



NVF-400L/R

4 Band VDSL CO/CPE Bridge with 4 Ports Switch

USER'S MANUAL

Copyright

Copyright © 2008 by National Enhance Technology Corp. All rights reserved.

Trademarks

NETSYS is a trademark of National Enhance Technology Corp.

Other brand and product names are registered trademarks or trademarks of their respective holders.

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, National Enhance Technology Corp. hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

Statement of Conditions

In the interest of improving internal design, operational function, and/or reliability, NETSYS reserves the right to make changes to the products described in this document without notice. NETSYS does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

Maximum signal rate derived from IEEE Standard specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead lower actual data throughput rate.

VDSL Point to Point Solution

The NVF-400L/R utilizes Ethernet to/from VDSL subscriber-site conversion-bridge and uses QAM-based 4-band VDSL technology which supports high bandwidth up to 25Mbps symmetrical data service.

The NVF-400L also works with NVF-200R or NVF-400R, together to form a cost-effective solution for services such as remote lecturing, telemedicine, video conferencing, Video-on-Demand (VoD), IP-TV, Internet access, and various high-speed data applications.

The front panel provides LED indicators for system and interface status. The built-in POTS/ISDN splitter allows a standard POTS phone or ISDN device to be connected. Full- or half-duplex mode of LAN operations is automatically sensed and configured. VDSL link rates are configured by local IP DSLAMs over a fix speed and auto speed function.

Therefore, NVF-400L/R supports auto speed and plug & play operations in the subscriber site to form an ideal solution for delivering cost effective, high performance broadband/multimedia services to Multi-Dwelling Units (MDU) and Multi-Tenant Units (MTU) environments such as hotels, campus, hospitals and telecom.

Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions before device use.

- DO NOT open the device or unit. Opening or removing covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel can service the device. Please contact your vendor for further information.
- Use ONLY the dedicated power supply for your device. Connect the power cord or power adaptor to the right supply voltage (110V AC in North America or 230V AC in Europe).
- DO NOT use the device if the power supply is damaged as it might cause electrocution. If the power supply is damaged, remove it from the power outlet. DO NOT attempt to repair the power supply. Contact your local vendor to order a new power supply.
- Place connecting cables carefully so that no one will step on them or stumble over them. DO NOT allow anything to rest on the power cord and do NOT locate the product where anyone can work on the power cord.
- DO NOT install nor use your device during a thunderstorm. There may be a remote risk of electric shock from lightning.
- DO NOT expose your device to dampness, dust or corrosive liquids.
- DO NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Connect ONLY suitable accessories to the device. Make sure to connect the cables to the correct ports.
- DO NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- DO NOT store things on the device.
- DO NOT use the device outside, and make sure all the connections are indoors. There may be a remote risk of electric shock from lightning.
- Be careful when unplugging the power, because the transformer may be very hot.
- Keep the device and all its parts and accessories out of children's reach.
- Clean the device using a soft and dry cloth rather than liquid or atomizers. Power off the equipment before cleansing it.
- This product is recyclable. Dispose of it properly.

Table of Contents

Copyright	1
VDSL Point to Point Solution	2
Safety Warnings	3
1. Unpacking Information	6
Check List.....	6
2. Installing the Bridge.....	7
Hardware Installation	7
Pre-installation Requirements.....	7
General Rules	8
Connecting the Bridge.....	8
Connecting the RJ-11 / RJ-45 Ports.....	9
3. Hardware Description	11
Front Panel	11
Front Indicators.....	12
Rear Panel.....	13
4. Firmware Description	14
Appendix A: Cable Requirements.....	15
Appendix B: Product Specification	17
Key Features & Benefits.....	17
Product Specification	18
Appendix C: 4 Band VDSL Electrical Characteristics.....	20
Appendix D: Troubleshooting.....	21

Diagnosing the Bridge's Indicators	21
System Diagnostics	24
Appendix E: Compliance and Safety Information	26
Warranty.....	29

1. Unpacking Information

Check List

Carefully unpack the package and check its contents to compare to the checklist.

Package Contents

- VDSL 4-Band Bridge (NVF-400L or R)
- Two rubber feet
- User Manual
- AC To DC Power Adapter
- RJ-45 cable
- RJ-11 cable

Please inform your dealer immediately for any missing 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 repair.

