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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](#) on page 17 provides information about router features and capabilities
- [Chapter 2](#) on page 24 contains an overview describing router operation
- [Chapter 3](#) on page 27 provides initial configuration procedures
- [Chapter 4](#) on page 40 describes configuring the Ethernet LAN interface
- [Chapter 5](#) on page 44 describes configuring the serial WAN interfaces
- [Chapter 6](#) on page 50 describes configuring WAN services
- [Chapter 7](#) on page 68 describes configuring security for the router
- [Chapter 8](#) on page 82 describes DHCP and DNS configuration
- [Chapter 9](#) on page 93 describes configuring IP services
- [Chapter 10](#) on page 96 describes system configuration
- [Chapter 11](#) on page 104 describes SNTP client configuration
- [Chapter 12](#) on page 108 provides a summary of the IPLink's status webpage and status LEDs
- [Chapter 13](#) on page 112 contains information on contacting Patton technical support for assistance
- [Appendix A](#) on page 115 contains compliance information for the IPLink routers
- [Appendix B](#) on page 118 contains specifications for the routers
- [Appendix C](#) on page 122 provides cable recommendations
- [Appendix D](#) on page 124 describes the router's ports
- [Appendix E](#) on page 129 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, cautions, and warnings, which have the following meanings, are used throughout this guide to help you become aware of potential problems. **Warnings** are intended to prevent safety hazards that could result in personal injury. **Cautions** are intended to prevent situations that could result in property damage or impaired functioning.

Note A note presents additional information or interesting sidelights.



The alert symbol and IMPORTANT heading calls attention to important information.



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



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.



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



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.

Safety when working with electricity



Do not work on the system or connect or disconnect cables during periods of lightning activity.



Mains Voltage: Do not open the case when the power cord is attached. Disconnect the power supply cord before servicing. For systems without a power switch, line voltages are present within the power supply when the power cords are connected. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker.



For AC powered units, ensure that the power cable used with the device meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.



For units with an external power adapter, the adapter shall be a listed Limited Power Source.



Hazardous network voltages are present in WAN ports regardless of whether power to the unit is ON or OFF. To avoid electric shock, use caution when near WAN ports. When detaching the cables, detach the end away from the device first.



This device contains no user serviceable parts. The equipment shall be returned to Patton Electronics for repairs, or repaired by qualified service personnel.



In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.

General observations

- Clean the case with a soft slightly moist anti-static cloth
- Place the unit on a flat surface and ensure free air circulation
- Avoid exposing the unit to direct sunlight and other heat sources
- Protect the unit from moisture, vapors, and corrosive liquids

Factory default parameters

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

- Ethernet IP address: 192.168.200.10/24
- WAN Connection: PPP 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
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the Go to Previous View button  in the Adobe® Acrobat® Reader toolbar to return to your starting point.
Futura bold type	Commands and keywords are in boldface font.
<i>Futura bold-italic type</i>	Parts of commands, which are related to elements already named by the user, are in <i>boldface italic</i> font.
<i>Italicized Futura type</i>	Variables for which you supply values are in <i>italic</i> font
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.

Chapter 1 **General Information**

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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, MDI-X 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 and a cable to convert to an M34/F.

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, HTTP, and 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 19
- Protocol support, see section “Protocol support” on page 19
- PPP support, see section “PPP Support” on page 19
- Management, see section “Management” on page 19
- WAN interface, see section “WAN Interfaces” on page 19
- Security, see section “Security” on page 20
- Front panel status LED see section “Front Panel Status LEDs and Console Port” on page 20

General attributes

- Compact, low cost router/bridge
- 10/100 Ethernet
- Comprehensive hardware diagnostics. 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.
- Front panel LEDs indicate *Power*, *WAN*, and *Ethernet LAN* speed and status.
- Convenient and standard RJ connectors for *Ethernet*, *Line*, and *Console*.
- Standard one-year parts and labor 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
- 2 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)
- 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.
- Frame Relay with Annex A/D LMI, RFC 1490 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.

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

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)

- 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 2](#) for LED descriptions):

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

Table 2. Status LED descriptions

Power		Green	ON indicates that power is applied. Off indicates that no power is applied.
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Table 2. Status LED descriptions (Continued)

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'
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



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.

Chapter 2

Product Overview

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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.

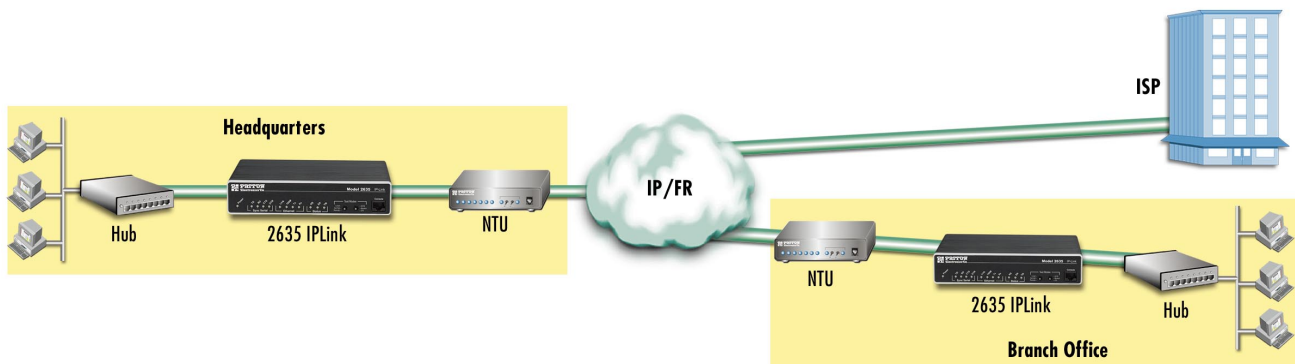


Figure 2. Sync Serial Application

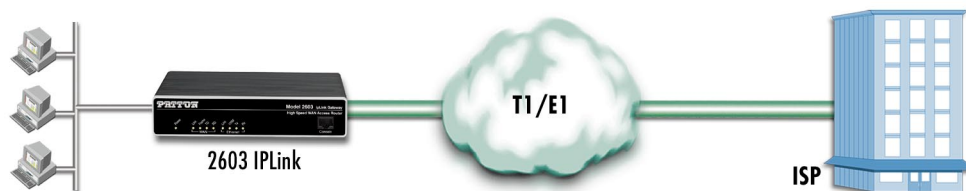


Figure 3. T1/E1 Application

Chapter 3 **Initial Configuration**

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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)



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

- Changing the IP address from the factory default setting (see section “[IP address modification](#)” on page 37)
- 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*) capable of emulating a VT-100.

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:



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

- 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).



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

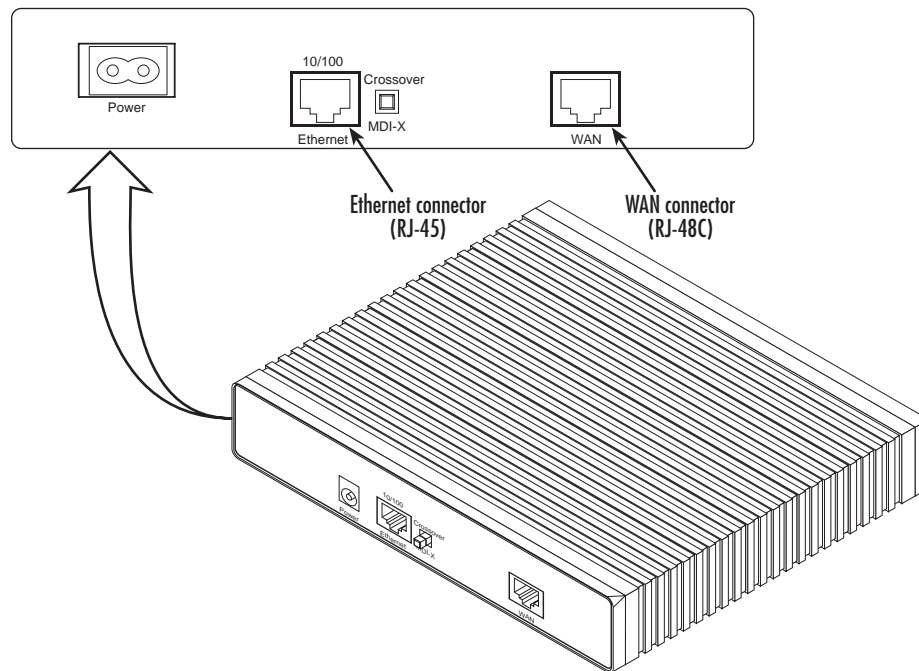


Figure 4. Rear View of the 2603/T showing location of Ethernet and WAN connectors

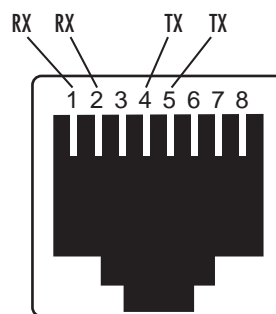
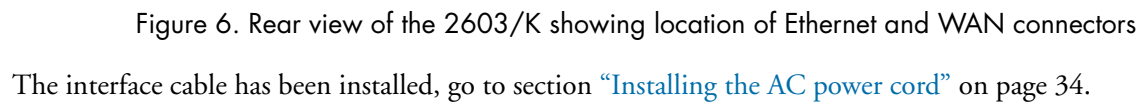


Figure 5. RJ-48C pinout diagram



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.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

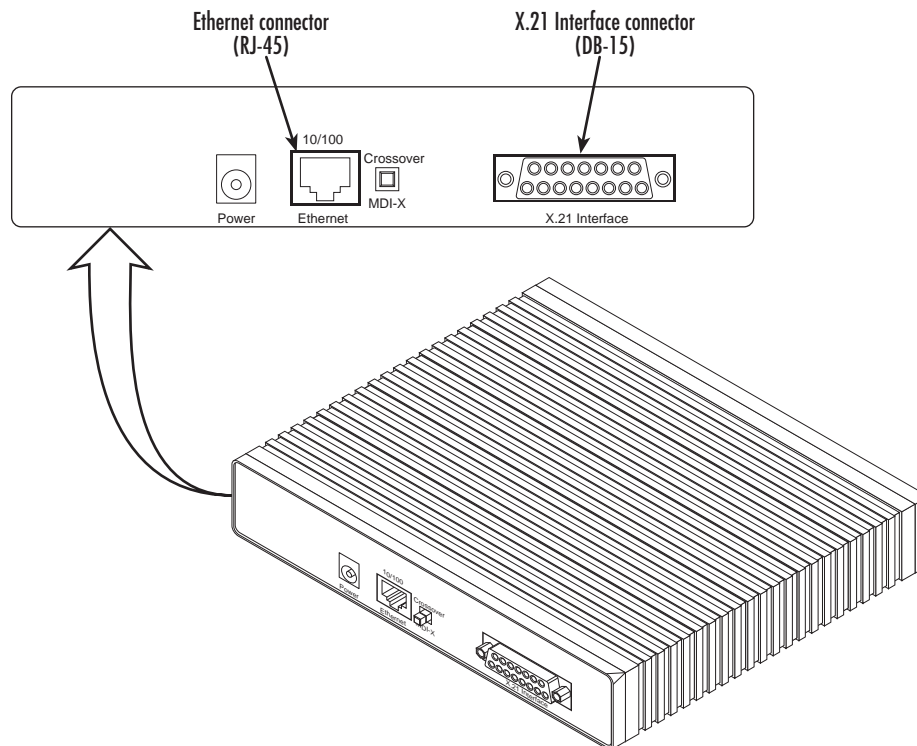


Figure 7. Rear view of the 2621 showing location of Ethernet and X.21 connectors

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.

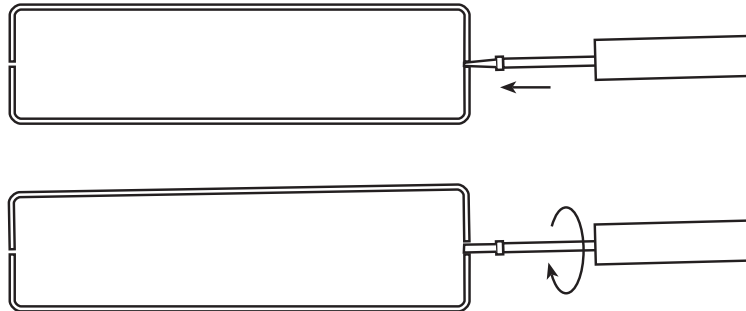


Figure 8. Case being opened with a screwdriver

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).

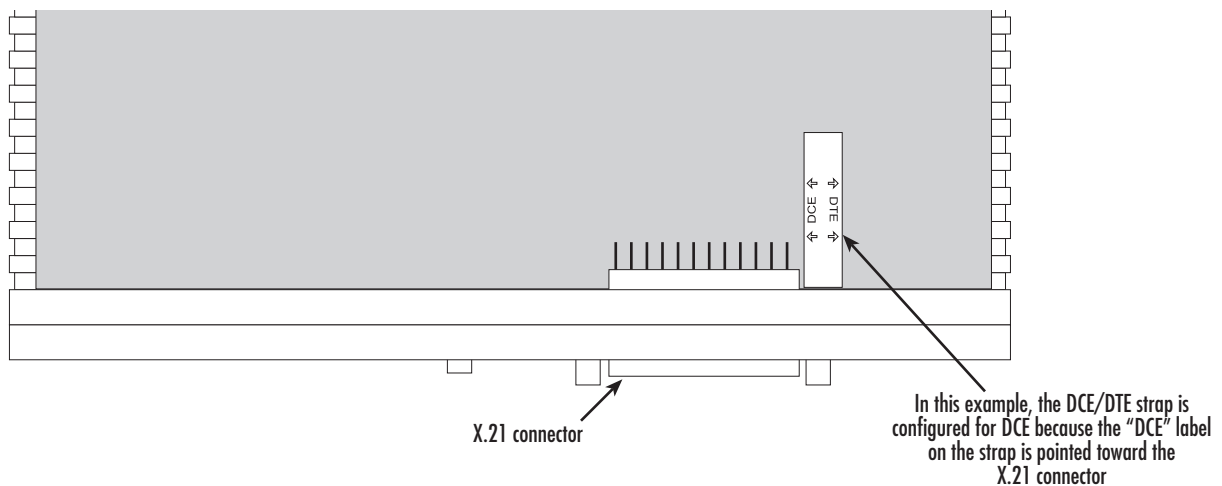


Figure 9. Location of DTE/DCE board

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 and 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](#)).



