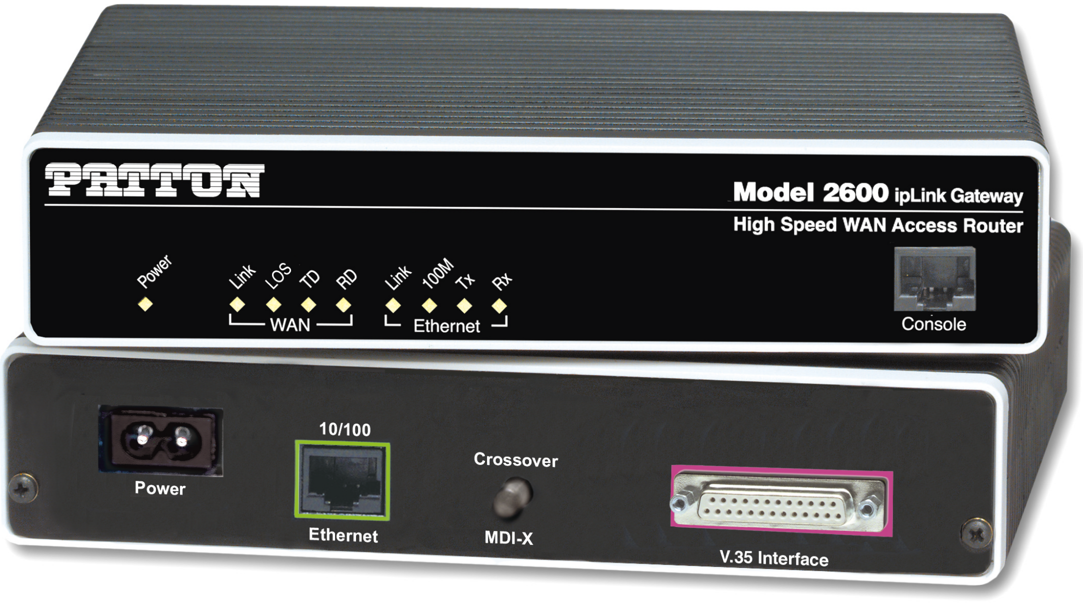
For Quick Start Installation
see page 27

Models 2603, 2621, and 2635
IPLink Series High Speed Routers

User Guide



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Warranty Information

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

Patton Electronics warrants all IPLink Series router components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of the shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If the product fails to perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

Contents

Compliance Information

Radio and TV Interference

The IPLink Series router generates and uses 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 and television reception. The IPLink router have been tested and found to comply with the limits for a Class A computing device in accordance with specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If The IPLink Series router does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

CE Notice

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

FCC Part 68 (ACTA) Statement (Model 2603 only)

This equipment complies with Part 68 of FCC rules and the requirements adopted by ACTA. On the bottom side of this equipment is a label that contains—among other information—a product identifier in the format *US: AAAEQ##TXXXX*. If requested, this number must be provided to the telephone company.

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA.

This equipment uses a Universal Service Order Code (USOC) jack: RJ-11C.

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

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

If trouble is experienced with this equipment, for repair or warranty information, please contact our company. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

Industry Canada Notice

Note This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, *IC*, before the registration number signifies that registration was performed based on a Declaration of conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

Service

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Services at:

- Tel: **+1 (301) 975-1007**
- Email: **support@patton.com**
- URL: **www.patton.com**

Note Packages received without an RMA number will not be accepted.

About this guide

This guide describes installing and configuring Patton Electronics IPLink Series High Speed Routers. The instructions in this guide are based on the following assumptions:

- The router may connect to a serial DTE device or T1/E1 line
- There is a LAN connected to the Ethernet port of the router

Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters and appendices:

- Chapter 1 provides information about router features and capabilities
- Chapter 2 contains an overview describing router operation
- Chapter 3 provides quick start installation procedures
- Chapter 4 describes configuring the IPLink router
- Chapter 5 describes configuring security for the router
- Chapter 6 describes configuring for network address translation (NAT)
- Chapter 7 describes configuring SNMP daemon settings
- Chapter 8 contains definitions for the LED status indicators
- Chapter 9 describes router diagnostics
- Appendix A contains specifications for the routers
- Appendix B provides cable recommendations
- Appendix C describes the router's ports
- Appendix D describes how to use the command line interface (CLI)

For best results, read the contents of this guide *before* you install the router.

Precautions

Notes and cautions, which have the following meanings, are used throughout this guide to help you become aware of potential Router problems. *Warnings* relate to personal injury issues, and *Cautions* refer to potential property damage.

Note Calls attention to important information.

⚠ WARNING **The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.**

⚠ WARNING **The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.**

⚠ CAUTION The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.

⚠ CAUTION The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

Factory default parameters

IPLink Series High Speed Routers have the following factory default parameters.

- Ethernet IP address: 192.168.200.10/24
- WAN Connection: PPPoH Bridged
- Ethernet and serial connections
- MDI (LAN connector)
- Model 2621 (X.21)—DB-15 port (DTE)
- Model 2635 (V.35)—DB-25 port (DCE, DTE when using special V.35 cable)
- Model 2603/T—T1 configuration. RJ-48C (100-ohm) interface
- Model 2603/K—E1 configuration. RJ-48C (120-ohm) and dual-BNC interface (75-ohm)

Typographical conventions used in this document

This section describes the typographical conventions and terms used in this guide.

General conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Futura bold type	Indicates the names of menu bar options.
Italicized Futura type	Indicates the names of options on pull-down menus.
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.
< >	Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on.
`Are you ready?`	All system messages and prompts appear in the `Courier` font as the system would display them.
`% dir *.*`	Bold Courier font indicates where the operator must type a response or command

Mouse conventions

The following conventions are used when describing mouse actions:

Table 2. Mouse conventions

Convention	Meaning
Left mouse button	This button refers to the primary or leftmost mouse button (unless you have changed the default configuration).
Right mouse button	This button refers the secondary or rightmost mouse button (unless you have changed the default configuration).
Point	This word means to move the mouse in such a way that the tip of the pointing arrow on the screen ends up resting at the desired location.
Click	Means to quickly press and release the left or right mouse button (as instructed in the procedure). Make sure you do not move the mouse pointer while clicking a mouse button.
Double-click	Means to press and release the same mouse button two times quickly
Drag	This word means to point the arrow and then hold down the left or right mouse button (as instructed in the procedure) as you move the mouse to a new location. When you have moved the mouse pointer to the desired location, you can release the mouse button.

Chapter 1 General Information

Chapter contents

IPLink Series High Speed Routers overview

The IPLink Series of gateway routers/bridges combine full set of high-speed IP routing features and WAN access via PPP/IP/FR protocols. All IPLink routers come with an auto-sensing full-duplex 10/100Base-T Ethernet port, cross-over switch, console port, and internal or external power supply. There are three versions in the IPLink series corresponding to a choice of WAN interface:

- The Model 2603 is equipped with an integrated T1/E1 CSU/DSU for connection to full and fractional T1/E1 services.
- The Model 2621 is equipped with DTE/DCE user configurable X.21 interface.
- The Model 2635 equipped with a V.35 interface presented on a female DB-25 connector.

The IPLink routers provide selectable bridging or routing functionality along with advanced IP features such as NAT/NAPT, Firewall, and DHCP. A complete set of configurable PPP/IP/FR WAN protocols allow a wide range of choices when connecting branches via common WAN services. The IPLink routers boast easy installation offering Console/VT-100, Telnet, and HTTP/SNMP management options.

The following sections describes the IPLink series features and capabilities:

- General attributes, see section “General attributes”
- Ethernet, see section “Ethernet” on page 17
- Protocol support, see section “Protocol support” on page 17
- PPP support, see section “PPP Support” on page 17
- Management, see section “Management” on page 18
- WAN interface, see section “WAN Interfaces” on page 17
- Security, see section “Security” on page 18
- Front panel status LED see section “Front Panel Status LEDs and Console Port” on page 19

General attributes

- Compact, low cost router/bridge
- 10/100 Ethernet
- Unlimited host support.
- Comprehensive hardware diagnostics, works with any operating system, easy maintenance and effortless installation.
- Plug-and-Play operation for fast and seamless turn-up with pre-configured WAN and LAN options.
- Built-in web configuration.
- Setup allows for standard IP address and unique method for entering an IP address and mask *without* requiring a console connection. Default IP address of 192.168.1.1/24.
- Simple software upgrades obtained via FTP and loaded into FLASH memory.
- Front panel LEDs indicate *Power, WAN,* and *Ethernet LAN* speed and status.
- Convenient and standard RJ connectors for Ethernet, Line, and Console.

- Field factory default option.
- Standard one-year warranty.

Ethernet

- Auto-sensing full-duplex 10Base-T/100Base-TX Ethernet.
- Standard RJ-45 connector
- Built-in MDI-X cross-over switch.
- IEEE 802.1d transparent learning bridge up to 1,024 addresses and Spanning Tree.
- 8 IP address/subnets on Ethernet interface.

Protocol support

- Complete internetworking with IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826).
- IP router with RIP (RFC 1058), RIPv2 (RFC 2453) for up to 64 static routes.
- Built-in ping and traceroute facilities.
- Integrated DHCP server (RFC 2131).
- DHCP relay agent (RFC 2132/RFC 1542) with 8 individual address pools.
- DNS relay with primary and secondary name server selection.
- NAT (RFC 3022) with network address port translation (NAPT), MultiNat with 1:1, Many:1, Many:Many mapping, Port/IP redirection and mapping.

PPP Support

- Point-to-point protocol over HDLC
- PPPoE (RFC 2516) Client for autonomous network connection. Eliminates the requirement of installing client software on a local PC and allows sharing of the connection across a LAN.
- User configurable PPP PAP (RFC 1661) or CHAP (RFC 1994) authentication.

WAN Interfaces

- T1/E1, V.35 or X.21 interfaces
- Available with female RJ-48C, dual BNC, DB-25, and DB-15 connectors
- User configurable DTE/DCE for X.21

Protocol Support

- Complete internetworking with IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826).
- IP router with RIP (RFC 1058), RIPv2 (RFC 2453),
- Up to 64 static routes with user selectable priority over RIP/OSPF routes.
- Built-in ping facilities.

- Integrated DHCP server (RFC 2131). Selectable general IP leases and user specific MAC/IP parings. Selectable lease period.
- DHCP relay agent (RFC 2132/RFC 1542) with 8 individual address pools.
- DNS relay with primary and secondary Name Server selection.
- NAT (RFC 3022) with network address port translation (NAPT) for cost-effective sharing of a single DSL connection. Integrated application level gateway with support for over 80 applications.
- NAT MultiNat with 1:1 mapping.
- NAT Many:1.
- NAT Many:Many mapping.
- NAT Port/IP redirection and mapping.
- uPNP controlled device for seamless networked device interconnectivity and Windows XP integration.
- IGMPv2 Proxy support (RFC 2236).
- Frame Relay with Annex A/D/LMI, RFC 1490 MpoFR and FRF.12 Fragmentation.

Management

- User selectable HDLC or Frame Relay WAN datalink connection.
- Web-Based configuration via embedded web server
- CLI menu for configuration, management, and diagnostics.
- Local/Remote CLI (VT-100 or Telnet).
- SNMPv1 (RFC 1157) MIB II (RFC 1213)
- Quick Start Setup runs through common options to simplify circuit turn-up.
- Logging via SYSLOG, and VT-100 console. Console port set at 9600 bps 8/N/1 settings no flow control.

Security

- Packet filtering firewall for controlled access to and from LAN/WAN. Support for 255 rules in 32 filter sets. 16 individual connection profiles.
- DoS Detection/protection. Intrusion detection, Logging of session, blocking and intrusion events and Real-Time alerts. Logging or SMTP on event.
- Password protected system management with a username/password for console and virtual terminal. Separate user selectable passwords for SNMP RO/RW strings.
- Access list determining up to 5 hosts/networks which are allowed to access management system SNMP/HTTP/TELNET.
- Logging or SMTP on events: POST, POST errors, PPP/DHCP, IP.

Front Panel Status LEDs and Console Port

The IPLink routers have all status LEDs and console port on the front panel of the unit, and all other electrical connections are located on the rear panel.

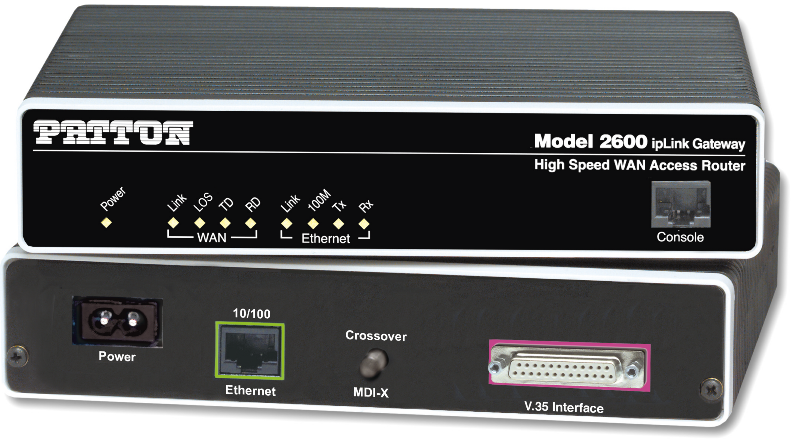


Figure 1. IPLink Series Router (Model 2635 shown)

The status LEDs from left to right are (see table 3 for LED descriptions):

- Power
- Sync Serial TD, RD, CTS, and DTR
- Ethernet Link, 100M, Tx, and Rx

Table 3. Status LED descriptions

Power		Green	ON indicates that power is applied. Off indicates that no power is applied.
T1/E1	Link	Green	Solid green: connected Off: disconnected
	LOS	Red	On: indicates a T1/E1 loss-of-frame condition. It also indicates that no T1/E1 signal is detected.
	TD	Green	Green: indicates a binary '0' condition *off*: indicates a binary '1'or idle condition
	RD	Green	Green: indicates a binary '0'condition off: indicates a binary '1' or idle condition
Sync Serial	TD	Green	Green: indicates a binary '0' condition *off*: indicates a binary '1'or idle condition
	RD	Green	Green: indicates a binary '0'condition off: indicates a binary '1' or idle condition
	CTS	Green	ON: indicates the CTS signal from the router is active, binary '1' off: indicates CTS is binary '0'
	DTR	Green	ON: indicates the DTR signal from the DTE device attached to the serial port is active, binary '1'

Table 3. Status LED descriptions (Continued)

Ethernet	Link	Green	ON: indicates an active 10/100 Base-T connection
	100M	Green	ON: connected to a 100BaseT LAN Off: connected to a 10BaseT LAN
	Tx	Green	Flashing: when transmitting data from the router to the Ethernet
	Rx	Green	Flashing: when transmitting data from the Ethernet to the router.

Console port

Located on the front panel, the unshielded RJ-45 RS-232 console DCE port (EIA-561) with the pin-out listed in the following table:

Pin No.	Signal Direction	Signal Name
1	Out	DSR
2	Out	CD
3	In	DTR
4	—	Signal Ground
5	Out	RD
6	In	TD
7	Out	CTS
8	In	RTS

Rear panel connectors and switches

On the rear panel from left to right are the following:

- Power input connector
- Ethernet connector
- MDI-X switch
- WAN port (V.35, X.21, T1/E1)

Power connector

AC universal power supply.

The IPLink Series router offers internal or external AC power supply options.

- The internal power supply connects to an AC source via an IEC-320 connector (100–240 VAC, 200 mA, 50/60 Hz)
- The external power supply connects to an external source providing +5 VDC via a barrel-type connector

48 VDC power supply.

- The DC power supply connects to a DC source via a terminal block
- Rated voltage and current: 36–60 VDC, 400 mA

CAUTION

> Connect the equipment to a 36–60 VDC source that is electrically isolated from the AC source. The 36–60 VDC source is to be reliably connected to earth.

Ethernet port (outlined in green)

Shielded RJ-45 10Base-T/100Base-TX Ethernet port using pins 1,2,3, & 6. See MDI-X switch for hub or transceiver configuration.The following table defines conditions that occur when the MDI-X switch is in the out position.

Pin No.	Signal Direction	Signal Name
1	Output	TX+
2	Output	TX-
3	Input	RX+
4	—	—
5	—	—
6	Input	RX-
7	—	—
8	—	—

MDI-X

The MDI-X push switch operates as follows:

- When in the default “out” position, the Ethernet circuitry takes on a straight-through MDI configuration and functions as a transceiver. It will connect directly to a hub.
- When in the “in” position, the Ethernet circuitry is configured in cross-over MDI-X mode so that a straight-through cable can connect The IPLink Series router’s Ethernet port directly to a PC’s NIC card.

Line port (outlined in yellow)

The RJ-11/4 DSL line port uses pins 2 and 3 of the RJ-11 port.

Pin No.	Signal Name
1	—
2	In/Out-A
3	In/Out-B
4	—

Chapter 2 Product Overview

Chapter contents

Introduction

The IPLink Series Router operates as a bridge or a router and has two ports for communication:

- The Ethernet port—Connects to the LAN side of the connection
- The Serial port—Connects to local DTE devices (Model 2621 and 2635)
- The T1/E1 port—Connects directly to T1/E1 lines (Model 2603)

the router provides all layer 2 and layer 3 protocols required for end-to-end-link communication.

When configuring the IPLink router, questions must be answered so the IPLink router functions as desired. For example, when a router or bridge module needs to be activated, some questions would be:

- Is a default gateway required?
- Which encapsulation technique is best for this application: Frame Relay, PPP, or another?

These decisions can be made and implemented more easily if The IPLink Series router's fundamental architecture is understood. Also, while configuring The IPLink Series router via a browser using the built-in HTTP server is very intuitive, an understanding of the architecture is essential when using the command-line interface (CLI) commands.

The fundamental building blocks comprise a router or bridge, interfaces, and transports. the router and bridge each have interfaces. A transport provides the path between an interface and an external connection. For example, the Ethernet transport attaches to an Internet Protocol (IP) interface. A transport consists of layer 2 and everything below it. Creating a transport and attaching it to a bridge or router's interface enables data to be bridged or routed. The supported transports are *PPPoE*, *Frame Relay*, *PPPoH*, and *Ethernet*.

Configuring an interface and transport for the router or bridge requires naming the interface and transport before attaching them. When using the built-in HTTP server web browser, this is done automatically. But when configuring The IPLink Series router via CLI commands through the RS-232 control port, it must be done manually.

Applications Overview

Patton’s IPLink Gateway routers deliver all the advanced features for secure, reliable, and high speed Internet data connections. They combine ease-of-use with powerful data routing to make shared Internet connectivity simple and easy.

With NAT support, the IPLink routers offer convenient and economical operation by using a single IP address while the integrated DHCP server automates IP address assignment for connected LAN computers. Security is standard with built-in firewall and violation alerting features that protect the network from would-be intruders.

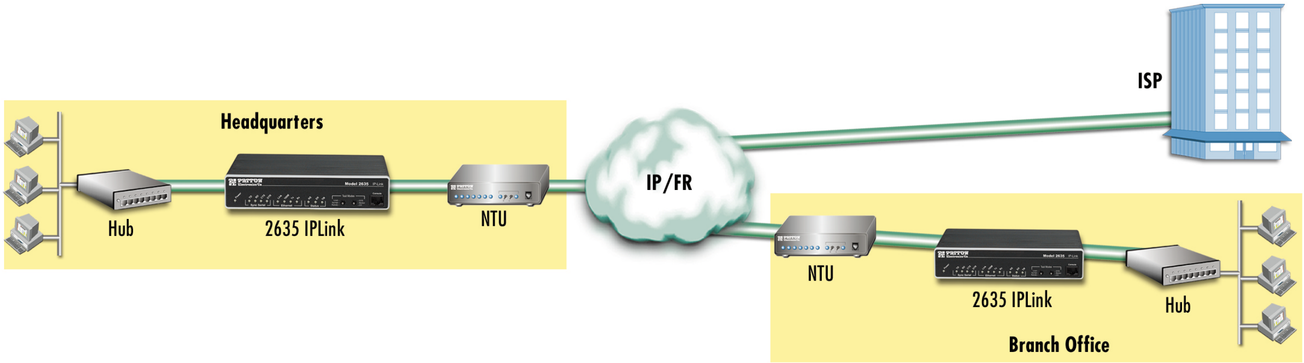


Figure 2. Sync Serial Application

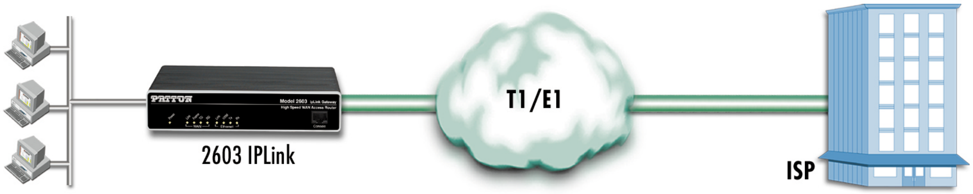


Figure 3. T1/E1 Application

Chapter 3 **Quick Start Installation**

Chapter contents

Hardware installation

If you are already familiar with IPLink Series Router installation and configuration, this chapter will enable you to finish the job quickly. Installation consists of the following:

- Preparing for the installation (see section "What you will need")
- Installing the T1/E1 WAN, X.21, or V.35 interface cable (see section "Interface cable installation")
- Hooking up network cables, verifying that the unit will power up, and running a HyperTerminal session (see section "Installing the Ethernet cable" on page 36)
- Changing the IP address from the factory default setting (see section "IP address Quick Start modification" on page 36)
- Launching a web browser in preparation for configuring the modem (see "Web Operation and Configuration" on page 37)

What you will need

- IPLink Series High Speed Router
- Ethernet cable with RJ45 plugs on each end (included with router)
- DB9-RJ45 adapter (included with router)
- RJ45/RJ45 straight-through cable for connecting to control port (included with router)
- PC computer with HyperTerminal or equivalent VT-100 emulation program, or an ASCII terminal (also called a *dumb terminal*).

Interface cable installation

An IPLink Series router comes with a T1/E1 WAN, V.35, or X.21 interface. Refer to the appropriate section to install an interface cable on your IPLink router:

- Model 2603 router (see "Installing an interface cable on the IPLink 2603's T1/E1 interface port" on page 29)
- Model 2621 router (see "Installing an interface cable on the IPLink 2621's X.21 interface port" on page 31)
- Model 2635 router (see "Installing an interface cable on the IPLink 2635's V.35 interface port" on page 33)

Installing an interface cable on the IPLink 2603's T1/E1 interface port

The IPLink Models 2603/K and 2603/T come with a selectable T1/E1 WAN interface (see figure 4). Located on the back of the IPLink, the T1 and E1 interfaces are presented on an RJ-48C connector with selectable line impedances of 100-ohms for T1 and 120-ohms for E1 lines (see figure 5). The 2603/K also comes with dual BNC for alternate connection to unbalanced 75-ohm E1 lines (see figure 6 on page 30).

