Garnet ADSL Ethernet Modem

GAE-3020

User's Guide

Ver. 2.1

Garnet Systems Co., Ltd.

Contents

Chapter 1. Overview

1.1 Introduction

Garnet ADSL(Asymmetric Digital Subscriber Line) Modem GAE-3020 is an External stand-alone modem that provides users faster connectivity than conventional access technologies by offering up to 8 Mbps of downstream line rate and up to 640 Kbps of upstream over existing phone lines, which is asymmetric.

It also provides interoperability and industry standards and protocols. Garnet ADSL Modem supports either G.992.1(G.dmt) or Splitterless G.992.2(G.lite) standards via software upgrades.

Garnet ADSL Modem supports Windows NT, 2000 as well as Rinux and Macintosh.

1.2 Features

- Using Garnet ADSL Modem, you will experience stable, high speed Internet access and can connect to other multimedia service networks that ADSL delivers over existing PSTN copper wires.

- Garnet ADSL Modem, using existing phone lines, can help greatly reduce cost for installing new lines, i.e. optical cables, for high speed network transmission.

- Compared with conventional dial-up modems, Garnet ADSL Modem provides high speed network access always on, irrespective of subscriber numbers. You can simultaneously have phone conversation.

- Garnet ADSL Modem offers multiple applications such as Internet access, messenger service, E-mail, file transfer, data download and upload and etc.

- Garnet ADSL Modem is a customer premise terminal, co-operating with Central Office equipments. So, the Central Office can effectively manage subscriber network.

- Garnet ADSL Modem users can easily monitor with network

monitoring program, which enables users to see speed of data streams, supports physical connect and disconnect and diagnose hardware malfunctioning.

1.3 Specifications

- **Dimension : 135(L) x 188(W) x 35.5(H)**
- **Operating Temperature : 0~45 ^{o}C**
- **Operating Humidity : 10% to 90%, non-condensing**
- **Power Consumption: 4.05W**
- **Standards : ANSI T1.413 Issue 2 / ITU-T G.992.1, G.992.2**
- **Frequency Range : 0.11~1.1MHz(Down) / 30KHz~110KHz(Up)**
- **Modulation : DMT (Discrete Multi Tone)**
- **Data Rates : Downstream : Max. 8Mbps, Upstream : Max. 960Kbps**
- **Interface : 10Base-T Ethernet**
- **O/S   : Win95, Win98, Win NT4.0(Service Pack 3 or higher), Win2000**
  Rinux, Macintosh
- **Minimum System Requirements : Pentium 300MHz CPU, 64MB RAM, 20MB HDD**
- **Virtual Path & Channel : 8bits VPI, 16bits VCI Address**
- **WAN Protocol : RFC1483, RFC2364**

☞ **Note : Data Rates can differ according to distance between DSLAM and modem, wire gauge, PC specification and other network environments.**

☞ **Trademark Notification**
- ▶ **Garnet™ is a registered trademark of Garnet Systems Co., Ltd.**
- ▶ **Windows™ and Internet Explorer™ is a registered trademark of Microsoft Corporation.**
- ▶ **Ethernet™ is a trademark of Xerox Corporation.**

Chapter 2. Installation

2.1 Before Installation

Please be advised that if you do not yet subscribe phone service, it is impossible to get ADSL service. In this case, please contact your local service provider to have new telephone service.

And please be informed that telephone service providers do not service all ADSL applications. Please contact your local Central Office on the applications and ADSL service providers may support different service protocols. Prior to installation, please contact your service providers for Service Protocols.

2.2.Delivery Check

☞ following materials are provided in the package

A. ADSL Ethernet Modem – GAE-3020

B. Power Adapter – 110/240V, 50/60Hz

C. Serial Port Cable with DB-9 connectors

D. Cross-over Ethernet cable with RJ-45 connectors

E. Phone line cable whit RJ-11 connectors

F. User Guide

☞ If you have two or more phones in one phone line, one or more Micro filters are needed to prevent signal disturbance. To purchase micro filters, please contact your service provider.

☞ **<Figure 1. One example for ADSL Network Configuration>**

PC

Garnet ADSL Modem Ethernet

Telephone

Micro filter

Internet

PSTN

(DSLAM)

