Prestige 861

VDSL Modem

User's Guide

Version 1.1

December 2003

ZyXEL

Unleash Networking Power

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Federal Communications Commission (FCC) Interference Statement

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operations.

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

If this equipment does cause harmful interference to radio/television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

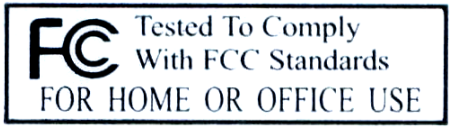
1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and the receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Notice 1

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

Certifications

1. Go to www.zyxel.com.
2. Select your product from the drop-down list box on the ZyXEL home page to go to that product's page.
3. Select the certification you wish to view from this page.



Information for Canadian Users

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

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

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

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

Caution

Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority, or electrician, as appropriate.

Note

This digital apparatus does not exceed the class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of Industry Canada.

ZyXEL Limited Warranty

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two years from the date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its discretion, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product is modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

Note

Repair or replacement, as provided under this warranty, is the exclusive remedy of the purchaser. This warranty is in lieu of all other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular use or purpose. ZyXEL shall in no event be held liable for indirect or consequential damages of any kind of character to the purchaser.

To obtain the services of this warranty, contact ZyXEL's Service Center for your Return Material Authorization number (RMA). Products must be returned Postage Prepaid. It is recommended that the unit be insured when shipped. Any returned products without proof of purchase or those with an out-dated warranty will be repaired or replaced (at the discretion of ZyXEL) and the customer will be billed for parts and labor. All repaired or replaced products will be shipped by ZyXEL to the corresponding return address, Postage Paid. This warranty gives you specific legal rights, and you may also have other rights that vary from country to country.

Safety Warnings

1. To reduce the risk of fire, use only No. 26 AWG or larger telephone wire.

2. Do not use this product near water, for example, in a wet basement or near a swimming pool.

3. Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightening.

Customer Support

Please have the following information ready when you contact customer support.

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

METHOD / LOCATION	E-MAIL SUPPORT/SALES	TELEPHONE/FAX	WEB SITE/ FTP SITE	REGULAR MAIL
WORLDWIDE	support@zyxel.com.tw sales@zyxel.com.tw	+886-3-578-3942 +886-3-578-2439	www.zyxel.com www.europe.zyxel.com ftp.zyxel.com ftp.europe.zyxel.com	ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu 300, Taiwan.
NORTH AMERICA	support@zyxel.com sales@zyxel.com	+1-800-255-4101 +1-714-632-0858	www.us.zyxel.com ftp.zyxel.com	ZyXEL Communications Inc., 1130 N. Miller St. Anaheim, CA 92806, U.S.A.
SCANDINAVIA	support@zyxel.dk sales@zyxel.dk	+45-3955-0700 +45-3955-0707	www.zyxel.dk ftp.zyxel.dk	ZyXEL Communications A/S, Columbusvej 5, 2860 Soeborg, Denmark.
GERMANY	support@zyxel.de sales@zyxel.de	+49-2405-6909-0 +49-2405-6909-99	www.zyxel.de	ZyXEL Deutschland GmbH. Adenauerstr. 20/A2 D-52146 Wuerselen, Germany

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Preface

Congratulations on your purchase of the Prestige 861 VDSL modem.

The Prestige is a high-performance, cost-effective VDSL (Very High Speed Digital Subscriber Line) modem with a four-port switch. Your Prestige can access the Internet via a telephone line. See the following section for more background information on DSL.

Your Prestige is easy to install and configure using CLI (Command Line Interface) commands.

Please visit our web site at www.zyxel.com for the latest release notes and product information.

Don't forget to register your Prestige (fast, easy online registration at www.zyxel.com) for free future product updates and information.

About This User's Guide

This manual is designed to guide you through the configuration of your Prestige for its various applications.

Related Documentation

- Supporting Disk

  Refer to the included CD for support documents.

- ZyXEL Web Site

  The ZyXEL download library at www.zyxel.com contains additional support documentation. Please also refer to www.zyxel.com for an online glossary of networking terms.

Syntax Conventions

- "Type" means for you to type one or more characters and press the carriage return. "Select" or "Choose" means for you to use one predefined choices. Command and arrow keys are enclosed in square brackets. [ENTER] means the Enter, or carriage return key.
- For brevity's sake, we will use "e.g.," as shorthand for "for instance", and "i.e.," for "that is" or "in other words" throughout this manual.
- The Prestige 861 may be referred to as the Prestige, the device or the P861 in this user's guide.
- Images of Prestige 861 are used throughout this document unless otherwise specified.

The following section offers some background information on DSL. Skip to *Chapter 1* if you wish to begin working with your Prestige right away.

What is DSL?

DSL (Digital Subscriber Line) technology enhances the data capacity of the existing twisted-pair wire that runs between the local telephone company switching offices and most homes and offices. While the wire itself can handle higher frequencies, the telephone switching equipment is designed to cut off signals above 4,000 Hz to filter noise off the voice line, but now everybody is searching for ways to get more bandwidth to improve access to the Web - hence DSL technologies.

There are actually seven types of DSL service, ranging in speeds from 16 Kbits/sec to 52 Mbits/sec. The services are either symmetrical (traffic flows at the same speed in both directions), or asymmetrical (the downstream capacity is higher than the upstream capacity). Asymmetrical services (ADSL) are suitable for Internet users because more information is usually downloaded than uploaded. For example, a simple button click in a web browser can start an extended download that includes graphics and text.

As data rates increase, the carrying distance decreases. That means that users who are beyond a certain distance from the telephone company's central office may not be able to obtain the higher speeds.

A DSL connection is a point-to-point dedicated circuit, meaning that the link is always up and there is no dialing required.

What is VDSL?

VDSL is the next generation of DSL technology that offers a much higher bandwidth than most DSL technologies. VDSL is the only feasible solution for bandwidth-demanding and video-rich applications such as video-on-demand, high definition television, tele-medicine, surveillance systems and other switched video services. VDSL supports both symmetric and asymmetric applications using existing copper wire (telephone wire) and therefore saving the cost of using traditional T1/E1 service for small/medium-sized business and residential users.

Part I:

GETTING STARTED

This part covers Getting to Know Your Prestige and Hardware Installation.

Chapter 1
Getting to Know Your VDSL Modem

This chapter covers the key features and main applications of your Prestige.

1.1 Introducing the Prestige

The Prestige can be used for high-speed Internet access through a VDSL connection over the telephone line. The Prestige supports data transmission speeds of 50 Mbps downstream and 30 Mbps upstream. The actual rate depends on the copper category of your telephone wires, distance from the central office and the type of DSL service you subscribe to. Its 10/100M auto-negotiating LAN interface enables fast data transfer of either 10Mbps or 100Mbps in either half-duplex or full-duplex mode depending on your Ethernet network. Your Prestige is easy to install and configure using CLI (Command Line Interface) commands.

1.2 Features of the Prestige

The following features make the Prestige a complete and the flexible networking solution for most users.

High Speed Internet Access

The Prestige supports transmission speeds of up to 50 Mbps downstream and 30 Mbps upstream.

10/100MB Auto-negotiation Ethernet/Fast Ethernet Interface

This auto-negotiation feature allows the Prestige to detect the speed of incoming transmissions and adjust appropriately, providing a faster data transfer on the Ethernet network as required. It enables fast data transfer of either 10 Mbps or 100 Mbps in either half-duplex or full-duplex mode depending on your Ethernet network.

Auto-crossover 10/100 Mbps Ethernet LAN

The LAN interfaces automatically adjust to either a crossover or straight-through Ethernet cable.

Protocols Supported

- TCP/IP (Transmission Control Protocol/Internet Protocol) network layer protocol.

Encapsulation

The Prestige supports RFC-2684 (Multiprotocol Encapsulation over ATM Adaptation Layer 5).

RFC 2684 describes two methods for Multiprotocol Encapsulation over ATM Adaptation Layer 5 (AAL5). The first method allows multiplexing of multiple protocols over a single ATM virtual circuit (LLC-based multiplexing) and the second method assumes that each protocol is carried over a separate ATM virtual circuit (VC-based multiplexing). Please refer to the RFC for more detailed information.

