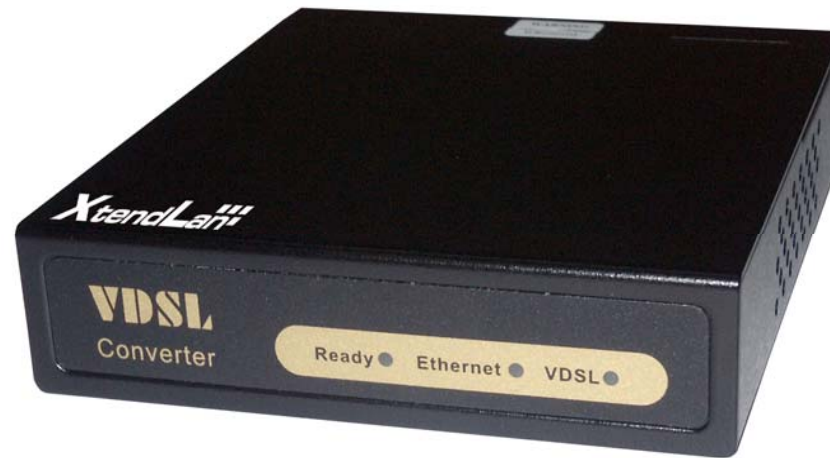




XL-VCQ102MB

4-band VDSL CO/Master bridge

User's Guide



VDSL Point to Point Solution

The VDSL (Very High Data Rate DSL) networking solution delivers cost-effective, high-performance broadband access to multiunit buildings (hotels, apartment, and multi-tenant unit office buildings) and enterprise campus environments such as manufacturing, educational campuses, and medical facilities. VDSL technology dramatically extends Ethernet over existing Category 1/2/3 wiring at speeds 10Mbps (full duplex) and distances up to 1200 meters. The VDSL technology delivers broadband service on the same lines as Plain Old Telephone Service (POTS), digital telephone, and ISDN system. In addition, VDSL supports modes compatible with asymmetric digital subscriber line (ADSL), allowing service providers to provision VDSL to buildings where broadband services already exist.

The VDSL solution includes VDSL IP DSLAM (VDSL switches), VDSL CO(Point to Point), and VDSL Modem for Customer Premise Equipment (CPE) device.

The VDSL solution delivers everything needed to quickly deploy an Ethernet-based network with the performance required to deliver high-speed Internet access at much greater distances and drive services like IP telephony and audio/video streaming. With this technology, a broad range of customers can benefit from lower operating costs and rapid deployment. This solution provides a RS-232C console port for monitoring

VDSL status and to configure speed.

This device is a CO side solution, and bridge between external Internet backbone through a router for IP sharing and the building 110D telephone rack or telephone box. It utilizes the available telephone wire to enable high-speed Internet access to building residents.

VDSL Modem uses the phone line networking technology endorsed by the VDSL, and utilizes the already existing telephone wire to deliver 4/1, 5/10/15 Mbps Internet access on each RJ-11 port.

This gives users a low-cost, end-to-end solution and eliminates the need to train installation teams on multiple systems.

Foreword

This is an Ethernet to VDSL CO side adapter that enables high speed internet access to building residents, campuses students and hotel guests by connecting Ethernet equipped computers, set-top box or any internet access device to the existing telephone wires.

The VDSL Modem uses the phoneline networking technology endorsed by the VDSL, an association of industry-leading companies for in- networking focus on the existing telephone wire.

The Modem utilizes the already existing telephone wire to deliver 10Mbps internet access with no interference on the existing telephone service. It allows user to make calls while access the internet on the same wire simultaneously. It even allows staying connected 24 hours on internet connections, thus, eliminating dial up prior to internet access.

The Modem is simple to install and use. One RJ-45 Ethernet connects to a Router, Ethernet Switch or to LAN card. The RJ11 ports available to connect to any existing modular phone jack.

There are two RJ-11 jack on the Modem to provide a phone extensions.

No software installation makes the Modem highly compatible with different operating system (Windows, Linux, Apple....etc).

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1. Unpacking Information

Check List

Carefully unpack the package and check its contents against the checklist.

Package Contents

- VDSL CO
- Four plastic feet
- User Manual & utility
- AC To DC Power Adapter
- RJ-45 cable
- RJ-11 cable
- RJ-45 To D-SUB Cable

Please inform your dealer immediately for any missing items, or damaged parts.

If possible, retain the carton, including the original packing materials.

Use them to repack the unit in case there is a need to return for repairing.

2. Installing the Modem

Hardware Installation

This chapter describes how to install the Modem and establishes network connections. You may install the Modem on any level surface (e.g, a table or shelf). However, please take note of the following minimum site requirements before you begin. Stick the 4 plastic feet at the bottom to avoid scratches.

Pre-installation Requirements

Before you start the actual hardware installation, make sure you can provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected.

Verify the following installation requirements:

- Power requirements: DC 5V/1A or above
- The Modem should be located in a cool dry place, with at least 10cm/4in of space at the front and back for ventilation.
- Place the Modem out of direct sunlight, and away from heat sources or areas with a high amount of electromagnetic interference.
- Check if network cables and connectors needed for installation are available

General Rules

Before making any connections to the Modem, note the following rules:

- Ethernet Port (RJ-45)

All network connections to the Modem Ethernet port must be made using Category 5 UTP for 100Mbps; Category 3,4 UTP for 10Mbps

No more than 100 meters of cabling may be use between the MUX or HUB and an end node.

- VDSL Port (RJ-11)

All Home network connections to the RJ-11Port made using 24~26 Gauge phone wiring.

- We do not recommend using 28 Gauge or above phone line.

Connecting the Modem

The Modem has one Ethernet port which support connection to Ethernet operation. The devices attached to these ports must support auto-negotiation or 10Base-T OR 100Base-TX unless they will always operate at half duplex.

Use any of the Ethernet ports to connect to devices such as NIC, Switch, bridge or router. You can also connect to another compatible Modem to an RJ-45 port on the other device.

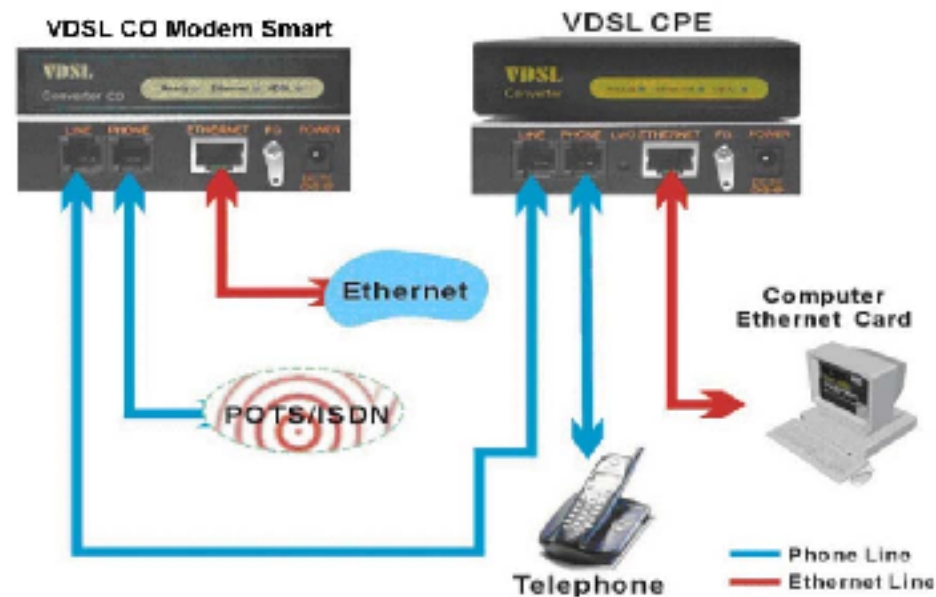
The RJ11 Line port is used to connect to the wall RJ-11 modular socket which is connect to VDSL CPE Modem side (Point to point solution)

The RJ11 Phone port of the Modem can connected to a telephone and a computer sharing one telephone wire for making calls and accessing the internet at the same time

Connecting the RJ-11/RJ-45 Ports

1. The Modem's RJ-11 ports support the transmission of data up to **4/1, 5/10/15Mbps** across existing phone wiring, without interfering with standard voice transmissions, easy-to-use does not require the installation of any additional wiring. Every RJ-11 modular phone jack in the home can become a port on the LAN. Networking devices can be installed on a single telephone wire that can span within 1.9/1.5/1.2/1km (depend on speed) between the two farthest points. **(Figure 1.0).**
2. VDSL CO Modem has embedded Splitter between every VDSL side (Line) and POTS (Phone) side. It permit you can delivers broadband service on the same lines as Plain Old Telephone Service (POTS), PBX, ISDN traffic and VDSL Signal.