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

The Model 2635 V.35 (DB-25) interface is configured internally as a DCE. However, when using the Patton cable with the 2635, the V.35 interface at the M/34 end of the cable is a DTE (see [figure 11](#)). In other words, the Patton DB-25 to M/34 cable is a sync null modem cable.

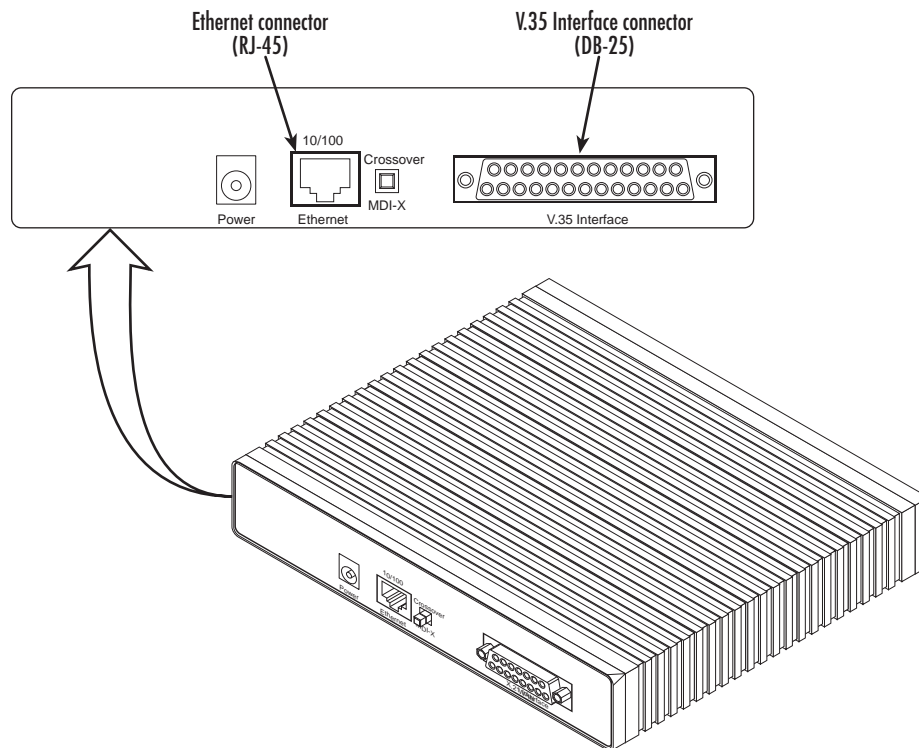


Figure 10. Rear view of the 2635 showing location of Ethernet and V.35 connectors

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

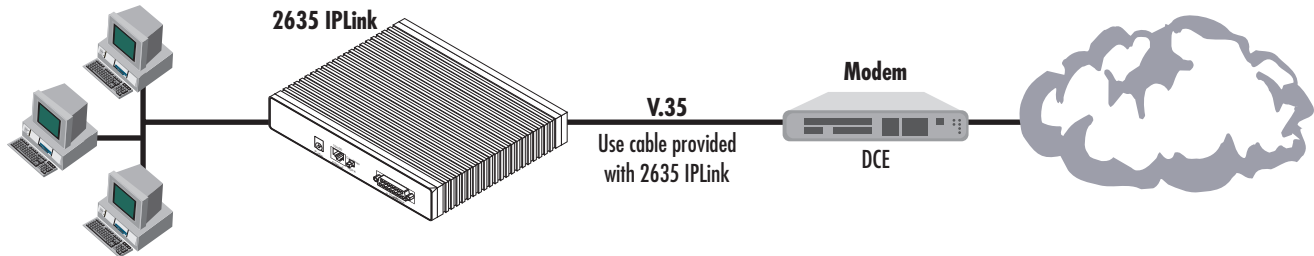


Figure 11. Connecting the 2635 to a DCE device

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 (see [figure 11](#)).

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:



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

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](#)).

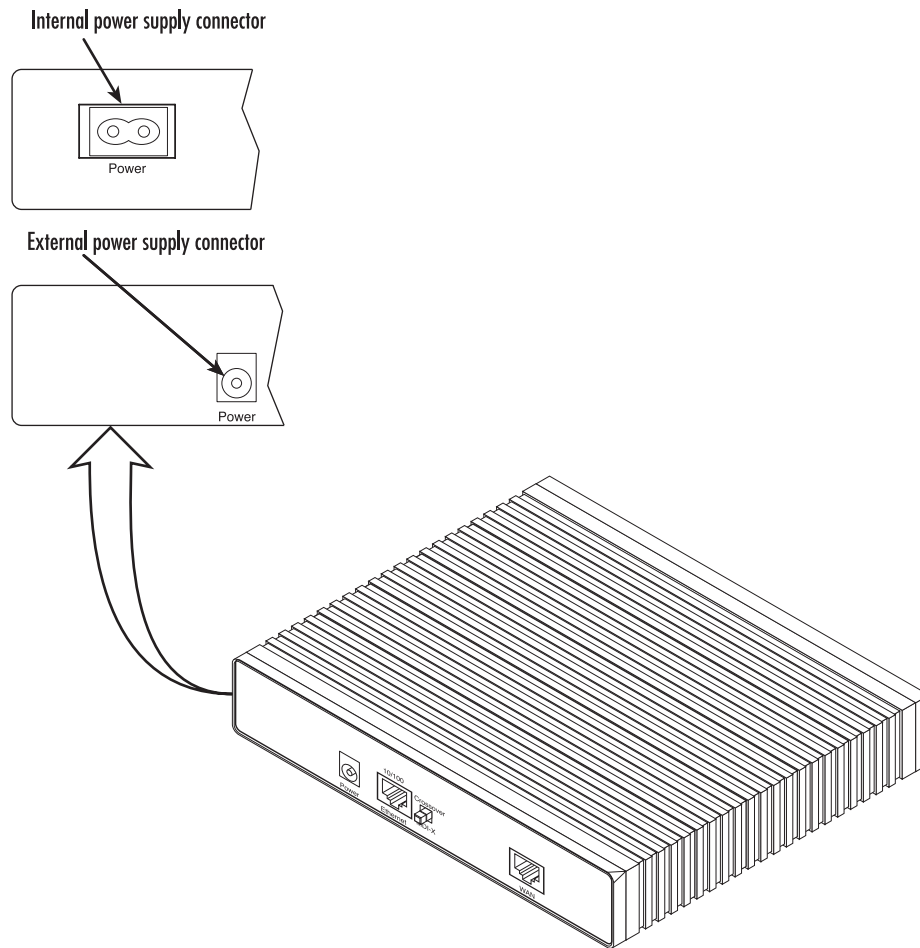


Figure 12. Power connector location on rear panel (Model 2603/T shown)



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 13, “[Contacting Patton for assistance](#)” on page 112 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.

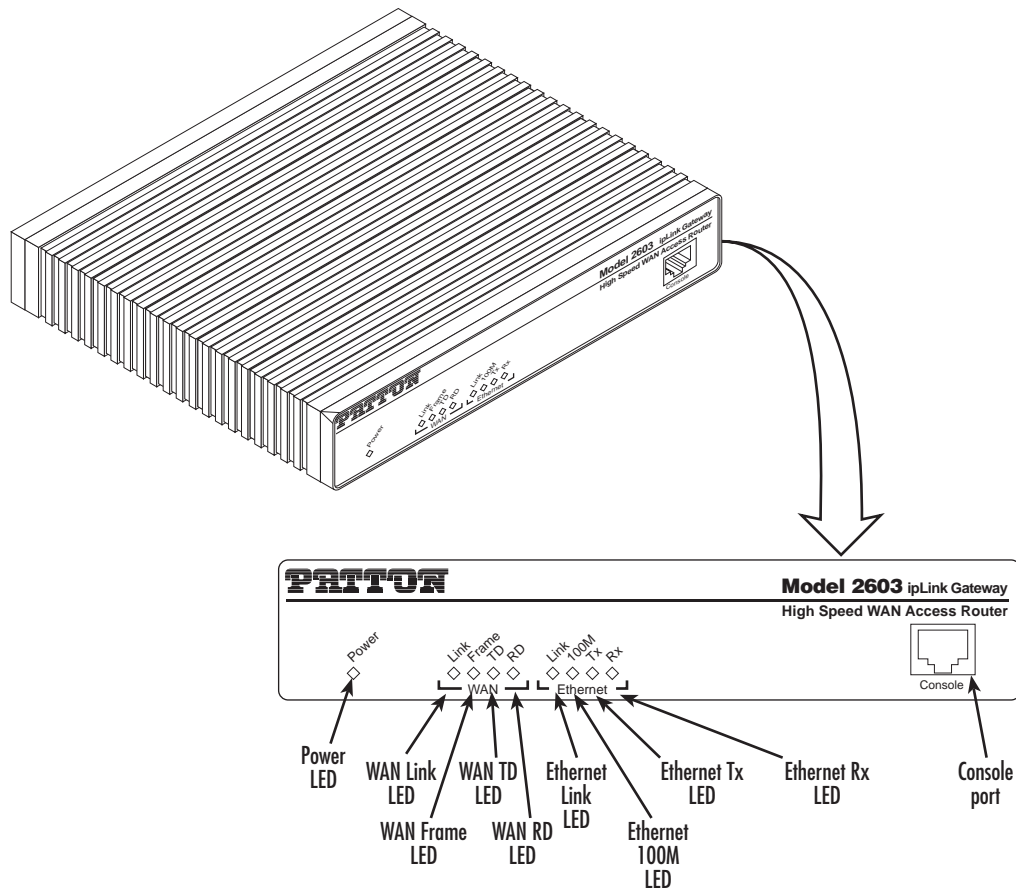


Figure 13. IPLink front panel LEDs and Console port locations (Model 2603 shown)

Installing the Ethernet cable

Do the following:



CAUTION

The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

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 terminal emulation session (such as TeraTerm or HyperTerminal) 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.