Ease of Installation

Your Prestige is designed for quick, easy and intuitive installation. Its compact size and light weight make it easy to position anywhere in your busy office.

1.3 Application Scenario for the Prestige

This section provides an example of how your Prestige can be used.

1.3.1 Internet Access

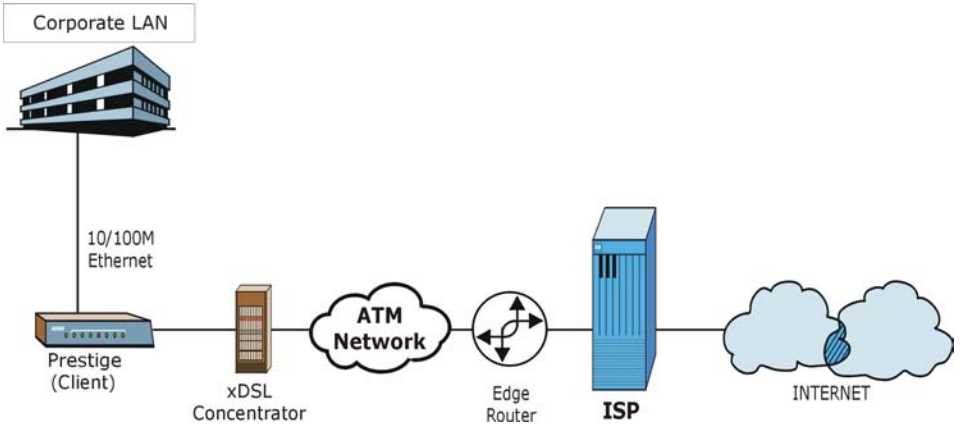

Figure 1-1 Internet Access Application

Chapter 2
Hardware Installation

This chapter introduces the Prestige hardware and shows you how to make cable connections.

2.1 Installation Requirements

In addition to your Prestige package, your computer should include the following hardware:

- An Ethernet 10/100Base-T NIC (Network Interface Card).

2.2 Front Panel

The LED indicators on the front panel show the operational status of the Prestige.

Figure 2-1 Front Panel

Table 2-1 Front Panel LED Description

LED	COLOR	STATUS	MEANING
SYS	Green	On	Your Prestige is on.
LAN 1-4	Green	On	The Prestige has a successful 10Mb Ethernet connection.
		Blinking	Data is being sent or received.

Table 2-1 Front Panel LED Description

LED	COLOR	STATUS	MEANING
	Amber	On	The Prestige has a successful 100Mb Ethernet connection.
		Blinking	Data is being sent or received.
VDSL	Green	On	Your Prestige is connected to a DSL line.
		Blinking (Slow)	The Prestige is initializing the DSL line.
		Blinking (Fast)	Data is being transmitted or received.

2.3 Rear Panel

Figure 2-2 Rear Panel

2.3.1 VDSL Port

Connect the Prestige directly to the wall jack using a telephone wire (RJ-11 connector).

2.3.2 LAN 10/100M

The Prestige has four 10/100Mbps auto-negotiating, auto-crossover Ethernet ports. The LAN interface is auto-crossover, so you may use a crossover cable or a straight-through Ethernet cable to connect your Prestige to a computer/external hub.

2.3.3 Console Port

You can configure the Prestige via a terminal emulator software on a computer that is connected to the Prestige through the console port. Connect the male end of the console cable to the console port of the Prestige and the female end to a serial port (COM1, COM2 or other COM port) of your computer.

2.3.4 Power Port

Connect the power adaptor to the port labeled **POWER** on the rear panel of your Prestige. Push in the power button to turn on the Prestige.

To avoid damage to the Prestige, make sure you use the supplied power adaptor.

2.4 Turning On Your Prestige

You can now turn on your Prestige by pushing in the power button (located on the back panel).

Part II:

COMMANDS

This part covers Commands Introduction, System Configuration, System Status, VDSL and Ping Commands and Firmware uploading.

Chapter 3
Commands Introduction

This chapter describes how to access the Prestige and provides an overview of its commands.

3.1 Command Line Overview

You can use line commands to configure the Prestige. If you have problems with your Prestige, customer support may request that you issue some of these commands to assist them in troubleshooting.

3.1.1 Command Syntax Conventions

1. Command keywords are in `courier new` font.
2. The / symbol means "or".
3. Type "`help`" to display a list of valid commands or type a command followed by "`help`" under main command (see *Table 3-1 Command Summary*) to display a list of associated subcommands.

```
P861:/> help
    bmelog    - show link up/down log after startup time
    exit      - logout
    passwd    - change login passwd
    ping      - send ICMP echo request message to Host
    reboot    - reboot system
    status    - show status
    sysconfig - configure system parameters
    vdsl      - start BME user interface
    version   - show software version information
P861:/> vdsl

vdsl> help
    port    - show the information about VDSL port
    profile - set and show profile of VDSL port
    pvc     - set and show the parameters of PVC
    version - show Ikanos firmware version
    exit    - exit UI program

vdsl>
```

Figure 3-1 CLI Help Example -1

```
vdsl> port help
    port snr      - show SNR
    port speed    - show speed information
    port counter  - show port statistics
```

Figure 3-2 CLI Help Example -2

3.1.2 Command Notation

The following notations denote user options:

[a/b/c/d...] *or* ***<a/b/c/d…>***:	Select and type the predefined default options.
[DEFAULT] *or* ***<DEFAULT>:***	Enter the value or predefined selection for this sub-command.
a.b.c.d:	The option is a 4-byte dotted decimal value.

3.2 Connect to your Prestige Using Telnet

The following procedure details how to telnet into your Prestige.

Step 1. Make sure your computer IP address and the Prestige IP address are on the same subnet. Refer to the *Setting Up Your Computer IP Address* appendix.

Step 2. In Windows, click **Start** (usually in the bottom left corner), **Run** and then type "telnet 192.168.1.1" (the default IP address) and click **OK**.

Step 3. For your first login, enter "admin" in the **login** field and "1234" in the **Password** field.

Step 4. After entering the correct password you can use the commands to do configuration.

3.3 Connect to Your Prestige Using the Console Port

Connect to the Prestige console port using a terminal emulation software. A computer with terminal emulation software configured to the following parameters:

- VT100 terminal emulation
- 9600 bps
- No parity, 8 data bits, 1 stop bit
- No flow control

3.3.1 Initial Screen

When you turn on your Prestige, it performs several internal tests as well as line initialization. After the initialization, the Prestige asks you to press [ENTER] to continue, as shown.

```
Bootloader Version: V1.6 | 2003/09/09 22:59:45

RAM: Size = 16384 Kbytes
TEST SDRAM: Verifying 832Kbytes    [OK]

Press any key to stop auto-booting......
Autoboot started.
System coming up.................................


    bootloader - Length: 60538 bytes, Checksum: 0x791c
    kernel - Length: 445590 bytes, Checksum: 0x6500
    ramdisk - Length: 1402346 bytes, Checksum: 0x7814


Copyright (c) 1994-2003 ZyXEL Communications Corp.
Product Name : P861, Firmware Version: V1.1(BV.0)B6
Press ENTER to continue...
```

Figure 3-3 Console Port Power-On Display

3.3.2 Entering Password

The login screen appears after you press [ENTER], prompting you to enter the login username and password, as shown next.

For your first login, enter the default login username “admin” and default password “1234”.

```
P861 login: admin
admin
Password:

Sash command shell (version 1.1.1)
P861:/>
```

Figure 3-4 Login Screen

3.3.3 Changing the Password

It is highly recommended that you change the password for accessing the Prestige.

Change the Prestige default password by following the steps shown next. Make sure you store the password in a safe place.

Step 1. Type “`passwd`” and press [ENTER].

Step 2. Type your existing system password after **(current) password**, for example “1234”, and press [ENTER].

```
P861:/> passwd
Changing password for admin
(current) password:
New P861 password:
Retype new P861 password:
        Erase Block at : 0x205f0000.
        Erase Old System Configuration
passwd: all authentication tokens updated successfully
P861:/>
```

Figure 3-5 Password Changing

Step 3. Type your new system password after **New P861 password** (up to 32 alpha-numeric characters), and press [ENTER]. The password is case sensitive.