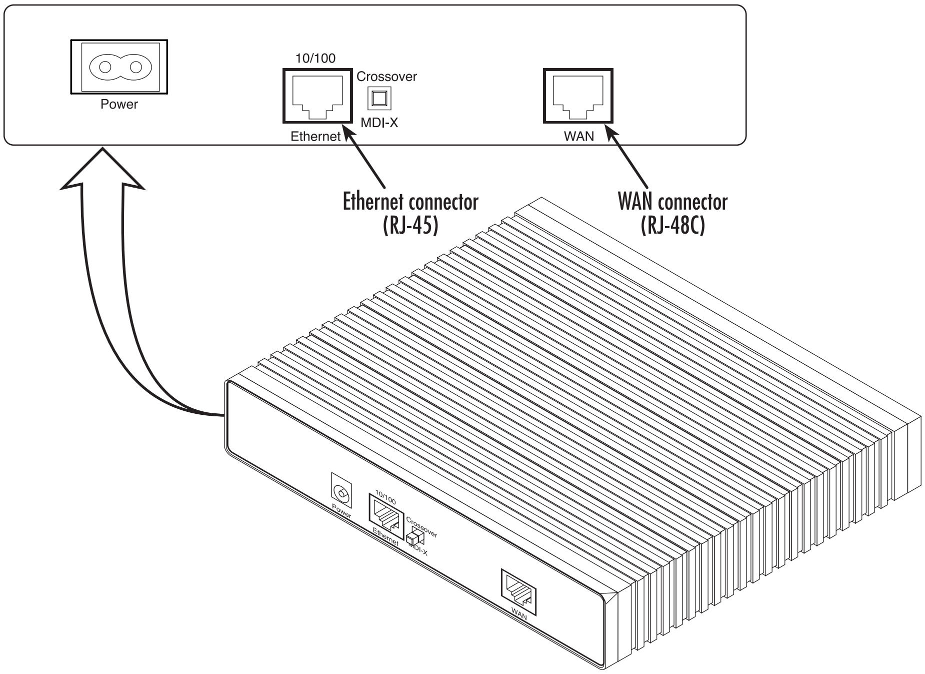


Figure 4. Rear View of the 2603/T showing location of Ethernet and WAN connectors

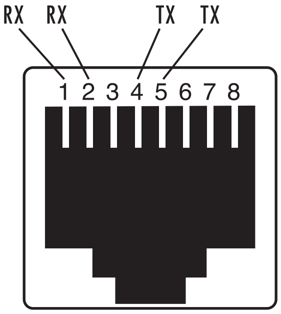


Figure 5. RJ-48C pinout diagram

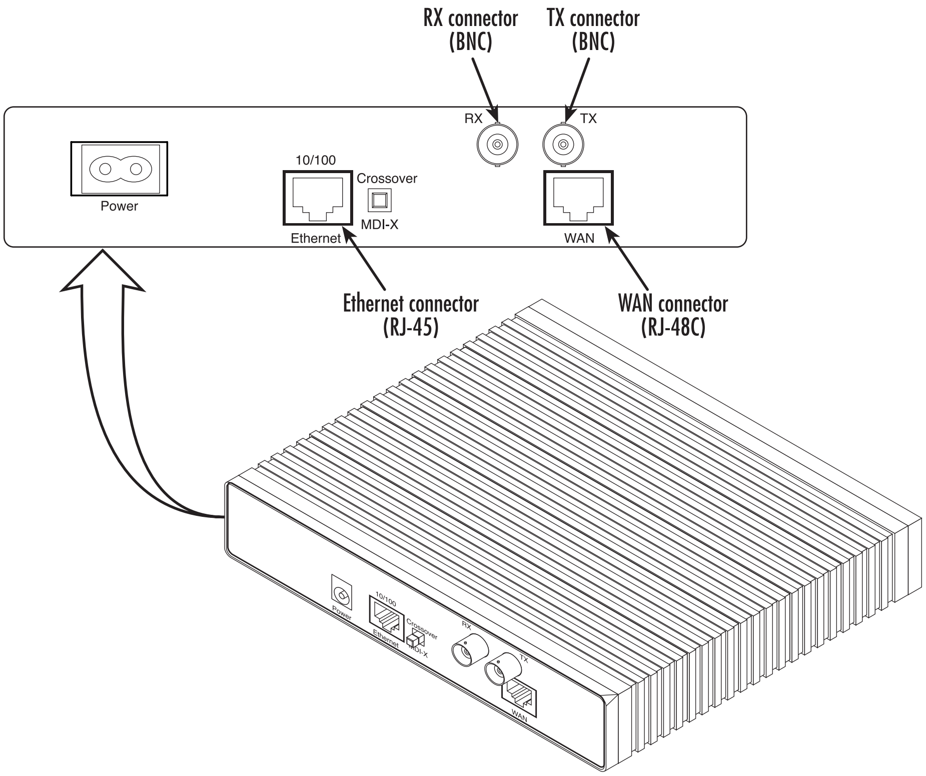


Figure 6. Rear view of the 2603/K showing location of Ethernet and WAN connectors

The interface cable has been installed, go to section “Installing the AC power cord” on page 34.

Installing an interface cable on the IPLink 2621's X.21 interface port

The IPLink Model 2621 comes with an X.21 interface presented on a female DB-15 connector (see figure 7). This interface can be configured as a DTE (factory default), or as a DCE via internal configuration jumper.

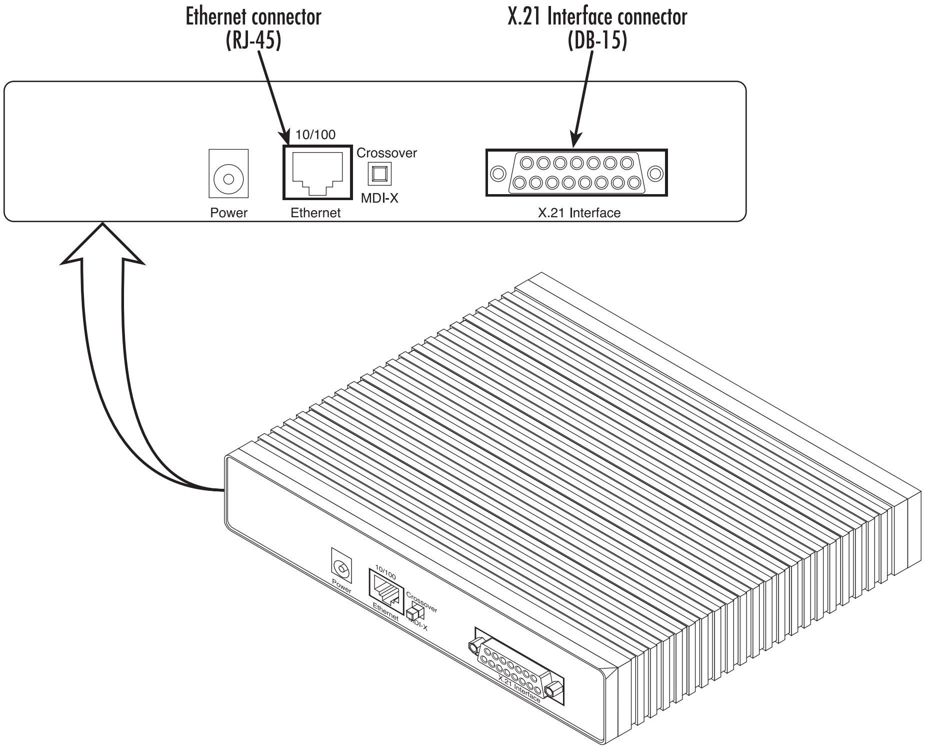


Figure 7. Rear view of the 2621 showing location of Ethernet and X.21 connectors

When the local third party equipment is configured as DTE, the Model 3086 X.21 serial port can be configured as DCE, and a regular straight-through cable can then be used. Do the following to configure the X.21 port as a DCE:

1. Open the IPLink's case by inserting a screwdriver into the slots and twist the screwdriver head slightly. The top half of the case will separate from the lower half of the case (see figure 8). Take caution not to damage any of the PC board mounted components.

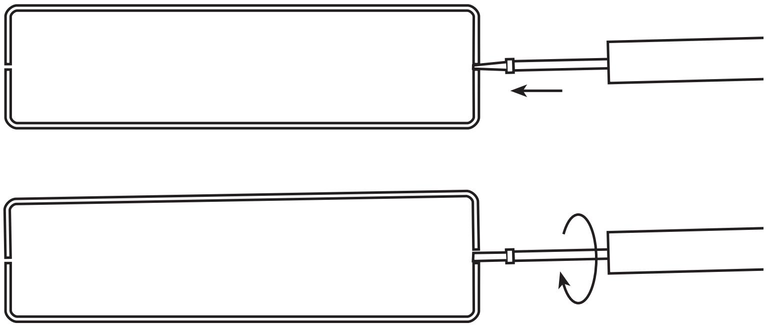
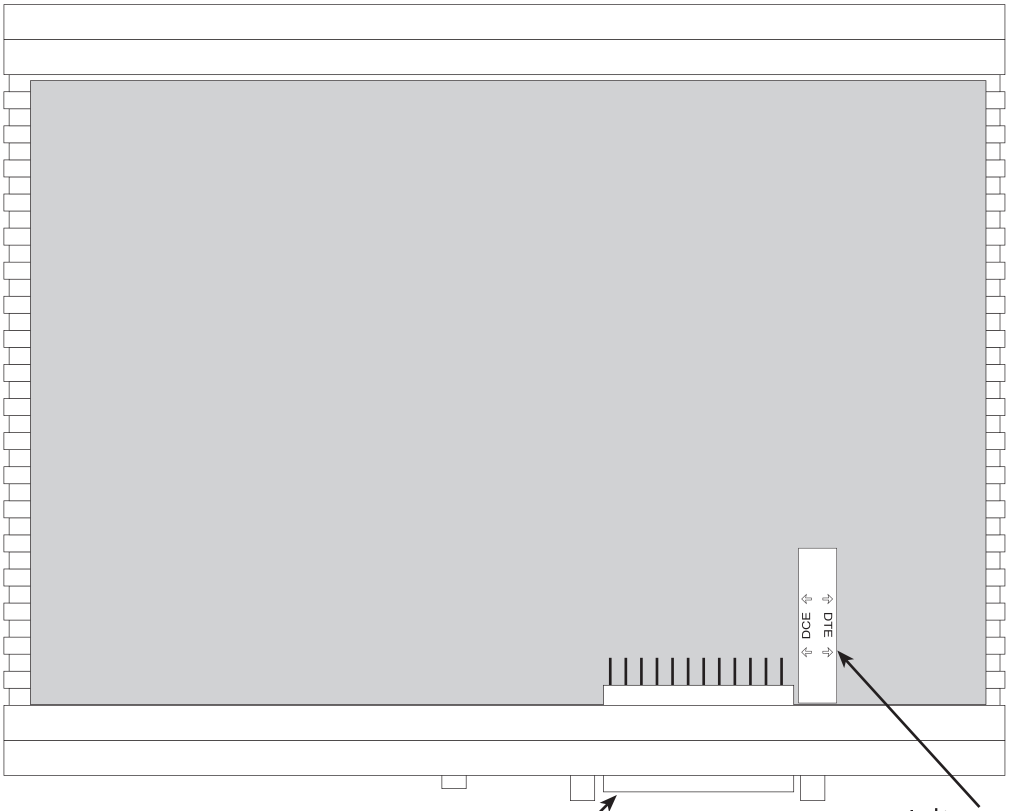


Figure 8. Case being opened with a screwdriver

2. Locate the small daughter board on the Model 2621 board to the right of the DB-9 connector (figure 9 shows location of DTE/DCE daughter board).



X.21 connector

In this example, the DCE/DTE strap is configured for DCE because the "DCE" label on the strap is pointed toward the X.21 connector

Figure 9. Location of DTE/DCE board

3. The DTE/DCE daughter board is installed at the factory with the DTE label and arrows pointing towards the X.21 connector (DTE configuration). To change to DCE configuration, lift the daughter board from the connector, turn it around so that the DCE label an arrows point to the X.21 connector, and place it back on the connector. The X.21 port is now configured as a DCE.

> **Note** When the X.21 port is configured as a DTE, the clocking mode for the port must be set for external clock.

4. Re-assemble the case.

The interface cable has been installed, go to section "Installing the AC power cord" on page 34.

Installing an interface cable on the IPLink 2635's V.35 interface port

The IPLink Model 2635 comes with a V.35 interface presented on a DB-25 female connector (see figure 10).

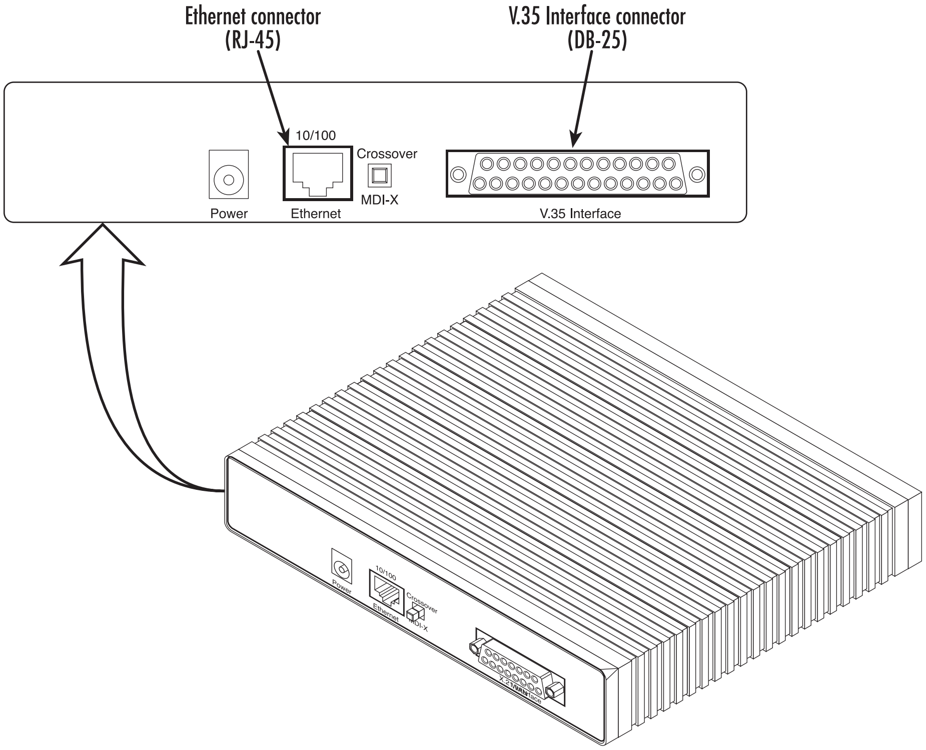


Figure 10. Rear view of the 2635 showing location of Ethernet and V.35 connectors

Note The IPLink comes with a V.35 cable. Use this cable to interconnect the IPLink's V.35 port to a device configured as a DCE.

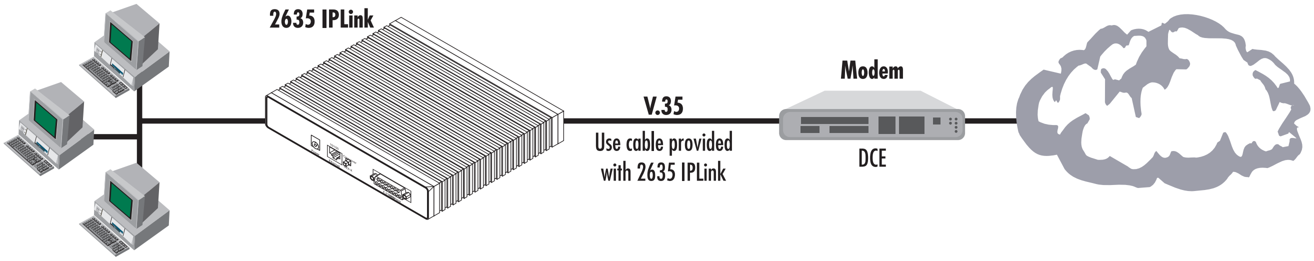


Figure 11. Connecting the 2635 to a DCE device

The serial port on the IPLink Model 2635 is configured as a DCE, it connects directly to a DTE using a standard straight-through V.35 cable.

However, in many applications, the IPLink's V.35 interface will connect to a DCE (modem or multiplexer), in this situation use the special cable provided with your Model 2635. This DB-25/M35 cable presents the 2635's V.35 interface as a DTE for direct connection to a DCE.

Installing the AC power cord

The IPLink router comes with an internal or external power supply. This section describes installing the power cord into the IPLink router. Do the following:

Note *Do not connect the other end of the power cord to the power outlet at this time.*

1. If your unit is equipped with an internal power supply, go to step 2. Otherwise, insert the barrel type connector end of the AC power cord into the external power supply connector (see figure 12).
2. Insert the female end of the AC power cord into the internal power supply connector (see figure 12).

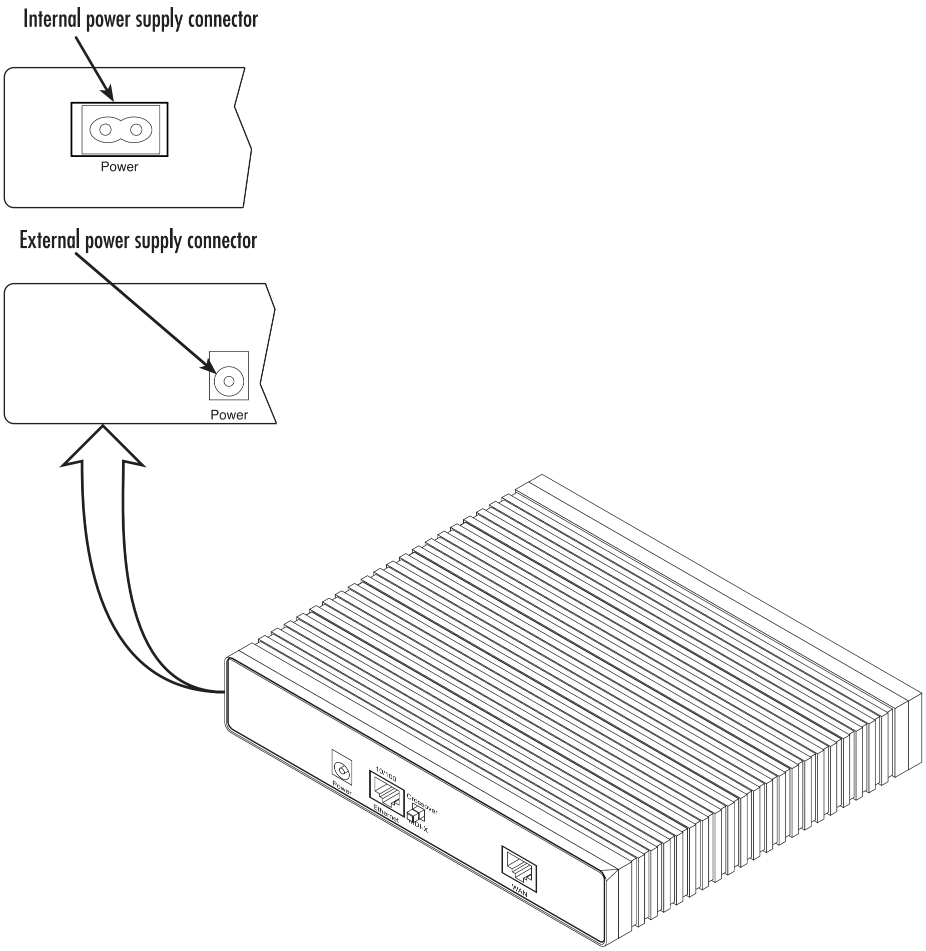

Internal power supply connector
Power
External power supply connector
Power
Power
10/100
Ethernet
Crossover
MDI-X
WAN

Figure 12. Power connector location on rear panel (Model 2603/T shown)

CAUTION

The IPLink router power supply automatically adjusts to accept an input voltage from 100 to 240 VAC (50/60 Hz).

Verify that the proper voltage is present before plugging the power cord into the receptacle. Failure to do so could result in equipment damage.

3. Verify that the AC power cord included with your IPLink router is compatible with local standards. If it is not, refer to Chapter 10, "Contacting Patton for assistance" on page 27 to find out how to replace it with a compatible power cord.
4. Connect the male end of the power cord to an appropriate power outlet.
5. Verify that the green *Power* LED is lit (see figure 13).
6. Unplug the AC power cord from the IPLink Series router to power down the unit.

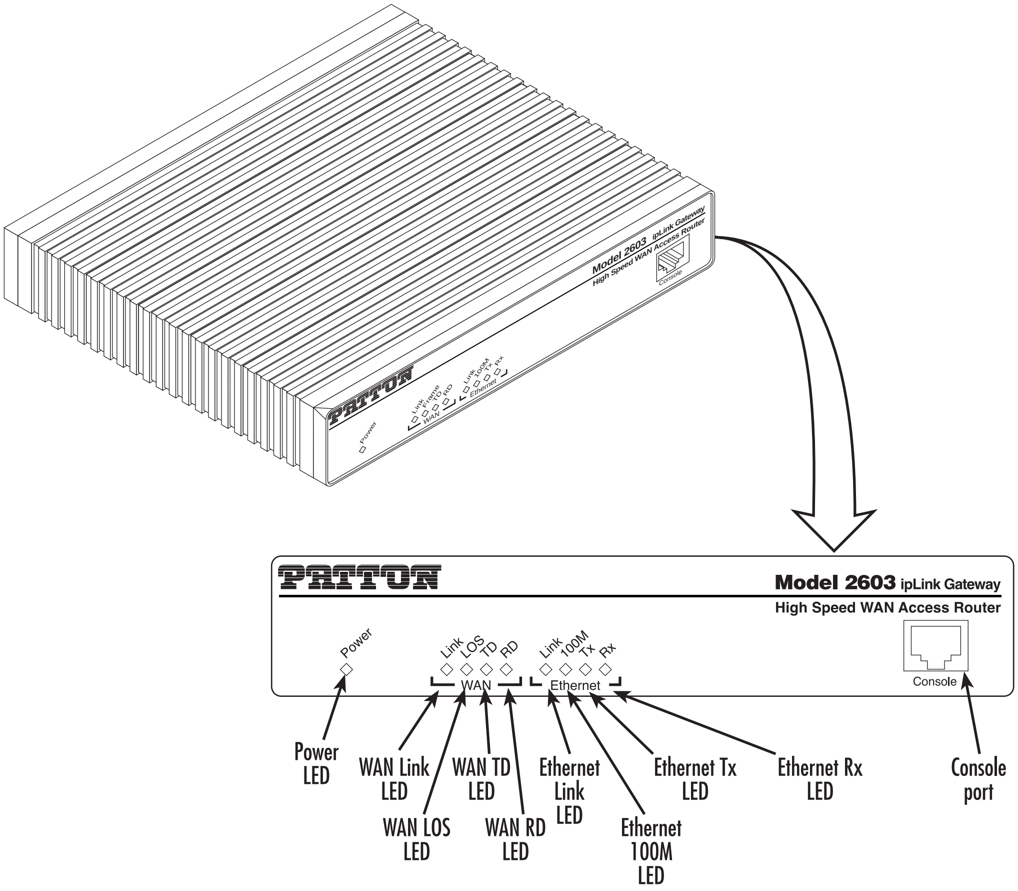


Figure 13. IPLink front panel LEDs and Console port locations (Model 2603 shown)

Installing the Ethernet cable

Do the following:

1. Connect the DB9-RJ45 adapter to the DB-9 serial port on the PC or dumb terminal. Use the RJ45-RJ45 straight-through cable between the adapter and the red marked RJ45 port on the IPLink Router.
2. ***Do not*** connect the router to the Ethernet LAN at this time.
3. On the PC, start a HyperTerminal session at 9600 bps, 8 data bits, 1 stop bit, and no parity.
4. Plug the AC power cord into The IPLink Series router to power up the router.
5. Type *superuser* for Login:, and press *Enter.*
6. Then type *superuser* for the password, press *Enter.*
7. A message will display, "Login Successful." By typing the character "?", all the commands will be displayed. Any commands parameters may be seen by entering the command followed by a space and a question mark.

```
→ ethernet ? [The following parameters appear]
    add
    delete
    set
    show
    list
    clear
```

IP address Quick Start modification

The first parameter to change is the IP address from the default IP address of 192.168.200.10 to your selected IP address. Do the following (comments are in brackets [...]):

```
→ ip list interfaces  <enter> [lists the characteristics of the different interfaces]

    IP Interfaces:
      ID   |     Name      |  IP Address     |    DHCP     |     Transport
    -------|---------------|-----------------|-------------|-----------------
      1    |   ip1         |  192.168.200.10 |  disabled   |   <bridge>
    ------------------------------------------------------------------------

→ ip set interface ip1 ipaddress 192.168.100.2 255.255.255.0 <enter>[Sets the new IP address which you have selected.
    The IP address in this example is for illustrative purposes only.]
→ ip list interfaces <enter> [To see if the change in IP address is correct]
→ system config save <enter> [To save the new IP address in flash memory.]

    Wait for "configuration saved" message…

    Saving configuration

→

    Configuration saved.
    <enter>

→
```

The IP address has now been successfully changed.

