

Prestige 941

DOSCIS Based

Cable Router

User's Guide

Version 2.70

September, 2001

ZyXEL

TOTAL INTERNET ACCESS SOLUTION

Prestige 941

Cable Router

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- Product : Cable Bridge/Router
Model Number : Prestige 941, Prestige P942, Prestige 961, Prestige P962
- RFI Emission: Limit class B according to EN 55022: 1998
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Electrostatic Discharge according to EN 61000-4-2:1995
Contact Discharge: +/-4kV, Air Discharge; +/-8kV
Radio-frequency electromagnetic field according to EN 61000-4-3:1996
80-1000MHz with 1kHz AM 80% Modulation: 3V/m
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Immunity to conducted disturbances, induced by radio-frequency fields: EN 61000-4-6:1996
0.15-80MHz with 1kHz AM 80% Modulation: 3V/m
Power frequency magnetic field immunity test according to EN 61000-4-8:1993
1A/m at frequency 50Hz
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FCC Part 15 class B
- Safety: Safety of Information Technology Equipment, including Electrical Business Equipment
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Preface

About Your Cable Router

Congratulations on your purchase of the Prestige 941 Cable Router.

The Prestige Cable Router connects your 10/100 Mbps LAN to the Internet through your television cable. It follows the industry standards and is interoperable with the industry's leading cable Headend equipment. It is an ideal cable access solution for small offices and home offices to enjoy broadband Internet access.

Your Prestige 941 is easy to install and to configure since you do not need to set any switches.

All functions of the Prestige are software configurable via the SMT (System Management Terminal) interface. The SMT is a menu-driven interface that you can access from a terminal emulator through the console port or over a telnet connection.

About This User's Guide

The nine chapters of this manual are designed to guide you through the configuration of your Prestige for its various applications.

Structure of This Manual

This manual is divided into five parts:

1. *Getting Started* (Chapters 1 and 2) is structured as a step-by-step guide to help you connect, install and setup your Prestige to operate on your network.
2. *The Internet Access* (Chapter 3) describes how to configure your Prestige for Internet access.
3. *Management & Maintenance* (Chapters 4 to 7) provides information on management and maintenance facilities for network administrators.
4. *Telnet Configuration and Capabilities* (Chapter 8) provides information about configuration using telnet.
5. *Troubleshooting* (Chapter 9), provides information about solving common problems.

Regardless of your particular application, it is important that you follow the steps outlined in *Chapters 1* and *2* to connect your Prestige to your LAN. You can then refer to the appropriate chapters of the manual, depending on your applications.

Syntax Conventions

- “Enter” means for you to type one or more characters and press the carriage return. “Select” or “Choose” means for you to select one from the predefined choices.
- The SMT menu titles and labels are in **Bold Times** font. The choices of a menu item are in **Bold Arial** font. A single keystroke is in Arial font and enclosed in square brackets, for instance, [Enter] means the Enter, or carriage return, key; [ESC] means the Escape Key.
- For brevity’s sake, we will use “e.g.,” as a shorthand for “for instance” and “i.e.,” for “that is” or “in other words” throughout this manual.

Related Documentation

➤ *Support Notes*

More detailed information about the Prestige and examples of its use can be found in the Supporting CD.

➤ *Packing List Card*

You should have a Packing List Card that lists all items that should have come with your Prestige.

➤ *ZyXEL Web Page and FTP Server Site*

You can access release notes for firmware upgrades and other information at ZyXEL web pages and FTP server sites. Refer to the *Customer Support* page in this User’s Guide for more information.

Chapter 1

Getting to Know Your Cable Router

This chapter provides functional overviews, key features, applications and product specifications of your Prestige Cable Router.

1.1 Overview of the Prestige 941 Cable Router

The Prestige is a high bandwidth Internet access Cable Router that connects your LAN to the Internet using the hybrid fiber coaxial (HFC) cable; the same cable that brings television into a cable television (CATV) subscriber's home. With the Prestige Cable Router, a computer can be connected to the HFC cable network for high-speed access to the Internet. It is ideal for cable users with more than one computer and is an excellent alternative to the more expensive leased lines.

Prestige cable routers are based on the Multimedia Cable Network System (MCNS) Data Over Cable Service Interface Specification (DOCSIS) standards specifications. MCNS is a consortium of cable television companies whose goal is to create standards for interoperable data-over-cable systems.

The Prestige operates with one external 9V DC-input power supply.

1.2 Bridge and Router

According to DOCSIS specification, a cable modem is basically a bridge device. It can be configured to serve specific CPEs by provisioning their MAC addresses. Only traffic to/from these CPEs will be forwarded. The others will be filtered. It can also be configured to serve specific numbers of CPEs. However, these services are provided by your cable operator. They have to setup one account for each CPE.

For most Internet users, they have only one access account. If they have two computers' at home and want to share this account for two or more users, they have to add another Internet sharing device, like a router.

The Prestige Cable Router can be configured as either a bridge or router. In router mode, it is equivalent to a cable modem plus a router. This is very suitable for Internet sharing.

1.3 Key Features of the Prestige 941 Cable Router

The following are the key features of the Prestige 941 Cable Router:

- **DOCSIS compliant cable modem**

Provides interoperability with other DOCSIS compliant cable modems and cable headend equipment.

- **Support for both Bridging and Routing operation modes**

With both Bridging and Routing operation modes, the Prestige is highly suitable for both residential and SOHO applications.

- **Peak downstream signaling rates of 43 Mbps and upstream signaling rates of 10 Mbps**

Access the Internet with high performance network capability.

- **IP routing, TCP, ICMP, ARP, TFTP, RIP1, RIP2 using the ZyNOS software**

Improves network performance through containment of broadcast messages and improves security through address filtering of IP packets and support for unicast, broadcast and multicast IP packets.

- **SUA/NAT for single-IP-address Internet access**

The SUA (Single User Account) feature allows multiple users to share a single ISP account.

IP routing combines port-level multiplexed NAT (Network Address Translation) to provide ease of configuration in SOHO networks and to provide conservation of IP addresses and dynamic allocation of address.

- **Auto-negotiating 10/100 Mbps Ethernet**

The LAN interface automatically detects if it is on a 10 Mbps or a 100 Mbps Ethernet.

- **56-bit DES Baseline Privacy**

- **MAC address, IP address and TCP/UDP ports filtering**

- **Packet Filter**

The Packet Filter blocks unwanted traffic from entering/leaving your network.

- **DHCP Server**

The Prestige's DHCP (Dynamic Host Configuration Protocol) server capability allows you to automatically assign TCP/IP settings to a workstation on your LAN.

- **DHCP Client**

The Prestige's DHCP client capability allows it to get its IP address from the ISP automatically.

- **Full Network Management**

This feature allows you to access SMT (System Management Terminal) through the console port or telnet connection.

- **RoadRunner Support**

In addition to standard cable modem services, the Prestige supports Time Warner's RoadRunner Service.

- **Logging and Tracing**

Built-in message logging and packet tracing.

- **UNIX Syslog Support**

- **Software Remotely Upgradeable**

The software and configuration information is downloadable from the cable headend to the cable router. This eliminates the need for a cable technician's visit to install software upgrades.

- **Built-in Remote Diagnostic Features**

Perform device configuration and troubleshooting via a direct terminal connection or by boot-up and CMTS-initiated diagnostics, eliminating visit by a technician.

1.4 Internet Access Applications for Prestige 941

This section shows you the possible applications for your Prestige 941.

With built-in routing capability, the Prestige SUA/NAT function allows users to connect multiple workstations to the Internet with a single IP address via HFC network. Your Prestige supports the TCP/IP

protocol that the Internet uses exclusively. Typical Internet access applications in a home and business environment are shown next.

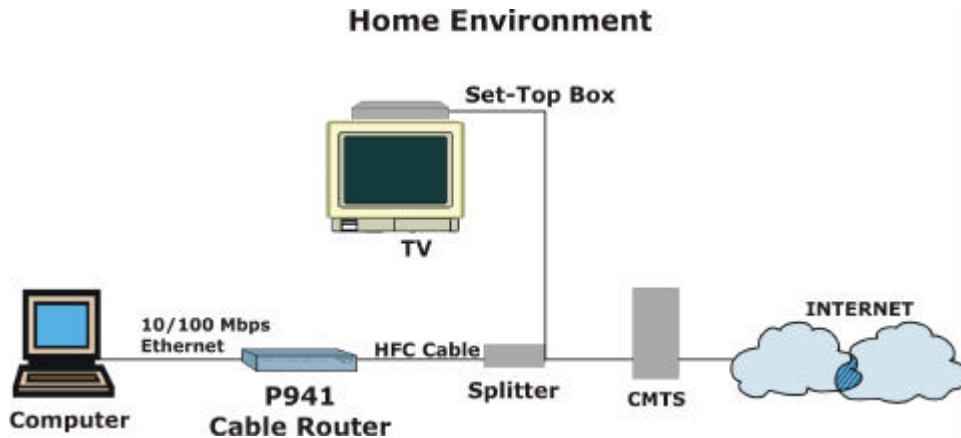


Figure 1-1 Home Environment

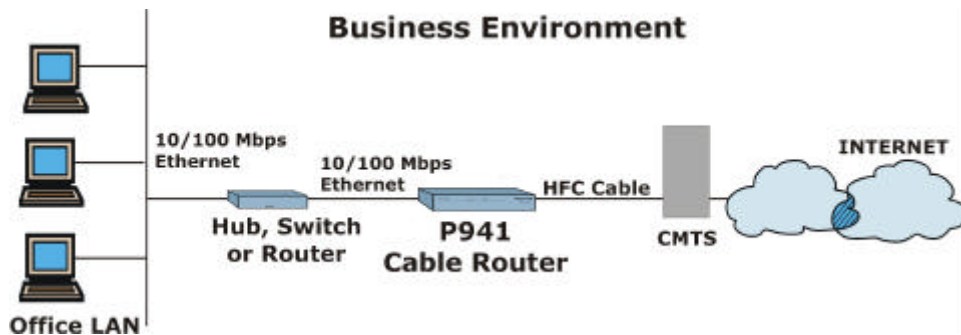


Figure 1-2 Business Environment

For Internet access applications, the highlights of the Prestige's distinguished features are described as follows:

- **High Speed Access to the Internet**

Downstream (receive) signal rate of up to 43 Mbps, and upstream (send) signal rate of up to 10 Mbps (Please see NOTE).

- **Support for both Bridging and Routing operation modes**

The Prestige is highly suitable for both residential and SOHO applications as it supports both bridging and routing modes.

Internet Single User Account

For a SOHO (Small Office/Home Office) environment, your Prestige offers a Single User Account (SUA) feature that allows multiple users on the LAN (Local Area Network) to access the Internet concurrently at the cost of a single user.

- **Multicast Messages**

Multiple users can receive important information at the same time.

- **User Data Privacy**

Upstream and downstream data is encrypted to provide data privacy protection.

- **10/100 Mbps Ethernet Interface**

10/100 Mbps Ethernet interface provides high speed and flexible LAN interface.

- **Software Remotely Upgradeable**

Software and configuration information is downloadable from the headend CMTS to the cable router for future software upgrade. Your cable operator will help you in future software upgrades.

NOTE: DOCSIS cable systems are capable of providing signaling rate of up to 43 Mbps and 10 Mbps for downstream and upstream respectively. This bandwidth however, is shared by several subscribers because there are very few computers today that can connect to a network at such high speeds. Hence, typical connection speeds are 5 Mbps downstream and 1 Mbps upstream.

1.5 Product Specifications

Table 1-1 lists the Prestige 941 Cable Router specifications.

Table 1-1 Prestige 941 Cable Router Specifications

Features	Downstream	Upstream
Operating Frequency	88 MHz ~ 860 MHz	5 MHz ~ 42 MHz
Modulation	64 QAM and 256 QAM	QPSK and 16 QAM
Channel Width	6 MHz	200/400/800/1600/3200 kHz
Receive Input Level	-15 dBmV to +15 dBmV	
Output Transmission Power		+8 ~ +58 dBmV (QPSK) +8 ~ +55 dBmV (16 QAM)
Signaling Rates	30.34 Mbps (64 QAM) 42.88 Mbps (256 QAM)	320 kbps ~ 5.12 Mbps (QPSK) 640 kbps ~ 10.24 Mbps (16 QAM)
FEC	Reed Solomon Decoder	Reed Solomon Encoder
Encryption	56-bit DES	56-bit DES
Numbers of LAN Users (with external hub)	Bridge Mode: up to 15 Router Mode: up to 64	
Power Requirements	9 VDC @ 1.2 Amps (maximum)	
Operating Requirements	Temperature: 0° C to 40° C (32° F to 104° F) (Please see NOTE) Humidity: 5 % to 90 % (non-condensing)	
Dimensions	230(W) x 160(D) x 34.5(H) mm 9.05(W) x 6.3(D) x 1.36(H) inches	
Weight	510gm (1.02lb)	
Power Adapter	110/120/220/230/240V AC, 50 ~ 60 Hz (depends on your locality)	

NOTE: To keep the Prestige cable router operating at optimal internal temperature, keep the bottom, sides and rear of the cable router clear of obstructions and away from the exhaust of other equipment.

Chapter 2

Hardware Installation and Initial Setup

This chapter shows the procedures for installing and starting the Prestige 941 cable router.

2.1 Front Panel LEDs and Back Panel Ports

2.1.1 Front Panel LEDs

The LEDs on the front panel indicate the operational status of the Prestige 941.

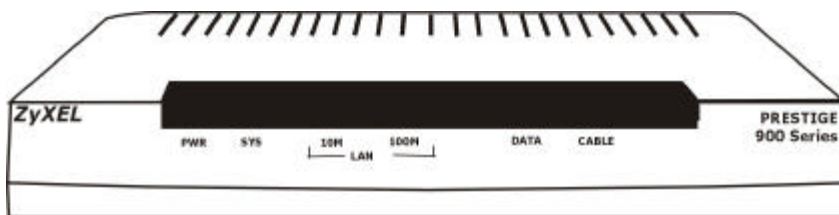


Figure 2-1 Front Panel

The following table describes the LED functions:

Table 2-1 LED Functions

FUNCTION	NAMING	COLOR	LED DESCRIPTION
Power	PWR	Green	On: Power On Off: Power Off
System	SYS	Green	On: System ready and running successfully Flashing: System rebooting Off: System not ready

LAN 10M	LAN10M	Green	On: 10M Ethernet link successful Flashing: Sending or Receiving Off: 10M Ethernet not ready
LAN 100M	LAN100M	Orange	On: 100M Ethernet link successful Flashing: Sending or Receiving Off: 100M Ethernet not ready
DATA	DATA	Green	Flashing: Upstream or Downstream Channel is transmitting data Off: Connection is idle
CABLE	CABLE	Green	On: The Prestige is registered successfully with Cable Modem Terminal System (CMTS) Slow Flash (2 seconds interval): The Prestige is scanning downstream channel Fast Flash (1 second interval): The Prestige is locked on to downstream channel and is ranging and registering with CMTS

2.1.2 Prestige 941 Rear Panel and Connections

The next figure shows the rear panel of your Prestige 941 and the connection diagram.

