User Manual

3000 series 4U 19” Rack Mount Chassis

and

3110C Bridge/Router

ATM based G.SHDSL Line card

Version : 0.01

Table of Contents

1 Introduction

This manual is used to explain the installation and operating procedures for the 3000 series Rack Mount, G.SHDSL ATM Based Line Cards (3110C) and present its capabilities and specifications.

The manual is divided into 3 Chapters with Appendix.

The three chapters are the Introduction, Installation and Operation.

The Appendix includes the pin assignments of special cables.

1.1 General Description

The 3000 series is a 4U chassis that may be placed on a shelf or installed in either a 19" or 23" rack mount. All I/O connections and input power service are located on the rear of the chassis, while the line cards with LED status indicators and console connectors are installed in the front of the chassis. The power module for the 3000 series is including AC and DC input.

When AC input power is used, the AC power cord is directly connected to rear side of the power module, where it is rectified and regulated to 48VDC before routing to the backplane. When DC input power is used, the DC power cord is directly connected to rear side of the power module, where it is wire connect directly to the backplane.

There are 18 slots in the 3000 series chassis. Two slots are reserved for two power modules, one slot is reserved for the SNMP (Simple Network Management Protocol) card, which leaves 15 slots for Line Cards. There is the type of line cards currently available for the 3000 series: 3110C G.SHDSL 2-wire 2-channel ATM Line cards.

3110C line cards are based on ATM with router/bridge function and may be interconnected at the physical layer to any other 5000 series SHDSL ATM based standalone router/bridge.

Without the SNMP card, configuration and monitoring is performed via RS-232 console ports located on each individual line card.

1.2 General Features

- Meets ITU-T and ETSI Standards
- 3110C line card can support up to two channels, each channel utilizes one pair (two-wire) for DSL

- Single-pair (2-wire) operation for 3110C per channels, uses only one pair with a maximum user data rate of 2.304Mbps for symmetric payload rates over exiting copper wire
- Two console ports on the front panel of each 3110C line card
- Menu oriented craft screens for easy usage
- Downloadable software for easy upgrade
- Central solution in standard 19 inch or 23 inch rack
- High density and compact and 4U high
- Hot swapping of cards
- Up to 15 cards can be installed
- Redundant power supplies (optional)
- Optional SNMP network management system card(under development)
- Different power source option , AC or DC

1.3 General Specifications

Routing

- Support IP/TCP/UDP/ARP/ICMP/IGMP protocols
- IP routing with static routing and RIPv1/RIPv2 (RFC1058/2453)
- IP multicast and IGMP proxy (RFC1112/2236)
- Network address translation (NAT/PAT) (RFC1631)
- NAT ALGs for ICQ/Net meeting/MSN/Yahoo Messenger
- DNS relay and caching (RFC1034/1035)
- DHCP server, client and relay (RFC2131/2132)

Bridging

- IEEE 802.1D transparent learning bridge
- IEEE 802.1q VLAN
- Spanning tree protocol

Security

- DMZ host/Multi-DMZ/Multi-NAT function
- Virtual server mapping (RFC1631)
- VPN pass-through for PPTP/L2TP/IPSec tunneling

Management

- Easy-to-use web-based GUI for quick setup, configuration and management
- Menu-driven interface/Command-line interface (CLI) for Telnet access
- Password protected management and access control list for administration
- SNMP management with SNMPv1/SNMPv2 (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
- Software upgrade via web-browser/TFTP server

ATM

- Up to 8 PVCs
- OAM F5 AIS/RDI and loopback
- AAL5

ATM QoS

- UBR (Unspecified bit rate)
- CBR (Constant bit rate)
- VBR-rt (Variable bit rate real-time)
- VBR-nrt (Variable bit rate non-real-time)

AAL5 Encapsulation

- VC multiplexing and SNAP/LLC
- Ethernet over ATM (RFC 2684/1483)
- PPP over ATM (RFC 2364)
- Classical IP over ATM (RFC 1577)

PPP

- PPP over Ethernet for fixed and dynamic IP (RFC 2516)
- PPP over ATM for fixed and dynamic IP (RFC 2364)
- User authentication with PAP/CHAP/MS-CHAP

WAN Interface

- SHDSL.bis: ITU-T G.991.2 (2004) Annex A, B, F and G supported
- Encoding scheme: 16-TCPAM,
- Data Rate: N x 64Kbps ,N=3~36
- Impedance: 135 ohms

LAN Interface

- 10/100 Base-T auto-sensing and auto-negotiation
- Auto-MDI/MDIX

Indicators

- General: PWR
- WAN: LNK, ACT
- LAN: 10M/ACT, 100M/ACT
- SHDSL: ALM

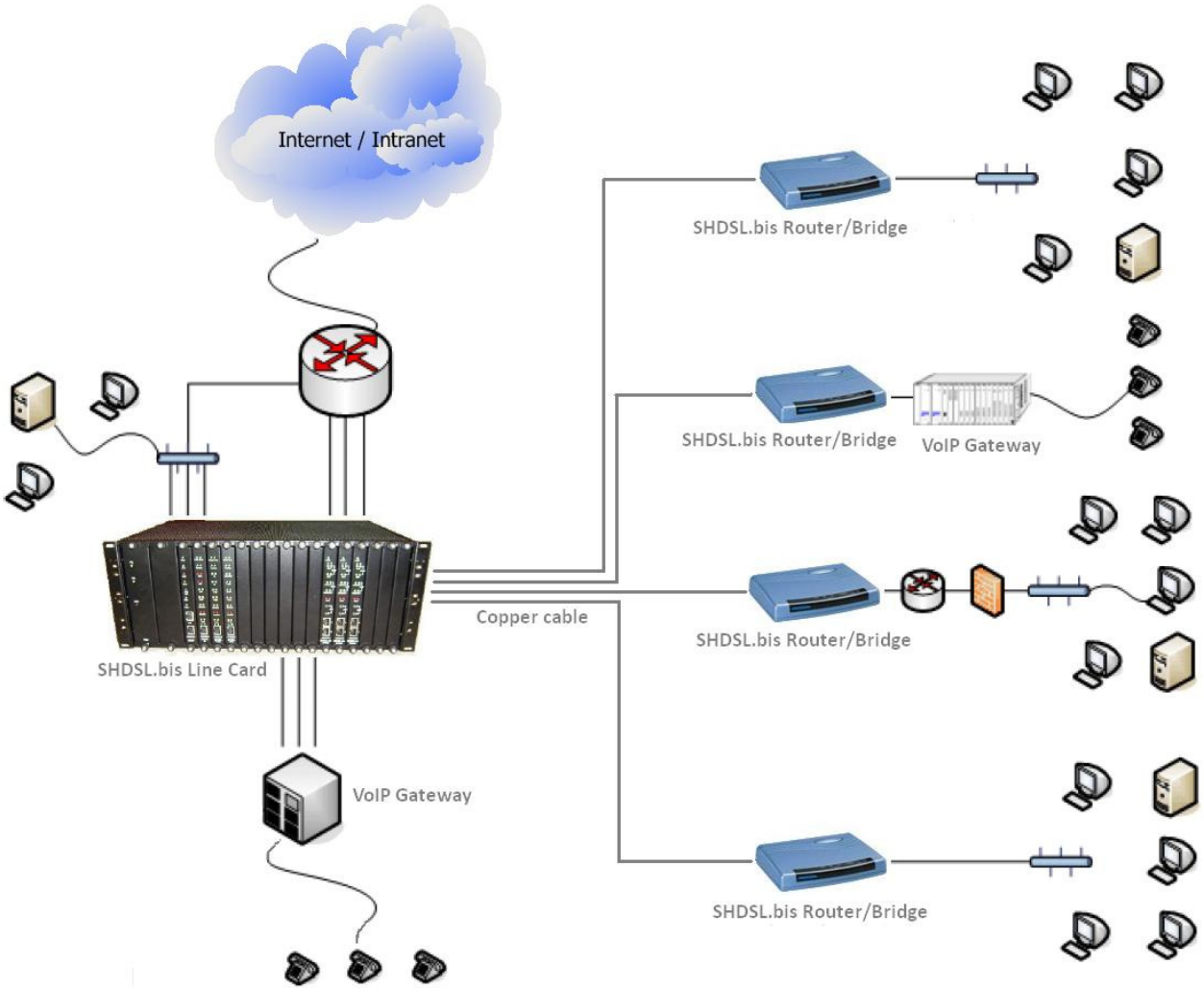
Console ports

- 2 numbers on 3110C

Reset bottom

- 2 numbers on 3110C

1.4 Application



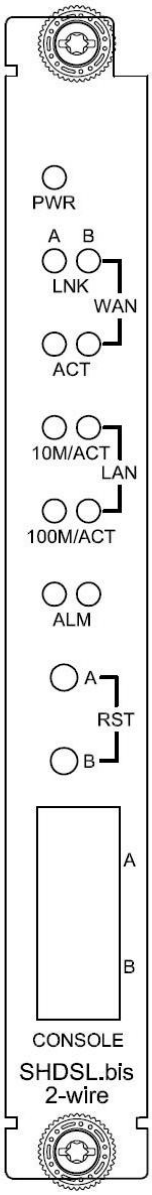
1.5 Front Panel

1.5.1 Slot Number

Each slot will have a number from 1 to 15 indicating the slot number location of the line card. From the front view of the chassis, the numbers go from left to right.

1.5.2 Line card

1.5.2.1 View of Front Panel on Line Card



3110C line card

2-wire 2-channel

1.5.2.2 LED Indicators

LED status of SHDSL.bis Line Card:

LEDs		Active	Description
PWR		On	Power supply is connected to this line card
WAN	LNK	On	SHDSL line connection is established
		Blink	SHDSL handshake
	ACT	Blink	Transmit or received data over SHDSL link
LAN	10M/ACT	On	LAN port connect with 10M NIC
		Blink	LAN port acts in 10M
	100M/ACT	On	LAN port connect with 100M NIC
		Blink	LAN port acts in 100M
ALM		On	SHDSL line connection is dropped
		Blink	SHDSL self test

1.5.2.3 Reset Button

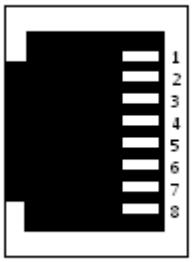
The reset button can be used only in one of two ways:

(1) Press the Reset Button for one second will cause system reboot.

(2) Pressing the Reset Button for four seconds will cause the product loading the factory default setting and losing all of yours configuration. When you want to change its configuration but forget the user name or password, or if the product is having problems connecting to the Internet and you want to configure it again clearing all configurations, press the Reset Button for four seconds with a paper clip or sharp pencil.