Web Operation and Configuration

Now that the IP address has been configured for your application, you can complete the configuration using any standard web browser.

PC Configuration

In order to connect the PC to the Ethernet LAN to communicate with The IPLink Series router, the PC's IP address should be on the same subnet as the router.

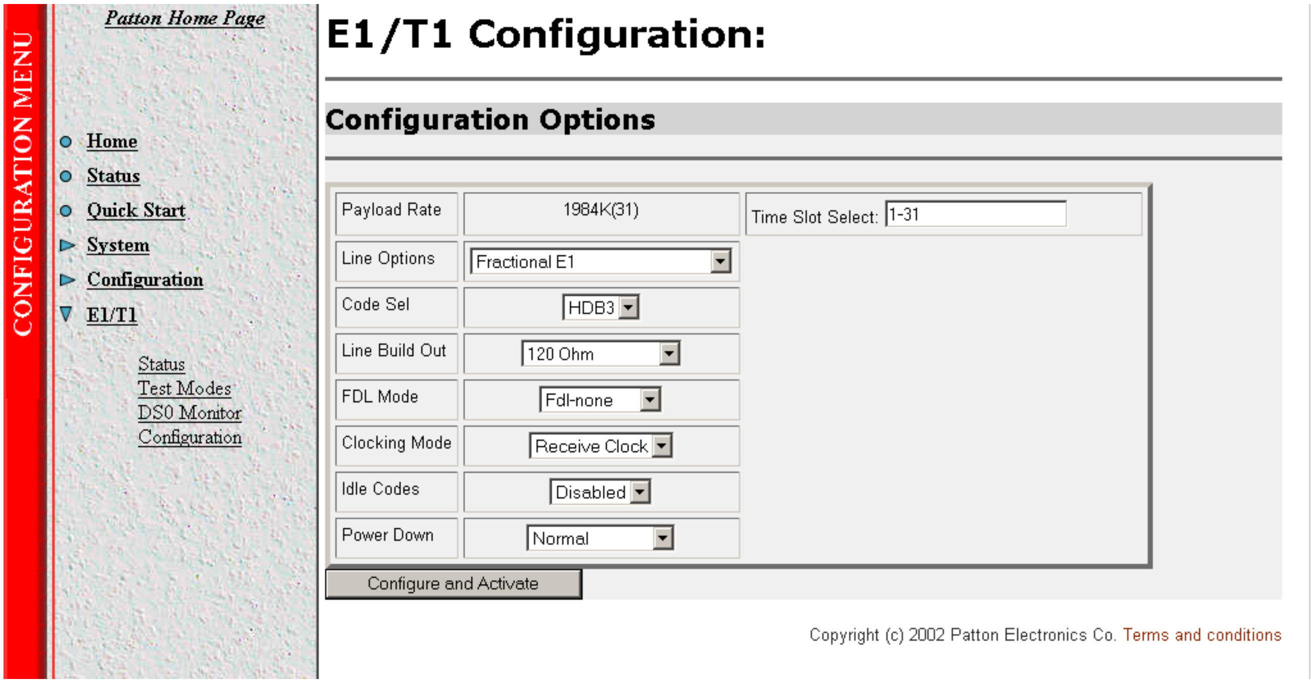
Connect a straight-through Ethernet cable between the PC's NIC or PCMCIA Ethernet card and an Ethernet hub or switch.

Web Browser

Do the following:

1. Launch a standard web browser such as Netscape Communicator or Internet Explorer (IE).
2. Enter the IPLink router's IP address into the URL or Address field of the browser.

The IPLink Series router home page displays as shown in figure 14 if you have a Model 2603, or figure 15 on page 38 if you have a Model 2621 or Model 2635.



E1/T1 Configuration:

Configuration Options

Payload Rate	1984K(31)	Time Slot Select: 1-31
Line Options	Fractional E1	
Code Sel	HDB3	
Line Build Out	120 Ohm	
FDL Mode	Fdl-none	
Clocking Mode	Receive Clock	
Idle Codes	Disabled	
Power Down	Normal	

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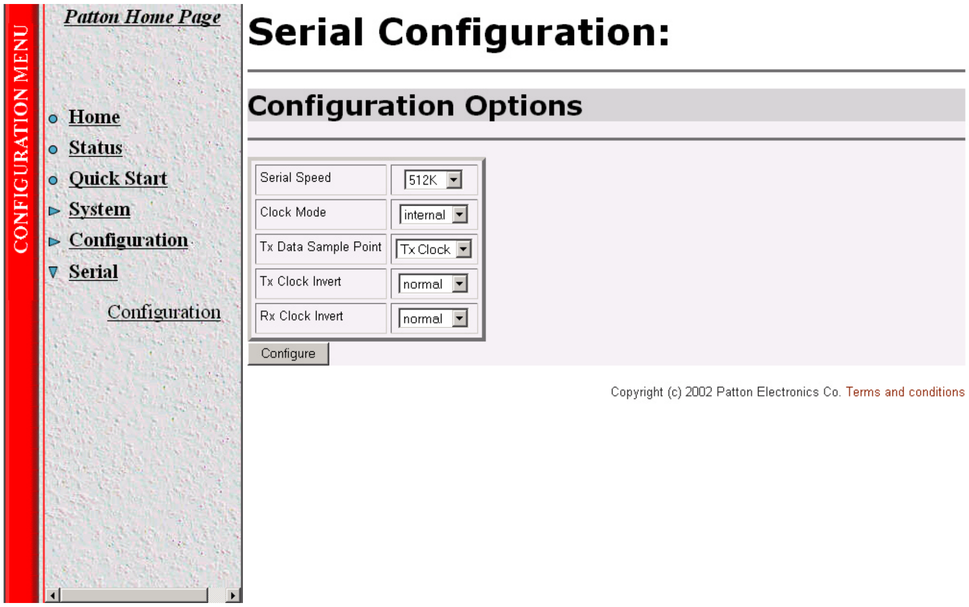
Figure 14. Model 2603 home page



Serial Configuration:

Configuration Options

Serial Speed	512K
Clock Mode	internal
Tx Data Sample Point	Tx Clock
Tx Clock Invert	normal
Rx Clock Invert	normal

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Figure 15. Models 2621 or 2635 home page

The IPLink Series router menu structure is shown in figure 16 on page 39.

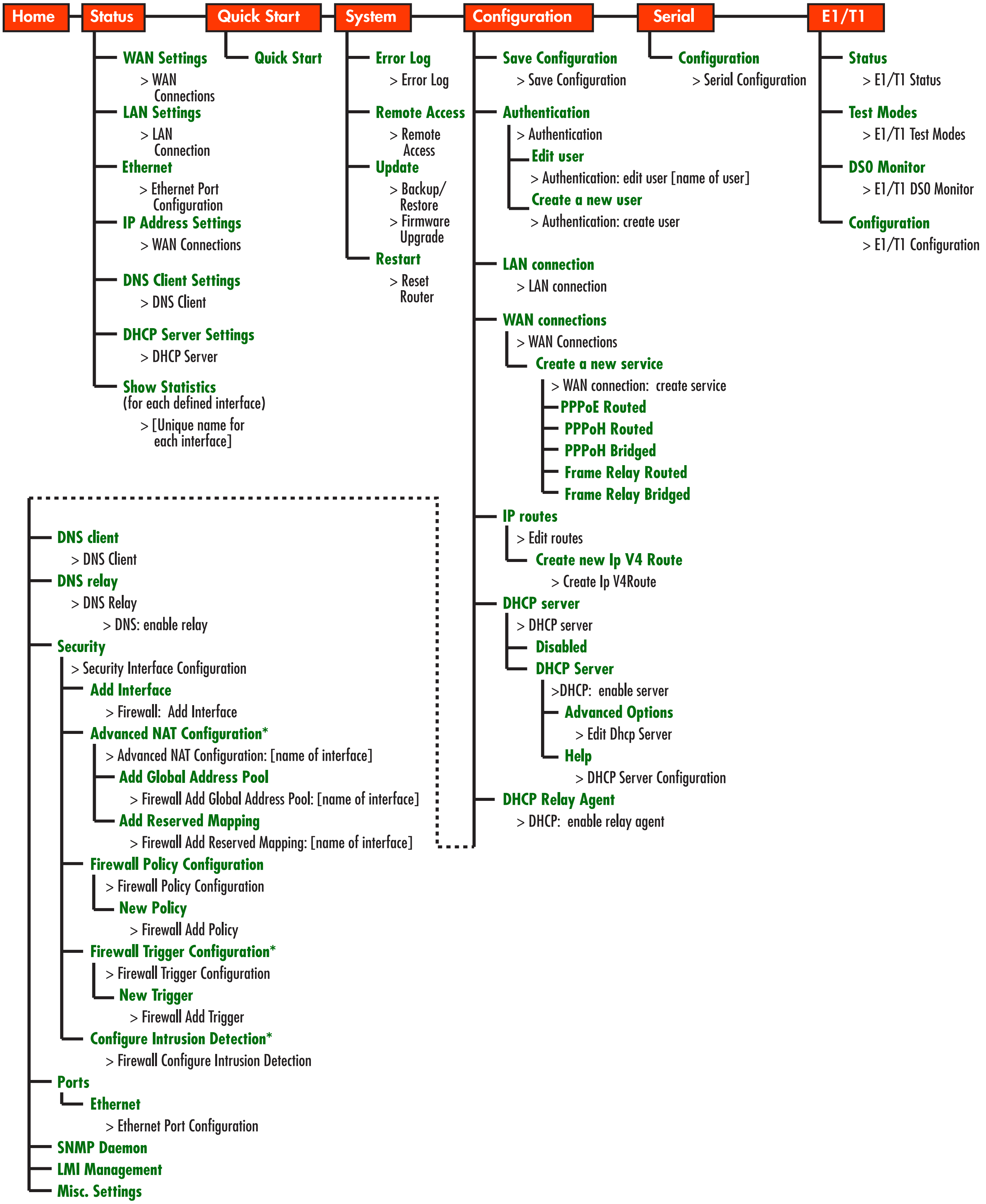


Figure 16. IPLink Series router menu structure

Chapter 4 Configuring the IPLink Router

Chapter contents

WAN Port Configuration

The IPLink Series routers use a sync.-serial interface (X.21, V.35) or a T1/E1 interface for connection to standard WAN services. Below are the configuration options for the WAN interface.

Serial Interface

The serial interface configuration menus allow the user to configure the serial interface for HDLC based connections. Configurations are available for both the web interface and the CLI interface. Both will be discussed in the following sections.

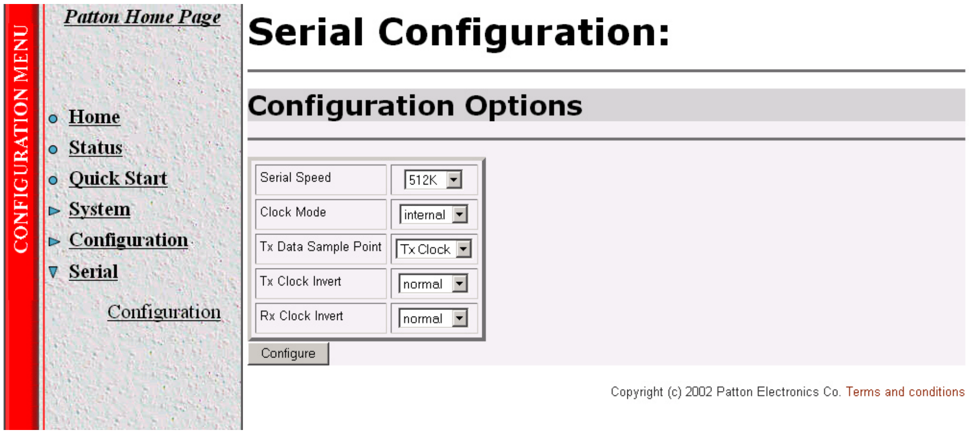
Variables

The following table lists variables that are configurable on the IPLink's software:

Variable	Options	Function
Clock	Internal	The clock setting for the serial interface will determine the source of timing for the serial interface only
	External	
rxClkInv/txClkInv	Inverted	The clock invert functions could be used to invert the clocks that are used on the serial interface. It is not recommended to set this parameter unless requested by Patton Electronics' technical support
	Normal	
Speed	Any n x 64 kbps speed. Speed should be entered as the rate, i.e. *512* for 512 kbps or *2048* for 2.048 Mbps	Defines the generated speed for internal clock mode operation or the clock that will be received in external clock mode operation
txSamplePoint	ExtClk	When the unit is running in internal clock mode the setting of txSamplePoint will notify the system which clock to use to sample the in coming data. Some systems require that the data be sampled on one clock or another. This is also useful when tail circuits are being created When running in the external clock mode this should be set to ExtClk
	TxClk	

Web Interface Configuration

The following screen capture shows the variables available to configure the V.35 or X.21 serial interface through the web.



Serial Configuration:

Configuration Options

Serial Speed	512K
Clock Mode	internal
Tx Data Sample Point	Tx Clock
Tx Clock Invert	normal
Rx Clock Invert	normal

Configure

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CLI Configuration

The serial interface can be configured through the CLI (terminal or Telnet session) just as any other set of variables. The configuration variables are displayed by typing the command **serial ?**. There are two sub screens that are available to help configure the system. The commands with their responses are shown below:

Serial Show: Shows the current configuration on the serial interface.

```
→ serial show

   Clock Source: internal
     Intf Speed: 512

   Tx Sample Point: txclk
     Tx Clk Inv: normal
     Rx Clk Inv: normal
```

Serial Help: Describes each of the serial commands that are available

```
→ serial help
```

Serial Interface Help Screen

```
>serial show:
>              Show the current configuration of the
>              serial interface
>serial help:
>              Show this help screen
>serial clock:
>              Defines the clock mode or source of timing
>              for the serial interface.
>     options: internal - internal timing
>              external - external timing
>     notes:   For X.21 devices this setting must match
>              the DTE/DCE jumper inside the unit
>serial speed:
```

```
>             Defines the clock speed for the serial interface
>     options: n x 64K speed (n=1..32), example: "1536" or "256"
>
> serial txClkInv:
>             Allows the user to invert the clock source
>     options: normal - use normal clock
>             inverted - use the inverted version of the clock
> serial rxClkInv:
>             Allows the user to invert the clock source
>     options: normal - use normal clock
>             inverted - use the inverted version of the clock
> serial txSamplePoint:
>             Determines whether the TxData will use the External
>             Clock or the Transmit clock to sample data
>     options: txClk  - use Transmit Clock
>             extClk - use External Clock
>
```

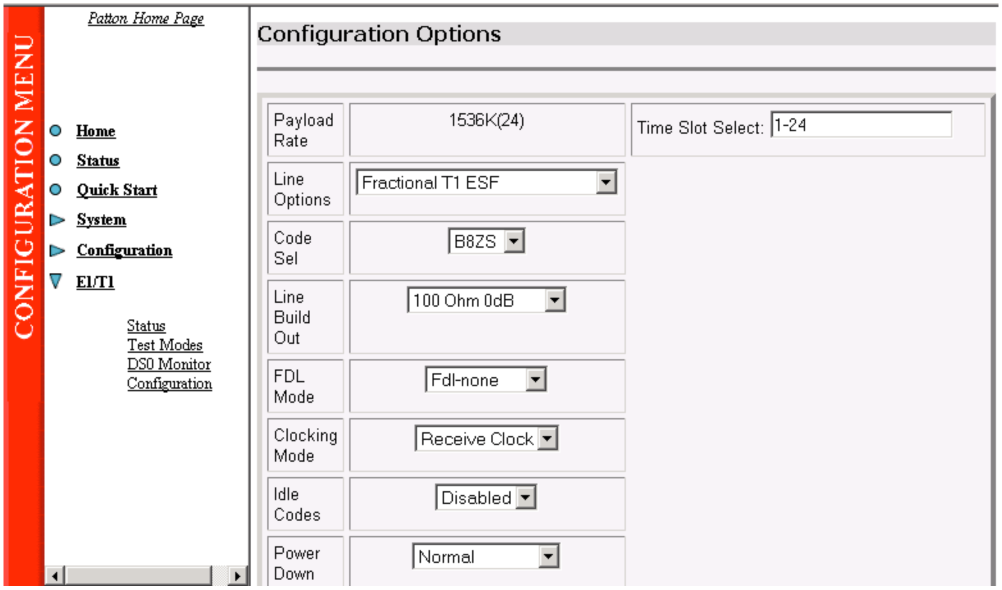
After the serial port has been configured, go to section “WAN Service Configuration” on page 47 for router/bridge and WAN service configuration.

T1/E1 Interface Configuration

The IPLink Series Model 2603 is equipped with a user selectable T1/E1 interface. The T1 interface is presented via an RJ-48C (100-ohm) connector, while the E1 interface can use the RJ-48C (120-ohm) or dual BNC (75-ohm) connectors.

Configuring the IPLink Series 2603 for T1 Operation

Web Configuration. Launch *Internet Explorer* or similar web browser, type the IP address of the 2603, enter username **superuser** and password **superuser**. From the main page click on the *E1/T1 option > Configuration*.



Configuration Options

Payload Rate	1536K(24)	Time Slot Select: 1-24
Line Options	Fractional T1 ESF	
Code Sel	B8ZS	
Line Build Out	100 Ohm 0dB	
FDL Mode	Fdl-none	
Clocking Mode	Receive Clock	
Idle Codes	Disabled	
Power Down	Normal	

Time Slot Select. For a T1 using all 24 time slots enter 1-24, for fractional T1 enter in any format for example: 1,2,3,5; or 1-5,10-24. Any entry for timeslots above 24 will return an invalid-selection message.

Line Options: Fractional T1

Line Code: The 2603 uses B8Zs and AMI. B8Zs is the most widely used.

Line Build Out: Select from 100 0dB, 100 Ohm -7.5dB, 100 Ohm -15dB, and – 22.5dB. For CSU/DSU application use 100 0dB option, consult your T1 service provider for more information.

FDL Mode: Options are ANSI-T1-403, ATT-54016, and Fdl-none. Consult your T1 service provider for FDL mode required.

Clocking Mode: Internal, Receive Clock (network). In most applications clocking for the 2603 will be derived from the T1 network, set the unit for Receive Recover unless instructed otherwise by your service provider.

Idle code: Enabled, Disabled. When enabled, the 2603 inserts idle codes (7E hex) on unused timeslots. Set this option to 'Disabled' unless instructed otherwise.

Power Down: Normal, Powered Down. When powered down, T1/E1 transceiver input and output lines will be set to high impedance to protect the device – set unit to "Normal" for regular operation.

After all options have been selected, click on the **Configure and Activate** button at the bottom of the screen. Additionally, save the configuration by going to the *Configuration* > *Save Config* menu.

This concludes the T1 interface configuration via the web browser, go to section "WAN Service Configuration" on page 47 for instructions on router/bridge and WAN service configuration.

CLI configuration. Using terminal or Telnet software log into the Model 2603, enter username **superuser** and password **superuser**. You can display all E1/T1 configurable options by typing **e1t1 ?** and pressing *Enter*.

Time Slot Select. For a T1 using all 24 time slots enter 1-24, for fractional T1 enter in any format for example: 1,2,3,5; or 1-5,10-24. Any entry for timeslots above 24 will return an invalid-selection message. For a full T1, type: *e1t1 set timeslotselect 1-24*, then press *Enter*.

Line Options. At the prompt type *e1t1 set lineOptions framed_t1* then press *Enter*.

Line Code. At the prompt type *e1t1 set codeSel b8zs* then press *Enter*.

Line Build Out. Type *e1t1 set buildOut 0_dB_T1* then press *Enter*.

FDL Mode option. Options are ANSI-T1-403, ATT-54016, and Fdl-none. If ANSI-T1-403 is selected type *e1t1 set FdlMode Ansi-T1-403* then press *Enter*.

Clock Mode. Select from Internal or Receive Recover (Network). For most T1 applications, Receive Recover clock mode is used.

At the prompt type *e1t1 set clockMode receiveClock,* then press *Enter*.

Idle Code. Select from Enabled and Disabled. When idle code is set to Enabled, the 2603 inserts idle codes (7E hex) on unused timeslots. Set this option to *Disabled* unless instructed otherwise by your provider.

At the prompt type *e1t1 set enableIdleCode disabled,* then press *Enter*.

Power Down. Options are Normal and Powerdown, select *Normal* unless instructed differently from your provider.

At the prompt type *e1t1 set powerDown normal* then press *Enter*.

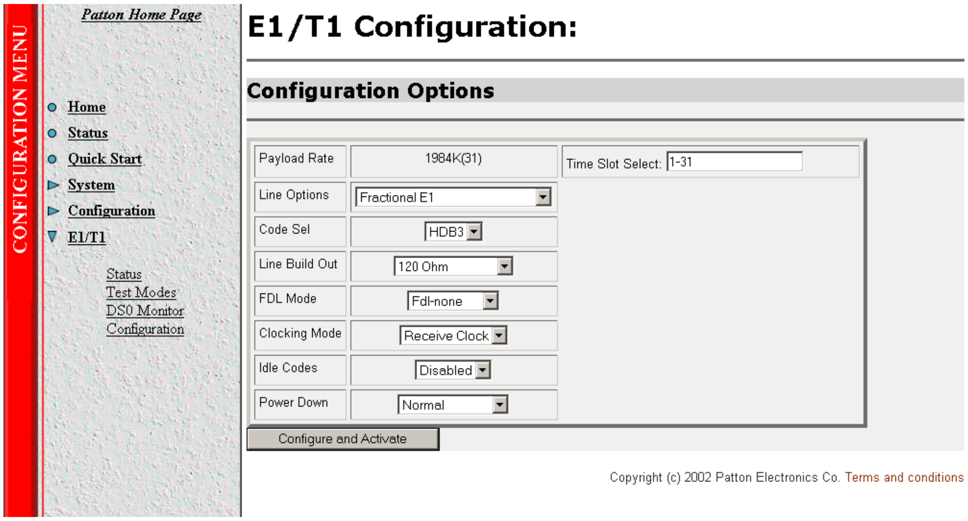
Once all options have been entered, save the configuration as follows:

Type *system config save* then press *Enter*.

This concludes the T1 interface configuration via CLI go to section “WAN Service Configuration” on page 47 for instructions on router/bridge and WAN service configuration.

Configuring the IPLink Series 2603 for E1 Operation

Web Configuration. Launch *Internet Explorer* or similar web browser, type the IP address of the 2603, enter username **superuser** and password **superuser**. From the main page click on the *E1/T1 option* > *Configuration*.



E1/T1 Configuration:

Configuration Options

Payload Rate	1984K(31)	Time Slot Select: 1-31
Line Options	Fractional E1	
Code Sel	HDB3	
Line Build Out	120 Ohm	
FDL Mode	Fdl-none	
Clocking Mode	Receive Clock	
Idle Codes	Disabled	
Power Down	Normal	

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Time Slot Select. For unframed E1 service (Clear Channel) enter time slots 0-31. For a full framed E1 enter 1-31, for partially filled E1 enter the range of timeslots using the format for example: 1,2,3,5; or 1-5,10-31. Any entry for timeslots above 31 will return and invalid selection message.

Line Options: Choose from Clear Channel E1, Fractional E1, Multi-Frame(CAS) E1, Multi-Frame(CAS) E1 with CRC. Consult with your service provider which option is required.

Line Code: Choose from AMI or HDB3. Most E1 applications use HDB3

Line Build Out: Select 120 Ohms if the E1 connection is made via the RJ-48C connector, select 75 Ohm if the E1 connection is made via the Dual BNC connectors.

FDL Mode: FDL is a T1 application, therefore select ‘Fdl- none’ for E1 applications.