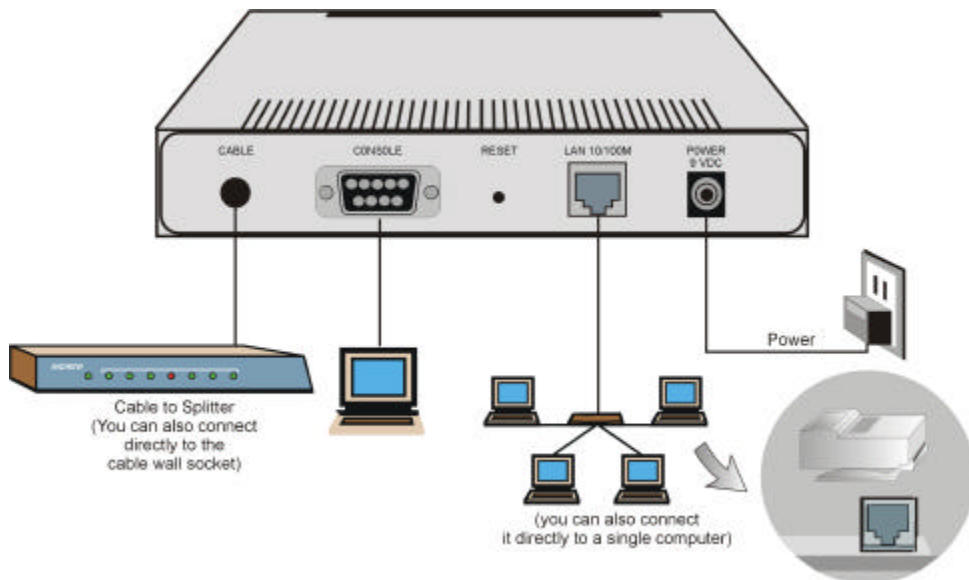


Figure 2-2 Prestige 941 Rear Panel and Connections

2.2 Additional Installation Requirements

In addition to the contents of your package, there are other hardware and software requirements you need before you can install and use your Prestige. These requirements include:

1. You must have a network interface card installed on your computer and configure the TCP/IP protocol stack properly. In addition, please configure your computer as a DHCP client.
2. A computer equipped with communications software configured to the following parameters:
 - VT100 terminal emulation.
 - 9600 Baud.
 - No parity, 8 Data bits, 1 Stop bit.
 - Flow Control set to None.
3. An ISP account. Before installing your cable router, you need to establish an Internet access account with your local cable operator. They might ask for your cable router's MAC address and model number. Please locate the MAC address at the bottom of your Prestige 941.

NOTE: HFC MAC address can be found on the bar code sticker. Use the HFC MAC address when registering with your cable company.

After the Prestige is properly set up, you can make future changes to the configuration through telnet connections.

2.3 Initializing the Cable Modem

This section outlines how to connect your Prestige 941 to the LAN and the cable network.

Step 1. Preparing the CATV Coaxial Cable Connection

Locate the coaxial cable at the installation site and move the cable end, or install a two-way splitter as necessary to provide a connection near the Prestige 941 cable modem location.

Step 2. Connecting the Prestige to the Cable System

Connect the Prestige to the cable port using an F-type connector. (If the quality or general condition of the coaxial cable at the installation site is in question, we recommended that you replace the coaxial cable). The cable port on the Prestige is labeled "CABLE".

Step 3. Connecting Ethernet Cables to the Prestige 941

If you do not have an Ethernet interface card (NIC) in your computer, please install one.

If you have only one computer, you can connect the Prestige to the computer directly without a hub. For a single computer, connect the 10/100M LAN port on the Prestige to the Network Adapter on the computer using a straight-through Ethernet cable.

If you have more than one computer, you must use an external hub. Connect the 10/100M LAN port on the Prestige to a port on the hub using a *cross-over* Ethernet cable. If your Ethernet hub provides cascade (also called uplink) port, you can connect the Prestige to that port by using a straight Ethernet cable.

Step 4. Connecting the Prestige 941 to the Computer(s)

For a single computer, locate an available end of the Ethernet cable that you just connected to the Prestige and connect this end to the Ethernet port on the computer.

For more than one computer, connect your computers to the hub using other straight Ethernet cable.

Step 5. Connecting the Power Adapter to your Prestige

Connect the power adapter to the port labeled **POWER** on the rear panel of your Prestige.

Step 6. Cable Router Initialization

The Prestige cable router is powered on whenever you connect the power adapter to the power outlet. It will initialize the system and start to connect with headEnd CMTS. When the CABLE LED shines steadily, the Prestige is ready to handle data traffic. The first initialization process might take several minutes because it will scan for the proper downstream and upstream channels. When the cable modem is ready, it will memorize the channel attributes. If you power cycle the cable modem, the next connection process will be faster.

Generally, your cable company will configure your Prestige for you. You do not have to do any configuration.

Step 7. Connecting the Console Port

For Internet sharing, you have to configure your Prestige in Router mode. You need to use a terminal emulator software on a workstation and connect it to the Prestige through the console port. Connect the 9-pin (smaller) end of the console cable to the console port of the Prestige and the other 9-pin or 25-pin (bigger) end to a serial port (COM1, COM2 or other COM port) of your workstation. You can use an extension RS-232C cable if the enclosed one is too short.

For users using a DOS version terminal emulator, you may need to configure your communication parameters as follows:

VT100 terminal emulation
9600 Baud rate

No parity, 8 Data bits, 1 Stop bit

No flow control

After the initial setup, you can modify the configuration remotely through telnet connections.

NOTE: When using the Prestige 941 in Router mode, use the default (static) IP address of 192.168.1.1 to telnet from your LAN PC to your Prestige 941.

2.4 Network Configuration of Your Computer

You must have a network interface card installed on your computer and configure the TCP/IP protocol stack properly. For Windows®95/98/NT, please configure your computer as a DHCP client.

For Windows®95/98, you can use the following command to verify the TCP/IP configuration.

```
Winipcfg
```

For Windows®NT, you can use the following command.

```
Ipconfig
```

2.5 Router Configuration

While your Prestige operates in Router mode, you have to further configure it through the console port.

In router mode, you do not need to ask your cable company for a special configuration. The Prestige can act as a DHCP client to acquire an IP address from the headend. Besides, it can act as a DHCP server at the LAN port and assign an IP address to your computers on the LAN subnet. What you have to do is to configure the LAN port with the proper IP address and netmask. If you already have a DHCP server on your LAN subnet, you can disable the DHCP server in the Prestige but you have to assign an IP address/ netmask for the LAN port.

For more details, please refer to **Chapter 3 – Internet Access**.

2.6 Power On Your Prestige

At this point, you should have connected the console port, the LAN port, the cable port and the power port to the appropriate devices or lines. Plug the power adapter into a wall outlet.

When connected and powered on, the cable router executes an automatic installation procedure:

1. Scans and locks on to the service provider's downstream frequency.
2. Obtains timing, signal, power level, authentication, addressing, and other operational parameters from the CATV headend.
3. Downloads its configuration file and is then operational.

During the initialization, the LEDs on the cable router turns on:

1. The Power LED should be ON.
2. The CABLE LED flashes on a 2 seconds on/off cyclic duration while scanning downstream channel and then on a 1 second on/off cyclic duration when it has locked on to the downstream channel and is communicating with headend CMTS. Once the cable connection is complete, it will stay ON.
3. The DATA LED flashes when the cable downstream, cable upstream, or LAN is receiving and transmitting data. It is OFF when the connection is idle.
4. The LAN10M LED or LAN100M LED (depending on the Ethernet speed connection) will be ON if Ethernet link is successful and flashing while sending/receiving.

Step 1. Initial Screen

When you power on your Prestige, it performs several internal tests as well as line initialization. After the tests, press **[Enter]** to continue.

```
Bootbase Version: V1.4 | 6/22/2000 15:41:27
RAM: Size = 4096 Kbytes
FLASH: Intel 8M@3V
Hardware Information:
Mrd Version : 1
Product ID 1000 Hardware Version 1.58
Bridge Mode with Temic Tuner
ZyNOS Version: V2.40(R25)b3 | 6/28/2000 21:59:44
Press any key to enter debug mode within 3 seconds.
.....
Check flash
primary RomFile: OK
backup RomFile: OK
copy primary to backup
Erasing.
Start programing..
primary RAS: OK
backup RAS: OK
initialize ch =0, ethernet address: 00:a0:c5:21:fe:21
initialize ch =1, ethernet address: 00:a0:c5:21:fe:22
initialize ch =2, ethernet address: 00:a0:c5:21:fe:23
Press ENTER to continue...
Running BIST test...result was 1000000 ..passed
Chip ID: 3300, rev: 1
SRAM memory test result is 00
Downstream frequency is 627000000 Hz (EIA 91)
Annex B mode selected
Use default MCNS symbol rates.
Stored upstream channel ID is 2
Initial upstream power is 29 dBmV
Board is configured for Temic 4937 tuner
LAN interface set to 10M Half
QAM: lock, FEC: lock
Update channel information to flash
DHCP OK, IP=10.200.0.107
Current Time: Thu Jun 29 10:39:53 2000
==>Registered<==
*** Cable Link UP *** Thu Jun 29 10:39:53 2000
```

Figure 2-3 Initial Screen

Step 2. Entering Password

The login screen appears after you press [Enter], prompting you to enter the password shown as follows.

For your first login, enter the default password **1234**. As you type the password, the screen displays an (X) for each character you typed.

Please note that if there is no activity for longer than 5 minutes after you log in, your Prestige will automatically log you out and will display a blank screen. If you see a blank screen, press [Enter] to bring up the login screen again.

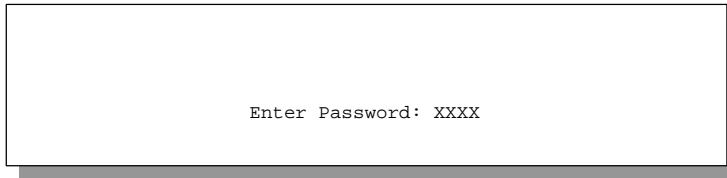


Figure 2-4 Login Screen

2.7 Navigating the SMT Interface

The SMT (System Management Terminal) is the interface that you use to configure your Prestige.

Several operations that you should be familiar with before you attempt to modify the configuration are listed in the following table.

Table 2-2 Main Menu Commands

OPERATION	KEYSTROKE	DESCRIPTION
Move forward to another menu	[Enter]	To move forward to a sub-menu, type in the number of the desired sub-menu and press [Enter].
Move backward to a previous menu	[Esc]	Press [Esc] to move back to the previous menu.
Move the cursor	[Enter] or [Up]/[Down] arrow keys	Within a menu, press [Enter] to move to the next field. You can also use the [Up]/[Down] arrow keys to move to the previous and the next field, respectively.
Enter information	Fill in, or Press [space bar] to toggle	You need to fill in two types of fields. The first requires you to type in the appropriate information. The second allows you to cycle through the available choices by pressing [space bar].
Required fields	<?>	All fields with the symbol <?> must be filled in order to save the new configuration.
N/A fields	<N/A>	Some of the fields in the SMT will show a <N/A>. This symbol refers to an option that is Not Applicable.
Save your configuration	[Enter]	Save your configuration by pressing [Enter] at the message [Press ENTER to confirm or ESC to cancel]. Saving the data on the screen will take you, in most cases to the previous menu.
Exit the SMT	Type 99, then press [Enter].	Type 99 at the main menu prompt and press [Enter] to exit the SMT interface.

2.7.1 Main Menu

After you enter the password, the SMT displays the **Prestige 941 Main Menu**, as shown.

```

Copyright (c) 1994 - 2000 ZyXEL Communications Corp.
Prestige 941 Main Menu

Getting Started
  1. General Setup

  3. LAN Setup
  4. Internet Access Setup

Advanced Applications
  12. Static Routing Setup

  15. SUA Server Setup

Advanced Management
  21. Filter Set Configuration

  23. System Password
  24. System Maintenance

  99. Exit

Enter Menu Selection Number:

```

Figure 2-5 Prestige 941 Main Menu

2.7.2 System Management Terminal Interface Summary

Table 2-3 Main Menu Summary

#	MENU TITLE	DESCRIPTION
1	General Setup	Use this menu to setup general information.
3	LAN Setup	Use this menu to setup the LAN.
4	Internet Access Setup	A quick and easy way to setup Internet connection.
12	Static Routing Setup	Use this menu to setup static route for different protocols.
15	SUA Server Setup	Use this menu to specify inside servers when SUA is enabled.
21	Filter Set Configuration	Use this menu to setup filters to provide security.
23	System Password	Use this menu to setup a new password.
24	System Maintenance	This menu provides system status, diagnostics, firmware upload, etc.
99	Exit	To exit from SMT and return to the blank screen.

2.8 Changing the System Password

The first thing you should do before anything else is to change the default system password by performing the following steps.

Step 1. Enter 23 in the main menu to open **Menu 23 – System Password** as shown.

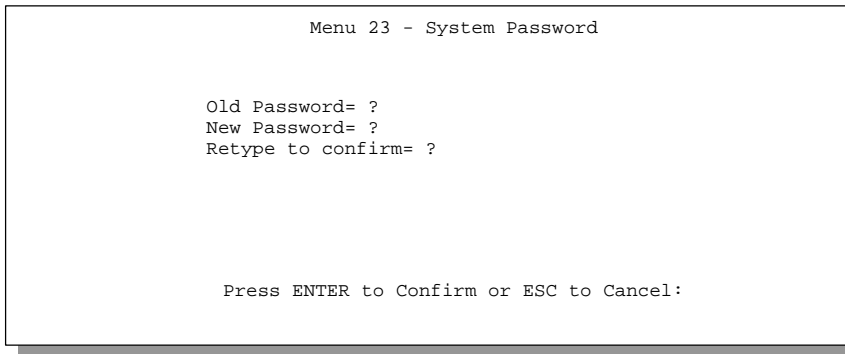


Figure 2-6 Menu 23 – System Security

Step 2. Enter your existing password and press [Enter].

Step 3. Enter your new system password and press [Enter].

Step 4. Re-type your new system password for confirmation and press [Enter].

Note that as you type a password, the screen displays an (X) for each character you typed.

2.9 General Setup

Menu 1 – General Setup contains administrative and system-related information.

To enter Menu 1 and fill in the required information, follow these steps:

Step 1. Enter 1 in the main menu to open **Menu 1 – General Setup**.

