The Internet Access Router connects your Ethernet LAN to the Internet or Intranet. Connection is made via ISDN BRI, Frame Relay, PSTN, leased line, or DDS (see **Figure 2-1**).

ISDN BRI (Integrated Services Digital Network)—ISDN is a telecommunications standard that is capable of sending digitally encoded voice, data, video, and other signals on the same line. BRI (Basic Rate Interface) indicates that the service is provided over two B channels of 64K each.

Frame Relay is a network interface that provides high-speed frame or packet transmission with minimum delay and maximum use of bandwidth.

PSTN (Public Switched Telephone Network) is the telecommunications network commonly accessed by telephones, key systems, private telephone exchanges, and data equipment. Access can be via regular switched circuits, or dedicated leased lines.

DDS (Digital Data Service)—Digital leased lines that support transmission rates between 2.4 and 56 Kbps.

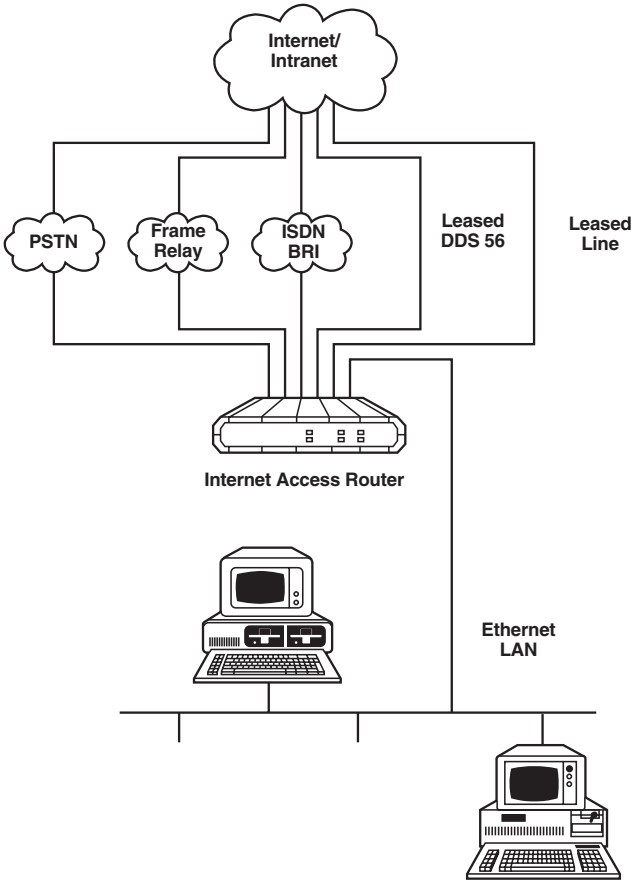


Figure 2-1. Typical Application of the Internet Access Router.

2.4 Internet Access Router and Single IP

Single IP is a feature of the Internet Access Router that can be enabled or disabled by the user. When Single IP is enabled, the Router allows users in a small office to connect to the Internet/Intranet quickly and transparently. Connection can be made via ISDN, PSTN, Frame Relay, or leased lines. Single IP also completely protects all the small office users from hackers on the Internet and Intranet.

Normally, a LAN requires a complete statically assigned, unique, and legal subnet in order to connect to the Internet or Intranet. Single IP allows an entire small office to connect to the Internet or Corporate Intranet using only one dynamically assigned IP address received from the IP Provider via a dial-up modem, ISDN, Frame Relay, or leased-line connection.

Single IP is recommended for small-office LANs where up to around 20 users are expected at any one instant to access the Internet/Intranet.

2.5 Single IP Features

- Allows a small office to connect to the Internet/Intranet in the same way as a single PC.
- Requires only one legal IP address.
- Dynamically obtains a single temporary IP address from the Router at the other end of the connection (your Internet service provider, for example) using standard IPCP.
- Allows a small office to use any private IP subnet.
- Allows up to 20 users to access the Internet/Intranet via Single IP simultaneously.
- Allows Web browsing, FTP, Telnet, E-mail, News, and other IP applications using any TCP/IP stack on any type of station in the small office.
- Provides total security against Internet hackers using the Solid Firewall feature.
- Allows automatic connection and disconnection of the link by Single IP based on actual or specific use of the Internet/Intranet.
- Allows filtering of traffic on the link to reduce waste of bandwidth and to improve security.

3. Quick Installation

This section describes procedures for quick installation and connection of the Internet Access Router to the Internet/Intranet. A checklist describes things you should do before connecting to the Internet/Intranet. For more detailed installation instructions, refer to **Chapter 4**.

3.1 Connecting to the Internet/Intranet as a Public IP Net

Use the checklist below to make sure you are ready to connect to the Internet/Intranet.

√ Subscribe to the Internet Service Provider (ISP) and request a static IP subnet.

√ Request a dialup telephone number, your username, and your password from the ISP. Configure this into the Internet Access Router using the Quick Setup option. Check whether a login script is necessary to access the ISP. If it is, call for technical support.

√ Disable the Single IP in the Quick Setup option.

√ Make sure the line (ISDN, PSTN, Frame Relay, or DDS) to the ISP is working properly.

√ Use the static IP subnet you have obtained to configure the LAN IP host addresses of the Internet Access Router.

Preparing Your PCs

√ Make sure your PCs have a correctly installed TCP/IP stack such as WinSock or Chameleon.

√ Assign an IP address, from the static IP subnet to each PC.

√ Make sure that each PC has the correct subnet mask.

√ Configure each PC with the Router as the Default Gateway.

√ Configure each PC with the ISP's DNS IP address.

√ Check that your small-office LAN is correctly set up to work with IP.

3.2 Connecting to the Internet/Intranet as a Private IP net

Use the checklist below to make sure you are ready to connect to the Internet/Intranet.

Internet Checklist

√ Subscribe to the Internet Service Provider (ISP) and request a single-user subscription connection.

√ Decide on a private IP net for your small-office LAN (Reference RFC 1918). This address should have a different network number from the provider's network number. Otherwise, the chosen IP net number is irrelevant.

√ Request a dialup telephone number, your username and password from the ISP. Configure this into the Router using the Quick Setup option. Check whether a login script is necessary to access the ISP. If it is, call for technical support.

√ Enable the Single IP in the Router Setup option.

√ Make sure the line (ISDN, PSTN, Frame Relay, or DDS) to the ISP is working properly.

√ Use the private IP subnet you have obtained to configure the private host addresses of the Router.

√ Check that your small-office LAN is correctly set up to work with IP.

Preparing Your PCs

√ Make sure your PCs have a correctly installed TCP/IP stack such as WinSock or Chameleon.

√ Assign an IP address, unique to the LAN, to each PC.

√ Configure each PC with the Router as the Default Gateway.

√ Make sure that each PC has a correct subnet mask.

√ Configure each PC with the ISP's DNS IP address.

√ Check that your small-office LAN is correctly set up to work with IP.

3.3 Configuring the Internet Access Router

To set up and configure the Router:

1. Connect one of the PCs in your small-office LAN to the Router as a terminal emulator. Connection can be via the control port or TELNET.

2. From the Main Menu, select the Quick Setup option. Follow the on-screen instructions to enter parameters.

Your small-office PCs are now ready to connect to the Internet.

4. Installation and Operation

4.1 General

The Internet Access Router is delivered completely assembled. To install the Router, follow the steps below:

- Unpack the Router
- Connect to the power source
- Connect to the LAN
- Connect to the link
- Connect to the Terminal Emulator

After installing the unit, refer to **Chapter 5** for configuration instructions.

If you encounter a problem, refer to **Appendix B** for fault-isolation and troubleshooting instructions.

4.2 Unpacking

Inspect the container before unpacking. Report evidence of damage immediately to your dealer. Unpack the equipment as follows:

1. Place the container on a clean, flat surface, cut all straps, and open or remove the top.
2. Take out the Router carefully and place it securely on a clean surface.
3. Inspect the Router for damage. Report any damage found immediately.

4.3 Site Requirements

Before installing the Router, pay attention to the following:

Power

The Router should be installed within 5 feet (1.5 m) of a grounded AC outlet furnishing 115 VAC (or 230 VAC).

WARNING

Do not adjust, maintain, or repair the opened device under voltage. You could be shocked! All repairs should be done by competent technicians who are aware of the hazards involved.

Front and Rear Panel Clearance

Allow at least 4 inches (10 cm) clearance at the rear of the unit for interface cable connections.

Operating Environment

The operating temperature should be regulated between 32 and 122 °F (0 and 50 °C) with a relative humidity of up to 90%, noncondensing.

Installation in a 19" rack (optional)

The Router is designed for installation on top of a bench or shelf or secured to a 19" rack. A rack adapter kit provides the hardware you need to install the unit.

4.4 Cable Connections

AC Power Connection

AC power should be supplied to the Router through a standard power cable with a grounded three-prong plug. A 1-amp slow-blow fuse is present in the power supply unit.

WARNING

To prevent electrical fire hazard, always replace the fuse with the same type and rating as indicated.

1. Connect the power cable to the power port located on the right hand side of the Router rear panel.

2. Connect the three-prong plug to a grounded AC outlet.

Connecting to the Link

A connector is provided for connection of the interface to the communication link. Refer to **Table C-1** for Link connector pin assignments. Note that X.21 and V.36 connections are provided by adapter cables to the RS-530 (25-pin connector) on the Router's rear panel.

To connect to the Link:

1. Attach the cable with the interface connector to the link port on the rear panel of the Router.

2. Attach the other side of the cable to the wall outlet or modem.

See **Figure 4-2** for illustrations of the Router's rear panel with ISDN, V.24, and V.35 connectors.

WARNING

Take care to insert the ISDN or DDS connector into the assigned port and not into the 10BASE-T port. This can damage the device. Refer to Figure 4-2 for placement of the ports on the rear panel.

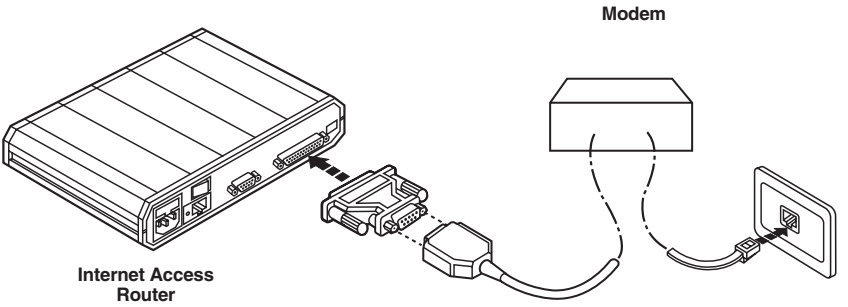


Figure 4-1. Connecting to the PTT.

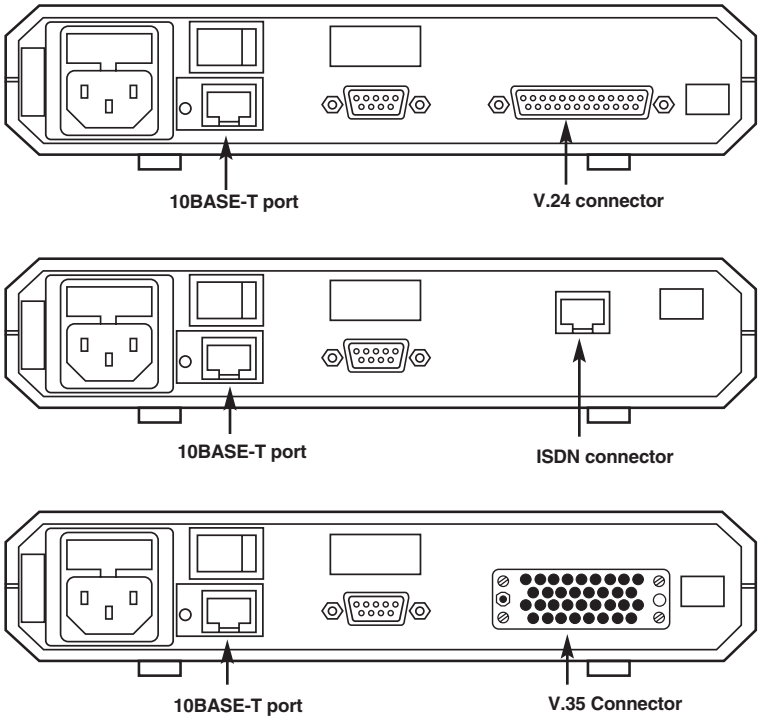


Figure 4-2. Router Rear Panel V.24, ISDN, and V.35 Connectors.

Connecting to the LAN

A standard 10BASE2 (BNC) or 10BASE-T (RJ-45) connector is provided for LAN connection.

To connect to the LAN:

1. Attach the cable to the 10BASE-T or 10BASE2 port on the rear panel of the Router.
2. Attach the other end of the cable to the hub (see **Figure 4-3**). The Router attaches to the network just as a workstation attaches to the network.

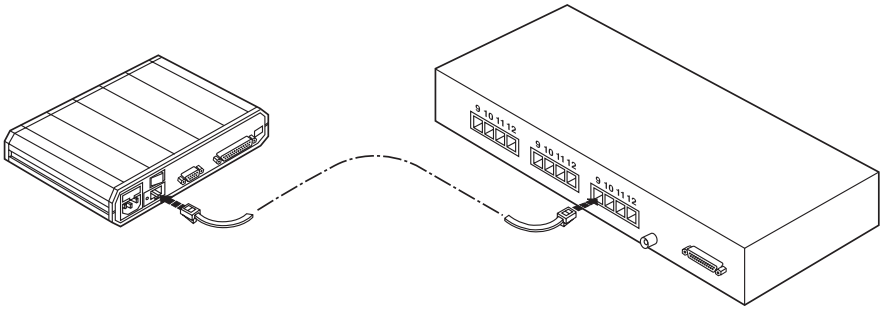


Figure 4-3. Connecting to the LAN.

Connecting to the Terminal Emulator

The Router features a setup program that can be invoked and run from an ASCII terminal or a PC terminal emulator. The terminal is connected to the DB9 control port on the back panel of the Router.

To connect to the terminal emulator:

1. Attach the cable to the RS-232 port on the PC.
2. Attach the other end to the control port on the rear panel of the Router (see **Figure 4-4**). This DB9 to DB9 cable should be pinned "straight-through."