EXchange
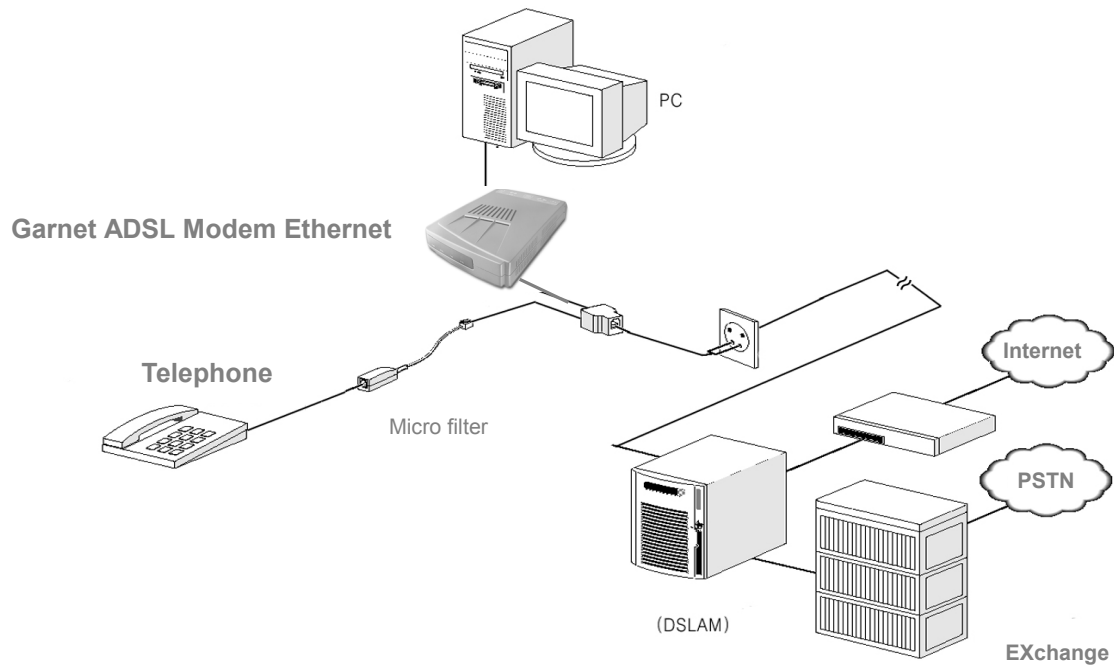
2.3 Hard Ware Installation

☞ **To install modem into PC, follow below steps.**

1. Turn off your computer and all attached peripheral devices (printer, monitor, etc.) and unplug them from the electrical outlet.

ⓘ *CAUTION : To avoid risk of electric shock, make sure your computer and all peripheral devices are turned off and unplugged.*

2. Attach power supply to power inlet connector

3. Plug power supply cable into standard electrical socket.

4. Connect the RJ11 port to the modem(▢) using the phone line

5. For Ethernet Modem installation, connect one end of the Ethernet cross-over cable to the modem and the other end to the PC. If an Ethernet hub is being used, a straight–through cable will be needed to attach the modem to the hub.

| DC POWER JACK | POWER S/W | DB-9 CONNECTOR | RJ-45 CONNECTOR (ETHERNET) | RJ-11 CONNECTOR (PHONE LINE) |
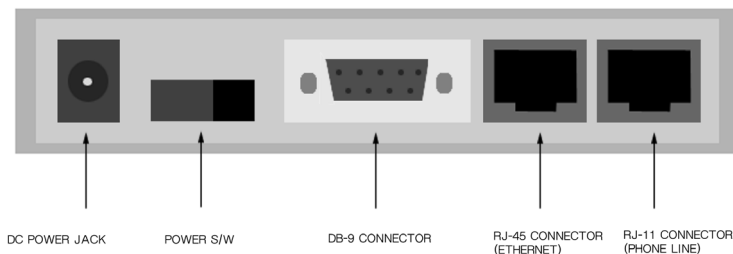
2.4 Soft Ware Installation

☞ **The modem has its software image stored in flash. The Ethernet bridge/router image is stored in flash by default.**

In order to use the modem, the modem will need to be configured as a bridge or

router. There is no installation of software on the PC for this, except for the normal Ethernet LAN adapter installation.

The modem configuration can be viewed and modified through the console which is accessible through the RS-232 serial connection. To use the serial interface, a straight-through cable is needed between the modem and a terminal (could be a PC running a terminal emulation package).

The PHY can be configured to attempt the layer 1 connection in one of the following modes:
• **T1.413**
• **G.Lite**
• **G.dmt**

This is configured by setting the BUN attribute AdslMode with the following console command:

bun set port atm/adslmode <mode>

Where acceptable value of *<mode>* are, t1413, glite, gdmt.

Protocol Configuration for configuring the modem for this mode of operation.