Step 2. The **Menu 1 – General Setup** screen appears, as shown. Fill in the required fields.

```

Menu 1 - General Setup

System Name=
Domain Name=

IP Routing= Enable

Channel Scan Table:
  channel plan   channel start   channel end
-----
1.  EIA          67             70
2.  EIA          85             88
3.  Disable     N/A            N/A
4.  Disable     N/A            N/A
5.  Disable     N/A            N/A

Channel Override:
  Channel plan= EIA          Channel number= 78

Press ENTER to Confirm or ESC to Cancel:

```

Figure 2-7 Menu 1 – General Setup**Table 2-4 General Setup Menu Field**

FIELD	DESCRIPTION	EXAMPLE
System Name	Choose a descriptive name for identification purposes. This name can be up to 30 alphanumeric characters long. Spaces are not allowed, but dashes “-” and underscores “_” are accepted.	P941
Domain Name	Enter the domain name.	Domain
IP Routing	Set operation mode as Router mode (Enable) or Bridge mode (Disable).	Enable (default)
Channel Scan Table	This table defines the channel for scanning prior to normal downstream frequency scanning. Five bands are implemented.	
Channel plan	The channel plan can be EIA: EIA-542 Cable Television Channel Identification Plan. HRC: Harmonic-Related Carrier Frequency Plan. B/G (CCIR): Europe Standard B + G Frequency Plan OIRT: OIRT Standard D Frequency Plan EURO: 250 kHz incremental Non-Standard Frequency Plan Disable: no predefined channel band.	EIA
Channel start/end	The channel start and the channel end define the range of the scanning channels.	
Channel override	The user can use this field to set the current downstream channel.	

2.10 LAN Setup

This section describes how to configure the LAN using **Menu 3 – LAN Setup**. From the main menu, enter 3 to open Menu 3.

```
Menu 3 - LAN Setup

1. LAN Port Filter Setup
2. TCP/IP and DHCP Setup

Enter Menu Selection Number:
```

Figure 2-8 Menu 3 – LAN Setup

2.10.1 LAN Port Filter Setup

This menu allows you to specify the filter sets that you wish to apply to the LAN traffic. You seldom need to filter the LAN traffic, however, the filter sets may be useful to block certain packets, reducing traffic and preventing security breaches.

```
Menu 3.1 - LAN Port Filter Setup

Input Filter Sets:
  protocol filters=
  device filters=
Output Filter Sets:
  protocol filters=
  device filters=

Press ENTER to Confirm or ESC to Cancel:
```

Figure 2-9 Menu 3.1 – LAN Port Filter Setup

If you need to define filters, please read **Chapter 6 – Filter Configuration**, then return to this menu to apply the filter sets.

2.11 Protocol Dependent LAN Setup

For TCP/IP LAN Setup, refer to **Chapter 3 – Internet Access**.

2.12 Diagnostics Facility for Bridge Mode

The computer connected to the Prestige 941 must be configured for Internet Protocol (IP). In addition, please configure your computer as a DHCP client.

NOTE: All the functions described in this section are only applicable for the Prestige 941 in bridge mode.

Your cable company has a DHCP server to assign the IP address for your computer.

For diagnostic purposes, the Prestige 941 can also act as a DHCP server for your computer. As long as the Prestige 941 is disconnected (not registered) with the headend CMTS, the Prestige 941 built-in DHCP server will hand out IP address for the computer which is requesting IP address. With the Prestige 941 DHCP server, the IP address for your computer is assigned from an address pool that begins with 192.168.100.11 and ends with 192.168.100.25. Once the Prestige 941 becomes connected (registered) with the headend CMTS, this DHCP server will become inactive and the DHCP packets from the computer will be forwarded to the headend CMTS without touching the Prestige 941 built-in DHCP server.

To verify the TCP/IP configuration and the IP address that your computer got from the DHCP server, you can use the "winipcfg" command (for Windows®95/98) or "ipconfig" command (for Windows®NT). (**Please see section 2.4**) Normally, the computer's DHCP client software will automatically get an IP address for itself from the DHCP server.

You can also use the "release" and then the "renew" functions of the "winipcfg" or "ipconfig" commands to get a dynamically assigned IP address for your computer.

To make troubleshooting easier, the Prestige 941 with a web-server (http-daemon) inside can be accessed from the WWW Browser of your computer.

You can use the address <http://192.168.100.1> anytime to access the web pages of the Prestige 941. These web pages provide the current status of your cable connection and many useful information for troubleshooting.

NOTE: Some IP addresses on the LAN are reserved for used with Prestige 941.

The IP address for Prestige 941 on the LAN is 192.168.100.1. In addition, the Prestige 941 built-in DHCP server allocates IP address from the address pool that begins with 192.168.100.11 and ends with 192.168.100.25. Statically assigned IP addresses for other devices on the LAN should be chosen from outside of this range.

2.12.1 Prestige 941 Web Pages

You can use the address <http://192.168.100.1> to access the web pages of the Prestige 941. The first web page displays the Cable Modem Status, as shown.

NOTE: The address <http://192.168.100.1> can only be used with Prestige 941 operating in Bridge mode. When the Prestige 941 is configured as a router, the web pages should be accessed by the IP address of the Prestige 941 LAN interface. The IP address of the LAN interface is configured in SMT Menu 3.2.

Cable Modem Description :			
ZyXEL Prestige 941, HW V1.58, SW ZyNOS V2.73(P941) 8/17/2001			
Cable Modem Status :			
IP Address		Traffic Loads	5.96 %
MAC Address	00:02:CF:00:2F:34	LAN Status	100M/Full
Operation Status	CM Status : 3	Packet Counts	0
Cable Link Status :			
DownStream Freq	649782400 Hz	D/S S/N Ratio :	59.43 dB
UpStream Freq	0 Hz	D/S Rx Power :	-25.86 dBmv
Permit Service Lists :			
Mac Lists	00:02:CF:00:2F:34	00:50:BA:E9:74:13	
IP Lists	192.168.100.11		
Cable Modem Status		Config Cable Modem	

Figure 2-10 Cable Modem Status Web Page

In this read-only page, it displays the Prestige 941 firmware version and the status of the cable connection.

The following table describes the fields present in the Cable Modem Status web page.

Table 2-5 Cable Modem Status Web Page

FIELD	DESCRIPTION
Cable Modem Description:	Hardware and firmware version of your Prestige 941.
Cable Modem Status:	
IP Address	The cable modem' s IP address.
MAC Address	The cable modem' s MAC address.
Operation Status	Indicates the status of the cable modem.
LAN Status	Indicates the status of the LAN port.
Packet Counts	The number of packets transferred.
Cable Link Status:	
DownStream Freq	The downstream receiving frequency.
UpStream Freq	The upstream transmission frequency.
D/S S/N Ratio	The downstream SNR (Signal-to-Noise Ratio).
D/S Rx Power	The downstream receiving power level.
Permit Service Lists:	
Mac Lists	The MAC addresses of computers that can connect through the cable modem.
IP Lists	The IP addresses of computers that can connect through the cable modem.

To access the second web page, you can click the "Config Cable Modem" at the bottom-right portion of this Cable Modem Status web page. The default username and password to access the second web page are "1234" and "1234".

Cable Modem Description :				
ZyXEL Prestige 941, HW V1.58, SW ZyNOS V2.73(P941) 8/17/2001				
Successful Scanned Channels		Channel Override		
EIA-91		eia		SET
Pre-defined Channel Scan Range :				
Sequence	Channel Plan	Start Channel	End Channel	Action
1	disable			SET
2	disable			SET
3	disable			SET
4	disable			SET
5	disable			SET
Default Channel Scan Range :				
<input type="checkbox"/> eia	<input checked="" type="checkbox"/> hrc	<input type="checkbox"/> euro	<input type="checkbox"/> oirt	<input type="checkbox"/> bg
Cable Modem Status		Config Cable Modem		

Figure 2-11 Configure the Cable Modem Web Page

The following table describes the fields present in the Config Cable Modem web page.

Table 2-6 Config Cable Modem Web Page

FIELD	DESCRIPTION
Cable Modem Description:	Hardware and firmware version of your Prestige 941.
Successful Scanned Channels	The downstream channel successfully used before.
Channel Overwrite	Set the current downstream channel.
Pre-defined Channel Scan Range:	This table defines the channel for scanning prior to normal downstream frequency scanning. Five bands are implemented.
Channel Plan	<p>The channel plan can be:</p> <ul style="list-style-type: none"> • EIA: EIA-542 Cable Television Channel Identification Plan. • HRC: Harmonic-Related Carrier Frequency Plan. • B/G (CCIR): Europe Standard B + G Frequency Plan • OIRT: OIRT Standard D Frequency Plan • EURO: 250 kHz incremental Non-Standard Frequency Plan <p>Disable: no predefined channel band.</p>
Start Channel	The start channel number for the range of the scanning channels.
End Channel	The end channel number for the range of the scanning channels.
Default Channel Scan Range	Choose the Channel Plan for selecting the full channel range.

2.13 Stacking ZyXEL Cable Routers

Your Prestige has rubber pads that fit snugly into grooves for sturdy stacking. You should not stack more than three routers for maximum stack stability.

Chapter 3

Internet Access

This chapter shows you how to configure the LAN as well as the CABLE of your Prestige for Internet access.

3.1 TCP/IP and DHCP for LAN

The Prestige has built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

3.1.1 Factory LAN Defaults

The LAN parameters of the Prestige are preset in the factory with the following values:

1. IP address of 192.168.1.1 with subnet mask of 255.255.255.0 (24 bits).
2. DHCP server enabled with 32 client IP addresses starting from 192.168.1.33.

These parameters should work for the majority of installations. If the parameters are satisfactory, you can skip to section **3.2 TCP/IP and DHCP Ethernet Setup** to enter the DNS server address(es) if your ISP gives you explicit DNS server address(es). If you wish to change the factory defaults or to learn more about TCP/IP, please read on.

3.1.2 IP Address and Subnet Mask

Similar to the houses on a street that share a common street name, the machines on a LAN share one common network number, also.

Where you obtain your network number, it would depend on your particular situation. If the ISP or your network administrator assigns you a block of registered IP addresses, follow their instructions in selecting the IP addresses and the subnet mask.

If the ISP did not explicitly give you an IP network number, then most likely you have a single user account and the ISP will assign you a dynamic IP address when the connection is established. If this is the case, it is recommended that you select a network number from 192.168.0.0 to 192.168.255.0 and you must enable the Single User Account feature of the Prestige. The Internet Assigned Number Authority (IANA) reserved this block of addresses specifically for private use; please do *not* use any other number unless you are told otherwise. Let us say you select 192.168.1.0 as the network number; which covers 254 individual addresses, from 192.168.1.1 to 192.168.1.254 (zero and 255 are reserved). In other words, the first 3 numbers specify the network number while the last number identifies an individual workstation on that network.

Once you have decided on the network number, pick an IP address that is easy to remember, e.g., 192.168.1.1, for your Prestige.

The subnet mask specifies the network number portion of an IP address. Your Prestige will compute the subnet mask automatically based on the IP address that you entered. You do not need to change the subnet mask computed by the Prestige unless you are instructed to do otherwise.

3.1.3 RIP Setup

RIP (Routing Information Protocol) allows a router to exchange routing information with other routers. The **RIP Direction** field controls the sending and receiving of RIP packets. When set to **Both** or **Out Only**, the Prestige will broadcast its routing table periodically. When set to **Both** or **In Only**, it will incorporate the RIP information that it receives; when set to **None**, it will not send any RIP packets and will ignore any RIP packets received.

The **Version** field controls the format and the broadcasting method of the RIP packets that the Prestige sends (it recognizes both formats when receiving). **RIP-1** is universally supported; but RIP-2 carries more information. RIP-1 is probably adequate for most networks, unless you have an unusual network topology.

Both **RIP-2B** and **RIP-2M** sends the routing data in RIP-2 format; the difference being that **RIP-2B** uses subnet broadcasting while **RIP-2M** uses multicasting. Multicasting can reduce the load on non-router machines since they generally do not listen to the RIP multicast address and so will not receive the RIP packets. However, if one router uses multicasting, then all routers on your network must use multicasting also.

3.1.4 DHCP Configuration

DHCP (Dynamic Host Configuration Protocol) allows the individual clients (workstations) to obtain the TCP/IP configuration at start-up from a server. Unless you are instructed by your ISP, leave the DHCP at **Server**, the default value. You can configure the Prestige as a DHCP server or disable it. When configured as a server, the Prestige provides the TCP/IP configuration for the clients.

IP Pool Setup

The Prestige is pre-configured with a pool of 32 IP addresses starting from 192.168.1.33 to 192.168.1.64. This configuration leaves 31 IP addresses (excluding the Prestige itself) in the lower range for other server machines, e.g., server for mail, FTP, telnet, web, etc., that you may have.

DNS Server Address

DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa, e.g., the IP address of *www.zyxel.com* is 204.217.0.2. The DNS server is extremely important because without it, you must know the IP address of a machine before you can access it. The DNS server addresses that you enter in the DHCP setup are passed to the client machines along with the assigned IP address and subnet mask.

There are two ways that an ISP disseminates the DNS server addresses. The first is for an ISP to tell a customer the DNS server addresses, usually in the form of an information sheet, when you sign up. If your ISP does give you the DNS server addresses, enter them in the **DNS Server** fields in **DHCP Setup**, otherwise leave this field blank.

3.2 TCP/IP and DHCP Ethernet Setup

From the main menu, enter 3 to open **Menu 3 – LAN Setup** to configure TCP/IP and DHCP Ethernet setup.

```
Menu 3 - LAN Setup

1. LAN Port Filter Setup
2. TCP/IP and DHCP Setup

Enter Menu Selection Number:
```

Figure 3-1 Menu 3 – LAN Setup

To edit the TCP/IP and DHCP configuration, enter 2 to open **Menu 3.2 – TCP/IP and DHCP Ethernet Setup** as shown below.

```
Menu 3.2 - TCP/IP and DHCP Ethernet Setup

DHCP= Server
Configuration:
  Client IP Pool Starting Address=
  Size of Client IP Pool= 6
  Primary DNS Server= 0.0.0.0
  Secondary DNS Server= 0.0.0.0

TCP/IP Setup:
  IP Address=
  IP Subnet Mask= 255.255.255.0
  RIP Direction= Both
  Version= RIP-1

Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.
```

Figure 3-2 Menu 3.2 – TCP/IP and DHCP Ethernet Setup

Follow the instructions in the following table on how to configure the DHCP fields.