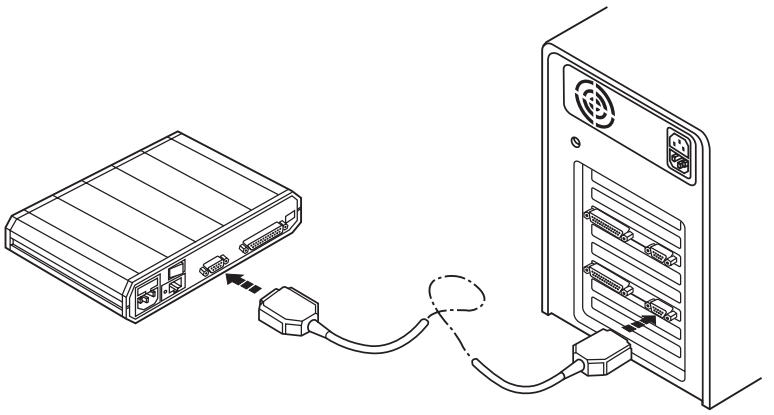


Figure 4-4. Connecting to the Terminal Emulator.

4.5 Front Panel Controls and Indicators

Table 4-1 lists the controls and indicators on the front panel of the Router and their functions.

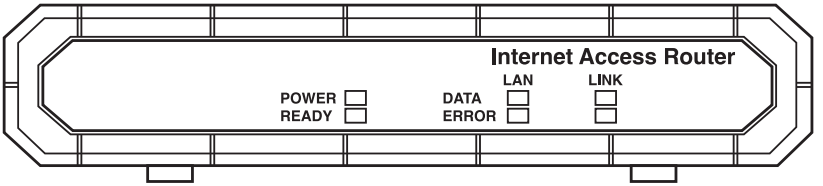


Figure 4-5. Router Front Panel.

Table 4-1. Controls and Indicators.

Controls and Indicators	Function
POWER	Green LED goes ON when Router is powered on.
READY	ON when packets can be transferred.
LAN DATA	ON when a packet is received or transmitted on the LAN side.
LAN ERROR	ON when LAN interface indicates an error.
LINK DATA	ON when a packet is received or transmitted on the link side.
LINK ERROR	ON when LINK interface indicates an error.

4.6 Operating Procedure

Power-On

Set the POWER switch on the rear panel to the ON position. The POWER indicator lights, indicating that the Router is on.

Operation

The Router operation is completely automatic. During normal operation, when the remote workstations are active, the READY indicator lights continuously, the activity indicators blink and the LAN and LINK error indicators remain OFF.

Power-Off

Switch the POWER switch on the rear panel to the OFF position.

WARNING

Always ground this unit through the protective earth lead of the power cable. When connecting AC power to this unit, the mains plug should only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by use of an extension cord (power cable) without a protective conductor (grounding). Interrupting the protective (grounding) conductor (inside or outside the unit), or disconnecting the protective earth terminal can make this unit dangerous.

5. Configuration

5.1 Initial Setup

The Internet Access Router features a setup program that is invoked and run from an ASCII terminal or a PC terminal emulator. The terminal/terminal emulator is connected to the DB9 CONTROL port on the back panel of the Internet Access Router.

This section describes the procedures necessary to connect to the terminal and to access the main menu of the setup program. To install the terminal, follow the steps outlined below:

5.1.1 Connecting to the Terminal

1. Connect a control cable between the DB9 control port on the Internet Access Router and the connector on the terminal (see **Figure 4-4**) with a "straight-through" cable.

2. Set the terminal to work at any baud rate from 2.4 to 19.2 Kbps, No Parity, 8 Data Bits. The Router will automatically sense the baud rate.

3. Switch on the Internet Access Router. The operational status screen displays. Press the Enter key several times to invoke the password message.

5.1.2 Setting a Password

For first-time operation, or if no configuration password has been specified, the following message appears:

```
WARNING:  No configuration password exists

Define configuration password? (Y/N):
```

1. Type Y to set a configuration password. A message appears, prompting you to enter a new configuration password.

2. Type a password. The password can be up to twelve characters. Press the Enter key. A message appears, prompting you to retype the password for verification.

3. Retype the password and press Enter. The Main Menu screen appears (see **Section 5.2**).

The password protects entry to the configuration module, preventing unauthorized personnel from changing setup and configuration parameters.

NOTE

All Internet Access Router password verification routines are CASE SENSITIVE. Once a password has been set, always use the same case as in the original when typing the password.

5.1.3 Changing the Password

To change the password during normal operation:

1. From the Main Menu, select option 0, Exit, to return to the Operational Status Messages screen.
2. Press Enter several times, you will be prompted to enter the current password.
3. Enter the current password. A message appears, asking if you want to update the current password. Type Y. You will be prompted to re-enter the current password.
4. Re-enter the current password. A message appears prompting you to enter the new password.
5. Enter a new password and re-enter the same password for verification. The Main Menu appears.

5.1.4 Removing the Password

To delete the current password:

1. Follow the steps above to change the password. When prompted to enter a new password, press Enter without typing a new password. This deletes the current password and removes password protection.
2. Press Enter again when prompted for verification. The Main Menu appears. If the unit doesn't have an IP Address, the Quick Setup menu appears.

NOTE

Use of password protection for the configuration module is recommended. Always use the "Exit" option in the main menu once configuration has been carried out. This will force use of the password by personnel requiring access to the configuration module.

5.2 Menus and Screens

This section provides a brief description of the menus and screens available.

The Main Menu

The name of the device (Internet Access Router) connected to the terminal is listed at the top of the screen. The Main Menu has five options. To choose an option, you type the number preceding the option.

```
Internet Access Router Main Menu

1. Quick Setup
2. Security Setup
3. Advanced menu
4. Diagnostic tools

8. Exit

Choose one of the above:
```

Figure 5-1. Internet Access Router Main Menu.

Quick Setup

The Quick Setup menu allows adjusting of setup and link configuration parameters while the Internet Access Router is operating. Line-by-line prompting provides minimum input. On screen instructions and explanations guide the user through the setup procedure.

Security Setup

Use the options in the Security Setup menu to prevent management of the Internet Access Router and entry to your LAN by unauthorized users.

Advanced Menu

The Advanced Menu lists the Internet Access Router configuration parameters and their current values. The user is able to change these parameters and to perform advanced configuration operations not available through the Quick Setup menu. The Advanced Menu includes an option to view interface connections, routing information, and LAN statistics. Resetting the device and software downloads are also performed via the Advanced Menu.

Diagnostic Tools

Use the Diagnostic Tools menu to verify WAN and LAN connectivity. The Ping feature allows the user to dial (ping) another user on the LAN or WAN. If the remote user replies, WAN connectivity is confirmed up to and including the IP level.

Exit

Select this option to return to the Operational Status Messages. From the Operational Status Messages screen, you can remove or change the password.

5.3 Quick Setup

The Quick Setup option allows you to adjust setup parameters and link configuration when the Internet Access Router is operating (see **Chapter 8** for advanced configuration options). Messages appear on the screen, prompting you to accept or modify the current parameter.

- To accept the current parameter, press Enter.
- To view options listed in [ ], toggle with the space bar and press Enter.
- To enter new information, type in the new parameters and press Enter.

When all the parameters have been accepted or changed, you are able to view them on the screen. A confirmation message appears requesting that you confirm all the setup changes. The device will reset after saving these changes.
To adjust setup parameters:

1. From the Main Menu, select option 1, Quick Setup.
2. Follow the on-screen instructions to accept or modify the setup parameters.
3. Press "Y" to save the setup parameters.

The Quick Setup menu automatically adapts itself to the built-in link interface. The final screen for each interface and a description of the options in the Quick Setup menu can be found in the sections that follow. Refer to the section that applies to the interface you ordered.

5.3.1 ASYNCHRONOUS/SYNCHRONOUS V.24

```
Quick Setup
-----------------
'ENTER' — Accept parameter, 'SPACE' — Change parameter

IP setup:
LAN IP address:  192.168.1.1, enter new:  192.168.1.1
LAN IP mask:  255.255.255.224, enter new: 255.255.255.224
Do you want to enable SINGLE IP option? [y]

WAN interface—V.24
Link mode: [Asynchronous]
MODEM type:  Microcom DeskPorte ES 28.8 (V.fast)
Do you want to change MODEM type ? [n]
PHONE number:  1111122
Connection:  [Upon traffic to WAN]
Disconnect timeout (sec):  600, enter new:  600

SECURITY setup
Unit name:  Internet Access Router, enter new:  Router
Do you want to change password? [n]

Do you want to save QUICK SETUP (y/n)? y
```

Figure 5-2. Quick Setup Screen.

The fields in the Quick Setup screen are described below:

IP Setup

LAN IP Address: The IP address is a unique 4-byte (32-bit) numeric value used to identify a network and a local host on that network. Each IP address consists of four decimal numbers separated by periods (e.g., 192.168.0.8). If using the Single IP feature, refer to **Appendix A** for more information on this parameter. Refer to **Figure 5-4** for a description of how the IP address is obtained. This will be the address of the Router on your local LAN.

LAN IP Mask: The mask is configured automatically from the IP address class. If the mask should be different, override the default by entering the new mask.

Single IP Option: Single IP is a feature of the Internet Access Router that allows users in a small-office LAN to connect to the Internet/Intranet quickly and transparently. Single IP uses a dynamically assigned IP address for all the users (see **Appendix A**). For most applications, this will be 0.0.0.0.

WAN Interface

Link Mode: The link mode determines the method in which data is sent across the link. When the mode is synchronous, data bits are transmitted at a fixed rate. The sender and the receiver are synchronized. During asynchronous transmission, data units are sent character-by-character. The characters are preceded by start bits and followed by stop bits. The start and stop bits provide synchronization at the receiver side.

Use the space bar to toggle between synchronous and asynchronous mode.

Modem type: Allows you to change the modem type and displays a list of modems.

Baud Rate: Displays the rate at which data is sent across the link. Use the space bar to toggle between the different baud rates.

Phone Number: Lists the Internet provider's phone number. To edit the phone number, erase the number with the backspace button on the keyboard and enter the new number.
Connection: Use this option to decide when the link between the local LAN and the Internet should be activated. Selecting "upon traffic to WAN" activates the link only when there is traffic to be sent on the link. This feature is important in reducing operating costs.

Toggle between "always" and "upon traffic to WAN."

Disconnect Timeout: This parameter defines the condition that has to be met for the link to disconnect. The condition stipulates that the link will disconnect if there is no traffic for the specified amount of time.

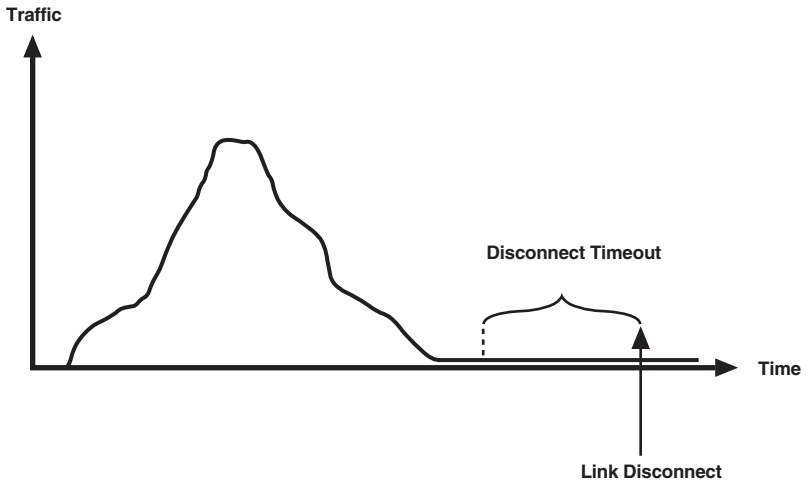


Figure 5-3. Disconnect Timeout.

Security Setup

Unit Name: Displays the name assigned to the Internet Access Router for identification by the Internet Provider. To change the unit name, type in the new name and press Enter. This will be used to log in to the ISP when the Router attempts to connect, so this should match the username that the ISP assigned to you.

Password: A password assigned to the Internet Access Router for access to the Internet. To change the password, use the space bar to toggle between yes and no. This must be the password the ISP has assigned to you.

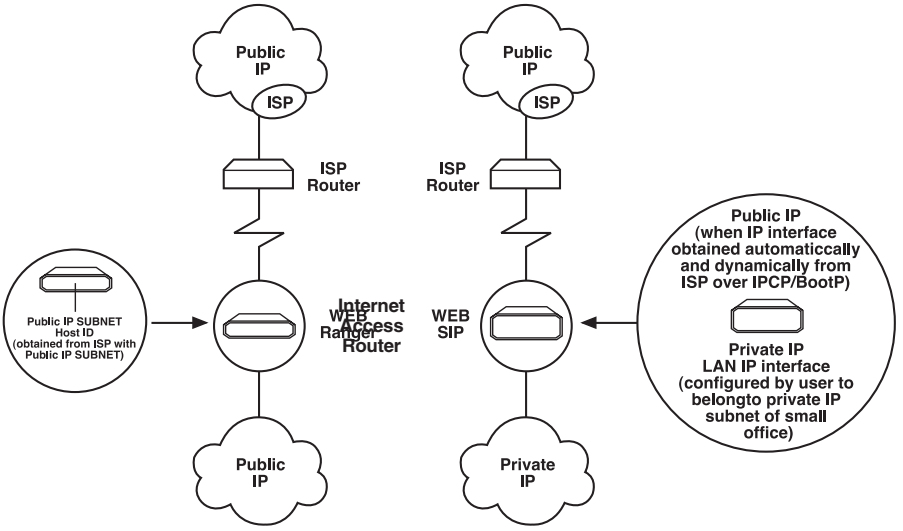


Figure 5-4. Obtaining IP Addresses.

5.3.2 SYNCHRONOUS: V.35, V.36, X.21, RS-530, AND DDS

```
   QUICK SETUP
   ----------------------
   'ENTER'—Accept parameter, 'SPACE'—Change parameter.

   IP setup:
   LAN IP address:  194.98.182.58, enter new:  194.90.182.58
   LAN IP mask:  255.255.255.0, enter new:  255.255.255.0
   Do you want to enable SINGLE IP option?  [y]

   WAN interface—V.35

   SECURITY setup
   Unit name:  Internet Access Router, enter new:  Internet Access
Router
   Do you want to change password? [n]

   Do you want to save QUICK SETUP (y/n)? y
```

Figure 5-5. Quick Setup Screen.