Login: superuser

Password: *****

Login successful

-->

8. 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 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 | eth0
-----|-----|-----|-----|-----
```

→ ip set interface ip1 ipaddress 10.10.19.10 255.255.0.0 <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.]

→

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.

To see the IPLink Series router home page, refer to the following Figures. Model 2603 is shown in [figure 14](#). Model 2621 in [figure 15](#). Model 2635 in [figure 16](#).

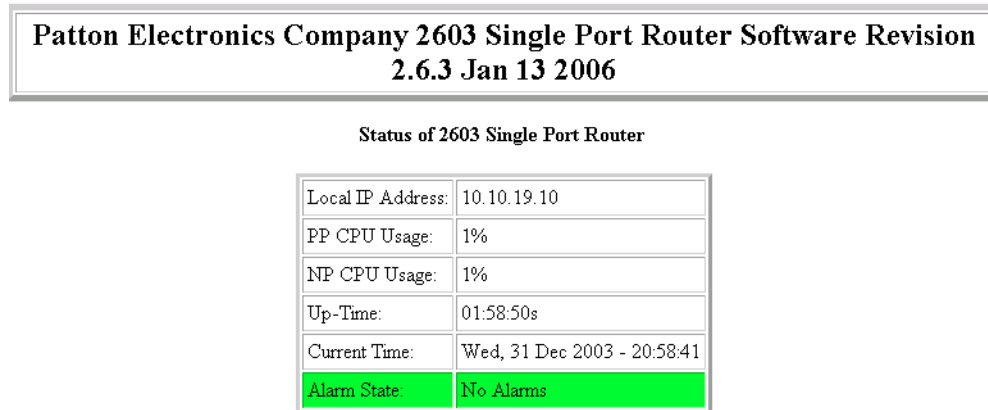


Figure 14. Model 2603 home page

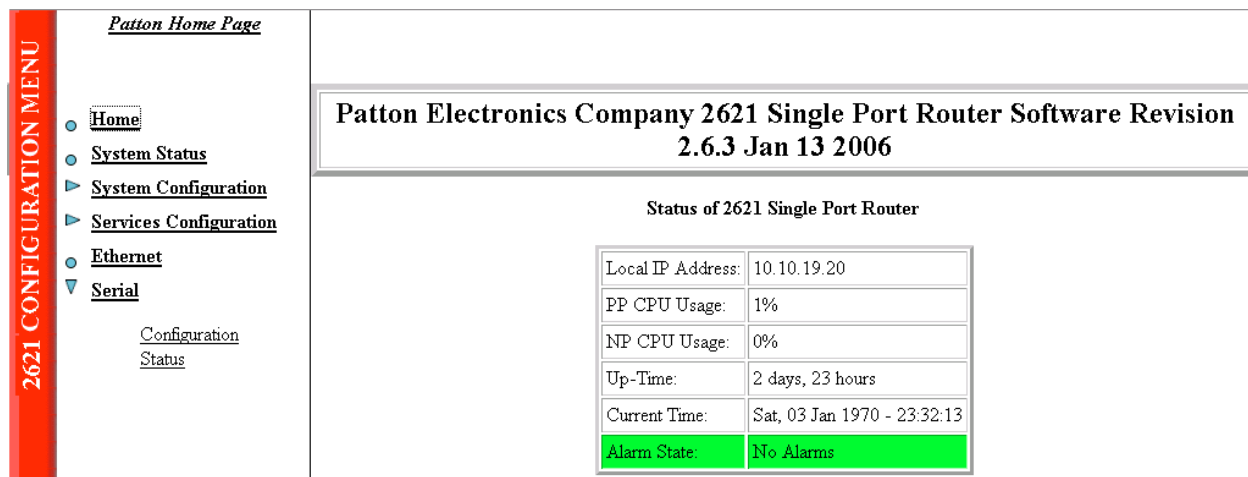


Figure 15. Model 2621 home page

2635 CONFIGURATION MENU

Patton Home Page

- Home
- System Status
- ▶ System Configuration
- ▼ Services Configuration
 - LAN
 - WAN
 - LMI Management
 - IP routes
 - DHCP server
 - DHCP relay
 - DNS relay
 - IP Services
 - Security
 - SNTP client
- Ethernet
- ▶ Serial

Patton Electronics Company 2635 Single Port Router Software Revision 2.6.3 Jan 13 2006

Status of 2635 Single Port Router

Local IP Address:	10.10.19.30
PP CPU Usage:	1%
NP CPU Usage:	1%
Up-Time:	2 days, 23 hours
Current Time:	Sat, 03 Jan 1970 - 23:30:18
Alarm State:	No Alarms

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Figure 16. Model 2635 home page

Chapter 4 Ethernet LAN Port

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Introduction

The Ethernet LAN interface/port can be configured with two IP addresses, a primary and a secondary IP address. The configuration web page is found by following the path -> [Services Configuration](#) (in the Configuration Menu) -> [LAN](#) -> '**Change default LAN port IP address**' (button on the main window).

The Basic and Advanced Port Attributes of the Ethernet LAN port is found by clicking on the [Ethernet](#) hyperlink in the IPLink's Configuration Menu, the narrow window on the left-hand side of the web page. Clicking on the *View advanced attributes...* hyperlink leads to a webpage with only a few parameters that could be of interest. They are for controlling auto-negotiation, 100BaseT mode, and Full-duplex mode.

LAN Connections

The default LAN port's IP address and netmask can be changed on this webpage. Go to -> [Services Configuration](#) (in the Configuration Menu) -> [LAN](#) -> '**Change default LAN port IP address**' (button on the main window). (See [figure 17](#).) The primary IP address and mask can be modified here, but if you do, you will no longer be able to access the IPLink's webpages with the previous IP address. The interface associated with the Ethernet is named **ip1**. You can also configure a secondary IP address to the Ethernet LAN port.

LAN connections

This page allows you to change the IP address for the default LAN port. The name of the IP interface is **ip1**.

Default LAN Port

The Secondary IP Address should be on the same subnet as the Primary IP Address and uses the same Subnet Mask. Addresses on other subnets can be added using Virtual Interfaces.

	Primary IP Address			
IP Address:	<input type="text" value="10"/>	<input type="text" value="10"/>	<input type="text" value="19"/>	<input type="text" value="10"/>
Subnet Mask:	<input type="text" value="255"/>	<input type="text" value="255"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
	Secondary IP Address			
IP Address:	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
<input type="button" value="Update"/>				

Note: there may be a short pause between clicking *Update* and receiving a response.

[Advanced...](#)

Figure 17. Ethernet LAN port IP address configuration

The secondary IP address must be in the same subnet as the primary IP address. With primary and secondary IP addresses, you can reach the IPLink's webpages via either IP address. However you will have to login for each separate IP address.

Ethernet Port

The Ethernet Port Configuration webpage provides a summary of the Ethernet port's performance. You reach it by clicking on the hyperlink [Ethernet](#) in the IPLink's Configuration Menu window.

The Basic Port Attributes webpage displays the most commonly used Ethernet parameters for determining the performance of the Ethernet port (see [figure 18](#) on page 42).

Ethernet Port Configuration

[View advanced attributes...](#)

Basic Port Attributes

Name	Value
MAC	00:a0:ba:00:28:3f
Rx Ok	1224338
Rx Broadcast Packets	654397
Rx Error Packets	1305
Tx Ok	2321
Tx Collisions	41
Tx Error Packets	0
100Base	false
Connected	true
Full Duplex	false
Link Speed	100000

Figure 18. Basic Ethernet port attributes

For additional statistical parameters and a few configurable parameters, click on the hyperlink *View advanced attributes...* (See [figure 19](#).)

Advanced Ethernet Port Configuration

[Return to basic attribute list...](#)

Advanced Port Attributes

Name	Value
Rx No Buffer	0
Rx Error Align	0
Max Multicast Listsize	64
Max Queue	32
Disable	false
Promiscuous Enable	false

Figure 19. Advanced Ethernet port attributes

The three configurable parameters are all either 'true' or 'false.'

- Auto Negotiation: the autonegotiation can be enabled (default) or disabled. In some instances autonegotiation may be problematic if another device on the LAN does not work properly with autonegotiation.
- 100Base Mode: the default is for 100BaseT ('true'). To configure it for 10BaseT operation at all times, set to 'false.'

- Full Duplex Mode: the default value is 'true' for Full Duplex operation. Setting it to 'false' configures the Ethernet port to operate only in half-duplex mode.

Rarely do these parameters require a change from their default operation.

Auto Negotiation	<input type="button" value="true"/>
Auto Negotiate Restart	false
Connected	true
Dis Reconnect Count	14
Enable Duplex Check	true
Full Duplex	false
Jabber	false
Jabber Count	0
Link Speed	100000
100Base Mode	<input type="button" value="true"/>
Full Duplex Mode	<input type="button" value="false"/>
Remote100BTFD	false
Remote100BTHD	false
Remote10BTFD	false
Remote10BTHD	true
Remote Fault	false
Remote Fault Count	0
<input type="button" value="Update"/> <input type="button" value="Reset"/>	
<input type="button" value="Clear if Entry"/>	

Figure 20. Configurable Ethernet parameters

Chapter 5 **Serial Port Configuration**

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WAN Serial 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.

Variables

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

Variable	Options	Function
Clock Mode	Internal	The clock setting for the serial interface will determine the source of timing for the serial interface only.
	External	
RX Clock Invert / TX Clock Invert	Inverted	The clock invert functions could be used to invert the clocks that are used on the serial interface. It is not recommended to change this parameter unless requested by Patton Electronics' technical support. Keep at default.
	Normal	
Serial 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.
TX Data Sample-Point	Ext Clk	When the unit is running in internal clock mode, the setting of TX Data SamplePoint will indicate to the system which clock to use to sample the incoming 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 Ext Clk.
	Tx Clk	

Web Interface Configuration

The following screen capture shows the variables available to configure the X.21 serial interface.

Serial Configuration:

Configuration Options	
Serial Speed	512K
Clock Mode	external
Tx Clock Invert	normal
Rx Clock Invert	normal
Enabled	true
<input type="button" value="Configure"/>	

Figure 21. Model 2621 X.21 serial port configuration parameters

The next figure shows the Model 2635 (V.35) serial port configuration parameters.

Serial Configuration:

Configuration Options	
Serial Speed	512K
Clock Mode	external
Tx Data Sample Point	Ext Clock
Tx Clock Invert	normal
Rx Clock Invert	normal
Enabled	true
<input type="button" value="Configure"/>	

Figure 22. Model 2635 V.35 serial port configuration parameters

After the serial port has been configured, go to [“WAN Service Configuration”](#) on page 52 section [“WAN Service Configuration”](#) on page 52 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 on an RJ-48C (100-ohm) connector, while the E1 interface can use the RJ-48C (120-ohm) or dual BNC (75-ohm) connectors.

The 2603 T1/E1 serial port configuration page appears in [figure 23](#).

2603 CONFIGURATION MENU

- Home
- System Status
- System Configuration
- Services Configuration
- Ethernet
- T1/E1
 - Status
 - Configuration

T1/E1 Configuration:

Configuration Options

Time Slot Select:	1-24	Payload Rate: 1536K(24)
Line Options	Fractional T1 ESF	
Code Sel	B8ZS	
Line Build Out	100 Ohm 0dB	
FDL Mode	Ansi-T1-403	
Clocking Mode	Receive Clock	
Idle Codes	Enabled	
Power Down	Normal	

Configure and Activate

Figure 23. Model 2603 T1/E1 WAN port configuration parameters

Configuring the IPLink Series 2603 for T1 Operation

Web Configuration. Launch *Netscape*, *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 *T1/E1 > Configuration*. (See [figure 24](#).)

T1/E1 Configuration:

Configuration Options

Time Slot Select:	1-24	Payload Rate: 1536K(24)
Line Options	Fractional T1 ESF	
Code Sel	B8ZS	
Line Build Out	100 Ohm 0dB	
FDL Mode	Ansi-T1-403	
Clocking Mode	Receive Clock	
Idle Codes	Enabled	
Power Down	Normal	

Configure and Activate

Figure 24. T1 configuration

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 and Fdl-none. Consult your T1 service provider if FDL is active on your T1 link.

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 in non-volatile memory by going to the *System Configuration* > *Save* menu.

This concludes the T1 interface configuration via the web browser, go to section “[WAN Service Configuration](#)” on page 52 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 *T1/E1* > *Configuration*. (See [figure 25](#).)

T1/E1 Configuration:

Configuration Options	
Time Slot Select:	1-31 Payload Rate: 1984K(31)
Line Options	Channelized E1 (G.703/G.704)
Code Sel	HDB3
Line Build Out	120 Ohm
FDL Mode	Fdl-none
Clocking Mode	Receive Clock
Idle Codes	Enabled
Power Down	Normal
Configure and Activate	

Figure 25. E1 port configuration

Time Slot Select. For unframed E1 service (Clear Channel) go to the “Line Option” parameter and select “Clear Channel E1 (G.703).” 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 an invalid selection message.

Line Options: Choose from Clear Channel E1(G.703) or Channelized E1(G.703/G.704). 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 *System Configuration > Save* menu.

This concludes the E1 interface configuration via the web browser, go to section [“WAN Service Configuration”](#) on page 52 for instructions on router/bridge and WAN service configuration.

Chapter 6 **WAN Services**

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WAN Services

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 *T1/E1 > Configuration*. (See [figure 26](#).)

T1/E1 Configuration:

Configuration Options	
Time Slot Select:	1-31 Payload Rate: 1984K(31)
Line Options	Channelized E1 (G.703/G.704)
Code Sel	HDB3
Line Build Out	120 Ohm
FDL Mode	Fdl-none
Clocking Mode	Receive Clock
Idle Codes	Enabled
Power Down	Normal
Configure and Activate	

Figure 26. E1 port configuration

Time Slot Select. For unframed E1 service (Clear Channel) go to the “Line Option” parameter and select “Clear Channel E1 (G.703).” 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 an invalid selection message.

Line Options: Choose from Clear Channel E1(G.703) or Channelized E1(G.703/G.704). 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 *System Configuration > Save* menu.

This concludes the E1 interface configuration via the web browser, go to section “WAN Service Configuration” on page 52 for instructions on router/bridge and WAN service configuration.

WAN Service Configuration

The IPLink Series Routers offer various WAN services for the proper transport encapsulation: Ethernet, Frame Relay, and PPP options. The Ethernet option is PPPoE, bridged only. Frame Relay and PPP can be used in either bridged or routed applications.

PPP Configuration

PPP Bridged

PPP Bridged Remote Site Configuration. The IPLink series routers can be configured as bridges; in this situation the IPLink typically is at the customer premise or branch office and connects 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. (See [figure 27](#).)

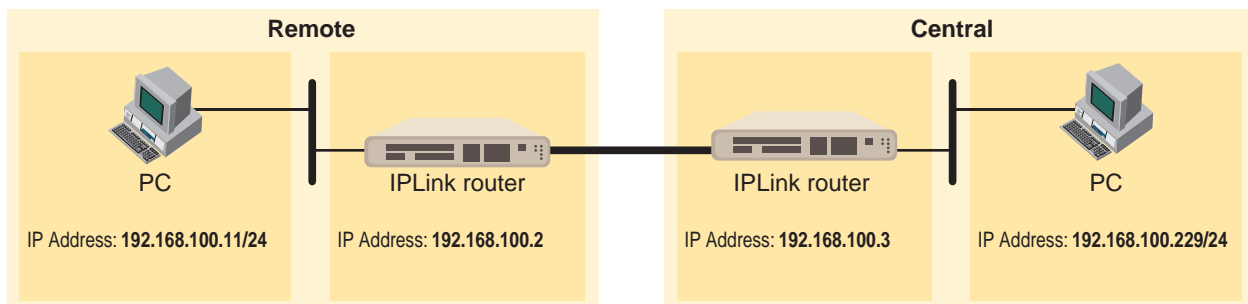


Figure 27. PPP Bridged Application

IPLink series (Remote)

First configure the IP address on the Ethernet port (interface ip1) for 192.168.100.2/24 via the command line (CLI). Once this is done, you can complete the configuration using the web pages.

1. Bring up the web-page management system on your browser by entering the IP address of IPLink.
2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select “*PPP 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

PPP: ☐ PPP routed ☐ PPP bridged

Figure 28. WAN services' options

4. In the Description field, enter the description you wish. This is a mandatory field. Without a description, you cannot create the WAN service.

WAN connection: PPP bridged

Description:

Interface:

LLC header mode:

LLC header mode:

HDLC header mode:

☒ No authentication

☐ PAP

☐ CHAP or PAP

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 **Create**.

Central Site Configuration. If the central site also has an IPLink, you may configure as described in this section. Refer to the web page images for the Remote IPLink configuration above.

In this example, the IP address of interface *ip1* is changed to 192.168.100.3/24.

1. Bring up the web-page management system on your browser by entering the IP address of the IPLink
2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select *PPP bridged* and click on the **Continue** button.
4. In the Description field, enter the description you wish, for example, *PPP 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 **Create**.

PPP Routed

This application shows configuration for two IPLink units in PPP routed mode. An IPLink may be used as the router at the Central site, but it is not necessary. You can use a third party router as long as it supports PPP routed operation. If using a third party router at the Central site, review the router's configuration. (See [figure 29](#).)

Remote site configuration.

First configure the IP address on the Ethernet port (interface ip1) for 192.168.200.2/24 via the command line (CLI). The PC will be on the same subnet as the IPLink Ethernet port. Once this is done, you can complete the configuration using the web pages.

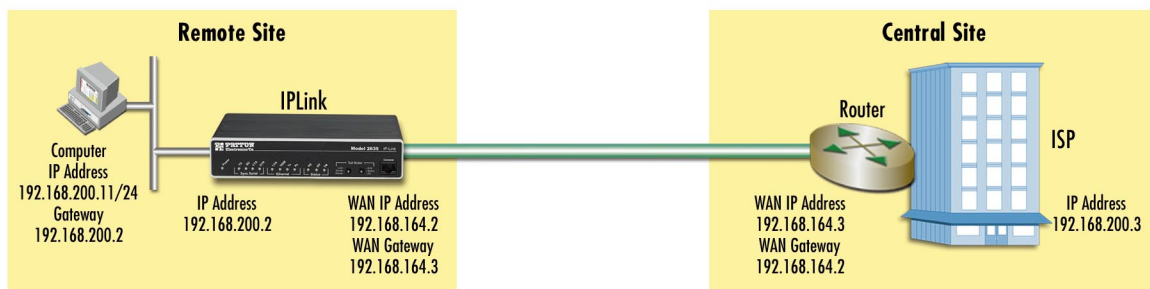


Figure 29. PPP Routed Application

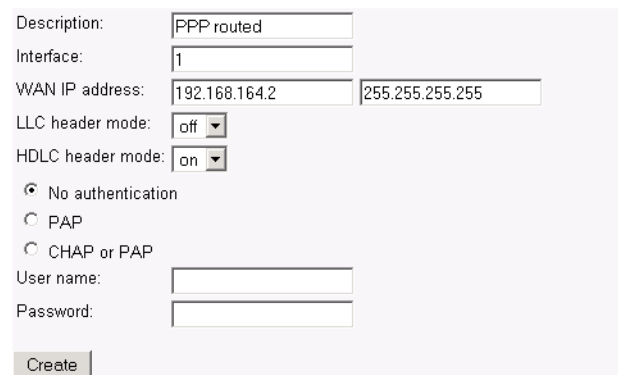
1. Bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.

3. Click on *Create a new service* in the main window, select “*PPP routed*” and click on the **Continue** button.

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

- Description: PPP Routed
- Interface: 1
- WAN IP address: 192.168.164.2 255.255.255.255
- LLC Header Mode: off
- HDLC Header Mode: ON
- No authentication
- Username: [blank]