Figure 1.0 VDSL Point to Point application



- 3.The RJ-11 port support 4/1,5/10/15 Mbps connections. When inserting a RJ-11 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated.
- 4.Do not plug a RJ-11 phone jack connector into the Ethernet port (RJ-45 port). This may damage the Modem Instead; use only twisted-pair cables with RJ-45 connectors that conform to Ethernet standard.

Notes:

- 1.Be sure each twisted-pair cable (RJ-45) does not exceeds 100 meters (333 feet).
- 2.RJ-11 port use 24 ~ 26 gauge phone wiring, we do not recommend 28 gauge or above.
- 3.We advise using Category 3,4,5 cable for Cable Modem or Router connections to avoid any confusion or inconvenience in the future when you upgrade attached to high bandwidth devices.

3. Hardware Description

This section describes the important parts of the Modem. It features the front indicators and rear connectors.

Front Indicators

The following figure shows the front panel.

Figure Chapter 2.2 Front Indicators



At a quick glance of the front panel, it is easy to tell if the CO Modem has power, if it has signal from its Ethernet RJ-45 port and if there is phone line signal on RJ-11port

LED Description and Operation. The Modem has three LED indicators.

LEDs	Status	Descriptions
Ready (Ready LED)	Steady Green	It will light up (ON) to show that the product is power good, and system reset OK.
Ethernet (Ethernet LED)	Steady Green Flashing (LINK/ACT)	Each RJ45 station port on the Ethernet is assigned an LED light for monitoring port “Good Linkage”. LED is normally OFF after the power on operation, but will light up steadily to show good linkage and flashing to show data transmission.
VDSL (VDSL LED)	Steady Green	RJ11 station port on the VDSL is assigned an LED light for monitoring port “Good Linkage”. LED is normally OFF after the power on operation, but will light up steadily to show good linkage.

Rear Panel

The following figure shows the rear connectors

Figure Chapter 2.3 Rear Connectors



Table Modem Rear Connectors

Connectors	Description	Type
Line	For connecting to the VDSL Modem Using a RJ-11 cable	RJ-11
Phone	For connecting to the telephone or Fax ISDN modem	RJ-11
Ethernet	For connecting to a Ethernet equipped device	RJ-45

Left side view

The following figure shows the left side connectors. You can adjust VDSL Speed and Monitor VDSL status from console (see chapter 4).

Figure Chapter 2.4 Left side Connector



Table Modem Rear Connectors:

Connector	Description	Type
Console port	For connecting to PC with RS-232 serial port over a RJ-45 To D-SUB Cable	RJ-45

Power On

1. Check the adapter is properly connected.
2. Verify the power LED is steadily on.

4 .Configuration Software Description

4.1 Start-up Dialog

When the software is started, the user has to adjust the COM port setting for which is connected to.

Figure 4.1 shows startup dialog.



4.2.1 General Settings Page

The general settings page allows basic settings. Both, local and remote modem (if available and synchronized) can be addressed by this window.

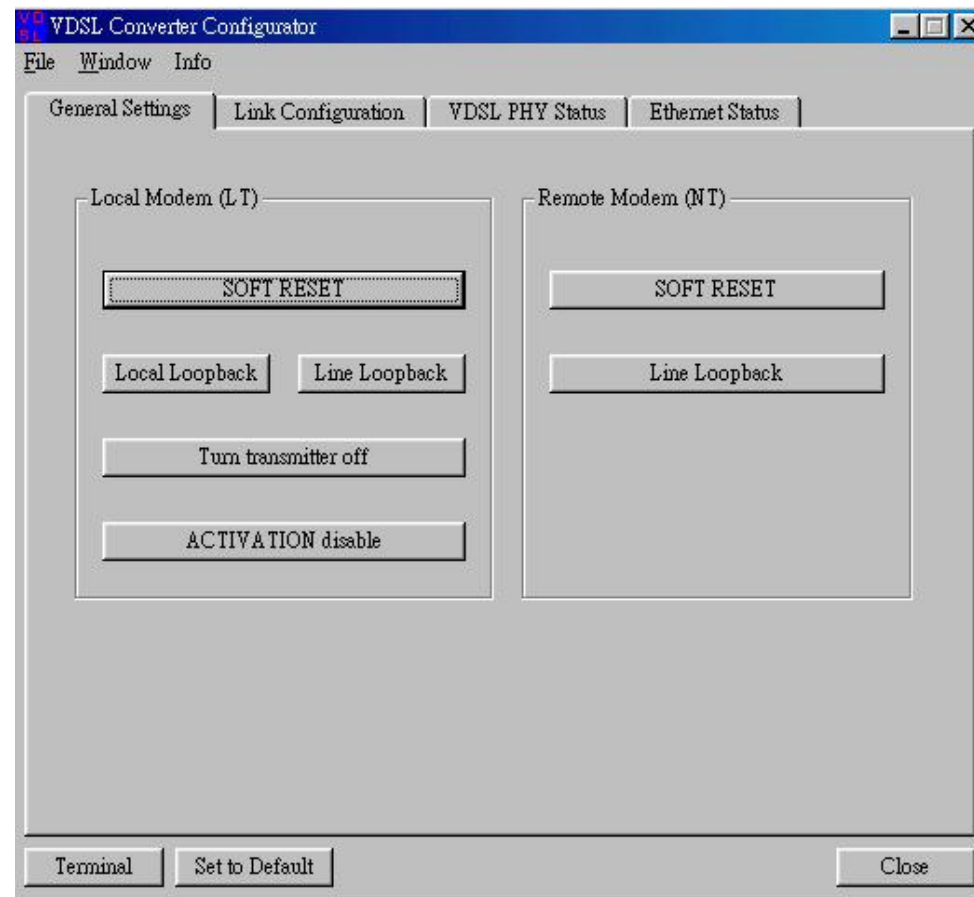


Figure 4.2 General Settings Page

Following functions are supported on the General Settings page:

- **Modem Type Display:** Indicates which modem type (LT or NT) is the local and remote modem.
- **Reset:** Performs a soft reset of the modem. After a soft reset, the 10BaseS-D is held in reset state for 256 clocks.
- **Local Loop back:** Returns data from the Tx port of the 10BaseS-D to the Rx port of the 10BaseS-D. The transmitted data to the line is not guaranteed when the local loop back is activated. This feature is not supported on the far-end modem, since this would bring down the link
- **Line Loop back:** Connects the output port of the VDSL TC-layer to the TC-layer input. This loop back contains the Ethernet interface, the scrambler, the Reed Solomon block, interleaver, framer and synchronizer.
- **Turn transmitter on/off:** This button turns the transmitter on/off in case a VDSL link is not established. This feature serves for test purposes, e.g monitor the spectrum with a spectrum analyzer.
- **Activation disable/enable:** This button enables the user to enable or disable the VDSL link

4.2.2 Link Configuration Page

The Link Configuration window shown in **Figure 4.3** allows access to the PMD (Physical Media Dependent) registers of the VDSL. Both, local and remote modem (if available and synchronized) can be addressed by this window.

