netsys

Networking your world

NB-301A

G.SHDSL bis LAN EXTENDER

USER'S MANUAL

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Maximum signal rate derived form 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.

Overview

NB-301A (G.shdsl bis LAN Extender) from Netsys provides a broadband transmission speed up to 5.7Mbps through G.shdsl bis connection over single pair copper line for point-to-point LAN connectivity between two sites. With its rate adaptive features, NB-301A provides longer reach on transmission distance. Users may also select a fixed data rate for the copper line ranging from 144kbps to 5,696kbps.

A pair of NB-301A offers a cost effective solution for bandwidth-hungry applications such as video-conferencing and distant learning over twisted pair telephone line. NB-301A is indeed an ideal symmetrical broadband solution for LAN-to-LAN connectivity, Internet access, VOIP application and etc.

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

1. Unpacking Information

Check List

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

- One NB-301A unit with dimension of 150x135x30 (mm)
- One power adapter
- One DB-9 Console Cable
- One User's Manual (Compact Disk)

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 Modem

Hardware Installation

This chapter describes how to install the LAN extender and establishes network connections. You may install the LAN extender on any level surface (e.g. a table or shelf). However, please take note of the following minimum site requirements before you begin.

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.
- LAN extender should be located in a cool dry place with at least 10cm/4in of space at the front and back for ventilation.
- Place the LAN extender 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.

Application Notes

Ethernet to Ethernet Bridge Extension as shown in figure 1.

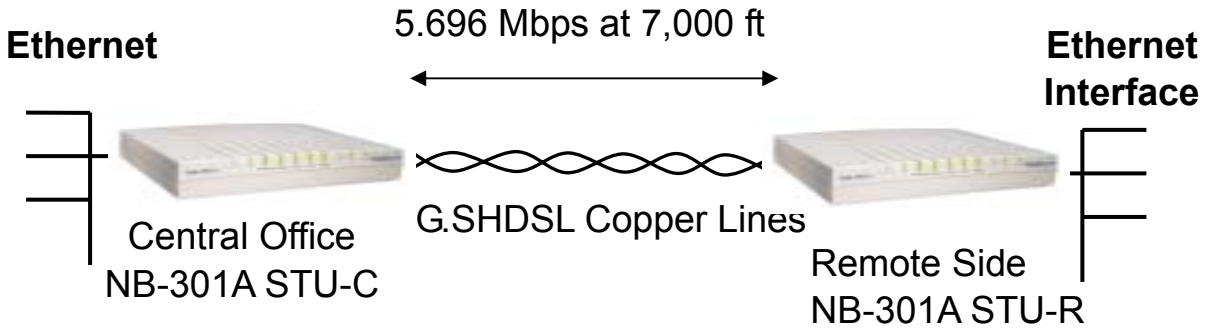

Figure 1. Ethernet to Ethernet Bridge Extension

Installation Procedure

Step 1. Connect G.SHDSL Line to DSL RJ-45 connector on NB-301A back panel

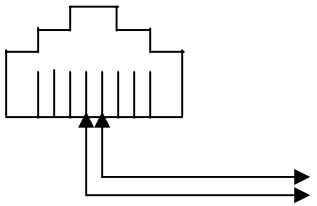

Figure 2. RJ-45 Connector Pin Assignment for G.SHDSL Line Interface

Step 2. Connect Ethernet to RJ-45 Port with CAT 5 LAN cable

Step 3. Connect the power adapter to the NB-301A 12VDC outlet

Step 4. Turn on the power. Set one NB-301A as STU-C from Console port, and the other NB-301A as STU-R

Step 5. Set the desired Data Rate for G.SHDSL connection from Console port. Note that both NB-301A must set the same data rate settings.

Step 6. Both units of NB-301A will automatically connect with each other.

Turn on the power and NB-301A will then execute self-test routines. There will be 2 or more handshaking cycles when adaptive rate is selected. The system will automatically adapt to maximum rate according to the line distances. The maximum rate is 5696 kbps for 1-pair G.SHDSL line.