- Password: [blank]

WAN connection: PPP routed



The screenshot shows a configuration window titled "WAN connection: PPP routed". It contains the following fields and options:

- Description: PPP routed
- Interface: 1
- WAN IP address: 192.168.164.2 255.255.255.255
- LLC header mode: off
- HDLC header mode: on
- Authentication options: ☒ No authentication, ☐ PAP, ☐ CHAP or PAP
- User name: [blank]
- Password: [blank]
- Create button

Figure 30. PPP Routed Configuration menu

4. Click on Create.

5. Go to *Services Configuration > WAN > Edit...* (for PPP routed) > *Edit 'IP Interface' > Ipaddr*: [enter the WAN IP Address and Mask, in this example = 192.168.164.2 and 255.255.255.255]. (See [figure 31](#).)

6. Click on **Create**.

Edit Ip Interface

Options	
Name	Value
Ipaddr:	192.168.164.2
Mask:	255.255.255.255
Dhcp:	false
MTU:	1500
Name:	ppp-0
Enabled:	true
Layer2Session:	

Figure 31. Edit IP address of WAN port

7. Click on *Services 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. (See [figure 32](#).)
8. Click the Update button.

Create Ip V4Route

Name	Value
Destination	0.0.0.0
Gateway	192.168.164.3
Netmask	0.0.0.0
Cost	1
Interface	none

Figure 32. Configuring the gateway

The other fields should be:

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

You can see the status of the PPP link by going to the ‘Edit PPP’ web page and paging down until you see the “Summary” description. In [figure 33](#) the PPP link is in the Establishment phase. To get to the ‘Edit PPP’ web page, follow this path: *Services Configuration > WAN > Edit... > Edit ‘PPP’*

MRU:	<input type="text" value="1500"/>
Ip Addr From IPCP:	<input type="button" value="true"/>
Use Ip Addr From IPCP:	<input type="button" value="true"/>
Discover Primary DNS:	<input type="button" value="true"/>
Discover Secondary DNS:	<input type="button" value="true"/>
Give DNSto Relay:	<input type="button" value="true"/>
Give DNSto Client:	<input type="button" value="true"/>
Lcp Echo Every:	<input type="text" value="10"/>
Auto Connect:	<input type="button" value="false"/>
Idle Timeout:	<input type="text" value="0"/>
Bcp Tagged Frame:	<input type="button" value="Not Enforced"/>
Summary:	enabled, up, phase=Establish
Connect State:	connecting
Uptime:	0
Idletime:	0
NCPRemote Addr:	
Version:	1.04
If In Octets:	0
If Out Octets:	16536

Figure 33. PPP link status

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 configurable parameters are different although the process is the same.

Configure the IP address of the Ethernet port (interface ip1) to be 192.168.172.3/24. The PC, connected to the Ethernet LAN directly, must be on the same subnet in order to access the configuration web pages. In this example, the PC's IP address is 192.168.172.229/24. Notice that this subnet differs from the subnets of the WAN service link and also the Ethernet port of the remote IPLink (which we just configured).

1. Bring up the web-page management system on your browser by entering the IP address of the IPLink, 192.168.172.3.
2. On the Menu, go to *Service Configuration*, then to *WAN*. Delete the default WAN services already defined.
3. Click on *Create a new service* in the main window, select "PPP routed" and click on the **Continue** button.

In the Description field, enter the description. In this example, it is called PPP Routed.

- Description: PPP Routed
- Interface: 1
- WAN IP address and Mask: 192.168.164.3 255.255.255.255
- LLC Header Mode: off
- HDLC Header Mode: ON
- No authentication

- Username: [blank]
- Password: [blank]

Click on the Create button.

4. Go to *Services Configuration > WAN > Edit...* (for PPP routed) > *Edit 'IP Interface' > Ipaddr*: [enter the WAN IP Address and Mask, in this example = 192.168.164.3 and 255.255.255.255].
5. Click on **Create**.
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
- Mask:0.0.0.0
- Cost 1
- Interface: [blank]

You can see the status of the PPP link by going to the 'Edit PPP' web page and paging down until you see the "Summary" description. To get to the 'Edit PPP' web page, follow this path: *Services Configuration > WAN > Edit... > Edit 'PPP'*

LMI Management (Frame Relay links)

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 3](#):

Table 3. 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

Note LMI uses DLCI 0, but ANSI/CCITT has also reserved 1–15. Best practice (per the recommendation) is to use only DLCIs 16–991 for FR data PVCs, and DLCIs 0–15 for LMI PVCs.

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_maintenance) the managementType variable defines the LMI protocol that will be used from the table above. The following options are available.
 - **no_maintenance:** No maintenance interface will be used for this frame relay connection.
 - **ITU Network:** The ITU Q.933 protocol will be used. The unit will operate as the Network side of the connection.
 - **ITU User:** The ITU Q.933 protocol will be used. The unit will operate as the User side of the connection.
 - **ITU Both:** (NNI) The ITU Q.933 protocol will be used. The unit will operate as both the Network and User side of the connection.
 - **ANSI Network:** The ANSI T1.617 protocol will be used. The unit will operate as the Network side of the connection
 - **ANSI User:** The ANSI T1.617 protocol will be used. The unit will operate as the User side of the connection
 - **ANSI Both:** (NNI) The ANSI T1.617 protocol will be used. The unit will operate as both the Network and User side of the connection.
- **Management State:** 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
- **Management Auto Start:** (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.
- **Full Report Cycle:** (Default Value: 6) This variable represents the N391 protocol value
- **User Max Errors:** (Default Value: 3) Network side N392 protocol value
- **Net Max Errors:** (Default Value: 3) Network side N392 protocol value
- **User Error Window Size:** (Default Value: 4) User side N393 protocol value
- **Net Error Window Size:** (Default Value: 4) Network side N393 protocol value
- **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.

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 *Services Configuration > LMI Management* link. The following screen shows the configuration variables available.

LMI Management: LMI Configuration

Management Type	no_maintenance ▾
Management State	N/A
Management Auto Start	false ▾
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
Update	

Figure 34. LMI Configuration webpage

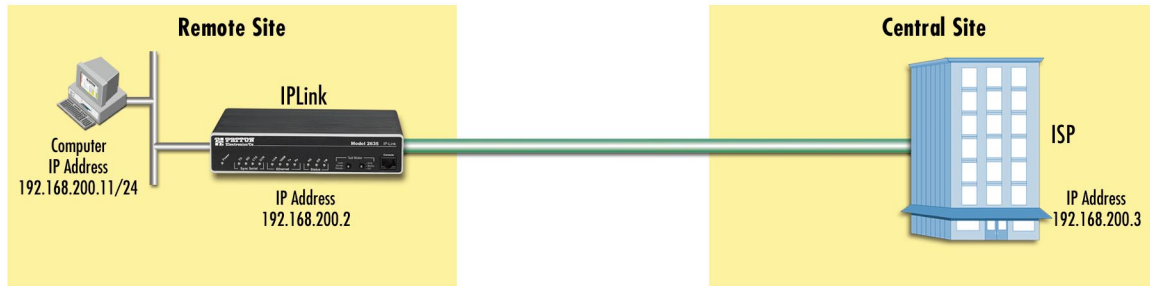
Frame Relay Configuration

The Frame Relay service can be configured for either bridged or routed applications. The use of DLCI values since the original publication of the Frame Relay specifications has been modified as to their use. For the two-octet address format, they are as follows:

DLCI Number	Use
0	Used for in-channel signaling
1 – 15	Reserved DLCI's
16 – 991	Assigned using Frame Relay connection procedures. Verify that none of these values have been assigned to permanent frame relay cells.
992 – 1007	Layer 2 management of FR bearer service
1008 – 1022	Reserved
1023	Used for in-channel layer management

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.

First configure the IP address of the Ethernet port (interface ip1) via the command line (CLI) for 192.168.200.2/24. The PC must be on the same subnet for configuring the IPLink via the web pages.

1. Bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select “*Frame Relay bridged*” and click on Continue.
4. Enter the description for the circuit in the Description field. This is a mandatory field. Without a description you cannot create a WAN service.
5. Click on *Create a new service* in the main window, select *Frame relay bridged* and click on the **Configure** button. (See [figure 35](#).)

WAN connection: Frame Relay bridged

Description:	<input type="text" value="FR bridge"/>
DLCI:	<input type="text" value="1"/>
Encapsulation method:	<input type="text" value="Bridged Ethernet"/>
<input type="button" value="Create"/>	

Figure 35. Frame Relay bridged creation

6. Click along the following path: *Services Configuration* > *WAN* > ‘*Edit...*’ Then click on *Edit ‘Frame Relay Channel’*. (See [figure 36](#).) The configurable parameters are:
 - **DLCI:** Consult with your service provider for the DLCI number required. LMI uses DLCI 0, but ANSI/CCITT has also reserved 1–15. Best practice (per the recommendation) is to use only DLCIs 16–991 for FR data PVCs, and DLCIs 0–15 for LMI PVCs.

- **Encapsulation type:** Bridged Ether (Defines the RFC 1490 encapsulation type to be used by the channel. In some instances you may need to choose another type. Consult your service provider.)
- **RX Max PDU:** 8192 Receive side max PDU, default 8192 (normally not changed from default)
- **TX Max PDU:** 8192 Transmit side max PDU, default 8192 (normally not changed from default)
- **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”.

Click on the Create button.

Name	Value
Dci:	21
Encaps Type:	BridgedEther
Rx Max Pdu:	8192
Tx Max Pdu:	8192
Chnl Segment Size:	0
Port:	fr
Port Class:	framerelay

Create Reset

Figure 36. Frame Relay Channel configuration

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 IPLink above. Some parametric values will differ, but the process remains the same.

First configure the IP address of the Ethernet port (interface ip1) via the command line (CLI) for 192.168.172.3/24. The PC (IP address 192.168.172.229) must be on the same subnet for configuring the IPLink via the web pages.

1. Bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select “*Frame Relay bridged*” and click on Continue.

4. Enter the description for the circuit in the Description field. This is a mandatory field. Without a description you cannot create a WAN service.
5. Click on *Create a new service* in the main window, select *Frame relay bridged* and click on the **Configure** button.
6. Click along the following path: *Services Configuration > WAN > 'Edit...'* Then click on *Edit 'Frame Relay Channel'*. The configurable parameters are:
 - **DLCI**: Consult with your service provider for the DLCI number required.
 - **Encapsulation type**: Bridged Ether (Defines the RFC 1490 encapsulation type to be used by the channel. In some instances you may need to choose another type. Consult your service provider.)
 - **RX Max PDU**: 8192 Receive side max PDU, default 8192 (normally not changed from default)
 - **TX Max PDU**: 8192 Transmit side max PDU, default 8192 (normally not changed from default)
 - **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".

Click on the **Create** button.

This conclude the central site configuration.

Frame Relay Routed

This application shows the 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.

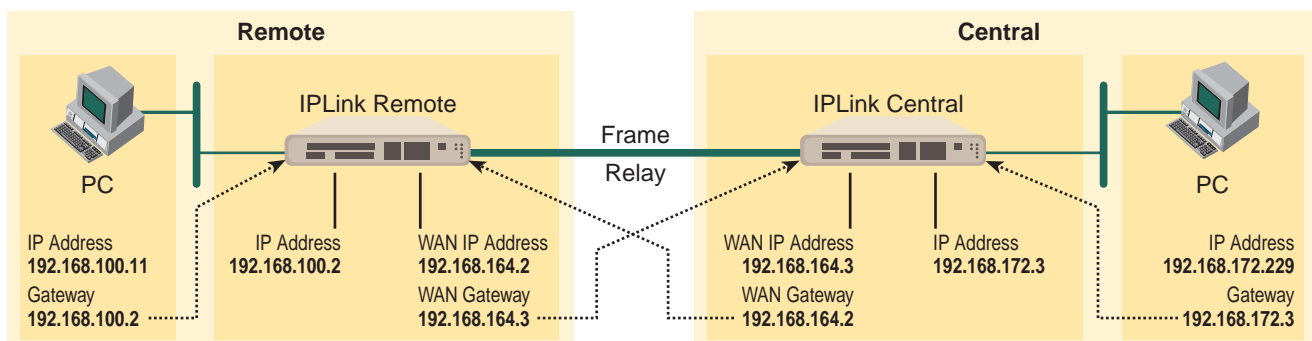


Figure 37. Frame Relay routed application

Remote Site Configuration.

First configure the IP address of the IPLink's Ethernet port (interface ip1) via the command line (CLI) for 192.168.100.2/24. The PC must be on the same subnet for configuring the IPLink via the web pages.

1. Bring up the web-page management system on your browser by entering the IP address of the IPLink.

2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select “*Frame Relay routed*” and click on Continue.
4. Enter the description for the circuit in the Description field. This is a mandatory field. Without a description you cannot create a WAN service. (See [figure 38](#).)

WAN connection: Frame Relay routed

Description:

DLCI:

Encapsulation method:

☐ Use DHCP

☒ WAN IP address:

☐ Enable NAT on this interface

Figure 38. Frame Relay routed configuration

- **Description:** FR routed
 - **DLCI.** Enter DLCI number. Consult with your service provider for the DLCI number required.
 - **Encapsulation Method.** Defines the RFC1490 encapsulation type that will be used by the channel. Choose the encapsulation method best suited for your network needs from the following options:
 - Routed IP (default value)
 - 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
5. Click the **Create** button.
 6. Go to *System Configuration* > *WAN* > *Edit* (for Frame Relay Routed service) > *Edit 'IP Interface'*
 7. Enter the WAN IP Address, in this example = 192.168.164.2, and click on the Create button.
 8. From the 'IP Interface' web page, click on *Edit 'Frame Relay'*, then click on *Edit 'Frame Relay Channel'* (See [figure 39](#).)

Name	Value
DlcI:	41
Encaps Type:	RoutedIP
Rx Max Pdu:	8192
Tx Max Pdu:	8192
Chnl Segment Size:	0
Port:	frf
Port Class:	framerelay

Create Reset

Figure 39. Frame Relay Channel - Routed configuration

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*
- **RX Max PDU:** Enter the number of receive side max PDU, in this example it is the default 8192
- **TX Max PDU:** Enter the number of transmit side max PDU, in this example it is the 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”.)

9. Click on the Create button.

10. Click on *System Configuration > IP Routes > Create new Ip V4 Route*

11. 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.

The other fields should be:

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

- Cost: 1
- Interface: frame-0

Create Ip V4Route

Name	Value
Destination	0.0.0.0
Gateway	192.168.164.3
Netmask	0.0.0.0
Cost	1
Interface	frame-0

Figure 40. IP route for Frame Relay routed application

12. Click on the Update button.

This concludes the configuration of the remote site. Be sure to save the configuration in non-volatile memory by *System Configuration > Save > Click on Save* in the main window.

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.

First configure the IP address of the IPLink's Ethernet port (interface ip1) via the command line (CLI) for 192.168.172.3/24. The PC must be on the same subnet for configuring the IPLink via the web pages.

1. Bring up the web-page management system on your browser by entering the IP address of the IPLink.
2. On the Menu, go to *Services Configuration*, then to *WAN*. Delete the factory default WAN services already defined.
3. Click on *Create a new service* in the main window, select "*Frame Relay routed*" and click on Continue.
4. Enter the description for the circuit in the Description field. This is a mandatory field. Without a description you cannot create a WAN service.
 - **Description:** FR routed
 - **DLCI.** Enter DLCI number. Consult with your service provider for the DLCI number required.
 - **Encapsulation Method.** Defines the RFC1490 encapsulation type that will be used by the channel. Choose the encapsulation method best suited for your network needs from the following options:
 - Routed IP (default value)
 - 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
- 5. Click the **Create** button.
- 6. Go to *System Configuration > WAN > Edit* (for Frame Relay Routed service) > *Edit 'IP Interface'*
- 7. Enter the WAN IP Address, in this example = 192.168.164.3, and click on the Create button.
- 8. From the 'IP Interface' web page, click on *Edit 'Frame Relay'*, then click on *Edit 'Frame Relay Channel'*

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*