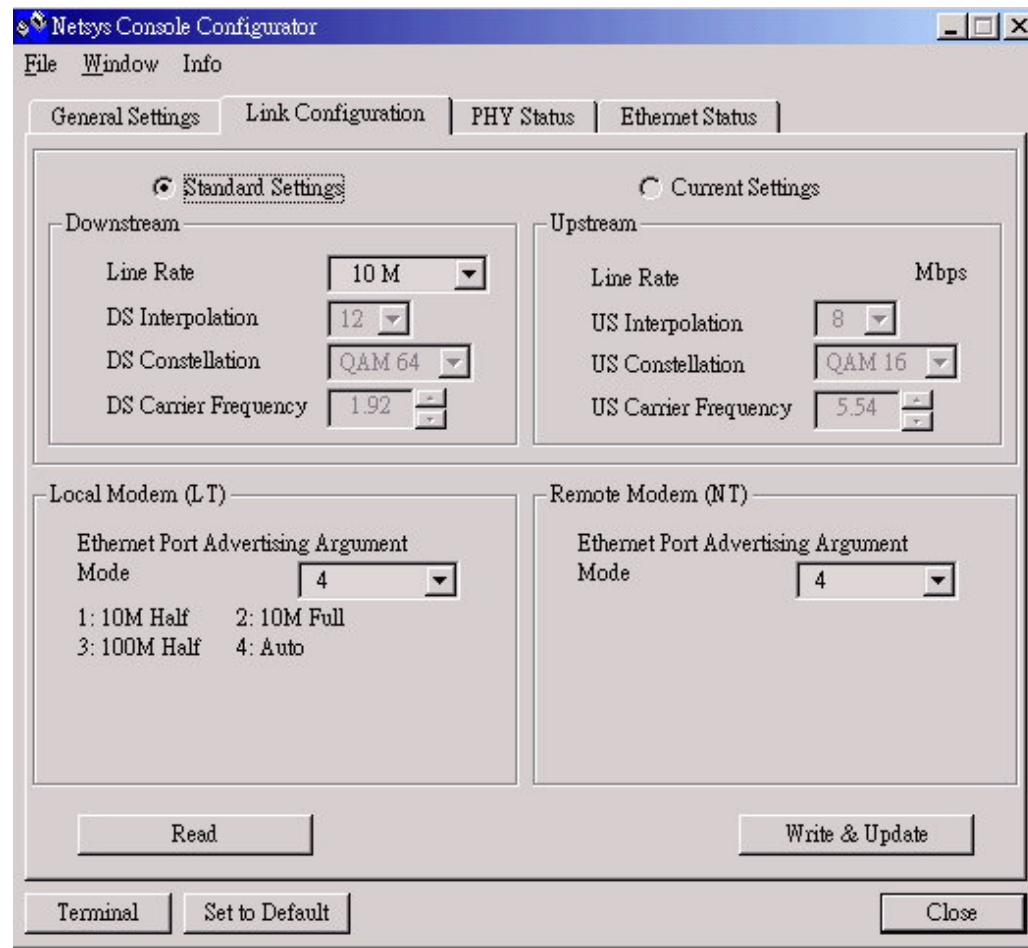


Figure 4.3 Link Configuration Page

The following functions are available within the Link Configuration page:

- **Customized Settings (Not Release):** If this option is selected, the user has access to the whole bandwidth of adjustable constellations and interpolations as well as the carrier frequencies. So he can easily find the appropriate line rate for his special application.
- **Use Recommendations:** In this option the user can select a couple of approved constellations, interpolations and carrier frequencies to change the line rate of the modem.

We support the following modes:

- **4/1 M** asymmetrical rate (up to **1900 meters**)
- **5 M** symmetrical rate (up to **1500 meters**)
- **10 M** symmetrical rate (up to **1200 meters**)
- **15 M** symmetrical rate (up to **1000 meters**)

Change Speed procedures:

- Connecting both VDSL CO and VDSL CPE.**
- Make sure VDSL CO has already connected to VDSL CPE, please check both VDSL LEDs are light up.**
- Select the Upstream and Downstream speed mode (4/1M, 5 M / 10 M / 15 M)**
- Click “Write & Update” to confirm the settings**
- The VDSL port LED will be link down temporarily about 30~60 seconds.**
- Then the VDSL link LED will be re-linked up. It means that the new speed mode has been changed successfully.**

Note. Manufacturing default threshold is on 10Mbps mode.

- **Line Rate Throughput:**

4/1M Line Rate= **4.17/1.56 Mbps**

5M Line Rate= **6.25 Mbps**

10M Line Rate=**12.5 Mbps**

15M Line Rate=**16.67 Mbp**

4.2.2.1 Write-Update Message Box

After pressing button "Write & Update" the message box shown in

Figure 4.4 appears.

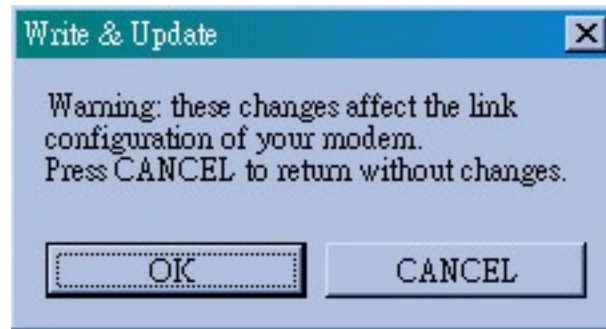


Figure 4.4 Write and Update Message Box

Pressing "OK" causes the following actions:

- If a VDSL link is established the software changes all registers in the remote modem (via the VOC) and then the in the local modem.
- If no VDSL link is established the changes are only applied to the local modem Pressing "CANCEL" closes the box without changes.

Configuring Modem Ethernet Port(Nway)

You can change Modem Ethernet port "Advertisement Argument" from the Switch when the port is linked.

There are 4 modes of the Advertisement Argument that will be used in the Ethernet Auto Negotiation procedure: 1.{10M Half}, 2.{10M Full} 3.{100M Half} 4.{Auto}.

10M Half

- Ethernet can only link by 10Mbps Half duplex

10M Full

- Ethernet can link by 10Mbps Half and 10Mbps Full duple

100M Half

- Ethernet can link by 10Mbps Half, 10Mbps Full duplex and 100Mbps Half duplex. This is default setting

Auto

- Ethernet Auto Negotiation by 10Mbps Half, 10Mbps Full duplex, 100Mbps Half duplex and 100Mbps Full duplex

Example

- If you want modem Ethernet port to link at 10Mbps Half, you can select " 10M Half "
- If you want modem Ethernet port to link at 100Mbps Full, you can select " Auto "

4.2.2.2 Read Message Box

After pressing button “Read”, System will show current Downstream and Upstream status of Line Rate, Interpolation, Constellation and Carrier Frequency.

4.2.3 VDSL PHY Status Page

The VDSL PHY Status page shown in **Figure 4.5** represents the current link status of the local modem. This window is refreshed each five seconds.

