P841C

Central-Side VDSL Modem

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Version 1.00

User's Guide

ZyXEL

TOTAL INTERNET ACCESS SOLUTION

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Preface

Congratulations on your purchase of the Prestige 841C Central-Side VDSL Modem.

This preface introduces you to the Prestige 841C and discusses the organization and conventions of this user's guide. It also provides information on other related documentation.

About VDSL

VDSL (Very high bit rate Digital Subscriber Line) is one type of DSL with very high data rates. The service can be asymmetrical or symmetrical and can be used on the same wire as the POTS (Plain Old Telephone Service) network and ISDN in conjunction with voice services.

About the P841C

The Prestige 841C is the ideal VDSL Line Termination (LT) modem for telephone companies. It maps one Ethernet link to one VDSL link effectively extending Ethernet service up to 1.5km The Prestige 841C attains speeds ranging from 1.56 Mbps to 16.67 Mbps upstream and 4.17 Mbps to 16.67 Mbps downstream at distances of up to 1.5 Km (5,000 feet) over ordinary telephone lines.

General 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.

- For brevity's sake, we will use "e.g." as shorthand for "for instance", and "i.e." as shorthand for "that is" or "in other words" throughout this manual.

- The Prestige 841C may be referred to as the P841C throughout this manual.

Related Documentation

ZyXEL Web Site

The ZyXEL web site at www.zyxel.com contains an online glossary of networking terms and a download library with additional support documentation.

Chapter 1
Getting to Know the P841C

This chapter describes the key features, benefits and applications of your P841C.

The P841C is a VDSL Line Termination (LT) modem that is the perfect partner for the P841 VDSL subscriber modem. It maps traffic from one VDSL (Very high bit rate Digital Subscriber Line) subscriber to one 10/100M Ethernet that connects to a computer or LAN switch. It has built-in POTS/ISDN splitters and a console port for local management.

1.1 Features

Compact Design With Integrated Splitters

The P841C is just 18cm x 12.6cm x 3cm (Width, Depth, Height) in size. Because of built-in POTS/ISDN splitters, you do not have to allocate extra space for external splitters that separate voice-band and DSL signals.

10/100 Mbps Fast Ethernet Port

The 10/100 Mbps Fast Ethernet port allows you to connect it to a LAN switch.

VDSL Modes and Rates

The P841C supports the following DSLAM VDSL modes.

- 10BaseS mode giving upstream rates from 1.56 Mbps to 18.75 Mbps and downstream rates of 4.17 Mbps Kbps to 16.67 Mbps.

- ANSI Mode giving upstream rates from 1.56 Mbps to 6.25 Mbps and downstream rates of 4.17 Mbps to 16.67 Mbps.

- ETSI Mode giving upstream rates from 1.56 Mbps to 6.25 Mbps and downstream rates of 4.17 Mbps to 12.50Mbps.

Management

Command-line interface

System Monitoring

System status (link status, rates, statistics counters)

1.2 Application Example

The following diagram depicts a typical application of the P841C VDSL line termination modem working together with the P841 VDSL subscriber modem in a campus setting. With the built-in splitters, VDSL service can coexist with voice service on the same line.
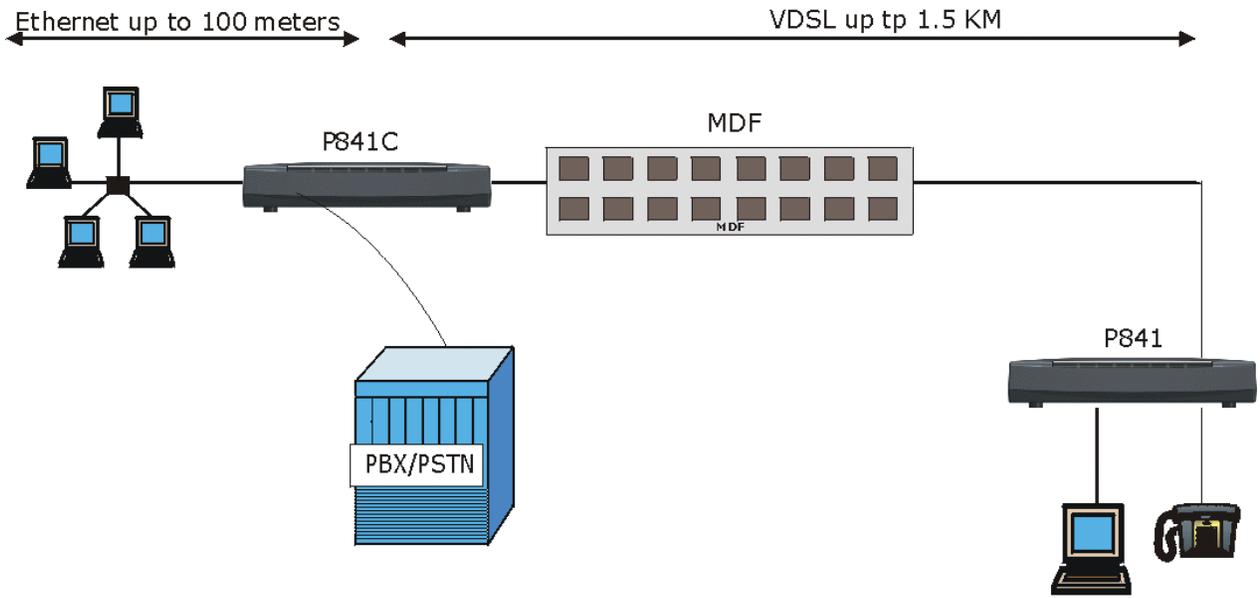
Figure 1-1 Campus Application

Chapter 2
Hardware Connections

This chapter gives a brief introduction to the P841C hardware.

2.1 Front Panel

The following figure shows the front panel of the P841C.

Figure 2-1 P841C Front Panel

2.1.1   Front Panel LEDs

The following table describes the LED indicators on the front panel of the P841C.