IP Setup

LAN IP Address: The IP address is a unique 4-byte (32-bit) numeric value used to identify a network and a local host on that network. Each IP address consists of four decimal numbers separated by periods (e.g. 192.168.0.8). If using the Single IP feature, refer to **Appendix A** for more information on this parameter. Refer to **Figure 5-4** for a description of how the IP address is obtained.

LAN IP Mask: The mask is configured automatically from the IP address class. If the mask differs, enter the new mask. If the mask should be different, override the default by entering the new mask.

Single IP Option: Single IP is a feature of the Internet Access Router that allows users in a small-office LAN to connect to the Internet/Intranet quickly and transparently. Single IP uses a single dynamically assigned IP address for all the users.

Security Setup

Unit Name: Displays the name assigned to the Internet Access Router for identification by the Internet Provider. To change the unit name, type in the new name and press Enter. This will be used to log in to the ISP when the Router attempts to connect, so this should match the username that the ISP assigned to you.

Password: A password assigned to the Internet Access Router for access to the Internet. To change this password, use the space bar to toggle between yes and no. This must be the password the ISP has assigned to you.

5.3.3 ISDN

```
QUICK SETUP
----------------------
'ENTER'—Accept parameter, 'SPACE'—Change parameter.

IP setup:
IP address:  194.090.080.001, enter new:  194.090.080.001
IP mask:  255.255.255.224, enter new:  255.255.255.224
Do you want to enable SINGLE IP option? [y]

WAN interface—ISDN BRI
Bandwidth:  [64] Kbps
Protocol:  [ETSI]
PHONE number:
Connection: [Always]

SECURITY setup
Unit name:  lanrang, enter new:  lanrang
Do you want to change password? [n]

Do you want to save QUICK SETUP (y/n)? y
```

Figure 5-6. Quick Setup Screen.

IP Setup

LAN IP Address: The IP address is a unique 4-byte (32-bit) numeric value used to identify a network and a local host on that network. Each IP address consists of four decimal numbers separated by periods (e.g. 192.168.0.8). If using the Single IP feature, refer to **Appendix A** for more information on this parameter. Refer to **Figure 5-4** for a description of how the IP address is obtained.

LAN IP Mask: The mask is configured automatically from the IP address class. If the mask differs, enter the new mask. If the mask should be different , override the default by entering the new mask.

Single IP Option: Single IP is a feature of the Internet Access Router that allows users in a small-office LAN to connect to the Internet/Intranet quickly and transparently. Single IP uses a single dynamically assigned IP address for all the users.

WAN Interface

Bandwidth: The bandwidth is the rate at which data passes through the link. The greater the bandwidth, the more information can be sent through the link at a certain time. The Internet Access Router allows you to work with a bandwidth of 64 Kbps or 128 Kbps.

Protocol: The protocol used by the Internet Provider in your area. Toggle between the following protocols: ETSI, National-1, NTT, Israel, 5ESS, 5ESS/PTP, DMS100, and leased.

Phone Number: Lists the Internet provider's phone number. To edit the phone number, erase the number with the backspace button on the keyboard and enter the new number.

Connection: Use this option to decide when the link between the local LAN and the Internet should be activated. Selecting "upon traffic to WAN" activates the link only when there is traffic to be sent on the link. This feature is important in reducing operating costs.

Toggle between "always" and "upon traffic to WAN."

Security Setup

Unit Name: Displays the name assigned to the Internet Access Router for identification by the Internet Provider. To change the unit name, type in the new name and press Enter. This will be used to log in to the ISP when the Router attempts to connect, so this should match the username that the ISP assigned to you.

Password: A password assigned to the Internet Access Router for access to the Internet. To change the password, use the space bar to toggle between yes and no. This must be the password the ISP has assigned to you.

5.3.4 FRAME RELAY: V.24, V.35, V.36, X.21, RS-530, AND DDS

```
QUICK SETUP
----------------------
'ENTER'—Accept parameter, 'SPACE'—Change parameter

IP setup:
IP address:  194.090.182.033, enter new:  194.090.182.033
IP mask:  255.255.255.224, enter new:  255.255.255.224

WAN interface—FRAME RELAY
MAINTENANCE PROTOCOL:  [ANSI T1.617 ANNEX D]
DLCI number:  18—enter new:  18

SECURITY setup
Unit name: Internet Access Router,enter new: Internet Access Router
Do you want to change password? [n]
```

Figure 5-7. Quick Setup Screen.

IP Setup

LAN IP Address: The IP address is a unique 4-byte (32-bit) numeric value used to identify a network and a local host on that network. Each IP address consists of four decimal numbers separated by periods (e.g. 192.168.0.8). If using the Single IP feature, refer to **Appendix A** for more information on this parameter. **Figure 5-4** shows you how the IP address is obtained.

LAN IP Mask: The mask is configured automatically from the IP address class. If the mask differs, enter the new mask. If the mask should be different, override the default by entering the new mask.

Single IP Option: This option is not available for Frame Relay.

WAN Interface

Maintenance Protocol: This parameter defines which maintenance protocol is used in the Frame Relay WAN link: ANSI T1.617 ANNEX D, CCITT Q.933 ANNEX A, LMI, or none. Use the space bar to toggle between the options.

DLCI Number: Displays the number of the logical connection. This number can be a decimal number from 16 to 991 and is provided by the Frame Relay provider.

Security Setup

Unit Name: Displays the name assigned to the Internet Access Router for identification by the Internet Provider. To change the unit name, type in the new name and press Enter. This will be used to log in to the ISP when the Router attempts to connect, so this should match the username that the ISP assigned to you.

Password: A password assigned to the Internet Access Router for access to the Internet. To change the password, use the space bar to toggle between yes and no. This must be the password the ISP has assigned to you.

5.4 Security Setup

The Security Setup menu allows you to enable and disable access to the Internet Access Router and the LAN. The Internet Access Router is protected against access by unauthorized users by disabling access via SNMP and TELNET. The Solid Firewall is used to protect the LAN against undesired entry.

To access the Security Setup menu:

Select option 2 from the Main Menu. The following screen appears:

```
SECURITY SETUP  (Device name—Internet Access Router)
---------------------------

1. TELNET access—Disable
2. SNMP access—Disable
3. FIREWALL options—Disable

ESC—Return to previous menu

Choose one of the above:
```

Figure 5-8. Security Setup Menu.

The Security Setup options are described below:

5.4.1 Enabling TELNET Access

TELNET is supported allowing configuration and control of the Internet Access Router over the WAN and LAN. By default, TELNET access to the Internet Access Router is disabled. This prevents changes being made to the unit's configuration parameters. Enabling this option also allows the user to change the TELNET username and password.

To enable TELNET Access:

1. From the Main menu, select option 2, Security Setup.
2. From the Security Setup menu, select option 1, TELNET access.
3. Toggle to "y" to allow TELNET management. Press Enter.
4. Follow the on-screen instructions to allocate a user name and password. Save the new setup.

```
TELNET access setup
---------------------------
'ENTER'—Accept parameter, 'SPACE'—Change parameter

Do you want to permit TELNET management of the device? [y]

TELNET user name:  Internet Access Router, enter new:  Router
Do you want to change the TELNET password? [y]
Enter new password: *
Enter new password verification: *

Do you want to save TELNET parameters (y/n)?
```

Figure 5-9. TELNET Access Setup Screen.

5.4.2 Enabling SNMP Access

By default, the Internet Access Router via SNMP is disabled. Blocking SNMP access prevents changes being made to the unit's configuration parameters. Enabling SNMP access prompts the user to define SNMP management parameters.

To enable SNMP access:

1. From the Main menu, select option 2, Security Setup.
2. From the Security Setup menu, select option 2, SNMP access.
3. Toggle to "y" to allow SNMP management. Press Enter.
4. Enter the read, write, and trap communities. Save the new setup.

```
SNMP access setup
-------------------------
'ENTER'—Accept parameter, 'SPACE'—Change parameter

Do you want to permit SNMP management of the device? [y]

Read community:  public
Write community:
Trap community:

Do you want to save SNMP parameters (y/n)?
```

Figure 5-10. SNMP Access Setup.

5.4.3 Enabling/Disabling the Solid Firewall

Solid Firewall, when enabled, prevents all access from the Internet/Intranet into the small-office LAN. Traffic may still be sent from the LAN to the WAN. However, there are some limitations applied to the traffic sent from the LAN to the WAN. Refer to **Appendix A** for further information. By default, Solid Firewall is disabled.

To enable the Solid Firewall feature:

1. From the Main Menu, select option 2, Security Setup.
2. From the Security Setup menu, select option 3, Solid Firewall.
3. Toggle to "y" and press Enter to allow Solid Firewall. Save the new setup.

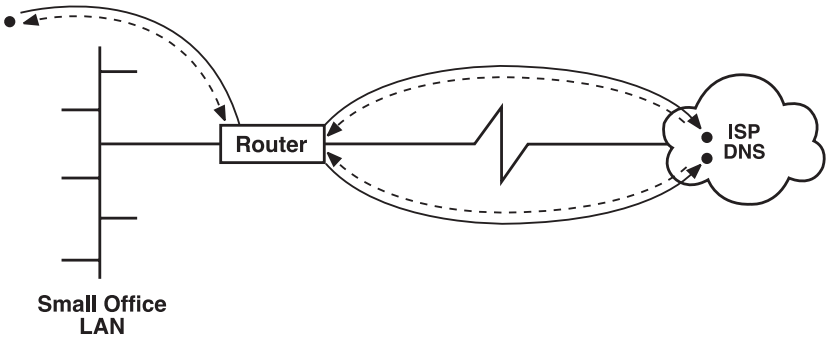
```
FIREWALL options setup
----------------------------------

To enable FIREWALL options means that sessions will be forwarded
from LAN to WAN but will be blocked from entering the LAN.

Do you want to enable FIREWALL options? [n] y

Do you want to save FIREWALL setup (y/n)? y
```

Figure 5-11. FIREWALL Options Setup Screen.

5.5 Diagnostic Tools

The Diagnostic Tools menu has two options. The Ping option allows you to confirm IP connectivity by "pinging" (dialing) other IP hosts. If there is a reply from the remote IP host, WAN connectivity is confirmed. The second option, Trace Route, is not currently available.

Figure 5-12. Pinging IP Hosts.



To ping another host:

1. From the Main Menu, select option 4. The following menu appears:

```
DIAGNOSTIC TOOLS (Device name—WEB)
----------------------------------

1. Ping terminal
2. Trace route

ESC—Return to previous menu
```

Figure 5-13. Diagnostic Tools Menu.

2. From the Diagnostic Tools menu, select option 1. You are prompted to enter the IP address of the host.

3. Enter the host's IP address. The Internet Access Router pings the destination host. A message appears showing the result of the request. The Internet Access Router continues pinging the host until you press ESCAPE.

```
PING TERMINAL (Device name—WEB)
--------------------------

Insert the IP address in the format:  xxx.xxx.xxx.xxx

Ping IP address:  192.114.31.14

Pinging 192.114.031.014

Reply from—192.114.031.014 time = 0.100 sec
Reply from—192.114.031.014 time = <0.050 sec
Reply from—192.114.031.014 time = <0.050 sec

ESC—Return to previous menu
```

Figure 5-14. Ping Terminal.

6.1 Ways of Reducing Operating Costs

The sections below contain information on how to reduce operating costs. At the end of each section, you are directed to the menu that allows you to set up these parameters.

6.1.1 Connection on Demand

Connection on Demand activates the link only when traffic needs to be sent. The user can define conditions for starting and terminating a connection. In this way, the link is not constantly up. Once a connection is established, you are able to define when to terminate and restart the connection. Alternatively, connection and disconnection can be done manually. This ensures that a connection is only established when traffic needs to be sent on the link.

To access the Connection on Demand menu:

1. From the Advanced menu, select option 1. The Setup menu appears.
2. From the Setup menu, select option 5. The WAN Economy menu appears.
3. From the WAN Economy menu, select option 2. The Connection on Demand menu appears.
4. Follow the on-screen instructions to set the Connection on Demand parameters.

6.1.2 Filtering

Filtering allows the user to decide which traffic the Internet Access Router should allow to enter and exit the LAN. Limiting unnecessary traffic saves bandwidth and improves security of the LAN. However, care should be taken to minimize the number of filters defined. Too many filters can reduce the performance of the Internet Access Router. Filtering can be implemented through two modes: blocking or forwarding.

When a filter is in the blocking mode, the Internet Access Router tests each packet of data that is sent to or from the LAN. If the packet passes the test, it is blocked from entering or exiting the LAN. In the forwarding mode, passage is allowed if the packet passes the test.

For a more detailed description and instructions on implementing Filtering, refer to **Section 8.2.5**.

6.1.3 Van Jacobson Compression

Compression reduces the number of bits required to represent information in data transmission or storage. In this way, valuable bandwidth and memory

is saved. Van Jacobson compression is enabled by default.

If you decide to disable Van Jacobson compression, follow the steps in **Figure 6-1**.

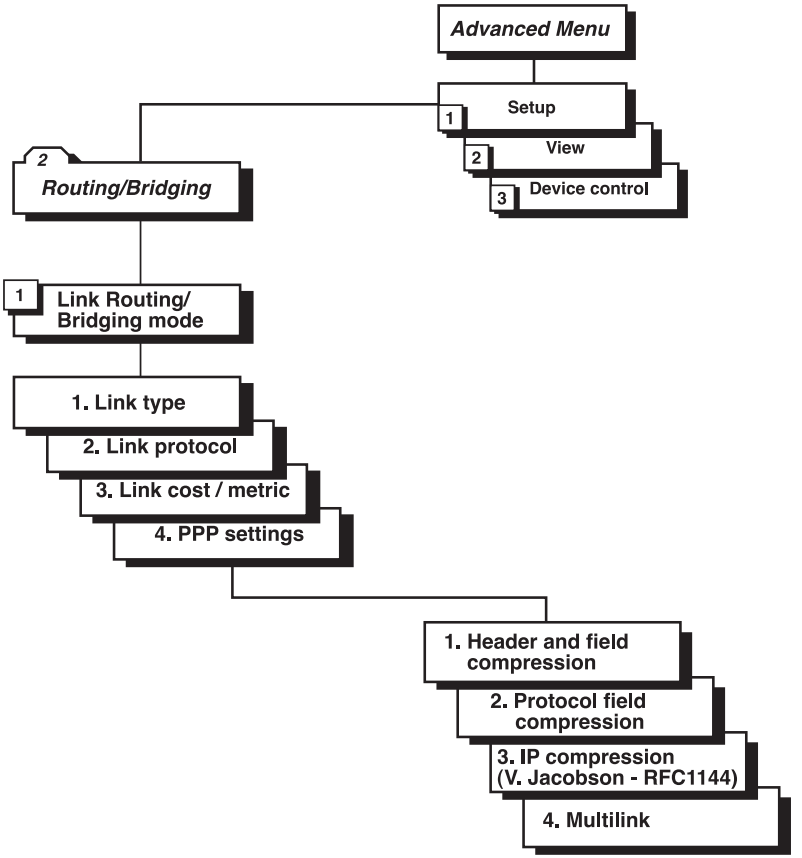


Figure 6-1. Disabling Van Jacobson Compression.