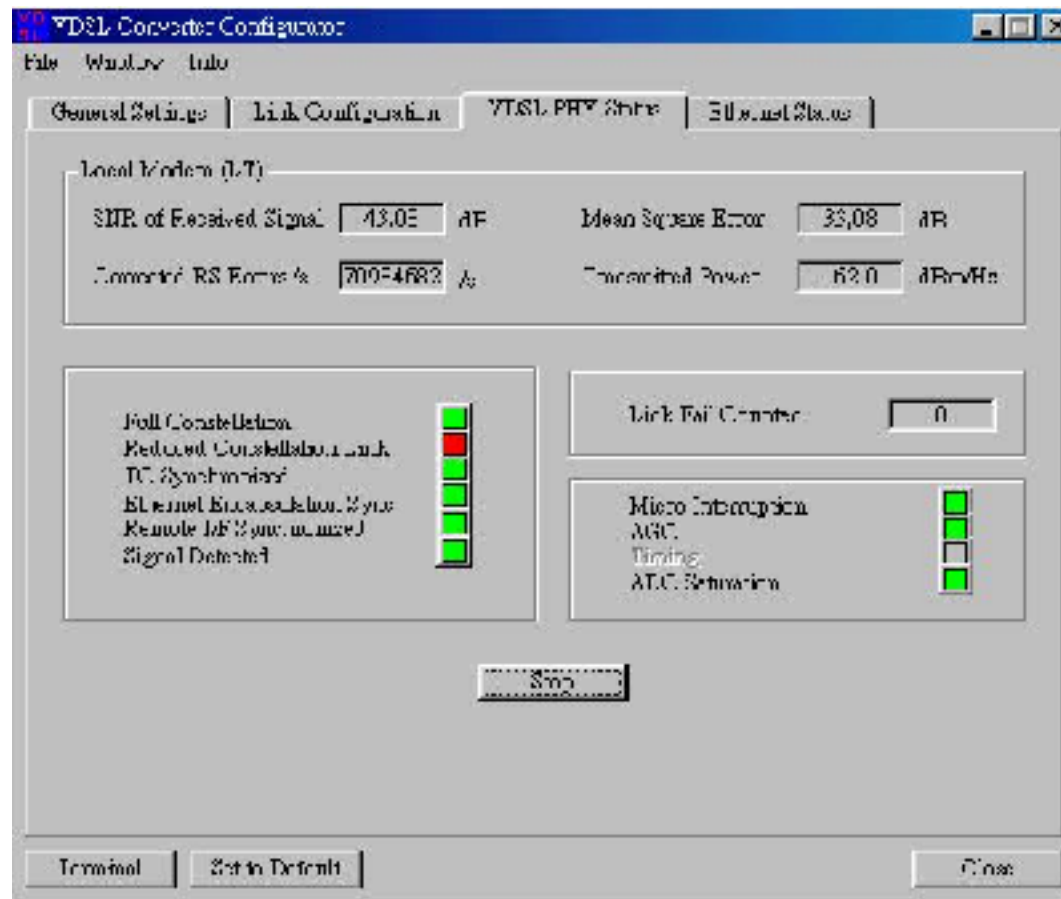


Figure 4.5 VDSL PHY Status

The status page shows the following values:

- **SNR of Received Signal:** The SNR of the received signal is calculated from the parameters found in the PMD layer. The SNR calculation depends on the QAM constellation of the received signal.

Followings are the good SNR readings (db) for each of the standard line rates in VDSL CO:

- 4/1M ≥ 19 db
- 5M ≥ 25 db
- 10M ≥ 25 db
- 15M ≥ 37 db

- **Mean Square Error:** The mean square error is an indication of the symbol error rate. Its calculation depends on the QAM constellation and the SNR of the received signal
- **Corrected RS Error(s):** This field gives the number of corrected Reed Solomon errors per second. It is an indication of the bit error rate on the line due to disturbers.
- **Transmit Power:** This field shows the actual transmitted power level. On RT modems with PBO enabled this value may be different from the minimum and maximum PSD level adjusted on the Link Configuration Page
- **Full Constellation Link:** Full constellation link is working and the modem can transmit and receive data
- **Reduced Constellation Link:** The modem has synchronized in reduced constellation(QAM4) only. In this state the VDSL Operating Channel (VOC) is working and the VOC channel can be used to re-configure the link.
- **TC Synchronized:** Indicates that the transmission convergence layer (TC) is synchronized. VDSL frame acquisition is working and the modem is in SYNC state

- **Ethernet Encapsulation Sync:** Indicates that the Ethernet data path machine has synchronized. In this state payload data transmission is working.
- **Remote I/F Synchronized:** Indicates that the remote data interface is synchronized.
- **Signal Detected:** Indicates that a signal is detected after the Analog-to-Digital Modem (ADC).
- **Micro Interruption occurred:** Indicates that a micro interruption (<10ms) has occurred.
- **AGC Converged:** Indicates that the automatic gain control (AGC) has converged.
- **Timing Converged:** Indicates that the timing acquisition function is converged. This indication is only active in RT configuration.
- **ADC Saturation:** Indicates a saturation of the ADC due to strong noise.
- **Link Fail Counter:** Counts the VDSL link failures since the first synchronizatio

4.2.4 Ethernet Status Page

The Ethernet Status Page shown in **Figure 4.6** displays Ethernet statistics.

The screenshot shows a software window titled "VDSL Converter Configurator" with a menu bar (File, Window, Info) and four tabs: General Settings, Link Configuration, VDSL PHY Status, and Ethernet Status. The Ethernet Status tab is active, displaying three sections of statistics: Transmission Counters, Collision Counters, and Error Counters. Each section contains several labels and input fields, all showing the value "0". At the bottom of the statistics section are "Clear" and "Start" buttons. The bottom of the window features a "Terminal" button, a "Set to Default" button, and a "Close" button.

Transmission Counters			
Transmitted Frames	0	Received Frames	0
Transmitted Pause Fr.	0	Received Pause Frames	0
Transmitted Octets	0	Received Octets	0
		Received Broadcast Fr.	0

Collision Counters	
Single	0
Multiple	0
Late Collisions	0
Excessive Collisions	0

Error Counters	
Receive Errors	0
Carrier Sense Errors	0
Frame too long	0
Frame Check Seq. Er.	0

Clear Start

Terminal Set to Default Close

Figure 4.6 Ethernet Status Page

The Ethernet Status Page comprises all provided counters which support the Management Information Base (MIB) based on RFC1757. Following RMON Group 1 statistics counters are displayed:

1. Transmission Counters:

- **Transmitted Frames**

Counts the successfully transmitted frames.

- **Received Frames**

Counts the successfully received frames.

- **Transmitted Pause Frames**

Counts the transmitted pause frames.

- **Received Pause Frames**

Counts the received pause frames.

- **Transmitted Octets**

Counts the successfully transmitted octets.

- **Received Octets**

Counts the successfully received octets.

- **Received Broadcast Frames**

Counts the successfully transmitted frames which are directed to a broadcast address.

2. Collision Counters

- **Single Collisions**

Counts successfully transmitted frames for which transmission was inhibited by exactly one collision.

- **Multiple Collisions**

Counts successfully transmitted frames for which transmission was inhibited by more than one collision.

- **Late Collisions**

The number of times that a collision was detected on a particular interface later than 512 bit-times into the transmission of a packet.

- **Excessive Collisions**

Number of frames for which transmission failed due to excessive collisions. Excessive collisions are defined as number of maximum collisions before the retransmission counter is reset.

3. Error Counters

- **Receive Errors**

Counts received frames which an incorrect number of bytes.

- **Carrier Sense Errors**

Counts the number of times the carrier sense condition was lost or never asserted when attempting to transmit a frame.

- **Frame too long Errors**

Counts the number of frames that exceeded the maximum permitted frame size.

- **Frame Check Sequence Errors**

Counts the number of frames which do not pass the FCS check.

4.3 Additional Dialogs

4.3.1 Terminal Window

On the terminal every access to serial interface is shown. The terminal window (see **Figure 4.7**) is always available and can be used to control exactly read and write accesses.

Note: This feature is only recommended for the experienced user, since wrong settings may cause malfunction of the unit!

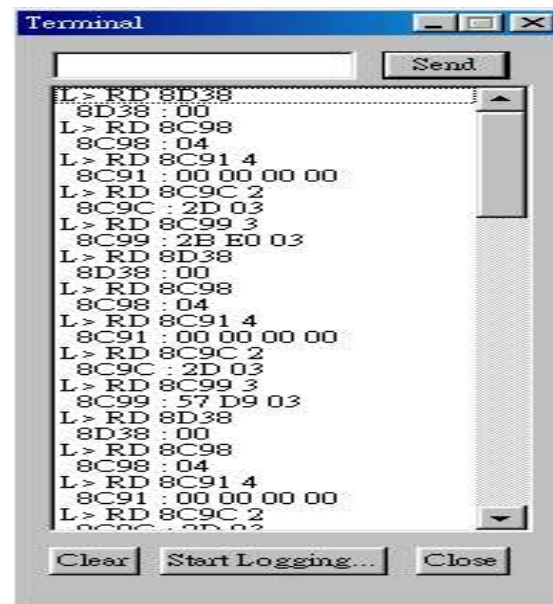


Figure 4.7 Terminal Windo

The following functions are available within the terminal window:

- **Send:** Sends the ASCII command in upper text field to the hardware. The terminal only supports the following commands (also in lower case). For some examples please refer to.

```
RD 8C**
RD 8C** *
WR 8C** **
OR 8C** **
ND 8C** **
```

- **Clear:** Clears the terminal display buffer.
- **Start Logging:** Saves the current terminal session to file.
- **Close:** Closes Terminal Window

4.3.2 Set to Default Dialog

The set-to-default dialog resets the local and the remote VDSL modem to the delivery status. This option can be used, if, after manual changes, problems with the link synchronization occur.

Note: If the local modem is set to default and a link is not established, the remote modem also has to be connected to the configuration software and a set-to-default has to be executed also on this modem.