Table 3-1 LAN DHCP Setup Menu Fields

FIELD	DESCRIPTION	EXAMPLE
DHCP	This field enables/disables the DHCP server. If it is set to Server , your Prestige will act as a DHCP server. If set to None , DHCP service will be disabled and you must have another DHCP sever on your LAN, or else the workstation must be manually configured. When DHCP is set to Server , the following four items need to be set.	None Server (default)
Client IP Pool Starting Address	This field specifies the first of the contiguous addresses in the IP address pool.	192.168.1.33
Size of Client IP Pool	This field specifies the size, or count of the IP address pool.	6
Primary DNS Server Secondary DNS Server	Enter the IP addresses of the DNS servers. The DNS servers are passed to the DHCP clients along with the IP address and the subnet mask.	

Follow the instructions in the following table to configure TCP/IP parameters for the LAN port.

Table 3-2 LAN TCP/IP Setup Menu Fields

FIELD	DESCRIPTION	EXAMPLE
TCP/IP Setup		
IP Address	Enter the IP address of your Prestige in dotted decimal notation.	
IP Subnet Mask	Your Prestige will automatically calculate the subnet mask based on the IP address that you assign. Unless you are implementing subnetting, use the subnet mask computed by the Prestige.	255.255.255.0
RIP Direction	Press [space bar] to select the RIP direction from Both/In Only/Out Only/None .	Both
Version	Press [space bar] to select the RIP version from RIP-1/RIP-2B/RIP-2M .	RIP-1
When you have completed this menu, press [Enter] at the prompt [Press ENTER to Confirm..] to save your configuration, or press [Esc] at any time to cancel.		

3.3 Internet Access Setup

Menu 4 allows you to enter the Internet access information in one screen.

From the main menu, enter 4 to go to **Menu 4 – Internet Access Setup**, as displayed below.

```
Menu 4 - Internet Access Setup

ISP's Name= ChangeMe
Service Type= RR - Manager Authentication Service
Server IP= 0.0.0.0
My Login=
My Password= *****

IP Address Assignment= Dynamic
IP Address= N/A
IP Subnet Mask= N/A
Gateway IP Address= N/A
RIP Direction= None
Version= RIP-1
Single User Account= Yes
Edit Filter Set= No

Press ENTER to Confirm or ESC to Cancel:
```

Figure 3-3 Menu 4 – Internet Access Setup

The following table contains instructions on how to configure your Prestige for Internet access.

Table 3-3 Internet Access Setup Menu Fields

FIELD	DESCRIPTION
ISP' s Name	Enter the name of your Internet Service Provider, e.g., myISP. This information is for identification purposes only.
Service Type	Choose Standard, RR – Toshiba Authentication Service and RR – Manager Authentication Service . Choose RoadRunner service if your ISP is Time Warner' s RoadRunner otherwise, choose Standard . For RoadRunner service, fill in the Server IP, login and password fields.
Server IP	The Prestige will find the RoadRunner Server IP if this field is left blank. If it does not, then you must enter the authentication server IP address.
My Login Name	Enter the login name given to you by your ISP.
My Password	Enter the password associated with the login name above.
IP Address Assignment	If your ISP did not assign you an explicit IP address, select Dynamic otherwise, select Static and enter the IP address and subnet mask in the following fields.
IP Address	Enter the IP address assigned to you when Static Assignment is selected.
IP Subnet Mask	Enter the subnet mask you assign when Static Assignment is selected.
Gateway IP Address	Enter the gateway IP address when Static Assignment is selected.
RIP Direction	Select the RIP Direction.
Version	Select the RIP Version.
Single User Account	Please see the following section for a more detailed discussion on the Single User Account feature. The default is Yes .
Edit Filter Set	Use [space bar] to toggle this field to Yes and press [Enter] to open Menu 4.1 to edit the filter sets. See the CABLE Port Filter section for more details. The default is No .

3.4 Cable Port Filter

Use **Menu 4.1 – Cable Port Filter** to specify the filter set(s) to apply to the incoming and outgoing traffic between the Internet and the Prestige. You can specify up to 4 filters separated by comma, e.g., 1, 5, 9, 12, in each filter field.

NOTE: Spaces are accepted in this field. For more information on filters, see the chapter on Filter Configuration.

```
Menu 4.1 - Cable Port Filter

Input Filter Sets:
  protocol filters=
  device filters=
Output Filter Sets:
  protocol filters=
  device filters=

Press ENTER to Confirm or ESC to Cancel:
```

Figure 3-4 Menu 4.1 – Cable Port Filter

3.5 Single User Account

Typically, if there are multiple users on the LAN wanting to concurrently access the Internet, you will have to lease a block of legal, or globally unique IP addresses from the ISP.

The Single User Account (SUA) feature allows you to have the same benefits as having multiple legal addresses, but only pay for one IP address, thus saving significantly on the subscription fees. (Check with your ISP before you enable this feature).

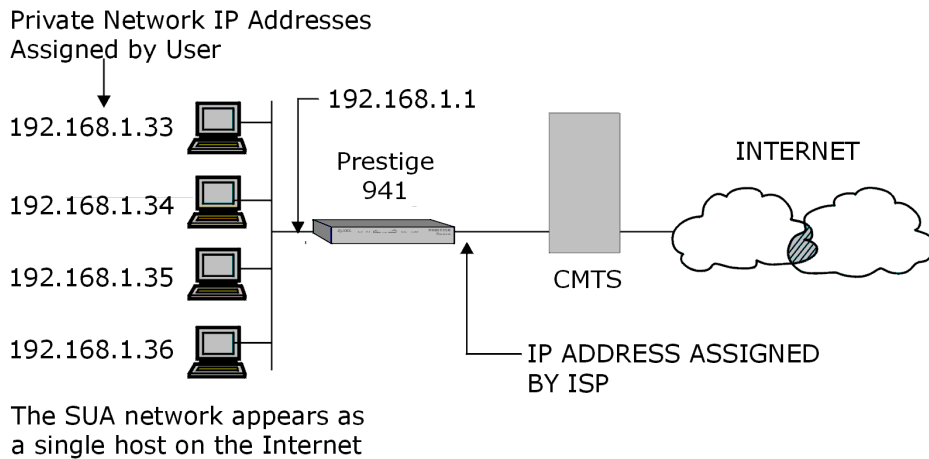


Figure 3-5 Single User Account Topology

The IP address for the SUA can be either fixed or dynamically assigned. In addition, you can designate servers, e.g., a web server and a telnet server on your local network and make them accessible to the outside world.

If you do not define any server, SUA offers the additional benefit of firewall protection. If no server is defined, incoming inquiries will be filtered out by your Prestige and thereby, prevent intruders from probing your network.

Your Prestige accomplishes this address sharing by translating the internal LAN IP addresses to a single address that is globally unique on the Internet. For more information on IP address translation, refer to RFC-1631, *The IP Network Address Translator (NAT)*.

3.5.1 Advantages of SUA

In summary:

- SUA is a cost-effective solution for small offices with less than 64 hosts to access the Internet.
- SUA supports servers to be accessible to the outside world.
- SUA can provide firewall protection if you do not specify a server. All incoming inquiries will be filtered out by your Prestige.

- UDP and TCP packets can be routed. In addition, partial ICMP including echo and trace route is supported.

3.5.2 Single User Account Configuration

The steps for configuring your Prestige for Single User Account are identical to the conventional Internet access with the exception that you need to fill in one extra field in **Menu 4 – Internet Access Setup**, as shown in the following figure;

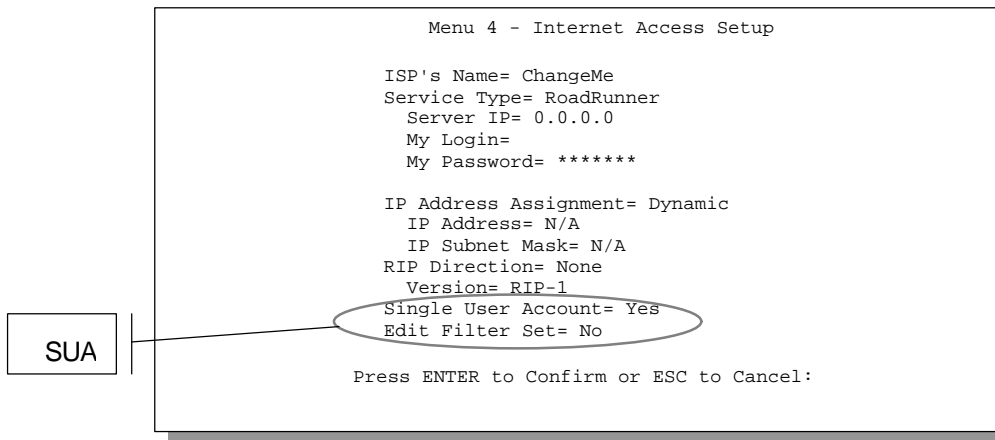


Figure 3-6 Menu 4 – Internet Access Setup for Single User Account

To enable the SUA feature in **Menu 4**, move cursor to the **Single User Account** field and select **Yes** (or **No** to disable SUA). Then follow the instructions on how to configure the SUA fields.

Table 3-4 Single User Account Menu Fields

FIELD	DESCRIPTION
Single User Account	Select Yes to enable SUA.
Press [Enter] at the message [Press ENTER to Confirm . . .] to save your configuration, or press [Esc] at any time to cancel.	

Chapter 4

IP Static Route Setup

This chapter shows you how to configure Static routes for your Prestige.

Static routes tell the Prestige routing information that it cannot learn automatically through other means. This can arise in cases where RIP is disabled on the LAN.

Each remote node specifies only the network to which the gateway is directly connected and the Prestige has no knowledge of the networks beyond. For instance, the Prestige knows about network N2 in the following diagram through remote node Router 1. However, the Prestige is unable to route a packet to network N3 because it does not know that there is a route through the same remote node Router 1 (via gateway Router 2). The static routes are for you to tell the Prestige about the networks beyond the remote nodes.

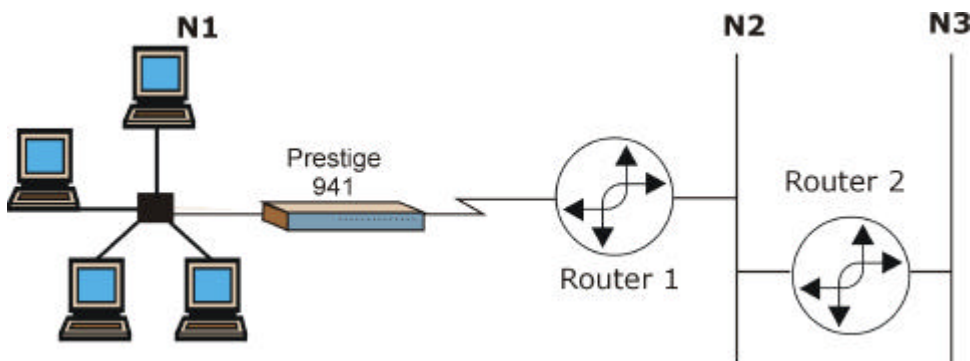


Figure 4-1 Example of Static Routing Topology

4.1 IP Static Route Setup

You configure IP static routes in **Menu 12. 1**, by selecting one of the IP static routes as shown next.

```
Menu 12 - IP Static Route Setup

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Enter selection number:
```

Figure 4-2 Menu 12 – IP Static Route Setup

```
Menu 12.1 - Edit IP Static Route

Route #: 1
Route Name= ?
Active= No
Destination IP Address= ?
IP Subnet Mask= ?
Gateway IP Address= ?
Metric= 2
Private= No

Press ENTER to Confirm or ESC to Cancel:
```

Figure 4-3 Menu 12. 1 – Edit IP Static Route

The next table describes the IP Static Route menu.

Table 4-1 IP Static Route Menu Fields

FIELD	DESCRIPTION
Route #	The static route. (1~8)
Route Name	Enter a descriptive name for this route. This is for identification purpose only.
Active	This field allows you to activate/deactivate this static route.
Destination IP Address	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.
IP Subnet Mask	Enter the IP subnet mask for this destination.
Gateway IP Address	Enter the IP address of the gateway. The gateway is an immediate neighbor of your Prestige that will forward the packet to the destination. On the LAN, the gateway must be a router on the same segment as your Prestige; over the CABLE, the gateway must be the IP address of one of the Remote Nodes.
Metric	Metric represents the “cost” of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Enter a number that approximates the cost for this link. The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number.
Private	This parameter determines if the Prestige will include the route to this remote node in its RIP broadcasts. If set to Yes , this route is kept private and not included in RIP broadcast. If No , the route to this remote node will be propagated to other hosts through RIP broadcasts.
Once you have completed filling in this menu, press [Enter] at the message [Press ENTER to Confirm.]. to save your configuration, or press [Esc] to cancel.	

Chapter 5

Multiple SUA Servers

This Chapter describes how to set-up multiple servers when SUA is enabled.

5.1 Multiple Servers Behind SUA

If you wish, you can make inside servers for different services, e.g., web or FTP, visible to the outside users, even though SUA makes your whole inside network appear as a single machine to the outside world. A service is identified by the port number, e.g., web service is on port 80 and FTP on port 21.

As an example, if you have a web server at 192.168.1.2 and an FTP server 192.168.1.3, then you need to specify for port 80 (web) the server at IP address 192.168.1.2 and for port 21 (FTP) another at IP address 192.168.1.3.

Please note that a server can support more than one service, e.g., a server can provide both FTP and DNS service, while another provides only web service. Also, since you need to specify the IP address of a server in the Prestige, a server must have a fixed IP address and not be a DHCP client whose IP address potentially changes each time it is powered-on.

In addition to the servers for specific services, SUA supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default server is not defined, the service request is simply discarded.

To make a server visible to the outside world, specify the port number of the service and the inside IP address of the server in **Menu 15 – SUA Server Setup**.

5.1.1 Configuring a Server Behind SUA

Follow the steps below to configure a server behind SUA.

1. Enter **15** in the main menu to go to **Menu 15 – SUA Server Setup**.

2. Enter the service port number in the **Port #** field and the inside IP address of the server in the **IP Address** field.
3. Press [Enter] at the “Press ENTER to confirm .:” prompt to save your configuration after you define all the servers or press [Esc] at any time to cancel.

```
Menu 15 - SUA Server Setup

Port #                IP Address
-----                -
1.Default            0.0.0.0
2. 0                 0.0.0.0
3. 0                 0.0.0.0
4. 0                 0.0.0.0
5. 0                 0.0.0.0
6. 0                 0.0.0.0
7. 0                 0.0.0.0
8. 0                 0.0.0.0
9. 1025              RR Reserved

Press ENTER to Confirm or ESC to Cancel:
```

Figure 5-1 Multiple Server Configuration

The most often used port numbers are:

Table 5-1 Services vs. Port Number

SERVICES	PORT NUMBER
FTP (File Transfer Protocol)	21
Telnet	23
POP3 (Post Office Protocol, version 3)	110
SMTP (Simple Mail Transfer Protocol)	25
DNS (Domain Name System)	53
HTTP (Hyper Text Transfer Protocol or WWW, Web)	80
PPTP (Point-to-Point Tunneling Protocol)	1723
Road Runner Service	1025

Chapter 6

Filter Configuration

6.1 About Filtering

Your Prestige uses filters to decide whether to allow passage of a data packet.