1.5.2.4 Console Connector

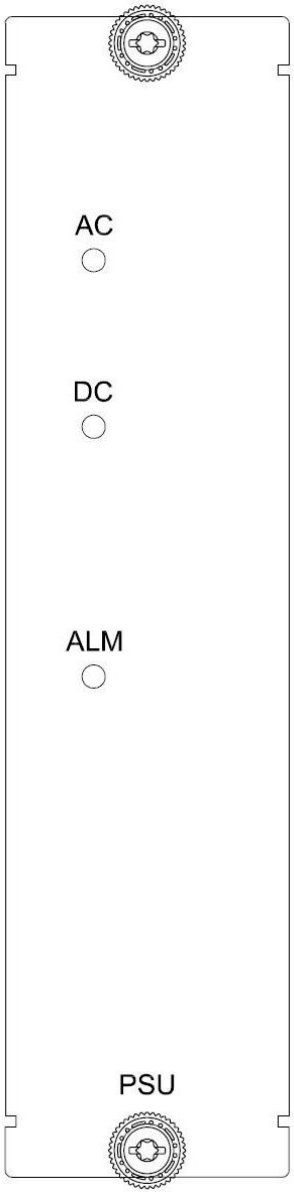
The front panel of each line card provides an RJ-45 connector for configuration, individually from each channel of each line cards. The terminal settings are 115200, 8 bit, no parity, 1 stop bit and no flow control.



3110C have two console connector for using on channel A and B individually.

1.5.3 Power Supply Module

1.5.3.1 View of Front Panel on Power Supply Module



1.5.3.2 LED Indicators

LED status of Power Supply Module:

LEDs	Active	Description
AC	On	AC input is be used
	Blink	AC input isn't be used or no AC input
DC	On	DC input is be used
	Blink	DC input isn't be used or no DC input
ALM	On	Power input failure

1.6 Rear Panel

1.6.1 Slot Number

Each slot will have a number from 1 to 15 indicating the slot number location of the line card. From the rear view of the chassis, the numbers go from right to left.

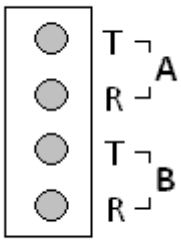
1.6.2 View of Rear Panel on Line card

The rear panel provides all of the data connections for each line card. A total of 15 slots are available for SHDSL ATM based Line Card.

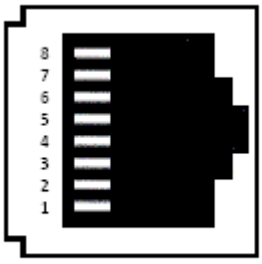
The following is a description of all the connectors for the line cards located on the rear panel.

1.6.2.1 DSL connector

Use 4 pin wire wrap pin header provided the DSL twisted pair wire connect to the remote CPE device.
When using 3110C Line card, there are two pins labeled T (Tip) and R (Ring) on channel A and channel B.

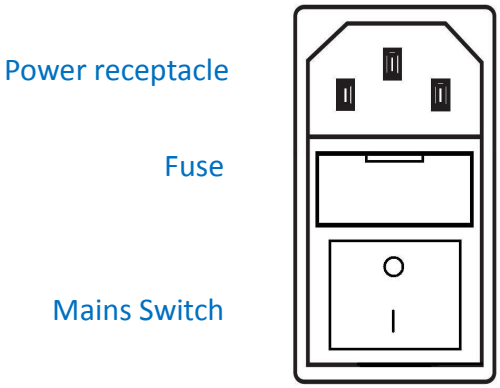


1.6.2.2 LAN connector:



On the rear panel of 3110C, there have two RJ-45 connectors provides standard Ethernet connections for channel A (on upper side) and channel B (on below side).

1.6.3 View of Rear Panel on Power Supply Module



The power modules can be using on AC or DC operation, as the chassis backplane is designed for -48VDC direct connection to central office power.

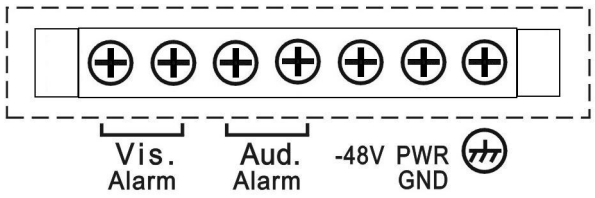
1.6.3.1 Power receptacle

To connect the AC power to the chassis, insert the female end of power card to the power receptacle on the rear panel. Connect the other end of the supplied power card to a 100~240V AC power outlet.

1.6.3.2 Mains Switch

These mains switches control the input flow of AC or DC, depending on the input voltage type.

1.6.3.3 Terminal Block connector



There are not using the alarm connectors (Vis. Alarm and Aud. Alarm) for ATM based line card.

The DC input terminal strip provides hard wired connections for DC power (-48VDC) to the DC power supply device.

The size of the screws in the terminal block is M3.0.

WARNING!:

Proper polarity must be observed for DC power connections or severe electrical damage may occur to the chassis. Always confirm the polarity with a voltage meter before inserting line cards or powering on the mains switches.

2 Installation

2.1 General

The Installation chapter will cover the physical installation of the 3000 series, the electrical connections, line card installation and cabling requirements. A brief overview of the functional components such as power modules, line cards and management options will also be outlined in this chapter.

Required Tools

You will need these tools to install the 3000 series Rack Mount:

- Phillips screw driver for chassis installation screws.
- Wrist strap or other personal grounding device to prevent ESD occurrences.
- Antistatic mat or antistatic foam to set the equipment on.

2.2 Unpacking

Step 1. Inspect the outside carton for any shipping damage and report immediately to your freight forwarder if any damage is visible.

Step 2. Place the shipping carton with the top facing up. Carefully cut through the shipping tape with a box cutter knife.

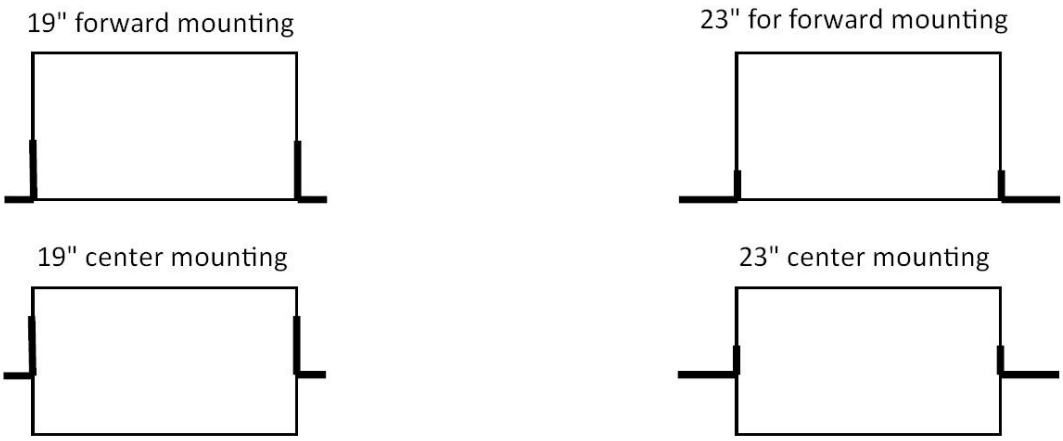
Step 3. Open the top cover of the carton and remove any pizza box.

Step 4. Pull the entire chassis straight up out of the carton

Step 5. The chassis should be wrapped in a plastic bag. Remove the chassis from the plastic bag. Set the chassis on a secure flat surface and again inspect for any shipping damage. Report any damage immediately to your freight forwarder.

2.3 Installation with Rack

The rack mount brackets that ship with the 3000 series chassis allow mounting in either 19" or 23" wide rack spaces. A total of four different mounting configurations are possible. Please see the chassis top view graphics below.



Chassis Mounting Options

2.3.1 Attaching the Mounting Brackets

Step 1. Place the supplied rack- mounting bracket on one side of chassis ensuring the mounting holes on the chassis line up to the mounting holes on the rack mounting bracket.
Step 2. Insert the supplied screws (M3X4 flat head screws) into the rack mounting holes and tighten with a screwdriver.

Precautions: Only M3X4 flat head screws can be used, failure to use the proper screws may damage the unit.

Step 3. Repeat the process for the rack-mounting bracket on the other side of the chassis.
Step 4. You may now mount the chassis on a rack. Proceed to the next section.

2.3.2 Mounting the chassis on a Rack

Precautions:

(a) Make sure the rack will safely support the combined weight of all the equipment it contains.
(b) Make sure the position of the chassis doesn't make the rack unstable or top-heavy. Take all necessary precautions to anchor the rack securely before installing the unit.
(c) For proper ventilation, ensure the air flow around the front, sides, and back of the chassis is not restricted.
(d) Do not install the chassis in an environment where the operation ambient temperature might exceed 40°C.

Step 1. Insert the chassis into the 19-inch or 23-inch rack ensuring the rack-mounting holes on the chassis line up to the mounting hole on the rack.

Step 2. Secure the chassis to the rack with the supplied rack screws. Fasten the lower pair of screws before the upper pair of screws. This ensures that the weight of the unit is evenly distributed during installation. Ensure that the ventilation holes are not obstructed.

It is recommended that the 3000 chassis be mounted into the rack cabinet prior to installing any required power modules and line cards. Without cards, the chassis is light weight and can easily be installed by a single person.

WARNING: A fully loaded chassis can be quite heavy and unbalanced. Dropping a fully loaded chassis would result in severe damage to the chassis and line cards, as well has pose a serious safety hazard resulting in bodily injury to the installation personnel. Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

2.3.3 AC power Connection

To connect the AC power supply is perform the following:

1. Using the supplied standard power cable with safety ground connector, connect the power cable to the AC main socket located on the back panel.
2. Connect the power cable to a grounded AC outlet.
3. Confirm that the device is connected and operating by checking that the Power Supply LED(AC) on the front panel is green.

The chassis can use dual power supply modules for redundant power system

2.3.4 DC Power Connection

To connect the DC power supply is perform the following:

1. Remove the plastic cover on the terminal block.
2. Loosen the two screws marked “-48V” and ”PWR GND”, so that you can slide the DC cable beneath it. Insert the DC cable into the connector first, and screw it down tight.
3. Connect the power cable to the DC power supply.
4. Confirm that the chassis is connected and operating by checking that the Power Supply LED(DC) on the front panel is green.

WARNING: Before connect the DC power cable to the input terminal block of rear panel, ensure that the power switch in the “OFF” position and the DC power is OFF.

NOTE: A qualified electrician must perform all connections to DC power and to safety grounds. All electrical wiring must comply with applicable local or national codes and practices.

2.4 Line Card Removal / Replacement

This section will explain how to install and remove SHDSL.bis Line Cards.

2.4.1 Installing a Line Card

Use the following procedure to install a SHDSL.bis Line Card in the main chassis.

Step 1. Using either an anti-static grounded wrist strap or touching a grounded metal frame, remove the line card from its anti-static protective bag by grasping the metal panel. Do not touch the PCB or components on the PCB.