4.3.3 About / Version Info Dialog

In this window all hardware and software version numbers can be found.

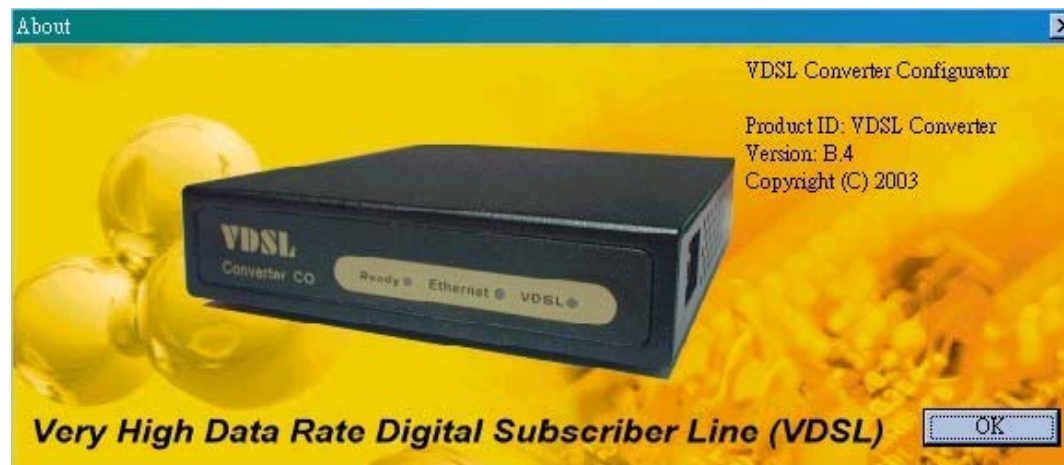


Figure 4.8 About Dialog

4.3.4 Error - Hardware does not respond

If on startup the an error is reported by the pop up box shown in **Figure 4.9** please proceed as follows:

1. Make sure that the serial connection between modem and PC is ok.
2. Make sure that the modem is connected to the adjusted COM port
3. Reset the modem by pressing the on-board reset button.
4. Press 'RETRY'

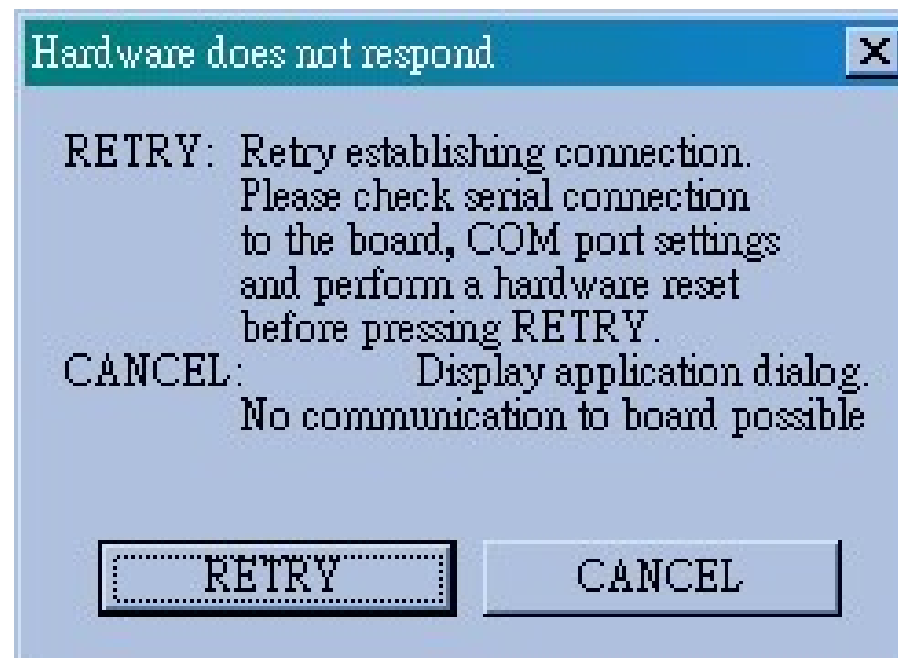


Figure 4.9 Error Message - Hardware does not respond

4.3.5 Error - COM port not accessible

If the software indicates that the selected COM port is not accessible (see **Figure 4.10**) please make sure that no other application (e.g. HyperTerminal) accesses the selected COM port.

If the error message still occurs it is recommended to reboot the PC. In this case the PC resources are corrupted.

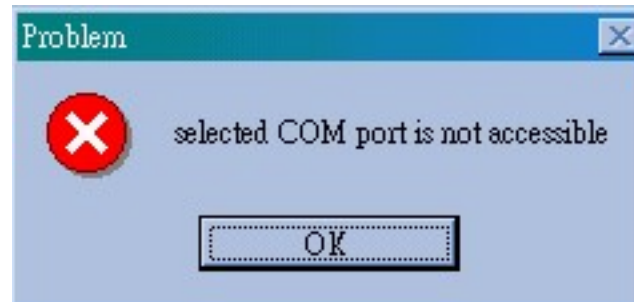


Figure 4.10 Error Message - COM Port not accessible

4.4.1 File Menu

The file Menu provides two possible selections:

- **Save current configuration:** The software reads the configuration registers from current address (read address) and saves it as ASCII file with selectable name. A file header informs about the modem type. Configuration files for NT modems are saved with postfix .NT and for LT modems with postfix .LT.
- **Load configuration from file:** The software loads a given configuration file and checks the file header. If it does not match with modem type a responding message box is shown. If the header matches the configuration file is loaded to the modem and the modem is restart with the new configuration settings.

Configuration File Example

The following file describes a LT modem. The address 0x8C59 contains the value 0x00, the address 8C5A the value 0x00 etc.:

LT

8C59:00

8C5A:00

8C5B:00

8C40:00

8C41:00

8C42:00

8C43:00

8C44:00

4.4.2 Window Menu

- **General:** Opens the General page.
- **Link Configuration:** Opens the Link Configuration page.
- **VDSL PHY Status:** Opens the VDSL PHY Status page.
- **Ethernet Status:** Opens the Ethernet Status page

5.Glossary

ADC	Analog to digital Modem
AFE	Analog Front End
CO	Central Office
CPE	Customer Premises Equipment
FCS	Frame Check Sequence
IPG	Inter Package Gap
ISDN	Integrated Services Digital Network
LT	Line Termination
MAC	Media Access Controller
MDC	Management Data Clock
MDIO	Management Data Input/Output
MIB	Management Information Base
MII	Media Independent Interface
NT	Network Termination
PHY	Physical Layer Device
POTS	Plain Old Telephone Service
QAM	Quadrature Amplitude Modulation
RMII	Reduced Media Independent Interface
RT	Remote Terminal
SMII	Serial Media Independent Interface
VDSL	Very High Data Rate Digital Subscriber Line

6.Applications

APPLICATION FOR HOME NETWORKING

The 10Mbps Modem is used to connect any device equipped with a standard 10/100Mbps Ethernet port to a VDSL LAN.

The Modem has been designed to operate on the telephone wire installed in homes throughout the world. They utilize the same modular patch cords and connectors commonly used for telephones.

To install the Modem or to access the Internet, you simply plug into your existing telephone jacks just like you would a telephone modem or a fax machine. There is no need for special splitters, terminators or filters. In fact, there is no need to add or modify the home telephone wiring at all.

The Modem uses a frequency division multiplexing approach that enables standard telephone wiring to simultaneously carry POTS voice, ISDN and VDSL signals without any of the services impacting each other.

Appendix A: Cable Requirement

A CAT 3,4 or 5 UTP (unshielded twisted pair) cable is typically used

To connect the Ethernet device to the Modem.

A 10Base-T cable often consists of four pairs of wires, two of which are used for transmission. The connector at the end of the 10Base-T cable is referred to as an RJ-45 connector and it consists of eight pins.

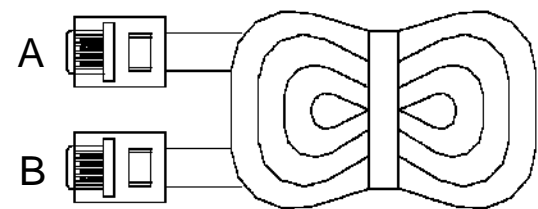
The Ethernet standard uses pins 1,2,3 and 6 for data transmission purposes.