3. Hardware Description

Front Indicators

The Modem has FIVE LED indicators on the front panel of NB-301A displaying the current status. The following Table shows the description. **(Table 1)**

Table 1 LED Indicators Description and Operation

LEDs	Color	Status	Descriptions
POWER	Green	On	The device is receiving the power and functioning properly.
		Off	The device is not ready or has malfunctioned.
TEST	Green	On	NB-301A is self-testing after power on.
		Off	NB-301A is ready to link.
LINE	Green	On	G.SHDSL line connects successfully.
		Blink	G.SHDSL connection is in progress.
		Off	G.SHDSL connection not ready.
LAN	Green	On	LAN port is in connection.
		Blink	LAN port shows data activity.
		Off	LAN port connection is down.

100M	Green	On	LAN Ethernet connection is at 100Mbps.
		Off	LAN Ethernet connection is at 10Mbps.

4. Console Port Control

The NB-301A provides an RS232C console port for user to monitor the OA&M status through a VT100 terminal. This section covers the operation procedures, settings and for all screen selections.

Connect the RS232 cable to the COM port of the computer as shown in the following diagram. Set the personal computer to VT100 or VT102 type through HyperTerminal. Press the <ESCAPE> key and the main menu will be shown on the screen of the terminal. The terminal operations can then start.

If the <ESCAPE> key is pressed and the screen of the terminal does not display, this may be due to the incorrect COM port setting. Choose the right COM port (COM1 or COM2) on the computer, and press the <ESCAPE> key again to make sure that the main menu appears on the terminal screen. Note that the COM port should be set as 9600 bps, none parity, 8 data bit, and 1 stop bit.

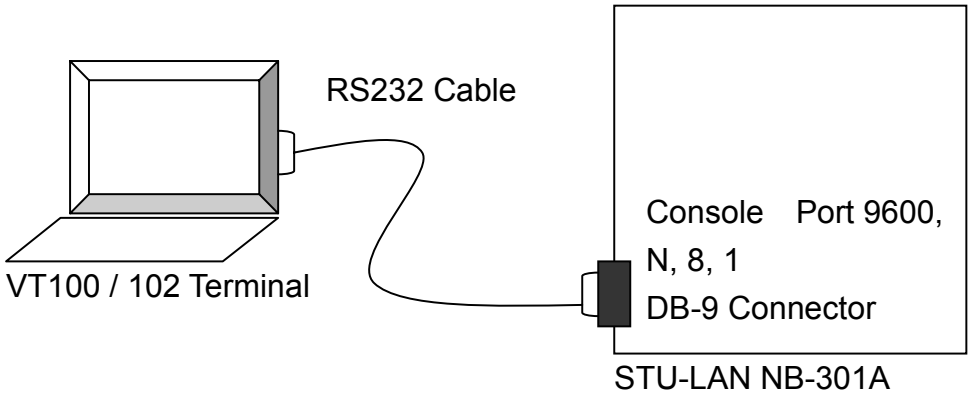

Figure 3. Connection for Console Port with RS232 Terminal

Main Menu

Main Menu will display the connection status of the STU-LAN NB-301A unit and settings including two sections: Configuration, and Status. For details please refer to Table 2.