7. LAN Access Security

7.1 Securing LAN Access

Your small-office LAN can be protected against unauthorized access in two ways:

- By disabling TELNET and SNMP access.
- By enabling Solid Firewall.

7.1.1 TELNET AND SNMP

Remote control of the Router is denied by disabling TELNET and SNMP access. By preventing access to the Router, access to the LAN is also prevented. Refer to **Section 5.3** for instructions to disable TELNET and SNMP access.

NOTE

For authentication by the Internet Service Provider, a username and password is assigned to the Internet Access Router. The username and password are entered in the Security Setup section of the Quick Setup screen.

7.1.2 SOLID FIREWALL

Solid Firewall allows IP sessions originating from the LAN to be forwarded to the WAN. IP sessions originating from the WAN are blocked from entering the LAN. Solid Firewall is enabled via the Security Setup menu. For instructions to enable Solid Firewall, refer to **Section 5.4**.

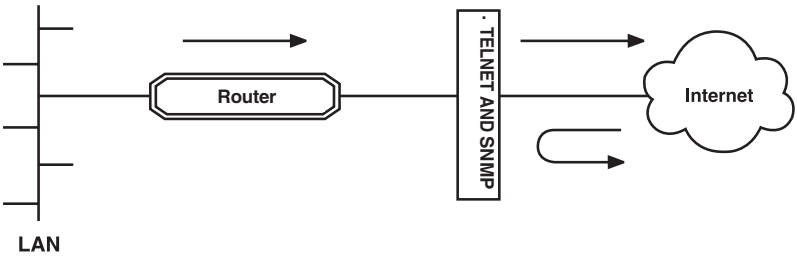


Figure 7-1. Solid Firewall.

8. Advanced Configuration

8.1 Advanced Menu

```
Internet Access Router Advanced Menu
------------------------------------

1. Setup
2. View
3. Device control

8. Exit

Choose one of the above:
```

Figure 8-1. Advanced Menu.

The options in the Advanced Menu are described below:

Setup: Use this menu to modify setup parameters.

View: Use this menu to view the configuration screens and information on interface connections, routing tables and statistics.

Device Control: The Device Control menu allows you to download the software, perform reset operations, and choose a terminal type.

8.2 Setup Menu

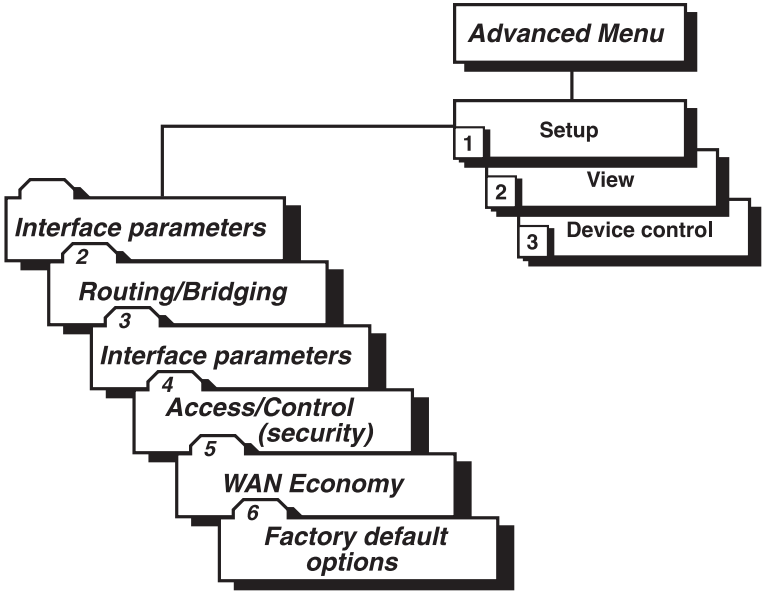


Figure 8-2. Advanced Menu Tree, Setup Option.

To access the Setup Menu:

In the Advanced menu, press 1. The Setup Menu appears.

```
SETUP (Device name — WEB)
-----

1. Host parameters
2. Routing/Bridging
3. Interface parameters
4. Access control (Security)
5. WAN economy
6. Factory default options

ESC — return to previous menu

Choose one of the above:
```

Figure 8-3. Setup Menu.

The options in the Setup menu are briefly described below. For a detailed description of the submenus, refer to the sections that follow.

8.2.1 Host Parameters

This option enables you to enter information about the device, the IP host, the SNMP agent, and TFTP.

Routing/Bridging

Select this option to enter routing or bridging information for the device.

Interface Parameters

Select this option to set link, ISDN, or Frame Relay parameters.

Access Control (security)

Select this option to perform security operations.

WAN Economy

Select this option to reduce traffic over the WAN and to keep the link up only when necessary.

Factory default options

Select this option to return settings to the factory default.

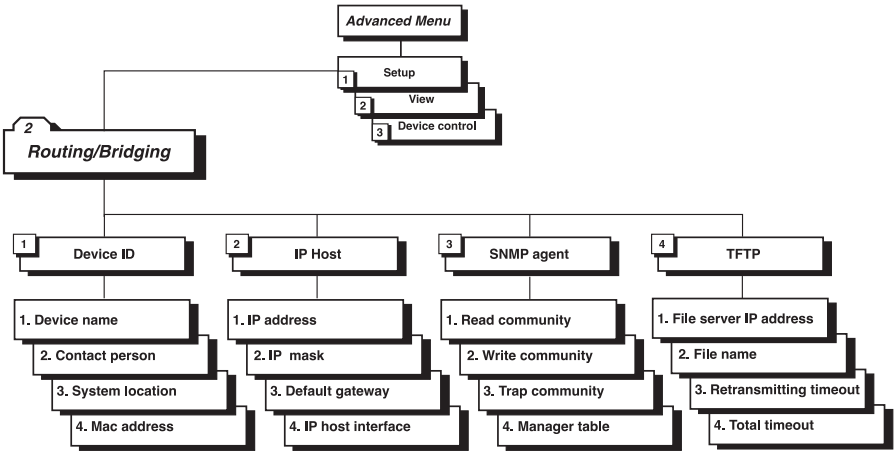


Figure 8-4. Advanced Menu Tree, Host Parameters Option.

To access the Host Parameters menu:

1. In the Advanced menu, press 1. The Setup menu appears.
2. In the Setup menu, press 1. The Host Parameters menu appears.

```
HOST PARAMETERS (Device name—WEB)
---------------

1. Device ID
2. IP Host
3. SNMP agent
4. TFTP

ESC—return to previous menu

Choose one of the above:
```

Figure 8-5. Host Parameters Menu.

The options in the Host Parameters menu are described below.

Device ID

Use the Device ID menu to view and/or modify the following arbitrary parameters:

Device Name: An arbitrary name assigned to the Internet Access Router for identification by the system manager.

Contact Person: The name of the person to be contacted with matters pertaining to the system.

System Location: Lists the physical location of the device.

MAC Address: This option allows the user to assign a MAC address locally. The Internet Access Router can be used with a burned-in address provided by the manufacturer or with the locally administered address. This address must be unique to your network.

IP Host

The options in the IP Host menu are described below:

IP Address: The IP address is a unique 4-byte (32-bit) numeric value used to identify a network and a local host on that network. Each IP address consists of four decimal numbers separated by periods (e.g. 192.168.0.8).

IP Mask: The IP mask is configured automatically from the IP address class. If the mask differs, enter the new mask.

Default Gateway: Use this option to set the IP address of the default gateway. Routing will be performed to this address by default.

IP Host Interface: Use this option to set the host interface to LAN or Link.

SNMP Agent

Select this option to enter parameters for SNMP management.

Read Community: Set the parameters for obtaining information from the SNMP agent.

Write Community: Select this option to set parameters for sending information to the SNMP agent.

Trap Community: Select this option to set the parameters for obtaining trap messages from the SNMP agent.

Manager Table: Select this option to add, clear, or delete parameters from the manager table. The manager table lists the SNMP manager IP addresses and masks.

TFTP

The options in the TFTP menu are described below:

File Server IP Address: The IP address of the TFTP server.

File Name: The name and path of the file to be transferred.

Retransmitting Timeout: The amount of time that is allowed to pass before a file is retransmitted.

Total Timeout: The amount of time the user should wait for an acknowledgement from the TFTP server.

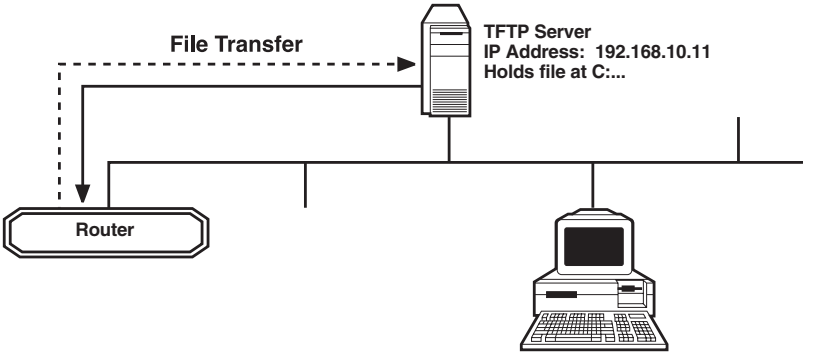


Figure 8-6. File Transfer to and from TFTP Server.

8.2.2 ROUTING/BRIDGING

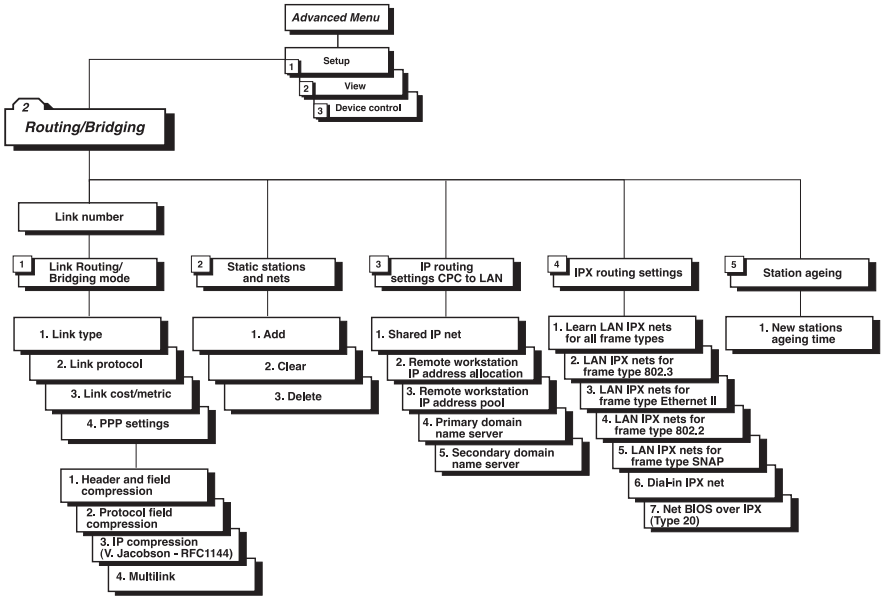


Figure 8-7. Routing/Bridging Options.

To access the Routing/Bridging menu:

1. In the Advanced menu, press 1. The Setup menu appears.
2. In the Setup menu, press 2. The Routing/Bridging menu appears.

```
ROUTING/BRIDGING (Device name—WEB)
---------------------------------

Link 1 — IP ROUTER          PPP

Setup Menu
----------------
1. Link Routing/Bridging mode
2. Static stations & nets
3. IP routing settings (PC to LAN)
4. IPX routing settings
5. Station aging (minutes):  60

ESC—Return to previous menu

Choose one of the above:
```

Figure 8-8. Routing/Bridging Menu.

The options in the Routing/Bridging menu are described below:

Link Routing/Bridging mode

Link Type: This menu is not applicable for this version of the Internet Access Router.

Link Protocol: Specifies the link protocol: SLIP, CSLIP, or PPP.

Link cost/metric: Use this option to assign a cost to each WAN link for routing purposes.

PPP settings: Use this option to set compression options. Compression is used to save bandwidth and memory.

Static stations and nets

Select this option to add, delete, or clear static stations from the network.

When selecting a static net for a link, the user defines all nets over which the link will perform routing. The user can set more than one routing net for the same link. Also, more than one link can perform routing to the same net (in this case, the device will learn the IP addresses of the stations connected to each link and will route the frames to the appropriate link according to this information).

When setting a static station for a link, the user defines which stations are set in the remote net. A station can be set only once. By setting a static station, the device can transmit frames to the station even though it hasn't been learned yet (that is, even though the station hasn't sent any frames yet).

IP Routing Settings

This menu is not applicable for this version of the Internet Access Router.

IPX Routing Settings

This menu is not applicable for this version of the Internet Access Router.

Station Aging

Station aging determines the amount of time a station is allowed to be inactive before it is removed from the network. A station is inactive when no IP traffic is forwarded or received.