Step 4. Re-type your new system password after **Retype new P861 password** for confirmation and press [ENTER].

3.3.4 Resetting the password

If you forget your password, you will need to reset the password to "1234".

Step 1. Turn on the Prestige and press any key to stop auto-booting at the prompt "Press any key to stop auto-booting ..... ".

Step 2. Type "`resetpawd`" and press [ENTER].

Step 3. Type "1234" after **resetting password, root passwd required**, and press [ENTER].

```
Bootloader Version: V1.6 | 2003/09/09 22:59:45

RAM: Size = 16384 Kbytes
TEST SDRAM: Verifying 832Kbytes    [OK]

Press any key to stop auto-booting......
Type "help" to get a list of commands
P861> resetpawd
resetting password, root passwd required :1234
        Erase Block at : 0x205F0000.*
*password initialized
P861>
```

Figure 3-6 Password Resetting

3.4 Command Summary

The following table is a summary of the commands available in the Prestige together with a brief description of each command.

Table 3-1 Command Summary

MAIN COMMAND	SUB-COMMAND		DESCRIPTION
passwd			This command sets the password.
ping			This command sends ICMP echo request message to the host.
exit			This command logs out the prestige.
reboot			This command reboots the Prestige.
sysconfig			
	exit		This command exits the sysconfig shell.
	help		This command shows the help available.
	getmac		This command shows the MAC address of the Prestige.
	getip		This command shows the IP address of the Prestige.
	setip		This command sets the IP address of the Prestige.
	getmask		This command shows the IP subnet mask.
	setmask		This command sets the IP subnet mask.
vdsl			
	exit		This command exits the vdsl shell.
	help		This command shows the help message.
	port	counter	This command shows port statistics and current performance counters from Prestige.
		snr	This command shows the port SNR (Signal-to-Noise-Ratio) and attenuation statistics.
		speed	This command shows the port speed. The transmission power is also displayed.
		help	This command shows the help message.
	profile	actv	This command activates the current profile.
		reset	This command resets the current profile to factory default.

Table 3-1 Command Summary

MAIN COMMAND	SUB-COMMAND		DESCRIPTION

		`set band`	This command sets the band plan.
			`[998-138-8500/998-138-12000/`
			`997-138-8500/997-138-4400]`

		`set bandmod`	This command sets the band modifier. `[00/11/22/33]`
		`set channel`	This command sets the channel type (latency mode). `[fast/slow]`
		`set delay`	This command sets the interleave upstream and downstream delay. The `[dsdelay] [usdelay]` could be from 0 to 10ms.
		`set ghs`	This command turns on/off the G.hs option.
		`set upbo`	This command sets the upbo (Upstream Power Back-Off).
		`show`	This command shows all detailed attributes of the current profile.
		`help`	This command shows the help message.
	`pvc`	`list`	This command shows a list of all PVC channels.
		`reset`	This command resets the PVC.
		`set`	This command sets the PVC.
		`help`	This command shows the help message.
	`version`		This command shows the VDSL chip firmware version.
`status`			
	ver		This command shows the current system version.
	sys		This command shows general system information.
	ether		This command shows the current status of Ethernet ports.
	vdsl		This command shows the current status of VDSL connection.
`bmelog`			This command shows the link up/down logs after startup time.
`version`			This command shows the system firmware version.

Chapter 4
System Configuration

This chapter provides the information on system configuration.

4.1 System Configuration

Syntax:

```
sysconfig
```

This command shows the valid sysconfig commands.

```
P861:/> sysconfig
==========================================
sysconfig - launch shell for configuring
sysconfig setip [ipaddr(aaa.aaa.aaa.aaa)]
sysconfig setmask [mask(aaa.aaa.aaa.aaa)]
sysconfig getip/getmac/getmask
sysconfig exit
==========================================
syscfg>
```

Figure 4-1 Sysconfig Commands

Syntax:

```
sysconfig setip [ipaddr(aaa.aaa.aaa.aaa)]
```

This command sets the IP address.

An example is shown next.

```
P861:/> sysconfig setip 192.168.1.1
        Erase Block at : 0x205f0000.
        Erase Old System Configuration
        Save System Configuration at : 0x205ff758
P861:/>
```

Figure 4-2 Sysconfig Setip Command Example

Syntax:

```
sysconfig setmask [xxx.xxx.xxx.xxx]
```

This command sets the subnet mask.

Syntax:

```
sysconfig getip/getmac/getmask
```

This command shows the IP, MAC address and subnet mask of your Prestige.

An example is shown next.

```
P861:/> sysconfig getip
    IP Address [192.168.1.1]
P861:/> sysconfig getmac
    MAC Address [00:a0:c5:12:34:56]
P861:/> sysconfig getmask
    Network Mask [255.255.255.0]
P861:/>
```

Figure 4-3 Sysconfig Commands Example

Chapter 5
VDSL Commands

This chapter shows you how to configure VDSL using line interface commands.

5.1 VDSL Commands Overview

Line interface commands contain advanced configuration features that may be used for debugging and troubleshooting. Exercise caution when using commands as incorrect usage may damage your Prestige.

See *Table 3-1 Command Summary* for an overview of VDSL commands.

5.2 VDSL Default Values

The default values for the following VDSL parameters are shown in the next table.

Table 5-1 VDSL Default Values

VDSL PARAMETER	DEFAULT VALUE
VDSL Active	on
VDSL Upstream Power Backoff(UPBO) Option	on
VDSL Line Type	auto
VDSL Channel Type (Latency Mode)	slow
Upstream Max interleave delay	10ms
Downstream Max interleave delay	10ms
VDSL Band Plan	998-138-12000
VDSL Band Modifier	0x11 (The lowest DS frequency starts from 138KHz.)
VDSL G.HS Option	on

5.3 PVC Default Values

The default values for the following PVC (Permanent Virtual Circuit) parameters are shown in the next table.

Table 5-2 PVC Default Values

VDSL PARAMETER	DEFAULT VALUE
Encapsulation Mode	LLCBridged (LLC Encapsulation for Bridged Protocols)
VPI/VCI for PVC 0	0/33
Traffic Class	UBR
Peak Cell Rate	*262144* (100Mbps)
Cell Delay Variation Tolerance	1

5.4 Introduction to ATM

ATM (Asynchronous Transfer Mode) is a connection-oriented switching technology that uses fixed-size cells to transmit data across a dedicated path (permanent virtual circuit (PVC)).

An ATM service contract is an agreement between the carrier and the subscriber to regulate the average rate and fluctuations of data transmission over an ATM network. This agreement helps eliminate congestion, which is important for transmission of real time data such as audio and video connections.

5.4.1 Quality of Service (QoS) Parameters

Peak Cell Rate (PCR) is the maximum rate at which the sender can send cells. This parameter may be lower (but not higher) than the maximum line speed. 1 ATM cell is 53 bytes (424 bits), so a maximum speed of 832 Kbps gives a maximum PCR of 1962 cells/sec. This rate is not guaranteed because it is dependent on the line speed.

Sustained Cell Rate (SCR) is the mean cell rate of each bursty (data flows followed by idle periods) traffic source. It specifies the maximum average rate at which cells can be sent over the virtual connection. SCR may not be greater than the PCR.

Maximum Burst Size (MBS) is the maximum number of cells that can be sent at the PCR. After MBS is reached, cell rates fall below SCR until cell rate averages to the SCR again. At this time, more cells (up to the MBS) can be sent at the PCR again.

The following figure illustrates the relationship between PCR, SCR and MBS.