 - **RX Max PDU:** Enter the number of receive side max PDU, in this example it is the default 8192
 - **TX Max PDU:** Enter the number of transmit side max PDU, in this example it is the 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".)
9. Click on the Create button.
 10. Click on *System Configuration > IP Routes > Create new Ip V4 Route*
 11. 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.

The other fields should be:

- Destination: 0.0.0.0
- Gateway: 192.168.164.2
- Mask: 0.0.0.0
- Cost: 1
- Interface: frame-0

12. Click on the Update button.

This concludes the configuration of the remote site. Be sure to save the configuration in non-volatile memory by *System Configuration > Save > Click on Save* in the main window.

Chapter 7 **Security**

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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.

Configuring the router

The configuration of security assumes that the IPLink router has been configured with 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 Modification.

In this example the WAN transport between the two IPLink router/Routers will be PPP (routed).

1. Click on **WAN** under Services Configuration in the IPLink router's Configuration Menu.
2. Click on **Create a new service...**
3. Select **PPP routed** and click on the **Continue=>** button.
4. For this example, enter **PPP Security Firewall** in the Description field. (See [figure 41.](#))
5. Click on **Create**.

WAN connection: PPP routed

Description:	PPP Security Firewall	
Interface:	1	
WAN IP address:	0.0.0.0	255.255.255.255
LLC header mode:	off	
HDLC header mode:	on	
<input checked="" type="radio"/> No authentication <input type="radio"/> PAP <input type="radio"/> CHAP or PAP		
User name:		
Password:		
<div>Create</div>		

Figure 41. PPP routed WAN service for Security Firewall example

- Click on **Edit** in the WAN Connections webpage, and then click on the **Edit 'Ip Interface'** hyperlink.
- In the **Edit Ip Interface** webpage, enter the fields as follows and click on the Create button. (See [figure 42.](#))

Ipaddr: 192.168.101.1

Mask: 255.255.255.0

[Edit 'Ip Interface'](#)
[Edit 'Tcp Mss Clamp'](#)

Edit Ip Interface

Options

Name	Value
Ipaddr:	192.168.101.1
Mask:	255.255.255.0
Dhcp:	false
MTU:	1500
Name:	ppp-0
Enabled:	true
Layer2Session:	

Create

Reset

Figure 42. IP address of PPP routed WAN service

The next step in configuring the router is to add the default gateway route. The WAN IP address of the routed PPP WAN service at the CO site is 192.168.101.2, so this will be the gateway IP address on the IPLink.

- Click on **IP routes** under Services Configuration in the Configuration Menu.
- Click on the **Create a new Ip route...** hyperlink.

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 the **Update** button.
6. Seeing the green check mark under **Valid** indicates the IP addresses of the WAN service and the gateway are properly configured. (See [figure 43](#).)

Edit Routes

Existing Routes				
Valid	Destination	Gateway	Netmask	Delete?
✓	0.0.0.0	192.168.101.2	0.0.0.0	<input type="checkbox"/>
<input type="button" value="Update"/> <input type="button" value="Reset"/>				

Figure 43. Valid gateway route

Configuring the security interfaces

The interfaces and routes have been configured on the IPLink Router. The Ethernet side of the IPLink router will be configured to be an internal interface and the WAN side is selected to be the external interface since it is on “public” side of the modem connection.

1. Go to the Security Interface Configuration webpage as follows ‘Configuration Menu’ > Services Configuration > Security. (See [figure 44](#).)

Security Interface Configuration

Security State

Security: ☐ Enabled ☒ Disabled
Firewall: Disabled
Intrusion Detection Enabled: Disabled

Change State

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.)

[Add Interface...](#)

Policies, Triggers and Intrusion Detection

[Security Policy Configuration...](#)
[Security Trigger Configuration...](#) ("Why can't I configure this?")
[Configure Intrusion Detection...](#) ("Why can't I configure this?")

Figure 44. Security configuration home page

- Go to the third section (Security Interfaces) on the Security Interface Configuration webpage. Click on the hyperlink *Add interface...*
- Select 'ip1' beside the Name pull-down menu, and select 'internal' beside the Interface Type pull-down menu. Click on Create. (See [figure 45](#).)

Security: Add Interface

New Interface Setup

Name: ip1
Interface Type: external

Create

[Return to Interface List](#)

Figure 45. Define 'ip1' interface as Internal

- Again, click on the hyperlink *Add interface...* to define the WAN interface as "external."
- Select 'ppp-0' beside the Name pull-down menu, and select 'external' beside the Interface Type pull-down menu. Click on Create. (See [figure 46](#).)

Security: Add Interface

New Interface Setup

Name:

Interface Type:

Create

[Return to Interface List](#) ⓘ

Figure 46. Define 'ppp-0' interface as External

Configuring Security Policies

Continue the previous example by defining security policies. We will add only one Firewall policy, called *etoi*, signifying an *external-to-internal* policy between the external and internal interfaces.

1. Go to the last section on the Security Interface Configuration webpage called 'Policies, Triggers and Intrusion Detection.' Click on the hyperlink *Security Policy Configuration...* (See [figure 47](#).)

Policies, Triggers and Intrusion Detection

- [Security Policy Configuration...](#) ⓘ
- [Security Trigger Configuration...](#) ⓘ
- [Configure Intrusion Detection...](#) ⓘ

Figure 47. Security Policy Configuration hyperlink

2. Click on the hyperlink *New Policy...* (See [figure 48](#).)

Security Policy Configuration

Current Security Policies

No Policies Defined

[New Policy...](#) ⓘ

Figure 48. New Policy link to configuration webpage

3. Select the parameters so the policy is defined as follows:

Between interfaces of types: **external internal**

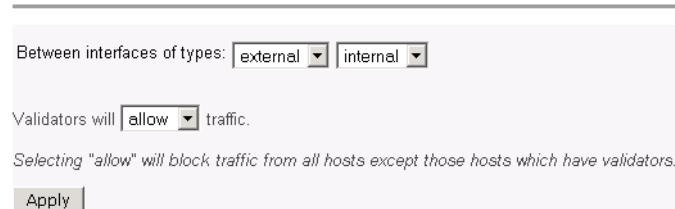
Validators will **allow** traffic.

Click on Apply.

Deleting a security Policy

To delete a security policy, go to the table of 'Current Security Policies' and click on the Delete button for the selected security policy.

Security Add Policy



Between interfaces of types:

Validators will traffic.

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

Figure 49. Deleting a Security Policy

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, that is, all traffic has been blocked between the internal ('ip1') and external ('ppp-0') interfaces. Only traffic which has validators is allowed to pass through, and, at this moment, there are no validators.

1. Return to the Security page.
2. Under Security State select **Enabled** for Security. Click on Change State.
3. Next select **Enabled** for Firewall. 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 (in general, hosts) 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 Protocol Number below, the different types are defined as:

Protocol Number	Abbreviation
1	ICMP
2	IGMP
3	GGP
4	IP

Protocol Number	Abbreviation
6	TCP
8	EGP
9	IGP
17	UDP
46	RSVP
47	GRE
89	OSPF
92	MTP
94	IPIP

This example continues to allow pings over the firewall:

1. From the Configuration Menu, > Configuration > Security > *Security Policy Configuration...* > *Port Filters...* > *Add Raw IP Filter*
2. Enter *1* (for ICMP) in the Protocol Number field.
3. Set both **Inbound** and **Outbound** for **Allow**. (See [figure 50](#).)
4. Click on Create.

Firewall Add Raw IP Filter: external-internal

The screenshot shows a configuration window titled 'Firewall Add Raw IP Filter: external-internal'. It contains a 'Protocol Number' field with the value '1'. To the right, under the 'Direction' header, are two dropdown menus: 'Inbound' and 'Outbound', both of which are set to 'Allow'. At the bottom left of the window is a 'Create' button.

Figure 50. Defining ICMP port filter for ping

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 sets up a trigger on the Firewall to permit 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 in the previous section, 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**. (See [figure 51](#).)
5. Click on **Create**.

Firewall Add TCP Port Filter: external-internal

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

Figure 51. Configuring TCP port filter for FTP

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.). Because the trigger to permit transfer of data via FTP has not been defined, no data can be transferred. (Data transfer occurs with the commands 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 to open a secondary channel only when data is being passed. This minimizes the number of open ports. Each open port is a security risk.

1. From the Configuration Menu, > Configuration > Security > *Security Trigger Configuration...* > *New Trigger*.
2. Set the parameters as follows (See [figure 52](#)):
 - 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 Create.

Security: 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
<input type="button" value="Create"/>								

Figure 52. Adding trigger for FTP data transfer

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**.
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.

Victim Protection. When enabled, 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 spoofing style attack are blocked.

- Victim Protection Block Duration: Default = 600 seconds
- 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 **Update**.

Introduction to NAT

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 inside 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 Application Level Gateway is provided: FTP, Net-BIOS, and DNS.

Enabling NAT

The configuration of NAT in this example follows on the preceding configuration completed earlier in this chapter.

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 Security Interfaces table. NAT is now enabled between the internal (LAN) and the external (WAN) interfaces of the firewall.

Global address pool and reserved map

1. Click on **Advanced NAT Configuration...** on the web page, “Security Interface Configuration.”
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 (See [figure 53](#)):
 - 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** button.

NAT Add Global Address Pool: ppp-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

Add Global Address Pool

Figure 53. NAT Global Address Pool configuration

4. Next, create a reserved mapping between a global IP address from the global pool and a PC on the side of the internal interface ('ip1'). In this example, 10.10.19.11.
5. Click on the hyperlink *Add Reserved Mapping...*
6. Set the parameters to the following values (See [figure 54](#).):
 - Global IP Address: 100.100.100.101
 - Internal IP address: 10.10.19.11
 - 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**.

NAT Add Reserved Mapping: ppp-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 "ppp-0")	10.10.19.11	all	65535

Add Reserved Mapping

Figure 54. NAT Reserved mapping configuration

The PC on the Ethernet side of the IPLink can now communicate with the 'public' or 'global' side through NAT.

Chapter 8 **DHCP and DNS Configuration**

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Introduction

The routers offer a DHCP Server, DHCP Relay capability, and DNS Relay incorporated into the IPLink. Of the two DHCP features, only one can be enabled at a time—either DHCP server or DHCP relay.

DNS relay can hold two DNS server IP addresses in memory so the DNS relay can forward DNS queries and responses between the host user and the DNS server.

The DHCP Server will listen for DHCP client requests on a suitable IP interface. Typically this is the Ethernet interface, named ip1 by default.

Note The Ethernet LAN port can be configured as a DHCP client to receive its IP address from a DHCP server on the Ethernet LAN. If so configured, you should not enable the IPLink's DHCP server on the Ethernet interface.

DHCP Relay functions transparently between a DHCP client and a DHCP server. The DHCP relay appears as a DHCP server to the DHCP client's point of view. The relay operates by forwarding all broadcast client request to known DHCP servers. The DHCP relay listens on all available interfaces. All relay-server communication is unicast. It is important that valid routes are set up to the server and also to the client.

Services and features normally associated with each other

The following table (figure 4) is to give guidance on what services of IPLink features to configure when you have decided to use DHCP Server, DHCP Relay, or DNS Relay.

If you are configuring a feature listed in the first column (Configured Feature), you can determine which other features either cannot be, must be, usually, can be, or are rarely used. The “Rarely used” column is listed to be technically correct, but it is ill advised to use. The three most important columns (other than the first) are:

- Cannot be used
- Must be used
- Usually used

Use the table like this: “The feature in this column [...] with the Configured Feature (in Column 1).”

For example:

1. The feature *DHCP Relay* [column 2] cannot be used with *DHCP Server* [row 1, column 1].
2. The feature *Routed* [column 4] usually is used with *DHCP Relay* [row 2, column 1].

Table 4. Features and services matrix

Configured Feature	The feature in this column [...] with (Column 1 feature)				
	Cannot be used	Must be used	Usually used	Can be used	Rarely used
DHCP Server	DHCP Relay		Routed, NAT		Bridged ¹
DHCP Relay	DHCP Server		Routed	NAT ²	Bridged ³
DNS Relay			Routed, DHCP Server or DHCP Relay		Bridged
NAT	Bridged	Routed		DHCP Server, DHCP Relay, DNS Relay	
DHCP Client (WAN side)			Routed		
Static IP (WAN side)		Routed			

Some comments on [figure 4](#).

Routed means a ‘routed WAN service’ and Bridged means a ‘bridged WAN service.’

DHCP Server and DHCP Relay cannot be used simultaneously.

NAT can be used only if a Routed WAN service is configured.

¹If a DHCP Server were used with a Bridged WAN service, the DHCP server would respond to IP address requests from both interfaces, that is, the Ethernet and the WAN serial interfaces.

²When NAT is used together with DHCP Relay, the WAN service must be routed.

³When DHCP Relay is used with a Bridged WAN service, the DHCP server must be on the same subnet as the clients and the IPLink.

DHCP Server

Go to the DHCP Server webpage from the Configuration Menu --> Services Configuration --> DHCP Server.

The DHCP server default is disabled. Click on the Enable button to begin the configuration process.

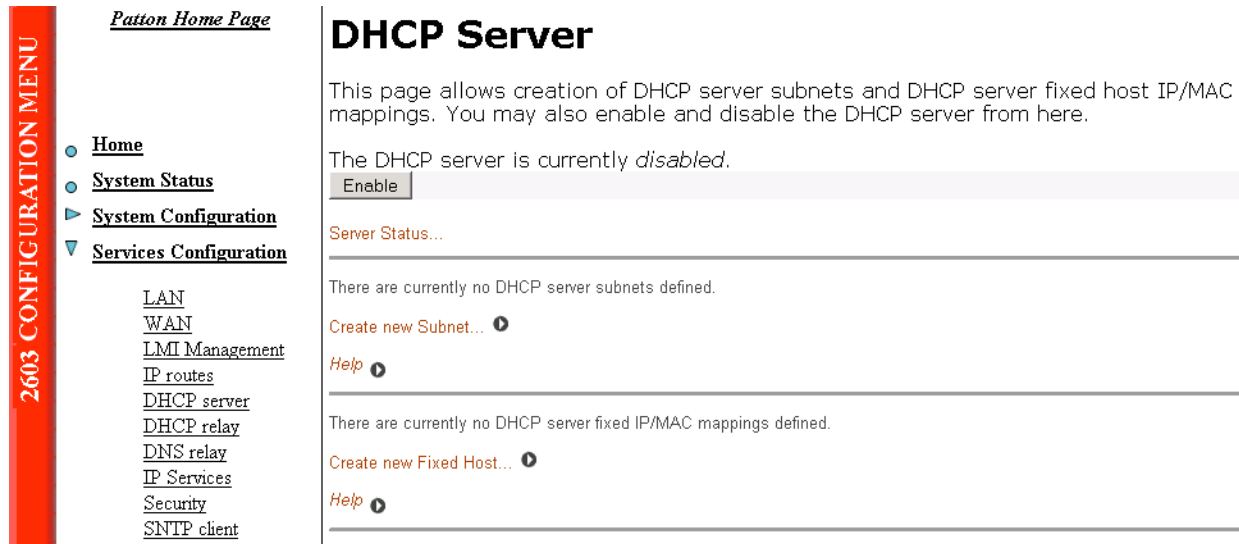


Figure 55. DHCP Server web page

The server needs to have a subnet of IP addresses which will be allocated when a DHCP client makes a request. Define the subnet by clicking on the hyperlink *Create new Subnet...* The next webpage, 'Create new DHCP Server subnet' has four sections.

- Parameters for this subnet: defines the subnet and netmask, the origin of the subnet, maximum lease time, and default lease time.