Clocking Mode: Options are Internal or Receive Recover Clock (network). In most applications clocking for the 2603 will be derived from the E1 network, set the unit for Receive Recover unless instructed otherwise by your service provider.

Idle code: Options are Enabled or Disabled. When idle code is Enabled, the 2603 inserts idle codes (7E hex) on unused timeslots. Set this option to *Disabled* unless instructed otherwise.

Power Down: Options are Normal and Powerdown. When powered down, the E1 will put high impedance on the input and output lines to protect the device—set unit to *Normal* for regular operation.

Once all options have been selected, click on the **Configure and Activate** button at the bottom of the screen. Additionally, save the configuration by going to the *Configuration > Save Config* menu.

This concludes the E1 interface configuration via the web browser, go to section "WAN Service Configuration" on page 47 for instructions on router/bridge and WAN service configuration.

CLI configuration. Using terminal or Telnet software log into the Model 2603, enter username **superuser** and password **superuser**. You can display all E1/T1 configurable options by typing **e1t1 ?** and pressing *Enter.*

Time Slot Select. For unframed E1 service (Clear Channel) enter time slots 0-31. For a full framed E1 enter 1-31, for partially filled E1 enter the range of timeslots using the format for example: 1,2,3,5; or 1-5,10-31. Any entry for timeslots above 31 will return and invalid selection message. For a full framed E1, type: *e1t1 set timeslotselect 1-31*, then press *Enter.*

Line Options. Choose from Clear Channel E1, Fractional E1, Fractional E1, Multi-Frame(CAS) E1, Multi-Frame(CAS) E1 with CRC. If selecting the most common service, Fractional E1, *type e1t1 set lineOptions framed_e1* then press *Enter.*

Line Code. Options are AMI and HDB3. Most E1 applications use HDB3. At the prompt type *e1t1 set codeSel hdb3* then press *Enter.*

Line Build Out. Select 120 Ohms if the E1 connection is made via the RJ-48C connector, select 75 Ohm if the E1 connection is made via the Dual BNC connectors. For 120 ohm connections type *e1t1 set buildOut 120_Ohm_E1* then press *Enter.*

FDL Mode option. FDL is aT1 feature, therefore for E1 applications select FDL-none. At the prompt type *e1t1 set FdlMode Fdl-none* then press *Enter.*

Clock Mode. Select from Internal or Receive Recover (Network). In normal Telco deployments the IPLink 2603 will use Receive Recover.

At the prompt type *e1t1 set clockMode receiveClock* then press *Enter.*

Idle Code. Options are Enabled or Disabled, use Disabled unless instructed differently from your provider. When enabled, the 2603 inserts 7E hex on unused timeslots.

At the prompt type *e1t1 set enableIdleCode disabled* then press *Enter.*

Power Down. Options are Normal and Powerdown, select Normal unless instructed differently from your provider.

At the prompt type *e1t1 set powerDown normal* then press *Enter.*

Once all options have been entered, save the configuration as follows:

Type *system config save* then press *Enter.*

This concludes the E1 interface configuration via CLI, go to section "WAN Service Configuration" on page 47 configuration for instructions on router/bridge and WAN service configuration

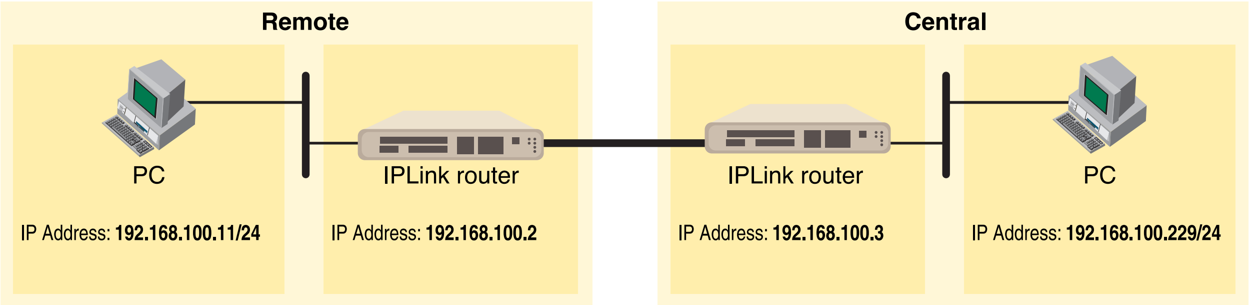
WAN Service Configuration

The IPLink Series Routers offer various Ethernet, Frame Relay, and PPPoH options, each of these, with exception of the Ethernet option, can be used in either bridged or routed applications.

PPP Configuration

PPPoH Configuration

PPPoH Bridged Remote Site Configuration. The IPlink series routers can be configured as bridges; in this situation the IPlink device will typically sit at the customer premise or branch office, and will connect to a router or bridge at a service provider location (this can be another IPLink router). This application shows configuration for two IPLink units in bridged mode. If using a third party router at the Central side, review the router's configuration for connection to a remote bridge.


Remote
Central
PC
IP Address: 192.168.100.11/24
IPLink router
IP Address: 192.168.100.2
IPLink router
IP Address: 192.168.100.3
PC
IP Address: 192.168.100.229/24

IPlink series (Remote)

From the command line interface (CLI) via the RS-232 control port,

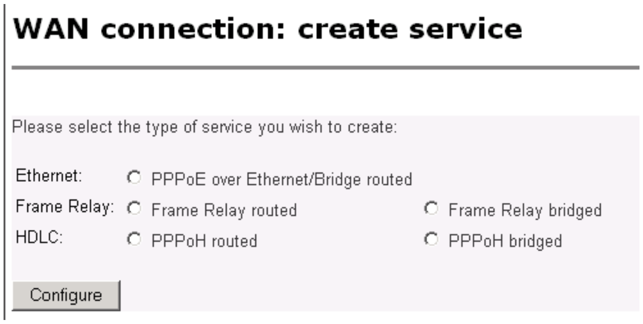
```
→ ip list interfaces
```

One IP interface is called ip1 with an IP address of 192.168.1.1

Let's change the IP address so it is in the same subnet as both PCs. For example, to 192.168.100.2

```
→ ip set interface ip1 ipaddress 192.168.100.2 255.255.255.0
```

1. Now you can bring up the web-page management system on your browser by entering the IP address of IPLink.
2. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select *PPPoH_Bridged* and click on the **Configure** button.

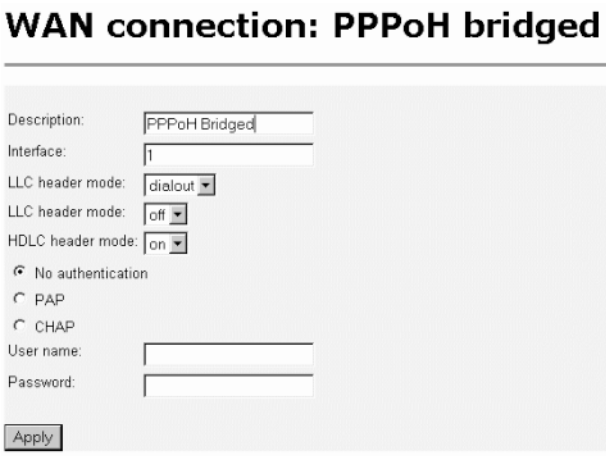


WAN connection: create service

Please select the type of service you wish to create:

Ethernet: ○ PPPoE over Ethernet/Bridge routed
Frame Relay: ○ Frame Relay routed ○ Frame Relay bridged
HDLC: ○ PPPoH routed ○ PPPoH bridged

4. In the Description field, enter the description you wish. In this example, it is called *PPPoH Bridged*.



WAN connection: PPPoH bridged

Description: PPPoH Bridged

Interface: 1

LLC header mode: dialout

LLC header mode: off

HDLC header mode: on

● No authentication

○ PAP

○ CHAP

User name:

Password:

Verify the settings to be:

- Interface = 1
- LLC header mode = dialout
- LLC header mode = off
- HDLC header mode = on
- No authentication
- Leave *User name* and *Password* blank.

Click on **Apply**.

Central Site Configuration. See the Web page images for the Remote IPLink configuration above.

From the command line interface (CLI) via the RS-232 control port,

```
→ ip list interfaces
```

One IP interface is called ip1 with an IP address of 192.168.1.1

Change the IP address so it is in the same subnet as both PCs. For example, to 192.168.100.3

```
→ ip set interface ip1 ipaddress 192.168.100.3 255.255.255.0
```

1. Now you can bring up the web-page management system on your browser by entering the IP address of the IPLink
2. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select *PPPoH_Bridged* and click on the **Configure** button.

In the Description field, enter the description you wish. In this example, it is called *PPPoH Bridged*.

Verify the settings to be:

- Interface = 1
- LLC header mode = dialout
- LLC header mode = off
- HDLC header mode = on
- No authentication
- Leave *User name* and *Password* blank.

Click on **Apply**.

PPPoh Routed

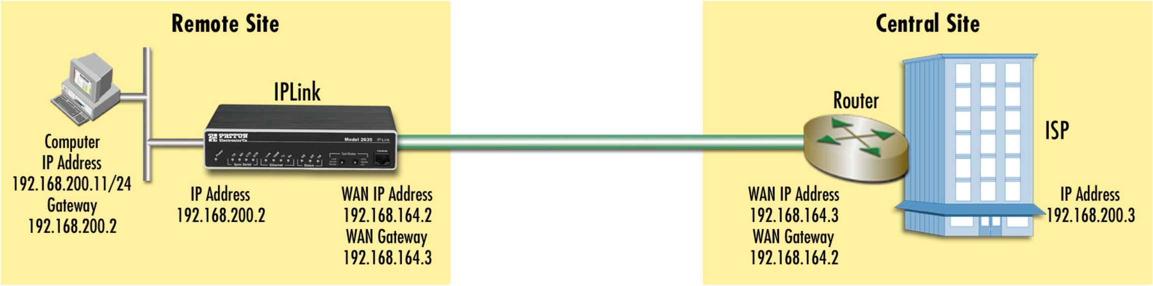
This application shows configuration for two IPLink units in routed mode. If using a third party router at the Central site, review the router's configuration.

Remote site configuration . From the command line interface (CLI) via the RS-232 control port,

```
→ ip list interfaces
```

One IP interface was called ip1 with an IP address of 192.168.1.1 Change it to an IP address which is in the same subnet as the Desktop PC. For example, to192.168.200.2. The default IP mask is 255.255.255.0.

```
→ ip set interface ip1 ipaddress 192.168.200.2 255.255.255.0
```

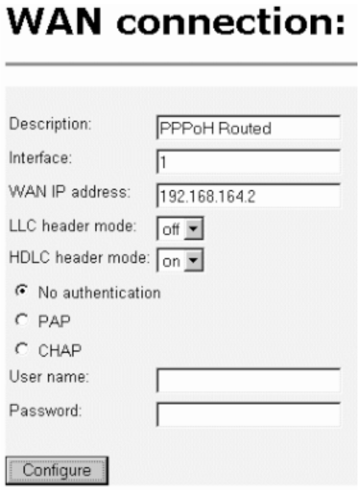


1. Now you can bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. Click on *Action.*
3. Select *deactivate* for Action.
4. Click on the **Action** button.
5. On the Menu, go to *Configuration*, then to *WAN Connections.* Delete both default WAN services already defined.
6. Click on *Create a new service* in the main window, select *PPPoH_Routed* and click on the **Configure** button.

In the Description field, enter the description you wish. In this example, it is called PPPoH Routed.

- Description: PPPoH Routed

- Interface: 1
- WAN IP address: 192.168.164.2
- LLC Header Mode: off
- HDLC Header Mode: ON
- No authentication
- Username: [blank]
- Password: [blank]



WAN connection:

Description: PPPoH Routed

Interface: 1

WAN IP address: 192.168.164.2

LLC header mode: off

HDLC header mode: on

● No authentication

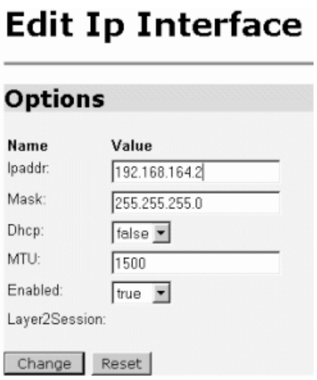
○ PAP

○ CHAP

User name:

Password:

1. Click on Configure.
2. Go to *Configuration Menu > Configuration > WAN connections > Edit (for PPPoH Routed service) > Edit 'IP Interface' > Ipaddr:* [enter the WAN IP Address, in this example = 192.168.164.2]
3. Click on **Change**.



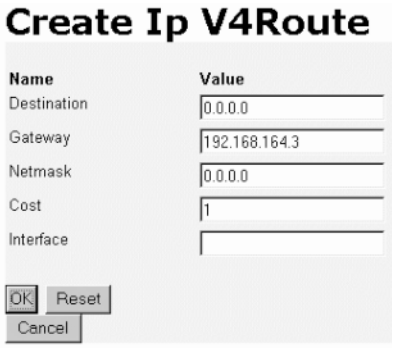
Edit Ip Interface

Options

Name	Value
Ipaddr:	192.168.164.2
Mask:	255.255.255.0
Dhcp:	false
MTU:	1500
Enabled:	true
Layer2Session:	

4. *Configuration Menu > Configuration > IP Routes > Create new Ip V4 Route.* Create the gateway to the remote router by entering the WAN IP address of the remote router, in this example, enter 192.168.164.3 in the Gateway field

5. Click the **OK** button.



Create Ip V4Route

Name	Value
Destination	0.0.0.0
Gateway	192.168.164.3
Netmask	0.0.0.0
Cost	1
Interface	

The other fields should be:

- Destination: 0.0.0.0
- Gateway: 192.168.164.3
- Mask: 0.0.0.0
- Cost: 1
- Interface: [blank]

Central Site Configuration. If the router at the ISP or Central site is another IPLink series, follow the instructions below, if not, consult your third party router user manual for configuration.

See the web pages for the desktop above. Some parametric values are different although the process is the same.

From the command line interface (CLI) via the RS-232 control port:

```
→ ip list interfaces
→ ip clear routes
→ pppoh clear transports
→ ethernet add transport eth1 ethernet
```

One IP interface was called ip1 with an IP address of 192.168.1.1

Change the IP address so it is in the same subnet as the laptop PC. The laptop’s IP address is *192.168.172.229*, so in this example, change the IP address of the IPLink to *192.168.172.3*. The default IP mask is *255.255.255.0*.

```
→ ip set interface ip1 ipaddress 192.168.172.3 255.255.255.0
```

1. Now you can bring up the web-page management system on your browser by entering the IP address of the IPlink.
2. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete both default WAN services already defined.
3. Click on *Create a new service* in the main window, select *PPPoH_Routed* and click on the **Configure** button.

4. In the Description field, enter the description you wish. In this example, it is called PPPoH Routed. Description:PPPoH Routed

   – Interface:1

   – WAN IP address: 192.168.164.3

   – LLC Header Mode:off

   – HDLC Header Mode:ON

   – No authentication

   – Username:[blank]

   – Password:[blank]

   Click on **Configure**.

5. Go to *Configuration Menu* > *Configuration* > *WAN connections* > *Edit (for PPPoH Routed service)* > *Edit 'IP Interface'* > *Ipaddr:* [enter the WAN IP Address, in this example = 192.168.164.3]. Click on **Change**.
6. Go to *Configuration Menu* > *Configuration* > *IP Routes* > *Click on Create new Ip V4 Route*.
7. Create the gateway to the remote IPLink by entering the WAN IP address of the remote IPLink, in this example, enter 192.168.164.2 in the Gateway field
8. Click **OK**.

The other fields should be:

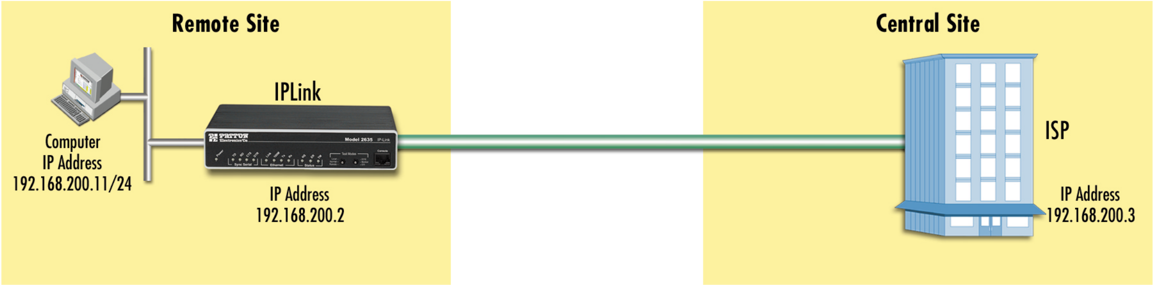
- Destination:0.0.0.0
- Gateway:192.168.164.2 [already changed in the first part of step 5).]
- Mask:0.0.0.0
- Cost 1
- Interface: [blank]

Frame Relay Configuration

The Frame Relay service can be use in both bridged and routed applications.

Frame Relay bridged

This application shows configuration for two IPLink units in bridged mode. If using a third party router at the Central site, review the router's configuration for connection to a remote bridge.



Remote Site Configuration. From the command line interface (CLI) via the RS-232 control port,

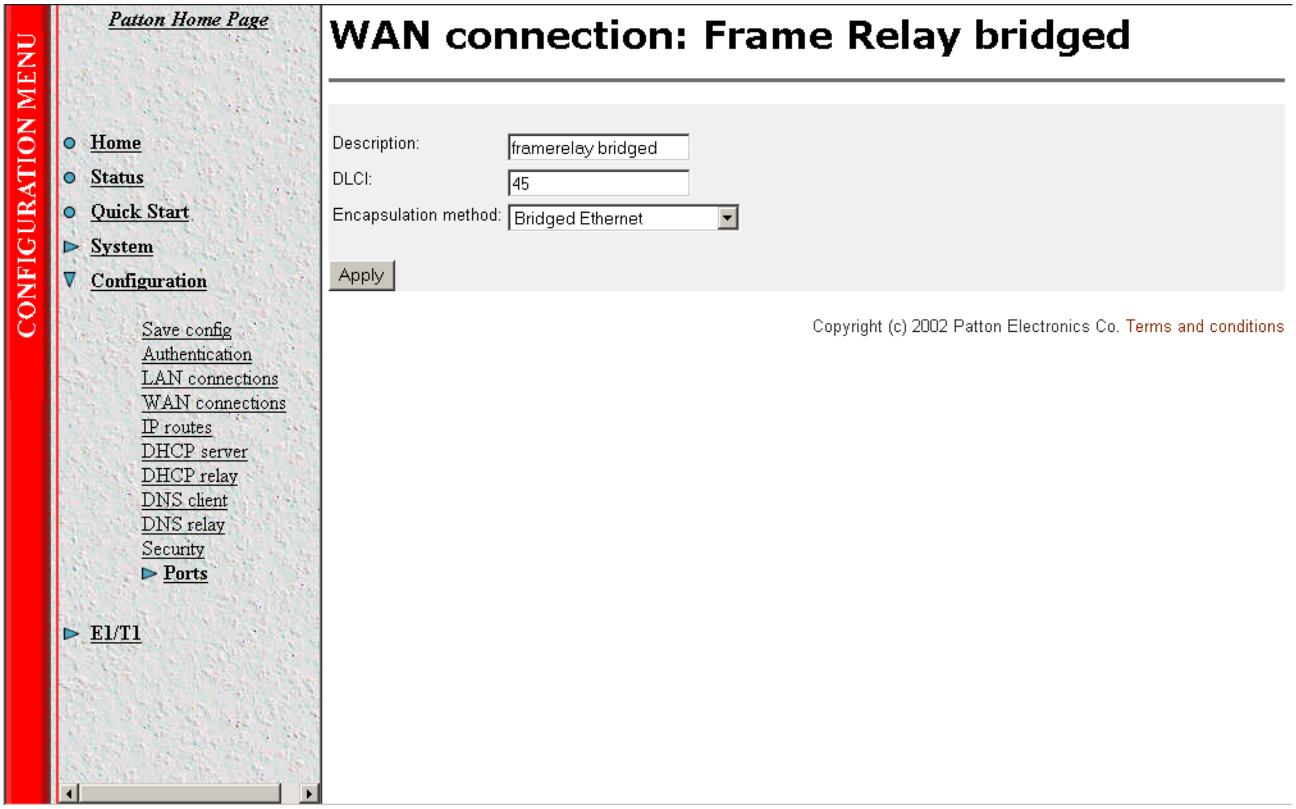
```
→ ip list interfaces
```

One IP interface was called ip1 with an IP address of 192.168.1.1 Change it to an IP address which is in the same subnet as the Desktop PC. For example, to192.168.200.2. The default IP mask is 255.255.255.0.

```
→ ip set interface ip1 ipaddress 192.168.200.2 255.255.255.0
```

1. Now you can bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. Click on *Action*.
3. Select *deactivate* for Action.
4. Click on the **Action** button.
5. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete both default WAN services already defined. (Factory default services).

6. Click on *Create a new service* in the main window, select *Frame relay bridged* and click on the **Configure** button.



WAN connection: Frame Relay bridged

Description: framerelay bridged

DLCI: 45

Encapsulation method: Bridged Ethernet

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7. In the Description field, enter the description you wish. In this example, it is called Frame Relay bridged.

8. DLCI number. Consult with your service provider for the DLCI number required.

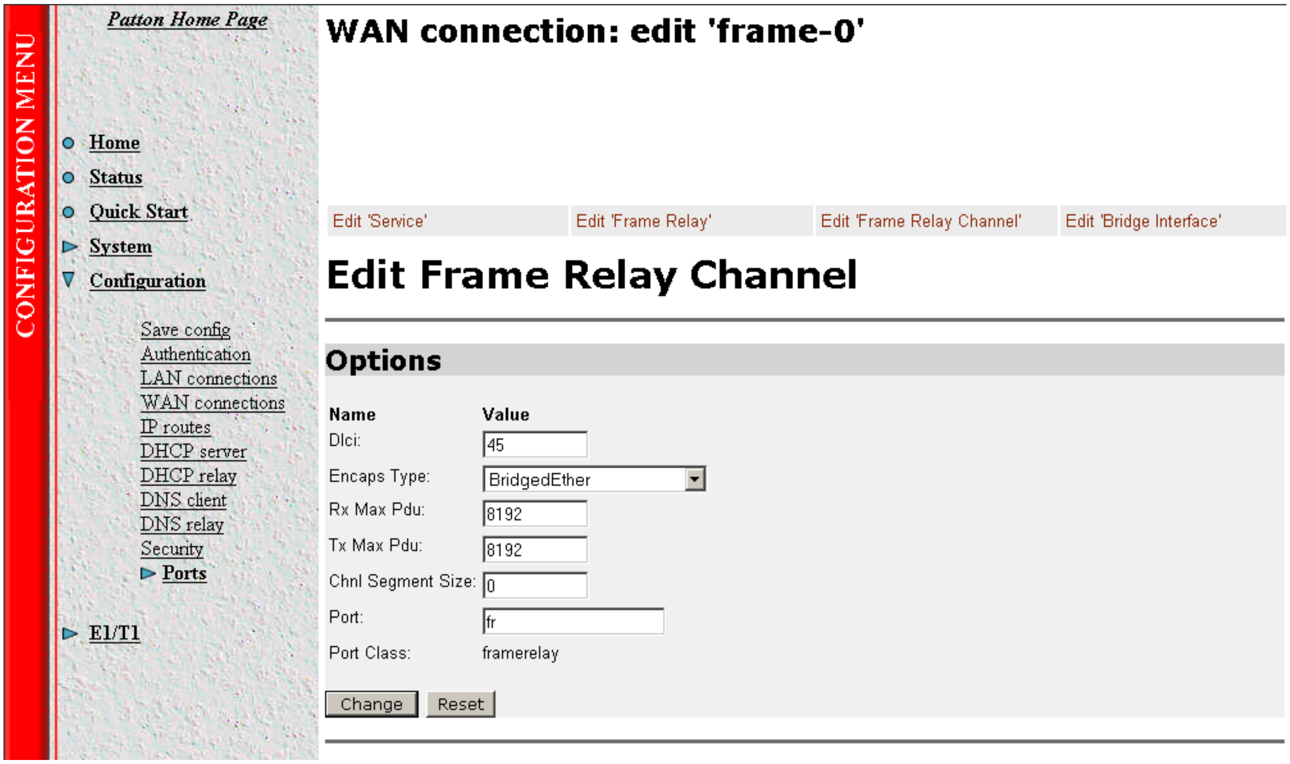
9. Encapsulation Method. Defines the FRC1490 encapsulation type that will be used by the channel. Choose the encapsulation method best suited for your network needs from the following options:

   – Bridged Ethernet

   – Bridged Ethernet with CRC

   – Raw

10. Go to *Configuration Menu > Configuration > WAN connections > Edit (for Frame Relay Routed service) > Edit 'Frame Relay Channel'*.