Step 2. While still grasping the center of the front panel of the card with one hand, place the other hand under the card to support it.

Step 3. Slide the Line Card into the slot until it makes contact with the backplane.

Step 4. Gently press the card the remaining way into the backplane connector until fully seated.

Step 5. Tighten the two thumbscrews by hand.

2.4.2 Removing a Line Card

Use the following procedure to remove a SHDSL.bis Line Card from the main chassis.

Step 1. Using either an anti-static ground wrist strap or by touching a grounded metal frame, loosen the two thumbscrews, using a flat blade screwdriver if necessary. Do not remove the screws completely.

Step 2. Grasp the line card by the captive thumbscrews and pull evenly on both to release the backplane connectors.

Step 3. After you have the card partially out of the chassis, place one hand under the card to support it.

Step 4. Slide the card completely out of the slot and place in an anti-static protective bag.

3 Operation

This chapter will deal with the specifics of configuration and operation of all aspects of the 3000B series from individual line card configuration, management options and typical application examples and settings.

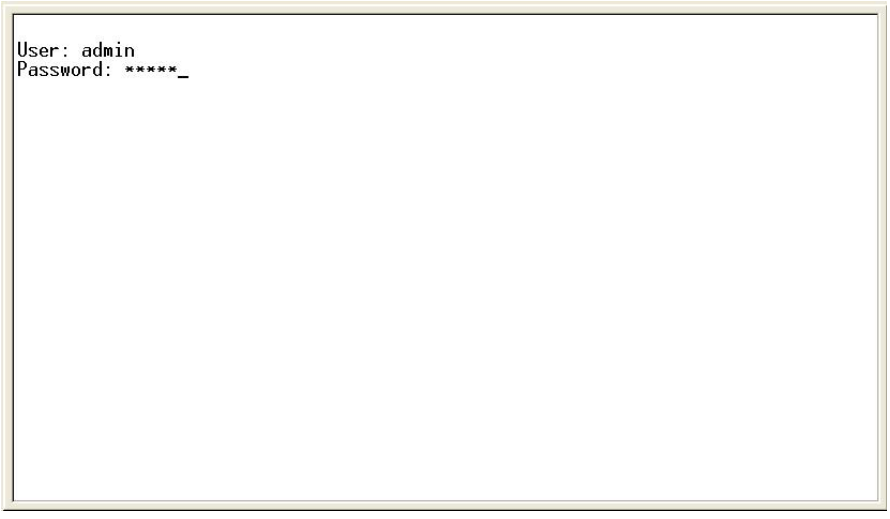
3.1 Login Procedure

There are three methods to login to line card: serial console, Telnet and web browser.

3.1.1 Serial Console

Check the connectivity of the RS-232 cable from your computer to the serial port of line card. Start your terminal access program with VT100 terminal emulation. Configure the serial link with band rate of 115200, 8 data bits, no parity check, 1 stop bit and no flow-control, and press the SPACE key until the login screen appears. When you see the login screen, enter the username and password and then you can login to this line card.

User: admin
Password: *****



If you haven't set any user profile for line card before, enter the factory default user "admin" and password "admin" to login the device.

3.1.2 Telnet

Make sure the correct Ethernet cable is used for connecting the LAN port of your computer to

line card. The LAN LNK indicator on the front panel of line card shall light if a correct cable is used. Starting your Telnet client with VT100 terminal emulation and connecting to the management IP of line card (factory default IP is 192.168.0.1), wait for login screen appears. When you see the login screen, enter the correct user and password and then you can login to line card.

User: admin
Password: *****

The factory default management IP and subnet mask are 192.168.0.1 and 255.255.255.0,. If you haven't set any user profile for line card before, enter the factory default user "admin" and password "admin" to login the device.

3.1.3 Web browser

Make sure the correct Ethernet cable is used for connecting the LAN port of your computer to line card. The LAN LNK indicator on the front panel of line card shall light if a correct cable is used. Starting your web browser and connecting to the management IP of line card (factory default IP is 192.168.0.1), wait for login screen appears. When you see the login screen, enter the correct username and password and then you can login to line card.

Open web browser and type http://192.168.0.1 in the Internet address box. This number is the default IP address for this device. Make sure your computer's subnet mask is as same. And then press Enter.

A user name and password prompt will appear. The default username and password is "root". Click OK button and you will login this line card.

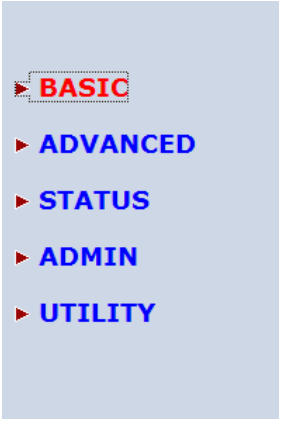
The factory default management IP and subnet mask are 192.168.0.1 and 255.255.255.0. If you haven't any user profile for line card before, enter the factory default user name "root" and password "root" to login the device.

3.2 Configuration by Web Browser

3.2.1 Basic Setup

The Basic Setup contains Bridge or Route operation mode. User can use it to completely setup the line card .

The advanced functions are only for advanced users to setup advanced functions. The incorrect setting of advanced function will affect the performance or system error, even disconnect.



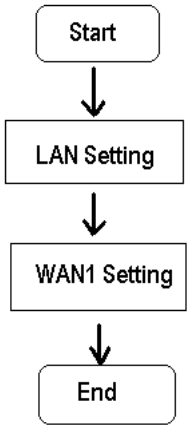
Click Basic for basic installation.

3.2.1.1 Bridge Mode

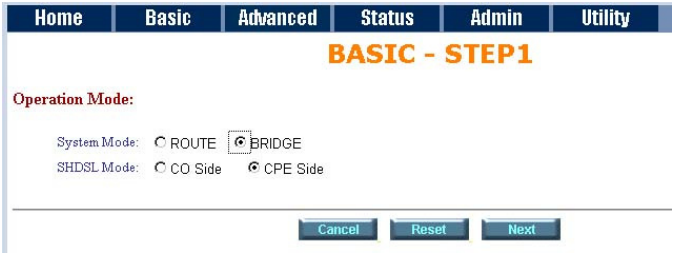
Parameter Table:

System mode	Bridge	
SHDSL	☐CO side ☐CPE side	
LAN	IP address	
	Subnet Mast	
	Gateway	
	Host Name	
WAN1	VPI	
	VCI	
	Encapsulation	☐VC-mux ☐LLC

The flow chart of bridge mode setup:



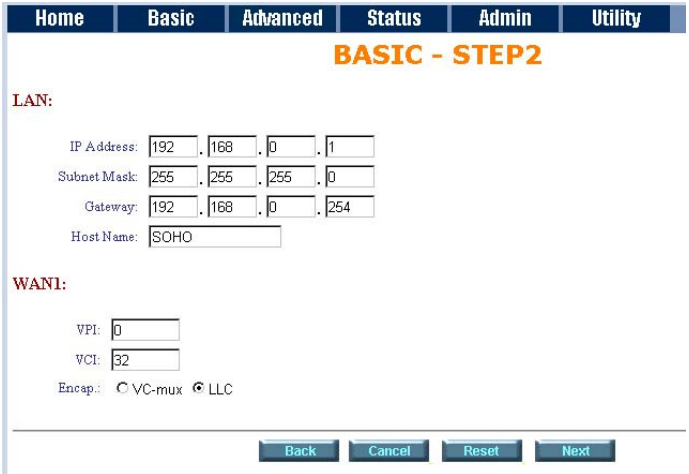
Setup up system mode and SHDSL mode



Click Bridge and CPE Side to setup Bridging mode and then click Next for the next setting.

This line card can be setup as one of two SHDSL.bis working mode: CO (Central Office) and CPE (Customer Premises Equipment). For connection with CPE ATM based standalone router/bridge, the SHDSL.bis line card working mode is CO. For “LAN to LAN” connection, one side must be CO and the other side must be CPE.

Set up (a) LAN IP address , Subnet Mask, Gateway and Host Name
(b) WAN1 VPI,VCI and Encapsulation



LAN:

IP: 192.168.0.1

Subnet Mask: 255.255.255.0

Gateway: 192.168.0.254 (The Gateway IP is provided by ISP.)

Host Name: SOHO

Some of the ISP requires the Host Name as identification. You may check with ISP to see if your Internet service has been configured with a host name. In most cases, this field can be ignored.

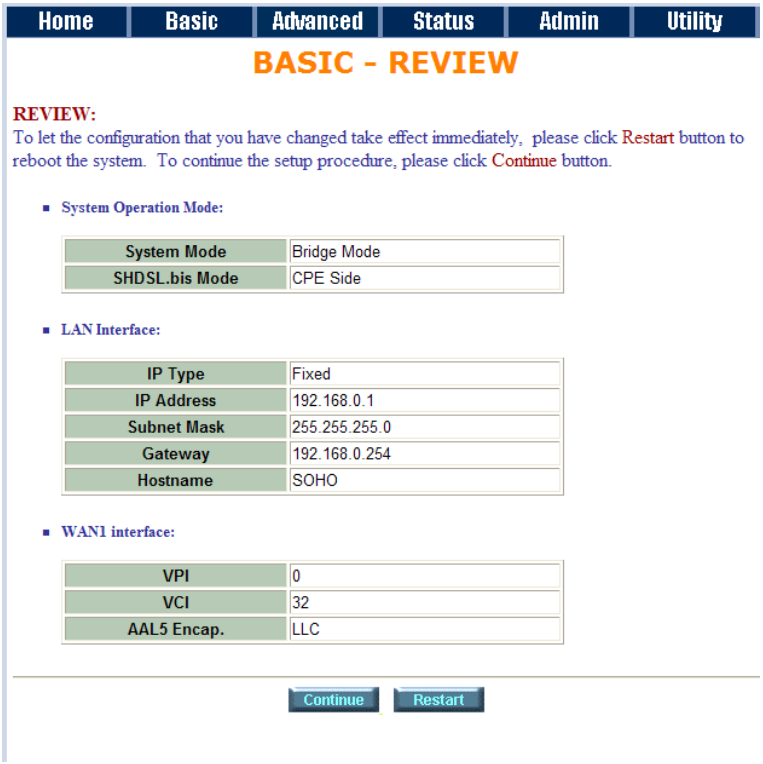
WAN1:

VPI: 0

VCI: 32

Encap: Click LLC and than Click Next to review

Review



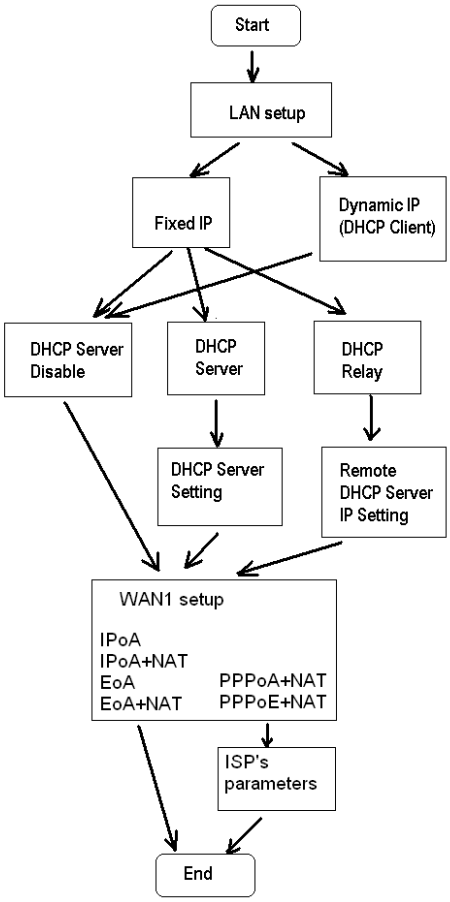
The screen will prompt the new configured parameters. Checking the parameters and Click Restart The line card will reboot with the new setting or Continue to configure another parameters.