2. Installing the Bridge

Hardware Installation

This chapter describes how to install the bridge and establishes network connections. You may install the bridge 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 rubber 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 12V/1A or above.
- The bridge should be located in a cool dry place with at least 10cm/4in of space at the front and back for ventilation.
- Place the bridge 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 bridge, note the following rules:

- Ethernet Port (RJ-45)
All network connections to the bridge 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 Bridge

The bridge has four 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.

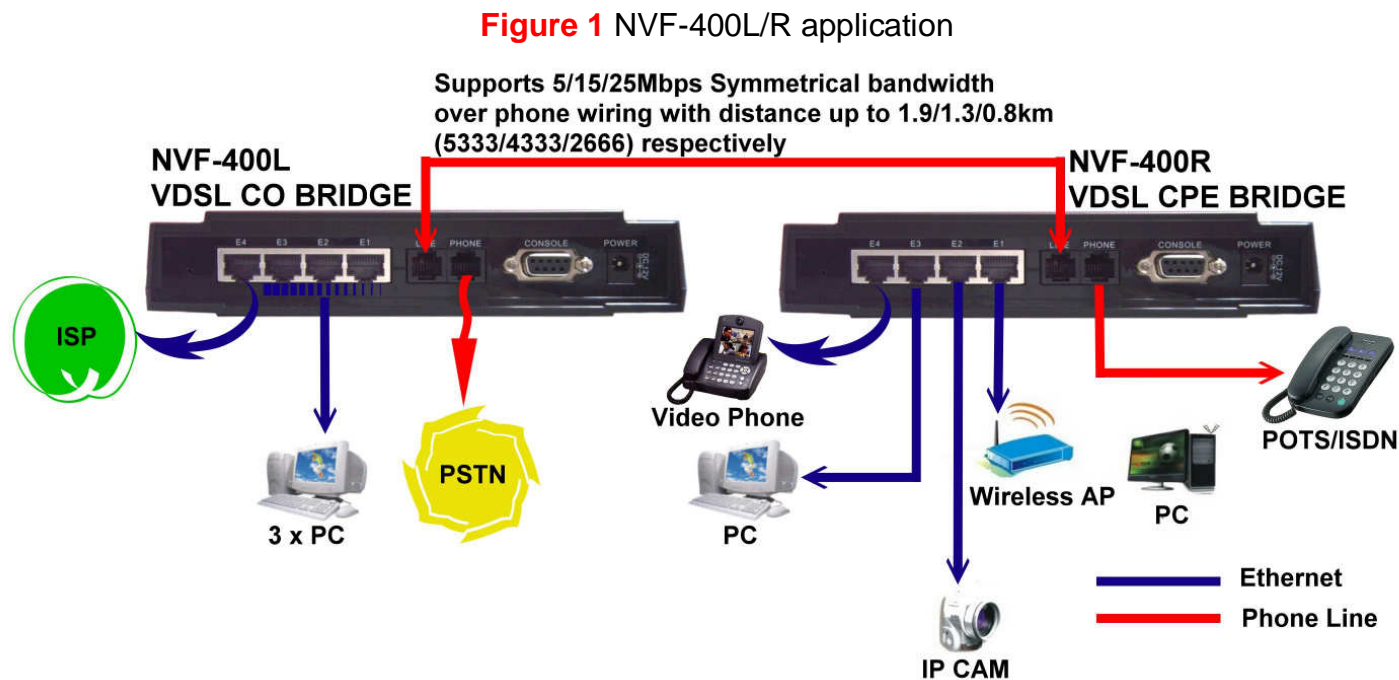
The RJ11 Line port is used to connect to the wall RJ-11 modular socket (outlet) that is connected to VDSL 4-Band CPE bridge side (Point to point solution).

The RJ11 Phone port of the bridge can be connected to a telephone for making calls.

The console port is not available for use. It is only use for engineering debug only.

Connecting the RJ-11 / RJ-45 Ports

1. The bridge's RJ-11 ports supports maximum distance up to 1.9km at 5M/5M or maximum speed at 25M/25M symmetrical with distances up to 800m data service across existing phone wiring without interfering with standard voice transmissions, it is easy to use and 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 1.9km or 800m (depending on speed) between the two farthest points. **(Figure 1).**



2. NVF-400L/R bridge has embedded splitter between every VDSL side (Line) and POTS (Phone) side. It permits you to deliver broadband service on the same lines as Plain Old Telephone Service (POTS), PBX, ISDN traffic and VDSL Signal.
3. The RJ-11 port support maximum distance 1.9km at 5M/5M or max speed 25M/25M symmetrical and distances up to 800m data service. When inserting a RJ-11 plug, be sure to 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 bridge. 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 exceed 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 cables for Cable Bridge or Router connections to avoid any confusion or inconvenience in the future when you upgrade attached to high bandwidth devices.
4. Be sure phone cable has been installed before NVF-400L/R powered on.