Table RJ-45 Ethernet Connector Pin out Assignments

PIN	MNEMONIC	FUNCTION
1	TX+	Ethernet differential Transmit signal(+)
2	TX-	Ethernet differential Transmit signal(-)
3	RX+	Ethernet differential receive signal(+)
4	NC	Unused
5	NC	Unused
6	RX-	Ethernet differential receive signal(-)
7	NC	Unused
8	NC	Unused

Standard telephone wire of any gauge or type-flat, twisted or quad is used to connect the Modem to the telephone network. A telephone cable typically consists of three pairs of wires, one of which is used for transmission. The connector at the end of the telephone cable is called an RJ-11 connector and it consists of six pins. POTS (plain old telephone services) use pins 3 and 4 for voice transmission. A telephone cable is shown below.

FigureTelephone cable



The A and B connectors on the rear of the Modem are RJ-11 connectors. These connectors are wired identically. The RJ-11 connectors have six positions, two of which are wired. The Modem uses the center two pins. The pin out assignment for these connectors is presented below.

Table RJ-11 Pin out Assignments

Pin#	MNEMONIC	FUNCTION
1	NC	Unused
2	NC	Unused
3	TIP	POTS
4	RING	POTS
5	NC	Unused
6	NC	Unused

Appendix B: Product Features & Specification

Product Name VDSL Modem With C.O. side(Master) Features:

- Compliant with IEEE 802.3 & 802.3u Ethernet Standards
- Compliant with ETSI, ITU, ANSI VDSL standards
- Provides 1 x 10/100M auto-sensing RJ-45 Ethernet ports
- Supports Bandwidth setup with 4/1,5/10/15 Mbps VDSL RJ-11 ports
- POTS / ISDN Splitter port RJ-11 x 1 (Splitter on board)
- Ethernet transport with POTS / ISDN traffic over single copper wire pair
- Spectral compatibility with XDSL, ISDN(2B1Q/4B3T).
- Robust operation on severely distorted line
- Supports console port for function setup
- Supports write default value
- Supports remote CE side from CO side console
- Provides configuration utility software
- Provides Ready LED.
- Provides LED indication Link/Active Status for Ethernet port.
- Provides LED indication Link for VDSL port.

Specifications:

- Compliant with IEEE 802.3 & 802.3u Ethernet Standards
- Compliant with ETSI, ITU, ANSI VDSL standards
- 10/100M auto-sensing RJ-45 Ethernet ports x 1
- 4/1, 5/10/15 Mbps VDSL RJ-11 port x 1
- POTS / ISDN Splitter port RJ-11 x 1
- Consol port RJ-45 x 1

Surge Protection

Switch method : store and forward

Flow control Full duplex : IEEE 802.3x

Half duplex : Backpressure

Driver capable : 4/1M: 1.9km

5M :1.5km

10M : 1.2km(**Default**)

15Mbps : 1km

Indication LED x 3: Ready LED x1

Ethernet Link/Active LED x 1

VDSL Link LED x 1

Consol port : RS-232C/ 9600 bps

VDSL Frequency Spectrum :

Transmitter 0.9 ~ 3MHz

Receiver 4.5 ~ 7.9 MHz

Splitter : 0 ~ 620k

Power consumption : 2.5 Watt

Weight : About 345 g

Dimensions: 95 x 110 x 24 mm

External switching power adapter Input :AC 100-240 volts/50-60Hz

Output :DC 5V/1A or above

Operating Temperature : 0~ 50(41F ~ 122F) Storage

Temperature : - 20~ 65(-4F ~ 149F)

Humidity : 10%~90% non-condensing

Certifications : FCC, CE Mark class A, EN60950

Appendix C: Troubleshooting

Diagnosing the Modem's Indicators

The Modem can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the hub may encounter. This section describes common problems you may encounter and possible solutions

1. Symptom: Ready indicator does not light up (green) after power on.

Cause: Defective External power supply

Solution: Check the power plug by plugging in another that is functioning properly. Check the power cord with another device. If these measures fail to resolve the problem, have the unit power supply replaced by a qualified distributor.

2. Symptom: Link indicator does not light up (green) after making a connection.

Cause: Network interface (e.g, a network adapter card on the attached device), network cable, or switch port is defective.

Solution:

2.1 Power off and re- power on the VDSL Modem.

2.2 Verify that the switch and attached device are powered on.

2.3 Be sure the cable is plugged into both the switch and corresponding device.

2.4 Verify that the proper cable type is used and its length does not exceed specified limits.

2.5 Check the Modem on the attached device and cable connections for possible defects.

2.6 Replace the defective Modem or cable if necessary

2.7 Verify the VDSL switch and VDSL Modem during the same speed mode. You can select VDSL Speed mode by 10 Mbps. Only same speed mode can link and work. VDSL default transmission mode is 10 Mbps

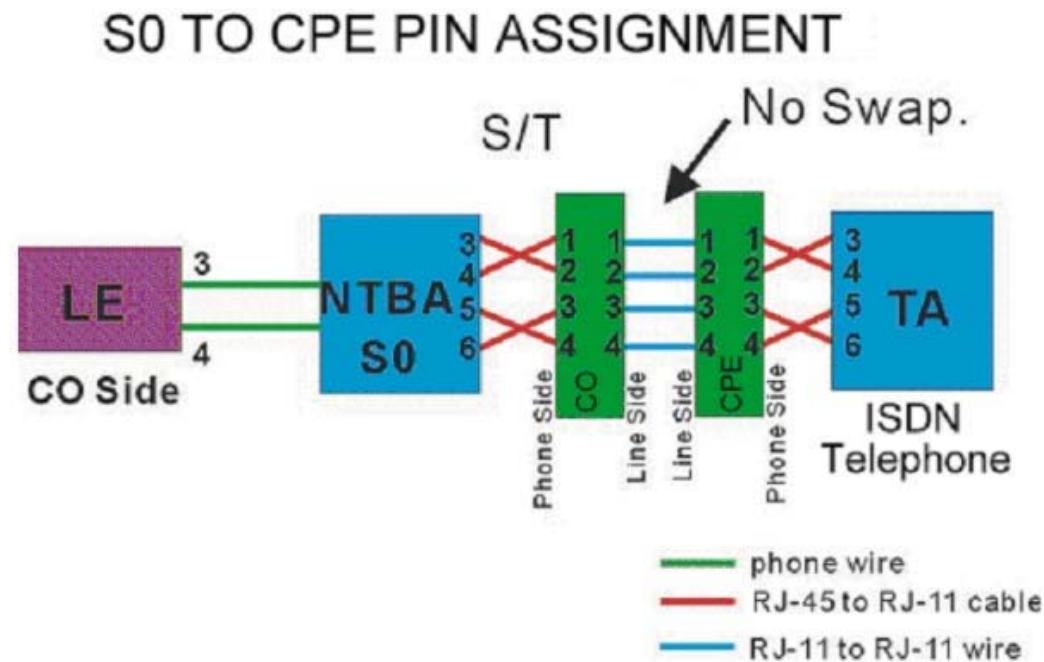
3. **Symptom:** VDSL Link can not be established.

Cause: Rusted phone wire, not standard 24 gauge phone wire, not twisted-pair phone wire, Wrong speed mode.

Solution: Check if speed of CO and CPE is in the same speed mode else please increase interleaver depth value to 8 or above.

4. **Symptom:** We tested with a regular S0 bus from an NTBA - data works, but ISDN telephone does not.

Solution: You have to connect as following chart if you want to connect VDSL CO Modem Smart and VDSL CPE Modem with NTBA.