3.2.1.2 Routing Mode

Parameter Table:

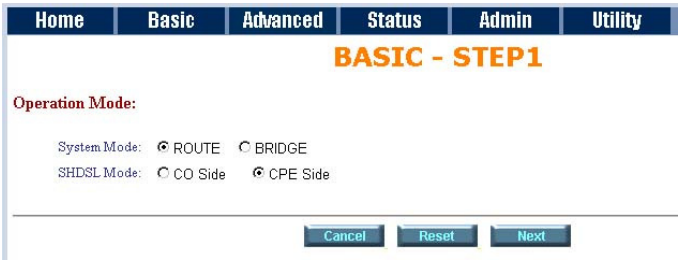
System mode	Route			
SHDSL	☐CO side ☐CPE side			
LAN	IP type		☐Fixed ☐Dynamic(DHCP Client)	
	IP address			
	Subnet Mast			
	Host Name			
	Trigger DHCP service		☐Disable ☐Server ☐Relay	
WAN1	VPI			
	VCI			
	Encapsulation		☐VC-mux ☐LLC	
	Protocol		☐IPoA ☐IPoA + NAT ☐EoA ☐EoA + NAT ☐PPPoA + NAT ☐PPPoE + NAT	
DHCP Server	Default gateway			
	Subnet Mast			
	Start IP address			
	End IP address			
	DNS Server 1			
	DNS Server 2			
	DNS Server 3			
	Lease time			
	Host Entries	1	MAC :	IP:
		2	MAC :	IP:
		3	MAC :	IP:
		4	MAC :	IP:
		5	MAC :	IP:
		6	MAC :	IP:
		7	MAC :	IP:
		8	MAC :	IP:
		9	MAC :	IP:
		10	MAC :	IP:
DHCP Relay	IP address			

The flow chart of route mode setup:



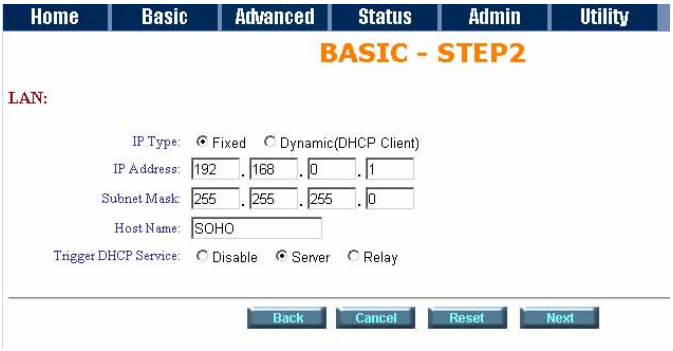
Routing mode contains DHCP server, DHCP client, DHCP relay, Point-to-Point Protocol over ATM and Ethernet and IP over ATM and Ethernet over ATM. You have to clarify which Internet protocol is provided by ISP.

Setup up system mode and SHDSL mode



click ROUTE and CPE Side then press Next.

Set up the LAN IP address , Subnet Mask, Gateway, Host Name and Trigger DHCP Service with fixed IP type.



IP type: Fixed

IP Address: 192.168.0.1

Subnet Mask: 255.255.255.0

Host Name: SOHO

Some of the ISP requires the host name as identification. You may check with ISP to see if your Internet service has been configured with a host name. In most cases, this field can be ignored.

Trigger DHCP Service: Server

The default setup is Enable DHCP server. If you want to turn off the DHCP service, choose Disable.

If set DHCP server to Relay, the line card acts as a surrogate DHCP server and relays requests and responses between the remote server and the clients.

DHCP Server

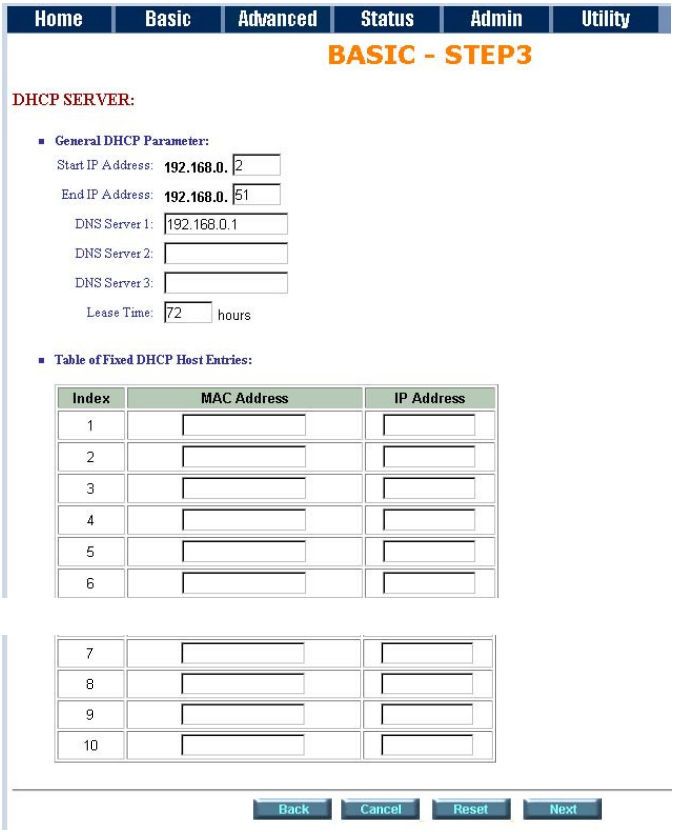
Dynamic Host Configuration Protocol (DHCP) is a communication protocol that lets network administrators to manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet Protocol, each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine.

Without DHCP, the IP address must be entered manually at each computer. If computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator to supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

If the DHCP server is “Enable,” you have to setup the following parameters for processing it as DHCP server.

The embedded DHCP server assigns network configuration information at most 253 users accessing the Internet in the same time.

Set up the DHCP Server parameters and fixed DHCP host table



Start IP Address: This field specifies the first of the contiguous addresses in the IP address pool.
End IP Address: The field specifies the last of the contiguous addresses in the IP address pool.

For example: If the LAN IP address is 192.168.0.1, the IP range of LAN is 192.168.0.2 to 192.168.0.51. The DHCP server assigns the IP form Start IP Address to End IP Address. The legal IP address range is form 0 to 255, but 0 are reserved as network name and 255 are reserved for broadcast. It implies the legal IP address range is from 1 to 254. That means you cannot assign an IP greater than 254 or less then 1. **Lease time** 72 hours indicates that the DHCP server will reassign IP information in every 72 hours.
DNS Server1, **DNS Server2** and **DNS Server3**: Your ISP will provide at least one Domain Name Service Server IP. You can type the line card IP in this field. The line card will act as DNS server relay function. There have three DNS server can use.
You may assign a fixed IP address to some device while using DHCP, you have to put this device's MAC address in the **Table of Fixed DHCP Host Entries**. There have ten fixed IP address location can use. Every Ethernet device has a unique MAC(Media Access Control) address. The MAC address is assigned at factory and consists of six pairs of hexadecimal characters, for example, 00:03:79:0A:01:3F

Press Next to setup WAN1 parameters.

Some of the ISP provides DHCP server service by which the PC in LAN can access IP information automatically. To setup the DHCP client mode, follow the procedure

Set up IP address, Subnet Mask, Host Name with DHCP Client mode

LAN IP Type: Dynamic(DHCP Client)

Click Next to setup WAN1 parameters.

DHCP relay

If you have a DHCP server in LAN and you want to use it for DHCP services, the product provides DHCP relay function to meet yours need.

IP Type: Fixed

IP Address: 192.168.0.1

Subnet Mask: 255.255.255.0

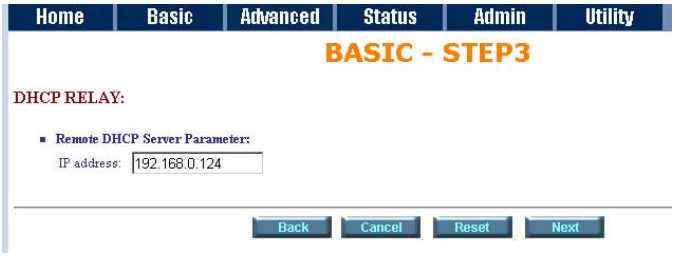
Host Name: SOHO

Some of the ISP requires the host name as identification. You may check with ISP to see if your Internet service has been configured with a host name. In most cases, this field can be ignored.

Trigger DHCP Service: Relay

Set up the DHCP Server

Press Next to setup **Remote DHCP server parameter**.

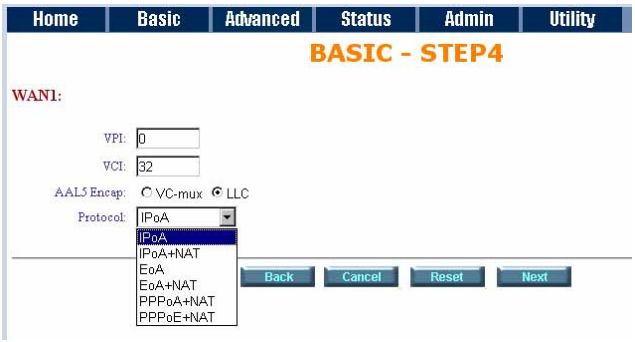


If using DHCP relay service, there must set up the remote DHCP server IP address

Enter DHCP server IP address in IP address field.