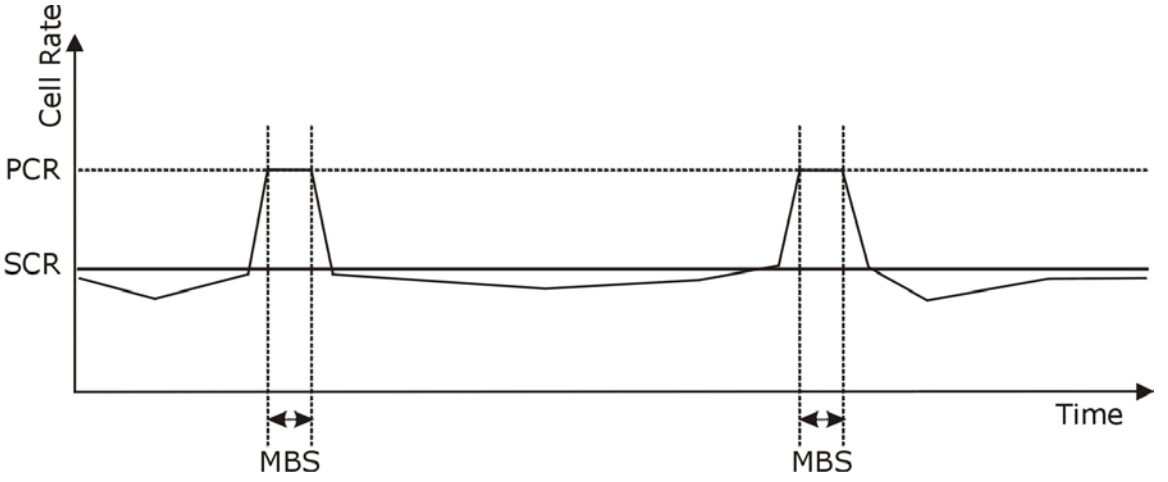

Figure 5-4 Example of Traffic Shaping

Cell Transfer Delay (CTD) is the average time for a cell to be transferred from its source to its destination over a virtual connection.

Cell Delay Variation (CDV) is difference between the maximum and minimum CTDs experienced during the connection.

Cell Delay Variation Tolerance (CDVT) is the acceptable range of the CDV.

5.4.2 Service Categories

Service categories ensure that high priority transmissions get the bandwidth they need.

CBR (Constant Bit Rate) provides a fixed amount of bandwidth that is always available even if no data is being sent. A PCR is specified and if traffic exceeds this rate, cells may be dropped. An example application is a T1 circuit.

rt-VBR (real-time Variable Bit Rate) also provides a fixed amount of bandwidth (a PCR is specified) but is only available when data is being sent. An example application is real-time videoconferencing.

nrt-VBR (non-real-time Variable Bit Rate) is commonly used for “bursty” traffic typical on LANs. PCR and MBS define the burst levels, SCR defines the minimum level. An example application is multimedia e-mail.

Unspecified Bit Rate (UBR) does not guarantee bandwidth or throughput. Cells are dropped if there is not enough bandwidth. Only the PCR is set. An example application is background file transfer.

Table 5-3 Service Characteristic

CHARACTERISTIC	CBR	RT-VBR	NRT-VBR	UBR
Guaranteed Bandwidth	✓	✓	✓	×
Good for Real-Time Traffic	✓	✓	×	×
Suitable for Bursty Traffic	×	×	✓	✓

5.5 Interleave Delay

Interleave delay is the wait (in milliseconds) that determines the size of a single block of data to be interleaved (assembled) and then transmitted. Interleave delay is used when transmission error correction (Reed- Solomon) is necessary due to a less than ideal telephone line. The bigger the delay, the bigger the data block size, allowing better error correction to be performed. This may sometimes be referred to as a “slow channel”.

An interleave delay of “0” means no interleaving takes place and transmission is faster (a “fast channel”). This would be suitable if you have a good line where little error correction is necessary.

Reed-Solomon codes are block-based error correcting codes with a wide range of applications. The Reed-Solomon encoder takes a block of digital data and adds extra "redundant" bits. The Reed-Solomon decoder processes each block and attempts to correct errors and recover the original data.

5.6 G.Hs

The G.hs (G standards handshake) is a list of standards DSLAMs (DSL Access Multiplexer) use to select a common mode of operation and exchange data. G.hs standards include ITU-T Recommendations G.992.1, G.992.2, G.993.1 and working draft T1E1.4/2000 009R3 VDSL contribution. G.hs occurs before the DSL initialization sequence.

When G.hs is enabled in the VDSL modem, the DSLAM dictates (and overrides) all modem VDSL parameters.

5.7 SNR (Signal-to-Noise-Ratio)

The Prestige uses SNR(Signal-to-Noise-Ratio) to determine line quality. SNR is the ratio of the amplitude of the actual signal to the amplitude of noise signals at a given point in time. A slow SNR indicates poor line quality. When SNR (upstream or downstream) falls below a pre-determined threshold, the Prestige then uses rate adaptation.

5.8 Multiplexing

There are two conventions to identify what protocols the virtual circuit (VC) is carrying. Be sure to use the multiplexing method required by your ISP.

5.8.1 VC-based Multiplexing

In this case, by prior mutual agreement, each protocol is assigned to a specific virtual circuit; for example, VC1 carries IP, etc. VC-based multiplexing may be dominant in environments where dynamic creation of large numbers of ATM VCs is fast and economical.

5.8.2 LLC-based Multiplexing

In this case one VC carries multiple protocols with protocol identifying information being contained in each packet header. Despite the extra bandwidth and processing overhead, this method may be advantageous if it is not practical to have a separate VC for each carried protocol, for example, if charging heavily depends on the number of simultaneous VCs.

5.9 VDSL Sub-Commands

The system uses a multi-level command structure for vdsl command. You must type the main command first and then the sub-commands, as follows:

```
P861-G1:/> vdsl
vdsl> port snr
```

The rest of this chapter shows commonly used VDSL sub-command examples.

5.9.1 VDSL Port Command

Syntax:

```
port [snr/speed/counter]
```

This command displays the information on your VDSL port SNR(Signal-to-Noise-Ratio), speed and counter.

The examples are shown next.

```
vdsl> port speed
VDSL status : DOWN

vdsl>
```

Figure 5-1 VDSL Port Speed Commands Example (Down)

```
vdsl> port speed
VDSL status : UP
Downstream line rate : 72384 kbps
Upstream line rate : 44928 kbps
Fast Downstream payload rate : 0 kpbs
Slow Downstream payload rate : 60864 kpbs
Fast Upstream payload rate : 0 kpbs
Slow Upstream payload rate : 37440 kpbs
Downstream delay : 3.8 ms
Uptream delay : 6.2 ms
Tx total power 5.9 dbm

vdsl>
```

Figure 5-2 VDSL Port Speed Commands Example (Up)

The following table explains these parameters.

Table 5-4 VDSL Port Speed Commands

PARAMETER	DESCRIPTION
VDSL Status	This field shows whether the VDSL connection is down.
Downstream line rate	This is the downstream line speed in kbps.
Upstream line rate	This is the upstream line speed in kbps.
Fast Downstream payload rate	This shows the downstream transfer rate in the fast channel mode. When the VDSL is linked up with fast mode, **Slow Downstream payload rate** will display 0. Otherwise, **Fast Downstream payload rate** will display 0.
Slow Downstream payload rate	This shows the downstream transfer rate in the slow channel mode.
Fast Upstream payload rate	This shows the upstream transfer rate in the fast channel mode. When the VDSL is linked up with fast mode, **Slow Upstream payload rate** will display 0. Otherwise, **Fast Upstream payload rate** will display 0.
Slow Upstream payload rate	This shows the upstream transfer rate in the slow channel mode.
Downstream delay	This is the downstream delay.

Table 5-4 VDSL Port Speed Commands

PARAMETER	DESCRIPTION
Upstream delay	This is the upstream delay.
Tx total power	This field displays transmission power information in dbm.

```
vdsl> port counter

FEC_F : 0,
CRC_F : 0,
FEC_S : 0,
CRC_S : 0,
LOS : 0,
TxBlkCnt_F : 0,
TxBlkCnt_S : 0,
RxBlkCnt_F : 0,
RxBlkCnt_S : 0,
numUsrCell_S : 0,
numUsrCell_F : 0,
numIdlCell_S : 0,
numIdlCell_F : 0,
NeNCD_S : 0,
NeNCD_F : 0,
NeOCD_S : 0,
NeOCD_F : 0,
NeHEC_S : 0,
NeHEC_F : 0

vdsl>
```

Figure 5-3 VDSL Port Counter Command Example

The following table explains these parameters.