Table 2-1 P841C LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
PWR	Green	ON	The system is turned on.
		OFF	The system is off.
LAN 10 M	Green	Blinking	The system is transmitting/receiving to/from a 10 Mbps Ethernet network.
		ON	The link to a 10 Mbps Ethernet network is up.
		OFF	The link to a 10 Mbps Ethernet network is down.
LAN 100 M	Yellow	Blinking	The system is transmitting/receiving to/from a 100 Mbps Ethernet network.
		ON	The link to a 100 Mbps Ethernet network is up.
		OFF	The link to a 100 Mbps Ethernet network is down.
VDSL	Green	Blinking	The system is transmitting/receiving to/from the VDSL modem.
		ON	The link to the VDSL modem is up.
		OFF	The link to the VDSL modem is down.

2.2 Back Panel

The following figure shows the back panel of the P841C.

Figure 2-2 P841C Back Panel

2.2.1   Rear Panel Connectors

Table 2-2 P841C Rear Panel Connectors

CONNECTER	DESCRIPTION
POWER 12VDC	**Make sure you are using the correct power source.** Connect the female end of the power adapter to the power receptacle on the rear panel of your P841C. Connect the other end of the adapter to a power outlet.
LAN 10/100M	The Ethernet interface is an RJ-45 connector. Use a crossover Ethernet cable to connect to a hub or WAN switch. Use a straight-through Ethernet cable to connect to a computer.
CONSOLE	The CONSOLE port is an RS-232 port for configuration of the P841C. Connect the male 9-pin end of the console cable to the console port of the P841C. Connect the other end (either a female 25-pin or female 9-pin) to a serial port (COM1, COM2 or other COM port) of your computer. You can use an extension RS-232 cable if the enclosed one is too short.
VDSL	Connect one end of a phone cable to the RJ-11 VDSL port and then connect the other end to the telephone wall jack that connects to the subscriber's VDSL modem (P841).
PHONE	The line from the subscriber's carries both VDSL and voice signals. The P841C has a built-in splitter that separates the high frequency VDSL signal from the voice band signal and feeds the VDSL signal to the P841C, while the voice band signal is diverted to the PHONE port. Connect one end of a phone cable to the RJ-11 PHONE port and then connect the other end to a PBX (Private Branch eXchange) or PSTN (Public Switched Telephone Network).

Chapter 3
Configuring the P841C

This chapter shows you how to configure and maintain your P841C using the command line interface.

3.1 Additional Installation Requirements

In addition to the contents of the package, you need the following hardware and software components to configure your device:

- A computer with a 10/100M Ethernet NIC (Network Interface Card)

- 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

3.2 Login Screen

When you turn on your P841C, it performs several internal tests as it initializes. A login screen appears with copyright and VDSL information prompting you to enter the password, as shown in the next figure. You need a password to configure the P841C.

The default password when the P841C is shipped is "1234".

```
ZyXEL(R) Prestige 841C VDSL-LT Modem Version V1.00(DH.0)b2 | 3/20/2002
Copyright (c) ZyXEL Communications Corp 2001-2002. All rights reserved.

VDSL Modem Code Version: 0x50
VDSL Mode: 10BaseS(0)
Reset VDSL Chip...
Password:
```

Figure 3-1 Login Screen

For your first login, enter the default password "1234". As you enter the password, the screen displays an "*****" for each character you type. You see the P841C prompt after a successful login.

```
Password: ****

P841C>
```

Figure 3-2 Login Screen

If you type a wrong password, you will see the following screen.

```
P841C>****
Wrong Password!
```

Figure 3-3 Wrong Password

You should change the default password using the passwd command.

3.3 Commands

3.3.1   General Command Conventions

References to "LT" and "NT" are common throughout the commands. "LT" means means Line Termination (unit), which is the P841C VDSL central office side modem. "NT" means Network Termination (unit), which is the subscriber's VDSL modem (P841).

3.3.2   Command Syntax Conventions

- Command keywords are in regular `courier` font and should be typed in as they appear or in abbreviated form (see the next section).

- Optional fields (parameters) in a command are enclosed in "`[]`" brackets. For example,

`P841C> vdsl active [on|off]`

- The "`|`" symbol is shorthand for the word "or". For example, `vdsl debug [on|off]`

3.4 System Related Commands

`Help, exit, passwd, sys` and `fwupgrade` are the system related commands.

3.4.1   Passwd Command

`passwd`

Use this command to change the login password. The default password when shipped is "1234".

```
P841C>passwd
New Password: *
Retype New Password: *

P841C>
```

Figure 3-4 Change Password Command

Type your new password (up to 15 characters) in the **New Password** field and press [ENTER]. To confirm, retype the same password in the **Retype New Password** field. As you enter the password, the screen displays an "*****" for each character you type. You see the P841C prompt after a successful password change.

ZyXEL recommend you change your password after your very first login. Store your new password in a secure place for later reference in case you forget it.

3.4.2   Exit Command

```
exit
```

Enter this command to log out. You will then have to re-enter your password to log in again.

```
P841C>exit
Password:
```

Figure 3-5 Exit Command

System Timeout

Please note that if there is no activity for longer than five minutes after you log in, your P841C will automatically log you out. When you are logged out, press [ENTER] to bring up the password prompt.