Data filters screen the data to determine if the packet should be allowed to pass. Data filters are further divided into incoming and outgoing filters, depending on the direction of the packet relative to a port.

The following sections describe how to configure filter sets.

The Filter Structure of the Prestige

A filter set consists of one or more filter rules. Usually, you would group related rules, e.g., all the rules for NetBIOS, into a single set and give it a descriptive name. The Prestige allows you to configure up to twelve filter sets with six rules in each set, for a total of 72 filter rules in the system.

You can apply up to four filter sets to a particular port to block multiple types of packets. With each filter set having up to six rules, you can have a maximum of 24 rules active for a single port. The next diagram illustrates the logic flow when executing a filter rule.

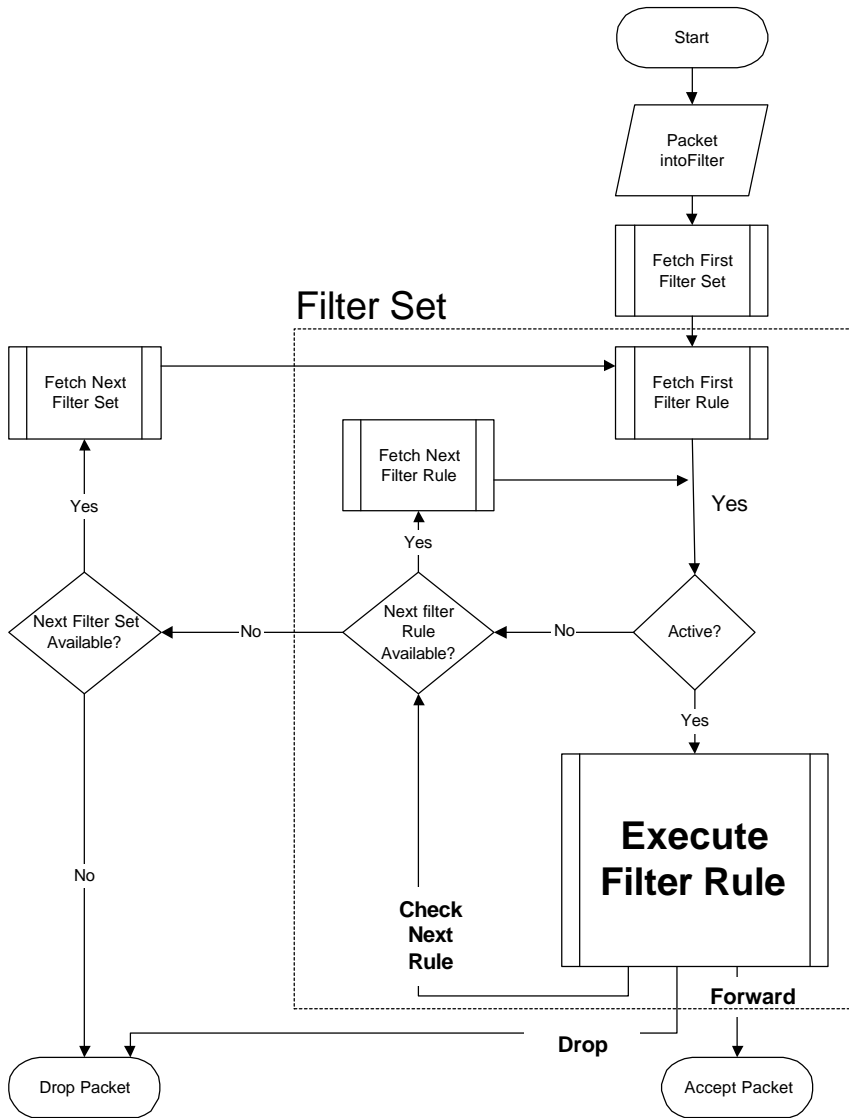


Figure 6-1 Filter Rule Process

6.2 Configuring a Filter Set

To configure a filter set, follow the procedures below:

Step 1. Select option **21. Filter Set Configuration** from the main menu to open **Menu 21**.

```

Menu 21 - Filter Set Configuration

Filter Set #      Comments      Filter Set #      Comments
-----
1                _____      7                _____
2                _____      8                _____
3                _____      9                _____
4                _____     10               _____
5                _____     11               _____
6                _____     12               _____

Enter Filter Set Number to Configure= 0

Edit Comments=

Press ENTER to Confirm or ESC to Cancel:

```

Figure 6-2 Menu 21 – Filter Set Configuration

Step 2. Select the filter set you wish to configure (nos. 1 to 12) and press [Enter].

Step 3. Enter a descriptive name or comment in the Edit Comments field and press [Enter].

Step 4. Press [Enter] at the message: [Press ENTER to confirm] to open **Menu 21.1 – Filter Rules Summary**.

```

Menu 21.1 - Filter Rules Summary

# A Type      Filter Rules      M m
-----
1 Y IP      Pr=17, SA=0.0.0.0, DA=0.0.0.0, DP=53      N D
2 Y
3 Y
4 Y
5 Y
6 Y

Enter Filter Rule Number (1-6) to Configure:

```

Figure 6-3 Menu 21.1 – Filter Rules Summary

6.2.1 Filter Rules Summary Menu

This screen shows the summary of the existing rules in the filter set. The following tables contain a brief description of the abbreviations used in **Menu 21.1**.

Table 6-1 Abbreviations Used in the Filter Rules Summary Menu

ABBREVIATIONS	DESCRIPTION	DISPLAY
#	Refers to the filter rule number (1 to 6).	
A	Refers to Active.	[Y], means the filter rule is active. [N], means the filter rule is inactive.
Type	Refers to the type of filter rule. This shows GEN for generic, IP for TCP/IP.	[GEN] for Generic. [IP] for TCP/IP.
Filter Rules	The filter rule parameters will be displayed here (see ahead).	
M	Refers to More. [Y], means an action cannot yet be taken as there are more rules to check, which are concatenated with the present rule to form a rule chain. When the rule chain is complete, an action can be taken. [N], means you can now specify an action to be taken i.e., forward the packet or check the next rule. For the latter, the next rule is independent of the rule just checked. If More is Yes , then Action Matched and Action Not Matched will be N/A .	[Y], means there are more rules to check. [N], means there are no more rules to check.
m	Refers to Action Matched. [F], means to forward the packet immediately and skip checking of the remaining rules.	[F], means to forward the packet. [D], means to drop the packet. [N], means to check the next rule.
n	Refers to Action Not Matched. [F], means to forward the packet immediately and skip checking of the remaining rules.	[F], means to forward the packet. [D], means to drop the packet. [N], means to check the next rule.

The protocol dependent filter rules abbreviation are listed as follows:

- If the filter type is IP, the following abbreviations listed in the next table will be used.

Table 6-2 Abbreviations Used if Filter Type is IP

ABBREVIATION	DESCRIPTION
Pr	Protocol
SA	Source Address
SP	Source Port number
DA	Destination Address
DP	Destination Port number

- If the filter type is GEN (generic), the following abbreviations listed in the next table will be used.

Table 6-3 Abbreviations Used if Filter Type is GEN

ABBREVIATION	DESCRIPTION
Off	Offset
Len	Length

Refer to the next section for information on configuring the filter rules.

6.2.2 Configuring a Filter Rule

To configure a filter rule, type its number in **Menu 21.1 – Filter Rules Summary** and press [Enter] to open **Menu 21.1.1** for the rule.

To speed up filtering, all rules in a filter set must be of the same class, i.e., protocol filters or generic filters. The class of a filter set is determined by the first rule that you create. When applying the filter sets to a port, separate menu fields are provided for protocol and device filter sets. If you include a protocol filter set in a device filter field or vice versa, the Prestige will warn you and will not allow you to save.

6.3 Filter Types and SUA

There are two types of filter rules, Device Filter (Generic) rules and Protocol Filter (TCP/IP) rules. Device Filter rules act on the raw data from/to LAN and CABLE. Protocol Filter rules act on the IP and IPX packets. Generic and TCP/IP filter rules are discussed in more detail in the next section. When NAT/SUA (Network Address Translation/Single User Account) is enabled, the inside IP address and port number are replaced on a connection-by-connection basis, which makes it impossible to know the exact address and port on the wire. Therefore, the Prestige applies the protocol filters to the “native” IP address and port number before NAT/SUA for outgoing packets and after NAT/SUA for incoming packets. On the other hand, the generic, or device filters are applied to the raw packets that appear on the wire. They are applied at the point where the Prestige is receiving and sending the packets; i.e., the interface. The interface can be Ethernet, or any other hardware port. The following diagram illustrates this.

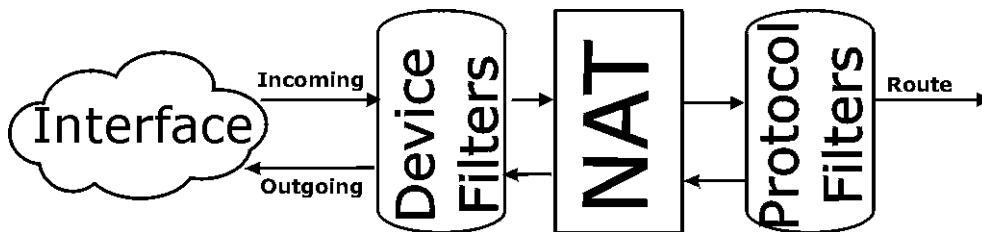


Figure 6-4 Protocol and Device Filter Sets

6.3.1 TCP/IP Filter Rule

This section shows you how to configure a TCP/IP filter rule. TCP/IP rules allow you to base the rule on the fields in the IP and the upper layer protocol, e.g., UDP and TCP, headers.

To configure a TCP/IP rule, select TCP/IP Filter Rule from the Filter Type field and press [Enter] to open **Menu 21.1.1 – TCP/IP Filter Rule**, as shown next.

```

Menu 21.1.1.1 - TCP/IP Filter Rule

Filter #: 1,1
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 6          IP Source Route= No
Destination: IP Addr= 0.0.0.0
                IP Mask= 0.0.0.0
                Port # = 137
                Port # Comp= Equal
Source: IP Addr= 0.0.0.0
        IP Mask= 0.0.0.0
        Port # =
        Port # Comp= None
TCP Estab= No
More= No          Log= None
Action Matched= Drop

Action Not Matched= Check Next Rule

Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.

```

Figure 6-5 Menu 21.1.1 – TCP/IP Filter Rule

The following table describes how to configure your TCP/IP filter rule.

Table 6-4 TCP/IP Filter Rule Menu Fields

FIELD	DESCRIPTION	OPTION
Active	This field activates/deactivates the filter rule.	Yes/No
IP Protocol	Protocol refers to the upper layer protocol, e.g., TCP is 6, UDP is 17 and ICMP is 1. This value must be between 0 and 255.	0 to 255
IP Source Route	If Yes , the rule applies to packet with IP source route option; or else the packet must not have source route option. The majority of IP packets do not have source route.	Yes/No
Destination: IP Address	Enter the destination IP Address of the packet you wish to filter. This field is disregarded if it is 0.0.0.0.	IP address
Destination: IP Mask	Enter the IP mask to apply to the Destination: IP Addr.	Subnet mask

FIELD	DESCRIPTION	OPTION
Destination: Port #	Enter the destination port of the packets that you wish to filter. The range of this field is 0 to 65535. This field is disregarded if it is 0.	0 to 65535
Destination: Port # Comp	Select the comparison to apply to the destination port in the packet against the value given in Destination: Port #.	None/Less/Greater/Equal/Not Equal
Source: IP Address	Enter the source IP address of the packet you wish to filter. This field is disregarded if it is 0.0.0.0.	IP Address
Source: IP Mask	Enter the IP mask to apply to the Source: IP Addr.	IP Mask
Source: Port #	Enter the source port of the packets that you wish to filter. The range of this field is 0 to 65535. This field is disregarded if it is 0.	0 to 65535
Source: Port # Comp	Select the comparison to apply to the source port in the packet against the value given in Source: Port #.	None/Less/Greater/Equal/Not Equal
TCP Estab	This field is applicable only when IP Protocol field is 6, TCP. If Yes , the rule matches only established TCP connections; or else the rule matches all TCP packets.	Yes/No
More	If Yes , a matching packet is passed to the next filter rule before an action is taken; or else the packet is disposed of according to the action fields. If More is Yes , then Action Matched and Action Not Matched will be N/A .	Yes / N/A
Log	Select the logging option from the following: None – No packets will be logged. Action Matched – Only packets that match the rule parameters will be logged. Action Not Matched – Only packets that do not match the rule parameters will be logged. Both – All packets will be logged.	None Action Matched Action Not Matched Both
Action Matched	Select the action for a matching packet.	Check Next Rule/Forward/Drop
Action Not Matched	Select the action for a packet not matching the rule.	Check Next Rule/Forward/Drop
Once you have completed filling in Menu 21.1.1 – TCP/IP Filter Rule , press [Enter] at the message [Press Enter to Confirm] to save your configuration, or press [Esc] to cancel. This data will now be displayed on Menu 21.1 – Filter Rules Summary .		

The next diagram illustrates the logic flow of an IP filter.

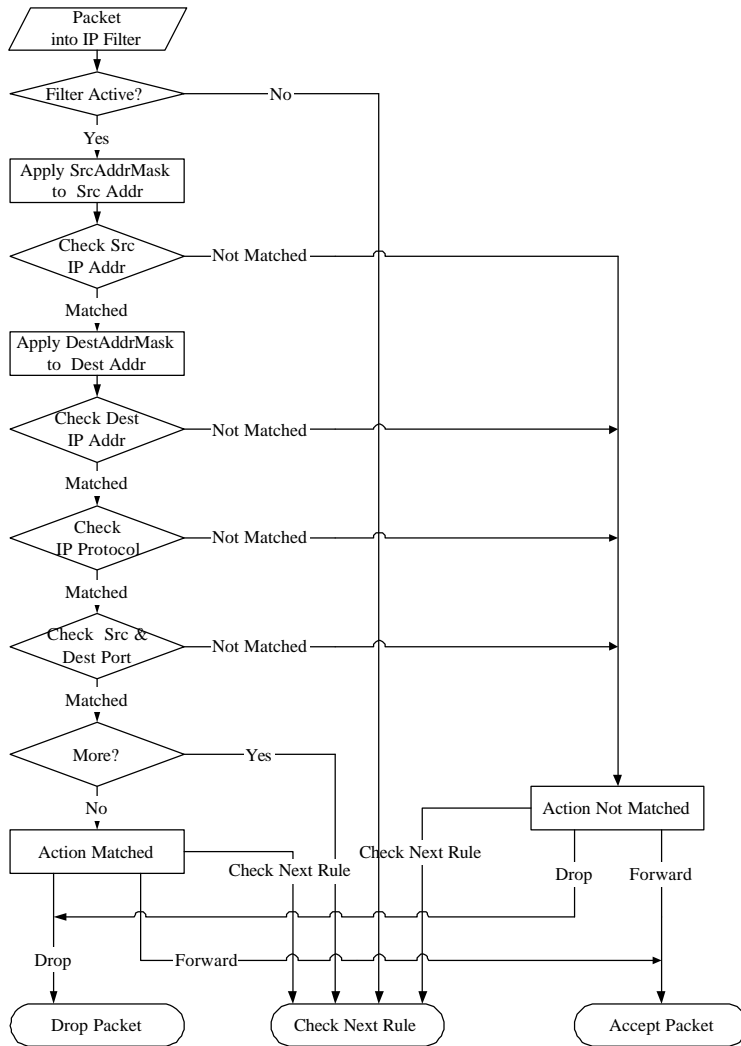


Figure 6-6 Executing an IP Filter

6.3.2 Generic Filter Rule

This section shows you how to configure a generic filter rule. The purpose of generic rules is to allow you to filter non-IP packets. For IP, it is generally easier to use the IP rules directly.