3. Hardware Description

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

Front Panel

The following figure shows the front panel. **(Figure 2)**

Figure 2 Front Panel of NVF-400L

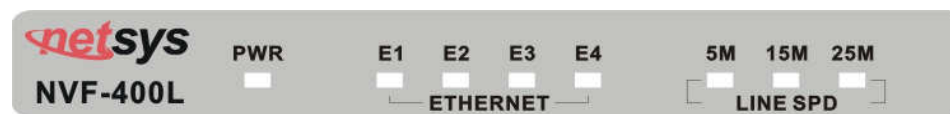
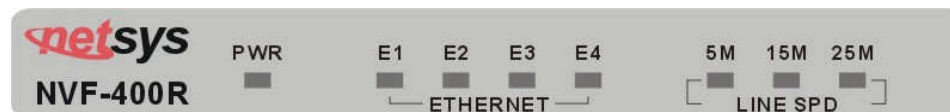


Figure 3 Front Panel of NVF-400R



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

Front Indicators

The Bridge has **EIGHT** LED indicators. The following Table shows the description. **(Table 1)**

Table 1 LED Indicators Description and Operation

LEDs	Color	Status	Descriptions
PWR (Power LED)	Green	On	The device is receiving the power and functioning properly.
		Off	The device is not ready or has malfunctioned.
E1~E4 (Ethernet LED)	Green	On	The device has a good Ethernet connection.
		Blinking	The device is sending or receiving data.
		Off	The LAN is not connected.
5M (VDSL LED)	Green	On	VDSL is in good linkage at 5Mbps data rate.
		Off	The VDSL connection is down.
15M (VDSL LED)	Green	On	VDSL is in good linkage at 15Mbps data rate.
		Off	The VDSL connection is down.
25M (VDSL LED)	Green	On	VDSL is in good linkage at 25Mbps data rate.
		Off	The VDSL connection is down.

Rear Panel

The following figure shows the rear connectors. **(Figure 4)**

And the table shows the description. **(Table 2)**

Figure 4 Rear connectors



Table 2 Description of the Bridge rear connectors

Connectors	Type	Description
Ethernet 1~4	RJ-45	For Ethernet equipped device connection
Line	RJ-11	For VDSL Bridge connection.
Phone	RJ-11	For telephone or Fax, ISDN bridge* connection.
Console	RS-232C	For In-band management.
Power	12Vdc adapter	For power supply.

* If it is needed to connect to the ISDN bridge, please refer to Appendix C for further details.

4. Firmware Description

Auto speed function description:

NVF-400L/R is a 4 band VDSL solution which supports auto speed function and real plug & play. It can support 5M/15M/25M symmetrical data service but depends on installation environment and cable limit length. It can also do auto speed function while phone cable be re-plug in between NVF-400L and NVF-400R, or both be re-power on. NVF-400L will try to link at 25M/25M mode first, if the link fails, it will auto speed down to 15M/15M mode, and if the link fails again, it will auto speed down to 5M/5M, then stay on this mode until re-plug in phone cable or re-power on them, to restart auto speed function again, both link up need one to three minutes which depend on phone cable length by auto-speed function.

Speed mode limitation:

5M/5M mode within 1.9km (6333 ft.)

15M/15M mode within 1.3km (4333 ft.)

25M/25M mode within 800m (2666 ft.)

* With the above phone cable length limit based only without PBX noise.

Note:

We recommend phone cable that must meet Cat 3 standard or above and without clustering, otherwise the above guarantee will be void.