3.4.3   help (or ?) Command

Type help or ? to show all available P841C commands as displayed in the next screen.

```
P841C>?
sys                         - display system status
help or ?                   - show this screen
exit                        - logout
passwd                      - change login password
fwupgrade                   - upgrade firmware
vdsl uprate [x]             - set/show VDSL uprate
vdsl downrate [y]           - set/show VDSL downrate
vdsl auto [on|off]          - set/show VDSL auto rate selection flag
vdsl load [lt|nt]           - load VDSL modem code
vdsl reset                  - reset VDSL chip
vdsl reconnect              - force VDSL reconnect
vdsl status                 - show VDSL connect status
vdsl clear                  - clear VDSL connect status
vdsl debug [on|off]         - set/show VDSL debug flag
vdsl monitor [on|off]       - set/show VDSL monitor flag
vdsl show                   - show VDSL parameters setting
vdsl mode (mode)            - set/show VDSL mode
vdsl active [on|off]        - active/deactive VDSL port
vdsl autoupg [on|off]       - set/show EEPROM auto upgrade flag
enet status                 - show ENET counters
enet clear                  - clear ENET counters
enet speed (lt|nt) (speed)  - set/show NT ENET speed
enet fctrl (lt|nt) [on|off] - set/show NT ENET full duplex flow control
enet monitor [on|off]       - set/show ENET monitor flag
```

Figure 3-6 P841C Help Commands

Table 3-1 P841C Help Commands

FIELD	DESCRIPTION
System-related Commands	
sys	Entering this command displays the system status.
help or ?	Entering this command shows the Help screen displayed
exit	Enter this command to log out of command mode.
passwd	Enter this command to change the login password.
fwupgrade	Enter this command to upgrade the P841C firmware.
VDSL-related Commands	
vdsl uprate [x]	Type this command to set the VDSL upstream rate to speed "x" or show the current upstream speed (without "x").
vdsl downrate [y]	Type this command to set the VDSL downstream rate to speed "y" or show the current downstream speed (without "y").
vdsl auto [on|off]	Type this command to turn the VDSL auto flag on or off or show the current VDSL auto flag status (without "on" or "off").
vdsl load [lt|nt]	This command causes the P841C to load new VDSL modem code into LT (P841C) or NT (P841). If LT is specified, the P841C will load the VDSL modem code into the VDSL chip. If NT is specified, P841C will load the VDSL modem code into the P841 VDSL chip.
vdsl reset	Issue this command to cause a software reset to the VDSL Chip. The VDSL link disconnects temporarily while resetting.
vdsl reconnect	Issue this command to cause the P841C to reconnect the VDSL link.
vdsl status	Issue this command to show the VDSL connection status.
vdsl clear	Issue this command to clear the VDSL connection status counters.
vdsl debug [on|off]	Type this command to show the VDSL debug flag status (without "on" or "off") or turn on/off the VDSL debug flag. When this flag is set (on), VDSL debug messages are displayed.
vdsl monitor [on|off]	Type this command to show the VDSL monitor flag status (without "on" or "off") or turn on/off the VDSL monitor flag. When this flag is set (on) and the VDSL link is up, VDSL parameters are displayed every three seconds.
vdsl show	This command displays your P841C settings.
vdsl write (lt|nt) addr value -	Write variables to VDSL chipset registers.
vdsl mode (mode)	This command displays the VDSL mode if you don't type a mode and sets it if you do.
vdsl active [on|off]	Use this command to activate or deactivate VDSL.
vdsl autoupg [on|off]	Type this command to show the VDSL auto upgrade status (without "on" or "off") or turn on/off auto upgrade. When auto upgrade is on, the P841C will check the subscriber's modem VDSL version and automatically upgrade it if it is an earlier version than the P841C's.
Ethernet-related Commands	
enet status	Type this command to display P841C and the subscriber's VDSL modem's Ethernet statistics (if link is up).
enet clear	Type this command to clear P841C and the subscriber's VDSL modem's Ethernet statistics (if link is up).

Table 3-1 P841C Help Commands

FIELD	DESCRIPTION
enet speed (lt|nt) (speed)	Type this command to set the Ethernet port speed of the P841C (you must type "lt") or P841 ("nt"). P841C speed is displayed if you just type "enet speed".
enet fctrl (lt|nt) [on|off]	Type this command to set the Ethernet port full duplex flow control of the P841C (you must type "lt") or P841 ("nt"). P841C full duplex flow control is displayed if you just type "enet fctrl".
enet monitor [on|off]	Display P841C and the subscriber's VDSL modem's Ethernet statistics (if link is up) if this flag is on.

3.4.4 Sys Status Command

Type `sys` to display the following system status parameters.

```
firmware version = V1.00(DH.0)b3 | 3/26/2002
VDSL modem code version = 0x50
sys uptime = 27782 ms (0:00:27.782)
```

Figure 3-7 Sys Status Command

Table 3-2 Sys Status Command

FIELD	DESCRIPTION
firmware version	This field shows the P841C firmware version and the date it was created.
vdsl modem code version	This field shows the VDSL driver version.
sys uptime	This field displays in milliseconds (and hours, minutes, seconds) how long the system has been up.

3.4.5 Firmware Upgrade Command

```
fwupgrade
```

Follow these steps for a successful firmware upgrade.

Step 1. Type `fwupgrade` to begin the firmware upgrade process via XMODEM.

```
P841C>fwupgrade
This operation will overwrite the old firmware! Continue?(Y/N)
```

Figure 3-8 Upgrading Firmware First Warning

Step 2. Type "Y" to continue the upgrade process.

Step 3. You now see the next screen warning you not to abort the upload process after the Xmodem file transfer begins. If you want to quit the firmware upgrade process and you have NOT YET started the file transfer process (using a Terminal emulation program), then restart the P841C now to exit.

```
       You MUST NOT abort this operation after XMODEM data transfer begins.
       Otherwise the device will be damaged.
       Restart your device before XMODEM transfer begins to quit the upgrade process.
```

Figure 3-9 Upgrade Firmware Last Warning

Step 4. Launch your terminal emulation program (see *next example*). You should have already downloaded the firmware and unzipped it on your computer. The firmware file has a "bin" extension. Begin the file transfer. DO NOT interrupt it – wait until the file transfer process finishes.

If you abort the upload after the transfer begins, your device will be seriously damaged!