WAN connection: edit 'frame-0'

Edit Frame Relay Channel

Options

Name	Value
Dlci:	45
Encaps Type:	BridgedEther
Rx Max Pdu:	8192
Tx Max Pdu:	8192
Chnl Segment Size:	0
Port:	fr
Port Class:	framerelay

Edit Frame Relay Channel

Enter the appropriate information in the following fields:

- **Rxmaxpdu:** Receive side max PDU, default 8192
- **Txmaxpdu:** Transmit side max PDU, default 8192
- **Channel segment size.** The channel segment size is used to define fragmentation of the packets based on the Frame Relay Forum IA FRF.12. If this variable is set to 0 then FRF.12 “Frame Relay Fragmentation” will be disabled, if set to any other value it will set the fragmentation size used.
- **Port:** Defines the port that should be used to setup the Frame Relay Connection. For routed applications the port should be set to “frf”, for bridged applications the port should be set to “fr”.

Central site configuration.

Note If you are using a IPLink at the Central location, follow the instructions below, otherwise refer to your third party router documentation for configuration.

See the web pages for the desktop above. Some parametric values are different although the process is the same.

From the command line interface (CLI) via the RS-232 control port,

```
→ ip list interfaces
→ ip clear routes
→ pppoh clear transports
→ ethernet add transport eth1 ethernet
```

One IP interface was called *ip1* with an IP address of *192.168.1.1.*

Change the IP address so it is in the same subnet as the laptop PC. The laptop's IP address is 192.168.172.229, so in this example, change the IP address of the IPLink to *192.168.172.3*. The default IP mask is *255.255.255.0*.

```
→ ip set interface ip1 ipaddress 192.168.172.3 255.255.255.0
```

1. Now you can bring up the web-page management system on your browser by entering the IP address of the IPlink.
2. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete both default WAN services already defined.
3. Click on *Create a new service* in the main window, select *Frame Relay Routed* and click on the **Configure** button. In the *Description* field, enter the description you wish. In this example, it is called *Frame Relay Routed*.

   – Description: Frame Relay Routed

   – DLCI. Enter DLCI number. Consult with your service provider for the DLCI number required.

   – Encapsulation Method. Defines the FRC1490 encapsulation type that will be used by the channel. Chose the encapsulation method best suited for your network needs from the following options:

     - Bridged Ethernet
     - Bridged Ethernet with CRC
     - Raw

   – WAN IP address. Enter the IP address assigned to the WAN port (V.35, X.21, or T1/E1)

   – Enable NAT on this interface. In this example leave this option blank
4. Hit the Apply button
5. Go to Configuration Menu > *Configuration* > *WAN connections* > *Edit (for Frame Relay Routed service)* > *Edit 'Frame Relay Channel*> *Ipaddr*: [enter the WAN IP Address, in this example = 192.168.164.3]
6. Click on **Change**.

   – **Dlci:** Consult with your service provider for the DLCI number required, in this example use 45.

   – **Encapsulation Method:** defines the RFC1490 encapsulation type that will be used by the channel. Chose the encapsulation method best suited for your network. In this example enter routedIp

   – **Rxmaxpdu:** enter the number of receive side max PDU, in this example enter 8192

   – **Txmaxpdu:** enter the number of transmit side max PDU, in this example enter 8192

   – **Channel segment size.** The channel segment size is used to define fragmentation of the packets based on the Frame Relay Forum IA FRF.12. If this variable is set to 0 then FRF.12 "Frame Relay Fragmentation" will be disabled, if set to any other value it will set the fragmentation size used.

   – Port: Defines the port that should be used to setup the Frame Relay Connection. For routed applications the port should be set to "frf". For bridged applications the port should be set to "fr".

7. Go to *Configuration* Menu > *Configuration* > *WAN connections* > *Edit (for Frame Relay Routed service)* > *Edit 'IP Interface'* > *Ipaddr:* [enter the WAN IP Address, in this example = 192.168.164.3]

8. Click on **Change**.

9. Go to *Configuration* Menu > *Configuration* > *IP Routes* > *Click on Create new Ip V4 Route*. Create the gateway to the remote IPLink by entering the WAN IP address of the remote IPLink, in this example, enter *192.168.164.2* in the Gateway field.

10. Click on **OK**.

    The other fields should be:

    – Destination: 0.0.0.0

    – Gateway: 192.168.164.2

    – Mask: 0.0.0.0

    – Cost: 1

    – Interface: [blank]

    – Click the **Ok** button to execute the change.

    – This conclude the central site configuration.

Frame Relay Routed

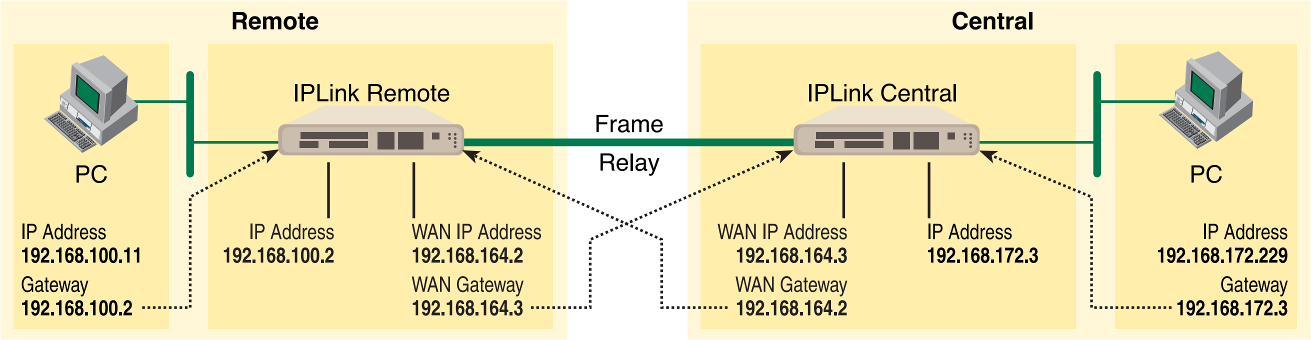
This application shows configuration for two IPLink units in routed mode. If using a third party router at the Central site, review the router's configuration for connection to a remote bridge.

Remote Site Configuration . From the command line interface (CLI) via the RS-232 control port,

```
→ ip list interfaces
```

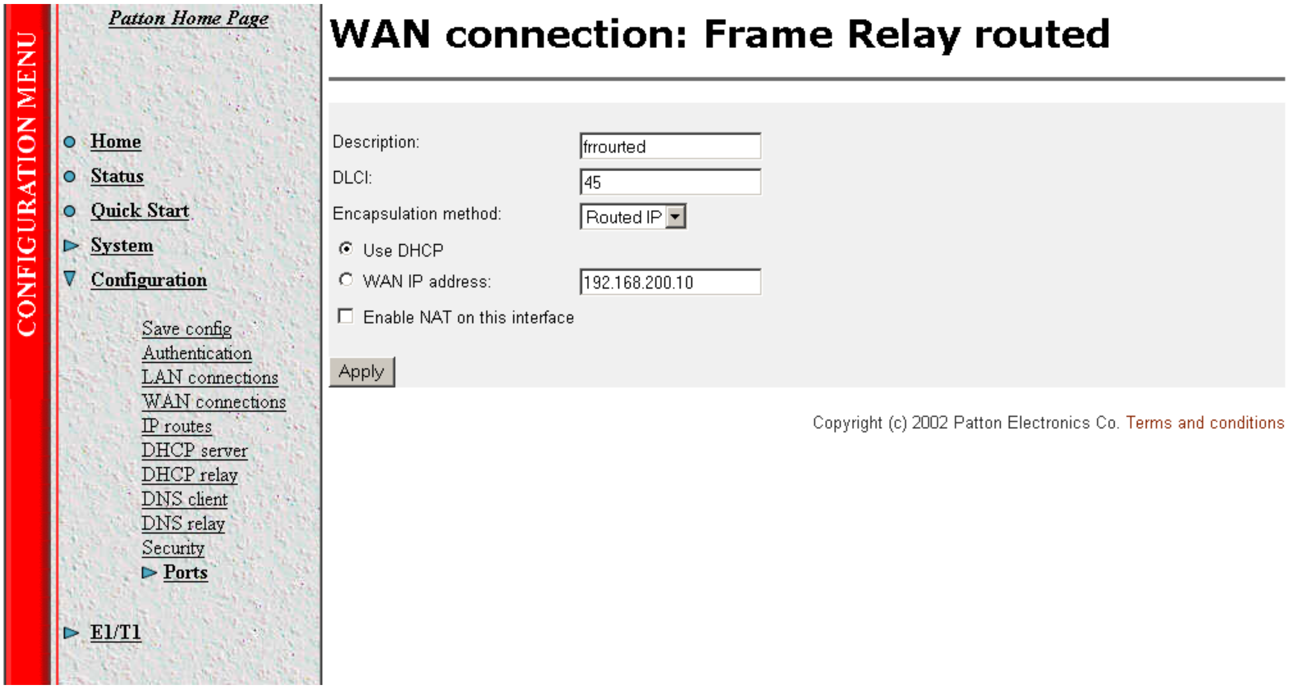
One IP interface was called *ip1* with an IP address of *192.168.1.1*. Change it to an IP address which is in the same subnet as the desktop PC. For example, to 192.168.100.2. The default IP mask is 255.255.255.0.

```
→ ip set interface ip1 ipaddress 192.168.100.2 255.255.255.0
```



1. Now you can bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. Click on *Action*.
3. Select *deactivate* for Action.
4. Click on the **Action** button.
5. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete both default WAN services already defined. (Factory default services).

6. Click on *Create a new service* in the main window, select *Frame relay routed* and click on the **Configure** button.



WAN connection: Frame Relay routed

Description: frrourted

DLCI: 45

Encapsulation method: Routed IP

● Use DHCP

○ WAN IP address: 192.168.200.10

□ Enable NAT on this interface

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7. In the Description field, enter the description you wish. In this example, it is called Frame Relay Routed .

   – **Description:** Frame Relay Routed

   – **DLCI.** Enter DLCI number. Consult with your service provider for the DLCI number required.

   – **Encapsulation Method.** Defines the FRC1490 encapsulation type that will be used by the channel. Choose the encapsulation method best suited for your network needs from the following options:

   - Bridged Ethernet
   - Bridged Ethernet with CRC
   - Raw

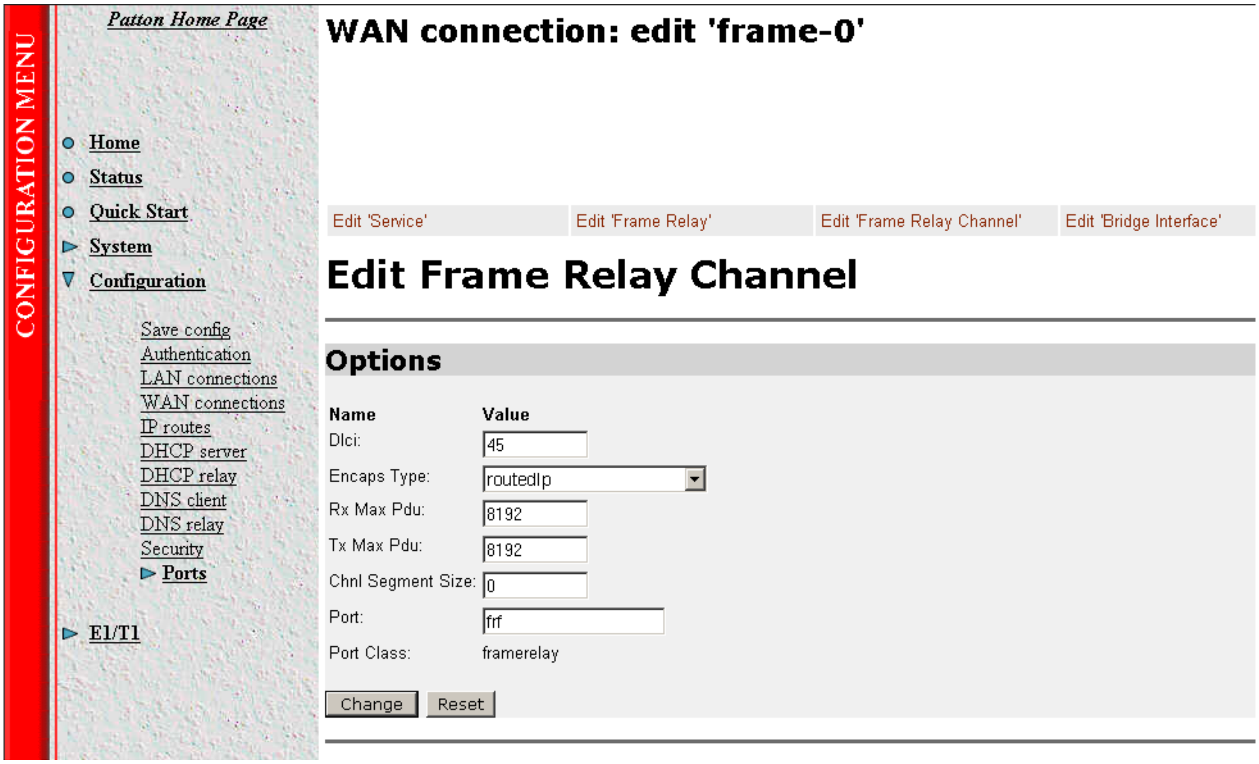
   – **WAN IP address.** Enter the IP address assigned to the WAN port (V.35, X.21, or T1/E1)

   – **Enable NAT on this interface.** In this example leave this option blank

8. Click the **Apply** button.

9. Go to *Configuration Menu* > *Configuration* > *WAN connections* > *Edit (for Frame Relay Routed service)* > *Edit ‘Frame Relay Channel> Ipaddr:* [enter the WAN IP Address, in this example = 192.168.164.2].

10. Click on **Change.**



WAN connection: edit 'frame-0'

Edit Frame Relay Channel

Options

Name	Value
Dlci:	45
Encaps Type:	routedIp
Rx Max Pdu:	8192
Tx Max Pdu:	8192
Chnl Segment Size:	0
Port:	frf
Port Class:	framerelay

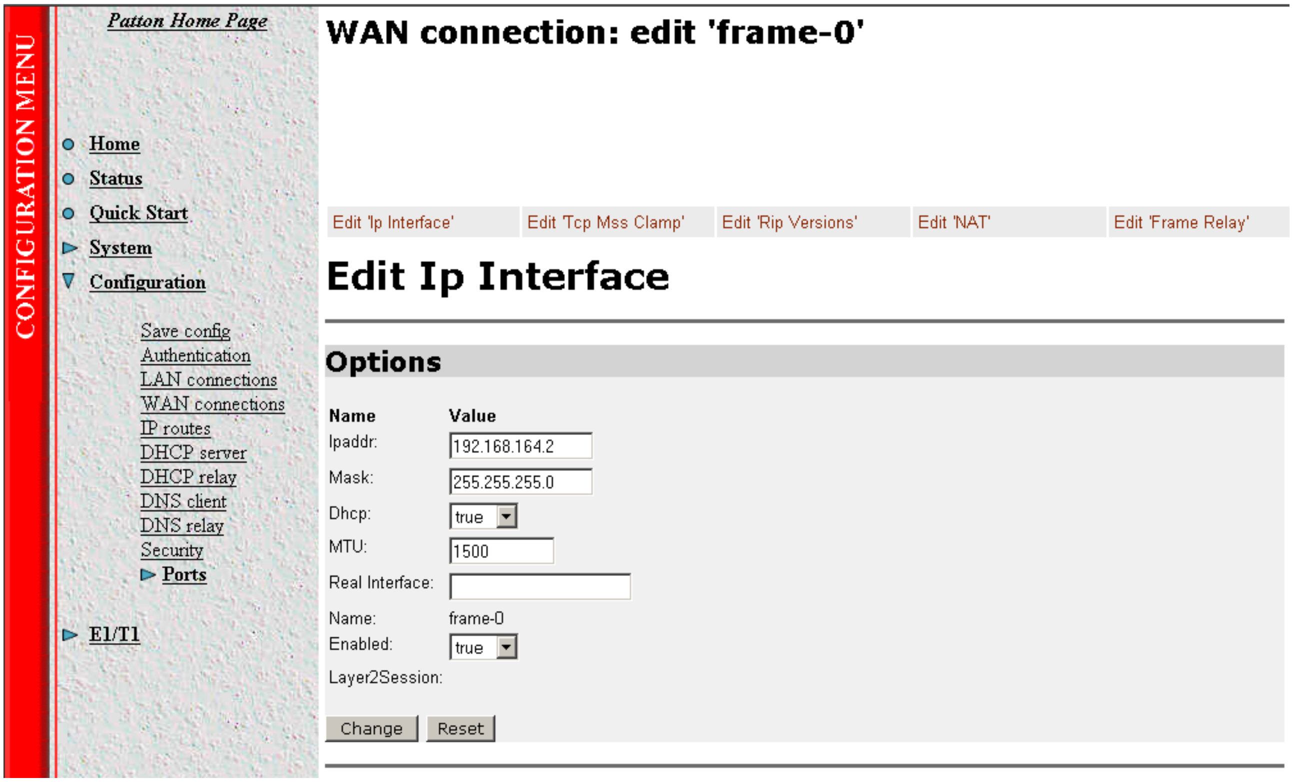
Edit Frame Relay Channel

Enter the appropriate information in the following fields:

- **Dlci:** Consult with your service provider for the DLCI number required, in this example use 45.
- **Encapsulation Method:** Defines the RFC1490 encapsulation type that will be used by the channel. Chose the encapsulation method best suited for your network. In this example enter *routedIp*
- **Rxmaxpdu:** Enter the number of receive side max PDU, in this example enter 8192
- **Txmaxpdu:** Enter the number of transmit side max PDU, in this example enter 8192
- **Channel segment size.** The channel segment size is used to define fragmentation of the packets based on the Frame Relay Forum IA FRF.12. If this variable is set to 0 then FRF.12 “Frame Relay Fragmentation” will be disabled, if set to any other value it will set the fragmentation size used.
- **Port:** Defines the port that should be used to setup the Frame Relay Connection. For routed applications the port should be set to “frf”. For bridged applications the port should be set to “fr”.

1. Go to *Configuration Menu* > *Configuration* > *WAN connections* > *Edit (for Frame Relay Routed service)* > *Edit ‘IP Interface’* > *Ipaddr:* [enter the WAN IP Address, in this example = 192.168.164.2]

2. Click on **Change**.



WAN connection: edit 'frame-0'

Edit Ip Interface

Options

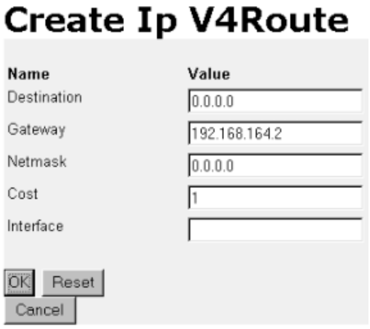
Name	Value
Ipaddr:	192.168.164.2
Mask:	255.255.255.0
Dhcp:	true
MTU:	1500
Real Interface:	
Name:	frame-0
Enabled:	true
Layer2Session:	

3. Click on *Configuration Menu > Configuration > IP Routes > Click on Create new Ip V4 Route*
4. Create the gateway to the remote IPLink by entering the WAN IP address of the remote IPLink, in this example, enter *192.168.164.3* in the Gateway field.
5. Click **OK**.

The other fields should be:

- Destination:0.0.0.0
- Gateway:192.168.164.3
- Mask:0.0.0.0

- Cost:1
- Interface:[blank]



Create Ip V4Route

Name	Value
Destination	0.0.0.0
Gateway	192.168.164.2
Netmask	0.0.0.0
Cost	1
Interface	

Central site configuration.

Note If you are using an IPLink at the central location, follow the instructions below, otherwise refer to your third party router documentation for configuration.

From the command line interface (CLI) via the RS-232 control port:

```
→ ip list interfaces
→ ip clear routes
→ pppoh clear transports
→ ethernet add transport eth1 ethernet
```

One IP interface was called ip1 with an IP address of 192.168.1.1

Change the IP address so it is in the same subnet as the laptop PC. The laptop's IP address is 192.168.172.229, so in this example, change the IP address of the IPLink to 192.168.172.3. The default IP mask is 255.255.255.0.

```
→ ip set interface ip1 ipaddress 192.168.172.3 255.255.255.0
```

6. Now you can bring up the web-page management system on your browser by entering the IP address of the IPlink.
7. On the Menu, go to *Configuration*, then to *WAN Connections*. Delete both default WAN services already defined.
8. Click on *Create a new service* in the main window, select *Frame Relay Routed* and click on the **Configure** button.
9. In the Description field, enter the description you wish. In this example, it is called *Frame Relay Routed*.
   – **Description:** Frame Relay Routed
   – **DLCI.** Enter DLCI number. Consult with your service provider for the DLCI number required.

– **Encapsulation Method.** Defines the FRC1490 encapsulation type that will be used by the channel. Chose the encapsulation method best suited for your network needs from the following options:

  - Bridged Ethernet
  - Bridged Ethernet with CRC
  - Raw

– **WAN IP address.** Enter the IP address assigned to the WAN port (V.35, X.21, or T1/E1)

– **Enable NAT on this interface.** In this example leave this option blank

10. Hit the **Apply** button.

11. Go to *Configuration Menu* > *Configuration* > *WAN connections* > *Edit (for Frame Relay Routed service)* > *Edit 'IP Interface'* > *Ipaddr:* [enter the WAN IP Address, in this example = 192.168.164.3].

12. Click on **Change**.

13. *Configuration Menu* > *Configuration* > *IP Routes* > *Click on Create new Ip V4 Route*.

14. Create the gateway to the remote IPLink by entering the WAN IP address of the remote IPLink, in this example, enter 192.168.164.2 in the Gateway field.

15. Click **OK**.

The other fields should be:

- Destination:0.0.0.0
- Gateway:192.168.164.2 [already configured in first part of step 5).]
- Mask:0.0.0.0
- Cost:1
- Interface:[blank]

LMI Configuration

Frame Relay Local Management Interface

The Frame Relay Local Management Interface (LMI) is a mechanism that two separate frame relay systems can use to communicate the status of the interface. The LMI interface allows dynamic updates on the status of the DLCI connections and the congestion state of the network. The IPLink implements all three versions of LMI available within the frame relay network. These are defined in Table 4:

Table 4. LMI Implementation on the IPLink

Protocol	Specification	Options Available
LMI	Frame Relay Forum Implementation Agreement (IA) FRF.1 superseded by FRF.1.1	User Side
Annex D	ANSI T1.617	User Side
Annex A	ITU Q.933 referenced in FRF.1.1	User Side

LMI Configuration Options

The Frame Relay Local Management Interface is configurable through either the CLI or web interface on the IPLink Series. The following variables are available for configuration.