2.5 Set up Hyper Terminal

- **After the ADSL Modem is connected with PC by serial port cable follow below steps.**
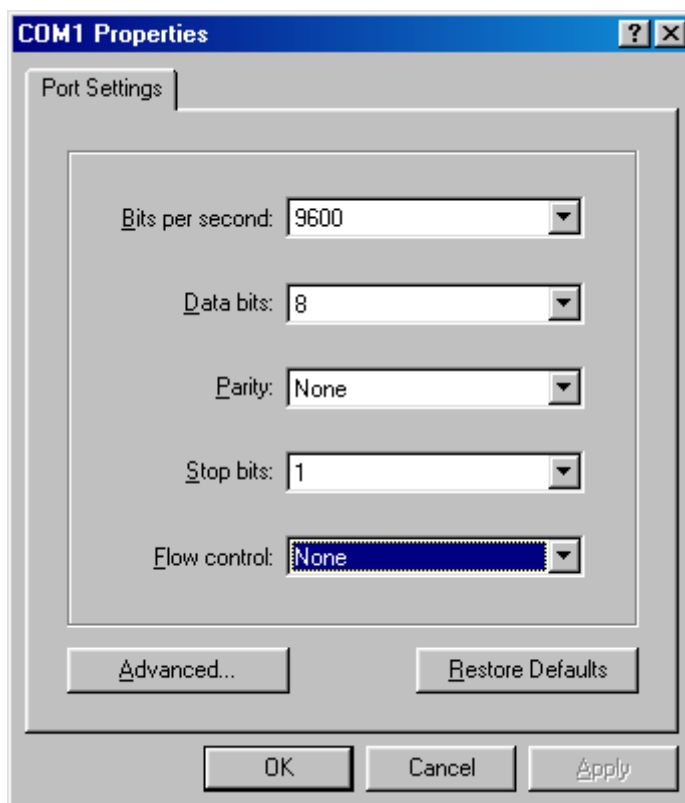- **Start => programs => Accessories => Communication => Hyper Terminal Enter the Hypertrm.exe.**

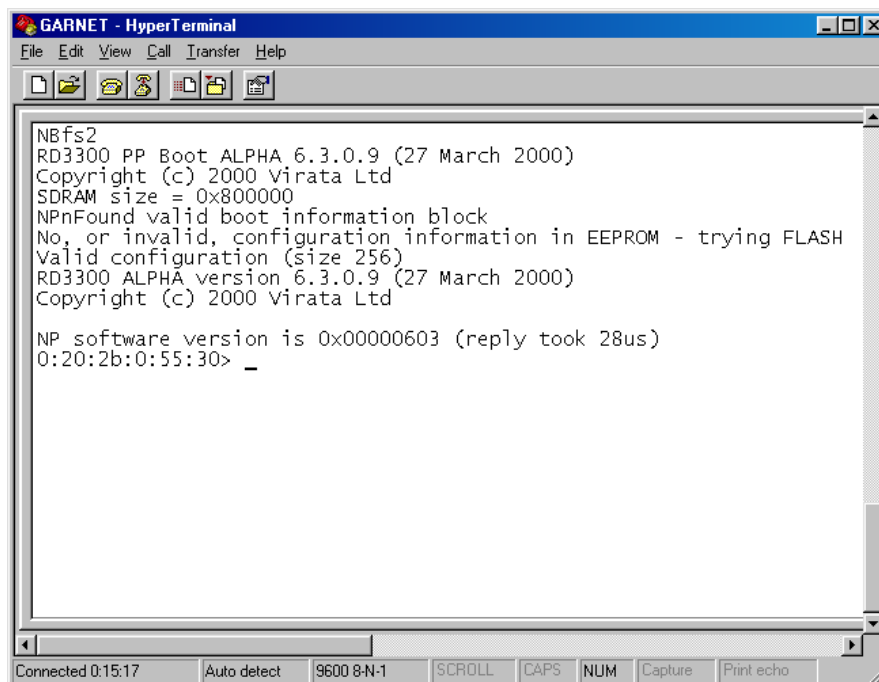- **After the suitable name choose. Choose the suitable name and click OK.**
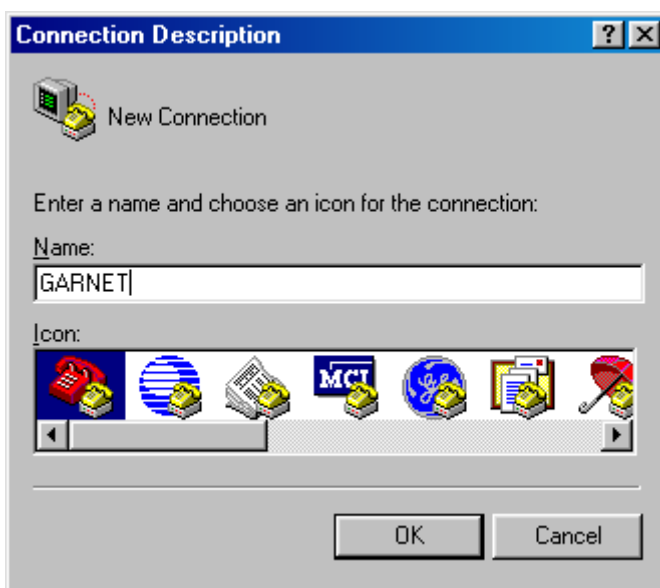
• **Choose the Direct to Com1, Click ok.**