Example Xmodem Firmware Upload Using HyperTerminal

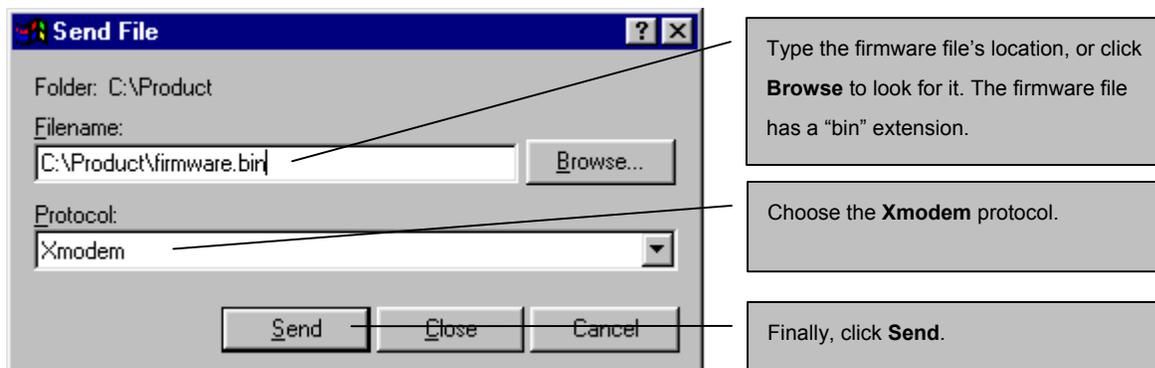Click **Transfer**, then **Send File** to display the following screen.

Figure 3-10 Example Xmodem Upload

Chapter 4
VDSL- Related Commands

This chapter shows you how to configure VDSL using Commands.

4.1 Introduction

VDSL-related commands supported by the P841C are shown in *Table 3-1.* The default values for the following VDSL parameters are:

Table 4-1 VDSL Default Values

VDSL PARAMETER	DEFAULT VALUE
VDSL Mode	0 = 10BaseS mode
VDSL Active	On
VDSL Upstream Rate	12Mbps
VDSL Downstream Rate	12Mbps

4.1.1   VDSL Mode Command

```
vdsl mode (mode)
```

This command displays the VDSL mode if you don't type a mode and sets it if you do. Use the "vdsl reset" or "vdsl recon" command to make VDSL reconnect after you set the mode; it does not do this automatically. The modes are listed in the next table.

```
P841C>vdsl mode
vdsl mode: 10BaseS(0)
```

Figure 4-1 VDSL Mode

Table 4-2 VDSL Mode

MODE NUMBER	MODE TYPE
0	10BaseS mode
1	ANSI Mode (ANSI/ETSI Band Plan 998)
2	ETSI Mode (ETSI Band Plan 997)

The band plan is different for each mode even though the speed may be the same. The following table summarizes transmission rates and frequency ranges for each VDSL mode supported by the P841C.

Table 4-3 VDSL Mode, Frequency Ranges and Rates

VDSL MODE	FREQ. RANGE (Hz)		RATE (Mbps)				
10 Base-S							
Upstream	4.0M	7.9M	1.56	6.25	9.38	12.50	18.75
Downstream	900K	3.0M	4.17	6.25	8.33	12.50	16.67
ANSI Mode (ANSI/ETSI Band Plan 998)							
Upstream	4.0M	5.0M	1.56	3.13	6.25		
Downstream	900K	3.0M	4.17	6.25	8.33	12.50	16.67
ETSI Mode (ETSI Band Plan 997)							
Upstream	4.0M	5.0M	1.56	3.13	6.25		
Downstream	900K	2.7M	4.17	6.25	9.38	12.50	

4.1.2   VDSL Active Command

```
vdsl active [on|off]
```

Use this command to activate or deactivate the VDSL driver.

4.1.3   VDSL Uprate and Downrate Commands

Use the following commands to view and set VDSL upstream and downstream rates. Rates vary according to VDSL mode selected – see *Table 4-4 and section 4.1.1.*

Upstream Rates

```
vdsl uprate [uprate]
```

"uprate" is an integer from 0 to 4 as defined in the next table. This command sets the upstream VDSL rate if you set a rate and displays the rate if you don't. If you set a new rate, you must use "vdsl reset" or "vdsl reconnect" command to reconnect.

```
P841C>vdsl uprate
vdsl upstream rate: 1562500 bps (0)
```

Figure 4-2 VDSL Upstream Rate

Downstream Rates

```
vdsl downrate [downrate]
```

"downrate" is an integer from 0 to 4 defined in the next table. This command sets the upstream VDSL rate if you set a rate and displays the rate if you don't. If you set the rate, you must use "vdsl reset" or "vdsl reconnect" command to make VDSL reconnect.

```
P841C>vdsl downrate
vdsl downstream rate: 4166667 bps (0)
```

Figure 4-3 VDSL Downstream Rate

Table 4-4 VDSL Rates

UPRATE/DOWN RATE	UPSTREAM RATE	DOWNSTREAM RATE
10BaseS Mode		
0	1.56Mbps	4.17Mbps
1	6.25Mbps	6.25Mbps
2	9.38Mbps	8.33Mbps
3	12.50Mbps	12.50Mbps
4	18.75Mbps	16.67Mbps
ANSI Mode (ANSI/ETSI Band Plan 998)		
0	1.56Mbps	4.17Mbps
1	3.13Mbps	6.25Mbps
2	6.25Mbps	8.33Mbps
3		12.50Mbps
4		16.67Mbps
ETSI Mode (ETSI Band Plan 997)		
0	1.56Mbps	4.17Mbps
1	3.13Mbps	6.25Mbps
2	6.25Mbps	9.38Mbps
3		12.50Mbps

4.1.4   VDSL Auto Command

```
vdsl auto [on|off]
```

This command turns the VDSL auto flag on or off. Type `vdsl auto` to show the current VDSL auto flag status (without "on" or "off"). When this flag is on, the P841C automatically negotiates upstream and downstream rates up to the values set using the upstream and downstream commands just described.

```
P841C>vdsl auto
vdsl auto flag: on
```

Figure 4-4 VDSL Auto Flag

4.1.5   VDSL Load Command

```
vdsl load [lt|nt]
```

This command makes the P841C loads new VDSL modem code into the P841C (LT) or P841 (NT). If "LT" is specified, the P841C will load the VDSL modem code into the P841C. If "NT" is specified, the P841C will load the VDSL modem code into the P841. The VDSL connection should automatically reconnect after the new VDSL modem code has been successfully loaded.