Table 5-5 VDSL Port Counter

COUNTER	DESCRIPTION
FEC_F	This is a count of the fast channel Forward Error Correction (FEC).
CRC_F	This is a count of the fast channel Cyclic Redundancy Check (CRC).
FEC_S	This is a count of the interleaved channel Forward Error Correction (FEC).
CRC_S	This is a count of the interleaved channel Cyclic Redundancy Check (CRC).
LOS	This is a count of the Loss of Signal (LOS).
TxBlkCnt_F	This counter indicates the number of frames that have been transmitted over the fast channel.

Table 5-5 VDSL Port Counter

COUNTER	DESCRIPTION
TxBlkCnt_S	This counter indicates the number of frames that have been transmitted over the interleaved channel.
RxBlkCnt_F	This counter indicates the number of frames that have been received over the fast channel.
RxBlkCnt_S	This counter indicates the number of frames that have been received over the interleaved channel.
NumUsrCell_S	This counter indicates the Number of User Cells (USR) in the interleaved channel mode.
NumUsrCell_F	This counter indicates the Number of User Cells (USR) in the fast channel mode.
NumIdleCell_S	This counter indicates the Number of Idle Cells (IDLE) in the interleaved channel mode.
NumIdleCell_F	This counter indicates the Number of Idle Cells (IDLE) in the fast channel mode.
NeNCD_S	This is a count of the Near-end No Cell Delineation (NCD) in the interleaved channel mode.
NeNCD_F	This is a count of the Near-end No Cell Delineation (NCD) in the fast channel mode.
NeOCD_S	This is a count of the Near-end Out of Cell Delineation (OCD) in the interleaved channel mode.
NeOCD_F	This is a count of the fast channel Near-end Out of Cell Delineation (OCD).
NeHEC_S	This is a count of the interleaved channel Near-end Header Error Control (HEC).
NeHEC_F	This is a count of the fast channel Near-end Header Error Control (HEC).

5.9.2 List PVC Channel

Syntax:

```
pvc list
```

This command lists the PVC (Permanent Virtual Circuit) channel. An example is shown next.

```
P861:/> vdsl

vdsl> pvc list
============================ PVC ==============================
pvc  act     mode     vpi/vci   qos   pcr   cdvt   scr   mbs
---------------------------------------------------------------
 0    Y    llcbridged   0/33    ubr  262144   1       0    0
===============================================================

vdsl>
```

Figure 5-4 PVC List Command Example

The following table explains these parameters.

Table 5-6 PVC List

PARAMETER	DESCRIPTION
pvc	This is the PVC channel.
act	This shows whether this PVC channel is active or not.
mode	This shows the encapsulation mode.
vpi/vci	This is the Virtual Path Identifier and Virtual Channel Identifier.
qos	This is the ATM QoS type.
pcr	This is the maximum rate at which the sender can send cells.
cdvt	This is the acceptable range of the Cell Delay Variation.
scr	This is the mean cell rate of each bursty traffic source.
mbs	This is the maximum number of cells that can be sent at the PCR.

5.9.3 Reset PVC Channel

Syntax:

```
pvc reset [0/all]
```

This command load and save the default PVC.

5.9.4 Activate/Deactivate PVC Channel

Syntax:

```
pvc set <n> [enable/disable]
```

This command enables/disables the PVC channel you specify. An example is shown next.

```
vdsl> pvc set 0 enable
        Erase Block at : 0x205f0000.

vdsl>
```

Figure 5-5 PVC Set Command Example 1

5.9.5 Set PVC Channel

If you change a PVC parameter(s), you need to disable that PVC and then reactivate it.

Syntax:

```
pvc set <n> <mode> <vpi> <vci> <class> <parameters>
```

This command sets the encapsulation mode and some parameters of the PVC you specify.

OPTIONS	DESCRIPTION
<n>	This is the PVC you specify by entering “0”.
<mode>	Select the encapsulation mode which can be **llcbridged**(LLC Encapsulation for Bridged Protocols) or **vcmuxbridged**(VC Based Multiplexing of Bridged Protocols).
<vpi>	Enter the Virtual Path Identifier from 0 to 255.
<vci>	Enter the Virtual Channel Identifier from 32 to 65535.
<class>	Type **cbr** (Continuous Bit Rate) to specify fixed (always-on) bandwidth for voice or data traffic. Type **ubr** (Unspecified Bit Rate) for applications that are non-time sensitive, such as e-mail. Type **vbrnr** (Variable Bit Rate non Real Time) or **vbrrt** (Variable Bit Rate Real Time) for bursty traffic and bandwidth sharing with other applications.
<parameters>	Enter the parameters according to the ATM QoS type.
<pcr><cdvt>	This command is for **ubr** or **cbr** class. Divide the DSL line rate (bps) by 424 (the size of an ATM cell) to find the Peak Cell Rate (PCR). This is the maximum rate at which the sender can send cells. The valid range for the PCR is from 360 to 262144. The valid range for the CDVT(Cell Delay Variation Tolerance) is from 1 to 100.

OPTIONS	DESCRIPTION
<pcr><cdvt><scr><mbs>	This command is for **vbrnr** or **vbrrt** class. Divide the DSL line rate (bps) by 424 (the size of an ATM cell) to find the Peak Cell Rate (PCR). This is the maximum rate at which the sender can send cells. The valid range for the PCR is from 360 to 262144. The valid range for the CDVT(Cell Delay Variation Tolerance) is from 1 to 100. The Sustain Cell Rate (SCR) sets the average cell rate (long-term) that can be transmitted. The valid range for the SCR is from 360 and less than PCR. Maximum Burst Size (MBS) refers to the maximum number of cells that can be sent at the peak rate. The valid range for the MBS is from 1 to 100.

An example is shown next.

```
vdsl> pvc set 0 llcbridged 0 33 ubr 262144 1
        Erase Block at : 0x205f0000.

vdsl>
```

Figure 5-6 PVC Set Command Example 3

5.9.6 Activate the VDSL Current Port Profile

Syntax:

```
profile actv
```

This command activates the VDSL current port profile.

A VDSL profile is a set of pre-configured VDSL values (see *Figure 5-7*).

It sends the current selected profile to the Prestige. It also sends system and port provisioning data to the Prestige and then the Prestige will be informed to initiating the VDSL line.

5.9.7 Reset VDSL Profile

Syntax:

```
profile reset
```

This command resets the VDSL profile to be the default settings (see *Table 5-1 VDSL Default Values*).

5.9.8 Show VDSL Profile

Syntax:

```
profile show
```

This command displays band plan, rate adaptation mode, UPBO option, channel type, G.hs option and band modifier. Maximum upstream and downstream delays are only available in the interleaved/slow channel mode. An example is shown next.

```
vdsl> profile show

============== PROFILE ===============
Bandplan : 998-138-12000
Rate Adaptation Mode : startup
UPBO option : on
Channel : slow
G.HS option : on
Band Modifier : 0x11
Max DS Delay : 10
Max US Delay : 10
======================================
vdsl>
```

Figure 5-7 VDSL Profile Show Command Example

5.9.9 Band Plan

Each VDSL mode operates in a different frequency band allocation, resulting in different upstream and downstream speeds. The following table summarizes frequency ranges for each VDSL mode supported by the Prestige.

Table 5-7 VDSL Mode and Frequency Ranges

VDSL MODE	BAND PLAN	FREQ. RANGE (Hz)			
		UPSTREAM_1	DOWNSTREAM_1	UPSTREAM_1	DOWNSTREAM_2
ANSI/ETSI Plan 998	998-138-8500	0.138M ~ 3.75M	3.75M ~ 5.20M	5.20M ~ 8.50M	
	998-138-12000	0.138M ~ 3.75M	3.75M ~ 5.20M	5.20M ~ 8.50M	8.50M ~ 12.00M
ETSI Plan 997	997-138-8500	0.138M ~ 3.00M	3.00M ~ 5.10M	5.10M ~ 7.05M	7.05M ~ 8.50M
	997-138-4400	0.138M ~ 3.00M	3.00M ~ 4.40M		

5.9.10 Set VDSL Profile

Syntax:

```
profile set channel [fast/slow]
```

This command sets the VDSL channel type (latency mode). When the Prestige is in a good network environment (good line quality), use a fast channel for better transmission speed. Otherwise, use a slow channel to avoid noise/interference.