Disable and enable VDSL CPE Modem LWD

1. Speed and Register Table

1.1 Link Watch Dog function:

		Register Address
		C255
LWD Mode	Enable	0x01
	Disable	0x05

1.2 Link Watch Dog Timing:

		Register Address	
		C052	C053
Timer	30 seconds	0xB8	0x0B
	10 minutes	0xFF	0xFF

2. Procedure:

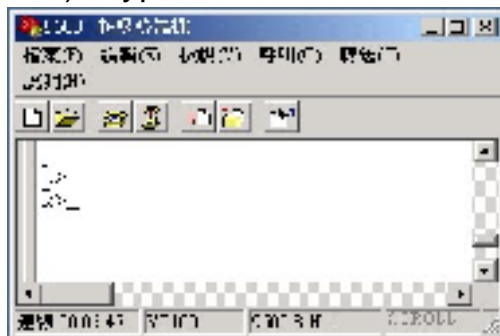
- 1) Power on and link VDSL CPE Modem KIT VDSL Port
- 2) Change VDSL CPE Modem side LWD mode from VDSL CO Modem Smart.
- 3) Change VDSL CPE Modem side LWD Timer from VDSL CO Modem Smart.

3. Example: Enable VDSL CPE Modem side LWD mode and Change VDSL CPE Modem side LWD Timer at 30 seconds

- 1) Link VDSL CO Modem Smart and VDSL CPE Modem
- 2) Connect computer and VDSL CO Modem Smart Console ports
- 3) Run “Hyper-terminal” program into terminal window:
 - 3.1) Set “Bits per second” at 9600 to the content window.
 - 3.2) Set “Flow control” at None
- 4) You can see Hyper-terminal command line by “L>” it means local modem- VDSL CO Modem Smart



- 5) Type “CTRL-E” and then command line will become “R>” it means remote modem- VDSL CPE Modem



6) Type following command to Enable VDSL CPE Modem LWD and change LWD timer

R>WR 8D00 B4

R>WR C255 01

R>WR C052 B8

R>WR C053 0B

R>WR 8D00 0

7) Type following command to check register of VDSL CPE Modem

R>RD C255

C255 : 01

R>RD C052

C255 : B8

R>RD C053

C255 : 0B

8) Power off and then power on VDSL CPE Modem

Power and Cooling Problems

If the POWER indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section. However, if the unit power is off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fan on back of the unit is unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, contact your dealer.

Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g., the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

Transmission Mode

The default method of selecting the transmission mode for RJ-45 ports is 10/100 Mbps ETHERNET, for RJ-11 port are 10Mbps VDSL. Therefore, if the Link signal is disrupted (e.g., by unplugging the network cable and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation.

If auto-negotiation fails, then communications are set to half duplex by default. Based on this type of industry-standard connection policy, if you are using a full-duplex device that does not support auto-negotiation, communications can be easily lost (i.e., reset to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to a version that support Ethernet and VDSL.

Physical Configuration

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation do not exceed recommendations.

System Integrity

As a last resort verify the switch integrity with a power-on reset. Turn the power to the switch off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, then contact your dealer.

Appendix DSPEED CHANGE QUICK GUIDE

I. Please follow the procedures below step by step to change the speed settings of VDSL CO & VDSL CPE:

1. Power on both VDSL CO & VDSL CPE
2. Connect each others over phone wire **(PLEASE USE ENCLOSED PHONE WIRE)**

Note: Please remove PBX(voice)signal when running speed change function.

3. Wait for a while and check if both link LEDs are on.(Default on 10M mode)
4. Plug in one end of the console cable(RJ-45) to VDSL CO then connect the other end(RS-232) to PC/Laptop's RS-232 COM port
5. Insert the diskette and select the VDSL Configuration Software
6. Run speed change utility program with Microsoft Win95/98/2000/NT/XP OS
7. Double click on the VDSL Configuration Software Icon, you will see