4.1.6   VDSL Reset Command

```
vdsl reset
```

This command causes a software reset to the VDSL Chip (local or remote). The VDSL link first disconnects before the channel resets.

4.1.7   VDSL Reconnect Command

```
vdsl reconnect
```

This command forcibly causes the P841C to reconnect the VDSL link.

4.1.8   VDSL Status Command

```
vdsl status
```

This command shows the VDSL status register values as shown in the next example. Information in these fields is mainly for debugging purposes.

SNR, MSE and RS_ERR are polled every three seconds. Total RS_ERR are counted during the connection. SNR, MSE, RS_ERR and Total_RSERR are cleared after the VDSL is link up.

```
        P841C>vdsl status
        VDSL Parameters:
          LINK_STAT = 0x00    DISC = 0    Modem Code = (0x50,N/A)
        VDSL Line Quality Status:
          US =  QAM 4/Int 32, Rate =  1562500 bps, fc = 4467773 Hz
          DS =  QAM 16/Int 24, Rate =  4166666 bps, fc = 1831054 Hz
          US SNR = 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 dB
          US MSE = 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 dB
          DS SNR = 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 dB
          DS MSE = 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 dB
          Average US SNR = 0.00dB  US MSE = 0.00dB  US Noise Margin = -9.00dB
          Average DS SNR = 0.00dB  DS MSE = 0.00dB  DS Noise Margin = -9.00dB
          US RS_ERR = 0 0 0 0 0 0 0 0
          US Total RS_ERR = 0
          DS RS_ERR = 0 0 0 0 0 0 0 0
          DS Total RS_ERR = 0
        LT Power Parameters:
          TXPWR = 0x32d, POCO = 0x0, POWER = 5.70 dBm, PSD = -55.27 dBm/Hz
```

Figure 4-5 VDSL Status Example

Table 4-5 VDSL Status Counters

FIELD	DESCRIPTION
VDSL Parameters: All these fields except for DISC are displayed in hexadecimal format.	
LINK STAT	This field displays the link status. The link is up if this field displays 0xac or 0xae; otherwise the link is down.
DISC	This is a VDSL Disconnect counter.
Modem Code	This field displays information about the modem code.
VDSL Line Quality Status	
US	This is the VDSL UpStream rate. The constellations are QAM 4, QAM 8, QAM 16, QAM 64, QAM 256 where QAM (Quadrature Amplitude Modulation) defines how many bits there are per symbol; for example QAM 4 means 2 bits per symbol (2^2), QAM 8, 3 bits (2^3) per symbol and so on.
	Int (Interpolation) defines how fast the symbols go through the line. It is equal to 25.0MHz / baud rate, so for example, Int 8 = 25.0 / 8 Mbaud.
	Rate is the VDSL raw speed and Fc is the carrier frequency.
DS	This is the VDSL DownStream rate.
SNR	The higher the SNR (Signal-to-Noise Ratio) number, the better. SNR (Signal-to-Noise Ratio is the ratio of the amplitude of the desired signal to the amplitude of noise signals at a given point in time).
MSE	This is the Minimum Square Error. The minimum mean-square error (also known as MMSE) performance measure is a popular metric for optimal signal processing.
RS_ERR	This is the count of bit errors detected and corrected by Reed-Solomon code. Reed-Solomon codes are block-based error correcting codes and are used to correct errors in many systems.
LT and NT Power Parameters	
TXPWR	This field displays transmission power information in hexadecimal format.
POCO	Port Output Control registers provide the control bit information.
POWER	This is the power measured in dBm (decibel milliwatts). It is the product of TXPWR and POCO.
PSD	This is the Power Spectrum Density (power divided by bandwidth).

4.1.9   VDSL Clear Command

```
vdsl clear
```

This command clears the VDSL status counters.

4.1.10 VDSL Debug Command

```
vdsl debug [on|off]
```

This command turns the VDSL auto flag on or off or just shows the current VDSL auto flag status (without "on" or "off"). When this flag is on, the P841C displays each stage (state) of the VDSL link initialization process. When the VDSL link is up, no messages are displayed until the VDSL line is disconnected.

```
                       0:Loading Patch to LT............................
                       P841C>2:State 0 - Initialize
                       2:  Write default parameters to LT
                       2:  Goto State 1
                       3:State 1 - Wait to connect to default rate
                       17:  Default rate connected (15230 ms)
                       17:  VDSL:US 1.56Mbps SNR 34.08dB DS 4.17Mbps SNR 43.08dB
                       18:  VDSL:US PSD -55.69dBm/Hz(946)  DS PSD -57.00dBm/Hz(813)
                       18:  Change Link Watchdog Timer
                       19:  Goto State 2
                       19:State 2 - Check NT EEPROM patch, setup target rate
                       19:  Remote VDSL Product Name:Prestige 841
                       19:  NT EEPROM exists
                       19:  NT patch signature 0x55 0x51 0x32
                       19:  EEPROM auto upgrade disabled, skip upgrade check
                       19:  Try to connect target rate (US:4,DS:4)
                       19:  Write parameters to NT
                       23:  Long Loop, Set NT M_TX = 1
                       24:  Write parameters to LT
                       24:  Goto State 3
                       25:State 3 - Wait to connect target rate
                       25:  Target rate connected (1115 ms)
                       25:  VDSL:US 18.75Mbps SNR 31.52dB DS 16.67Mbps SNR 43.42dB
                       26:  VDSL:US PSD -55.69dBm/Hz(946)  DS PSD -57.00dBm/Hz(813)
                       26:  Change NT LWDT to 5 sec
                       26:  Goto State 4
                       27:State 4 - Connect State
                       27:  LT PHY Reg 0 Changed! Should be 3100, Read 0
```

Figure 4-6 VDSL Initialization Messages

These messages are for debugging purposes only. If you are having problems initializing the VDSL connection, capture this screen and send it to your nearest customer support.