• **Follow below setting, chick OK.**

```
NBfs2
RD3300 PP Boot ALPHA 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd
SDRAM size = 0x800000
NPnFound valid boot information block
No, or invalid, configuration information in EEPROM - trying FLASH
Valid configuration (size 256)
RD3300 ALPHA version 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd

NP software version is 0x00000603 (reply took 28us)
0:20:2b:0:55:30> _
```

2.6 Ethernet Bridge Configuration

In the Ethernet bridge configuration, the modem bridges data between the local Ethernet LAN and the service provider. The ADSL link must be set up in RFC1483 mode with a PVC to communicate across. The PVC is assigned by the service provider. The bridge needs to be told about both the Ethernet interface and the 1483 interface. Since the modem is transparent, the PC's default gateway must be set to the service provider's IP address.

The following configuration must be performed to set up the modem for bridge mode:
- **Add the Ethernet device to the bridge:**
  bridge device *add edd*
- **Add the ADSL ATM port to the bridge with RFC 1483 enabled:**
  bridge device add //bun/port=atm/txvci=32/rxvci=32/txvpi=0/rxvpi=0/rfc1483=true
- **Save the configuration and reboot the system:**
  config save
  restart

11

2.7 Ethernet Router Configuration

There are multiple ways that routing can be set up depending on the requirements from the service provider.

The following routing methods are described below:

• **IPoA Routing**

• **PPP Routing**

• **Routing using NAT (can be used with either IPoA or PPP)**

2.8 IPoA Routing

When configured for IPoA, data is routed between Ethernet and Classical IP over ATM (RFC1577).   The IPoA data runs over a PVC between the modem and the service provider. IP addresses, the PVC and the peak cell rate need to be defined by the service provider. Since the modem is routing, an IP address needs to be assigned on both modem's interfaces. The PC's default gateway must be set to the Ethernet IP address of the modem. The following configuration must be performed to set up the modem for the above example:

• **Add the Ethernet device to the router and assign it an IP address. In the command, "ethernet" is a label used to refer to this device. The arguments "ether" and "//edd" are required for an Ethernet device.**

ip device add ethernet ether //edd 192.168.101.2

• **Add the IPoA device to the router and assign it an IP address. In the following command, "ipoa" is a label used to refer to this device. The arguments "atmpvc" and "//atm" are required for an IPoA device.**

ip device add ipoa atmpvc //atm 192.168.102.2

• **Save configuration and reboot system. This is necessary when configuring the system from the console, because the following commands can only operate on router interfaces which have already been created.**

config save

restart

• **Enable forwarding between the router interfaces:**

ip relay all

• **Add a default route with the service provider as the gateway:**

ip route add default 0.0.0.0 192.168.102.3 0:0:0:0

• **The next command configures the IPoA protocol to run on PVC 700 with a peak cell rate of 50000 cells per second, using the port named "atm":**

ip ipatm pvc add ipoa atm 700 pcr 50000

• **Save the configuration and reboot the system.**

config save

restart

2.9 PPP Routing

When configured for PPP, data is routed between Ethernet and PPP over ATM. The PPP data runs over a PVC between the modem and the service provider. The IP address and PVC need to be defined by the service provider.   Since the modem is routing, an IP address needs to be assigned on both modem's interfaces.   The PC's default gateway must be set to the Ethernet IP address of the modem.

The following configuration must be performed to set up the modem:

• **Add the Ethernet device to the router and assign it an IP address.   In the command, "ethernet" is a label   used to refer to this device. The arguments "ether" and "//edd" are required for an Ethernet device.**

ip device add ethernet ether //edd 192.168.101.2

• **Add the PPP device to the router and assign it an IP address. In the following command, "ppp_device" is a label for this device. The argument "ether" is required for a PPP device. The PPP module supports multiple simultaneous connections, so we explicitly specify Device 1.**

ip device add ppp_device ether //ppp/DEVICE=1

We will be using PPP Device 1 and Interface 1, which are able to automatically configure the IP address of the router interface and add a default route, when the connection is made. That is why the IP address of the router interface was not specified in the previous command.