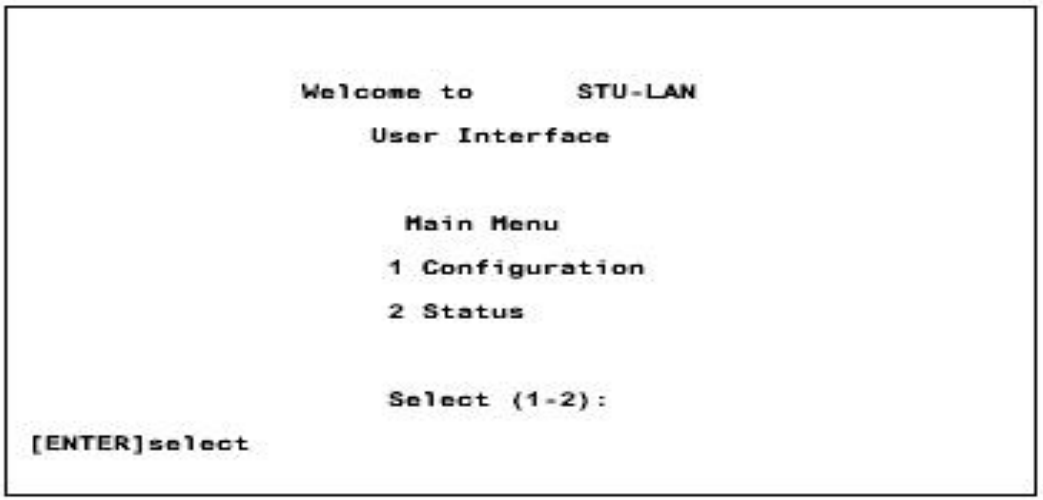

Table 2. Main Menu

The pull-down tree structure of the main menu is shown in Figure 4.

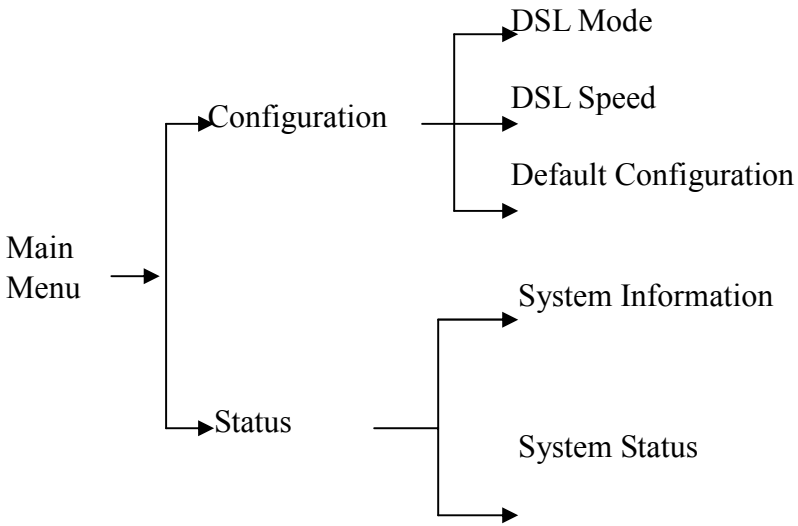

Figure 4. Pull-down Tree Structure of the main menu

Configuration Screen

Configuration screen will display the selections of connection for the NB-301A unit and the screen includes three selections: DSL Mode Settings, DSL Speed Settings, and Default Configuration.

For details please refer to Table 3.

```
                Configuration


                1 DSL Mode
                2 DSL Speed
                3 Default Configuration
               Select (1-3):

[ESC]quit
```

Table 3. Configuration screen

DSL Mode Settings:

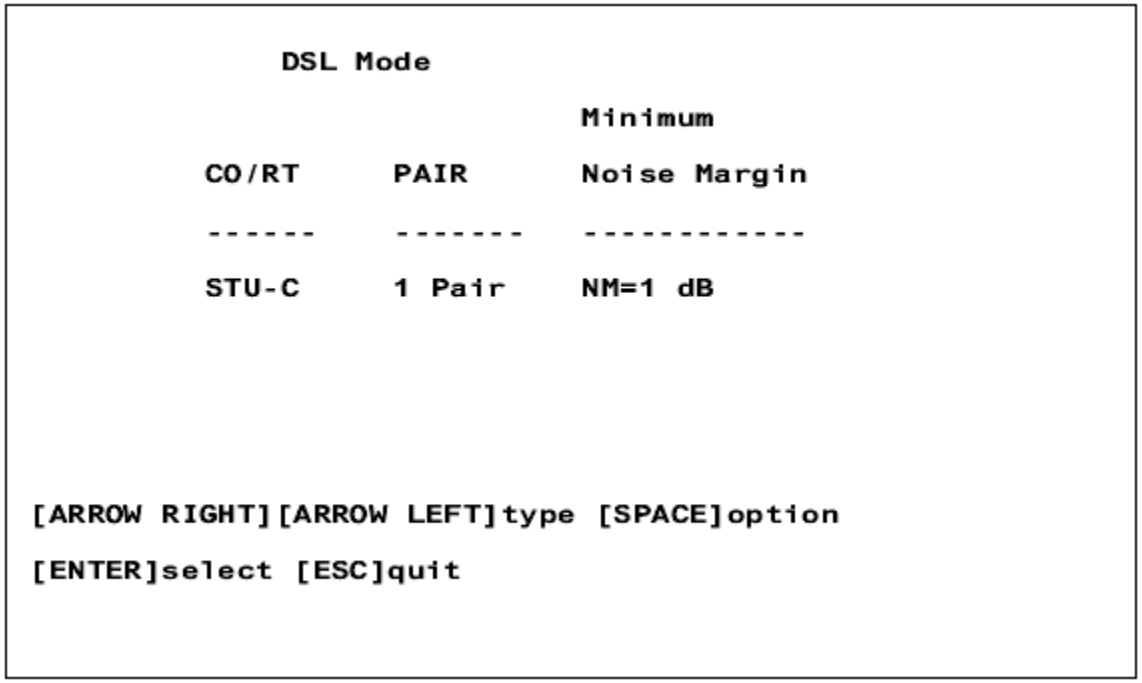

Table 4. DSL Mode Settings screen

This screen provides DSL mode settings and user can update the settings from this screen. The initial values of DSL Mode settings are read from EEPROM.

CO/RT:

The item of CO/RT has 2 options: STU-C and STU-R. To establish a successful connection for two NB-301A units, it is necessary to set one unit to STU-C and the other unit to STU-R.

2P/1P:

NB-301A supports 1-pair G.SHDSL application. To establish a successful connection for two NB-301A units, it is necessary to set the two units to the same selection.

Minimum Noise Margin:

The item of Minimum Noise Margin has 6 options: NM=OFF, NM= 1dB, NM=2dB, NM=3 dB, NM=4 dB, or NM=5 dB. If user sets to NM= 1dB, then noise margin ≧ 1 dB is guaranteed for DSL connection. If user sets to NM=OFF, this function is disabled.

DSL Speed Settings:

```
                DSL Speed


            DSL Speed Setting = Adaptive




[ARROW UP][ARROW DOWN]option
[ENTER]select [ESC]quit
```

Table 5. DSL Speed Settings screen

This screen provides DSL Speed Settings and user can configure DSL speed to set the transmission rate.

For 1-pair setting in the DSL Mode menu, the options are as following;
64 kbps, 128 kbps, 192 kbps, 256 kbps, 384 kbps, 512 kbps, 768 kbps, 1152 kbps, 1536 kbps, 1544 kbps, 2048 kbps, 2304 kbps, 2560 kbps, 2816 kbps, 3072 kbps, 3328 kbps, 3584 kbps, 3840 kbps, 4096 kbps, 4352 kbps, 4608 kbps, 5696 kbps, and Adaptive speed.
The user must set both units of NB-301A to the same speed selection in order to establish a successful connection for 64

kbps, 128 kbps, 2560 kbps, 2816 kbps, 3072 kbps, 3328 kbps, 3584 kbps, 3840 kbps, 4096 kbps, 4352 kbps, 4608 kbps, 5696 kbps and Adaptive speed.

For the rate speed options between 192 kbps and 2304 kbps, the STU-R NB-301A regardless its speed option will follow the speed of STU-C NB-301.

When setting for adaptive rate, 2 or more activation cycles are necessary. The system will automatically adapt to maximum speed according to the line distances. The maximum speed for adaptive rate is 4608 kbps.