8.2.3 INTERFACE PARAMETERS

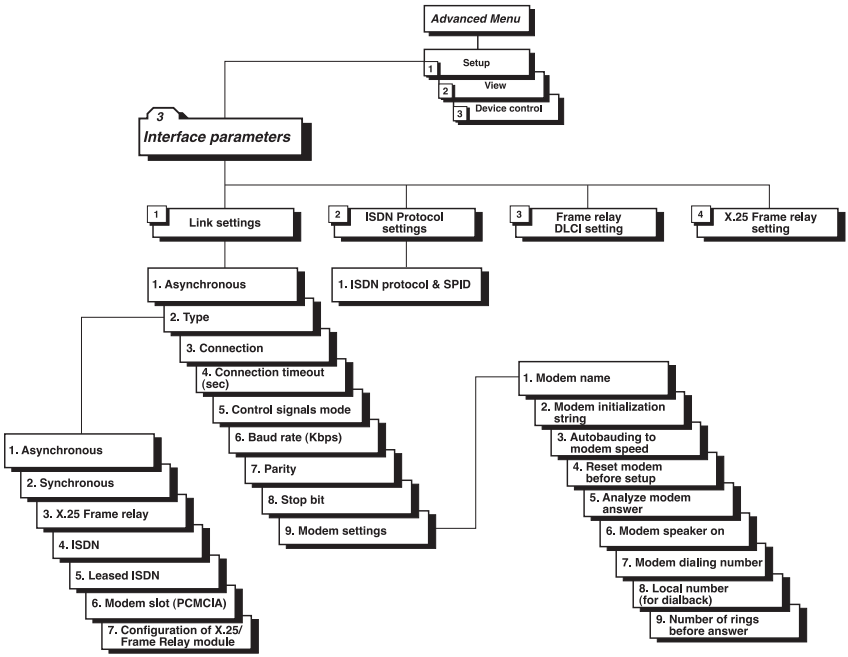


Figure 8-9. Interface Parameters Menu Tree.

To access the Interface Parameters screen:

1. In the Advanced menu, press 1. The Setup menu appears.
2. In the Setup menu, press 3. The Interface Parameters menu appears.

```
INTERFACE PARAMETERS (Device name—WEB)
--------------------

1. Link settings
2. ISDN protocol settings
3. Frame relay DLCI settings
4. X.25/Frame relay setting
ESC—Return to previous menu

Choose one of the above:
```

Figure 8-10. Interface Parameters Menu.

The options in the Interface Parameters menu are described below:

Link settings

Status: Specifies the status of a link: enabled or disabled.

Type: Specifies the type of interface in use: asynchronous, synchronous, Frame Relay, ISDN, or Leased ISDN.

Connection: Specifies the type of connection: originate only (for the Internet Access Router, this is the only type of connection available).

Connection timeout (sec): The time required by the Internet Access Router to detect a communication failure in the link.

Control Signals Mode: The Internet Access Router can be set to ignore or acknowledge the following control signals: RTS (Request to send), CTS (Clear to send), and CD (Carrier Detect).

Baud Rate: The rate at which data is sent across the link.

Parity: A parity bit is a non-information bit that is added to a group of bits to make sure that the total number of 1 bits in a character is odd or even. Toggle between odd, even, or none.

Stop Bit: The stop bit is a signal at the end of a character that instructs a receiving device to wait for a subsequent signal. Select this option to toggle between 1 and 2 stop bits.

Modem Settings: Select this option to display a menu that allows configuration of modem parameters.

ISDN Protocol Setting

The Internet Access Router with ISDN connects your Ethernet LAN to the Internet/Intranet at a rate of 64 or 128 Kbps. The Router with an ISDN interface was designed to reduce WAN costs to a minimum. WAN economy is achieved through automatic spoofing and connection-on-demand features for Internet/Intranet access.

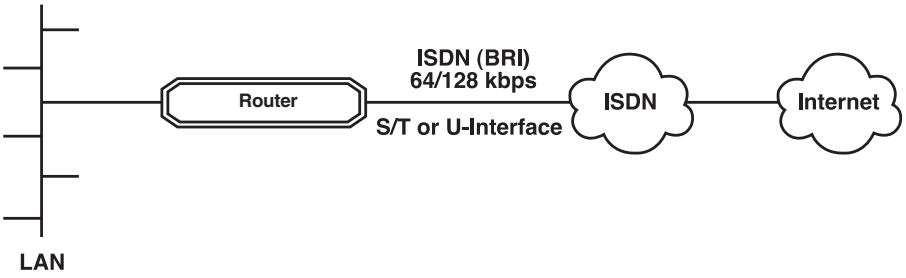


Figure 8-11. Connection to the Internet over ISDN.

ISDN Features

- ISDN BRI.
- Standard S/T interface.
- Optional U-interface eliminates the need for an external NTI device.
- Connection rate from 64 to 128 Kbps.
- Protocol supported: ETSI (Europe), NTT (Japan), NI-1 (US), 5ESS (US), DMS-100 (US), and Leased ISDN (I.430).

Implementing ISDN

To activate the ISDN line, you need to do the following:

1. Choose the ISDN protocol.
2. Choose the connection rate (bandwidth): 64 or 128 Kbps.
3. Enter the destination phone number.

Figure 8-12 maps the options in the Advanced Menu that are used to configure the Internet Access Router for operation with an ISDN interface. A brief explanation of the Link Settings Parameters follows.

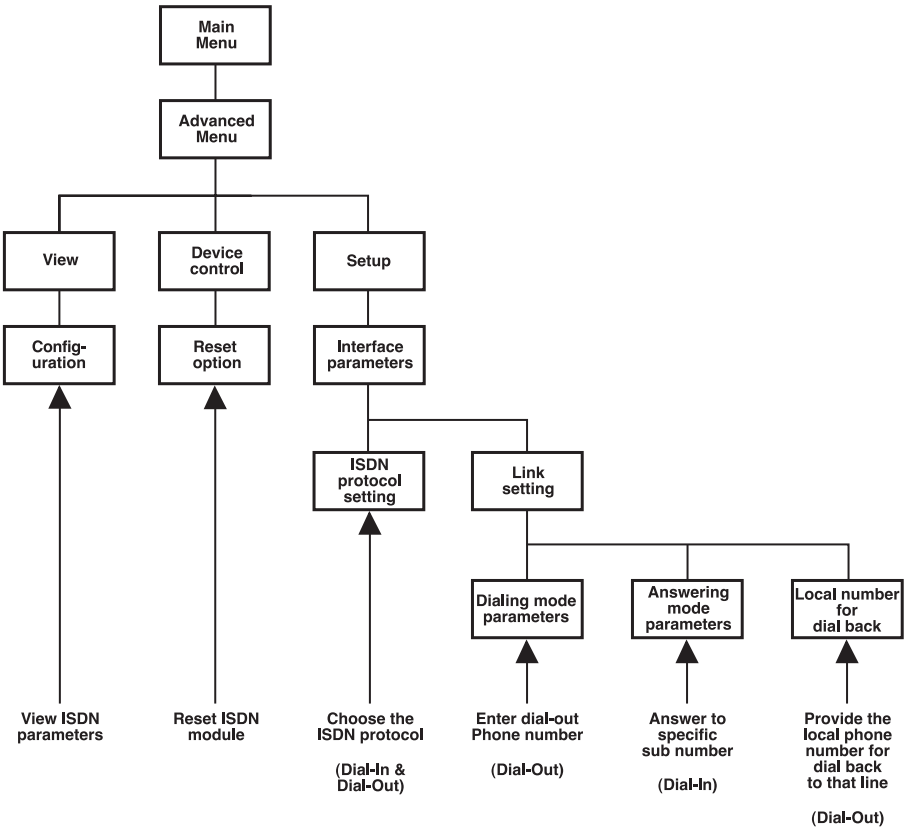


Figure 8-12. ISDN Options in the Advanced Menu.

Dialing Mode Parameters

Destination Phone Number: The phone number of the station you want to dial. This parameter is mandatory for dialing out. The other dialing mode parameters are optional.

Destination Sub-number: ISDN allows you to dial to an extension of the destination phone number. This parameter is optional.

Source Phone Number: The phone number of the person dialing out. This parameter is used by the destination station to identify the caller.

Source Sub-Number: An extension number of the person dialing out.

Answering Mode Parameters

Local Phone Number: The number to which incoming calls are directed.

Local Sub-number: The extension to which incoming calls are directed.

Local Number for Dialback

Dialback Phone Number: Use this option to enter the phone number that is used by the Internet Service Provider (ISP) to dial back the Internet Access Router. When the Router wants to dial up to the ISP, the ISP uses this number to identify and dial back the Internet Access Router (similar to reverse charging). In this way, the PTT bills the ISP and not the caller. This feature is only useful when dialback is enabled on both sides.

Dialback Sub-number: The extension used by the ISP for dialback purposes.

Frame Relay

Frame Relay is a form of wide-area networking that is designed to maximize throughput and minimize cost by simplifying network processing.

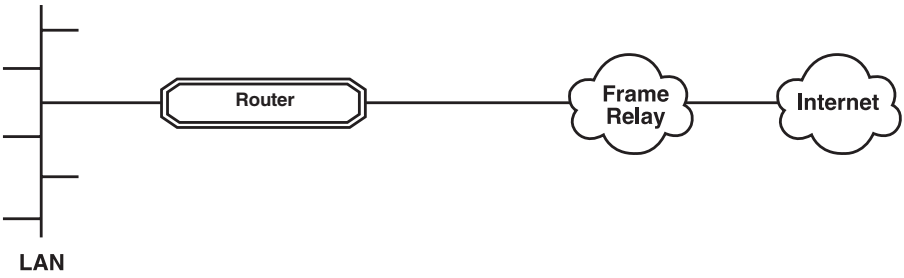


Figure 8-13. Connection to the Internet over Frame Relay.

Frame Relay Features

- Supports permanent virtual circuits (PVC).
- Supports Frame Relay (IP) encapsulation based on RFC 1490.
- Supports different management maintenance protocols: T1.617/ANNEX D, Q.933/ANNEX A and LMI.
- Supports self-learning of the maintenance protocol and the DLCI, which enables connection to the Frame Relay network without configuring Frame Relay parameters.
- Executes congestion control when an explicit congestion notification is received for the DLCI from the Frame Relay network. Frame Relay reduces the transmitted information rate of the DLCI and increases it when the congestion condition is cleared.
- Supports the Frame Relay SNMP MIB.

Implementing Frame Relay

Figure 8-14 maps the options in the Advanced Menu that are used to configure the Internet Access Router for operation over a Frame Relay network.

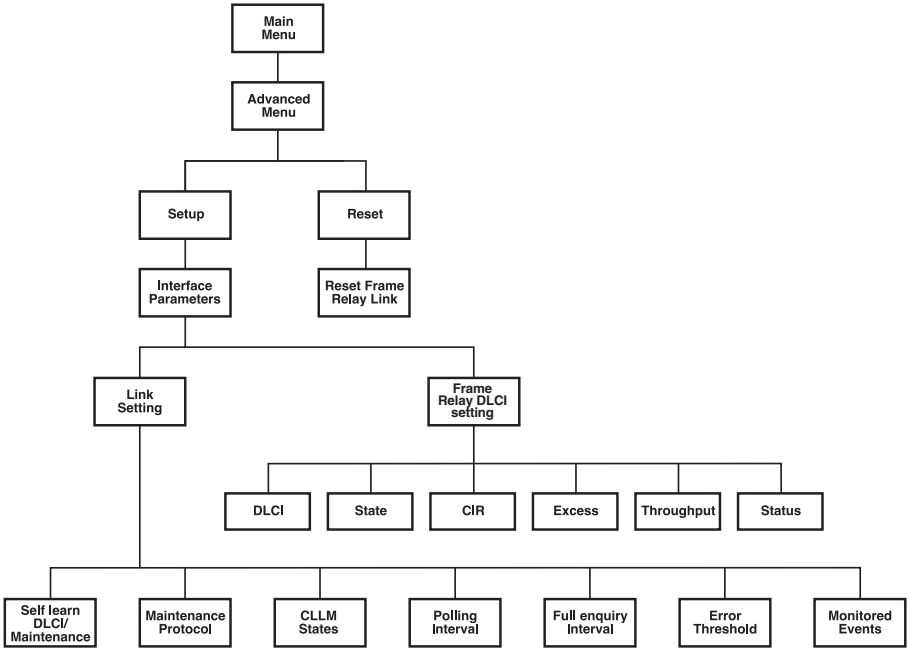


Figure 8-14. Frame Relay options in the Advanced Menu.

Frame Relay Link Parameters

The options in the Frame Relay Links Parameters menu are described below.

Self Learn DLCI/Maintenance: Determines whether the Internet Access Router will self learn the maintenance protocol on the Frame Relay link and the DLCI and its status (UP or DOWN). When this parameter is disabled (OFF), the user needs to configure the maintenance protocol and the DLCI.

CLLM Status: Specifies whether CLLM frames, used for congestion indication, will be supported (ON) or not (OFF).

Maintenance Protocol: Specifies the maintenance protocol of the Frame Relay link: T1.617/ANNEX D, Q.933/ANNEX A, LMI or None. This parameter can only be configured if the Self Learn DLCI Maintenance parameter is disabled (OFF).

Polling Interval: Specifies the number of seconds between transmission of two successive status enquiry functions.

Full Enquiry Interval: Specifies the number of polling intervals after which a full status request frame is transmitted.

Error Threshold: Specifies the number of unacknowledged monitored events (status enquiry frames and full status enquiry frames) that can occur in a sliding monitored events window before the link is declared DOWN.

Monitored Events: Specifies the number of monitored events (status enquiry frames and full status enquiry frames) in a sliding monitored events window.

Frame Relay DLCI Parameters

The options in the Frame Relay DLCI Parameters menu are described next.

DLCI: Specifies the DLCI number.

State: Specifies whether the DLCI is enabled or disabled (for receive/transmit).

CIR: Specifies the maximum amount of data, in bits, that the network guarantees to transfer during the measurement interval (the measurement interval is usually one second). The value of this parameter is obtained from the Frame Relay provider.

Excess: Specifies the maximum number of uncommitted data bits that the network will attempt to deliver during the measurement interval. The value of this parameter should be received from the Frame Relay provider.

Throughput: Specifies the average number of data bits per second transferred by the network. When a measurement interval of one second is assigned to the CIR, the throughput value should equal the CIR value.

Status: Specifies the status of the DLCI (UP or DOWN) as learned from the "Full Status Enquiry" reply frame, received from the network. This parameter cannot be configured.