Figure 1.1, please select which COM port you have connected & click OK

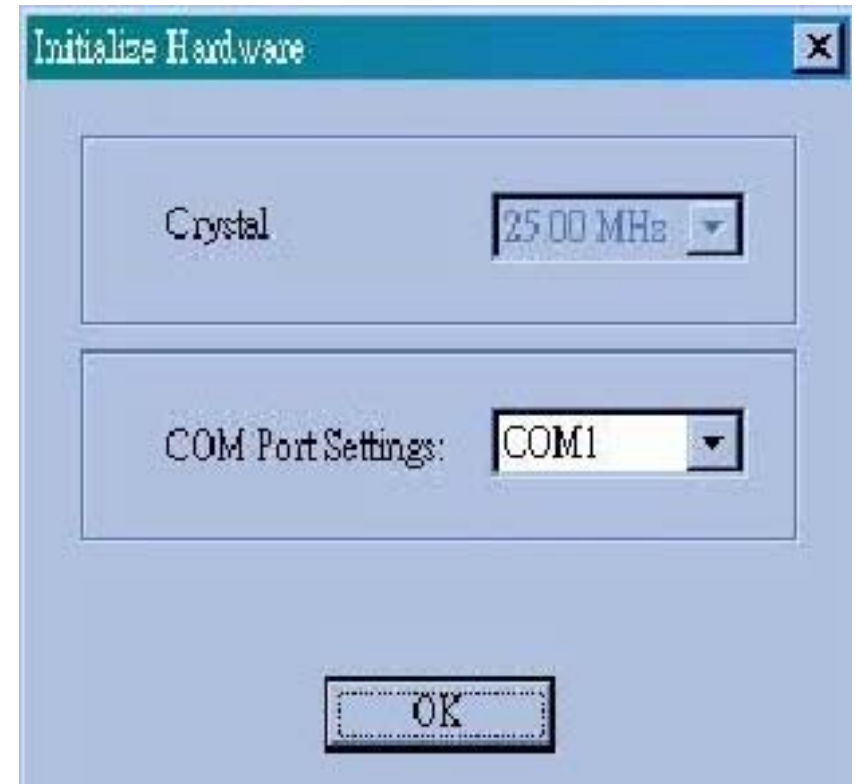


Figure 1.1

8. You will now see **Figure 1.2**

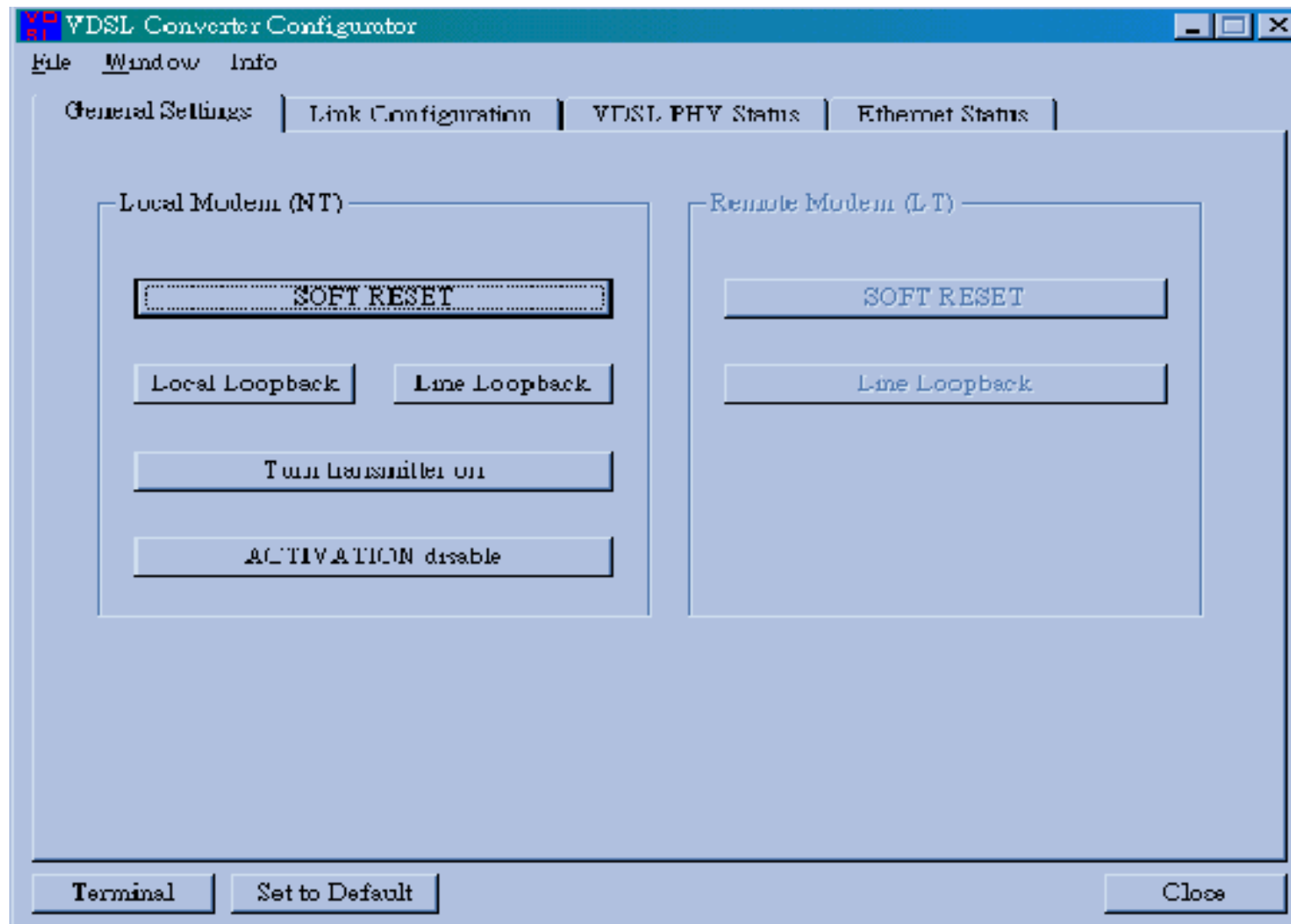


Figure 1.2

9. Click Link Configuration to enter **Figure 1.3**

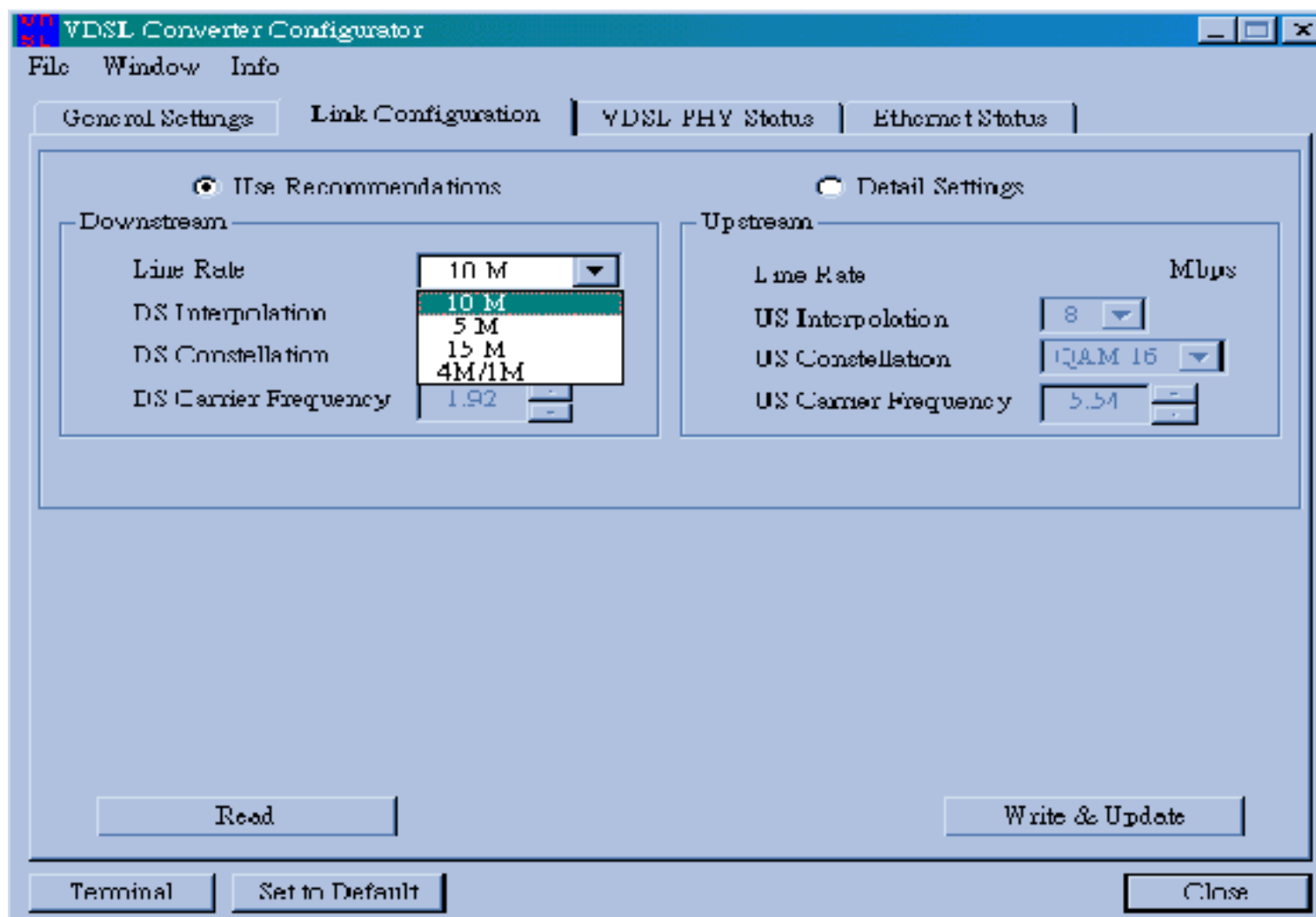


Figure 1.3


10. Select speed mode according to your requirement

- **Speed mode=Line Rate**

11. Check phone wire length limitation:

4/1M  1900 meters = 6270 feet

5M  1500 meters = 4950 feet

10M  1200 meters = 3960 feet(**default**)

15M  1000 meters = 3300 feet

12. Click “Apply” to confirm settings

13. VDSL CO & CPE's LEDs will be off

14. Wait for around 1 minut

15. Check if the LEDs of both VDSL CO &
VDSL CPE are on

16. If yes, the speed change is done successfully

II. Trouble shooting :

How to fix if VDSL CO & VDSL CPE cannot link, which caused by speed change failure?

1. Re-connect both VDSL CO & VDSL CPE by short length phone wire and without PBX(voice) signal
2. Re-power on VDSL CPE once
3. Change VDSL CO to its last speed mode
4. Wait for about 1 minute
5. Check if both LEDs of VDSL CO & VDSL CPE are on
6. Done

If you forgot the last speed mode of VDSL CO

Please try to change the from 4/1M to 15M until both link LEDs are on

<There are 4(four) speed modes – 4/1, 5, 10, 15Mbps>

Note : Please wait for 1 minute after running the speed change program to re-establish link.

Appendix E Compliance and Safety Information

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a computing device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or 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 receiver.
3. The equipment and the receiver should be connected to outlets on separate circuits.
4. Consult the dealer or an experienced radio/television technician for help.

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

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

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance in order for you to make necessary modifications to maintain uninterrupted service.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Important Safety Instructions

CautionThe direct plug-in wall transformer serves as the main disconnect for the product. The socket outlet shall be installed near the product and be readily accessible.

CautionUse only the power supply included with this product. In the event the power supply is lost or damagedIn the United States, use only with CSA certified or UL listed Class 2 power supply, rated 5Vdc 1A or above.

IN Europe, use only with CE certified power supply, rated 5Vdc 1A or above.

Do not use this equipment near water, for example in a wet basement.

Avoid using a telephone during an electrical storm. There may be a remote risk of electrical shock from lightning.

Do not use the telephone to report a gas leak in the vicinity of the leak.

If trouble is experienced with this unit, please contact customer service at the address and phone listed below. Do not disassemble this equipment. It does not contain any user serviceable components.

7. FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

This is a CE class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

8. Warranty

The original owner that the product delivered in this package will be free from defects in material and workmanship for one year parts after purchase.

There will be a minimal charge to replace consumable components, such as fuses, power transformers, and mechanical cooling devices. The warranty will not apply to any products which have been subjected to any misuse, neglect or accidental damage, or which contain defects which are in any way attributable to improper installation or to alteration or repairs made or performed by any person not under control of the original owner.

The above warranty is in lieu of any other warranty, whether express, implied, or statutory, including but not limited to any warranty of merchantability, fitness for a particular purpose, or any warranty arising out of any proposal, specification, or sample. Shall not be liable for incidental or consequential damages. We neither assumes nor authorizes any person to assume for it any other liability.

Note: Please do not tear off or remove the warranty sticker as shown, otherwise the warranty will be void.