For generic rules, the Prestige treats a packet as a byte stream as opposed to an IP or IPX packet. You specify the portion of the packet to check with the Offset (from 0) and the Length fields, both in bytes. The Prestige applies the Mask (bit-wise ANDing) to the data portion before comparing the result against the Value to determine a match. The Mask and Value are specified in hexadecimal numbers. Note that it takes two hexadecimal digits to represent a byte, so if the length is 4, the value in either field will take 8 digits, e.g., FFFFFFFF.

To configure a generic rule, select Generic Filter Rule in the Filter Type field in **Menu 21.1.1** and press [Enter] to open Generic Filter Rule, as shown next.

```
Menu 21.1.1 - Generic Filter Rule

Filter #: 4,1
Filter Type= Generic Filter Rule
Active= No
Offset= 0
Length= 0
Mask= N/A
Value= N/A
More= No           Log= None
Action Matched= Check Next Rule
Action Not Matched= Check Next Rule

Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.
```

Figure 6-7 Menu 21.4.1 – Generic Filter Rule

The following table describes the fields in the Generic Filter Rule Menu.

Table 6-5 Generic Filter Rule Menu Fields

FIELD	DESCRIPTION	OPTION
Filter #	This is the filter set, filter rule coordinates, i.e., 2,3 refers to the second filter set and the third rule of that set.	
Filter Type	Use [space bar] to toggle between both types of rules. Parameters displayed below each type will be different.	Generic Filter Rule/ TCP/IP Filter Rule
Active	Select Yes to turn on the filter rule.	Yes/No
Offset	Enter the starting byte of the data portion in the packet that you wish to compare. The range for this field is from 0 to 255.	0 (default)
Length	Enter the byte count of the data portion in the packet that you wish to compare. The range for this field is 0 to 8.	0 (default)
Mask	Enter the mask (in Hexadecimal) to apply to the data portion before comparison.	
Value	Enter the value (in Hexadecimal) to compare with the data portion.	
More	If Yes , a matching packet is passed to the next filter rule before an action is taken; or else the packet is disposed of according to the action fields. If More is Yes , then Action Matched and Action Not Matched will be N/A .	Yes / N/A
Log	Select the logging option from the following: None – No packets will be logged. Action Matched – Only packets that match the rule parameters will be logged. Action Not Matched – Only packets that do not match the rule parameters will be logged. Both – All packets will be logged.	None Action Matched Action Not Matched Both
Action Matched	Select the action for a matching packet.	Check Next Rule / Forward / Drop
Action Not Matched	Select the action for a packet not matching the rule.	Check Next Rule / Forward / Drop
Once you have completed filling in Menu 21.4.1 – Generic Filter Rule , press [Enter] at the message [Press Enter to Confirm] to save your configuration, or press [Esc] to cancel. This data will now be displayed on Menu 21.1 – Filter Rules Summary .		

6.4 Applying a Filter and Factory Defaults

This section shows you where to apply the filter(s) after you design it (them).

6.4.1 Ethernet Traffic

You seldom need to filter Ethernet traffic; however, the filter sets may be useful to block certain packets, reduce traffic and prevent security breaches. Go to **Menu 3.1** (shown next) and enter the number(s) of the filter set(s) that you want to apply as appropriate. You can choose up to four filter sets (from twelve) by entering their numbers separated by commas, e.g., 3, 4, 6, 11. Input filter sets filter incoming traffic to the Prestige and Output filter sets filter outgoing traffic from the Prestige.

```
Menu 3.1 - LAN Port Filter Setup

Input Filter Sets:
  protocol filters=
  device filters=
Output Filter Sets:
  Protocol filters=
  device filters=

Press ENTER to Confirm or ESC to Cancel:
```

Figure 6-8 Filtering Ethernet Traffic

6.4.2 Cable Port Filters

Go to **Menu 4.1** (shown next) and enter the number(s) of the filter set(s) as appropriate. You can cascade up to four filter sets by entering their numbers separated by commas.

```
Menu 4.1 - Cable Port Filter

Input Filter Sets:
  protocol filters=
  device filters=
Output Filter Sets:
  protocol filters=
  device filters=

Press ENTER to Confirm or ESC to Cancel:
```

Figure 6-9 Filtering Cable Port Traffic

Chapter 7

System Maintenance

This chapter covers the diagnostic tools that help you to maintain your Prestige. These tools include updates on system status, port status, log and trace capabilities and upgrades for the system software. This chapter describes how to use these tools in detail.

Select Menu 24 in the main menu to open **Menu 24 – System Maintenance**, as shown next.

```
Menu 24 - System Maintenance

1. System Status
2. System Information and Console Port Speed
3. Log and Trace
4. Diagnostic
5. Backup Configuration
6. Restore Configuration
7. Upload Firmware
8. Command Interpreter Mode

Enter Menu Selection Number:
```

Figure 7-1 Menu 24 – System Maintenance

7.1 System Status

The first selection, System Status, gives you information on the version of your system firmware and the status and statistics of the ports as shown next. System Status is a tool that can be used to monitor your Prestige. Specifically, it gives you information on your system firmware version, number of packets sent and number of packets received.

To get to the System Status, enter number **24** to go to **Menu 24 – System Maintenance**. In this menu, enter number **1** to open **System Maintenance – Status**. There are two commands in **Menu 24.1 – System Maintenance – Status**. Entering **9** resets the counters and **ESC** takes you back to the previous screen.

The next table describes the fields present in **Menu 24.1 – System Maintenance – Status** of your routing cable model. It should be noted that these fields are READ-ONLY and are meant to be used for diagnostic purposes.

NOTE: If you set your cable modem in Bridge mode you will see a different Status screen.

```
Menu 24.1 - System Maintenance - Status

SYSTEM:                                PORT STATUS:
Name: CM                                ---- LAN ----      ---- CABLE ---
Up Time: 0:09:42                        Status:      10M/Half      Ready
IP Routing: Enable                      TxPackets:    33              10
ZyNOS V2.40(R25)b3 | 6/28/2000           RxPackets:    20              82
CPU Load: 9.37%                          Collision:      0                0
                                         TxBytes/Sec:   0                0
                                         RxBytes/Sec:   0                7
CABLE MODEM:
Status: Operational                     Up Time:      0:09:33      0:09:33
Up Time: 0:09:13                        DHCP:         Server         Client
IP Addr: 10.200.0.136                    IP Addr: 192.168.1.1   10.201.0.231
IP Mask: 255.255.0.0                     IP Mask: 255.255.255.0 255.255.0.0
MAC Addr: 00a0:c523:2233                 MAC Addr: 00a0:c523:2231 00a0:c523:2232

DOWNSTREAM: +09.45 dBmV, 549,000,000 Hz (EIA-78), SNR=35.81 dB
UPSTREAM: +44.50 dBmV, 21,392,000 Hz

                                Press Command:
Commands: (9)-Reset Counters   (Esc)-Exit
```

Figure 7-2 Menu 24.1 – System Maintenance – Status (Router Mode)

The following table describes the fields present in **Menu 24.1 – System Maintenance – Status**.

Table 7-1 System Maintenance – Status Menu Fields

FIELD	DESCRIPTION
SYSTEM	
System Name	The name that identifies the Prestige.
Up Time	The total time the Prestige has been powered on.
IP Routing	Indicates if IP routing is enabled (router mode) or disabled (bridge mode).
ZyNOS	The ZyNOS (ZyXEL Network Operating System) version.
CPU Load	Specifies the percentage of CPU utilization.
PORT STATUS (LAN/CABLE)	
Status	Indicates the status of the LAN and CABLE port.
TxPackets	The number of transmitted packets on this port.
RxPackets	The number of received packets on this port.
Collision	The number of collisions on this port.
TxBytes/Sec	Shows the transmitted bytes per second on this port.
RxBytes/Sec	Shows the received bytes per second on this port.
Up Time	Time the line has been up.
DHCP	The LAN/CABLE port DHCP role.
IP Addr	The LAN/CABLE port IP address.
IP Mask	The LAN/CABLE port IP mask.
MAC Addr	The LAN/CABLE port MAC address.
CABLE MODEM	
Status	Indicates the status of the cable modem.
Up Time	Time the cable modem has been operational.
IP Addr	The cable modem's IP address.
IP Mask	The cable modem's IP mask.
MAC Addr	The cable modem's MAC address.
DOWNSTREAM	Shows the current downstream receiving status of the cable modem: the downstream receiving power level, the downstream frequency and the downstream SNR (Signal-to-Noise Ratio).
UPSTREAM	Shows the current upstream transmission status of the cable modem: the upstream transmission power level and the upstream frequency.

7.2 System Information and Console Port Speed

This section describes your system and allows you to choose different console port speeds. To get to the System Information and Console Port Speed, Enter **24** to go to **Menu 24 – System Maintenance**. In this menu, enter number 2 to open **Menu 24.2 System Information and Console Port Speed**. From this menu you can enter your selection as shown in the next figure:

```
Menu 24.2 - System Information and Console Port Speed

      1. System Information
      2. Console Port Speed

Please enter selection:
```

Figure 7-3 Menu 24.2 – System Information and Console Port Speed

7.2.1 System Information

System Information gives you information about your system as shown next in Figure 7-3 **Menu 24.2.1**.

```
Menu 24.2.1 - System Maintenance - Information

Name:
IP Routing: Enable
ZyNOS S/W Version: V2.40 | 3/17/2000

Press ESC or ENTER to Exit
```

Figure 7-4 Menu 24.2.1 System Maintenance – Information (Router Mode)

Table 7-2 Fields in System Maintenance

FIELD	DESCRIPTION
Name	Displays the system name of your Prestige. This information can be modified in Menu 1 – General Setup.
IP Routing	Refers if IP routing has been enabled (router mode) or disabled (bridge mode).
ZyNOS Version	Refers to ZyXEL's network operating software.

7.2.2 Console Port Speed

You can change the speed of the console port through **Menu 24.2.2 – Console Port Speed**. Your Prestige supports 9600 (default), 19200, 38400, 57600 and 115200 bps for the console port. Use [space bar] to select the desired speed in **Menu 24.2.2**, as shown next.

```

Menu 24.2.2 - System Maintenance - Change Console Port Speed

      Console Port Speed: 9600

      Press ENTER to Confirm or ESC to Cancel:

Press Space Bar to Toggle.

```

Figure 7-5 Menu 24.2.2 – System Maintenance – Change Console Port Speed

7.3 Log and Trace

There are two logging facilities in the Prestige. The first is the error logs and trace records that are stored locally. The second is the UNIX syslog facility for message logging.

7.3.1 Viewing Error Log

The first place you should look for clues when something goes wrong is the error/trace log.

Follow the procedure below to view the local error/trace log:

- Step 1.** Select option 24 from the main menu to open **Menu 24 – System Maintenance**.
- Step 2.** From Menu 24, select option 3 to open **Menu 24.3 – System Maintenance – Log and Trace**.

Step 3. Select the first option from **Menu 24.3 – System Maintenance – Log and Trace** to display the error log in the system.

After the Prestige finishes displaying, you will have the option to clear the error log.

Examples of typical error and information messages are presented in the next figure.

```
Menu 24.3 - System Maintenance - Log and Trace

1. View Error Log

Please enter selection
```

Figure 7-6 Menu 24.3 – Log and Trace

7.4 Diagnostic

The diagnostic facility allows you to test the different aspects of your Prestige to determine if it is working properly. **Menu 24.4** allows you to choose among various types of diagnostic tests to evaluate your system, as shown next.

```
Menu 24.4 - System Maintenance - Diagnostic

TCP/IP
1. Ping Host
2. Cable Port DHCP Release
3. Cable Port DHCP Renewal

System
11. Reboot System

Enter Menu Selection Number:

Host IP Address= N/A
```

Figure 7-7 Menu 24.4 – System Maintenance – Diagnostic

Perform the following procedures to get to Diagnostics.

Step 1. From the main menu, select option 24 to open **Menu 24 – System Maintenance**.

Step 2. From this menu, select option 4. Diagnostic. This will open **Menu 24.4 – System Maintenance – Diagnostic**.

The following table describes the diagnostic tests available in **Menu 24.4** for your Prestige and the connections.

Table 7-3 System Maintenance Menu – Diagnostic

FIELD	DESCRIPTION
Ping Host	This diagnostic test pings the host, which determines the functionality of the TCP/IP protocol on both systems and the links in between.
Cable Port DHCP Release	This option enables you to release DHCP settings.
Cable Port DHCP Renewal	This option enables you to renew DHCP settings.
Reboot System	This option reboots the Prestige.
Host IP Address	If you entered 1 above, then enter the IP address of the machine you want to ping in this field.

7.5 Backup Configuration

Option 5 from **Menu 24 – System Maintenance** allows you to backup the current Prestige configuration to your workstation. Backup is highly recommended once your Prestige is functioning properly.

You can only perform the backup and restore using Menu 24 through the console port, not telnet. Any serial communications program should work fine however, you must use XMODEM protocol to perform the download/upload.