Syntax:

```
profile set band [998-138-8500/998-138-12000/997-138-8500/
997-138-4400]
```

This command sets the VDSL band plan.

Syntax:

```
porfile set bandmod [00/11/22/33]
```

This command sets the VDSL band modifier.

Table 5-8 Band Modifier Value

OPTION	DESCRIPTION
00	All frequency (including optional band from 25KHz to 138 KHz) is allowed. This option is not recommended.
11	All frequency in the band plan range (see Table 5-7) is allowed.
22	All frequency below 640kHz is disabled.
33	All frequency below 1.1MHz is disabled.

Syntax:

```
profile set upbo [on/off]
```

This command turns on/off the VDSL upstream power backoff(UPBO) option.

Syntax:

```
profile set ghs [on/off]
```

This command turns on/off the VDSL G.hs option.

Syntax:

```
profile set delay [dsdelay(decimal)] [usdelay(decimal)]
```

This command sets the VDSL interleave delay (from 0 to 10 ms) for the interleave channel.
An example is shown next.

```
vdsl> profile set delay 9 7
        Erase Block at : 0x205f0000.

vdsl>
```

Figure 5-8 VDSL Profile Set Delay Command Example

5.9.11 VDSL Version Command

Syntax:

```
version
```

This command shows the VDSL chip firmware version. An example is shown next.

```
vdsl> version
BME Firmware Version:Firmware-VTU-R:5.5.1g Time Sep 24 2003,
18:35:51, RTOS 5.4
BME R:17 AFE<num, ver>  <0:810>
IFE<num:Dev.Rev> <0:1.4>

vdsl>
```

Figure 5-9 VDSL Version Command Example

Chapter 6
System Status

This chapter shows you the information about the system status.

6.1 System Status Overview

System Status is a tool that can be used to monitor your Prestige. Specifically, it gives you information on your VDSL telephone line status, number of packets sent and received.

6.2 System Status Configuring

The rest of this chapter shows commonly used sysconfig-related command examples. System Status is a tool that can be used to monitor your Prestige. Note that these fields are READ-ONLY and are meant to be used for diagnostic purposes.

6.2.1 System Version

Syntax:

```
status ver
```

This command displays the current system version.

```
P861:/> status ver
Version:
    bootloader: V1.6 | 2003/09/09 22:59:45
    kernel: V2.5 | 2003/10/28 12:06:21
    ramdisk: V2.5 | 2003/10/28 12:06:26
P861:/>
```

Figure 6-1 Status Version Command Example

The following table explains these parameters.

Table 6-1 Status Version

PARAMETER	DESCRIPTION
bootloader	This shows the version of bootloader.
kernel	This shows the version of kernel.
ramdisk	This shows the version of ramdisk.

6.2.2 System Information

Syntax:

```
status sys
```

This command displays general system information.

```
P861:/> status sys
System:
    IP: 192.168.1.1
    NETMASK: 255.255.255.0
    MAC: 00:a0:c5:12:34:56
    System Up Time: 0:0:32:16(day:hour:min:sec)
P861:/>
```

Figure 6-2 System Information Command Example

The following table explains these parameters.

Table 6-2 System Information

PARAMETER	DESCRIPTION
IP	This is the LAN IP address of the Prestige in dotted decimal notation.
NETMASK	This shows the subnet mask of the Prestige.
MAC	This refers to the Ethernet MAC (Media Access Control) address of your Prestige.
System Up Time	This is the time the Prestige is up and running from the last reboot.

6.3 Ethernet Parameters

6.3.1 Speed

When auto-negotiation is turned on, an Ethernet port negotiates with the peer automatically to determine the connection speed and duplex mode. If the peer Ethernet port does not support auto-negotiation or turns off this feature, the device determines the connection speed by detecting the signal on the cable and using half duplex mode. When the device's auto-negotiation is turned off, an Ethernet port uses the pre-configured speed and duplex mode when making a connection, thus requiring you to make sure that the settings of the peer Ethernet port are the same in order to connect.

6.3.2 Duplex Mode

Duplex mode choices are half duplex (**Half**), full duplex (**Full**) or (**N/A**). **N/A** displays when auto-negotiation is turned on, as the Ethernet port on the device negotiates with the peer automatically to determine the connection speed and duplex mode. When a port is in half-duplex mode, it can either send data or receive

data at a given time. When a port is in full-duplex mode, it can simultaneously send and receive data, effectively doubling its throughput.

6.3.3 Flow Control

A concentration of traffic on a port decreases port bandwidth and overflows buffer memory causing packet discards and frame losses. **Flow Control** is used to regulate transmission of signals to match the bandwidth of the receiving port.

The Prestige uses IEEE802.3x flow control in full duplex mode and back pressure flow control in half duplex mode.

IEEE802.3x flow control is used in full duplex mode to send a pause signal to the sending port, causing it to temporarily stop sending signals when the receiving port memory buffers fill.

Back pressure flow control is typically used in half duplex mode to send a "collision" signal to the sending port (mimicking a state of packet collision) when the receiving port memory buffers are full causing the sending port to temporarily stop sending signals and resend later

6.4 Ethernet Status

Syntax:

```
status ether
```

This command displays the current status of the Ethernet ports.

```
P861:/> status ether
ETHERNET:
    Ethernet Port 1
        Link Status: Down
        Duplex: n/a
        Speed: n/a
        Flow Control: n/a
    Ethernet Port 2
        Link Status: Down
        Duplex: n/a
        Speed: n/a
        Flow Control: n/a
    Ethernet Port 3
        Link Status: UP
        Duplex: Full
        Speed: 100M
        Flow Control: Enable
    Ethernet Port 4
        Link Status: Down
        Duplex: n/a
        Speed: n/a
        Flow Control: n/a
P861:/>
```

Figure 6-3 Ethernet Status Command Example

The following table explains these parameters.

Table 6-3 Ethernet Status

PARAMETER	DESCRIPTION
Ethernet Port 1-4	
Link Status	This shows the current status of the LAN which can be **Up** or **Down**.
Duplex	This shows the duplex mode of the Ethernet connections (either **Full** for full duplex or **Half** for half duplex).
Speed	This shows the speed of the Ethernet connections (either **10M** for 10Mbps or **100M** for 100Mbps).
Flow Control	This shows if flow control is enabled on this port or not. A concentration of traffic on a port decreases port bandwidth and overflows buffer memory causing packet discards and frame losses. Flow Control is used to regulate transmission of signals to match the bandwidth of the receiving port. The Prestige uses IEEE802.3x flow control in full duplex mode and backpressure flow control in half duplex mode. IEEE802.3x flow control is used in full duplex mode to send a pause signal to the sending port, causing it to temporarily stop sending signals when the receiving port memory buffers fill. Back Pressure flow control is typically used in half duplex mode to send a "collision" signal to the sending port (mimicking a state of packet collision) causing the sending port to temporarily stop sending signals and resend later. Select Flow Control to enable it.

6.4.1 VDSL Status

Syntax:

```
status vdsl
```

This command displays the current status of the VDSL connection.

```
P861:/> status vdsl
VDSL:
    Up Time: 0:0:0:0(day:hour:min:sec)
    Reconnect Count: 0
    Line Status: DOWN
P861:/>
```

Figure 6-4 VDSL Status Command Example (Down)

```
P861:/> status vdsl
VDSL:
    Up Time: 0:0:6:53(day:hour:min:sec)
    Reconnect Count: 2
    Line Status: UP
    Upstream Payload Rate: 37440 kbps
    DownStream Payload Rate: 60864 kbps

P861:/>
```

Figure 6-5 VDSL Status Command Example (Up)

The following table explains these parameters.

Table 6-4 VDSL Status

PARAMETER	DESCRIPTION
Up Time (day:hour:min:sec)	This is the time the link has been up.
Reconnect Count	This shows how many times the Prestige has been re-connected.
Line Status	This shows the current status of the VDSL line which can be **UP** or **DOWN**.
Upstream Payload Rate	This shows the upstream transfer rate in kbps (kilobit per second).
DownStream Payload Rate	This shows the downstream transfer rate in kbps (kilobit per second).