Press Next

Set up the WAN1 VPI, VCI Encap. and Protocol



VPI: 0

VCI: 33

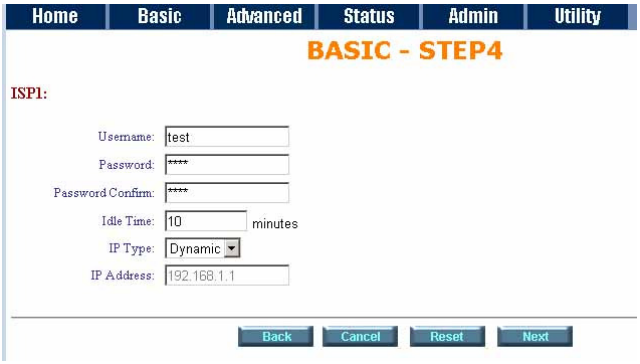
AAL5 Encap: LLC

Protocol: PPPoA + NAT or PPPoE + NAT

Click Next to setup User name and password.

For more understanding about NAT, review NAT/DMZ chapter.

If the Protocol using PPPoA+NAT or PPPoE+NAT, you must setup the ISP's parameters on the following:



Type the ISP1 parameters.

Username: test

Password: test

Password Confirm: test

Your ISP will provide the user name and password.

Idle Time: 10

You want your Internet connection to remain on at all time, enter "0" in the Idle Time field.

IP Type: Dynamics.

The default IP type is Dynamic. It means that ISP PPP server will provide IP information including dynamic IP address when SHDSL.bis connection is established. On the other hand, you do not need to type the IP address of WAN1. Some of the ISP will provide fixed IP address over PPP. For fixed IP address:

IP Type: Fixed

IP Address: 192.168.1.1

Click Next.

Note: For safety, the password will be prompt as star symbol.

***Username** : Enter the user name exactly as your ISP assigned.*

***Password**: Enter the password associated with the user name above.*

***Password confirm**: Enter the password again for confirmation.*

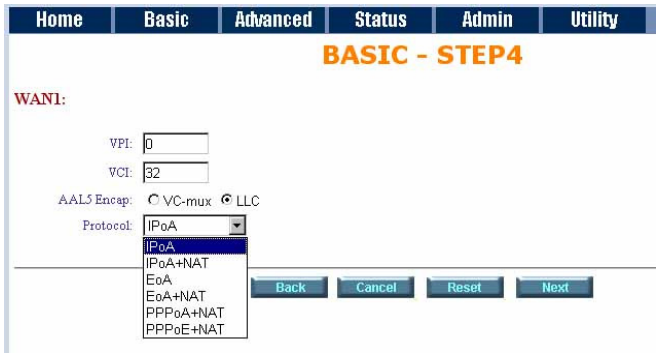
***Idle Time**: When you don't want the connection up all the time and specify an idle time on this field.*

***IP type**: A static IP address is a fixed IP that your ISP gives you. A dynamic IP address is not fixed; the ISP assigns you a differnet on each time you connect to the Internet.*

The screen will prompt the parameters that will be written in NVRAM. Check the parameters before writing in NVRAM.

Press Restart to restart the line card working with new parameters or press to continue setting another parameter.

Set up : WAN1 VPI, VCI, Encap. and Protocol



WAN:

VPI: 0

VCI: 33

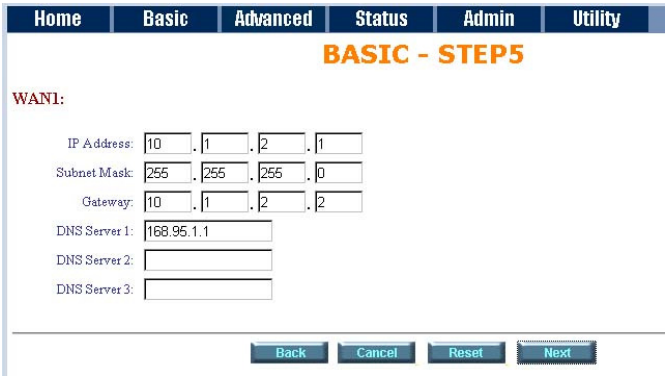
AAL5 Encap: LLC

Protocol: IPoA , EoA , IPoA + NAT or EoA + NAT

Click Next to setup the IP parameters.

For more understanding about NAT, review NAT/DMZ chapter.

Set up the WAN1 IP address, Subnet Mask, gateway and DNS Server



IP Address: 10.1.2.1

It is line card IP address like from Internet. Your ISP will provide it and you need to specify here.

Subnet mask: 255.255.255.0

This is the line card subnet mask seen by external users on Internet. Your ISP will provide it to you.

Gateway: 10.1.2.2

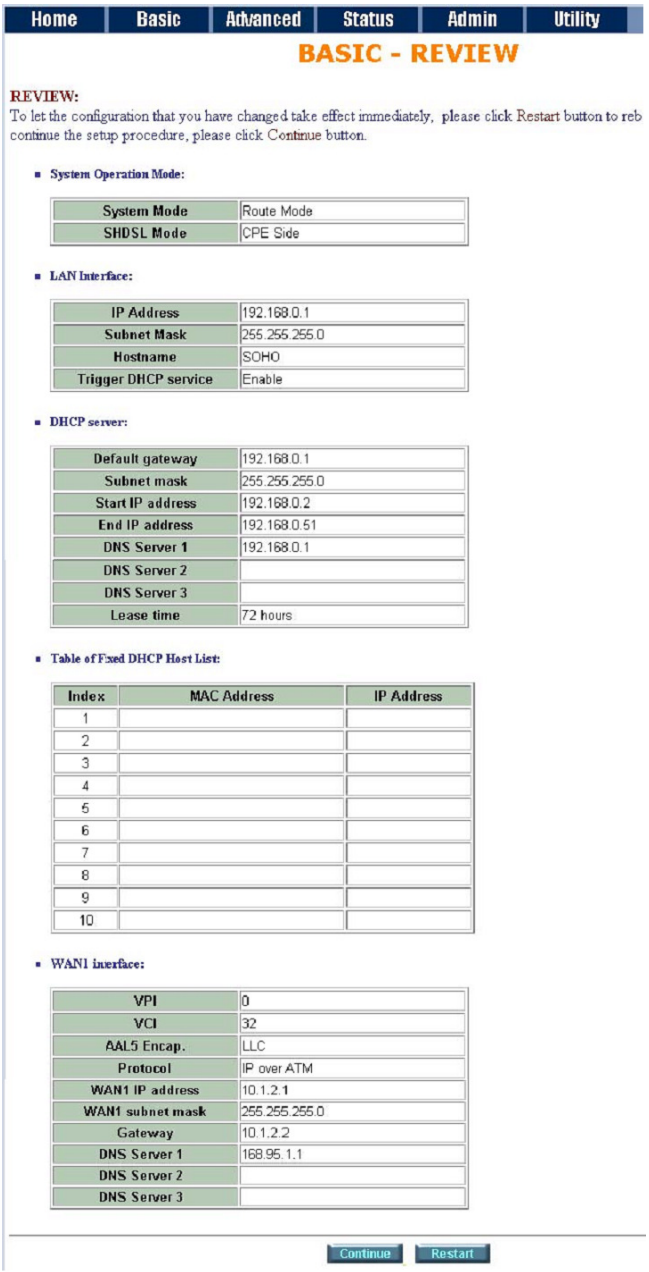
Your ISP will provide you the default gateway.

DNS Server 1: 168.95.1.1

Your ISP will provide at least one DNS (Domain Name System) Server IP address.

Click Next to review.

Review



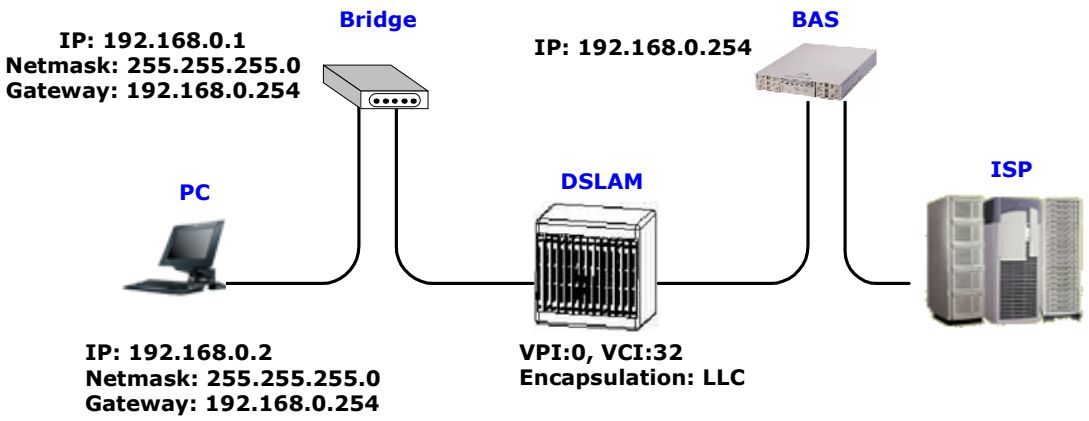
The screen will prompt the parameters that will be written in NVRAM. Check the parameters before writing in NVRAM.

Press Restart to restart the line card working with new parameters or press **Continue** to setup another parameter.

3.2.1.3 Reference diagram

Bridge mode

When configured in Bridge Mode, the line card will act as a pass-through device and allow the workstations on your LAN to have public addresses directly on the internet.

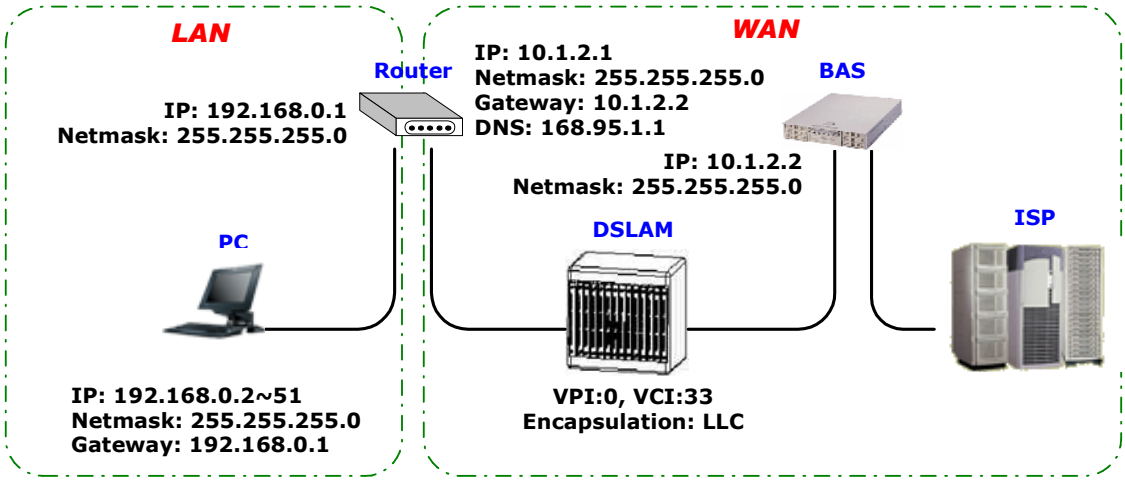


IPoA or EoA

IPoA (Dynamic IP over ATM) interfaces carries IP packets over AAL5. AAL5 provides the IP hosts on the same network with the data link layer for communications. In addition, to allow these hosts to communicate on the same ATM networks, IP packets must be tuned somewhat. AS the bearer network of IP services, ATM provides high speed point-to-point connections which considerably improve the bandwidth performance of IP network. On the other hand, ATM provides excellent network performance and perfect QoS.