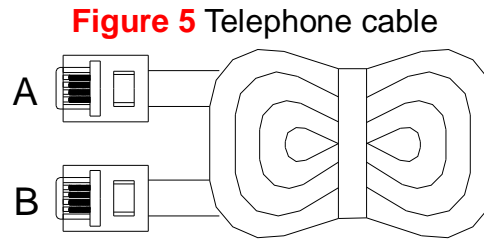
Appendix A: Cable Requirements

A CAT 3, 4 or 5 UTP (Unshielded Twisted Pair) cable is typically used to connect the Ethernet device to the bridge. 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 3)**

Table 3 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 bridge 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 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. **(Figure 5)**



The A and B connectors on the rear of the bridge are RJ-11 connectors. These connectors are wired identically. The RJ-11 connectors have six positions, two of which are wired. The bridge uses the center two pins. The pin out assignment for these connectors is presented below. **(Table 4)**

Table 4 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 Specification

Key Features & Benefits

- Supports Universal Plug & Play(UPnP)
- Compliant with IEEE802.3 10BASE-T and IEEE802.3u 100BASE-TX standard
- Compliant with ETSI, ITU, ANSI standards
- Supports high bandwidth up to 25Mbps symmetrical
- Supports 1 * RJ-11 connector for Ethernet over VDSL
- Supports 1 * RJ-11 connector for telephone/PBX connection
- Supports 4 * RJ-45 port for 10/100Mbps Ethernet with Auto MDI/MDIX
- Supports Auto-speed and full duplex for VDSL port
- Supports long packet size up to 1536 bytes
- Supports POTS/ISDN voice pass
- Supports 4wires phone set pass through
- Voice and Data work on the same telephone line
- Spectral compatibility with xDSL, ISDN (2B1Q/4B3T)
- Supports flow control IEEE802.3x for Full Duplex & Back Pressure for Half Duplex
- Supports Surge protection
- Provides Power LED and LED indication Link/Active Status for Ethernet port and 5/15/25Mbps Link/Speed for VDSL port
- EMI certified by CE and FCC

Product Specification

Standard:	IEEE802.3 standard IEEE802.3u standard Compliant with ETSI, ITU, ANSI standards
Interface:	4 * RJ-45 10/100Mbps Ethernet port 1 * RJ-11 connector for EoVDSL 1 * RJ-11 connector for telephone connection 1 * RS-232C / 19200bps for Console port
Cable Connections:	RJ-45 (Ethernet): Category 3, 4, 5 UTP/STP RJ-11 (EoVDSL): Twisted-Pair phone wire
LED indication:	Power Link/Active Status for Ethernet port 5/15/25Mbps Link/Speed for VDSL port
VDSL Frequency Spectrum:	NVF-400L_Transmitter: 900kHz ~ 3.9MHz Receiver: 4MHz ~ 7.9MHz NVF-400R_Transmitter: 4MHz ~ 7.9MHz Receiver: 900kHz ~ 3.9MHz

POTS/ISDN pass filter Spectrum: 0 ~ 630kHz

Power Consumption: NVF-400L (LT): 4.2W
NVF-400R (NT): 5.04W

Operating Temperature: 0°C ~ 50°C (32°F ~ 122°F)

Storage Temperature: -20°C ~ 70°C (-4°F ~ 158°F)

Humidity: 10 to 90% (non-condensing)

Dimensions: 184mm x 146mm x 40mm (7.2" x 5.74" x 1.57")

Weight: 0.78kg & 1.02kg (for metal case)

External Power Adapter Input: AC 85~240 volts/50~60Hz
Output: DC 12V/1A

Appendix C: 4 Band VDSL Electrical Characteristics

Parameter		Min.	Typ.	Max.	Unit
Spectrum	Transmit	0.9		3.9	MHz
	Receive	4		7.9	MHz
PSD Level	Transmit	-70		-61.5	dBm/Hz
	Receive	-70		-60	dBm/Hz
Noise Margin			6		dB
5Mbps Link Margin	Transmit	27	31	35	dB
	Receive	27	31	35	dB
15Mbps Link Margin	Transmit	36	38	40	dB
	Receive	36	38	40	dB
25Mbps Link Margin	Transmit	41	43	45	dB
	Receive	41	43	45	dB

Appendix D: Troubleshooting

Diagnosing the Bridge's Indicators

The bridge 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:** POWER 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 (ex. 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 bridge.
 - 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 bridge on the attached device and cable connections for possible defects.
 - 2.6 Make sure phone wire must be connected between NVF-400L and NVF-400R first, when both

are powered on.

2.7 Replace the defective bridge or cable if necessary.

3. Symptom: VDSL Link cannot be established

Cause: VDSL auto speed failed, or phone cable length is over specification with the limit of 1.9km or not a 24 gauge phone wire with twist pair.