• **The following command configures PPP Device 1 for dial-out on PVC 700. CHAP authentication will be used; PPP will supply a username of "fred" and a password of "password".**

ppp 1 pvc 700 ip

ppp 1 welogin fred password chap

ppp 1 enable

• **Save the configuration and reboot the system. This is necessary when configuring the system from the console, because the following command can only operate on router interfaces which have already been created.**

config save

restart

• **Enable forwarding between the router interfaces:**

ip relay all

• **Save the configuration and reboot the system:**

config save

restart

2.10 NAT

NAT can be used with IPoA routing or PPP routing. NAT has to be enabled on the router interface towards the service provider.
The following command enables NAT on a router interface.

ip nat add <interface name>

For the IPoA example previously described the command would be:

ip nat add ipoa

For the PPP example previously described the command would be:

ip nat add ppp_device

2.11 DHCP Server

DHCP can be used to assign IP addresses to PCs connected on the Ethernet interface of the Client Access Device, as long as the Client Access Device has been assigned an IP address. In addition to the commands shown in the next sections, use the following command to get information on all of the DHCP Server commands:

dhcpserver help

Enabling the DHCP Server

To enable the DHCP server, a range of IP addresses need to be provided that the server can assign to clients.

The example below shows the commands needed to supply the DHCP server with 99 IP addresses from 192.168.219.1 to 192.168.219.99 on the subnet 192.168.219.0 with the subnet mask of 255.255.255.0.   The maximum lease time for each client is set to 86400 seconds, or 1 day.   BOOTP clients may be serviced, and requests from unknown clients are allowed.

The following configuration must be performed for the example:

- **Set up the DHCP configuration**

    dhcpserver

    config add allow unknown-clients;

    config add allow bootp;

    config add subnet 192.168.219.0 netmask 255.255.255.0

    config add {

    config add range 192.168.219.1 192.168.219.99;

    config add max-lease-time 86400;

    config add }

    config confirm

- **Save the configuration and reboot the system:**

    home

    flashfs update

    restart

Disabling the DHCP Server

To disable the DHCP server, the configuration information previously supplied needs to be flushed.   To do so, issue the following commands:

- **Flush the DHCP configuration**

    dhcpserver

    config flush

    config confirm

- **Save the configuration and reboot the system:**

    home

    flashfs update

restart

Re-configuring the DHCP Server

To re-configure the DHCP server, issue the disable procedure followed by the enable procedure.
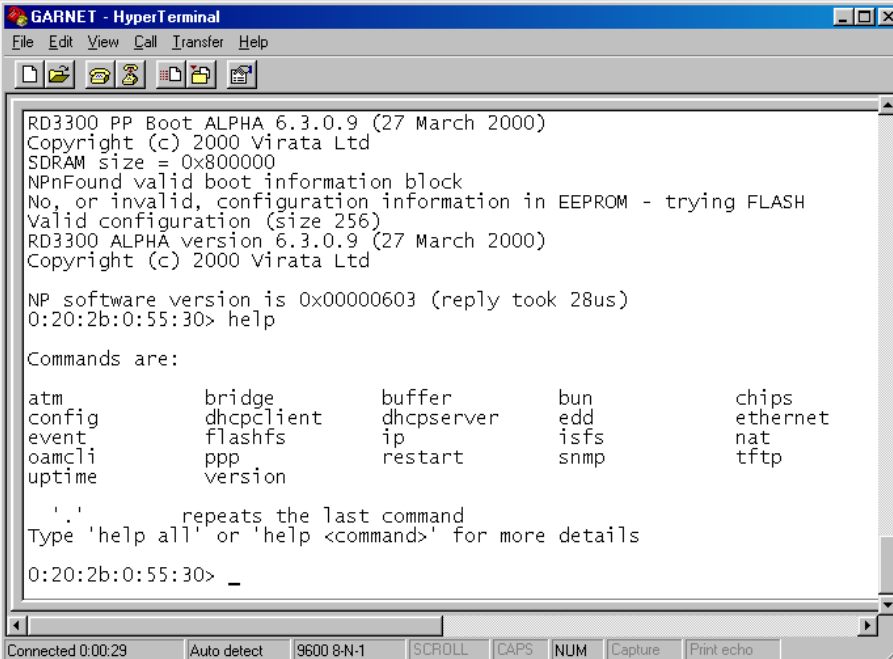
2.12 VCI/VPI Value Configuration.

Connect PC to Modem by RJ-45 cable and RS-232 cable, switching power on of the modem and set up Hyperterminal at Com 1(or Com 2) port for connection between Modem and PC.