- IP addresses to be available on this subnet: either define the IP address range for the DHCP server IP pool, or use the default range which is a set of 20 IP addresses.
- DNS server option information: enter the IP addresses of the primary and secondary DNS servers which are provided to the DHCP clients.
- Default gateway option information: You may use the local host as the default gateway.

figure 56 shows the entire configuration web page for the DHCP server.

Create new DHCP server subnet

This page allows you to set up a new DHCP server subnet so that the system can assign IP address, subnet mask and option configuration parameters to DHCP clients.

Parameters for this subnet

Define your new DHCP subnet here. If you do not wish to specify the subnet value and subnet mask by hand, you may instead select an IP interface using the **Get subnet from IP interface** field. A suitable subnet will be created based on the IP address and subnet mask belonging to the chosen IP interface.

Subnet value: . . .

Subnet mask: . . .

Get subnet from IP interface:

Maximum lease time: seconds

Default lease time: seconds

IP addresses to be available on this subnet

You need to make sure that the start and end addresses offered in this range are within the subnet you defined above. Alternatively, you may check the **Use a default range** box to assign a suitable default IP address pool on this subnet.

Start of address range: . . .

End of address range: . . .

Use a default range: ☒

DNS server option information

Enter the addresses of Primary and Secondary DNS servers to be provided to DHCP clients on this subnet. You may instead allow DHCP server to specify its own IP address by clicking on the **Use local host address as DNS server** checkbox.

Primary DNS server address: . . .

Secondary DNS server address: . . .

Use local host address as DNS server: ☐

Default gateway option information

Use local host as default gateway: ☒

Figure 56. DHCP server configuration web page

Parameters for the DHCP Server subnet

Four parameters are in the section for defining the DHCP subnet. (See [figure 57](#).)

Parameters for this subnet

Edit the definition of the DHCP subnet here. If you do not wish to specify the subnet value and subnet mask by hand, you may instead select an IP interface using the **Get subnet from IP interface** field. The subnet will track the IP address and subnet mask belonging to the chosen IP interface.

Subnet value: . . .

Subnet mask: . . .

Get subnet from IP interface:

Maximum lease time: seconds

Default lease time: seconds

Figure 57. DHCP Server subnet parameters

The first two parameters are applicable when you will define the subnet.

- Subnet value: It is necessary to enter the selected value here and the ‘Subnet mask’ if you do not ‘Get subnet from IP interface.’ See description for the 3rd parameter.
- Subnet mask

The third parameter is

- **Get subnet from IP interface:** If you use this option, then you will not enter any values in the first two parameters. Should you define another subnet and also select 'Get subnet from IP interface,' the IPLink uses the 'Get subnet from IP interface' as the ruling parameter and sets 'Subnet value' and 'Subnet mask' appropriately, overriding your initial selection. The 'ip1' Ethernet interface is always one option. However there may be a WAN interface also as an additional option. The interface is the DHCP server "listening" interface. It listens for client requests on this interface.

The two remaining parameters are:

- **Maximum lease time:** the default value is 86,400 seconds.
- **Default lease time:** the default value is 43,200 seconds.

IP Addresses to be available on this subnet

The next section (see [figure 58](#).) has three parameters.

IP addresses to be available on this subnet

*You need to make sure that the start and end addresses offered in this range are within the subnet you defined above. Alternatively, you may check the **Use a default range** box to assign a suitable default IP address pool on this subnet.*

Start of address range

End of address range

Use a default range ☐

Figure 58. DHCP IP address pool

- **Start of address range:** Enter the first IP address to be available in the DHCP IP address pool.
- **End of address range:** Enter the last IP address to be available in the DHCP IP address pool.
- **Use a default range:** Checking this box will give you an IP address pool of 20 contiguous addresses. This setting, when checked, overrides anything entered in the Start and End of address range.

If you have selected 'Get subnet from IP interface' and have checked the 'Use a default range', the first of the twenty IP addresses will be the next sequential address following the IP address of the IP interface. For example, assume that the IP address of 'ip1' is 10.10.19.10/16. [figure 59](#) shows that the IP address pool ranges from 10.10.19.11 to 10.10.19.30.

Parameters for this subnet

*Edit the definition of the DHCP subnet here. If you do not wish to specify the subnet value and subr. instead select an IP interface using the **Get subnet from IP interface** field. The subnet will track the mask belonging to the chosen IP interface.*

Subnet value: 10 . 10 . 0 . 0

Subnet mask: 255 . 255 . 0 . 0

Get subnet from IP interface: ip1

Maximum lease time: 86400 seconds

Default lease time: 43200 seconds

IP addresses to be available on this subnet

*You need to make sure that the start and end addresses offered in this range are within the subnet. Alternatively, you may check the **Use a default range** box to assign a suitable default IP address pool.*

Start of address range: 10 . 10 . 19 . 11

End of address range: 10 . 10 . 19 . 30

Use a default range: ☒

Figure 59. Example based on default range of IP address pool

DNS server option information

When a client requests an IP address from a DHCP server, the server can also send the IP addresses of the primary and secondary DNS servers' IP addresses. The IPLink can accomplish this in one of two ways, neither really having an advantage over the other. This section of the configuration page is one method, the other is DNS Relay to be described later in this chapter. Refer to [figure 60](#).

DNS server option information

*Enter the addresses of Primary and Secondary DNS servers to be provided to DHCP clients on this subnet. You may instead allow DHCP server to specify its own IP address by clicking on the **Use local host address as DNS server** checkbox.*

Primary DNS server address: 10 . 10 . 1 . 10

Secondary DNS server address: 10 . 10 . 1 . 11

Use local host address as DNS server: ☐

Figure 60. Configuration of the DNS server IP addresses

Enter the IP addresses of the primary and secondary DNS servers. Subsequently, the client will receive these addresses when assigned an IP address. When the client makes a DNS inquiry, it sends the request directly to the appropriate DNS server. The IPLink router merely forwards the packet.

The third parameter is 'Use local host address as DNS server' which is the IP address of the IPLink. In this scenario, the client considers the IPLink as a DNS server by sending all requests to the IPLink's IP address. The IPLink forwards the request to the DNS servers using the IP address of the actual servers. You still need to define the IP addresses of the primary and secondary DNS servers in the section because the IPLink needs to know in order to forward the DNS requests.

Default gateway option information

The IPLink is the gateway all client traffic when *Use local host as default gateway* is checked (see [figure 61](#)).

Additional option information

You may wish to provide additional information to the clients on the DHCP subnet. Click on the hyperlink *Create new DHCP option...* to access the configuration webpage. The options can specify:

- A default gateway
- Domain name
- IRC server
- HTTP server
- SMTP server
- POP3 server
- NNTP server
- WINS server
- Time servers

Refer to [figure 61](#) as an example of multiple options to be sent to the clients.

Default gateway option information		
Use local host as default gateway	<input type="checkbox"/>	
Additional option information		
<i>Add and remove items from this list to configure additional option information you would like the DHCP server to give to clients on this subnet.</i>		
Name	Value	Delete?
default-gateway	10.11.12.13	<input type="checkbox"/>
domain-name	idealnetdomain	<input type="checkbox"/>
nntp-server	10.15.1.1	<input type="checkbox"/>
netbios-name-servers	10.10.1.11, 10.10.1.12	<input type="checkbox"/>
Create new DHCP option...		
<input type="button" value="Update"/> <input type="button" value="Reset"/>		

Figure 61. DHCP server optional information example

DHCP Relay

With this webpage, you can enter a list of IP addresses for DHCP servers. When a client requests an IP address, it uses one of the DHCP addresses listed in the DHCP relay webpage. The IPLink forwards (or 'relays') the request to the DHCP server.

Note Do not use the IPLink's DHCP server if the DHCP Relay is enabled.

Configuration of the DHCP Relay

The DHCP Relay webpage has three sections. (See [figure 62](#).)

- Enable/disable: The button in the first section enables or disables the DHCP relay on the IPLink router.

- Edit DHCP server list: The IP addresses of DHCP servers can be updated, reset, or deleted from the list.
- Add new DHCP server: the IP addresses of the DHCP servers are added to the DHCP relay list in this section.

In the first section of the DHCP Relay webpage, click on the Enable button on the DHCP Relay webpage.

DHCP Relay

This page allows you to enter a list of DHCP server IP addresses that the relay will forward DHCP packets to. You may also enable and disable the DHCP relay from here.

The DHCP relay is currently *disabled*.

Enable

Edit DHCP server list

Use this section to edit existing DHCP server addresses present in the DHCP relay's list.

There are currently no DHCP servers in the list. Use the section at the bottom of the page to add a new DHCP server.

Add new DHCP server

Use this section to add a new DHCP server to the DHCP relay's list.

New DHCP server IP address: . . .

Create

Figure 62. DHCP Relay webpage

In the third section of the DHCP Relay webpage, enter the IP address of a DHCP server, and click on the Create button. (See [figure 63](#).) The IP addresses will appear in the section section, 'Edit DHCP server list.'

In the second section, you may update or delete the DHCP server IP addresses. (See [figure 63](#).)

To update or change a DHCP server IP address, enter the desired IP address over the IP address which is no longer valid. Click on the Update button. With this action, you do not need to delete the IP address and subsequently add a new IP address. It is one action.

To delete a DHCP server IP address, check the 'Delete?' box for the appropriate IP address and click on the Update button.

Edit DHCP server list

Use this section to edit existing DHCP server addresses present in the DHCP relay's list.

DHCP server IP address	Delete?
10 . 10 . 253 . 10	<input type="checkbox"/>
<input type="button" value="Update"/> <input type="button" value="Reset"/>	

Add new DHCP server

Use this section to add a new DHCP server to the DHCP relay's list.

New DHCP server IP address: . . .

Figure 63. DHCP Relay server list

DNS Relay

The DNS Relay webpage contains a configurable list of DNS server IP addresses. The IPLink's DNS Relay forwards DNS queries from a client to a pre-defined DNS server and DNS server responses to the client.

You can configure the DNS Relay for two IP addresses. These are for access to primary and secondary DNS servers.

Configuring the DNS Relay

Go to the DNS Relay webpage by following the hyperlink path 'Configuration Menu' > Services Configuration > DNS Relay. (See [figure 64](#).)

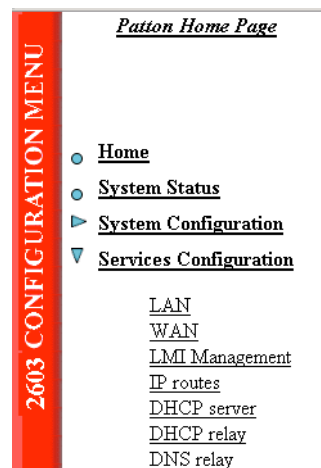


Figure 64. Hyperlink path to the DNS Relay webpage

Enter the IP address of the primary DNS server (see [figure 65](#)) and click on the Create button. Similarly enter the IP address of the secondary DNS server.

DNS Relay

This page allows you to enter a list of DNS server IP addresses that the DNS relay can forward DNS queries to.

Edit DNS server list

Use this section to edit existing DNS server addresses present in the DNS relay's list. The first address should be the Primary DNS server, and the second address should be the Secondary DNS server. You cannot have more than two addresses at a time.

There are currently no DNS servers in the list. Use the section below to add a new DNS server.

Add new DNS server

Use this section to add a new DNS server to the DNS relay's list.

New DNS server IP address: . . .

Figure 65. DNS Relay configuration webpage

You can change the IP address of the DNS servers on the DNS Relay webpage (see [figure 66](#)) by modifying the IP address requiring the change and clicking on the Update button.

To delete the IP address of a DNS server, check the 'Delete?' box, then click on the Update button.

DNS Relay

This page allows you to enter a list of DNS server IP addresses that the DNS relay can forward DNS queries to.

Edit DNS server list

Use this section to edit existing DNS server addresses present in the DNS relay's list. The first address should be the Primary DNS server, and the second address should be the Secondary DNS server. You cannot have more than two addresses at a time.

DNS server IP address	Delete?
<input type="text" value="10"/> . <input type="text" value="10"/> . <input type="text" value="1"/> . <input type="text" value="10"/>	<input type="checkbox"/>
<input type="text" value="10"/> . <input type="text" value="10"/> . <input type="text" value="1"/> . <input type="text" value="11"/>	<input type="checkbox"/>

Figure 66. DNS Relay - configuration completed

Chapter 9 **IP Services**

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IP Services

Certain System Services can be enabled or disabled. They are DNS Relay, FTP, TFTP, SNMP, and the WEB Server.

The importance of disabling any of these services is an issue of security. If you are not using a particular service, it is best to disable it. By disabling it, the associated port is not active, which means it is not available to abuse with the intent of unauthorized access.

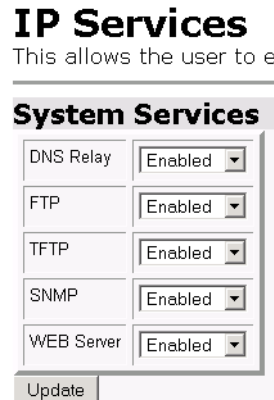


Figure 67. System Services configuration web page

WEB Server

The System Service which must be wisely disabled is the WEB Server. After you disable the WEB Server from the web page, you can no longer access the any of the IPLink's web pages. The only way to enable it is through the Command Line Interface (CLI).

CLI Configuration

After configuring a terminal emulator to access the IPLink's serial port, there are two commands for the enabling or disabling the WEB Server. The following command enables the WEB Server so you can access the management web pages via a browser. Remember that by only doing this command, the change is saved only in volatile memory. Be sure to execute the next command to save it in non-volatile memory.