- **managementType:** (Default Value: no_maintanence) the managementType variable defines the LMI protocol that will be used from the table above. The following options are available.
  - **no_maintenence**: No maintenance interface will be used for this frame relay connection.
  - **933A_Network:** The ITU Q.933 protocol will be used. The unit will operate as the Network side of the connection.
  - **933A_User:** The ITU Q.933 protocol will be used. The unit will operate as the User side of the connection.
  - **933A_Both:** The ITU Q.933 protocol will be used. The unit will operate as both the Network and User side of the connection.
  - **617D_Network:** The ANSI T1.617 protocol will be used. The unit will operate as the Network side of the connection
  - **617D_User:** The ANSI T1.617 protocol will be used. The unit will operate as the User side of the connection
  - **617D_Both:** The ANSI T1.617 protocol will be used. The unit will operate as both the Network and User side of the connection.
- **MgtState:** Defines the current state of the DTE side LMI. Possible options are as follows:
  - **Mgt_Port_DOWN** – Currently the LMI on the DTE side is DOWN
  - **Mgt_Port_UP** – Currently the LMI on the DTE side is UP
- **mgtAutoStart:** (Default Value: FALSE) The management Auto Start variable allows the user to start the LMI session before any DLCI connections are created within the unit. If this variable is set to FALSE, the LMI session will begin when the first DLCI channel is created. If this variable is set to TRUE the LMI session will begin immediately.
- **T391_Value:** (Default Value: 10) This variable sets the T391 timers in seconds.
- **T392_Value:** (Default Value: 16) This variable sets the T392 timers in seconds.
- **fullReportCycle:** (Default Value: 6) This variable represents the N391 protocol value
- **netErrorWindowSize:** (Default Value: 4) Network side N393 protocol value
- **netMaxErrors:** (Default Value: 3) Network side N392 protocol value
- **userErrorWindowSize:** (Default Value: 4) User side N393 protocol value
- **userMaxErrors:** (Default Value: 3) Network side N392 protocol value

CLI Configuration Methods

The following documentation defines how to configure the Frame Relay Local Management Interface using the CLI on the IPLink Series.

All LMI commands are contained under the “lmi” directive of the CLI interface. The following options are available:

- **show current configuration:** command: “lmi show”

```
→ lmi show
     FR_Mgt Type : no_maintenance
     FR_Mgt State : Mgt_Port_DOWN
            Full Report Cycle : 6
              User Max Errors : 3
               Net Max Errors : 3
        User Error Window Size  : 4
         Net Error Window Size   : 4
                    T391_Value : 10
                    T392_Value : 16
               Mgt Auto Start : false
```

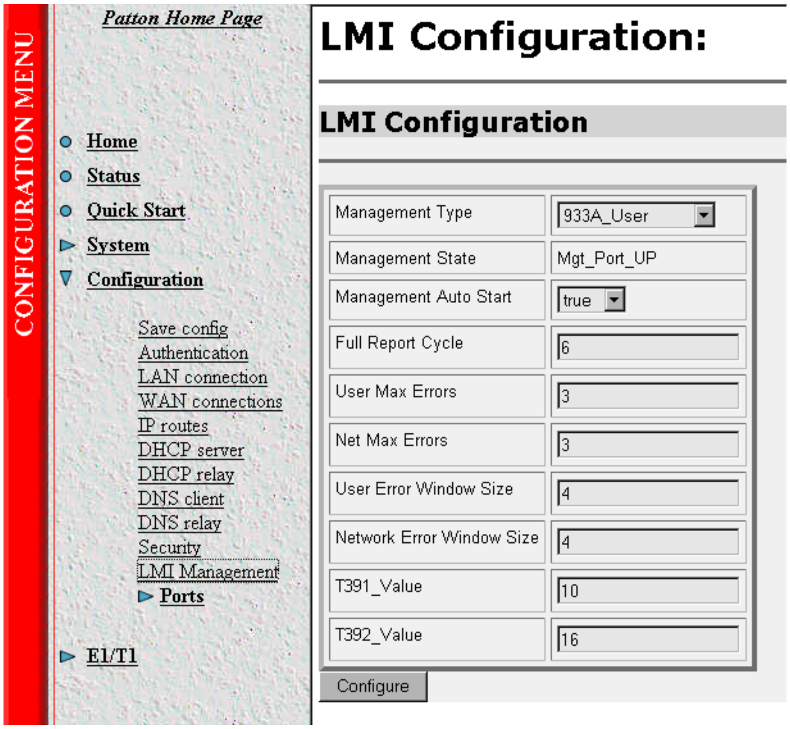
- **set configuration variable:**
  - **command:** “lmi set <variable> <value>”
  - **variable:** Any variable from the above list
  - **value:** Value as defined by the variable

```
→ lmi set managementType 933A_Network
```

Web Configuration Methods

The following documentation defines how to configure the Frame Relay Local Management Interface using the Web Interface on the IPLink Series.

All LMI configuration variables are contained under the “LMI Management” window found through the *Configuration >LMI Management* link. The following screen shows the configuration variables available.



LMI Configuration:

LMI Configuration

Management Type	933A_User
Management State	Mgt_Port_UP
Management Auto Start	true
Full Report Cycle	6
User Max Errors	3
Net Max Errors	3
User Error Window Size	4
Network Error Window Size	4
T391_Value	10
T392_Value	16

Chapter 5 Security

Chapter contents

Introduction

Security provides the ability to setup and enforce security policies. The policies define the types of traffic permitted to pass through a gateway, either inbound, outbound, or both, and from which origins the traffic may be allowed to enter.

Within the security configuration is a stateful firewall. A stateful firewall utilizes a security mechanism to maintain information concerning the packets it receives. This information is used for deciding dynamically whether or not a packet may pass through.

Port filters are rules that determine how a packet should be handled. The rules define the protocol type, the range of source and destination port numbers and an indication whether the packet is allowed or not.

Security triggers are used with applications that require and create separate sessions. The most common example is FTP. An FTP client establishes a connection to a server using port 21, but data transfers are done on a separate connection or port. The port number, and who makes the connection, can vary depending on the FTP client. To allow FTP to work without triggers, you would need to set up port filters allowing the correct port numbers through. This is a significant security risk.

This risk can be avoided by using security triggers. Triggers tell the security mechanism to expect these secondary sessions and how to handle them. Rather than allowing a range of port numbers, triggers handle the situation dynamically, opening the secondary sessions only when appropriate. The triggers work without needing to understand the application protocol or reading the payload of the packet, although this does happen when using NAT.

Triggering allows you to set up a trigger for different application protocols that use multiple sessions. The timeout between sessions and whether or not session chaining are allowed are configurable. Session chaining is not needed for FTP but is for NetMeeting.

See Chapter 6, “NAT (Network Address Translation)” on page 79.

Configuring the router

The configuration of security assumes that the IPLink router/Router already has a valid IP address for the Ethernet port so that the user may access the modem via the web page. If the IP address is still the factory default, go to the section in Chapter 3 entitled IP Address Quick Start Modification.

In this example the WAN transport between the two IPLink router/Routers will be PPPoH.

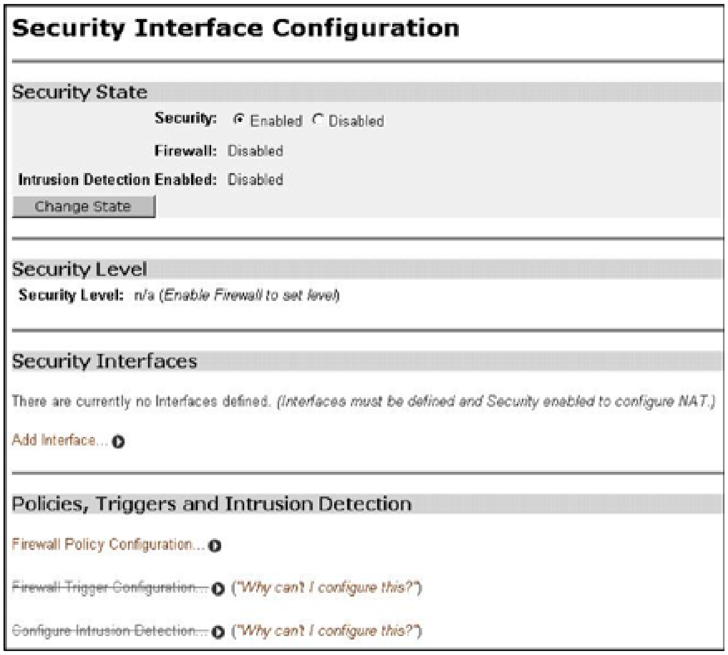
1. Click on **`WAN Connections`** under Configuration on the IPLink router’s Menu.
2. Click on **`Create a New Service`**.
3. Select **`PPPoH Routed`** and click on the **`Configure`** button.
4. For this example, enter **`PPPoH Security Firewall`** in the Description field.
5. Click on **`WAN IP address`** and enter *192.168.101.1* in the adjacent box. The default IP mask is 255.255.255.0.
6. Click on **`Apply`**.

The next step in configuring the router is adding the default gateway route. Since the WAN IP address of the IPLink router modem at the CO site is 192.168.101.2, this will be the gateway for the IPLink router modem at the CPE site, the modem we are currently configuring.

1. Click on **IP Routes** under Configuration on the IPLink router modem's Menu.
2. Click on **Create a New IP Route**.
3. Enter *192.168.101.2* in the box adjacent to Gateway.
4. Leave Destination and Netmask both as *0.0.0.0* because this is the gateway default route.
5. Click on **Create** and the route will be entered.
6. The default gateway can be verified by clicking on **IP Routes** under Status in the menu.

Configuring the security interfaces

The interfaces and routes have been configured on the IPLink Router which will function as the firewall. The Ethernet side of the IPLink router will be configured to be an internal security interface whereas the WAN side is configured as an external security interface since it is on "public" side of the modem connection.



Security Interface Configuration

Security State

Security: ● Enabled ○ Disabled

Firewall: Disabled

Intrusion Detection Enabled: Disabled

Security Level

Security Level: n/a *(Enable Firewall to set level)*

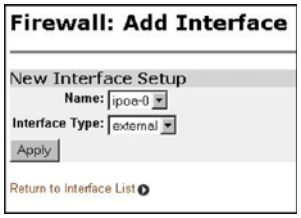
Security Interfaces

There are currently no Interfaces defined. *(Interfaces must be defined and Security enabled to configure NAT.)*

Policies, Triggers and Intrusion Detection

Firewall Policy Configuration...
~~Firewall Trigger Configuration...~~ ("Why can't I configure this?")
~~Configure Intrusion Detection...~~ ("Why can't I configure this?")

1. Click on **Security** under Configuration on the IPLink router modem's menu.
2. Under Security Interfaces, click on **Add Interface**.
3. Select Name of the WAN port (*PPPoH*) and Interface Type to be *external*. Click on **Apply**.



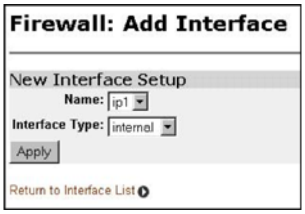
Firewall: Add Interface

New Interface Setup

Name: ipoa-0

Interface Type: external

4. Add one more security interface by repeating step 2.
5. Select Name of the LAN port (*ip1*) and Interface Type to be *internal*. Click on **Apply**.



Firewall: Add Interface

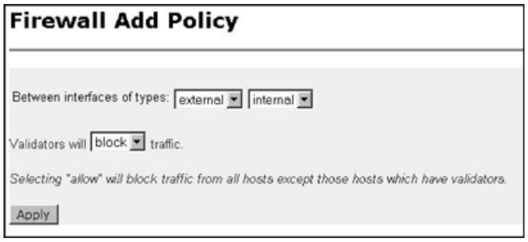
New Interface Setup

Name: ip1

Interface Type: internal

Now the Firewall policies will be added between the security interfaces. Only one Firewall policy, called *etoi*, is added between the external and internal interfaces.

1. Under Policies, Triggers and Intrusion Devices on the Security page, click on **Firewall Policy Configuration**.
2. In the Current Firewall Policies page, click on **New Policy**.



Firewall Add Policy

Between interfaces of types: external internal

Validators will block traffic.

Selecting "allow" will block traffic from all hosts except those hosts which have validators.

3. Select the parameters so the policy applies **between interface of types: external internal**.
   Also **Validators will block traffic**. This blocks all hosts.
4. Click on **Apply**.

Deleting a Firewall Policy

To delete a Firewall Policy, follow these Command Line Interface (CLI) commands via the Console port.

```
→ firewall list policies
```

Firewall Policies:

```
      ID |    Name     |   Type 1    |   Type 2    | Validator Allow Only
   -------------------------------------------------------------------
       1 | item0       | external    | internal    | false
   -------------------------------------------------------------------


     → firewall delete policy item0
```

The firewall policy named *item0* is now deleted.

Enabling the Firewall

At this point, both security and the firewall can be enabled and the network is secure. All the interfaces which have been defined are protected: all traffic blocked between the internal and external interfaces.

1. Return to the Security page.
2. Under Security State select **`Enabled for Security`** and click on **`Change State`**.
3. Then select **`Enabled for the Firewall`** and click on **`Change State`**.

The network is now secure. All the interfaces which have been defined are protected and all traffic is blocked between different the different interface types. That is, all traffic is blocked between the external and internal interfaces.

The next section describes how to configure the Firewall for allowing certain types of data transfer to occur between the PC's on different networks.

Firewall Portfilters

Next, we configure the Firewall to permit certain types of data transfer between the PCs on the different networks. This is done by the implementation of Firewall portfilters. Portfilters are individual rules that determine what kind of traffic can pass between two interface types.

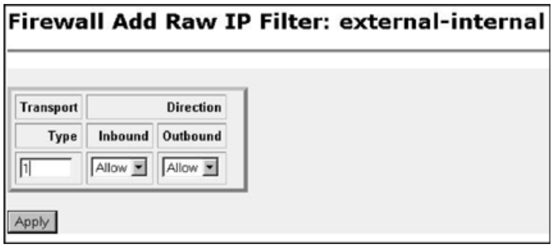
For the Transport Type below, the different types are:

Transport Type	Abbreviation
1	ICMP
2	IGMP
3	GGP
4	IP
6	TCP
8	EGP
9	IGP
17	UDP
46	RSVP
47	GRE
89	OSPFIGP
92	MTP

Transport Type	Abbreviation
94	IPIP

To allow pings between the two PCs:

1. From the Configuration Menu, > Configuration > Security > Firewall Policy Configuration > Port Filters > Add Raw IP Filter
2. Enter *1* (for ICMP) in Transport Type.
3. Both Inbound and Outbound should be allowed.
4. Click on **`Apply`**.



Firewall Add Raw IP Filter: external-internal

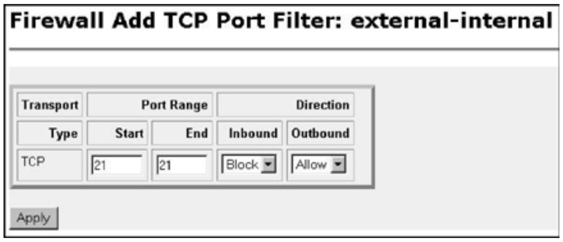
Transport	Direction	
Type	Inbound	Outbound
1	Allow	Allow

You can now ping between the two networks

Security Triggers

Security triggers are used to allow an application to open a secondary port in order to transport data. The most common example is FTP. This procedure is to set up a trigger on the Firewall to have an FTP session from PC A to PC B, but not the reverse.

1. First, create an outbound-only portfilter for FTP and add it to the item0 policy.
2. Following the path given in step 1 for the ping portfilter, click on **`Add TCP Filter`**.
3. The Port Range is entered as *21* for both Start and End.
4. Set Inbound as **`Block`**, but Outbound as **`Allow`**.
5. Click on **`Apply`**.



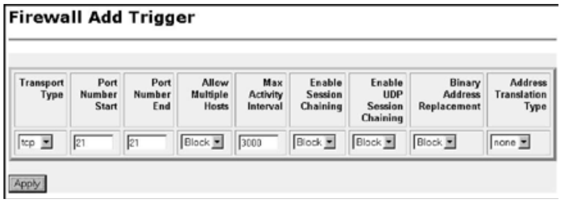
Firewall Add TCP Port Filter: external-internal

Transport	Port Range		Direction	
Type	Start	End	Inbound	Outbound
TCP	21	21	Block	Allow

After configuring the FTP portfilter, you can open an ftp session from Remote to Local, however you can issue ftp commands (e.g., login, cd, etc.) but transfer data (e.g., ls, dir, get, put commands). The portfilter allows an ftp control channel but does not allow the use of a secondary data channel for passing data by ftp.

To enable the ftp data channel, add a trigger which will open a secondary channel only when data is being passed. This prevents the need to open too many ports which offer a security risk.

1. From the Configuration Menu, > Configuration > Security > Firewall Trigger Configuration > New Trigger.
2. Set the parameters as follows:
   - Transport Type = tcp
   - Port Number Start = 21
   - Port Number End = 21
   - Allow Multiple Hosts = Block
   - Max Activity Interval = 3000
   - Enable Session Chaining = Block
   - Enable UDP Session Chaining = Block
   - Binary Address Replacement = Block
   - Address Translation Type = none
3. Click on **`Apply`**.



Firewall Add Trigger

Transport Type	Port Number Start	Port Number End	Allow Multiple Hosts	Max Activity Interval	Enable Session Chaining	Enable UDP Session Chaining	Binary Address Replacement	Address Translation Type
tcp	21	21	Block	3000	Block	Block	Block	none

You should now be able to use ftp commands to pass data between Remote and Local.

Intrusion Detection System (IDS)

The security feature in the IPLink Router provides protection from a number of attacks. Some attacks cause a host to be blacklisted (i.e., no traffic from that host is accepted under any circumstances) for a period of time. Other attacks are simply logged. The subsequent table is a summary of the attacks detected.

Attack Name	Protocol	Attacking Host Blacklisted?
Ascend Kill	UDP	yes
Echo/Chargen	UDP	no
Echo Scan	UDP	yes
WinNuke	TCP	yes
Xmas Tree Scan	TCP	yes
IMAP SYN/FIN Scan	TCP	yes
Smurf	ICMP	If victim protection set
SYN/FIN/RST Flood	TCP	If scanning threshold exceeded
Net Bus Scan	TCP	yes
Back Orifice Scan	UDP	yes

1. To enable IDS, click on Enabled for “Intrusion Detection Enabled” on the “Security Interface Configuration” page. Then click on **`Change State(s)`**.
2. Click on **`Configure Intrusion Detection.`**
3. You may choose which of the parameters to configure and for which value.

   – Use Blacklist:Default = 10 minutes when enabled.

   If IDS has detected an intrusion an external host, access to the network is denied for ten minutes.

   – Use Victim Protection:Default = Disabled.

   Enables Victim Protection. Victim Protection protects the victim from an attempted spoofing attack. Web spoofing allows an attacker to create a ‘shadow’ copy of the world wide web (WWW). All access to the shadow Web goes through the attacker’s machine, so the attacker can monitor all of the victim’s activities and send false data to or from the victim’s machine. When enabled, packets destined for the victim host of a spooking style attack are blocked.

   – DOS Attack Block Duration:Default = 1800 seconds (30 minutes).

   A Denial of Service (DOS) attack is an attempt by an attacker to prevent legitimate users from using a service. If a DOS attack is detected, all suspicious hosts are blocked by the firewall for a set time limit

   – Scan Attack Block Duration:Default = 86400 seconds

Sets the duration for blocking all suspicious hosts. The firewall detects when the system is being scanned by a suspicious host attempting to identify any open ports.

– Victim Protection Block Duration:Default = 600 seconds (10 minutes).

  Sets the duration of the block in seconds.

– Maximum TCP Open Handshaking Count:Default = 100

  Sets the maximum number of unfinished TCP handshaking sessions per second that are allowed by a firewall before a SYN Flood is detected. SYN Flood is a DOS attack. When establishing normal TCP connections, three packets are exchanged: (1) A SYN (synchronize) packet is sent from the host to the network server. (2) A SYN/ACK packet is sent from the network server to the host. (3) An Ack (acknowledge) packet is sent from the host to the network server. If the host sends unreachable source addresses in the SYN packet, the server sends the SYN/ACK packets to the unreachable addresses and keeps resending them. This creates a backlog queue of unacknowledged SYN/ACK packets. Once the queue is full, the system will ignore all incoming SYN request and no legitimate TCP connections can be established.

– Once the maximum number of unfinished TCP handshaking sessions is reached, an attempted DOS attack is detected. The firewall blocks the suspected attacker for the time limit specified in the DOS Attack Block Duration parameter.

– Maximum Ping Count:Default = 15

  Sets the maximum number of pings per second that are allowed by the firewall before an Echo Storm is detected. Echo Storm is a DOS attack. An attacker sends oversized ICMP datagrams to the system using the ‘ping’ command. This can cause the system to crash, freeze, or reboot, resulting in denial of service to legitimate users.

– Maximum ICMP Count:Default = 100

  Sets the maximum number of ICMP packets per second that are allowed by the firewall before an ICMP Flood is detected. An ICMP Flood is a DOS attack. The attacker tries to flood the network with ICMP packets in order to prevent transmission of legitimate network traffic.

4. After selecting the chosen parameters, click on **`Apply`**.

Chapter 6 NAT (Network Address Translation)

Chapter contents

Introduction

The basic steps for configuring NAT are:

1. Enable NAT between the internal and external interfaces of the firewall.
2. Create global addresses which will be added to the global pool of IP addresses on the WAN interface.
3. Create a reserved mapping between a global IP address and the IP address of an internal PC.

A Global Address Pool is a pool of addresses seen from the outside network. Each external interface creates a Global Address Pool with a single address—the address assigned to that interface. For outbound sessions, an address is picked from a pool by hashing the source IP address for a pool index and then hashing again for an address index. For inbound sessions, it is necessary to create a reserved mapping.

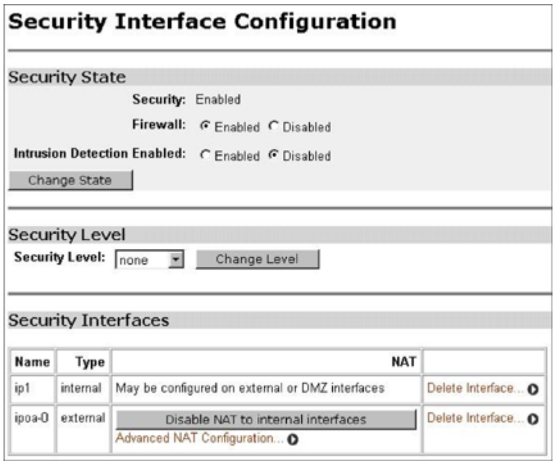
A reserved mapping is used so that NAT knows where to route packets on inbound sessions. The reserved mapping will map a specific global address and port to an inside address and port. Reserved mappings can also be used so that different inside hosts can share a global address by mapping different ports to different hosts. For example, Host A is an FTP server and Host B is a web server. By mapping the FTP port to Host A and the HTTP port to Host B, both insides hosts can share the same global address. Setting the protocol number to 255 (0xFF) means that the mapping will apply to all protocols. *Setting the port number to 65535 (0xFFFF) for TCP or UDP protocols means that the mapping will apply to all port numbers for that protocol.*

Some applications embed address and/or port information in the payload of the packet. The most notorious of these is FTP. For most applications, it is sufficient to create a trigger with address replacement enabled. However there are three applications for which a specific ALF is provided: FTP, NetBIOS, and DNS.

Enabling NAT

The configuration of NAT in this example follows on the preceding configuration completed in the chapter, “Security.”

1. Go to the “Security Interface Configuration” page by clicking on **`Security`** under Configuration in the menu.
2. Click on **`Enable NAT to internal interfaces`** in the table, Security Interfaces. NAT is now enabled between the internal (LAN) and the external (WAN) interfaces of the firewall.