- At the Hyper terminal window, you can see prompt

   0:20:2b:8d:40> help <enter>

   and you can find existing list of available commands.

```
RD3300 PP Boot ALPHA 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd
SDRAM size = 0x800000
NPnFound valid boot information block
No, or invalid, configuration information in EEPROM - trying FLASH
Valid configuration (size 256)
RD3300 ALPHA version 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd

NP software version is 0x00000603 (reply took 28us)
0:20:2b:0:55:30> help

Commands are:

atm            bridge         buffer         bun            chips
config         dhcpclient     dhcpserver     edd            ethernet
event          flashfs        ip             isfs           nat
oamcli         ppp            restart        snmp           tftp
uptime         version

  '.'        repeats the last command
Type 'help all' or 'help <command>' for more details

0:20:2b:0:55:30> _
```
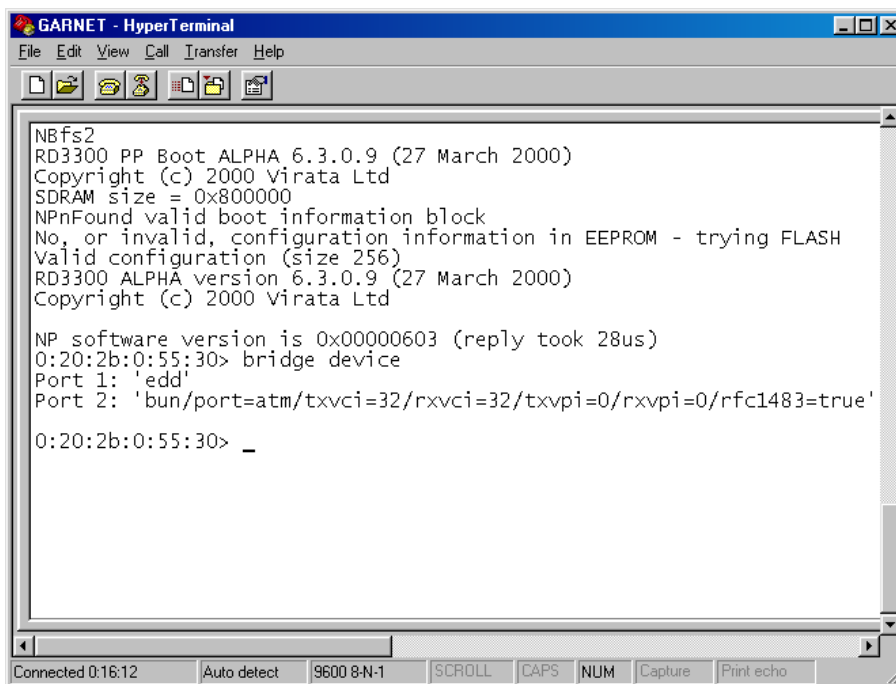
- To check existing VCI/VPI value, put in

0:20:2b:8d:40> *bridge device*

```
NBfs2
RD3300 PP Boot ALPHA 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd
SDRAM size = 0x800000
NPnFound valid boot information block
No, or invalid, configuration information in EEPROM - trying FLASH
Valid configuration (size 256)
RD3300 ALPHA version 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd

NP software version is 0x00000603 (reply took 28us)
0:20:2b:0:55:30> bridge device
Port 1: 'edd'
Port 2: 'bun/port=atm/txvci=32/rxvci=32/txvpi=0/rxvpi=0/rfc1483=true'

0:20:2b:0:55:30> _
```

- To delete existing VPI/VCI value, put in

0:20:2b:8d:40> *config reset   <enter>*

0:20:2b:8d:40> *config save <enter>*

0:20:2b:8d:40> *restart <enter>*

```
NP software version is 0x00000603 (reply took 28us)
0:20:2b:0:55:30> bridge device
Port 1: 'edd'
Port 2: 'bun/port=atm/txvci=32/rxvci=32/txvpi=0/rxvpi=0/rfc1483=true'

0:20:2b:0:55:30> config reset
dnsrelay: Default settings restored. (Warning: Must re-connect to DNS
dnsrelay: all old outstanding traffic and connections will be dropped
ip: config reset not supported
0:20:2b:0:55:30> config save
Saving configuration...Configuration saved.
0:20:2b:0:55:30> restart
 NBfs2
RD3300 PP Boot ALPHA 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd
SDRAM size = 0x800000
NPnFound valid boot information block
No, or invalid, configuration information in EEPROM - trying FLASH
Valid configuration (size 256)
RD3300 ALPHA version 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd

NP software version is 0x00000603 (reply took 29us)
0:20:2b:0:55:30> _
```
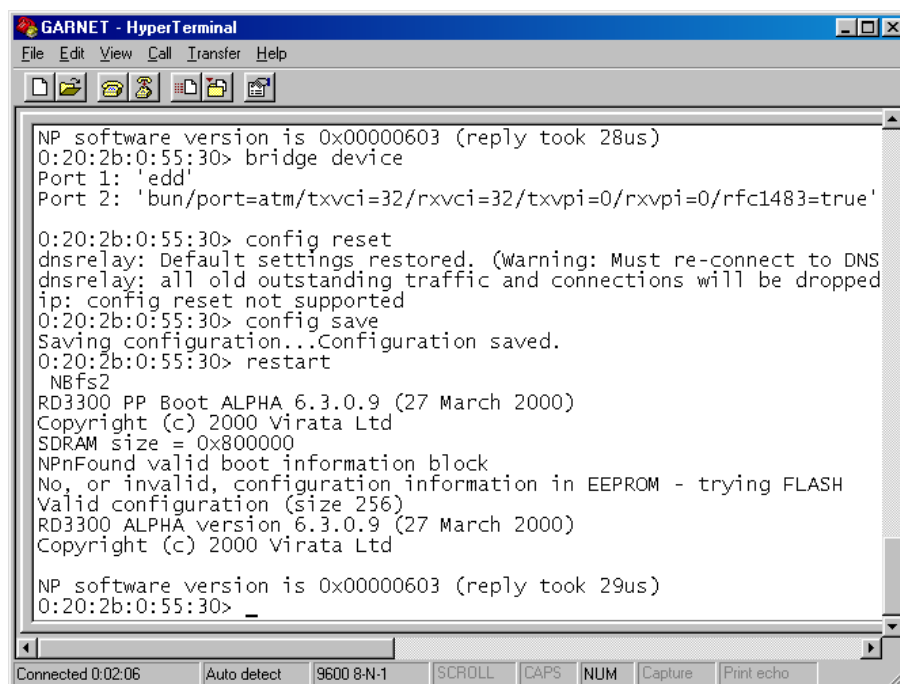
- To set up new VPI/VCI value, put in