8.2.4 ACCESS CONTROL (SECURITY)

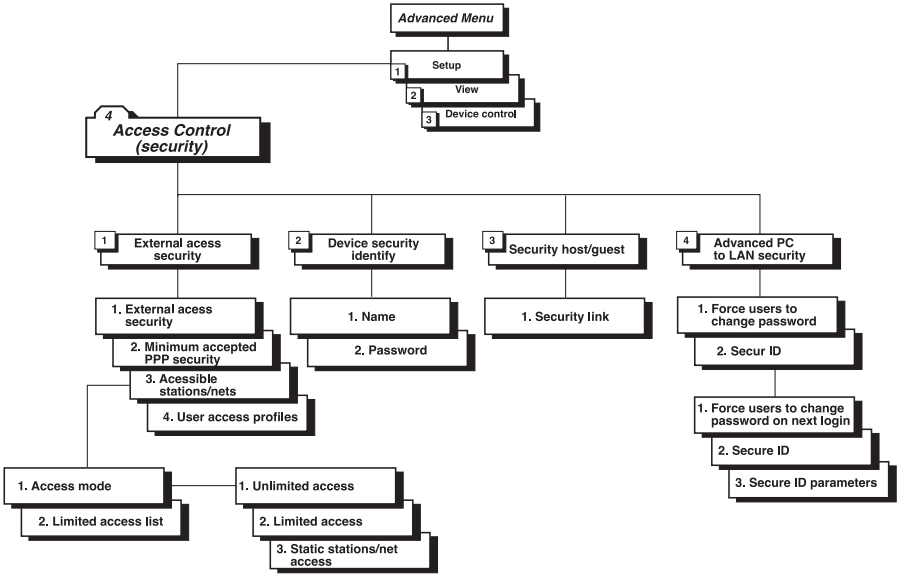


Figure 8-15. Access Control (Security) Menu Tree.

To access the Access Control menu:

1. In the Advanced menu, press 1. The Security menu appears.
2. In the Security menu, press 4. The Access Control menu appears.

```
ACCESS CONTROL (Device name—WEB)
----------------------------

1. External access security
2. Device security identity
3. Security Host/Guest
4. Advanced PC to LAN Bridge link security

ESC—Return to previous menu

Choose one of the above:
```

Figure 8-16. Access Control Menu.

The options in the Access Control menu are described below:

External access security

External Access Security: Select this option to protect your LAN against unwanted entry by outside users. Toggle between enable and disable.

Minimum accepted PPP security: Select this option to specify the minimum security to none, PAP, or CHAP.

Accessible stations/nets: This option does not apply to this version of the Internet Access Router.

User Access Profiles: This option does not apply to this version of the Internet Access Router.

Device Security Identity

Name: A name assigned to the Internet Access Router for access to the Internet Service Provider's central access router.

Password: A password assigned to the Internet Access Router for access to the Internet Service Provider's central access router.
Security host/guest: This option does not apply to this version of the Internet Access Router.

Advanced PC to LAN Security: This option does not apply to this version of the Internet Access Router.

8.2.5 WAN ECONOMY

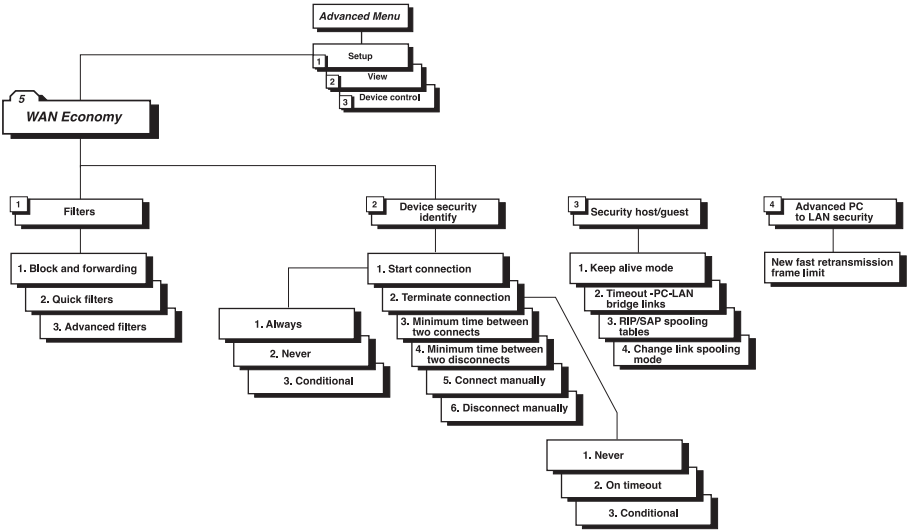


Figure 8-17. WAN Economy Menu Tree.

To access the WAN Economy menu:

1. In the Advanced menu, press 1. The Security menu appears.
2. In the Security menu, press 5. The WAN Economy menu appears.

```
WAN ECONOMY (Device name—WEB)
-----------

Use these features:
- to reduce traffic over the WAN to a minimum and increase t
- to keep the link up only when it is required

1. Filters
2. Connection on demand
3. Spoofing
4. Fast retransmission from limit:  2
ESC—Return to previous menu

Choose one of the above:
```

Figure 8-18. WAN Economy Menu.

The options in the WAN Economy menu are described below:

Filtering

Filtering allows the user to limit the type of traffic that enters and exits the small office LAN via the Internet Access Router. This feature saves valuable bandwidth and improves security.

There are two modes through which filtering can be implemented: blocking and forwarding.

Blocking: The block command causes the Internet Access Router to test every packet of data that is sent to or from the LAN. If the packet passes the test, passage is denied.

Example: You want to ensure that IP/VDP packets do not go on to the link in the direction of the Internet/Intranet. Thus, you design a filter that tests each packet to see if it is an IP/VDP packet. If the packet tests positive, it is automatically blocked.

Forwarding: The forward command works in the same way as the block command. However, with forwarding, if the packet passes the test, it is *allowed* passage to or from the LAN.

Example: You want to allow a certain user on the small-office LAN to access

the Internet for FTP purposes. To do this, you create a filter to test each packet for the IP host address of the specified user and the FTP socket of the packet. If the packet passes the test, it is forwarded to the Internet/Intranet.

Definition of Filter Tests: The user needs to define the filter test that will be applied to every packet that is transmitted. Use any combination of the following parameters to define the filter test:

- Destination and/or source MAC address of the packet (layer 2).
- Destination and/or source IP address of the packet.
- IP socket (upper and lower level)
- IP packet type (broadcast, multicast)
- Protocol
- Operation (block, forward, etc)

NOTE

Minimize the number of filters defined so as not to unnecessarily reduce the performance of the Internet Access Router.

Implementing Filters: Filters can be implemented through the control port, TELNET, or SNMP. First, decide on the mode and conditions for a filter, then follow the instructions below to set filter parameters.

Defining Quick Filters: Access the Quick Filters menu to display a list of protocols that can be blocked or forwarded.

To block or forward a protocol:

1. From the WAN Economy menu, choose Filters.
2. From the Filters menu, choose Quick Filters.
3. Press the number of the protocol to toggle between no filter, block, or forward.

Defining Advanced Filters: Access the Advanced Filters menu to define a mask with certain conditions for each protocol.
To define an advanced filter:

1. From the WAN Economy menu, choose Filters.

2. From the Filters menu, choose Advanced Filters.

3. Follow the on-screen instructions to perform advanced filter operations.

Connection on Demand

The Connection on Demand menu enables you to determine the start-connection and terminate-connection conditions, as well as the minimum time between two connections and disconnections. You are also able to end or start a connection manually from this menu.

Start Connection: Select this option to determine when to start a connection. If the link setup is ISDN (or configured with a modem) and has a dialing number, this option determines when to open the line for transmission and when to dial.

Terminate Connection: Select this option to determine when to terminate a link connection: never, on timeout, or conditional.

Minimum time between two connects: Defines the timeout period from the end of one session to the start of another. After a connection is terminated, it will reconnect only after the defined period, provided that the conditions to terminate are valid.

Minimum time between two disconnects: Defines the timeout period between two link disconnections. After a connection is initiated, it will terminate only after the defined timeout period, provided that the conditions to terminate are valid.

Connect Manually: Select this option to start a connection immediately.

Disconnect Manually: Select this option to terminate a connection immediately.

Spoofing

The Spoofing feature invokes the transmission of "keep alive" frames. These frames allow a remote user to logically remain on the local server station list for a specified period of time while the link is disconnected. This enables remote users to avoid re-login procedures to the server after reconnecting the link.

The options in the Spoofing menu are described below:

Keep alive mode: Select this option to allow the remote user to remain on the local server station list for a specified period of time while the link is disconnected.

Timeout PC-LAN bridge links: This option does not apply to this version of the Internet Access Router.

RIP/SAP spoofing tables updated timeout: This option does not apply to this version of the Internet Access Router.

Change link spoofing mode: Select this option to change the link/spoofing mode to enabled, disabled, or conditional.

Fast transmission frame limit

This option allows the user to insert the maximum number of acknowledge frames in the buffer to prevent unnecessary retransmissions on the WAN.

8.2.6 Factory Default Options

The factory default menu allows the user to change all configuration parameters back to their factory defaults.

To access the factory default screen:

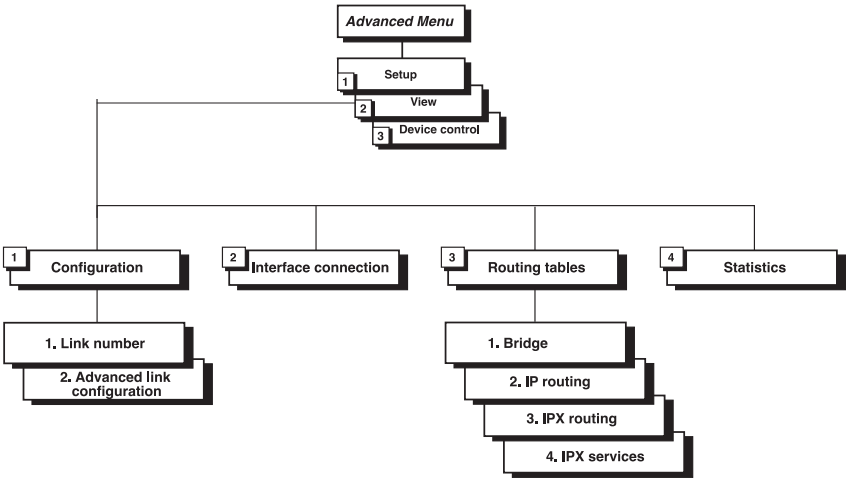
1. In the Main menu, press 1. The Setup menu appears.
2. From the Setup menu, press 6. A string of text appears, prompting you to reset certain parameters.
3. Press Y to reset the parameters to the factory default, or N to avoid reset. The next string of text appears. The screen in **Figure 8-19** displays all the parameters that can be reset.

```
Reset MONITOR parameters to factory default ? (Y/N):  N
Reset DEVICE ID parameters to factory default? (Y/N):  N
Reset MASKS parameters to factory default? (Y/N):  N
Reset FORWARDING parameters to factory default? (Y/N):  N
Reset SPOOFING parameters to factory default? (Y/N):  N
Reset SNMP parameters to factory default? (Y/N):  N
Reset LINKS parameters to factory default? (Y/N):  N
Reset DOWN LOAD parameters to factory default? (Y/N): N
Reset COD parameters to factory default? (Y/N):  N
Reset MODEMS parameters to factory default? (Y/N):  N
Reset ISDN parameters to factory default? (Y/N):  N
Reset PPP parameters to factory default? (Y/N):  N
Reset HOST IP parameters to factory default?  (Y/N):  N
Reset SECURITY parameters to factory default? (Y/N):  N
```

Figure 8-19. Factory Default Parameters.

8.3 View Menu

Figure 8-20. View Menu Tree.



To access the View Menu:

In the Advanced menu, press 2. The View menu appears.

```
VIEW MENU (Device name WEB)
---------

1. Configuration
2. Interface connections
3. Routing tables
4. Statistics

ESC—Return to previous menu

Choose one of the above:
```

Figure 8-21. View Menu.

The options in the View menu are described below:

Configuration

Allows you to view the configuration parameters for the device and the link, entered through the Setup menu. The Advanced Link Configuration screen displays configuration parameters for a specific link. These screens are "display-only" and parameters cannot be adjusted through them.

Interface connections

Select this option to display information about the stations connected to the Internet Access Router. The Interface Connections screen includes information about the type of router connected to a specific interface, the name of the router, and the state of the connection.

Routing tables

Select this option to display IP routing tables containing IP routing information.

NOTE

Bridge, IPX, and IPX service tables do not apply to this version of the Internet Access Router.

Statistics

Select this option to display information on the traffic between the networks connected by the Internet Access Router. The statistics enable the user to identify which networks need a greater link speed or multicast/broadcast masking.

8.4 Device Control Menu

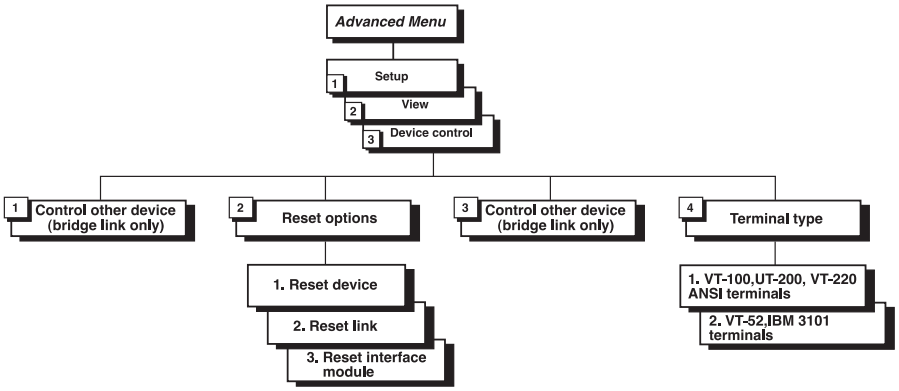


Figure 8-22. Device Control Menu Tree.

To access the Device Control menu:

In the Advanced menu, press 3. The Device Control menu appears.

```
DEVICE CONTROL (Device name—WEB)
--------------

1. Software download
2. Reset options
3. Control other device (bridge link only)
4. Terminal type

ESC—Return to previous menu

Choose one of the above:
```

Figure 8-23. Device Control Menu.

The options in the Device Control menu are described below:

Software download

Select this option to download a new software version. The download process erases the program code in the device and automatically resets the device. The Internet Access Router runs the download program by downloading the code from FLASH or via the system core code and EPROM. For more detailed information, see **Appendix D**.

Reset options

Select this option to reset the device, link, or interface module.

Control other devices

This option does not apply to this version of the Internet Access Router.

Terminal type

Select this option to choose a terminal type. Since each terminal type uses different ASCII control codes for cursor control, the Internet Access Router requires this information to clearly display screens on the terminal.