```
→ webserver enable
→ system config save
```

The next command disables the WEB server.

```
→ webserver disable
```

Associated Ports for the different System (IP) Services

This section is for information purposes only. Consult the table to identify which ports are associated with the different System (IP) Services.

Table 5. Standard port numbers for the System Services

System (IP) Service	TCP	UDP
FTP	21 (control connection) 20 (data connection)	
TFTP		69
SNMP		161
WEB Server	80	80

Chapter 10 **System Configuration**

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Introduction

The *System Configuration* item on the Configuration Menu opens to provide access to twelve (12) different items. They are:

- Authentication: allows you to control access to the IPLink's console and web configuration pages.
- Alarm: shows the Alarm Table and CPU Usage Settings. You can configure the alarm severity for each of the alarms and enable/disable the Alarm Error Log.
- Remote Access: enable and set the time limit for a remote user to have access to the IPLink.
- Update: update the IPLink software from here.
- Save: to save the IPLink configuration in non-volatile memory.
- Backup/Restore: used to save the IPLink's configuration on a PC or to load a configuration already saved on a PC.
- Restart: to do a soft start of the IPLink or to restore the IPLink to factory defaults.
- Key: the key version is used to identify which features are installed in the IPLink.
- Website Settings: configures the refresh rate of the web pages.
- Error Log: displays the Syslog Settings and shows recent configuration errors from the IPLink.
- SNMP Daemon: to modify the SNMP parameters for the IPLink.
- Tools: provides 'ping' and 'traceroute' commands from the IPLink. Also used to clear the interface table counters.

Authentication

The IPLink manager controls access to the IPLink's console and web pages. The default defined user is *superuser*. See [figure 68](#).

Authentication

This page allows you to control access to your router's console and these configuration web-pages

Currently Defined Users

User	May Configure?	Authenticate Remote End?	Comment	
superuser	true	false	Default admin user	Edit user...

[Create a new user...](#)

Figure 68. Authentication web page showing default *superuser*

The *superuser* is the default administrative user and is given authority to configure the IPLink, but the default settings have disabled the ability to authenticate through a remote connection. To enable remote access authentication, click on *Edit user...*

To add another user account, click on *Create a new user...* (See [figure 69](#).) You will define the new user by

- creating a Username
- defining the Password
- give the user ability to configure the IPLink or read-only authority
- add a comment useful to the administrator

Authentication: create user

Details for new user

Username:

Password:

May Configure?

May Dial-in?

Comment:

[Cancel and return to Authentication Setup Page...](#)

Figure 69. Creating new user

Alarm

Access the configuration and status of the alarms.

Alarm Management:

This page shows the table of alarms reported by the device.

[Modify Alarms...](#)

Alarm State: No Alarms

Alarm Error Log Reporting

Log Severity Level Major

Log Alarm State Enabled

Alarm Table

ID	Alarm Name	Alarm Severity	Time	Count	Generate Alarm	Clear Active Condition	Reset Alarm
1	PP Over Threshold	Major	00:00:00s	0	<input type="button" value="Generate"/>	<input type="button" value="Clear"/>	<input type="button" value="Reset"/>
2	NP Over Threshold	Major	00:00:00s	0	<input type="button" value="Generate"/>	<input type="button" value="Clear"/>	<input type="button" value="Reset"/>
3	T1/E1 Loss of Signal	Major	00:00:00s	0	<input type="button" value="Generate"/>	<input type="button" value="Clear"/>	<input type="button" value="Reset"/>
4	T1/E1 Red Alarm	Minor	00:00:00s	0	<input type="button" value="Generate"/>	<input type="button" value="Clear"/>	<input type="button" value="Reset"/>
5	T1/E1 Yellow Alarm	Minor	00:00:00s	0	<input type="button" value="Generate"/>	<input type="button" value="Clear"/>	<input type="button" value="Reset"/>
						<input type="button" value="ALL Alarms"/>	<input type="button" value="ALL Alarms"/>

Figure 70. Alarm Management web-page

All IPLinks have the 'PP over Threshold' and 'NP over Threshold' alarms. The Model 2603 has additional alarms for the T1/E1 WAN port. An alarm can be tested by clicking on the Generate button. Similarly, by clicking on the Clear button, the alarm is cleared, that is, turned off, however the Time and Count parameters

remain. Only by clicking on the Reset button can you clear the alarm and reset the Time and Count parameters. The parameter definitions are:

- Alarm Severity: there are five categories of severity-Critical, Major, Minor, Informational, and Ignore.
- Time: the time that the last alarm occurred.
- Count: the number of instances the alarm has occurred.

To configure the severity of each alarm and to configure the Alarm Error Log, click on *Modify Alarms...* to reach the webpage. (See [figure 71](#).)

Alarm Error Log Reporting

Log Severity Level: Major
Log Alarm State: enable

Update

Alarm Table

ID	Alarm Name	Alarm Severity	Update Alarm
1	PP Over Threshold	Major	Update
2	NP Over Threshold	Major	Update
3	T1/E1 Loss of Signal	Major	Update
4	T1/E1 Red Alarm	Minor	Update
5	T1/E1 Yellow Alarm	Minor	Update

Figure 71. Alarm & Alarm Error Log configuration

The Alarm Error Log can be enabled or disabled. The severity level of the Alarm Log can also be configured. Similarly each alarm can be set for its own severity level.

Remote Access

The IPLink can be accessed via Telnet, known as Remote Access. The length of access over a remote connection is set on this webpage. If set for zero (0), no user can access the IPLink remotely. However if a user is authorized for access, then the time is the limit before the remote access session is closed.

Remote Access

From this page you may temporarily permit remote administration of this network device

Enable Remote Access

Allow access for: 30 minutes.

Enable

Figure 72. Remote Access (Telnet) access limit

Update

To upgrade the IPLink to another software version, select the software image by clicking on the Browse button. The software is a '.tar' file. (See [figure 73](#).) After selected, the software is downloaded to the IPLink. Wait until the upload has completed. The best way to monitor when the IPLink reboots is to view the process from the RS-232 console port.

Firmware Update

From this page you may update the system software o

Select Update File

Updates (where available) may be obtained from [Patton Electronics Company](#)

New Firmware Image

[Options](#)

Figure 73. Updating software

Clicking on *Options* provides for selecting 'Firmware Update Configuration.' If enabled, the IPLink will prevent updating with incorrect software.

Save

To save configuration changes to non-volatile memory, it is essential to click on the Save button on this webpage. (See [figure 74](#).) If you do not do this, all configuration changes are stored only in volatile memory, meaning that if the IPLink is restarted, all configuration changes are lost. Click on the Save button and wait until seeing the message "Saved information model to im.conf."

Save configuration

Confirm Save

Please confirm that you wish to save the configuration.

There will be a delay while saving as configuration information is written to flash.

Figure 74. Save configuration changes in non-volatile memory

Backup/Restore

You may save or use previously saved configurations from this webpage. Should you want to save a specific application configuration from the IPLink, click on *Backup configuration to your computer*.

To reload a previously saved configuration file (.icf), browse and select the file from your computer. Click on the Restore button to load into the IPLink. (See [figure 75](#).)

Configuration Backup/Restore

This page allows you to backup the configuration settings to your computer, or restore configuration from your computer.

Backup Configuration

Backup configuration to your computer.

Restore Configuration

Restore configuration from a previously saved file.

Configuration File

Figure 75. Saving or reloading previously saved configuration files

Restart

From this webpage, you can do a soft reboot of the IPLink or restore the IPLink to factory defaults. To restore to factory defaults, click on the box for *Reset to factory default settings*. (see [figure 76](#).) Then click on the **Restart** button. No warning is given before beginning the reboot process. You will need to configure the IP address of the Ethernet port again as described in Chapter 3, Initial Configuration.

Restart Router

From this page you may restart your router

Restart

After restarting, please wait for several seconds to let the system come up. If you would like to reset all configuration to factory default settings, please check the following box:

☒ **Reset to factory default settings**

Figure 76. Restoring to factory defaults

Website Settings

The refresh rate of the webpages is a configurable parameter. Enter the desired refresh rate (in seconds) and click on the Update button. Default value is 4 seconds. (See [figure 77](#).)

Website Settings

Refresh Rates

Refresh Rate: seconds

Figure 77. Webpage refresh rates

Error Log

The Error Log webpage shows recent configuration errors and provides for the configuration of the Syslog. (See [figure 78](#).) Two parameters are configurable for the Syslog.

- Syslog Host: enter the IP address of the Syslog (Default = 0.0.0.0)
- Syslog Facility: select the type of syslog facility (Default = disabled)s

Click on the Update button to activate the selected parameters. Default value is a disabled Syslog.

Error log

This page shows recent configuration errors from your router

Syslog Settings

Syslog Host	<input type="text" value="0.0.0.0"/>
Syslog Facility	<input type="text" value="disable"/>
<input type="button" value="Update"/>	

Error log (most recent errors last; times are in seconds since last reboot):

When	Process	Error
1072915200	im	im:Invalid argument:failed to set the SNMP host to
1072915201	alarm	alarm:Box State Change to Minor

Figure 78. Error Log and Syslog Settings

SNMP Daemon

For remote management from an SNMP capable management station, the IPLink's SNMP Daemon must be configured. To identify a specific IPLink, configure the Static Variables which the system administrator may use for link identification.

The Community Table has three configurable parameters.

- Password: this is the password which the remote management station must use to access the IPLink for reading/writing the SNMP variables.
- Management IP: the IP address of the management station.
- Access: select either Write or Read. The management station can be authorized to configure the IPLink by 'writing' to the SNMP variables or limited to a 'read'-only function.

To delete an entry, click on the 'Del' box and click on the Update button.

SNMP Daemon Settings

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

Static Variables

System Description	2603 Single Port Router
System Location	not set
System Contact	not set
System Name	not set

Community Table

Index	Password	Management IP	Access	Del
1	secret	10.10.22.45	Write	<input type="checkbox"/>
NEW		0.0.0.0	Write	<input type="button" value="Create"/>

Trap Table

Index	Password	Management IP	Del
NEW			<input type="button" value="Create"/>

Save SNMP Configuration

Figure 79. SNMP Daemon configuration

The Trap Table identifies the IP address of the SNMP trap along with its password.

System Tools

The System Tools webpage provides two utilities for testing network connectivity. The two utilities are 'ping' and 'traceroute.' Enter the IP address of the device to 'ping' or 'traceroute' and click on the appropriate button. The example in shows a successful ping of a PC.

System Tools

This page gives the user access to system tools.

Ping and Traceroute Controls

This allows the box to initiate a Ping or Traceroute request. Note that input must be an IP address in the form 'XXX.XXX.XXX.XXX'.

10.10.22.45

PING 10.10.22.45: 32 data bytes
40 bytes from 10.10.22.45: seq=0, ttl=128, rtt<10ms

Figure 80. Ping and Traceroute utilities

Chapter 11 **SNTP Client Configuration**

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Introduction

The Simple Network Time Protocol (SNTP) Client webpage contains the configurable parameters for either setting up the SNTP client or, in the absence of an SNTP server, setting the internal clock.

If you plan the use of an SNTP server, you will configure the ‘SNTP Client Mode Configuration Parameters’ and ‘SNTP Client General Configuration Parameters.’ If you are not accessing an SNTP server, you can configure the system clock for a calendar clock setting.

Configuring the SNTP Client

The “SNTP Client Mode Configuration Parameters” section is for selecting the synchronization mode and entering the IP address of the SNTP Server. With the “SNTP Client General Configuration Parameters” section, you will select the time zone and set the transmit packet timeout period, retries, and polling period.

SNTP Client Mode Configuration Parameters

In this section you configure the synchronization mode and enter the IP address of the SNTP server. The IPLink supports three synchronization modes: unicast mode, anycast mode, and broadcast mode. Unicast is a point-to-point mode. Anycast is a multipoint-to-point mode. Broadcast mode is for use when the SNTP server is on the local network, that is, the same subnet as the IPLink.

When *Unicast mode* is enabled, the IPLink sends a request to the server designated in the field containing the SNTP server’s IP address. (See [figure 81](#).) This is a point to point communication link. The IPLink requests from one server. The server sends the timing information directly to the IPLink. When disabled, the IPLink does not send any requests to any SNTP Server.

In *Broadcast mode*, the synchronization is with an SNTP server on the local network. Since routers do not forward broadcast IP addresses, the SNTP server and IPLink must be on the same subnet.

With *Anycast mode*, the IPLink’s SNTP client sends a request to a designated broadcast address. One or more SNTP servers may reply with a unicast message to the IPLink. The IPLink communicates with the server first responding. After this point, the IPLink operates in unicast mode. When *Anycast* is enabled, *Unicast* is automatically enabled and the IP address of 255.255.255.255 is in the SNTP server’s IP address field. *Anycast* takes precedence over *Broadcast* mode.