4.1.11 VDSL Monitor Command

```
vdsl monitor [on|off]
```

Type this command to show the VDSL monitor flag status (without "on" or "off") or turn on/off the VDSL monitor flag. When this flag is set (on) and the VDSL link is up, VDSL parameters are automatically displayed every five seconds seconds.

```
P841C> vdsl monitor on
P841C>124:US 18.75M SNR 31.85dB RSERR 0 DS 16.67M SNR 41.08dB RSERR 0 DISC 0
127:US 18.75M SNR 31.89dB RSERR 0 DS 16.67M SNR 41.30dB RSERR 0 DISC 0
130:US 18.75M SNR 31.92dB RSERR 0 DS 16.67M SNR 41.27dB RSERR 0 DISC 0
133:US 18.75M SNR 31.78dB RSERR 0 DS 16.67M SNR 40.97dB RSERR 0 DISC 0
136:US 18.75M SNR 31.88dB RSERR 0 DS 16.67M SNR 41.10dB RSERR 0 DISC 0
139:US 18.75M SNR 31.96dB RSERR 0 DS 16.67M SNR 41.01dB RSERR 0 DISC 0
142:US 18.75M SNR 31.67dB RSERR 0 DS 16.67M SNR 41.20dB RSERR 0 DISC 0
```

Figure 4-7 VDSL Monitor

Refer to *Table 4-5* for more information on these fields.

4.1.12 VDSL Show Command

```
vdsl show
```

This command displays your P841C settings as shown in the next example.

```
P841C>vdsl show
vdsl mode: 10BaseS(0)
vdsl Active flag: on
vdsl Max. upstream rate: 1562500 bps (0)
vdsl Max. downstream rate: 4166667 bps (0)
vdsl state: 1
vdsl long loop flag: off
vdsl sleep mode: off
vdsl auto flag: on
vdsl monitor flag: off
vdsl debug flag: off
vdsl auto upgrade NT EEPROM flag: off
enet monitor flag: off
LT Ethernet speed: Auto
LT Ethernet full duplex flow control: on
NT Ethernet speed: Auto
NT Ethernet full duplex flow control: on
vdsl disconnect count: 0
vdsl uptime: 0 secs
```

Figure 4-8 VDSL Show Command

Table 4-6 VDSL Show Command

FIELD	DESCRIPTION	EXAMPLE
vdsl mode	This field displays the VDSL mode.	10BaseS(0)
vdsl Active flag	This field displays if the VDSL driver is active.	on
vdsl Max. upstream rate	This field displays the maximum upstream rate configured.	1562500 bps (0)
vdsl Max. downstream rate	This field displays the maximum upstream rate configured.	4166667 bps (0)
vdsl state	This field displays the VDSL state. VDSL goes through several states before the VDSL link is up. For more information on states, see the VDSL debug command.	1
vdsl long loop flag	This flag comes on when the distance from the P841C to the subscriber VDSL modem (P841) is greater than a certain distance (1 Km using 24 AWG (American Wire Gauge)). When this happens, interleaving is enabled so as to prevent bursty errors; however this decreases throughput.	off
vdsl sleep mode	Sleep mode means the VDSL chip is in power save mode. This happens when vdsl Active is "off".	off
vdsl auto flag	This field shows the current VDSL auto flag status ("on" or "off"). When this flag is on, the P841C will automatically negotiate upstream and downstream rates up to the values set using the upstream and downstream commands.	on
vdsl monitor flag	This field shows the current VDSL monitor flag status ("on" or "off"). When this flag is on and the VDSL link is up, the P841C will automatically VDSL parameters every three seconds. For more information, see the VDSL monitor command.	off
vdsl debug flag	This field shows the current VDSL debug flag status ("on" or "off"). When this flag is on, the P841C will automatically display messages during each stage (state) of the VDSL initialization process. For more information, see the VDSL debug command.	off
vdsl auto upgrade NT EEPROM flag	This field shows the VDSL auto upgrade status ("on" or "off"). When the P841C will begin to	off

FIELD	DESCRIPTION	EXAMPLE
vdsl auto upgrade NT EEPROM flag	This field shows the VDSL auto upgrade status ("on" or "off"). When auto upgrade is on, the P841C will check the subscriber's modem VDSL version and automatically upgrade it if it is an earlier version than the P841C's.	off
enet monitor flag	This field shows the Ethernet monitor flag status ("on" or "off"). If this flag is on and the link is up) the P841C display P841C and the subscriber's VDSL modem's Ethernet statistics.	off
LT Ethernet speed	This field shows the P841C Ethernet port speed.	Auto
LT Ethernet full duplex flow control	This field shows the P841C Ethernet port flow control status ("on" or "off").	on
NT Ethernet speed	This field shows the P841 (subscriber's VDSL modem) Ethernet port speed.	Auto
NT Ethernet full duplex flow control	This field shows the P841 (subscriber's VDSL modem) Ethernet port flow control status ("on" or "off").	on
vdsl disconnect count	This field displays how many times VDSL connection has been disconnected.	0
vdsl uptime	This field displays how long the VDSL link has been up.	0 secs

4.1.13 VDSL Autoupg Command

```
vdsl autoupg [on|off]
```

Type this command to show the VDSL auto upgrade status (without "on" or "off") or turn on/off auto upgrade. When auto upgrade is on, the P841C will check the subscriber's modem VDSL modem code version and automatically upgrade it if it is an earlier version than the P841C's.

Chapter 5
Ethernet-related Commands

This chapter shows you how to configure Ethernet.

5.1 Introduction

The P841C has one 10/100Mbps auto-sensing Ethernet port. There are two factors related to Ethernet: speed and duplex mode. In 10/100Mbps Fast Ethernet, the speed can be 10Mbps or 100Mbps and the duplex mode can be half duplex or full duplex. The auto-negotiation capability makes one Ethernet port able to negotiate with a peer automatically to obtain the connection speed and duplex mode that both ends support.

When auto-negotiation is turned on, the Ethernet port of the P841C 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 P841C determines the connection speed by detecting the signal on the cable and using half duplex mode. When the P841C'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.