    0:20:2b:8d:40> *bridge device add edd <enter>*

    0:20:2b:8d:40> *bridge device add //bun/port=atm/txvci=32/rxvci=32/txvpi=0/rxvpi=*
                0/rfc1483=true <enter>

    0:20:2b:8d:40> *config save <enter>*

    0:20:2b:8d:40> *restart <enter>*

```
GARNET - HyperTerminal
File  Edit  View  Call  Transfer  Help

Valid configuration (size 256)
RD3300 ALPHA version 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd

NP software version is 0x00000603 (reply took 29us)
0:20:2b:0:55:30> bridge device

0:20:2b:0:55:30> bridge device add edd
0:20:2b:0:55:30> bridge device add //bun/port=atm/txvci=32/rxvci=32/txvpi=0/rxvp
i=0/rfc1483=true
0:20:2b:0:55:30> config save
Saving configuration...Configuration saved.
0:20:2b:0:55:30> restart
 NBfs2
RD3300 PP Boot ALPHA 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd
SDRAM size = 0x800000
NPnFound valid boot information block
No, or invalid, configuration information in EEPROM - trying FLASH
Valid configuration (size 256)
RD3300 ALPHA version 6.3.0.9 (27 March 2000)
Copyright (c) 2000 Virata Ltd

NP software version is 0x00000603 (reply took 28us)
0:20:2b:0:55:30> _

Connected 0:08:44    Auto detect    9600 8-N-1    SCROLL  CAPS  NUM  Capture  Print echo
```
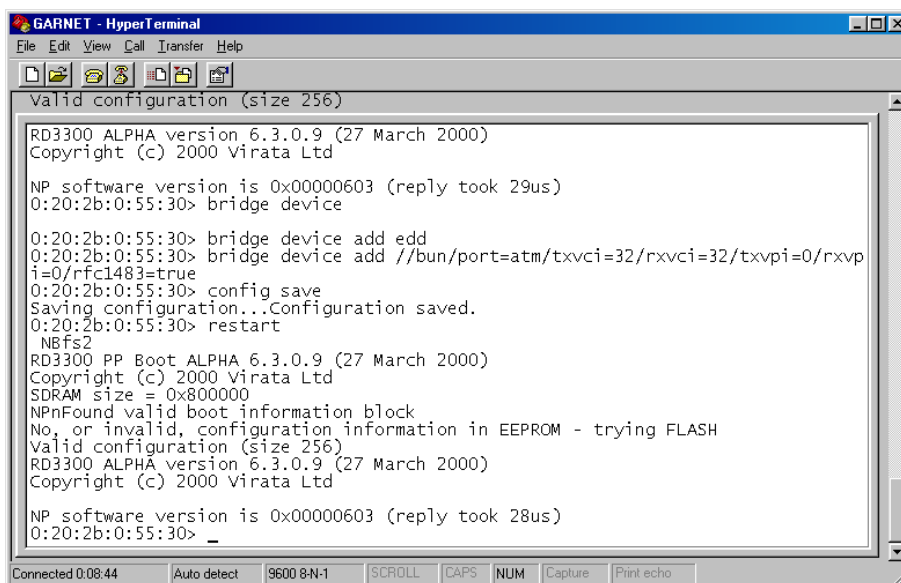
- To check new VCI/VPI value,

     0:20:2b:8d:40> *bridge device <enter>*

2.13 RFC 1483 (PPP over Ethernet) S/W Installation

The RFC 1483 doesn't require Dial-Up Networking installation. You can use a program provided by the Service Provider to connect to the Internet, or provided WinPoET Program as follows.