Please note that the terms “download” and “upload” are relative to the workstation. Download means to transfer from another machine to the workstation, while upload means from your workstation to another machine.

```
Menu 24.5 - System Maintenance - Backup Configuration

Ready to backup Configuration via Xmodem.
Do you want to continue (y/n):
```

Figure 7-8 Menu 24.5 – System Maintenance – Backup Configuration

7.6 Restore Configuration

Menu 24.6 – System Maintenance – Restore Configuration allows you to restore the configuration via the console port. Note that this function erases the current configuration before restoring to the previous back-up configuration; please do not attempt to restore unless you have the backup configuration stored on disk.

```
Menu 24.6 - System Maintenance - Restore Configuration

Ready to restore Configuration via Xmodem.
Do you want to continue (y/n):
```

Figure 7-9 Menu 24.6 – System Maintenance – Restore Configuration

7.7 Upload Firmware

Menu 24.7 – System Maintenance – Upload Firmware allows you to upgrade the firmware and the configuration file via the console port. Note that this function erases the old data before installing the new one; please do not attempt to update unless you have the new firmware at hand. There are two components in the system: the router firmware and the configuration file, as shown next.

```
Menu 24.7 - System Maintenance - Upload Firmware

1. Upload Router Firmware
2. Upload Router Configuration File

Enter Menu Selection Number:
```

Figure 7-10 Menu 24.7 – System Maintenance – Upload Firmware

7.7.1 Uploading the Router Firmware

Menu 24.7.1 shows you the instructions for uploading the router firmware. Perform the following procedures to upload the file:

```
Menu 24.7.1 - System Maintenance - Upload Router Firmware

To upload router firmware:
1. Enter "y" at the prompt below to go into debug mode.
2. Enter "atur" after "Enter Debug Mode" message.
3. Wait for "Starting XMODEM upload" message before activating
   Xmodem upload on your terminal.
4. After successful firmware upload, enter "atgo" to restart the
   router.

Warning: Proceeding with the upload will erase the current router
firmware.

Do You Wish To Proceed: (Y/N)
```

Figure 7-11 Menu 24.7.1 – System Maintenance – Upload Router Firmware

- Step 1.** Enter “y” at the prompt to go into debug mode.
- Step 2.** Enter “atur” after “Enter Debug Mode” message.
- Step 3.** Wait for the “Starting XMODEM upload” message before activating XMODEM upload on your terminal.
- Step 4.** After successful firmware upload, enter “atgo” to restart the Prestige.

7.7.2 Uploading Router Configuration File

The configuration data, system-related data, the error log and the trace log are all stored in the configuration file. Please be aware that uploading the configuration file replaces everything contained within.

Menu 24.7.2 shows you the instructions for uploading the Router Configuration file. Perform the following procedures to upload the configuration file:

- Step 1.** Enter “y” at the prompt to go into debug mode.
- Step 2.** Enter “atur3” after the “Enter Debug Mode” message.
- Step 3.** Wait for the “Starting XMODEM upload” message before activating XMODEM upload on your terminal.
- Step 4.** After successful firmware upload, enter “atgo” to restart the Prestige.

If you replace the current configuration file with the default configuration file, i.e., p941.rom, you will lose all configurations that you had before and the speed of the console port will be reset to the default of 9600 bps with 8 data bit, no parity, 1 stop bit (8n1), and no flow control. You will need to change your serial communications software to the default before you can connect to the Prestige again. The password will be reset to the default of 1234, also.

```
Menu 24.7.2 - System Maintenance - Upload Router Configuration File

To upload router configuration file:
1. Enter "y" at the prompt below to go into debug mode.
2. Enter "atur3" after "Enter Debug Mode" message.
3. Wait for "Starting XMODEM upload" message before activating
   Xmodem upload on your terminal.
4. After successful firmware upload, enter "atgo" to restart the
   router.

Warning:
1. Proceeding with the upload will erase the current
   configuration file.
2. The router's console port speed (Menu 24.2.2) may change
   when it is restarted; please adjust your terminal's speed
   accordingly. The password may change (Menu 23), also.
3. When uploading the DEFAULT configuration file, the console
   port speed will be reset to 9600 bps and the password to
   "1234".

Do You Wish To Proceed: (Y/N)
```

Figure 7-13 Menu 24.7.2 – System Maintenance – Upload Router Configuration File

7.7.3 TFTP Transfer

In addition to the direct console port connection, the Prestige supports the up/downloading of the firmware and the configuration file using TFTP (Trivial File Transfer Protocol) over LAN. Although TFTP should work over CABLE as well, it is not recommended because of the potential data corruption problems.

To use TFTP, your workstation must have both telnet and TFTP clients. To transfer the firmware and the configuration file, perform the following procedures:

- Step 1.** Use telnet from your workstation to connect to the Prestige and log in. Because TFTP does not have any security check, the Prestige records the IP address of the telnet client and accepts TFTP requests only from this address.
- Step 2.** Place the SMT in command interpreter (CI) mode by entering 8 in **Menu 24 – System Maintenance**.

- Step 3.** Enter command “`sys stdio 0`” to disable SMT timeout so the TFTP transfer will not be interrupted.
- Step 4.** Launch the TFTP client on your workstation and connect to the Prestige. Set the transfer mode to binary before starting data transfer.
- Step 5.** Use the TFTP client to transfer files between the Prestige and the workstation. The file name for the firmware is “`ras`” and for the configuration file, “`rom-0`” (rom-zero, not capital o).

If you upload the firmware to the Prestige, it will reboot automatically when the file transfer is completed.

NOTE: The telnet connection must be active and the SMT in CI mode before and during the TFTP transfer. For details on TFTP commands, please consult the documentation of your TFTP client program. For UNIX, use “get” to transfer from the Prestige to the workstation, “put” the other way around and “binary” to set binary transfer mode.

The following is a sample tftp command:

```
TFTP [-i] host put p941.bin ras
```

where “**i**” specifies binary image transfer mode (use this mode when transferring binary files), “**host**” is the Prestige IP address, “**put**” transfers the file source on the workstation (p941.bin – name of the firmware on the workstation) to the file destination on the remote host (ras – name of the firmware on the Prestige).

The following table describes some of the fields that you may see in third party TFTP clients.

Table 7-4 Third Party TFTP Clients – General Fields

Host	Enter the IP address of the Prestige. 192.168.1.1 is the Prestige default IP address when shipped.
Send/Fetch	Press send to upload the file to the Prestige and Fetch to back up the file on your computer.
Local File	Enter the path and name of the firmware file (*.bin extension) or configuration file (*.rom extension) on your computer.
Remote File	This is the filename on the Prestige. The filename for the firmware is ras and for the configuration file, is rom-0 .
Binary	Transfer the file in binary mode.
Abort	Stop transfer of the file.

7.8 Command Interpreter Mode

This option allows you to enter the command interpreter mode. A list of valid commands can be found by typing [help] or [?] at the command prompt. For more detailed information, check the ZyXEL web site or send an e-mail to the ZyXEL Support Group.

```
Menu 24 - System Maintenance

1. System Status
2. Console Port Speed
3. Log and Trace
4. Diagnostic
5. Backup Configuration
6. Restore Configuration
7. Upload Firmware
8. Command Interpreter Mode

Enter Menu Selection Number: 8

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```

Figure 7-14 Command Mode

7.9 Boot Commands

In Debug mode, enter ATHE to view the Prestige boot module commands as shown next and then enter ATGO to continue booting the system. For ATBAx, x denotes the number preceding the colon to give the speed following the colon in the list of numbers that follow; e.g., ATBA3 will give a speed of 9.6 Kbps. ATSE displays the seed that is used to generate a password to turn on the debug flag in the firmware. The ATSH command shows product-related information such as boot module version, vendor name, product model, RAS code revision, etc.