Default Configuration Setting:

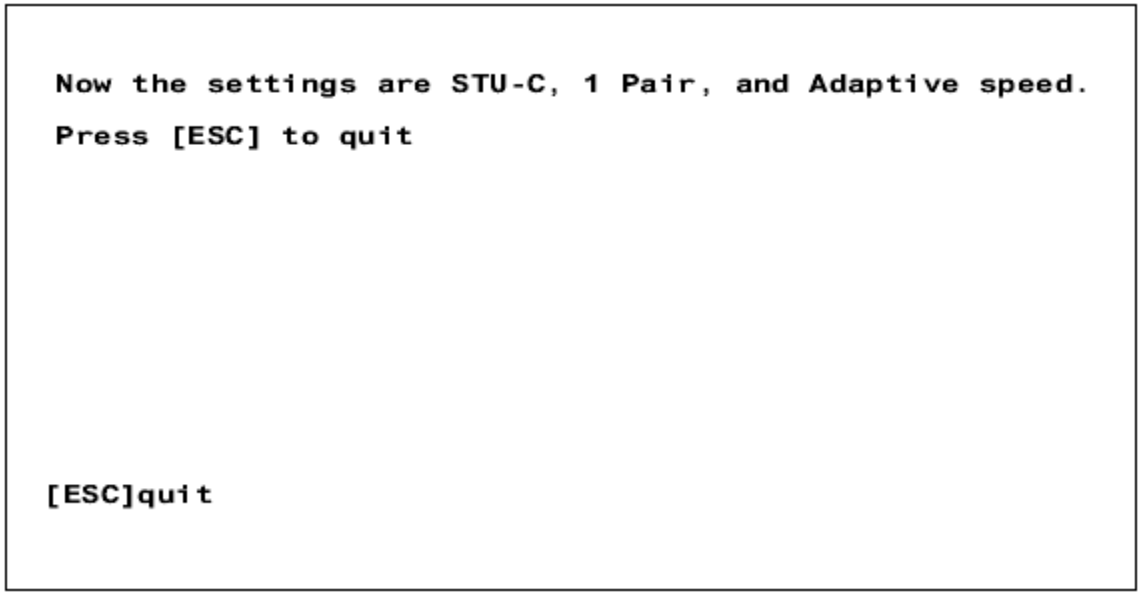

Table 6. Default Configuration Setting screen

When Default Configuration is selected, all the settings of NB-301A will go back to default settings. For the screen as shown in Table 6, it indicates setting is finished and press <ESC> key will be back to previous screen. The default settings of NB-301A are as following:

STU-C
1 Pair
Adaptive speed
NM=1 dB

Status Screen

The Status screen shows the connection status of NB-301A unit. The screen covers two selections: System Information and System Status. For details please refer to Table 7.

```
                Status


                1 System Information
                2 System Status
                Select (1-2):


[ENTER]select [ESC]quit
```

Table 7. Status screen

System Information:

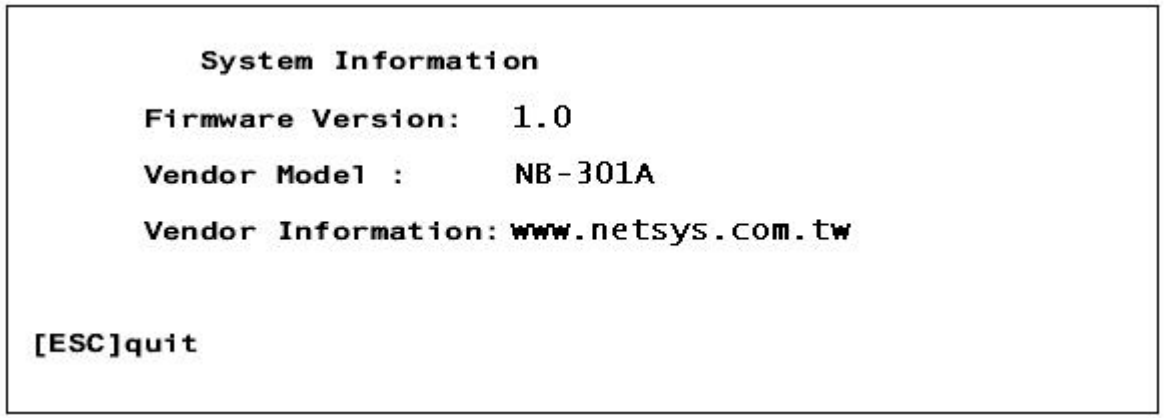

Table 8. System Information screen

Items list in the above screen are explained as follows:

Firmware Version:

Indicates the firmware version in this unit.