1. Run WinPoET. And the following picture will come out. Just put in your User ID and password.

2. If connection is successful, the following red-circled icon will come out and you may double click to check connection status. In order to connect with Internet, you may execute WinPoET.
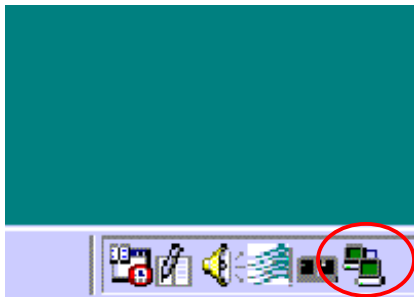
☞ **WinPoET support all Windows 9x, NT and 2000.**

Chapter 3. Appendix

3.1 Connector Specifications

3.1.1 H1 - RS232 Port

RS232 9-pin female D-connector transceiver port.

Pin	Description	Pin	Description
1	Data carrier detect	6	Data set ready

2	Transmit data	7	Request to send
3	Receive data	8	Clear to send
4	Data terminal ready	9	Not connected
5	Ground (0v)		

3.1.2 J2 – ADSL Port

RJ11 connector to connect to DSLAM or to PSTN

PinDescription

Pin	Description	Pin	Description
1	Transmit +	3	*Not connected*
2	Transmit -	4	*Receive -*

3.1.3 J3 - Ethernet Port

RJ45 type 10BaseT Ethernet connector. This connector is wired as an Ethernet NIC.

Pin	Description	Pin	Description
1	Transmit +	5	*Not connected*
2	Transmit –	6	*Receive –*
3	Receive +	7	*Not connected*
4	*Not connected*	8	*Not connected*

3.2 WARRANTY

LIMITED WARRANTY

Garnet Systems warrants that the product will be free from defects in materials or workmanship for a period of   years from the date of purchase. Under this limited warranty, and upon proof of purchase, our obligation is limited to repairing or replacing any product or parts proved to be defective at the inspection. The product will be repaired or replaced (with the same or a similar model) at our option, without charge for either parts or labor. This limited warranty shall not apply if the product is modified, tampered with, misused, or subjected to abnormal working conditions (Including, but not limited to, lightning and water damage).

THIS LIMITED WARRANTY DOES NOT GUARANTEE YOU UNINTERRUPTED SERVICE. THE FOREGOING REPAIR OR REPLACEMENT IS THE SOLE AND EXCLUSIVE REMEDY OF THE PURCHASER, AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, OR STATUTORY AS TO MERCHANTABILITY, FITNESS FOR PURPOSE SOLD, DESCRIPTION, QUALITY, PRODUCTIVENESS OR ANY OTHER MATTER. WITHOUT LIMITING THE FOREGOING REPAIR OR REPLACEMENT, IN NO EVENT SHALL GARNET SYSTEMS BE LIABLE FOR THE LOSS OF USE OR PROFIT OR OTHER COLLATERAL, SPECIAL OR CONSEQUENTIAL DAMAGES.

To receive service under this limited warranty, contact Garnet Systems Co., Ltd. Myungsung Bldg., 145-7, Dogok-dong, Kangnam-ku, Seoul, Korea (Zip Code 135-270), Technical Support Dept., at **Tel : +82-2-2188-7149, Fax : +82-2-529-8749** or visit the World Wide Web page at **http://www.garnets.com** or send E-mail at sales@garnets.com. You will be given a Return Material Authorization (RMA) number so that Garnet Systems Co., Ltd. may keep track of your limited warranty request.

Once you have received your RMA number, pack the product securely and send it, postage prepaid, to the following address. Be sure that you include your RMA number, name and address on the shipping label as well as inside the package.

<div align="center">

Technical Support Department

RMA #

Garnet Systems Co., Ltd..

Myungsung Bldg., 145-7, Dogok-dong, Kangnam-ku, Seoul, Korea

Tel : +82-2-2188-7149, Fax : +82-2-529-8749, http://www.garnets.com, sales@garnets.com.

</div>

3.3 Regulatory Information

Federal Communications Commission (FCC) Statements

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to guarantee this device doesn't harmfully interfere with, or harmfully be interfered by other devices

Radio Frequency Interference Statement

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

The limits are designed to provide reasonable protection against such interference in a residential situation. 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 on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna of the affected radio or television

- Increase the separation between the equipment and the affected receiver

- Connect the equipment and the affected receiver to power outlets on separate circuits

- Consult the dealer or an experienced radio/TV technician for help.