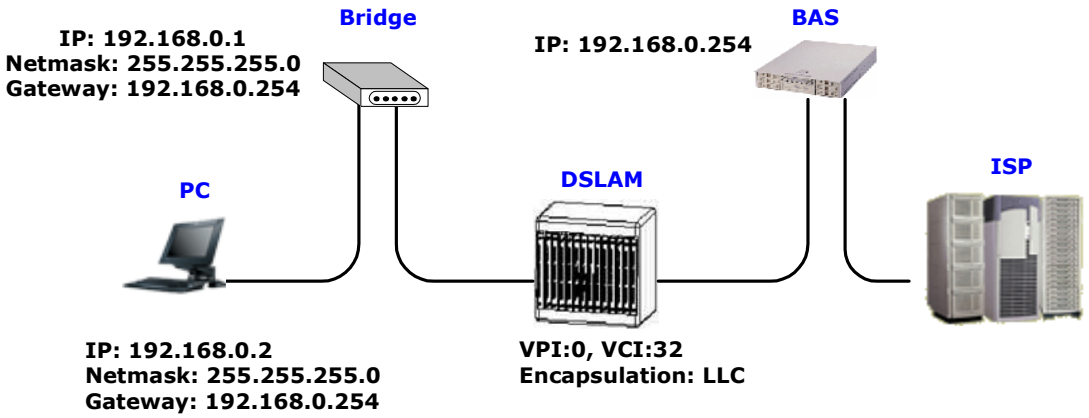
EoA (Ethernet-over-ATM) protocol is commonly used to carry data between local area networks that use the Ethernet protocol and wide-area networks that use the ATM protocol. Many telecommunications industry networks use the ATM protocol. ISPs who provide DSL services often use the EoA protocol for data transfer with their customers' DSL modems.

EoA can be implemented to provide a bridged connection between a DSL modem and the ISP. In a bridged connection, data is shared between the ISP's network and their customer's as if the networks were on the same physical LAN. Bridged connections do not use the IP protocol. EoA can also be configured to provide a routed connection with the ISP, which uses the IP protocol to exchange data.



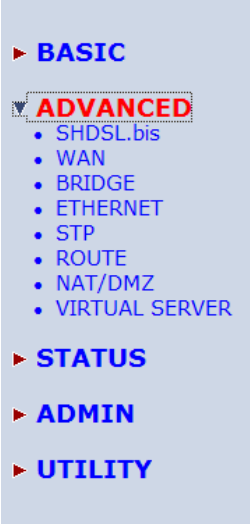
PPPoE or PPPoA

PPPoA (point-to-point protocol over ATM) and PPPoE (point-to-point protocol over Ethernet) are authentication and connection protocols used by many service providers for broadband Internet access. These are specifications for connecting multiple computer users on an Ethernet local area network to a remote site through common customer premises equipment, which is the telephone company's term for a modem and similar devices. PPPoE and PPPoA can be used to office or building. Users share a common Digital Subscriber Line (DSL), cable modem, or wireless connection to the Internet. PPPoE and PPPoA combine the Point-to-Point Protocol (PPP), commonly used in dialup connections, with the Ethernet protocol or ATM protocol, which supports multiple users in a local area network. The PPP protocol information is encapsulated within an Ethernet frame or ATM frame.



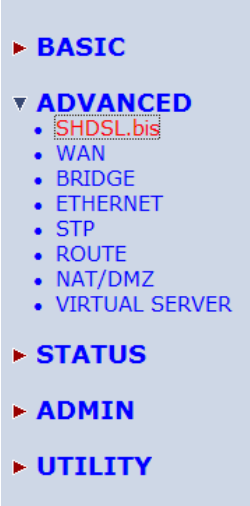
3.2.2 Advanced Setup

Advanced setup contains **SHDSL, WAN, Bridge, Ethernet, STP , Route, NAT/DMZ and Virtual SERVER** parameters.

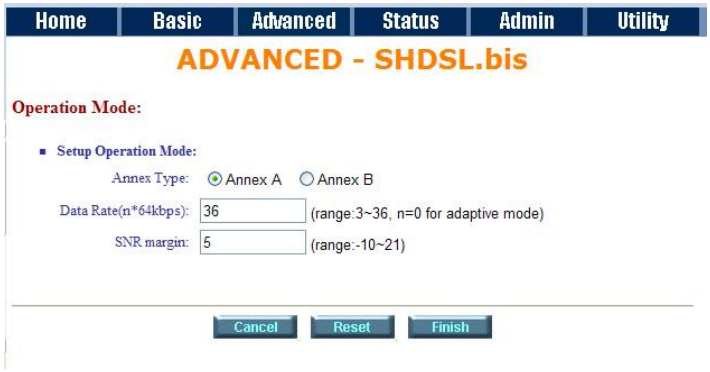


3.2.2.1 SHDSL.bis

You can setup the Annex type, data rate and SNR margin for SHDSL.bis parameters in SHDSL.bis. Click SHDSL.bis



Enter Parameters in SHDSL.bis



3.2.2.1.1 Annex Type

There are four Annex types: **Annex A** (ANSI) and **Annex B** (ETSI). It the line card must connect to your ISP, please check them about it. If the line card configed to point to point application, you must choose one of the two types according to which line rate you need.

3.2.2.1.2 Data Rate

You can setup the SHDSL data rate in the multiple of 64kbps.
The range of data rate is 192Kbps ~ 2304Kbps (Nx64kbps, N=3~36)
The default data rate is 2304Kbps (n=36).
It set n=0 , it means that is adaptive mode, the data rate is according to the line condition.

3.2.2.1.3 SNR Margin

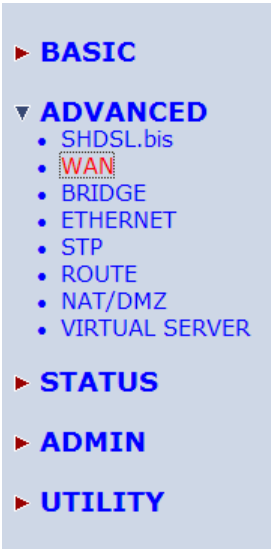
This is an index of line connection quality. You can see the actual SNR margin in STATUS SHDSL.bis.
The larger is SNR margin, the better is line connection quality.
The range of SNR Margin is -10 to 21.The default vaule is 5.

If you set SNR margin in the field as 5, the SHDSL.bis connection will drop and reconnect when the SNR margin is lower than 5. On the other hand, the device will reduce the line rate and reconnect for better line connection quality.

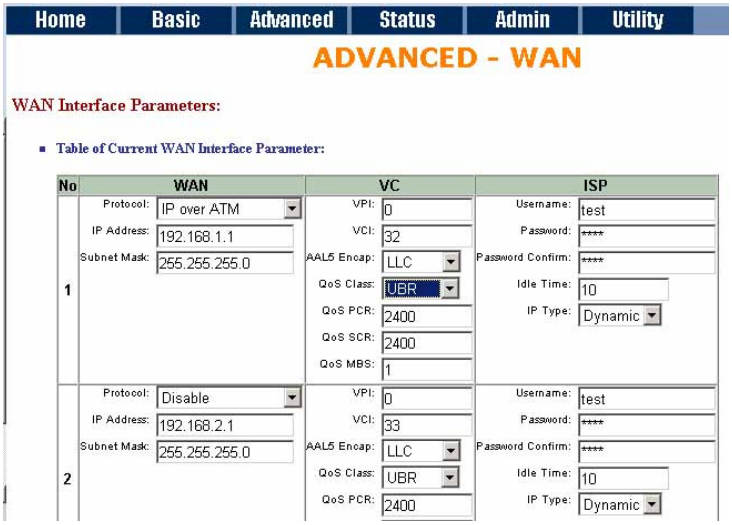
The screen will prompt the parameters that will be written in NVRAM. Check the parameters before writing in NVRAM.
Press Restart to restart the line card working with new parameters or press continue to setup another parameter.

3.2.2.2 WAN

The line card can support up to 8 PVCs. WAN 1 was configured via **BASIC** menu except QoS. If you want to setup another PVCs such as WAN 2 to 7, those parameters are setup on the pages of WAN under ADVANCED. On the other hand, you don't need to setup WAN except you apply two or more Internet Services with ISPs.



The parameters in WAN Number 1 has been setup in Basic Setup. If you want to setup another PVC, you can configure in WAN 2 to WAN 8.



Enter the parameters:

Protocol: If WAN Protocol is PPPoA or PPPoE with dynamic IP, leave the default WAN IP Address and Subnet Mask as default setting. The system will ingore the IP Address and Subnet Mask information, but

erasion or blank in default setting will cause system error.

If the WAN Protocol is IPoA or EoA, leave the ISP parameters as default setting. The system will ingore the information, but erasion or blank in default setting will cause system error.

VC-mux (VC-based Multiplexing): Each protocol is assigned to a specific virtual circuit. VC-based multiplexing may be dominant in environments where dynamic creation of large numbers of ATM VCs is fast and economical.

LLC (LLC-based Multiplexing): One VC carries multiptle protocols with protocol identifying information being contained in each packet header. Deapite the extra bandwidth and processing overhead, this method may be advantagrous if it is not practical to have a sepatate VC for each carried protocol.

VPI (Virtual Path Identifier) is for set up ATM Permanent Virtual Channels(PVC).The valid range for VPI is 0 to 255.

VCI (Virtual Channel Identifier is for set up ATM Permanent Virtual Channels(PVC). The valid range for VCI is 32 to 65535 (0 to 31 is reserved for local management of ATM traffic.)

QoS (Quality of Service) **class** : The Traffic Management Specification V4.0 defines ATM service cataloges that describe both the traffic transmitted by users onto a network as well as the Quailty of Service that the network need to provide for that traffic. There have four class four choice: UBR, CBR, rt-VBR and nrt-VBR. Select CBR to specify fixed bandwidth for voice or data traffic. Select UBR for applications that are non-time sensitive, such as e-mail. Slect VBR for bursty traffic and bandwidth sharing with other applications.

UBR (Unspecified Bit Rate) is the simplest service provided by ATM networks. There is no guarantee of anything. It is a primary service used for transferring Internet traffic over the ATM network.

CBR (Constant Bit Rate) is used by connections that requires a static amount of bandwidth that is avilable during the connection life time. This bandwidth is characterized by Peak Cell Rate (PCR). Based on the PCR of the CBR traffic, specific cell slots are assigned for the VC in the schedule table. The ATM always sends a signle cell during the CBR connection’s assigned cell slot.