Vendor Model:

Indicates this device's vendor model name.

Vendor Information:

Indicates the vendor's web site information.

System Status screen:

```
                        System Status

    DSL mode:                           STU-C    1 Pair    NM=1 dB
    Speed setting:                      Adaptive
    Speed actual(kbps):                 4608
    Link status of pair #1:             up
     Noise Margin of pair #1(dB):        08
    Line Attenuation of pair #1(dB):    22
    Activation state of pair #1:        16



[ESC]quit
```

Table 9. System Status screen. The distance of this example is 6Kft and 26-AWG.

Items list in the above screen are explained as follows:

DSL mode:

Indicates the current DSL mode setting.

Speed setting:

Indicates the current DSL speed setting.

Speed actual (kbps):

Indicates the actual DSL speed in kilobit per second.

Link status of pair #1:

Indicates the DSL connection status (either up or down) for pair #1.

Noise Margin of pair #1(dB):

Indicates the Noise Margin in dB of pair #1.

Line Attenuation of pair #1(dB):

Indicates the Line Attenuation value in dB of pair #1. The maximum value is 43 dB when the DSL distance is 22500 ft, 26-AWG.

Activation state of pair #1(dB):

Indicates the DSL startup activation state of pair #1. The value starts from 05 and gradually reaches the final value 16. The value 16 is the DSL link up state value. The general activation state sequence is 05 → 20 → 10 → 12 → 16.

5. Data Rate & Distance

Data Rate (Kbps)	Distance (ft)
5696	4500
4608	5500
3088	9500
2304	12000
2048	13000
1544	13300
1536	13500
1152	15000
768	17000
512	18000
384	18000+
256	18000+
192	18000+
144	18000+

Appendix A: Product Specification

Key Features & Benefits

- ITU-T Rec. G.991.2 G.SHDSL bis Compliance
- G.SHDSL Trellis Coded Pulse Amplitude Modulation (TCPAM) Line Code
- Fixed Data Rate Selection from 5696 Kbps to 64 Kbps for G.SHDSL line
- Adaptive Data Rate from 4608 Kbps to 192 Kbps for G.SHDSL line
- Maximum Transmission Distance: 22,500 ft over 26AWG twisted pair
- Noise Margin ≧ n dB (n=1~5) is guaranteed for fixed rate and adaptive rate modes.
- STU-R will follow STU-C's speed for 192Kbps~2304Kbps in fixed rate mode.
- RJ-45 Connector for G.SHDSL line connections
- RJ-45 Connectors for 10/100 BaseT Ethernet Switch ports
- Ethernet Auto-Negotiation for 10/100 Base T
- Ethernet Auto-MDIX for Auto Tx/Rx Swap
- Console Port for Network Management Configurations
- 5 LED status indicators
- Power feedings: 100~220VAC to 12VDC Power Adapter

Product Specification

G.shdsl bis Transmission:	ITU-T G.991.2 Compliance TCPAM-16 Level Line Code Rate: 144kbps~5.696Mbps RJ-45 Connector x 1
LAN Interface:	Auto-Detection for 10/100 Base T and Half/Full duplex High Performance bridge for Ethernet extension Fully compatible with IEEE802.3/IEEE802.3U Automatic MDIX Function RJ-45 Connector x 1
LED Indication:	POWER: Power is ON TEST: NB-301A Self Test LINE: G.SHDSL Line connection status LAN: Data Activity of LAN Port 100M: LAN port is in 100M Ethernet connection
EMC Compliant:	CE, FCC

Environmental Protection Compliant:	RoHS
Operating Temperature:	0°C ~ 50°C (41°F ~ 122°F)
Storage Temperature:	-20°C ~ 70°C (-4°F ~ 158°F)
Humidity:	5 to 95% (non-condensing)
Weight:	1kg
External Power Adapter:	Input: AC 100~220 volts/50~60Hz Output: DC 12V/1A
Dimensions:	154mm x 139mm x 31mm

Appendix B: 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.