Security Interface Configuration

Security State

Security: Enabled

Firewall: ● Enabled ○ Disabled

Intrusion Detection Enabled: ○ Enabled ● Disabled

Security Level

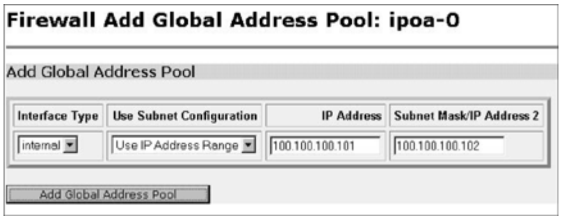
Security Level: none

Security Interfaces

Name	Type	NAT	
ip1	internal	May be configured on external or DMZ interfaces	Delete Interface...
ipoa-0	external	Disable NAT to internal interfaces Advanced NAT Configuration...	Delete Interface...

Global address pool and reserved map

1. Click on **Advanced NAT Configuration...** on the web page, “Security Interface Configuration.”



Firewall Add Global Address Pool: ipoa-0

Add Global Address Pool

Interface Type	Use Subnet Configuration	IP Address	Subnet Mask/IP Address 2
internal	Use IP Address Range	100.100.100.101	100.100.100.102

2. Click on the hyperlink **Add Global Address Pool**. The global IP addresses need to be created and put into the Global Address Pool.

3. Set the parameters to the following values:

   – Interface Type:internal

   – Use Subnet Configuration:Use IP Address Range

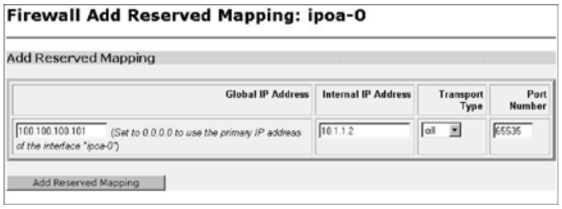
   – IP Address:100.100.100.101

   – Subnet Mask/IP Address 2:100.100.100.102

   Click on **Add Global Address Pool**.

4. Next, create a reserved mapping between a global IP address from the global pool and an internal PC’s IP address (in this example, 10.1.1.2)

5. Click on **Add Reserved Mapping...**



Firewall Add Reserved Mapping: ipoa-0

Add Reserved Mapping

Global IP Address	Internal IP Address	Transport Type	Port Number
100.100.100.101 (Set to 0.0.0.0 to use the primary IP address of the interface "ipoa-0")	10.1.1.2	all	65535

6. Set the parameters to the following values:

   – Global IP Address:100.100.100.101

   – Internal IP address:10.1.1.2

   – Transport Type:all

   – Port Number:65535(This port number means all port numbers for TCP or UDP protocols will be mapped.)

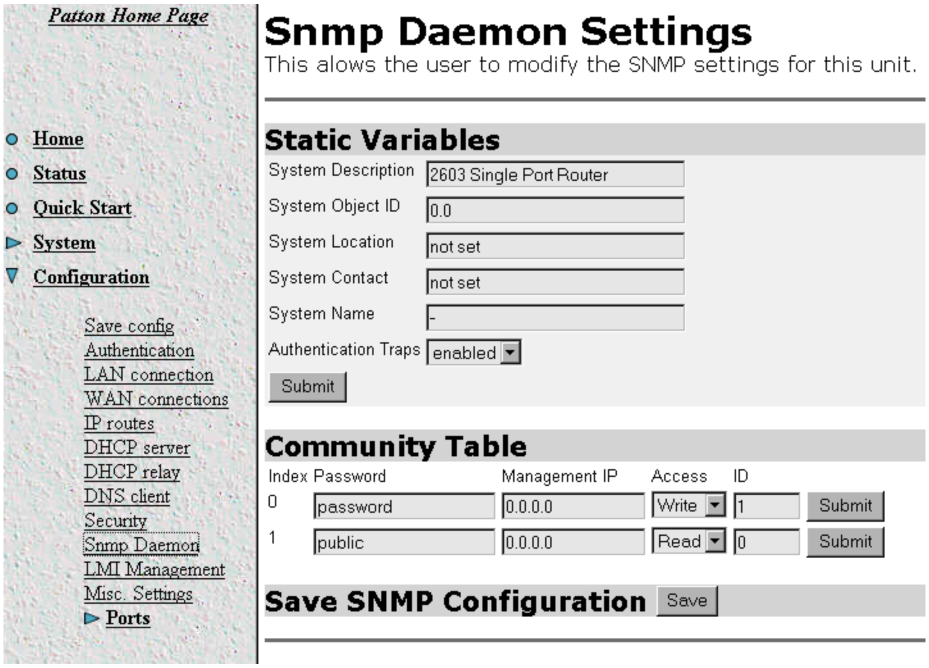
7. Click on **`Add Reserved Mapping`**.

Chapter 7 SNMP Daemon Settings

Chapter contents

SNMP Daemon Settings window

The SNMP Daemon Settings window enables the user to modify the settings used by the SNMP engine. These settings modify the *snmpd.cnf* file. Changes made to the SNMP Daemon Settings pages will be reflected in the file, and likewise any changes made in the file will be reflected on the Daemon Settings pages.



Snmp Daemon Settings

This alows the user to modify the SNMP settings for this unit.

Static Variables

System Description: 2603 Single Port Router
System Object ID: 0.0
System Location: not set
System Contact: not set
System Name: -
Authentication Traps: enabled

Community Table

Index	Password	Management IP	Access	ID
0	password	0.0.0.0	Write	1
1	public	0.0.0.0	Read	0

Save SNMP Configuration

Static Variables

These static variables can be retrieved with an SNMP request, and provide details about this specific unit. These variables are modified as a group.

Variable	Definition
System Description:	Description of this unit
System Object ID:	The root object ID of the system.
System Location:	Physical location of unit.
System Contact:	Contact information of the Administrator.
System Name:	The name of this specific unit.
Authentication Traps:	The enabled status of authentication trap messages.

Community Table

This table of variables controls the access to the unit through SNMP. This table will modify any community string present in the *snmpd.cnf* file. This table can only edit the values currently present, and can not add or remove values. Each row is submitted as a group.

Variable	Definition
Index:	This is a unique ID field given by our system used when editing from the CLI.
Password:	The community string needed to access the box.
Management IP:	Setting this to any value other than '0.0.0.0' will deny access to the unit from all other IP addresses using this password.
Access:	This field determines if the password grants read or write access.
ID:	The unique ID of this password. Note, this is not used as in index from the CLI.

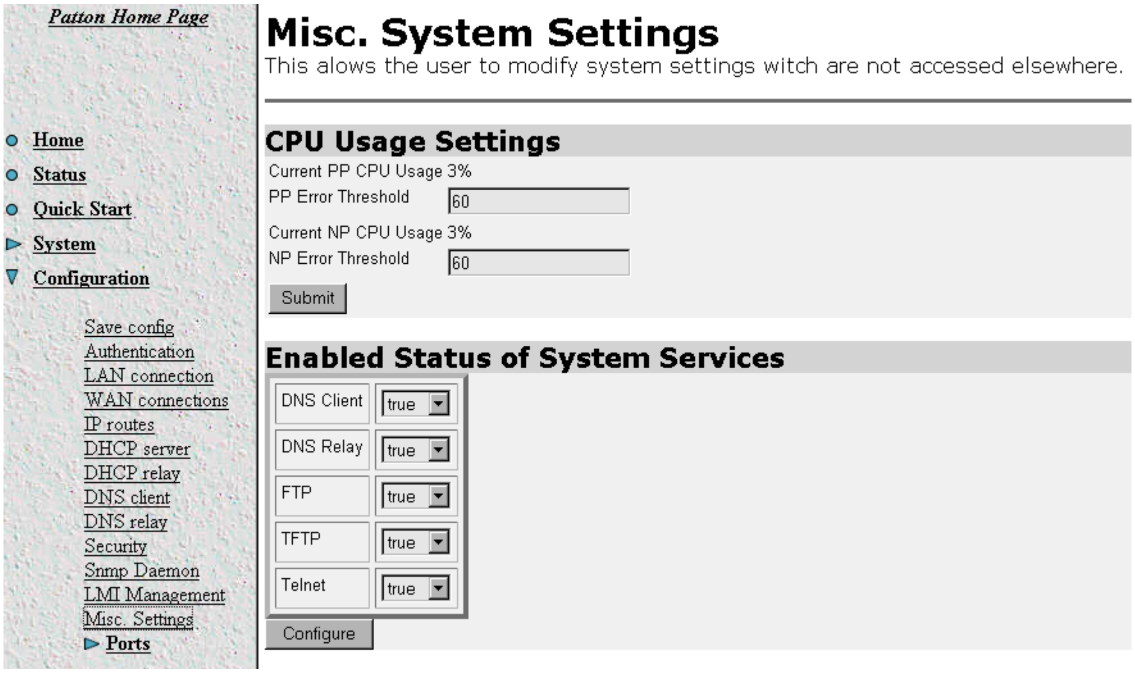
Save SNMP Configuration

Clicking this button will write the current settings to the file *snmpd.cnf*. The system configuration must still be saved for the changes to persist after reset.

Note The changes made to these settings will take effect immediately; however they will not be persistent after a reboot unless saved.

Misc. System Settings window

The settings on this window enable the user to change settings that do not relate to other pages.



Misc. System Settings

This allows the user to modify system settings witch are not accessed elsewhere.

CPU Usage Settings

Current PP CPU Usage 3%

PP Error Threshold 60

Current NP CPU Usage 3%

NP Error Threshold 60

Enabled Status of System Services

DNS Client	true
DNS Relay	true
FTP	true
TFTP	true
Telnet	true

CPU Usage

This section tells the user the current CPU usage of both the NP and PP processors. This also allows the user to set the usage threshold of the unit. If at any time this threshold is exceeded, a flag reporting this is set. The overflow flag can be checked with a self clearing SNMP variable (*cpuUsageOverThresholdPP 1.3.6.1.4.1.1768.1.5* and *cpuUsageOverThresholdNP 1.3.6.1.4.1.1768.1.6*).

Variable	Definition
Current PP CPU Usage:	The current usage of the PP Processor.
PP Error Threshold:	The threshold which must be reached before an error is flagged.
Current NP CPU Usage:	The current usage of the NP Processor.
NP Error Threshold:	The threshold which must be reached before an error is flagged.

Note Settings will take effect immediately. System must be saved to persist over reboot.

Enabled Status of System Services

This section allows the user to disable some system services. By disabling these services, it prevents TCP/UDP ports from being opened for processes that are not currently being used. If the user does not wish to use the service, this guarantees there is no security risk.

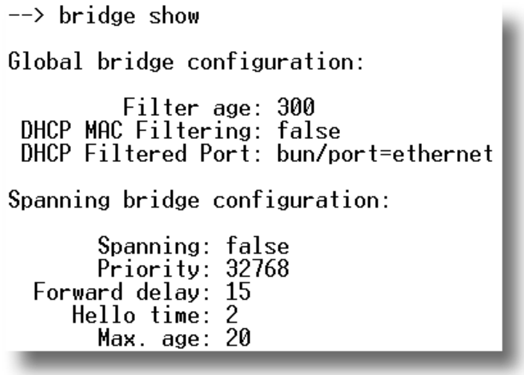
Variable	Definition
DNS Client:	Disables use of the DNS Client.
DNS Relay:	Disables use of the DNS Relay.
FTP:	Disables use of FTP.
TFTP:	Disables use of TFTP.

Note For changes here to take effect, the configuration must be saved and the unit rebooted. This will prevent the service from running at startup.

MAC Filtering of the Bridge Interface

This feature allows the bridge interface to filter traffic through the box based on known MAC addresses. Traffic from an unknown MAC address is only permitted to access the IP of the unit itself. This allows a PC joining the network to communicate with the DHCP server in the unit in order to obtain an IP address. Once the PC has received a lease from the DHCP server, the MAC address is granted permission to cross the bridge; allowing the user extra control of the traffic through the unit.

Note Administration of this feature is only granted through the CLI.



```
--> bridge show

Global bridge configuration:

         Filter age: 300
 DHCP MAC Filtering: false
 DHCP Filtered Port: bun/port=ethernet

Spanning bridge configuration:

       Spanning: false
       Priority: 32768
  Forward delay: 15
     Hello time: 2
       Max. age: 20
```

This screen capture shows the Settings of the Bridge interface. The important items here are DHCP MAC Filtering and DHCP Filtered Port. DHCP MAC Filtering reports true when the MAC filtering is enabled and false otherwise. DHCP Filtered Port is the string name of the port which the filter will be applied to.

To modify these values, type the following from the CLI:

Command	Description
bridge set dhcpFilteredPort	This value is provided for future expandability, it is not recommended that the user modify this.
bridge set dhcpMACFiltering	Possible values for this are ‘disable’ and ‘enable’.

Chapter 8 **Monitoring Status**

Chapter contents

Status LEDs

The LEDs indicate the status of the Power, the WAN, Sync Serial port, and the Ethernet connection.

All LED indicators will present the same looking profile (e.g., clear) when unlit due to being single color, water clear, high efficiency LEDs.

Table 5. Status LED descriptions

Power		Green	ON indicates that power is applied. Off indicates that no power is applied.
T1/E1	Link	Green	Solid green: connected Off: disconnected
	TD	Green	Green: indicates a binary ‘0’ condition *off*: indicates a binary ‘1’or idle condition
	RD	Green	Green: indicates a binary ‘0’condition off: indicates a binary ‘1’ or idle condition
Sync Serial	TD	Green	Green: indicates a binary ‘0’ condition *off*: indicates a binary ‘1’or idle condition
	RD	Green	Green: indicates a binary ‘0’condition off: indicates a binary ‘1’ or idle condition
	CTS	Green	ON: indicates the CTS signal from the router is active, binary ‘1’ off: indicates CTS is binary ‘0’
	DTR	Green	ON: indicates the DTR signal from the DTE device attached to the serial port is active, binary ‘1’
Ethernet	Link	Green	ON: indicates an active 10/100 BaseT connection
	100M	Green	ON: connected to a 100BaseT LAN Off: connected to a 10BaseT LAN
	Tx	Green	Flashing: when transmitting data from the router to the Ethernet
	Rx	Green	Flashing: when transmitting data from the Ethernet to the router.

Chapter 9 T1/E1 Diagnostics

Chapter contents

Introduction

The 2603 IPLink series offers the following diagnostics loops:

- Network (line) loopback
- D4 loop
- Remote Digital Loopback

These tests can be activated via the CLI/Web management menus.

Ping

The ping command is executed from the Command Line Interface (CLI). Ping in the IPLink is executed from the “ip” command. Here is the ping format followed by a valid response.

```
ip ping 192.168.100.11
ping: PING 192.168.100.11: 32 data bytes
ping: 40 bytes from 192.168.100.11: seq=0, ttl=128, rtt<10ms
→
```

Traceroute

Traceroute is a diagnostic utility that allow users to trace the route that packets traversing across a network connection between two hosts.

To use a traceroute , use the following command:

```
→ ip traceroute

→ usage: traceroute [-n] [-v] [-m max_ttl] [-q nqueries] [-w waittime] <ipaddr or hostname>
    -n          print addresses numerically rather than symbolically
    -v           verbose output
    -m           max ttl
    -q queries   set number of probes per ttl
    -w           wait time
    host         hostname or IP address to trace the route to
```

2603 IPLink’s Line Loop

The Network (line) Loopback applies to the T1/E1 interface data traffic; it does not affect traffic from the Ethernet port. The network Loop test verifies the operation of the T1/E1interface of the local IPLink unit and the T1/E1 line. Any data received by the the IPLink in this test mode will be echoed (returned) to the originating device. This test is useful when the far end device, placed at a CO, is unable to send loop codes to the local IPLInk's CSU/DSU interface.

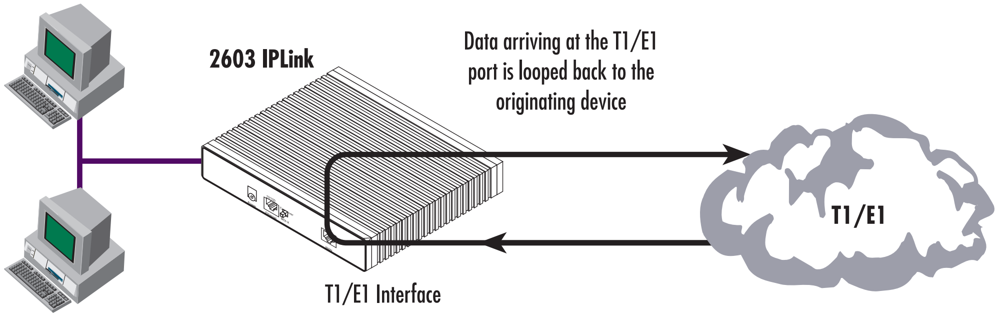
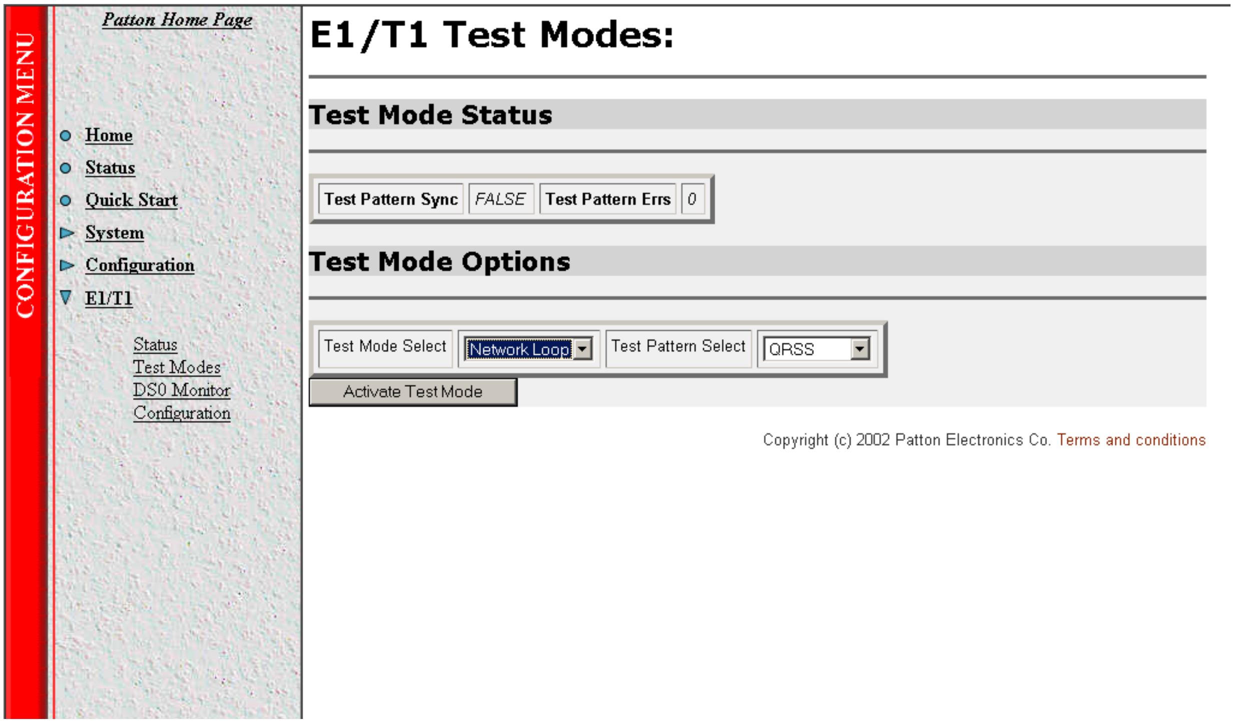

2603 IPLink
Data arriving at the T1/E1 port is looped back to the originating device
T1/E1
T1/E1 Interface

Figure 17. 2603 IPLink Line Loop

To perform a network loop, set the 2603 in Network Loopback test as follows:

1. Go to the IPLink Main page, select E1/T1. Next, click on *Test Modes*, select *network Loop* using the drop down menu, click on the **Configure and Activate** button.
2. Perform a BER (bit error rate) test. This test can be initiated from the far end using a BER tester to verify the condition of the T1/E1 line.



E1/T1 Test Modes:

Test Mode Status

Test Pattern Sync	FALSE	Test Pattern Errs	0

Test Mode Options

Test Mode Select	Network Loop	Test Pattern Select	QRSS

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D4 Loop (CO loop)

The IPLink 2603 responds to D4 or CO (Central Office) loop. The CO is a T1 network loop, and it is initiated by CO equipment when it is necessary to test the line and the device attached to it. The CO will send a standard loop pattern, the IPLink will detect this pattern and place its CSU (T1 interface) in a loop mode. During this test data sent by the CO equipment will be sent back by the IPLink 2603.

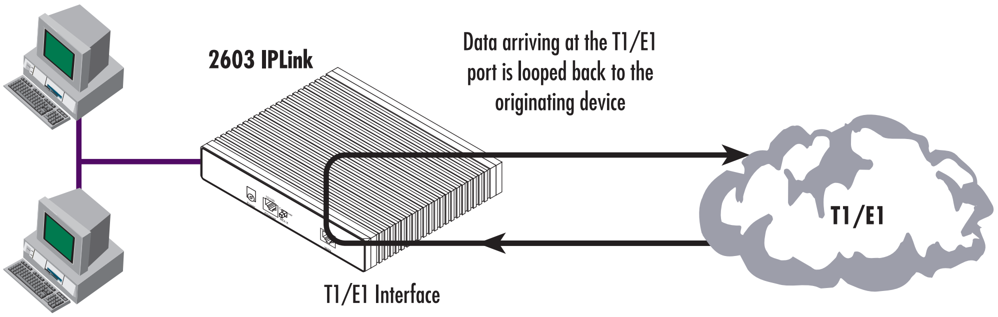

2603 IPLink
Data arriving at the T1/E1 port is looped back to the originating device
T1/E1
T1/E1 Interface

Figure 18. D4(CO) loop

Operating Remote Digital Loopback (RDL)

The Remote Digital Loopback (RDL) test checks the performance of the local, the remote equipment as well as the communication link between them. Any data sent to the remote unit in the test mode will be returned to the originating device (i.e, data sent by the local 2603 will be returned by the far end device).