Default Settings

The factory default settings for the Ethernet port of the P841C are:

- o Speed: Auto
- o Duplex: Auto
- o Flow control: On for full duplex and off for half-duplex

Use a crossover Ethernet cable to connect the P841C to a switch. Use a straight-through Ethernet cable to connect to a computer.

Ethernet-related commands supported by the P841C are shown in *Table 3-1*.

5.1.1 Enet Status Command

```
enet status
```

Type this command to display P841C and the subscriber's VDSL modem's Ethernet statistics (if link is up).

```
P841C>enet status
LT PHY: LSI 80225
LT Ethernet speed: Link Down!
LT Ethernet Counters:
  ALGM_ERR = 0        SINGLE_COL = 0      MUL_COL = 0
  LATE_COL = 0        EXC_COL = 0         MACRX_ERR = 0       CS_ERR = 0
  FTL_ERR = 0         FCS_ERR = 0         OTO = 0             ORO = 0
  BCF = 0             RXPAUS = 0          TXPAUS = 0          TXBCNT = 0
  RXBCNT = 0          TX_DEF = 0
NT Ethernet Counters:
  ALGM_ERR = 0        SINGLE_COL = 0      MUL_COL = 0
  LATE_COL = 0        EXC_COL = 0         MACRX_ERR = 0       CS_ERR = 0
  FTL_ERR = 0         FCS_ERR = 0         OTO = 0             ORO = 0
  BCF = 0             RXPAUS = 0          TXPAUS = 0          TXBCNT = 0
  RXBCNT = 0          TX_DEF = 0

P841C>
```

Figure 5-1 Ethernet Status

Table 5-1 Ethernet Status Counters

COUNTER	MEANING
ALGM_ERR	This is the number of frames received with alignment errors (odd number of nibbles).
SINGLE_COL	A count of successfully transmitted frames for which transmission is inhibited by exactly one collision.
MUL_COL	A count of successfully transmitted frames for which transmission was inhibited by more than one collision.
LATE_COL	The number of times that a collision was detected on a particular interface later than 512 bit-times into the transmission of a packet.
EXC_COL	A count of frames for which transmission failed due to excessive collisions. Excessive collision is defined as the number of maximum collisions before the retransmission count is reset.
MACRX_ERR	This counter contains the number of frames received that were less than 64 bytes. These frames are discarded.
CS_ERR	The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame on a particular interface.
FTL_ERR	This counter contains the number of frames received that were more than maximum length (1536 bytes). These frames are discarded.
FCS_ERR	Frame Check Sequence Errors.
OTO	A count of data and padding octets of frames that are successfully transmitted.
ORO	A count of data and padding octets of frames that are successfully received.
BCF	A count of frames that are successfully received and are directed to the broadcast group address.
RXPAUS	The number of received PAUSE packets.
TXPAUS	The number of PAUSE packets transmitted.
TXBCNT	This counter indicates the number of valid data frames that have been transferred over the transmit channel.
RXBCNT	This counter indicates the number of valid data frames that have been transferred over the receive channel.
TX_DEF	A count of frames for which the first transmission attempt was delayed because the Ethernet media was busy.

5.1.2   Enet Clear Command

```
enet clear
```

Type this command to clear P841C and the subscriber's VDSL modem's Ethernet statistics (if link is up).

5.1.3   Enet Speed (lt|nt) (speed) Command

```
enet speed (lt|nt) (speed)
```

Type this command to set the Ethernet port speed of the P841C (with "lt") or P841 (with "nt"). P841C speed is displayed if you just type "enet speed".

```
P841C>enet speed
enet speed(LT): Auto
```

Figure 5-2 Ethernet Speed

Speed index number	Speed/Flow Control
0	Auto Negotiation
1	10 Mbits/s, Half Duplex
2	10 Mbits/s, Full Duplex
3	100Mbits/s, Half Duplex
4	100Mbits/s, Full Duplex

5.1.4   Enet full duplex Fctrl (lt|nt) [on|off] Command

```
enet full duplex fctrl (lt|nt) [on|off]
```

Type this command to set the Ethernet port flow control or show the Ethernet port flow control status (without "on" or "off"). By default, flow control is on for full duplex Ethernet connections and off for half duplex Ethernet connections.

```
P841C>enet fctrl
enet full duplex flow control(LT): on
```

Figure 5-3 Ethernet Flow Control

5.1.5   Enet Monitor [on|off] Command

```
enet monitor [on|off]
```

When this flag is on this command automatically displays the P841C (and the subscriber's VDSL modem's Ethernet statistics if the link is up) every five seconds. Enter the command without "on" or "off" to just show the Ethernet monitor status.

```
P841C>enet monitor
enet monitor flag: off
```

Figure 5-4 Ethernet Monitor Status

```
P841C>enet mon on

P841C>108:Enet(LT):Tx(F:0 B:0 S:0) Rx(F:681 B:85833 S:1950)
109:Enet(NT):Tx(F:694 B:90140 S:2709) Rx(F:0 B:0 S:0)
113:Enet(LT):Tx(F:0 B:0 S:0) Rx(F:815 B:117449 S:6323)
114:Enet(NT):Tx(F:828 B:119529 S:5877) Rx(F:0 B:0 S:0)
118:Enet(LT):Tx(F:0 B:0 S:0) Rx(F:876 B:125667 S:1643)
119:Enet(NT):Tx(F:884 B:126557 S:1405) Rx(F:0 B:0 S:0)
123:Enet(LT):Tx(F:0 B:0 S:0) Rx(F:934 B:134174 S:1701)
124:Enet(NT):Tx(F:943 B:134941 S:1676) Rx(F:0 B:0 S:0)
128:Enet(LT):Tx(F:0 B:0 S:0) Rx(F:980 B:138422 S:849)

P841C>enet mon off
129:Enet(NT):Tx(F:989 B:139256 S:863) Rx(F:0 B:0 S:0)
```

Figure 5-5 Enet Monitor Statistics

Table 5-2 Enet Monitor Statistics

LABEL	DESCRIPTION
LT	The P841C VDSL modem.
NT	The subscriber's VDSL modem (P841).
TxF and RxF	Transmitting and Receiving Frame count.
TxB and RxB	Transmitting and Receiving Byte count.
TxS and RxS	Transmitting and Receiving Throughput in Bytes per second.