Chapter 7
Ping Commands

This chapter shows you the information about the ping commands.

7.1 About Ping

Ping is a command you can use to check whether the Prestige can recognize other computers on your local network. A ping command sends a message to the computer you specify. If the computer receives the message, it sends messages in reply. Using ping, you can test whether the path to the device is working. To use it, you must know the IP address or the host name of the computer you are trying to communicate with.

7.2 Ping Commands

Syntax:

```
Ping [-LRdfnqrv] [-c count] [-i wait] [-l preload]
     [-p pattern] [-s packetsize] [-t ttl]
     [-I interface address] host
```

This command send ICMP echo request message to a remote host. The command options are case sensitive.

Table 7-1 Ping Commands

OPTION	DESCRIPTION
-L	This suppresses loopback of multicast packets. This option only applies if the ping destination is a multicast address.
-R	This is record route. It includes the RECORD_ROUTE option in the ECHO_REQUEST packet and displays the route buffer on returned packets. Note that the IP header is only large enough for nine such routes. Many hosts ignore or discard this option.
-d	This set the SO_DEBUG option on the socket being used.
-f	This is flood ping. For every ECHO_REQUEST sent a period "." is printed, while for every ECHO_REPLY received a backspace is printed. This provides a rapid display of how many packets are being drooped. If interval is not given, it sets interval to zero and outputs packets as fast as they come back or one hundred times per second, whichever is more. Only the super-user may use his option with zero interval.

Table 7-1 Ping Commands

OPTION	DESCRIPTION
-n	This is numeric output only. No attempt will be made to look up symbolic names for host addresses.
-g	This is quiet output. Nothing is displayed except the summary lines at startup time and when finished.
-r	Bypass the normal routing tables and send directly to a host on an attacked interface. If the host is not on a directly attached network, an error is returned. This option can be used to ping a local host through an interface that has no route through it provided the option -I is also used.
-v	This is verbose output.
-c count	Stop after sending count ECHO_REGUEST packets. With deadline option, ping waits for cpimt ECJP_REPLY packets, until the timeout expires.
-i interval	This is wait interval seconds between sending each packet. The default is to wait for one second between each packet normally, or not to wait in flood mode. Only super-user may set interval to values less 0.2 seconds.
-I interface address	This set source address to specified interface address. Argument may be numeric IP address or name of device. When pinging IPv6 link-local address this option is required.
-l preload	If preload is specified, ping sends that many packets not waiting for reply. Only the super-user may select preload more than 3.
-p patten	You may specify up to 16 "pad" bytes to fill out the packet you send. This is useful for diagnosing data-dependent problems in a network. For example, -p ff will cause the send packet to be filled with all ones.
-s packetsize	This specifies the number of data bytes to be sent. The default is 56, which translates into 64 ICMP data bytes when combined with the 8 bytes of ICMP header data.
-t ttl	This sets the IP Time to Live (TTL).

Some examples are shown next.

```
P861:/> ping -c 10 -i 2 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=1 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=5 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=6 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=7 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=8 ttl=255 time=0.0 ms
64 bytes from 192.168.1.1: icmp_seq=9 ttl=255 time=0.0 ms

--- 192.168.1.1 ping statistics ---
10 packets transmitted, 10 packets received, 0% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms
P861:/>
```

Figure 7-1 Ping Commands Example-1

```
P861:/> ping -R -c 3 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=255 time=0.0 ms
RR:     192.168.1.1
        192.168.1.1
        192.168.1.1
        192.168.1.1
64 bytes from 192.168.1.1: icmp_seq=1 ttl=255 time=0.0 ms      (same route)
64 bytes from 192.168.1.1: icmp_seq=2 ttl=255 time=0.0 ms      (same route)

--- 192.168.1.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms
P861:/>
```

Figure 7-2 Ping Commands Example-2

Chapter 8
Firmware Upload

This chapter tells you how to upload new firmware.

8.1 Firmware Upload Overview

Find firmware at www.zyxel.com and refer to the following sections for upgrading firmware using FTP commands. After a successful upload, the system will reboot.

Only use firmware for your Prestige's specific model. Refer to the label on the bottom of your Prestige.

8.2 Checking System Firmware Version

Syntax:

```
version
```

This command displays the current system firmware version. An example is shown next.

```
P861:/> version
VDSL/DMT P861 version V1.1(BV.0)B6 (October 28 2003)

P861:/>
```

Figure 8-1 Version Command Example

8.3 Uploading Firmware via FTP

Do not turn off the device while writing flash is in progress!!

Step 1. Make sure you are in the same directory where you put the firmware file, and then enter "ftp 192.168.1.1" in the command prompt line as shown next.

Step 2. Type any character in the **User (192.168.1.1: (none)):** field and press [ENTER].

Step 3. Enter "1234" or what you have set in serial or telnet management interface in the **Password** field and press [ENTER].

Step 4. Now you are ready to upload new firmware file to the Prestige by issuing the following ftp commands:

- bin
- hash
- put zimage kernel
- put cramdisk.gz ramdisk

Step 5. The firmware files “zimage” and “cramdisk.gz” have been transferred into the Prestige but have not been written into Flash yet. The Prestige will start writing the firmware file into flash after you issue the `bye` command. This may take about 60 seconds. After the Prestige finishes upgrading the firmware, it will automatically restart again and the IP address will be reset to 192.168.1.1 (default).

Please wait for 60 seconds after you issue `bye`.

Do not turn off the device until the Prestige restarts completely.

```
C:\>ftp 192.168.1.1
Connected to 192.168.1.1.
220 VDSL/DMT P861-CPE FTP version 1.0 ready at Fri Jan 01 01:27:44
User (192.168.1.11:(none)):
331 Password required for root.
Password:
230- ============================================================
230-  P861 FTP Server Utility
230-  You can download image using following procedure
230-
230-  step1) put <kernel image file> kernel
230-  step2) put <ramdisk image file> ramdisk
230-  step3) bye
230-
230-  "bye" command causes the update of new firmware on flash device
230- ============================================================
230 Logged in.
ftp> bin
200 Type set to I.
ftp> hash
Hash mark printing On  ftp: (2048 bytes/hash mark) .
ftp> put zimage kernel
200 Port command successful
150 Opening BINARY mode data connection for 'kernel' .
################################################################################
################################################################################
##########################################################
226 Transfer complete.
ftp: 444916 bytes sent in 0.41Seconds 1093.16Kbytes/sec.
ftp> put cramdisk.gz ramdisk
200 Port command successful
150 Opening BINARY mode data connection for 'ramdisk' .
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
############################
226 Transfer complete.
ftp: 1066289 bytes sent in 1.13Seconds 947.81Kbytes/sec.
ftp> bye
221 Goodbye for Updating flash file system, may takes 30 seconds - DO NOT power
off!!!!

C:\>
```

Figure 8-2 Firmware Upload via FTP Example

8.4 Uploading Firmware via TFTP

WARNING!
Do not interrupt the file transfer process as this may PERMANENTLY DAMAGE YOUR Prestige.

Step 1. Connect the LAN port to transfer files between the computer and the Prestige and use the console port to issue the commands.

Step 2. Run a TFTP server program on the computer and configure it to communicate with the Prestige.

Step 3. Specify the server IP address. The server and the Prestige should be on the same subnet.

Step 4. Put the firmware files in the specified directory. Turn on the Prestige and press any key to stop auto-booting at the prompt "Press any key to stop auto-booting ..... ".

```
Bootloader Version: V1.6 | 2003/09/09 22:59:45

RAM: Size = 16384 Kbytes
TEST SDRAM: Verifying 832Kbytes    [OK]


Press any key to stop auto-booting......
Type "help" to get a list of commands
P861>
```

Figure 8-3 Stop auto-booting

Step 5. Type "bootp" and press [ENTER]. The message "Bootp Packet received" displays to indicate the successful packet sending.