The field *Configured IP Address of SNTP Server*: is the IP address of the dedicated unicast server that the SNTP client will use for synchronization.

SNTP client

SNTP Client Mode Configuration Parameters

SNTP Synchronization mode(s):

Unicast Mode: ☐ Enabled ☒ Disabled

Anycast Mode: ☐ Enabled ☒ Disabled

Broadcast Mode: ☒ Enabled ☐ Disabled

Configured IP Address of SNTP Server:

Figure 81. SNTP synchronization and server IP address configuration

SNTP Client General Configuration Parameters

The general configuration parameters for the SNTP client are for selecting your timezone and setting the polling parameters for the client's transmit packets.

- Current Timezone: select the appropriate time zone and click on the Set New Timezone button.

The next three parameters configure the polling and synchronization process.

- Timeout value—The SNTP client will wait for the configured number of seconds of having no response from the server before retrying to send another time synchronization request. The maximum timeout value is 30 seconds. Default value is 5 seconds.
- Packet retries—When no response (after the timeout period) is received from the SNTP server, the IPLink will send another request for the number times configured in this parameter. The maximum number of retries is 10. Default value is 2.
- Polling value (in minutes)—The SNTP client will automatically send a time synchronization request periodically. If set to zero (0), the polling mechanism is disabled. The maximum value is 30 (minutes).

The screenshot shows a web form titled "SNTP Client General Configuration Parameters". It contains the following elements:

- A dropdown menu for "Current Timezone (+-UTC/GMT time):" with "US Eastern Standard (-5h)" selected.
- A "Set New Timezone" button.
- A text input field for "Enter new SNTP transmit packet timeout value (in seconds):" with the value "5".
- A text input field for "Enter new SNTP transmit packet retries value:" with the value "2".
- A text input field for "Enter new SNTP automatic resynchronization polling value (in minutes):" with the value "0".
- A "Set New Values" button.

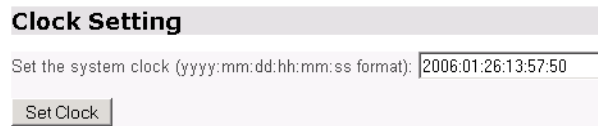
Figure 82. Timezone and Polling packet configuration

System Clock Setting

If you are not using a Stratum clock with the SNTP feature, you can still configure the internal system clock for a calendar date and time. This parameter is on the same web page as the SNTP Client configuration. The format is:

<Year(4 digits)> <Month(2 digits)> <Day(2 digits)> <Hour(2 digits)> <Minutes(2 digits).> <Seconds(2 digits)>

The example in [figure 83](#) is set for January 26, 2006, at 1:57:50 pm.



Clock Setting

Set the system clock (yyyy:mm:dd:hh:mm:ss format):

Figure 83. Configuration of the internal system calendar clock

After entering the system clock values, click on the Set Clock button to save in volatile memory.

If the IPLink is rebooted, either soft or by power-cycling, the Clock Setting returns to its default value.

Chapter 12 **System Status**

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System Status

A quick but thorough summary of the IPLink's status is provided on this webpage, but it also has links to the detailed webpages for the key subsystems of the IPLink.

The webpage is divided into six (6) sections:

- **Port Connection Status:** connection status of the Ethernet port and a link to the 'Ethernet Port Configuration' webpage.
- **LAN Status:** displays the local IP address on the Ethernet port, the MAC address and links to the LAN connections and DHCP Server web pages.
- **WAN Status:** parameters and links to the WAN services defined on the serial port.
- **PPPoE Status:** the connection authentication status is available when the PPPoE WAN service is configured and activated.
- **Hardware Status:** shows the time that the IPLink has been operating, the current time, software version, and a link to configure the time (including the SNTP client).
- **Defined Interfaces:** provides links to statistics for the defined interfaces.

Status			
Port Connection Status			
Port	Type	Connected	Line State
Ethernet	ethernet	✓	N/A
LAN Status			
Local IP Address: 10.10.19.10		LAN Settings... ⓘ	
LAN Subnet Mask: 255.255.0.0			
Act as Local DHCP Server: No		DHCP Server Settings... ⓘ	
MAC Address: 00:A0:BA:00:5D:9C			
WAN Status			
IP Address Type: Static		IP Address Settings... ⓘ	
WAN Subnet Mask: None			
Default Gateway: 192.1.1.4			
Primary DNS: None		DNS Client Settings... ⓘ	
PPPoE Status			
Connection Authentication: None			
Hardware Status			
Up-Time: 00:44:46s			
Current Time: Wed, 31 Dec 2003 - 19:44:37		Set Time... ⓘ	
Version: OP Image Software Revision 2.6.3 [Kernel: 8.2.0.37] (Jan 13 2006)			
Defined Interfaces			
fr rtd: Show Statistics... ⓘ			
eth0: Show Statistics... ⓘ			

Figure 84. System Status: subsystems' summary

Port Connection Status

The *Ethernet* link goes to the 'Ethernet Port Configuration' webpage. This is the same webpage accessed by clicking on the *Ethernet* menu item in the Configuration Menu. 'Connected' indicates whether the Ethernet port sees a received signal.

LAN Status

There are two hyperlinks, *LAN Settings...* and *DHCP Server Settings...*, which go to the 'LAN Connections' and 'DHCP Server' webpages, respectively. The other parameters shown in LAN Status are as follows:

- Local IP address: the IP address of the Ethernet port.
- LAN subnet mask: the subnet mask of the Local IP address.
- Act as Local DHCP Server: indicates 'Yes' or 'No' as to whether the DHCP server is enabled or disabled. An enabled DHCP server provides IP addresses to DHCP clients attached to the Ethernet port.
- MAC address: the MAC address of the Ethernet port.

WAN Status

Displays the basic parameters and status of the WAN port service and a link to the WAN Services configuration web page.

- IP Address Type: indicates whether the IP address of the WAN service is statically assigned or as a DHCP client.
- Default gateway: the gateway defined by the 'IP Routes' submenu item under 'Services Configuration' in the Configuration Menu.
- Primary DNS: DNS client is currently not available.

Hardware Status

The definitions of the parameters are as follows.

- Up-Time: this is the time since the IPLink was last rebooted, either soft or hard power cycle.
- Current Time: the time is derived from one of two sources. If the IPLink is configured as an SNTP client, the time is from an SNTP server. If the SNTP client is not configured, the time derives from the Clock Setting as set by the user. The Clock Setting is found in the 'SNTP Client' configuration page.
- Version: lists the version of the operating software in the IPLink. The version information is more detailed than is listed on the Home webpage of the IPLink.
- *Set Time...*: a link to the SNTP Client configuration page.

Defined Interfaces

Provides links to operating statistics of the defined interfaces.

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 6. 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 13 **Contacting Patton for assistance**

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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.

Patton support headquarters in the USA

- Online support—available at <http://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 (1300 to 2200 UTC/GMT)—by calling +1 (301) 975-1007
- Fax—+1 (253) 663-5693

Alternate Patton support for Europe, Middle East, and Africa (EMEA)

- Online support—available at <http://www.patton-inalp.com>
- E-mail support—email sent to support@patton-inalp.com will be answered within 1 day
- Telephone support—standard telephone support is available five days a week—from 8:00 am to 5:00 pm CET (0900 to 1800 UTC/GMT)—by calling +41 (0)31 985 25 55
- Fax—+41 (0)31 985 25 26

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 **Compliance information**

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Compliance

EMC

- FCC Part 15, Class A
- EN55022, Class A
- EN55024

Safety

- UL 60950-1/CSA C22.2 N0. 60950-1
- IEC/EN60950-1
- AS/NZS 60950-1

PSTN Regulatory (2603 Model only)

- ACTA Part 68
- CS03
- AS/ACIF S016

Radio and TV Interference (FCC Part 15)

This equipment 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. This equipment has been tested and found to comply with the limits for a Class A computing device in accordance with the 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 equipment causes interference to radio or television reception, which can be determined by disconnecting the cables, 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 Declaration of Conformity

This equipment conforms to the requirements of Council Directive 1999/5/EC on the approximation of the laws of the member states relating to Radio and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

The safety advice in the documentation accompanying this product shall be obeyed. The conformity to the above directive is indicated by the CE sign on the device.

The signed Declaration of Conformity can be downloaded at www.patton.com/certifications

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.

The method 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.

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 (2603 Model only)

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.

This Declaration of Conformity means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.

Appendix B **Specifications**

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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 192.168.200.10/24.
- 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 802.1d transparent learning bridge up to 1,024 addresses.
- 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 (also includes 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)
- 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 and traceroute 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.
- IGMPv2 Proxy support (RFC 2236).
- Frame Relay with Annex A/D LMI, RFC 1490 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)
- Logging via SYSLOG, and VT-100 console. Console port set at 9600 bps 8 bits, no parity, 1 stop bit, 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.

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



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 C **Cable Recommendations**

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Ethernet Cable

Ethernet cable (P/N 10-2500) (refer to “[RJ-45 shielded 10/100 Ethernet port](#)” on page 125)



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Adapter

EIA-561 to DB-9 (P/N 16F-561) (refer to “[RJ-45 non-shielded RS-232 console port \(EIA-561\)](#)” on page 125)



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Appendix D **IPLink Physical Connectors**

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RJ-45 shielded 10/100 Ethernet port

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

Table 7. Ethernet Port (MDI-X switch in out position)

Pin No.	Signal Name	Direction
1	TX+	from IPLink
2	TX-	from IPLink
3	RX+	to IPLink
4		
5		
6	RX-	to IPLink
7		
8		

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

The RS-232 serial control port of the IPLink is configured to operate as a DCE.

Table 8. RS-232 Control Port

Pin No.	Signal Name	Direction
1	DSR	from IPLink
2	CD	from IPLink
3	DTR	to IPLink
4	Signal Ground	-
5	RD	from IPLink
6	TD	to IPLink
7	CTS	from IPLink
8	RTS	to IPLink

Serial port

V.35 (M/34 and DB-25 Connector)

The Model 2635 has a DB-25 connector for the V.35 interface. [table 9](#) provides the pinouts for the M/34 and DB-25 connectors.

Table 9. V.35 pinout for M/34 & DB-25 connectors

M/34 Pin No.	DB-25 Pin No.	Signal Name	Direction
A	1	Frame/Chassis Ground	n/a
P	2	TD-a	from DTE
R	3	RD-a	to DTE
C	4	RTS	from DTE
D	5	CTS	to DTE
E	6	DSR	to DTE
B	7	Signal Ground	n/a
F	8	CD	to DTE
X	9	RC-b	to DTE
	10		
W	11	XTC-b	from DTE
AA	12	TC-b	to DTE
	13		
S	14	TD-b	from DTE
Y	15	TC-a	to DTE
T	16	RD-b	to DTE
V	17	RC-a	to DTE
L	18	Local Loopback	to DTE
	19		
H	20	DTR	from DTE
N	21	Remote Loopback	to DTE
	22		
	23		
U	24	XTC-a	from DTE
M	25	Test Mode	to DTE

X.21 (DB-15 Connector)

The X.21 interface in the Model 2621 may be configured for either DTE or DCE. Default is DCE.

Table 10. X.21 Interface (Model 2621)

Pin No.	Circuit	Signal Name	Direction
1	G	Signal Ground or Common Return	-
2	T	Transmit (Data)-a	from DTE
3	C	Control-a	from DTE
4	R	Receive (Data)-a	to DTE
5	I	Indication-a	to DTE
6	S	Signal Timing-a	to DTE
7	-	-	-
8	Ga	DTE Common Return	-
9	T	Transmit (Data)-a	from DTE
10	C	Control-b	from DTE
11	R	Receive (Data)-b	to DTE
12	I	Indication-b	to DTE
13	S	Signal Timing-b	to DTE
14, 15	-	-	-

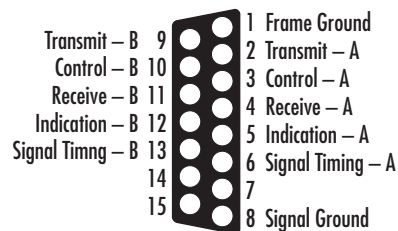


Figure 85. X.21 DB-15 connector

E1/T1 (RJ-48C Connector)

The T1/E1 transmit signals are not polarity sensitive, even though they have the traditional designation of Tip and Ring.

Table 11. T1/E1 Port

Pin No.	Signal
1	Receive (Ring)
2	Receive (Tip)
3	Shield (Receive)
4	Transmit (Ring)
5	Transmit (Tip)
6	Shield (Transmit)
7	
8	

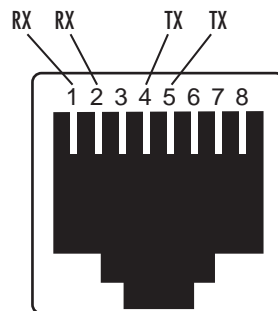


Figure 86. T1/E1 RJ-48C connector

Appendix E **Command Line Interface (CLI) Operation**

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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
- PPP: Point-to-Point Protocol 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:

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

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

To continue our example:

```
→ ethernet list ?
    ports
    transports
→ ethernet list
```

Then

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

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

```
→
```

Another example shows when the user must provide a parameter.

```
→ ip ?
    list
    clear
    add
    delete
    set
    attach
    attachbridge
    detach
    show
    interface
    ping
→ 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.

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

```
ip interface ipl list secondaryipaddresses <enter>
```

```
Secondary IP addresses for interface: ipl
```

```
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.

```
→ system config save
```

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

```
→ 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}
```