Solution: 3.1 Please make sure phone wire must be connected between NVF-400L and NVF-400R when both are power on. NVF-400L will do auto speed function depending on phone wire length, therefore if NVF-400L can't detect NVF-400R over phone wire while both power on, this will cause the link to fail.

3.2 Please check phone cable must be 24 gauge with twisted pair and without rust, and the length is not over 1.9km.

Note: Phone cable must meet Cat 3 standard or above and without clustering, otherwise it will cause more cross talk issue to reduce DSL power driver.

4. Symptom: VDSL always Link on 5M/5M speed mode at short phone cable.

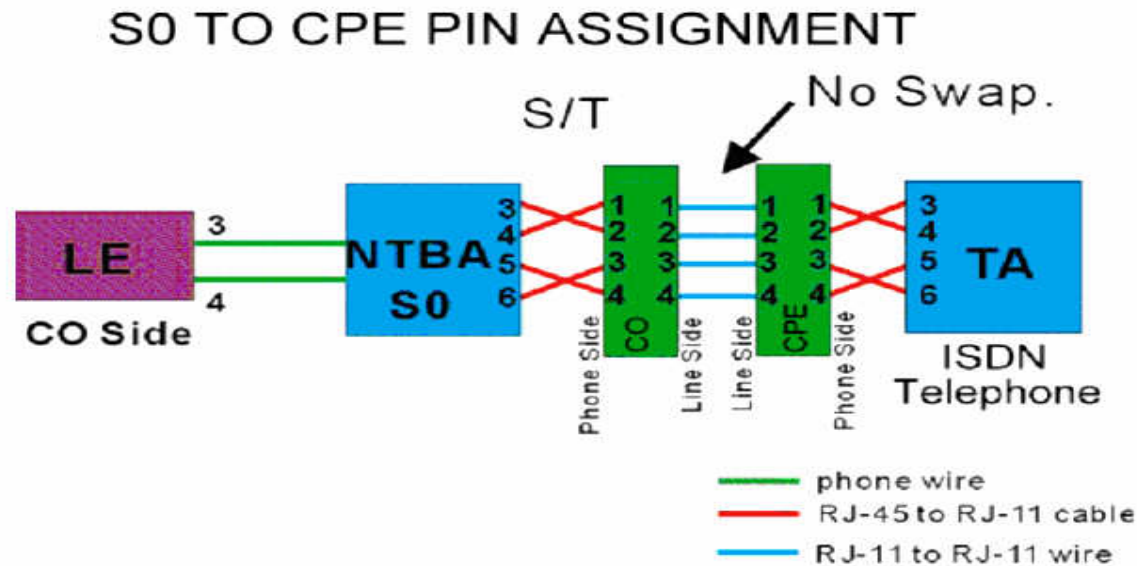
Cause: VDSL auto-speed stops functioning.

Solution: Please re-plug in phone cable between NVF-400L and NVF-400R, or re-power on NVF-400L and NVF-400R again.

Note: NVF-400L will do auto-speed function while phone cable re-plug in or re-power on.

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

Cause: You must connect according to the following chart if you want to connect CO and CPE with NTBA.



- 6. Symptom:** VDSL line is at link margin.
Cause: When the VDSL line is linking between 2 speeds at 5/15Mbps or 15/25Mbps.
Solution: Fixed the speed to 5Mbps when it is linking between 5/15Mbps or fixed the speed to 15Mbps when it is linking between 15/25Mbps.
- 7. Symptom:** VDSL flickers at 25Mbps when multicast streams.
Cause: Power level is too high and noise immunity is weak.
Solution: Fixed the speed to 15Mbps, since 15Mbps is ideal for multicast streaming while 25Mbps is for transferring large data file at high speed.

System Diagnostics

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, please contact your local 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 5/15/25Mbps 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 (e.g. 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 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

Caution: The 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.

Caution: Use only the power supply included with this product. In the event the power supply is lost or damaged: In the United States, use only with CSA certified or UL listed Class 2 power supply, rated 12Vdc 1A or above. In Europe, use only with CE certified power supply, rated 12Vdc 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.

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 its 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.

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. We shall not be liable for incidental or consequential damages. We neither assume nor authorize any person to assume for it any other liability.



WARNING:

DO NOT TEAR OFF OR REMOVE THE WARRANTY STICKER AS SHOWN, OR THE WARRANTY IS VOID.