VBR-rt (Varible Bit Rate real-time) is intended for real-time applications, such as compressed voice over

IP and video comferencing, that require tightly constrained delays and delay variation. VBR-rt is characterized by a peak cell rate (PCR), substained cell rate (SCR), and maximun burst rate (MBR).

VBR-nrt (Varible Bit Rate non-real-time) i*s intended for non-real-time applications, such as FTP, e-mail and browsing.*

PCR (Peak Cell Rate) in kbps: The maximum rate at which you expect to transmit data, voice and video. Consider PCR and MBS as a menas of reducing lantency, not increasing bandwidth. The range of PCR is 384kbps to 11392kbps

SCR (Substained Cell Rate): The sustained rate at which you expect to transmit data, voice and video. Consider SCR to be the true bandwidth of a VC and not the lone-term average traffic rate. The range of SCR is 384kbps to 11392kbps.

MBS (Maximum Burst Size): Refers to the maximum number of cells that can be sent at the peak rate. The range of MBS is 1 cell to 255 cells.

Username : Enter the user name exactly as your ISP assigned.

Password: Enter the password associated with the user name above.

Password confirm: Enter the password again for confirmation.

Idle Time: When you don't want the connection up all the time and specify an idle time on this field.

IP type: A static IP address is a fixed IP that your ISP gives you. A dynamic IP address is not fixed; the ISP assigns you a differnet on each time you connect to the Internet.

Press Finish to finish setting.

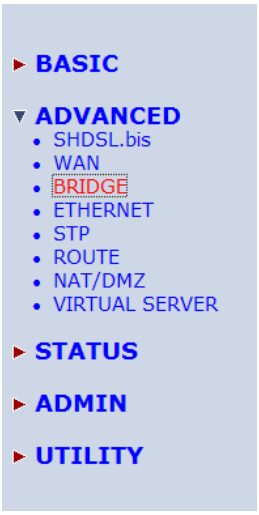
The screen will prompt the parameters that will be written in NVRAM. Check the parameters before writing in NVRAM.

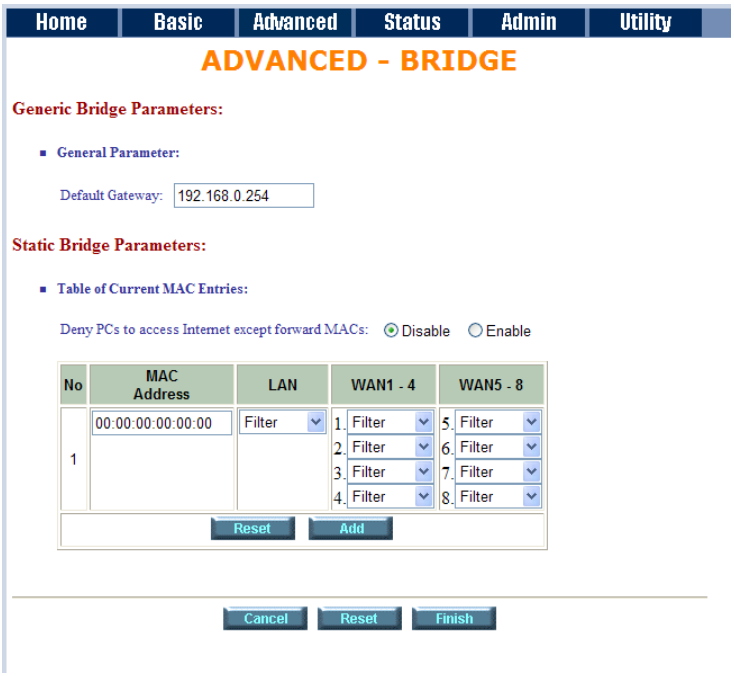
Press Restart to restart the line card working with new parameters or press continue to setup another parameter.

3.2.2.3 *Bridge*

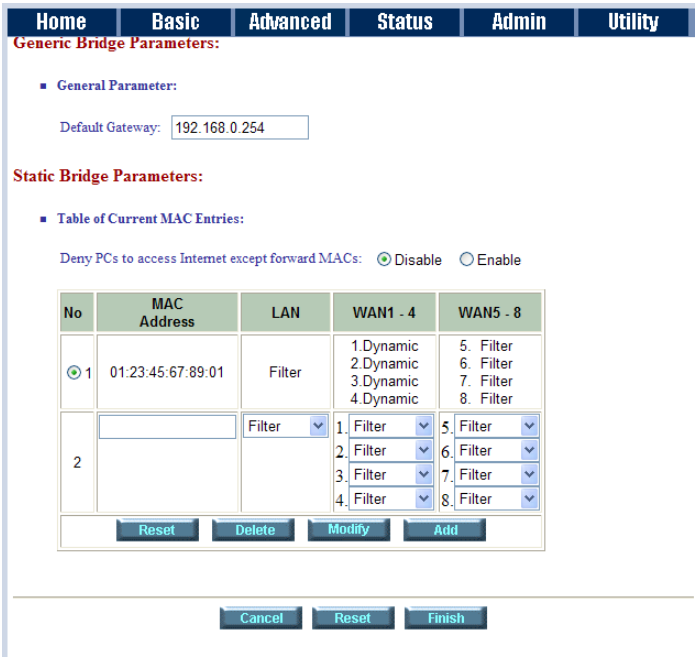
If you want to setup advanced filter function while line card is working in bridge mode, you can use **BRIDGE** menu to setup the filter function, blocking function.

Click Bridge to setup.





Press Add in the bottom of web page to add the static bridge information.

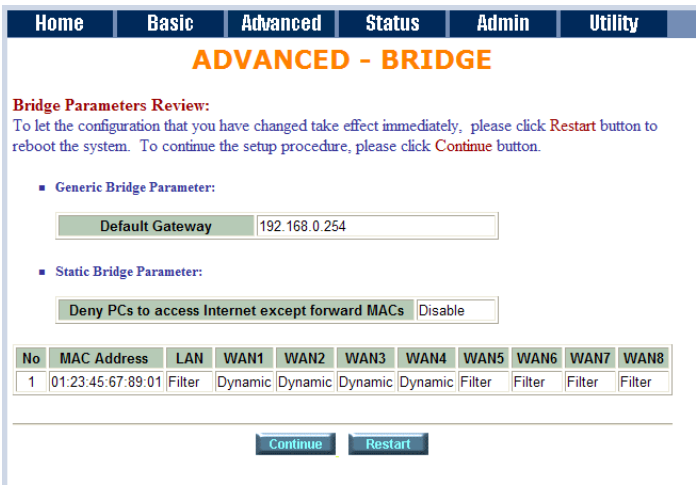


If you want to filter the designated MAC address of LAN PC to access Internet, press Add to establish the filtering table. Put the MAC address in **MAC Address** field and select Filter in **LAN** field.

If you want to filter the designated MAC address of WAN PC to access LAN, press Add to establish the filtering table. Key the MAC address in **MAC Address** field and select Filter in WAN field.

For example: if your VC is setup at WAN 1, select WAN 1 Filter.

Press Finish in the bottom of web page to review the bridge parameters.

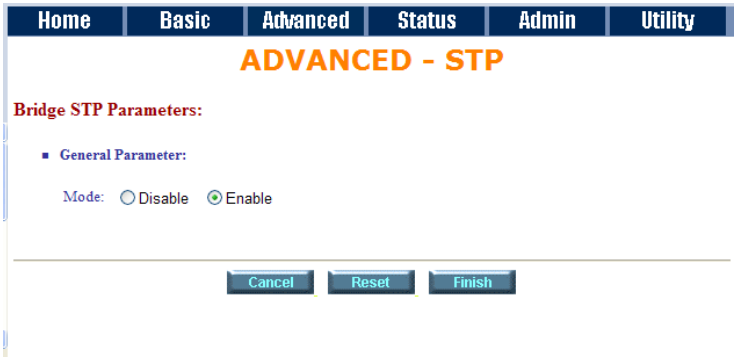


The screen will prompt the parameters that will be written in NVRAM. Check the parameters before writing in NVRAM.

Press Restart to restart the line card working with new parameters or press Continue to setup another parameter.

3.2.2.4 STP

Click STP can disable or enable the bridge STP mode.



STP (Spanning-Tree Protocol) defined in the IEEE 802.1D, is a link management protocol that provides path redundancy while preventing undesirable loops in the network. For an Ethernet network to function properly, only one active path can exist between two stations.

Multiple active paths between stations cause loops in the network. If a loop exists in the network topology, the potential exists for duplication of messages. When loops occur, some switches see stations appear on both sides of the switch. This condition confuses the forwarding algorithm and allows duplicate frames to be forwarded.

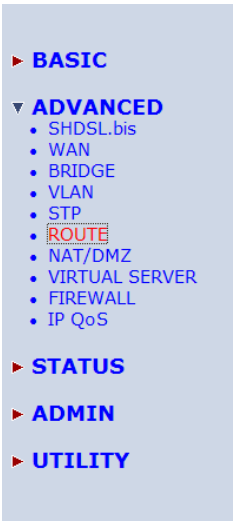
To provide path redundancy, Spanning-Tree Protocol defines a tree that spans all switches in an extended network. Spanning-Tree Protocol forces certain redundant data paths into a standby (blocked) state. If one network segment in the Spanning-Tree Protocol becomes unreachable, or if Spanning-Tree Protocol costs change, the spanning-tree algorithm reconfigures the spanning-tree topology and reestablishes the link by activating the standby path.

Spanning-Tree Protocol operation is transparent to end stations, which are unaware whether they are connected to a single LAN segment or a switched LAN of multiple segments.

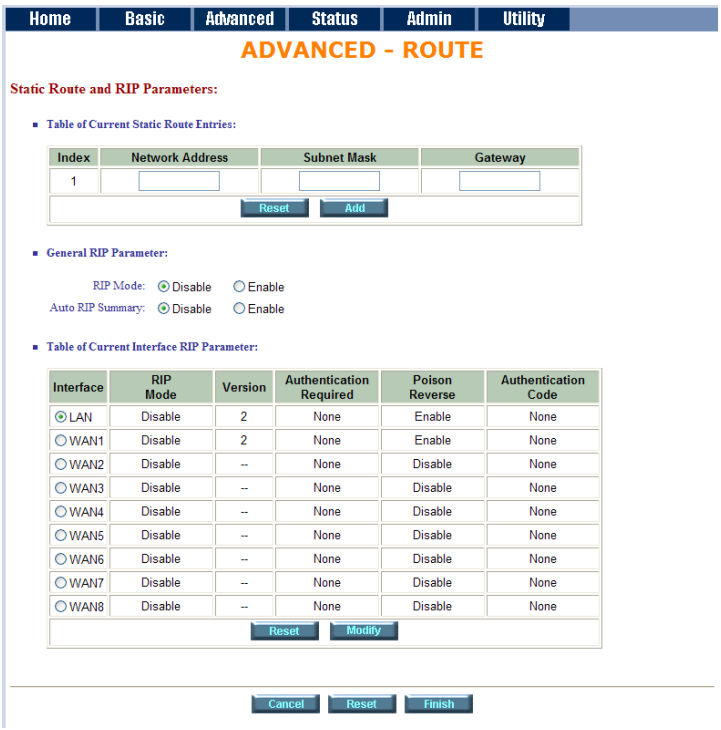
3.2.2.5 Route

If the line card is connected to more than one network, it may be necessary to set up a static route between them. A static route is a pre-determined pathway that network information must travel to reach a specific host or network.