```
Press any key to enter debug mode within 3 seconds.
.....
Enter Debug Mode
athe
===== Debug Command Listing =====
AT          just answer OK
ATHE        print help
ATBAX       change baud rate. 1:38.4k, 2:19.2k, 3:9.6k 4:57.6k
5:115.2k
ATENx,(y)   set Boot Extension Debug Flag (y=password)
ATSE        show the seed of password generator
ATTI(h,m,s) change system time to hour:min:sec or show current time
ATDA(y,m,d) change system date to year/month/day or show current date
ATDS        dump RAS stack
ATDT        dump Boot Module Common Area
ATDUX,y     dump memory contents from address x for length y
ATWBx,y     write address x with 8-bit value y
ATWWx,y     write address x with 16-bit value y
ATWLx,y     write address x with 32-bit value y
ATRBx       display the 8-bit value of address x
```

Figure 7-15 Boot Module Commands

Chapter 8

Telnet Configuration and Capabilities

This chapter covers the Telnet Configuration and Capabilities of the Prestige.

8.1 About Telnet Configuration

Before the Prestige is properly setup for TCP/IP, the only option for configuring it is through the console port. Once your Prestige is configured, you can use telnet to configure it remotely as shown next.

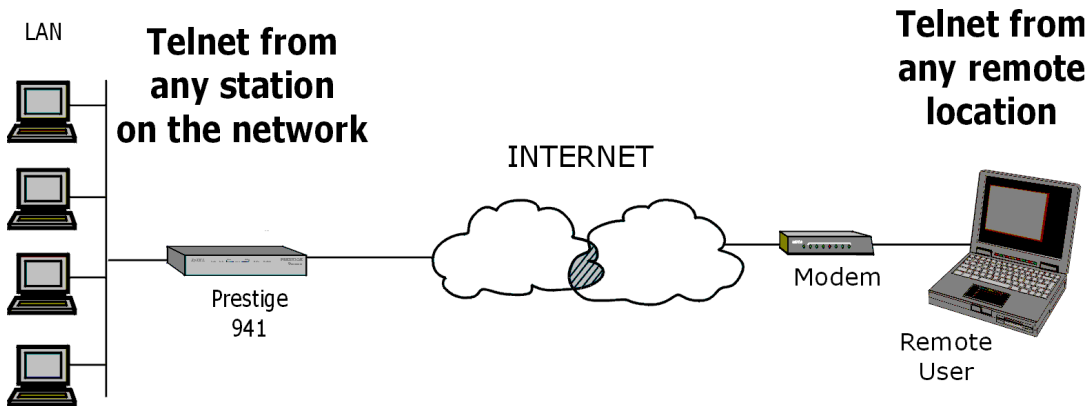


Figure 8-1 Telnet Configuration on a TCP/IP Network

When IP routing is disabled, the Prestige can still function as a host.

8.2 Telnet Under SUA

When Single User Account (SUA) is enabled and an inside server is specified, telnet connections from the outside will be forwarded to the inside server. So to configure the Prestige via telnet from the outside, you must first telnet to the inside server and then telnet from the server to the Prestige using its inside LAN IP address. If no inside server is specified, telnet to the SUA's IP address connects to the Prestige directly.

8.3 Telnet Capabilities

8.3.1 Single Administrator

To prevent confusion and discrepancy on the configuration, your Prestige only allows one administrator to log in at any time. Your Prestige also gives priority to the console port over telnet. If you have already connected to your Prestige via telnet, you will be logged out if another user logs in to the Prestige via the console port.

8.3.2 System Timeout

There is a system timeout of 5 minutes (300 seconds) for either the console port or telnet. Your Prestige will automatically log you out if you do nothing in this timeout period except when it is continuously updating the status in **Menu 24.1**.

Chapter 9

Troubleshooting

This chapter covers the potential problems you may run into and the possible remedies. After each problem description, some instructions are provided to help you to diagnose and solve the problem.

9.1 Problems Starting Up the Prestige

Table 9-1 Troubleshooting the Start-Up of Your Prestige

PROBLEM	CORRECTIVE ACTION	
None of the LEDs are on when you power on the Prestige.	Check the connection between the AC adapter and the Prestige. If the error persists, you may have a hardware problem. In this case, you should contact technical support.	
Cannot access the Prestige via the console port.	1. Check to see if the Prestige is connected to your computer's serial port.	
	2. Check to see if the communications program is configured correctly. The communications software should be configured as follows:	VT100 terminal emulation
		9600 bps
		No parity, 8 Data bits, 1 Stop bit
	No Flow Control for some DOS terminal emulation software	

9.2 Problems With the Coaxial Cable

Table 9-2 Troubleshooting the Coaxial Cable

PROBLEM	CORRECTIVE ACTION
CABLE LED does not flash. (Cannot lock on to downstream channel).	Check the conditions of coaxial cable connected to the back of the cable router and the quality of the cable tap. If not, improve connection condition and cable tap quality.

9.3 Problems With the LAN Interface

Table 9-3 Troubleshooting the LAN Interface

PROBLEM	CORRECTIVE ACTION
Cannot ping any workstation on the LAN.	Check the 10M/100M LEDs on the front panel. One of these LEDs should be on. If they are both off, check the cables between your Prestige and hub, or the station.
	Verify that the IP address and the subnet mask are consistent between the Prestige and the workstations.

9.4 Problems With Internet Access

Table 9-4 Troubleshooting Problems With Internet Service

PROBLEM	CORRECTIVE ACTION
Cannot access e-mail or Internet Service.	Check all the connections. Make sure that the cable line is securely connected to the cable jack on the back of the modem. Verify that the RJ-45 cable is securely plugged into both the modem and the computer. If all connections are made properly, all the LEDs should be functioning properly.
	Check your TCP/IP parameters and verify that you have installed TCP/IP properly. If the problem persists, call your cable service provider to verify that their service is two-way and DOCSIS-compliant.
	Check with your service provider to see if your account has been activated.
All of the LEDs look right, but I still cannot access the Internet.	<p>If the LEDs are right, then your cable router is operating properly. Try shutting down, powering off your computer and then turning it on again. This will cause your computer to re-establish communications.</p> <p>Check your TCP/IP parameters and verify that you have installed TCP/IP properly.</p>

Appendix A

Glossary

10BaseT: The 10-Mbps baseband Ethernet specification that uses two pairs of twisted-pair cabling (Category 3 or 5): one pair for transmitting data and the other for receiving data.

ARP: Address Resolution Protocol is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address that is recognized in the local network.

Bandwidth: This is the capacity on a link usually measured in bits-per-second (bps).

Bit (Binary Digit): A single digit number in base-2, in other words, either a 1 or a zero. The smallest unit of computerized data.

Byte: A set of bits that represent a single character. There are 8 bits in a Byte.

Cable Modem (CM): A cable modem is a device that enables you to hook up your computer to a local cable TV line and receive data at about 1.5 Mbps. This data rate far exceeds that of the prevalent 28.8 and 56 Kbps telephone modems, and up to 128 Kbps of ISDN that is about the data rate available to subscribers of Digital Subscriber Line (DSL) telephone service. A cable modem can be added to or integrated with a set top box that turns your TV set into an Internet channel. For computer attachment, the cable line must be split so that part of the line goes to the TV set and the other part goes to the cable modem and the computer.

A cable modem is more like a network interface card (NIC) than a computer modem. All of the cable modems attached to a cable TV company coaxial cable line communicate with a Cable Modem Termination System (CMTS) at the local cable TV company office. All cable modems can receive only from and send signals to the CMTS, but not to other cable modems on the line.

CATV: Cable TV system. Can be all coaxial- or HFC- (Hybrid Fiber Coax) based.

CDR: Call Detail Record. This is a name used by telephone companies for call-related information.

Channel: A specific frequency and bandwidth combination. In the present context, it means TV channels for television services and downstream data for cable modems.

Client: A software program that is used to contact and obtain data from a Server software program on another computer. Each Client program is designed to work with one or more specific kinds of Server programs and each Server requires a specific kind of Client. A Web Browser is a specific kind of Client.

CMTS: Cable Modem Termination System. A central device for connecting the cable TV network to a data network like the Internet. Normally it is placed in the headend of the cable TV system.

CPE: Customer Premises Equipment. Used to describe the computer and/or other equipment that the customer may want to connect to the cable modem.

Crossover Ethernet Cable: A cable that wires a pin to its opposite pin, for example, RX+ is wired to TX+. This cable connects two similar devices, for example, two data terminal equipment (DTE) or data communications equipment (DCE) devices.

DCE: Data Communications Equipment is typically a modem or other type of communication device. The DCE sits between the DTE (data terminal equipment) and a transmission circuit such as a phone line.

DES: Data Encryption Standard.

DHCP: Dynamic Host Configuration Protocol. This protocol provides a mechanism for allocating IP addresses dynamically so that addresses can be reused. Often used for managing the IP addresses of all the cable modems in a cable plant and the computers connected to the cable modems.

DNS: Domain Name System links names to IP addresses. When you access web sites on the Internet, you can type the IP address of the site or the DNS name. When you type a domain name in a Web browser, a query is sent to the primary DNS server defined in your web browser's configuration dialog box. The DNS server converts the name you specified to an IP address and returns this address to your system. From then on, the IP address is used in all subsequent communications.

DOCSIS: Data over Cable Service Interface Specification. It is the dominating cable modem standard, which defines technical specifications for both cable modem and CMTS.

Domain Name: The unique name that identifies an Internet site. Domain Names always have 2 or more parts, separated by dots. The part on the left is the most specific, and the part on the right is the most general.

Downstream Frequency: The frequency used for transmitting data from the CMTS to the cable modem. Normally in the 42/65-850 MHz range depending on the actual cable plant capabilities.

Downstream: The data flowing from the CMTS to the cable modem.

DRAM: Dynamic RAM that stores information in capacitors that must be refreshed periodically.

DTE: Originally, the DTE (data terminal equipment) was a dumb terminal or printer, but today it is a computer, or a bridge, or router that interconnects local area networks.

EMI: ElectroMagnetic Interference. The interference by electromagnetic signals that can cause reduced data integrity and increased error rates on transmission channels.

Ethernet: A very common method of networking computers in a LAN. There are a number of adaptations to the IEEE 802.3 Ethernet standard, including adaptations with data rates of 10 Mbits/sec and 100 Mbits/sec over coaxial cable, twisted-pair cable and fiber-optic cable. The latest version of Ethernet, Gigabit Ethernet, has a data rate of 1 Gbit/sec.

FTP: File Transfer Protocol is an Internet file transfer service that operates on the Internet and over TCP/IP networks. FTP is basically a client/server protocol in which a system running the FTP server accepts commands from a system running an FTP client. The service allows users to send commands to the server for uploading and downloading files.

Gateway: A gateway is a computer system or other device that acts as a translator between two systems that do not use the same communication protocols, data formatting structures, languages, and/or architecture.

Headend: Central distribution point for a CATV system. Video signals are received here from satellites and maybe other sources, frequency converted to the appropriate channels combined with locally originated signals and rebroadcast onto the HFC plant. The headend is where the CMTS is normally located.

HFC: HFC (hybrid fiber coaxial cable) is a telecommunication technology in which fiber optic cable and coaxial cable are used in different portions of a network to carry broadband content (such as video, data and voice). Typically, a local cable TV company might use fiber optic cable from the cable headend (distribution center) to serving nodes located close to business and residential users and from these nodes use coaxial cable to individual businesses and homes. An advantage of HFC is that some of the characteristics of fiber optic cable (high bandwidth and low noise and interference susceptibility) can be brought close to the user without having to replace the existing coaxial cable that is installed all the way to the home and business.

Host: Any computer on a network that is a repository for services available to other computers on the network. It is quite common to have one host machine provide several services, such as WWW and USENET.

HTTP: HyperText Transfer Protocol.

IANA: Internet Assigned Number Authority acts as the clearinghouse to assign and coordinate the use of numerous Internet protocol parameters such as Internet addresses, domain names, protocol numbers and more. The IANA web site is at <http://www.isi.edu/iana>.

ICMP: Internet Control Message Protocol is a message control and error-reporting protocol between a host server and a gateway to the Internet. ICMP uses Internet Protocol (IP) datagrams, but the messages are processed by the TCP/IP software and are not directly apparent to the application user.

Internet: A vast collection of inter-connected networks that all use the TCP/IP protocols and, it evolved from the ARPANET of the late 60' s and early 70' s. The Internet now connects roughly more than 60,000 independent networks into a vast global Internet.

Intranet: A private network inside a company or organization that uses the same kinds of software that you would find on the public Internet, but is only for internal use.

IP: Internet Protocol. The IP (currently IP version 4, or IPv4), is the underlying protocol for routing packets on the Internet and other TCP/IP-based networks.

IPCP (PPP): IP Control Protocol allows changes to IP parameters such as the IP address.

IPCP: IP Control Protocol.

IPX: Internetwork Packet eXchange. The native NetWare internetworking protocol is IPX (Internetwork Packet Exchange). Like IP (Internet Protocol), IPX is an internetworking protocol that provides datagram services.

ISP: Internet Service Providers provide connections into the Internet for home users and businesses. There are local, regional, national and global ISPs. You can think of local ISPs as the gatekeepers of the Internet.

LAN: Local Area Network is a shared communication system to which many computers are attached. A LAN, as its name implies is limited to a local area. This has to do more with the electrical characteristics of the medium than the fact that many early LANs were designed for departments, although the latter accurately describes a LAN as well. LANs have different topologies the most common being the linear bus and the star configuration.

MAC: On a local area network (LAN) or other network, the MAC (Media Access Control) address is your computer's unique hardware number. (On an Ethernet LAN, it's the same as your Ethernet address.) The MAC layer frames data for transmission over the network then passes the frame to the physical layer interface where it is transmitted as a stream of bits.

MCNS: Multimedia Cable Network System is the consortium behind the DOCSIS standard for cable modems.

MSO: Multiple Service Operators. A cable TV service provider that also provides other services such as data and/or voice telephony.

NAT: Network Address Translation is the translation of an Internet Protocol address used within one network to a different IP address known within another network.

Network: Any time you connect 2 or more computers together so that they can share resources, you have a computer network. Connect 2 or more networks together and you have an Internet.

NIC: Network Interface Card. A board that provides network communication capabilities to and from a computer system.

Node: Any single computer connected to a network.

One-way Cable Modem: A one-way Cable Modem uses the TV cable for the downstream (receive) and a telephone modem for upstream (transmit).

POP3: Post Office Protocol, version 3.

Port: An Internet port refers to a number that is part of a URL, appearing after a colon (:) right after the domain name. Every service on an Internet server listens on a particular port number on that server. Most services have standard port numbers, e.g., web servers normally listen in on port 80.

PPP: Point to Point Protocol. PPP encapsulates and transmits IP (Internet Protocol) datagrams over serial point-to-point links. PPP works with other protocols such as IPX (Internetwork Packet Exchange). The protocol is defined in IETF (Internet Engineering Task Force) RFC-1661 through 1663. PPP provides router-to-router, host-to-router and host-to-host connections.

Ranging: The process of automatically adjusting transmission levels and time offsets of individual modems in order to make sure the bursts coming from different modems line up in the right timeslots and are received at the same power level at the CMTS.

RFC: An RFC (Request for Comments) is an Internet formal document or standard that is the result of a committee drafting and subsequent review by interested parties. Some RFCs are informational in nature. Of those that are intended to become Internet standards, the final version of the RFC becomes the standard and no further comments or changes are permitted. Change can occur however, through subsequent RFCs.

RIP: Routing Information Protocol is an interior or intra-domain routing protocol that uses the distance-vector routing algorithms. RIP is used on the Internet and is common in the NetWare environment as a method for exchanging routing information between routers.

Set-Top Box: A set-top box is a device that enables a television set to become a user interface to the Internet and also enables a television set to receive and decode digital television (DTV) broadcasts.

Server: A computer or a software package that provides a specific kind of service to the client software running on other computers.

SID (Service ID): Used in the DOCSIS standard to define a particular mapping between a cable modem (CM) and the CMTS. The SID is used for the purpose of upstream bandwidth allocation and class-of-service management.

SMT: System Management Terminal.

SMTP: Simple Mail Transfer Protocol.

SNR: Signal to Noise Ratio. The sensitivity of a communications receiver is generally specified in terms of the audio signal-to-noise ratio that results from an input signal of a certain number of microvolts.

SNMP: System Network Management Protocol is a popular management protocol defined by the Internet community for TCP/IP networks. It is a communication protocol for collecting information from devices on the network.

SOHO: Small Office / Home Office.

Splitter: Passive devices that divide the traffic on trunk cables and send it down feeder cables.

STP: Twisted-pair cable consists of copper-core wires surrounded by an insulator. Two wires are twisted together to form a pair and the pair form a balanced circuit. The twisting prevents interference problems. STP (shielded twisted-pair) provides protection against external crosstalk.

Straight through Ethernet Cable: A cable that wires a pin to its equivalent pin. This cable connects two dissimilar devices, for example, a data terminal equipment (DTE) and a data communications equipment (DCE) device. A straight-through Ethernet cable is the most common cable used.

SUA: Single User Account – The Prestige's SUA (Single User Account) feature allows multiple user Internet access at the cost of a single ISP account – see also NAT.

Subscriber Unit (SU): An alternate term for cable modem.

TCP: Transmission Control Protocol handles flow control and packet recovery as well as IP providing basic addressing and packet-forwarding services.

Telnet: Telnet is the login and terminal emulation protocol common on the Internet and in UNIX environments. It operates over TCP/IP networks. Its primary function is to allow users to log into remote host systems.

Terminal Software: Software that pretends to be (emulates) a physical terminal and allows you to type commands to a computer somewhere else.

Terminal: A device that allows you to send commands to a computer somewhere else. At a minimum, this usually means a keyboard and a display screen and some simple circuitry.

TFTP: Trivial File Transfer Protocol is an Internet file transfer protocol similar to FTP (File Transfer Protocol), but is scaled back in functionality so that it requires fewer resources to run. TFTP uses the UDP (User Datagram Protocol) rather than TCP (Transmission Control Protocol).

Three-way Cable Modem: A three-way cable modem is a hybrid that can use either a telephone modem or the TV cable for the upstream traffic.

Two-way Cable Modem: A two-way Cable Modem uses the TV cable for both downstream and upstream traffic.

UDP: UDP is a connectionless transport service that dispenses with the reliability services provided by TCP. UDP gives applications a direct interface with IP and the ability to address a particular application process running on a host via a port number without setting up a connection session.

Upstream Frequency: The frequency used to transmit data from the CM to the CMTS. Normally in the 5 to 42 MHz range for US systems and 5 to 65 MHz range for European systems.

Upstream: The data flowing from the CM to the CMTS.

UTP: Unshielded Twisted Pair (cable).

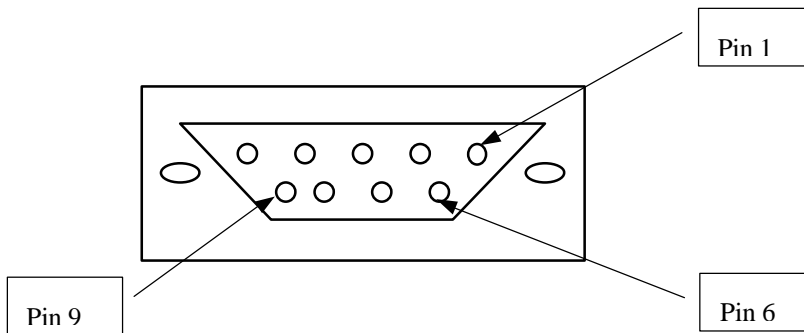
WAN: Wide Area Networks link geographically dispersed offices in other cities or around the globe. Just about any long-distance communication medium can serve as a WAN link, including switched and permanent telephone circuits, terrestrial radio systems and satellite systems.

ZyNOS: ZyXEL Network Operating System.

Appendix B

Hardware Specifications

Ethernet Specification for LAN	10/100 Mbit Half/Full Auto-negotiation
Console Port RS-232C	Pin 1 = NON; Pin 2 = DTE-RXD; Pin 3 = DTE-TXD; Pin 4 = DTE-DTR; Pin 5 = GND; Pin 6 = DTE-DSR; Pin 7 = DTE-RTS; Pin 8 = DTE-CTS; Pin 9 = NON. See the following figure.



LAN ETHERNET CABLE PIN LAYOUT:			
STRAIGHT-THROUGH (WHITE)		CROSSOVER (RED)	
(Switch)		(Adapter)	
1 IRD +	—————	1 OTD +	
2 IRD -	—————	2 OTD -	
3 OTD +	—————	3 IRD +	
6 OTD -	—————	6 IRD -	
(Switch)		(Switch)	
1 IRD +	—————	1 IRD +	
2 IRD -	—————	2 IRD -	
3 OTD +	—————	3 OTD +	
6 OTD -	—————	6 OTD -	

Appendix C

Power Adaptor Specifications

European Union

AC Power Adaptor model: 'Joden' JOD-4801-049

Input power: 230V AC, 50Hz, 105mA

Output power: 9V DC, 1.2 Amps.

Safety standards: TUV Certification No. S1 9754285 (EN 60950)

AC Power Adaptor model: 'Ahead' JAD090-1200E

Input power: 230V AC, 50Hz, 130mA

Output power: 9V DC, 1.2 Amps.

Safety standards: TUV Certification No. S1 2057450 (EN 60950)

AC Power Adaptor model: 'Ahead' JAD090-1200F

Input power: 230V AC, 50Hz, 130mA

Output power: 9V DC, 1.2 Amps.

Safety standards: TUV Certification No. TA 2057471 (EN 60950)

North America

AC Power Adaptor model: 'Joden' JOD-48U-17

Input power: 120V AC, 60Hz, 170mA

Output power: 9V DC, 1.2 Amps.

Safety standards: UL File No: E149469 (CSA STd No 223/UL 1310)

AC Power Adaptor model: 'Ahead' MW48-0901200

Input power: 120V AC, 60Hz, 20W

Output power: 9V DC, 1.2 Amps.

Safety standards: UL File No: E194707 (CSA std No 223/UL 1310)

Japan

AC Power Adaptor model: 'Joden' JOD-48-1251

Input power: 100V AC, 50/60Hz, 19VA

Output power: 9V DC, 1.2 Amps.

Safety standards: T-Mark Certification No. 91-58488

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