8.5 List of Operations

This section contains a quick reference table of operations, divided into sections according to the Advanced Menu. For your convenience, the keystrokes to carry out these operations are included, starting from the Advanced Menu. Browse through the list to find the action you would like to perform and simply type the figures in the order they appear. This brings you to the required screen. Follow the on-screen instructions to complete the action.

Table 8-1. Operations.

To...	You Press...
Host Parameters	
Change the device name	1.1.1.1
Enter name of contact person	1.1.1.2
Enter the location of the device	1.1.1.3
Set local administered address	1.1.1.4.1
Set active address to local or burned-in	1.1.1.4.2
Enter IP address	1.1.2.1
Enter IP mask	1.1.2.2
Enter default gateway	1.1.2.3
Enter IP host interface	1.1.2.4
Set read community	1.1.3.1
Set write community	1.1.3.2

Table 8-1. Operations.

To...	You Press...
Host Parameters	
Set trap community	1.1.3.3
Add parameter to manager table	1.1.3.4.a
Clear parameters in manager table	1.1.3.4.c
Delete specific parameters in manager table	1.1.3.4.d
Enter file server IP address	1.1.4.1
Enter file name	1.1.4.2
Set retransmitting timeout	1.1.4.3
Set total timeout	1.1.4.4
Routing/Bridging	
Change link type to SLIP	1.2.1.1.1
Change link type to CSLIP	1.2.1.1.2
Change link type to PPP	1.2.1.1.3
Change link cost/metric	1.2.1.3
Set header and control field compression	1.2.1.4.1
Set protocol field compression	1.2.1.4.2

Table 8-1. Operations (continued).

To...	You Press...
Routing/Bridging	
Set IP compression	1.2.1.4.3
Enable/disable Multilink	1.2.1.4.4
Add static station and net	1.2.2.a
Clear all static stations and nets	1.2.2.c
Delete static station and net	1.2.2.d
Enter shared IP net	1.2.3.1
Enable/disable remote workstation IP address	1.2.3.2
Add remote workstation to IP address pool	1.2.3.3.a
Delete remote workstation from IP address pool	1.2.3.3.d
Clear all IP addresses from IP address pool	1.2.3.3.c
Enter primary domain name server	1.2.3.4
Enter secondary domain name server	1.2.3.5
Enter aging time for stations learned by remote	1.2.5

Table 8-1. Operations (continued).

To...	You Press...
Interface Parameters	
Enable/disable link status	1.3.1.1
Set link type to asynchronous	1.3.1.2.1
Set link type to synchronous	1.3.1.2.2
Set link type to ISDN	1.3.1.2.4
Set link type to leased ISDN	1.3.1.2.5
Set link connection type	1.3.1.3
Set link connection timeout	1.3.1.4
Set control signals mode	1.3.1.5
Set baud rate	1.3.1.6
Set parity to on or off	1.3.1.7
Set number of stop bits	1.3.1.8
Set modem settings	1.3.1.9
Set ISDN protocol	1.3.2.1

Table 8-1. Operations (continued).

To...	You Press...
Access Control (Security)	
Enable/disable external access security	1.4.1.1
Set minimum accepted PPP security	1.4.1.2
Set access mode to unlimited access	1.4.1.3.1
Set access mode to limited access	1.4.1.3.2
Set access mode to static stations/nets only	1.4.1.3.3
Enter external device name for security identification	1.4.2.1
Enter external device password for security identification	1.4.2.2
WAN Economy	
Block/forward filters	1.5.1.1
Block/forward IP protocol	1.5.1.2.1
Set advanced filters	1.5.1.3
Set connection start condition to always	1.5.2.1.1
Set connection start condition to never	1.5.2.1.2
Set connection start condition to conditional	1.5.2.1.3

Table 8-1. Operations (continued).

To...	You Press...
WAN Economy	
Set connection terminate condition to never	1.5.2.1.2
Set connection terminate condition to timeout	1.5.2.2.2
Set connection terminate condition to conditional	1.5.2.2.3
Set minimum time between two connects	1.5.2.3
Set minimum time between two disconnects	1.5.2.4
Connect link manually	1.5.2.5
Disconnect link manually	1.5.2.6
Disable link spoofing mode	1.5.3.4.1
Enable link spoofing mode	1.5.3.4.2
Set conditional link spoofing mode	1.5.3.4.3
Enter new fast retransmission frame limit	1.5.4
Factory Default Options	
Reset monitor parameters to factory default settings	1.6
Reset device parameters to default settings	1.6
Reset masks parameters to default settings	1.6

Table 8-1. Operations (continued).

To...	You Press...
Factory Default Options	
Reset forwarding parameters to default settings	1.6
Reset spoofing parameters to default settings	1.6
Reset SNMP parameters to default settings	1.6
Reset links parameters to default settings	1.6
Reset download parameters to default settings	1.6
Reset COD parameters to default settings	1.6
Reset modem parameters to default settings	1.6
Reset ISDN parameters to default settings	1.6
Reset PPP parameters to default settings	1.6
Reset host IP parameters to default settings	1.6
Reset security parameters to default settings	1.6
Viewing Parameters	
View configuration parameters	2.1
View advanced configuration parameters	2.1.L

Table 8-1. Operations (continued).

To...	You Press...
Viewing Parameters	
View interface connections status	2.2
View IP routing table	2.3.2
View LAN statistics	2.4
Clear LAN statistics	2.4.c
Update average LAN statistics	2.4.u
Device Control	
Start download for new software version	3.1
Reset device	3.2.1
Reset link	3.2.2
Reset interface module	3.2.3
Control other device	3.3
Set terminal type to VT-100, VT-200, VT-220, ANSI terminals	3.4.1
Set terminal type to VT-52, IBM 3101 terminals	3.4.2
Set terminal type to other terminals	3.4.3

Appendix A: Single IP

A.1 Internet Access Router and Single IP

The Internet Access Router is a standalone IP router for the small office. Single IP is a feature of the Internet Access Router that can be enabled or disabled by the user. When Single IP is enabled, the Internet Access Router allows users in a small office to connect to the Internet/Intranet quickly and transparently. Connection is via ISDN, PSTN, Frame Relay, or Leased Lines. Single IP also completely protects all the small-office users from hackers on the Internet and Intranet.

Normally, a LAN requires a complete statically assigned, unique, and legal subnet in order to connect to the Internet or Intranet. Single IP allows an entire small office to connect to the Internet or Corporate Intranet using only one dynamically assigned IP address received from the ISP via a dial-up modem ISDN connection, leased line, DDS, or Frame Relay.

Single IP is recommended for small-office LANs where up to 20 users are expected at any one instant to access the Internet/Intranet via the Internet Access Router.

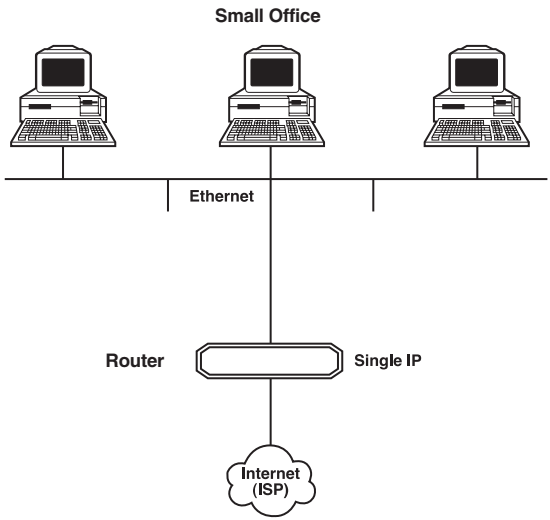


Figure A-1. Small-Office Configuration.

A.2 Features

- Allows a small office to connect to the Internet/Intranet in the same way as a single PC.
- Requires only one legal IP address.
- Obtains a single legal IP address from the Internet/Intranet Access Router using standard IPCP.
- Allows a Small Office to access any public IP subnet.
- Allows up to about 20 users to access the Internet/Intranet via Single IP simultaneously.
- Allows Web browsing, FTP, Telnet, email, News, and other IP applications using any TCP/IP stack on any type of station in the small office.
- Provides total security against Internet hackers using the Solid Firewall feature.
- Allows automatic connection and disconnection of the link by Single IP based on actual or specific use of the Internet/Intranet.
- Allows filtering of traffic on the link to reduce wastage of bandwidth and to improve security.

A.2.1 Small-Office Internet Access vs. Single PC Internet Access

Configure the Internet Access Router to dial up to a router at the other end of the connection—your Internet service provider, for example—and to supply a user name and password over PPP. The router at the other end automatically supplies your Internet Access Router with a single temporary IP address using the IPCP protocol—the same way that a single PC would connect directly to the ISP.

You can connect a complete small-office LAN with a private subnet to Single IP. Through Single IP, all the small-office users can access the Internet/Intranet. The Internet/Intranet provider does not need to specially coordinate or allocate the subnets.

A.2.2 Simultaneous Multiple Access to the Internet/Intranet

Single IP is designed to support up to twenty concurrent users on the small-office LAN. You can have more than twenty potential users exist in the small office LAN, but at any given moment, no more than twenty users should access the Internet/Intranet via Single IP. Performance may be impaired when more than twenty concurrent users use the Single IP feature.

A.2.3 IP Applications: Web Browsing, FTP, Telnet, Email, News, and Others

Single IP allows the use of any WWW browser, such as Netscape or Mosaic, to access the World Wide Web. Refer to the list below for some of the types of Internet and Intranet access supported by Single IP.

- World Wide Web browsing
- Email
- FTP client
- News reader
- Telnet client
- Ping (outbound)

Single IP supports any SOCKS-compatible client application (e.g. Netscape). Access to FTP within Netscape, Gopher access, and access to secure servers is supported. POP3 clients (e.g. Eudora, Pegasus mail, Microsoft Exchange) and other e-mail packages and news readers are allowed access to e-mail servers through Single IP e-mail support.

Single IP allows use of FTP client applications that support the username@hostname method of firewall crossing. For example: WS_FTP, CuteFTP and command-line FTP clients. Connection through another firewall using the same mechanism is also allowed.

A.2.4 Solid Firewall

The Solid Firewall feature prevents all access from the Internet/Intranet into the small office LAN. This feature makes the Small Office LAN invisible to outside users. The Solid Firewall feature is a simple and foolproof way of protecting security-sensitive small offices (e.g. doctors and lawyers) from Internet hackers.

A.2.5 Connection and Disconnection on Command

Single IP can be configured to automatically connect to the link (ISDN, PSTN) whenever IP traffic to the Internet/Intranet is detected on the Small Office LAN. This means that whenever any of the Small Office users opens an application such as Netscape or email, Single IP will automatically dial up the Internet/Intranet provider. No manual user intervention is necessary. To save money, Single IP can also be configured to automatically disconnect the link (hang up) when no users access the Internet/Intranet.

A.2.6 Filtering

Single IP can be set up to allow or deny connections to or from specified users. Single IP filtering can be used to reduce unnecessary traffic to the Internet/Intranet, to enhance security and to control access to the Internet/Intranet.

A.3 How Single IP Works

To set up your small office LAN connection to your IP provider quickly and easily, read this section to understand how Single IP works.

The System

A typical system consists of:

- one LAN
- one Internet Access Router
- an optional modem
- a public access service such as ISDN, PSTN, or Frame Relay
- an Internet Service Provider account or Intranet access point

LAN

The user stations are connected to the LAN. Each user station requires its own host IP address. The host IP addresses differ from all the other host IP addresses on the same LAN. However, all the host IP addresses on the LAN must belong to the same subnet. All the stations must have the same IP subnet mask.

Internet Access Router

The Internet Access Router is connected to the small office LAN via its LAN port. It has its own local IP address which is configured by the user. The local IP host address of the Internet Access Router must belong to the same IP subnet as the other stations on the LAN. The Internet Access Router's subnet mask must also be the same as the other stations on the LAN.

Public Access Service

The Internet Access Router can be used over a wide variety of links, including ISDN, PSTN, DDS, and Frame Relay. The user may require a modem or a CSU/DSU unit, depending on the type of link used.

Internet Service Provider account or Intranet Access Point

The Internet Access Router is designed to access an Internet or Intranet router on the other side of the Public Access Service. This can be any router that supports standard PPP and IPCP. Upon each dial in, the Internet Access Router dynamically obtains a single IP address from the router using the IPCP protocol. The Internet Access Router releases the temporary IP address every time it disconnects. The temporarily assigned IP address is not the same as the locally assigned host IP address assigned to the Internet Access Router by the user during the first installation. If you are using the Single IP option, the Router can successfully connect to the ISP through a terminal server as well.

IP Functionality

The Internet Access Router is a dedicated IP access router for the small office. Make sure you're familiar with the following terms:

- TCP and UDP
- IP Addresses
- IP Ports
- DNS

A.4 Implementing Single IP

To enable the Single IP feature, note the following points:

1. Single IP must first be configured to connect to the IP Provider over the link layer (ISDN, PSTN, Frame Relay, DDS). Refer to **Chapter 5** for instructions on enabling Single IP.

   Single IP has a built-in utility called Ping. We recommend that you use the Ping feature to confirm that the IP connectivity of the Single IP with the rest of the Internet world is correct, before configuring the LAN.

2. LAN and IP addresses

   Although Single IP operation is almost completely independent of the LAN, check the following:

- Each station on the LAN must have an IP address assigned to its LAN port. Each station should have its own unique IP address within the LAN.

- Each station's IP address should belong to the same subnet as all the other host IP addresses on the small office LAN.

- Each station's IP address subnet mask should be the same as that of all the other stations on the small office LAN.

  Any IP address can be used as a host IP address of the stations on the LAN, provided that it follows the rules in this section. However, if the same IP subnet is used on the small-office LAN and also somewhere else in the global Internet, and if the user tries to start an IP session with a station on the same numbered subnet somewhere else in the global Internet, that specific traffic will not get past Single IP.

  The reason for this is that the Single IP inspects the source and destination subnet of every IP packet sent from the small-office LAN. If the source and destination subnets are the same, the Single IP will not transfer the packet to the IP Provider.

  To solve this problem, you can use subnets which are called Private Addresses. These addresses are guaranteed by the IP standard not to be used by "legal" IP stations on the Internet. Private Addresses are reserved for stations that "hide" behind gateways such as Single IP.