Chapter 6
Troubleshooting

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

6.1   VDSL LED

The VDSL LED is not on.

Table 6-1 Troubleshooting the VDSL LED

STEPS	CORRECTIVE ACTION
1	Disconnect the phone wire coming from the VDSL port of the P841C and connect the subscriber's VDSL modem or router directly to the VDSL port of the P841C using a different telephone wire. If the LED turns on, check for a problem with the building's phone wire.
2	Set the VDSL modem to "auto-negotiate". If this is not possible, set it to 100 Mbps, half duplex mode.
3	Use the VDSL commands to reset and reconnect the VDSL channel (see *sections 4.1.6 and 4.1.7*).
4	Log into the P841C, enter the VDSL debug command (see *section 4.1.10*), take screen shots of this information and send it to your nearest customer support representative.
5	If the LED remains off, contact the distributor.

6.2 Data Transmission

The VDSL LED is on, but data cannot be transmitted.

Table 6-2 Troubleshooting Data Transmission

STEPS	CORRECTIVE ACTION
1	Disconnect the phone wire coming from the VDSL port of the P841C and connect the VDSL modem or router directly to the VDSL port of the P841C using a different telephone wire. If data can be transmitted, check for a problem with the building's phone wire.
2	Check to see that you are using the correct VDSL mode (see *section 4.1.1*).
3	Use the VDSL commands to reset and reconnect the VDSL channel (see *sections 4.1.6 and 4.1.7*).
4	Connect the VDSL modem or router to another P841C (VDSL port). If the VDSL modem or router works with a different P841C, then there may be a problem with the original P841C. Contact the distributor.
5	If using a different P841C does not work, try a different subscriber VDSL modem or router with the original P841C.
6	Log into the P841C, enter the VDSL status command (see *section 4.1.8*) and the VDSL debug command (see *section 4.1.10*), take screen shots of this information and send it to your nearest customer support representative.

6.3 Intermittent VDSL LED

A VDSL LED turns on and off intermittently.

Table 6-3 Troubleshooting a Non-Constant VDSL LED

STEPS	CORRECTIVE ACTION
1	Disconnect the phone wire coming from the VDSL port of the P841C and connect the subscriber's VDSL modem or router directly to the VDSL port of the P841C using a different telephone wire. If the VDSL LED stays on, check for a problem with the building's phone wire.
2	Use the VDSL commands to reset and reconnect the VDSL channel (see *sections 4.1.6 and 4.1.7*).

6.4 Data Rate

The SYNC-rate is not the same as the configured rate.

Table 6-4 Troubleshooting the SYNC-rate

STEPS	CORRECTIVE ACTION
1	Disconnect the phone wire coming from the VDSL port of the P841C and connect the subscriber's VDSL modem or router directly to the VDSL port of the P841C using a different telephone wire. If the rates match, the regular phone wire quality may be limiting the speed.
2	Use the VDSL commands to reset and reconnect the VDSL channel (see *sections 4.1.6 and 4.1.7*).
3	Log into the P841C, enter the VDSL status command (see *section 4.1.8*) and the VDSL debug command (see *section 4.1.10*), take screen shots of this information and send it to your nearest customer support representative.

6.5 Password

I forgot the password to my P841C.

Table 6-5 Troubleshooting the Password

STEPS	CORRECTIVE ACTION
1	Contact your distributor for a "generic password". Tell them your product serial number (located on the sticker on the bottom of the P841C) and firmware version you are using (see *section 3.4.4*).

6.6 Connecting to an Ethernet Switch

The P841C cannot connect to an Ethernet switch.

Table 6-6 Troubleshooting Connecting to an Ethernet Switch

STEPS	CORRECTIVE ACTION
1	Check your cable connections. Use a crossover Ethernet cable to connect to a hub or an Ethernet switch. (Use a straight-through Ethernet cable to connect to a computer.)
2	The factory default settings for the Ethernet port of the P841C are:

Table 6-6 Troubleshooting Connecting to an Ethernet Switch

STEPS	CORRECTIVE ACTION
	➢ Speed: Auto
	➢ Duplex: Auto
	➢ Flow control: On for full duplex and off for half-duplex
	If the P841C'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 switch Ethernet port are in the same order to connect.

Power Adapter Specifications

NORTH AMERICA	
AC Power Adapter model AD48-1201200DUY	AC Power Adapter model DV-121A2-5720
Input power: AC120Volts/60Hz/0.25A	Input power: AC120Volts/60Hz/27VA
Output power: DC12Volts/1.2A	Output power: DC12Volts/1.2A
Power consumption: 6 W	Power consumption: 6 W
Safety standards: UL, CUL (UL 1950, CSA C22.2 No.234-M90)	Safety standards: UL, CUL (UL 1310, CSA C22.2 No.223-M91)
EUROPE	**UNITED KINGDOM**
AC Power Adapter model AD-1201200DV	AC Power Adapter model AD-1201200DK
Input power: AC230Volts/50Hz/0.2A	Input power: AC230Volts/50Hz/0.2A
Output power: DC12Volts/1.2A	Output power: DC12Volts/1.2A
Power consumption: 6 W	Power consumption: 6 W
Safety standards: TUV, CE (EN 60950)	Safety standards: TUV, CE (EN 60950, BS7002)
JAPAN	**AUSTRALIA AND NEW ZEALAND**
AC Power Adapter model JOD-48-1124	AC Power Adapter model AD-1201200DS or AD-121200DS
Input power: AC100Volts/ 50/60Hz/ 27VA	Input power: AC240Volts/50Hz/0.2A
Output power: DC12Volts/1.2A	Output power: DC12Volts/1.2A
Power consumption: 6 W	Power consumption: 6 W
Safety standards: T-Mark (Japan Dentori)	Safety standards: NATA (AS 3260)

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