Step 6. Follow the instructions in bold type shown in the following figure to finish the upgrade procedure.

```
P861> bootp
Our Ethernet address is 00A0 C512 3406.
        Sending bootp packet...
.....................
Bootp packet received.
        Host   (server) Ethernet : 0090 CC1A 0B40
        Host   (server) IP       : 192.168.1.100
        Client (target) Ethernet : 00A0 C512 3456
        Client (target) IP       : 192.168.1.1

P861> tftp zloader loader
TFTP Start...
        Host   (server) IP       : 192.168.1.100
        Client (target) IP       : 192.168.1.1
        Loading Filename         : zloader
        Save Address             : 0x00010000
...
```

Figure 8-4 Firmware Upload via TFTP Example

```
Loading start...
        0x0000E344 (58180) bytes received.
        tftp done.

P861> flash loader
Warning! Don't power down
Saving loader to flash...
Erase flash blocks from 0x20400000 to 0x2040FFFF.
        Erase Block at : 0x20400000.
        Done.
Write to flash...
        Writing at 0x20400000...
        Done...
Verifying Flash Contents...   [OK]

P861> tftp zImage kernel
TFTP Start...
        Host   (server) IP       : 192.168.1.100
        Client (target) IP       : 192.168.1.1
        Loading Filename         : zImage
        Save Address             : 0x00010000
Loading start...
        0x0006C05C (442460) bytes received.
        tftp done.
P861> flash kernel
Warning! Don't power down
Saving kernel to flash...
Erase flash blocks from 0x20410000 to 0x2048FFFF.
        Erase Block at : 0x20410000.
        Done.
Write to flash...
        Writing at 0x20410000...
        Done...
Verifying Flash Contents...    [OK]

P861> tftp cramdisk.gz ramdisk
TFTP Start...
        Host@@ (server) IP       : 192.168.1.100
        Client (target) IP       : 192.168.1.1
        Loading Filename         : cramdisk.gz
        Save Address             : 0x00090000
Loading start...
        0x000FC81F (1034271) bytes received.
        tftp done.
P861> flash ramdisk
Warning! Don't power down
Saving ramdisk to flash...
Erase flash blocks from 0x20490000 to 0x205EFFFF.
        Erase Block at : 0x20490000.
        Done.
Write to flash...
        Writing at 0x20490000...
        Done...
Verifying Flash Contents...    [OK]
P861> reboot
```

Figure 8-5 Firmware Upload via TFTP Example (continued)

Part III:

APPENDICES AND INDEX

This part contains troubleshooting, additional background information and an index of key terms.

Appendix A Troubleshooting

This chapter covers potential problems and the corresponding remedies.

Make sure you have securely attached the proper cables to the proper ports. Refer to *Rear Panel* section for this information. If your Prestige still does not work properly, refer to the table shown next.

PROBLEM	CORRECTIVE ACTION
No LEDs are on when I turn the Prestige on.	Your Prestige or power adaptor may have malfunctioned. Check that the power cable is connected properly and that you are using the supplied power adaptor for your region. Make sure the power source is turned on and that the Prestige is receiving sufficient power. Try a different power outlet. If all this fails, contact your vendor.
The LAN LED(s) is off.	Verify that the attached device(s) is turned on and properly connected. Make sure the Ethernet cards are working on the attached devices. Verify that the proper network cable type is used and its length does not exceed 100 meters. Use unshielded twisted pair (UTP) or shielded twisted-pair (STP) Ethernet cables for the Ethernet ports. For 10 Base-T connections, use 100W 2-pair UTP/STP Category 3, 4 or 5 cable(s). For 100 Base-TX connections, use 100W 2-pair UTP/STP Category 5 cable(s).
The VDSL LED is not on or is blinking.	Make sure the distance from the Prestige to the DSLAM does not exceed 1.25km (3750feet). Rates deteriorate the further away the DSLAM is from the modem. Check with your telephone company that the telephone line quality is good enough for VDSL transmission. If G.hs is disabled in the Prestige, then make sure the Prestige and the remote DSLAM have the same VDSL parameters. Use the CI commands (refer to the chapter on VDSL commands) to check your VDSL parameters such as band plan, band modifier, channel type (is interleave delay set?), encapsulation mode, VPI/VCI numbers, QoS parameters and service categories. When G.hs is enabled in the Prestige, the DSLAM dictates (and overrides) all modem VDSL parameters.

Appendix B
Virtual Circuit Topology

ATM is a connection-oriented technology, meaning that it sets up virtual circuits over which end systems communicate. The terminology for virtual circuits is as follows:

- Virtual Channel — Logical connections between ATM switches
- Virtual Path — A bundle of virtual channels
- Virtual Circuit — A series of virtual paths between circuit end points

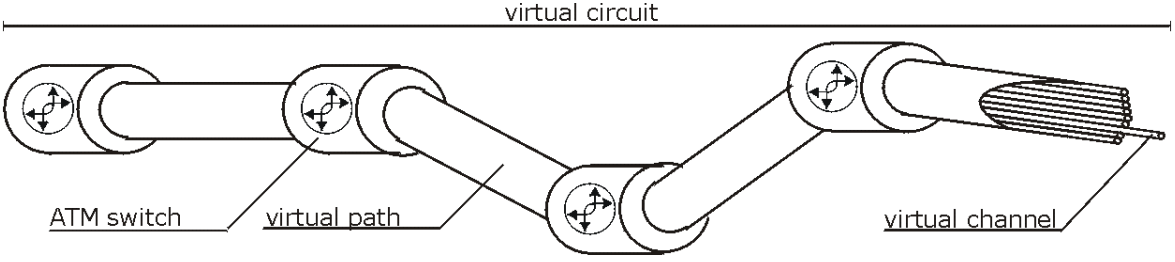

Diagram B-1 Virtual Circuit Topology

Think of a virtual path as a cable that contains a bundle of wires. The cable connects two points and wires within the cable provide individual circuits between the two points. In an ATM cell header, a VPI (Virtual Path Identifier) identifies a link formed by a virtual path; a VCI (Virtual Channel Identifier) identifies a channel within a virtual path.

The VPI and VCI identify a virtual path, that is, termination points between ATM switches. A series of virtual paths make up a virtual circuit.

Your service provider should supply you with VPI/VCI numbers.

Appendix C
Loop Reach

C.1 Testing Conditions

Loop Simulator : DLS 8100

Loop Wire : 26AWG

This is by no means a guaranteed value. These rates were achieved under lab conditions.

C.2 Band Plan : 998_138_12000(4B)

NO.	LOOP LENGTH (feet)	DOWNSTREAM LINE RATE (kbps)	UPSTREAM LINE RATE (kbps)	DOWNSTREAM PAYLOAD RATE (kbps)	UPSTREAM PAYLOAD RATE (kbps)
1	0	74384	42624	63872	35584
2	1000	69504	37248	61312	32128
3	2000	47168	7296	40576	6016
4	3000	16832	3136	14464	2432

C.3 Band Plan : 998_138_8500(3B)

NO.	LOOP LENGTH (feet)	DOWNSTREAM LINE RATE (kbps)	UPSTREAM LINE RATE (kbps)	DOWNSTREAM PAYLOAD RATE (kbps)	UPSTREAM PAYLOAD RATE (kbps)
1	0	57920	13184	51008	11584
2	1000	57920	12480	51008	11008
3	2000	47552	9024	41408	7680
4	3000	29376	2816	25152	2240

C.4 Band Plan : 997_138_8500(4B)

NO.	LOOP LENGTH (feet)	DOWNSTREAM LINE RATE (kbps)	UPSTREAM LINE RATE (kbps)	DOWNSTREAM PAYLOAD RATE (kbps)	UPSTREAM PAYLOAD RATE (kbps)
1	0	51328	30208	45248	26432
2	1000	49856	29248	43904	25792
3	2000	39616	19648	34496	16832
4	3000	25856	7552	22400	6464

C.5 Band Plan : 997_138_4400(2B)

NO.	LOOP LENGTH (feet)	DOWNSTREAM LINE RATE (kbps)	UPSTREAM LINE RATE (kbps)	DOWNSTREAM PAYLOAD RATE (kbps)	UPSTREAM PAYLOAD RATE (kbps)
1	0	32960	13312	28992	11776
2	1000	32128	12992	28480	11520
3	2000	30080	11328	26560	9856
4	3000	25024	6208	21824	5248
5	4000	Can’t link	Can’t link	Can’t link	Can’t link

Appendix D Index

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