  Private Addresses (see RFC 1918) exist in the range from 192.168.0.8 through to 192.168.255.255. For a small-office LAN, you can use the subnet mask 255.255.255.0 to allow up to 256 stations on the small- office LAN. We recommend that, since it is the first device in the LAN, you give the Internet Access Router a host IP address of 1 during Quick Setup.

Example: Three PCs want to connect to the Internet using Single IP. Assign 192.168.1.1 as the Single IP host IP address. For the first PC, allocate an address of 192.168.1.2., 192.168.1.2 for the second PC's address and 192.168.1.4 as the third PC's address. Set the subnet mask for the Internet Access Router and all the PCs to 255.255.255.0.

3. LAN and DNS's

When a user on the small-office LAN generates IP traffic, Single IP automatically checks whether the traffic is destined for a station outside the small office. If it is, Single IP automatically dials up the IP Provider and transfers the traffic to the IP Provider's router.

If the user generates traffic for a named destination, such as http://www.blackbox.com, a DNS server somewhere on the Internet needs to translate the specific destination name into an IP address that is used in all subsequent packets. Small offices with Single IP will usually use the DNS server of the IP provider to do this. Therefore, we recommend that you configure each user on the small-office LAN with the IP address of the DNS server at the IP Provider's site.

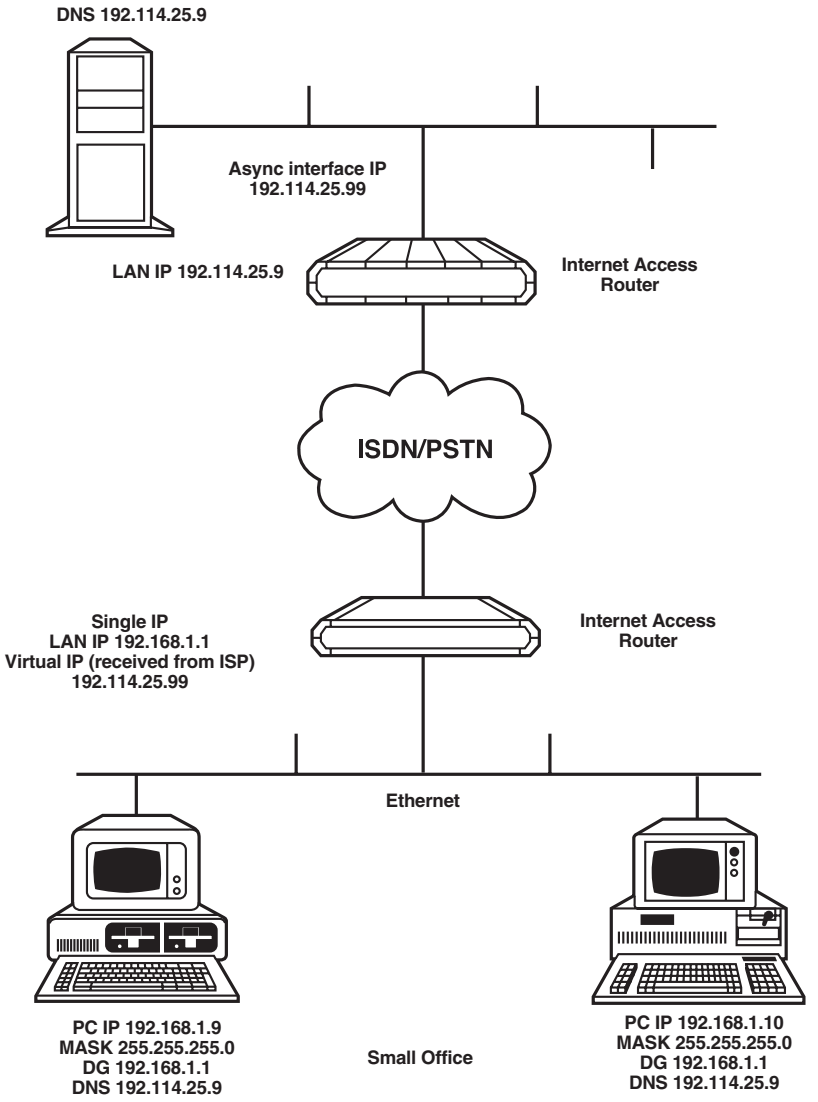


Figure A-2. Small-Office LAN Configuration.

A.5 Questions About Single IP

Can I use WFW 3.11, UNIX, Macintosh, or AS/400 on my LAN?

Yes, you can. In fact, you can use any operating system that supports TCP/IP.

Can I run other protocols (for example, IPX/SPX) on my LAN as well?

Yes, you can. The Microsoft network software supports multiple simultaneous protocols. You may find that you get better response on your LAN if you enable NetBEUI and set it as your default protocol. The default protocol is the first protocol that Microsoft Windows networking will try to connect with (except for sockets applications which only support TCP/IP). The default protocol will be used for your local LAN traffic and is slightly more efficient than TCP/IP. If you are running Novell, you will probably want to enable IPX/SPX.

Can I ping anything on the Internet from my LAN?

Yes, you can. However, you cannot ping from the Internet into the LAN.

Why does Single IP sometimes dialup apparently with no reason?

Single IP only initiates a dialup when it is trying to connect to something. The reason for apparent dialing without a reason is due to DNS forwarding. To solve the problem, place an entry in the host file of every LAN station that points to the local DNS on the LAN.

Why can't I ping anything on my small-office LAN from the Internet?

This is not possible since your small office LAN does not exist as far as the global Internet is concerned. The Single IP feature blocks all access initiated from outside the small office towards the LAN.

Why can't I get RealAudio (and some UDP clients) to work?

Make sure that your RealAudio application is configured to work in TCP mode.

Appendix B: Fault Isolation and Troubleshooting

Some common faults and their solutions are listed in **Table B-1**. If a persistent fault occurs, confirm that the Internet Access Router is configured properly. Link errors are sometimes caused by loose contact between connectors or lack of cable continuity. Check that all conductors are plugged in properly and that cable quality is good.

Table B-1. Troubleshooting Guide.

Symptom	Possible Cause	Recommended Course of Action
All front-panel indicators are OFF.	The unit is not receiving power.	1. Check that power is supplied to the unit.
Red LINK ERROR indicator is blinking.	In synchronous operation: Corrupted frames are being received, or the physical connection is unstable.	Check the modem configuration and cables.
Red LINK ERROR indicator is ON.	The LINK ERROR indicator will be ON if the link is configured in synchronous mode, and no clock signal is being received.	1. Check configuration settings. 2. Check the modem configuration and cables.
Red LAN ERROR indicator is blinking.	There is a temporary transmission problem.	Check cable connectors and make sure that the proper cable type is used.

Table B-1. Troubleshooting Guide (continued).

Symptom	Possible Cause	Recommended Course of Action
Red LAN ERROR indicator is ON.	There is a problem with the LAN connection.	Check that the LAN is connected properly.
READY indicator is blinking.	Traffic from the link exceeds the configured link rate causing a buffer overflow.	Increase link speed or use the software masking option to eliminate unnecessary traffic.
READY indicator is OFF.	If LAN ERROR indicator is ON, or all LINK ERROR indicators are ON, there is a possible connection problem with the LAN or Link.	Check LAN and Link connectors.

Appendix C: Interface Specifications and Cable Diagrams

Table C-1. Interface Signal List (Female Connectors).

Signal Function	Source	V.24/ RS-232 DB25 (female)	V.35 34-pin (female) Pin Circuit	EIA-530 DB25 (female) Pin Circuit	V.36/ RS-449 DB37 Pin Circuit	X.21 DB15 (female) Pin Circuit (Function)	Description
Protective Ground	Common	1	AFrame101	1	1	1 (Shield)	Chassis ground. May be isolated from Signal Ground.
Signal Ground	Common	7	BSignal102 GND	7AB	19SG	8 (GND)	Common Signal and DC power supply ground.
Transmitted Data	DTE	2	STD(B)103 PTD(A)103	2BA(A) 14BA(B)	4SD(A) 22SD(B)	2T(A) 9T(B) TRANSMIT	Serial digital data from Router. The data transitions must occur on the rising edge of the clock.
Request to Send	DTE	4	CRTS105	4CA(A) 19CA(B)	7RS(A) 25RS(B)	3C(A) 10C(B) CONTROL	ON from the Router upon completion of Self-Test.
Clear to Send	DCE	5	DCTS106	5CB(A) 13CB(B)	9CS(A) 27CS(B)	—	Router expects CTS ON.
Data Set Ready	DCE	6	EDSR107	6CC(A) 22CC(B)	11DM(A) 29DM(B)	—	Not used.
Data Terminal Ready	DTE	20	HDTR108	20CD(A) 23CD(A)	12TR(A) 30TR(B)	—	Constantly ON.
Carrier Detect	DCE	8	FDCD109	8CF(A) 10CF(B)	13RR(A) 31RR(B)	5(A) 12(B) Indication	Router expects DCD ON.
Transmit Clock	DCE	15	YSCT(A)114 ASCT(B)114	15DB(A) 12DB(B)	5ST(A) 23ST(B)	6S(A) 13S(B) Signal Timing	Router requires clock for synchron-ization.
Receive Clock	DCE	17	XCSR(B)115 VSCR(A)115	17DD(A) 9DD(B)	8RT(A) 26RT(B)	—	Router requires clock for synchron-ization.

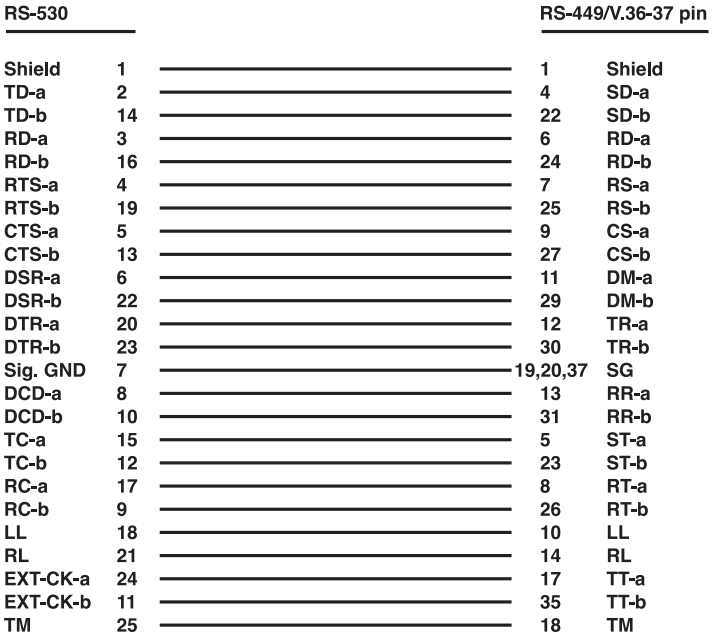


Figure C-1. Cable supplied for V.36 Interface.

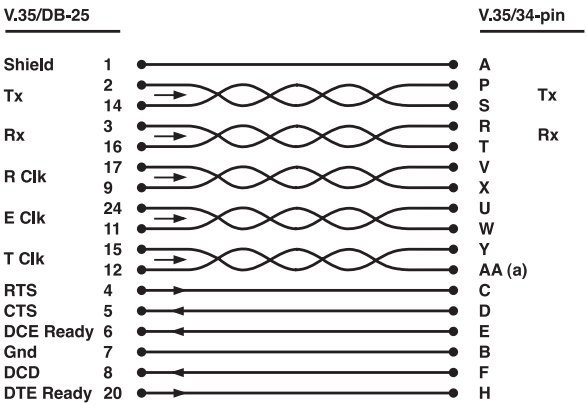


Figure C-2. Cable supplied for V.35 Interface.

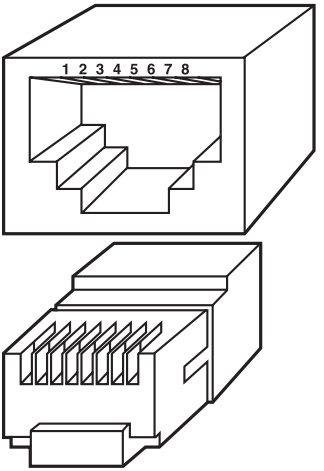


Figure C-3. RJ-45 Connection.

Table C-2. Control Cable RJ-45 to DB25 Connection.

RJ-45 Pin	Signal Function	DB25 Pin	Signal Function
1	GND	7	GND
5	TX	3	RX
6	RX	2	TX
7	RTS	5	CTS

Appendix D: Software Download

D.1 Introduction

The download process erases the program code in the device and automatically resets the device. The Internet Access Router runs the download program and downloads the updated code to the FLASH.

There are two ways to perform download:

1. Via the control port of the terminal emulator, using XMODEM protocol.
2. Via the TFTP server (LAN or WAN interface), using TFTP protocol.

To start the download process, the user must first erase the old software. Erase the software via the Software download option in the Device Control menu, or via the Rescue menu.

To display the rescue menu:

1. Connect to the terminal emulator.
2. Switch on the Internet Access Router and immediately press "R" several times. The Download Core Version screen appears.
3. Select the desired option and type "yes" to confirm.

D.2 Downloading via XMODEM

Follow the steps below to download XMODEM.

1. Connect to the terminal emulator.
2. Switch on the Internet Access Router and press Enter several times. The Download program's Main menu appears.
3. Select option 1 to display the Download Protocol menu.
4. Choose X to select the XMODEM protocol and press Enter. The XMODEM menu appears.
5. Select the download rate (recommended 115.2 Kbps).

6. Change the terminal emulation rate to match the download rate. Press Enter.

7. Press “S” to download the XMODEM in your unit.

8. Upload the new code version (xxx.bin) in the terminal emulator. At the end of the upload process, the unit resets itself and starts working with the new software version.

D.3 Downloading via TFTP

TFTP is a UDP/IP client-server application. The unit is a client TFTP that starts running after erasing the old software. Operating opposite the client, you need a TFTP server connected to the LAN or WAN interface via an IP network.

Before performing the download, configure the following parameters:

- IP host parameters: IP address, IP mask, and IP default gateway.

- IP host TFTP parameters: IP address of the TFTP server and the file name and path.

Save the above parameters before you erase the old code. The process automatically searches for the TFTP server to start downloading. After erasing the code, you can set or change the old parameters from the CORE code. However, this does not save the parameters in the unit.

At the beginning of the download, the following message appears: START DOWNLOAD. During the download process, a counter shows the number of packets that have passed. When the download is complete, the following message appears: DOWNLOAD DONE.

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