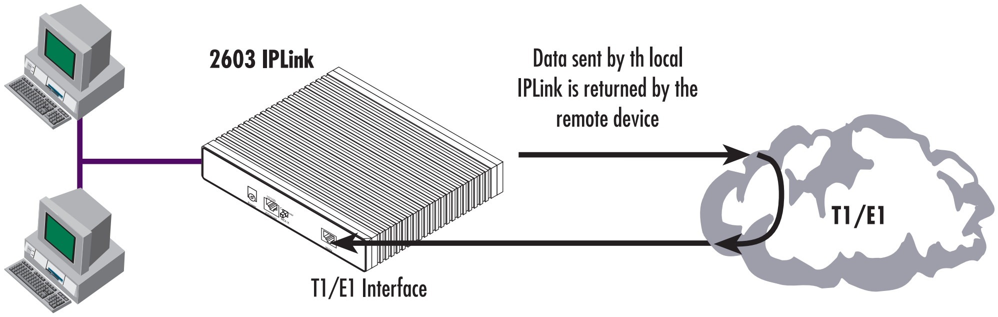
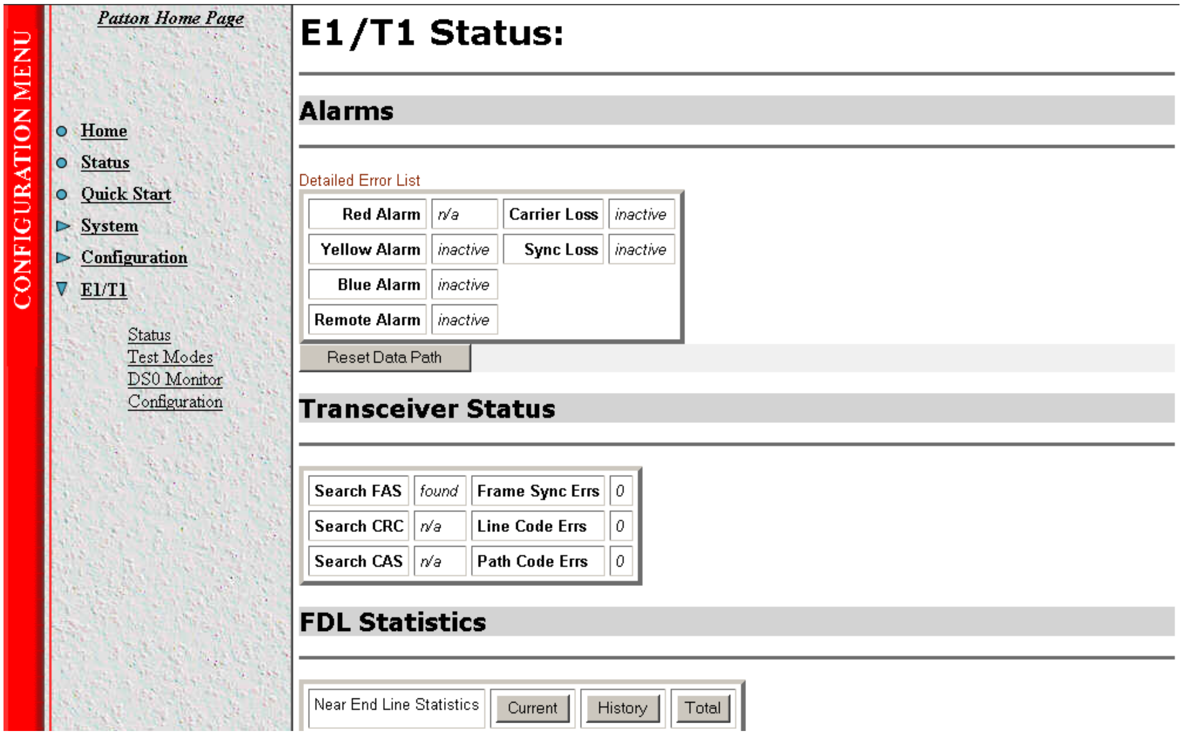

2603 IPLink
Data sent by th local IPLink is returned by the remote device
T1/E1
T1/E1 Interface

Figure 19. Remote Digital Loop

To perform an RDL test, follow these steps:

1. Go to the IPLink Main page, select the E1/T1 option. Next, click on *Test Modes*, select *Remote Loop* using the drop down menu, and click on the **Configure and Activate** button to start the test.
2. Perform a bit error test (BERT). See section “BIT Error Rate (V.52) Diagnostics” on page 95. The IPlink will compare the BER pattern sent against the pattern received and will show errors, if any, detected in the received stream. If the BER test indicates a fault, you may have a problem with the E1/T1 line between the modems. You should then check the E1/T1 line for proper connections and continuity.



E1/T1 Status:

Alarms

Detailed Error List

Red Alarm	n/a	Carrier Loss	inactive
Yellow Alarm	inactive	Sync Loss	inactive
Blue Alarm	inactive		
Remote Alarm	inactive		

Transceiver Status

Search FAS	found	Frame Sync Errs	0
Search CRC	n/a	Line Code Errs	0
Search CAS	n/a	Path Code Errs	0

FDL Statistics

BIT Error Rate (V.52) Diagnostics

The IPlink Series 2603 offers a V.52 Bit Error Rate (BER) QRSS test pattern. This test pattern may be invoked along with the RDL test to evaluate the unit(s) and the communication links. When a QRSS test is invoked, the 2603 generates a pseudo-random pattern using a mathematical polynomial. The pattern is sent to the far end device and looped to the 2603 (originator). The local IPLink 2603 decodes the received bits using the same polynomial. If the received bits match the agreed upon pseudo-random pattern, then the IPLink 2603 and the communication link(s) are functioning properly. The IPLink 2603 can also initiate a built-in QRSS pattern with errors. This test pattern generator injects intentional errors approximately once per second in the transmitted stream.

To perform a V.52 BER test, follow these steps:

1. From the Main page T1/E1 option, select the *QRSS* option, and then click on the **Configure and Activate** button. This will start the internal test pattern generator for data sent and looped at the far end device.
2. Monitor the BER test results, select the *Status* link under the T1/E1 options. The Status page will display the number of bit errors, if any, detected in the received stream.

Note The above V.52 BER tests can be used independently of the Remote Digital Loopback tests.

T1/E1 connection Status

The IPLink 2603 E1/T1 status page displays a number of alarms conditions, Transceiver status, and statistics. The information displayed in this page if of use when monitoring or trobleshooting network problems.

Alarms

The status page shows condition and alarm for the following: *Red Alarm, Yellow alarm, Blue Alarm, Remote Alarm, carrier loss*, and *Sync Loss*.

Transceiver Status

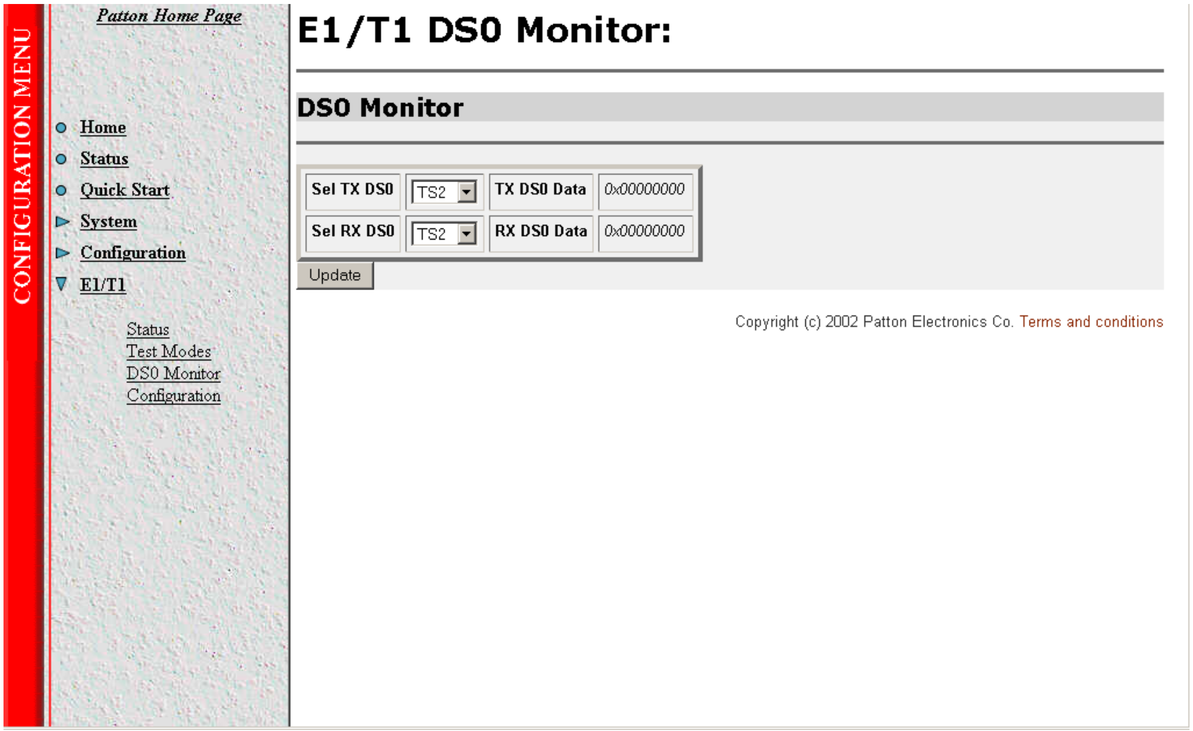
This section displays status for the following: *Search FAS, Search CRC, Search CAS, Frame Sync errors, Line Code errors*, and *Path Code* errors

FDL statistics (T1 only)

The FDL section provides statistics on T1 link performance, this include Current and historical near end line statistics.

E1/T1 DS0 Monitor

The DS0 monitor page allows monitoring of a particular timeslot in the E1/T1 stream. To enable this feature, click on the DSO Monitor link under the E1/T1 menu, and select the desired receive and transmit timeslot.



E1/T1 DS0 Monitor:

DS0 Monitor

Sel TX DS0	TS2	TX DS0 Data	0x00000000
Sel RX DS0	TS2	RX DS0 Data	0x00000000

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Software Upgrades

Software upgrades are required in two scenarios. First, for new features. Second, for standard software upgrades (at an additional cost).

For standard software upgrades, which are at no charge, contact **upgrades.patton.com** for the location of the new firmware and follow these instructions.

1. Get the firmware image from Patton and save on your PC. It is a .tar file and MUST NOT be unzipped!

2. Login to the IPlink's web page on the browser.
3. Click on > System, then > Upgrade
4. Locate the firmware image on this web page.
5. Click on Upgrade.
6. Wait until the upgrading is complete, and then restart the IPLink.
7. It is now ready to use with the new firmware.

If you encounter problems with the firmware upgrade, do the following to upload the software image into the router.

Note The Patton IPLink products have a TFTP server built-in, a TFTP client will be require on the user side to connect to the TFTP server

Configuration

The Patton products are configured as a TFTP server with the default IP address 192.168.200.10.

Procedure

1. Go to Upgrade.patton.com and download the software upload package. The package contains the following files:
   - Tftplock.key
   - Tftpupdt.beg
   - Image
   - Npimage
   - Key
   - Initbun
   - Im.conf
   - Tftpupdt.rbt
   - Tftpupdt.end
   - Script.bat
2. Connect the control (console) port of the unit to a PC.
3. Connect the Ethernet port to the appropriate device where the upload package will be stored.
4. On a Window 2000 or WindowsXP machine, open a Command Prompt and run the script. (The script will connect to the default 192.168.200.10 IP address). If you are using Windows9X, a TFTP client will be needed.
5. The TFTP process takes about 90 seconds, the unit will reboot automatically when done.

Chapter 10 Contacting Patton for assistance

Chapter contents

Introduction

This chapter contains the following information:

- "Contact information"—describes how to contact PATTON technical support for assistance.
- "Warranty Service and Returned Merchandise Authorizations (RMAs)"—contains information about the RAS warranty and obtaining a return merchandise authorization (RMA).

Contact information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

- Online support—available at **www.patton.com**.
- E-mail support—e-mail sent to **support@patton.com** will be answered within 1 business day
- Telephone support—standard telephone support is available 5 days a week, from 8:00am to 5:00pm EST by calling **+1 (301) 975-1007**

Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

Note If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

Warranty coverage

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

Out-of-warranty service

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

Returns for credit

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

Return for credit policy

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

RMA numbers

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at **www.patton.com**
- By calling **+1 (301) 975-1000** and speaking to a Technical Support Engineer
- By sending an e-mail to **returns@patton.com**

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

Shipping instructions

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

Patton Electronics Company
RMA#: xxxx
7622 Rickenbacker Dr.
Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

Appendix A **Specifications**

Chapter contents

General Characteristics

- Compact low-cost router/bridge
- 10/100 Ethernet
- Unlimited host support.
- Comprehensive hardware diagnostics, works with any operating system, easy maintenance and effortless installation.
- Built-in web configuration.
- Setup allows for standard IP address and unique method for entering an IP address and mask WITHOUT use of a console connection. Default IP address of 192.168.1.1/24.
- Simple software upgrade using FTP into FLASH memory.
- Front panel LEDs indicate Power, WAN, Ethernet LAN speed and status.
- Field Factory Default Option.
- Standard 1 year warranty.

Ethernet

- Auto-sensing Full-Duplex 10Base-T/100Base-TX Ethernet.
- Standard RJ-45 and built-in MDI-X cross-over switch.
- IEEE 8021.d transparent learning bridge up to 1,024 addresses and Spanning Tree.
- 8 IP address/subnets on Ethernet interface.

Sync Serial Interface

- ITU-T X.21 or V.35 interface
- Available with female DB-25 and DB-15 connectors
- User configurable DTE/DCE for X.21

T1/E1 Interface

- Line Rate 1.544 Mbps (T1), and 2.048 Mbps (E1)
- RJ-48C connector (with optional Dual BNC for E1 connections)
- DSX-1 levels for connection to local T1/E1 device (PBX).
- Nx56/64 kbps with full DS0 mapping
- AMI/B8ZS (T1), AMI/HDB3 (E1)
- D4/ESF coding and framing (T1)

Protocol Support

- Complete internetworking with IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826).
- IP Router with RIP (RFC 1058), RIPv2 (RFC 2453),
- Up to 64 static routes with user selectable priority over RIP/OSPF routes.
- Built-in ping facilities.
- Integrated DHCP Server (RFC 2131). Selectable general IP leases and user specific MAC/IP parings. Selectable lease period.
- DHCP relay agent (RFC 2132/RFC 1542) with 8 individual address pools.
- DNS Relay with primary and secondary Name Server selection.
- NAT (RFC 3022) with Network Address Port Translation (NAPT) for cost-effective sharing of a single DSL connection. Integrated Application Level Gateway with support for over 80 applications.
- NAT MultiNat with 1:1 mapping.
- NAT Many:1.
- NAT Many:Many mapping.
- NAT Port/IP redirection and mapping.
- uPNP controlled device for seamless networked device interconnectivity and Windows XP integration.
- IGMPv2 Proxy support (RFC 2236).
- Frame Relay with Annex A/D/LMI, RFC 1490 MpoFR and FRF.12 Fragmentation.

PPP Support

- Point-to-Point Protocol over HDLC
- PPPoE (RFC 2516) Client for autonomous network connection. Eliminates the requirement of installing client software on a local PC and allows sharing of the connection across a LAN.
- User configurable PPP PAP (RFC 1661) or CHAP (RFC 1994) authentication.
- PPP BCP (RFC 1638) support for bridged networking support.

Management

- Web-Based configuration via embedded web server
- CLI menu for configuration, management, and diagnostics.
- Local/Remote CLI (VT-100 or Telnet).
- SNMPv1 (RFC 1157) MIB II (RFC 1213)
- Quick Start Setup runs through common options to simplify circuit turn-up.
- Logging via SYSLOG, and VT-100 console. Console port set at 9600 bps 8/N/1 settings no flow control.

Security

- Packet filtering firewall for controlled access to and from LAN/WAN. Support for 255 rules in 32 filter sets. 16 individual connection profiles.
- DoS Detection/protection. Intrusion detection, Logging of session, blocking and intrusion events and Real-Time alerts. Logging or SMTP on event.
- Password protected system management with a username/password for console and virtual terminal. Separate user selectable passwords for SNMP RO/RW strings.
- Access list determining up to 5 hosts/networks which are allowed to access management system SNMP/HTTP/TELNET.
- Logging or SMTP on events: POST, POST errors, PPP/DHCP, IP.

Compliance Standard Requirements

- FCC part 15 Class A (US EMC)
- CE per RTTE 99/5/EC (EMC & LVD)
- FCC Part 68 (– US Permission to connect)
- CTR 12 and CTR 13
- IC-CS03 (Canadian Permission to connect)
- Safety – EN60950

Australia Specific

- TS016 (E1 Telecom)
- AZ/NZS 3260 Safety)
- AZ/NZS 35-48 EMC

Dimensions

1.58H x 4.16W x 3.75D in. (10.6H x 4.1W x 8.8D cm)

Power and Power Supply Specifications

The IPLink router may come with either an AC or DC power supply.

AC universal power supply

The IPLink Series router offers internal or external AC power supply options.

- The internal power supply connects to an AC source via an IEC-320 connector (100–240 VAC, 200 mA, 50/60 Hz)
- The external power supply connects to an external source providing +5 VDC via a barrel-type connector

48 VDC power supply

- Rated voltage and current: 36–60 VDC, 400 mA
- The DC power supply connects to a DC source via a terminal block

CAUTION

Connect the equipment to a 36–60 VDC source that is electrically isolated from the AC source. The 36–60 VDC source is to be reliably connected to earth.

Appendix B Cable Recommendations

Chapter contents

Ethernet Cable

Ethernet cable (P/N 10-2500) (refer to "RJ-45 shielded 10/100 Ethernet port" on page 112)

Adapter

EIA-561 to DB-9 (P/N 16F-561) (refer to "RJ-45 non-shielded RS-232 console port (EIA-561)" on page 112)

Appendix C Physical Connectors

Chapter contents

RJ-45 shielded 10/100 Ethernet port

Assuming the MDI-X switch is in the out position.

Pin No.	Signal Direction	Signal Name
1	Output	TX+
2	Output	TX-
3	Input	RX+
4		
5		
6	Input	RX-
7		
8		

RJ-45 non-shielded RS-232 console port (EIA-561)

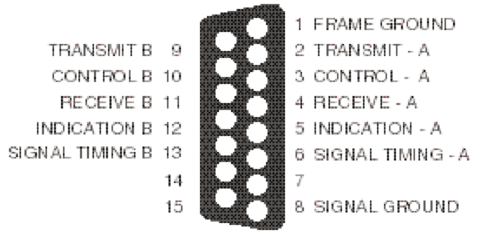
Pin No.	Signal Direction	Signal Name
1	Out	DSR
2	Out	CD
3	In	DTR
4	–	Signal Ground
5	Out	RD
6	In	TD
7	Out	CTS
8	In	RTS

Serial port

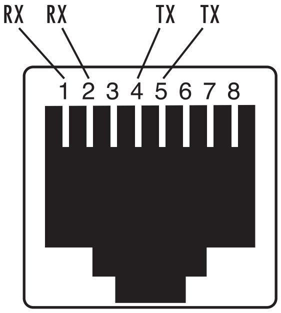
V.35 (DB-25 Female Connector)

Pin #	Signal
1	FG (FrameGround)
2	TD (Transmit Data-A, DTE Source)
3	RD (Receive Data-A, DCE Source)
4	RTS (Request to Send-A, DTE Source)
5	CTS (Clear to Send-A, DCE Source)
6	DSR (Data Set Ready-A, DCE Source)
7	SGND (Signal Ground)
8	CD (Carrier Detect-A, DCE Source)
9	RC/ (Receiver Clock-B, DCE Source)
10	CD/ (Carrier Detect-B, DCE Source)
11	XTC/(External Transmitter Clock-B, DTE Source)
12	TC/(Transmitter Clock-B, DTE Source)
13	CTS/(Clear to Send-B, DCE Source)
14	TD/(Transmit Data-A, DTE Source)
15	TC(Transmitter Clock-B, DCE Source)
16	RD (Receive Data-A, DCE Source)
17	RC (Receiver Clock-A, DCE Source)
18	LL (Local LIne Loop)
19	RTS/(Request to Send-B, DTE Source)
20	DTR (Data Terminal Ready-A, DTE Source)
21	RL (Remote Loopback)
22	DSR/ (Data Set Ready-B, DCE Source)
23	DTR/(Data Terminal Ready-B, DTE Source)
24	XTC (External Transmitter Clock-A, DTE Source)
25	TM (Test Mode)

X.21 (DB-15 Connector)



E1/T1 (RJ-48C Connector)



Appendix D Command Line Interface (CLI) Operation

Chapter contents

Introduction

The modem configuration and status can also be view and modified through the console, which is accessible through the RS-232 serial port or through a Telnet session over Ethernet.

CLI Terminology

In order to use the CLI commands, you need to understand the following CLI terms:

- Transport: A transport is a layer 2 session and everything below it. You can create a transport and attach it to a bridge or router so that data can be bridged or routed via the attached transport. The CLI supports the following transports:
- PPPoE: Point-to-Point Protocol over Ethernet
- Frame Relay
- PPPoH: Point-to-Point over HDLC
- Ethernet
- Interface: bridges and routers both have interfaces. A single transport is attached to a bridge or router via an interface.
- Object: an object is anything that you can create and manipulate as a single entity, for example, interfaces, transports, static routes and NAT rules.
- List: Objects are numbered entries in a list. For example, if you have created more than one ethernet transport, the following command:

ethernet list transports

produces a list of numbered transport objects:

```
ID Name Port

1 eth2 ethernet

2 eth1 ethernet
```

Local (VT-100 emulation)

A connection is made with the DB9-RJ45 adapter and an RJ45-RJ45 straight-through cable. Set the data rate to 9,600 baud, 8 data bits, one stop bits, and no parity. You may use a dumb terminal or a VT-100 emulation such as HyperTerminal.

Remote (Telnet)

Establishing a Telnet session displays the same CLI configuration and status parameters on the display.

Using the Console

The console commands needed for the various modes of operation are described in later sections. In this subsection are the most basic commands needed for console operation.

By entering “?” all the high level commands (the keywords) are seen.

By entering a keyword followed by a space and "?" the options available will print immediately without pressing enter. The previously entered commands are reprinted on the next lines. For example:

```
Æ  ethernet ?[After typing the "?" you will not see the "?"]
    add
    delete
    set
    show
    list
    clear
Æ  ethernet
```

Then you may enter one of the keywords on the displayed list followed by a space and "?"

To continue our example:

```
Æ  ethernet list ?
    ports
    transports
Æ  ethernet list
```

Then

```
Æ  ethernet list transports ?
Æ  ethernet list transports   <enter>

    Ethernet transports:
     ID  |    Name    |    Port
    -----|------------|------------
       1 | eth1       | ethernet
    -------------------------------
Æ
```

Another example shows when the user must provide a parameter.

```
Æ  ip ?
    list
    clear
    add
    delete
    set
    attach
    attachbridge
    detach
    show
    interface
    ping
Æ  ip interface ?
    <name>
```

The <name> of the interface. In this instance the interface name is ip1. It is important that you do the "?" inquiry to determine whether additional parameters follow.

```
Æ  ip interface ip1 ?
    add
    delete
    clear
    list
Æ  ip interface ip1 list ?
    secondaryipaddresses
Æ  ip interface ip1 list secondaryipaddresses ?
```

```
    ip interface ip1 list secondaryipaddresses   <enter>

    Secondary IP addresses for interface: ip1
     ID  |    IP Address
    -----|-----------------
    -----------------------
```

In this example there was not a secondary IP address. Now save the entire configuration in nonvolatile FLASH memory with the following command.

```
      Æ  system config save
```

Wait for the message that says “Configuration Saved”, then reboot the modem with this command.

```
      Æ  system restart
```

Administering user accounts

As admin user you can administer user accounts. This section summarizes the CLI commands which can be used to administer user accounts.

Adding new users

To add a new user username, use the command: *system add user < username >* `<“Comment”>`

```
system add login user < username > <“Comment”>
```

The first command creates a user who can access the system via a dialin connection using PPP for example. The second command creates a user who can login to the system.

For example, the commands:

```
system add user fred “user with dialin access”

system add login joe “user with login access”
```

creates two new users called fred and joe. The accounts are created with no passwords. To view details about the new users, enter:

```
system list users
```

The following information is returned:

```
Users:
May May Access
  ID | Name   | Conf.    | Dialin   | Level     | Comment
-----|--------|----------|----------|-----------|------------------------
   1 | fred   | disabled | ENABLED  | default   | user with dialin access
   2 | joe    | ENABLED  | disabled | default   | user with login access
   3 | admin  | ENABLED  | disabled | superuser | Default admin user
-------------------------------------------------------------------------
```

Setting user passwords

To change the password for the user you are currently logged in as, use the command:

```
user password
```

Enter the new password twice as prompted:

```
Enter new password: ***
Again to verify: ***
→
```

Note No check is made for any current password which may have been set for the user.

If you wish to change the password for another user, enter the command:

```
user change <username>
```

This command logs you into the system as another user. You can then use the user password command to change the password for this user.

Note Changing to another user means that you lose all superuser privileges.

Note Only superusers can use the user change command.

Changing user settings

To change any of the default settings for a user, use the following commands. For example, to change the settings for user fred:

```
system set user fred access {default|engineer|superuser}
system set user fred maydialin {enabled|disabled}
system set user fred mayconfigure {enabled|disabled}
```

For example, to change the security level for fred, enter:

```
system set user fred access engineer
```

Note Only superusers can use the user change command.

Controlling login access

To set user login access for user username, use the command (all on one line):

```
system set login < username > access {default|engineer|superuser}
```

Controlling user access

To set user access for user username, use the command (all on one line):

```
system set user < username > access {default|engineer|superuser}
```