With Dynamic Routing, you can enable the line card to automatically adjust to physical changes in the network's layout. The line card, using the RIP protocol, determines the network packets' route based on the fewest number of hops between the source and the destination. The RIP protocol regularly broadcasts routing information to other devices on the network.



Click Route to modify the routing information.

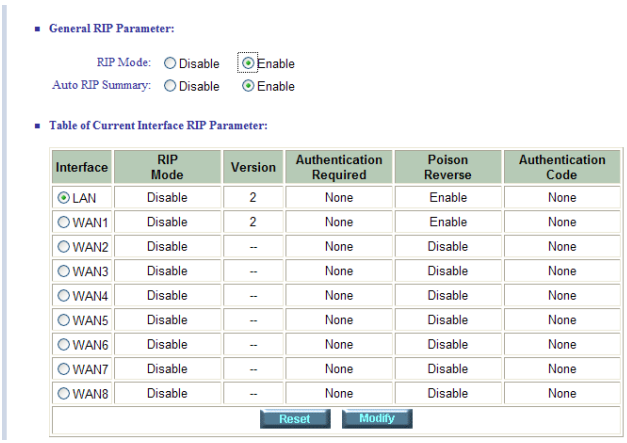


To modify the RIP (Routing information protocol) Parameters:

RIP Mode: Enable

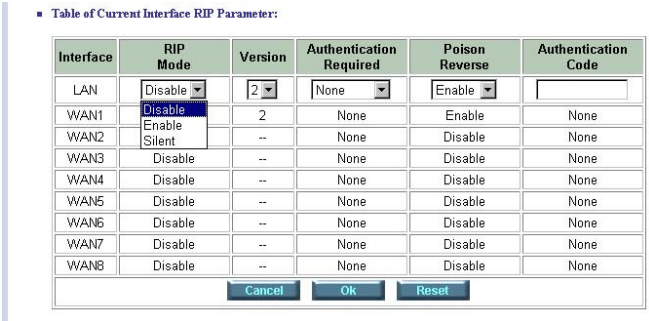
Auto RIP Summary: Enable

Press Modify



RIP Mode:

This parameter determines how the line card handle RIP (Routing information protocol). RIP allows it to exchange routing information with other router. If set to Disable, the gateway does not participate in any RIP exchange with other router. If set Enable, the router broadcasts the routing table of the router on the LAN and incoporates RIP broadcast by other routers into it's routing table. If set silent, the router does not broadcast the routing table, but it accepts RIP broadcast packets that it receives.

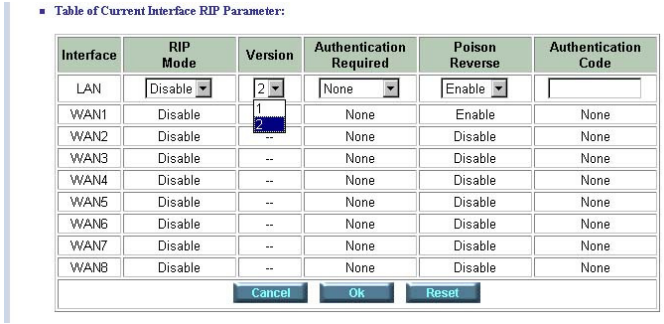


RIP Version:

It determines the format and broadcasting method of any RIP transmissions by the gateway.

RIP v1: it only sends RIP v1 messages only.

RIP v2: it send RIP v2 messages in multicast and broadcast format.

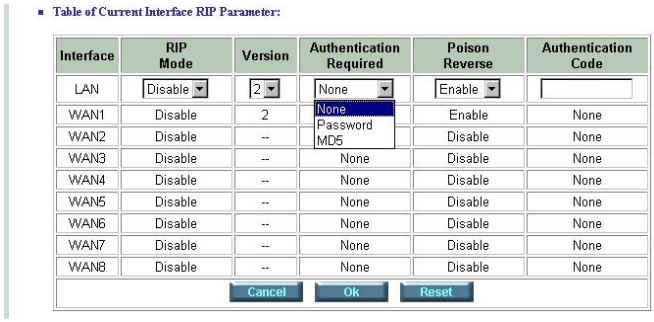


Authentication required:

None: for RIP, there is no need of authentication code.

Password: the RIP is protected by password, authentication code.

MD5: The RIP will be decoded by MD5 than protected by password, authentication code.

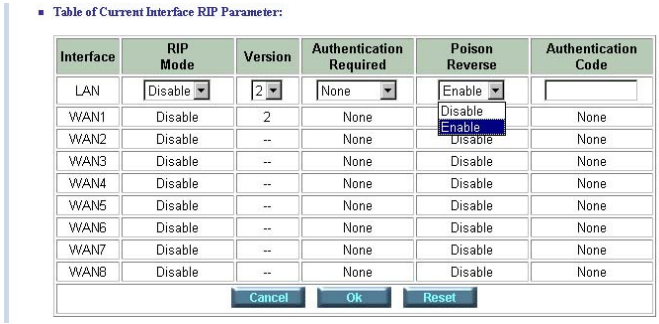


Poison Reserve:

Poison Reserve is for the purpose of promptly broadcast or multicast the RIP while the route is changed. (ex shuting down one of the routers in routing table)

Enable: the gateway will actively broadcast or multicast the information.

Disable: the gateway will not broadcast or multicast the information.



After modifying the RIP parameters, press finish.

The screen will prompt the modified parameter. Check the parameters and perss Restart to restart the line card or press Continue to setup another parameters.

3.2.2.6 NAT/DMZ

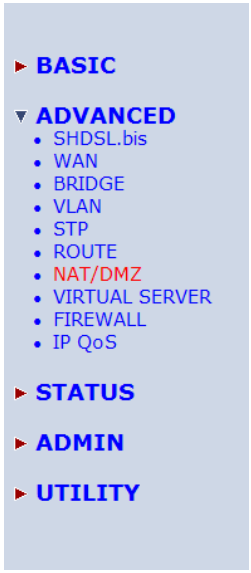
NAT *(Network Address Translation) is the translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the inside network and the other is the outside. Typically, a company maps its local inside network addresses to one or more global outside IP addresses and reverse the global IP addresses of incoming packets back into local IP addresses. This ensure security since each outgoing or incoming request must go through a translation process, that also offers the opportunity to qualify or authenticate the request or match it to a previous request. NAT also conserves on the number of global IP addresses that a company needs and lets the company to use a single IP address of its communication in the Internet world.*

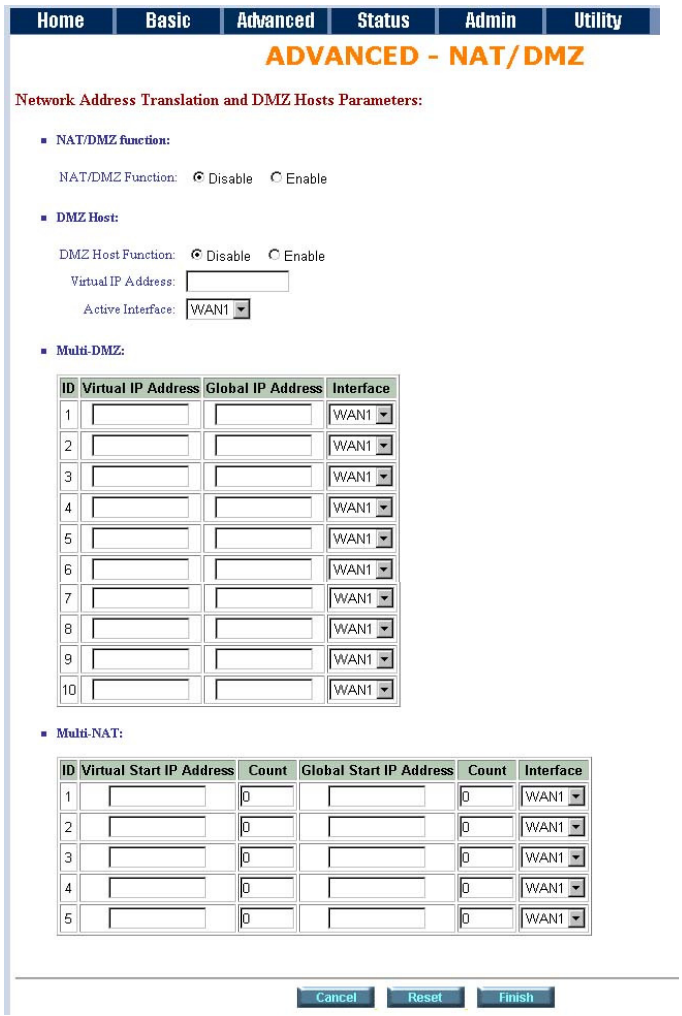
DMZ *(Demilitarized zone) is a computer host or small network inserted as a "neutral zone" between a company private network and the outside public network. It prevents outside users from getting direct access to a server that has company private data.*

In a typical DMZ configuration for an enterprise, a separate computer or host receives requests from users within the private network to access via Web sites or other companies accessible on the public network. The DMZ host then initiates sessions for these requests to the public network. However, the DMZ host is not able to initiate a session back into the private network. It can only forward packets that have already been requested.

Users of the public network outside the company can access only the DMZ host. The DMZ may typically also have the company's Web pages so these could serve the outside world. However, the DMZ provides access to no other company data. In the event that an outside user penetrated the DMZ host's security, the Web pages might be corrupted, but no other company information would be exposed.

Press NAT/DMZ to setup the parameters.





If you want to enable the NAT/DMZ functions, click Enable. Enable the DMZ host Function is used the IP address assigned to the WAN for enabling DMZ function for the virtual IP address.

3.2.2.6.1 Multi-DMZ

Some users who have two or more global IP addresses assigned by ISP can be used the multi DMZ. The table is for the mapping of global IP address and virtual IP address.

3.2.2.6.2 Mutli-NAT

Some of the virtual IP addresses (eg: 192.168.0.10 ~ 192.168.0.50) collectively use two of the global IP addresses (eg: 69.210.1.9 and 69.210.1.10). The Multi-NAT table will be setup as;

Virtual Start IP Address: 192.168.0.10

Count: 40

Global Start IP Address: 69.210.1.9

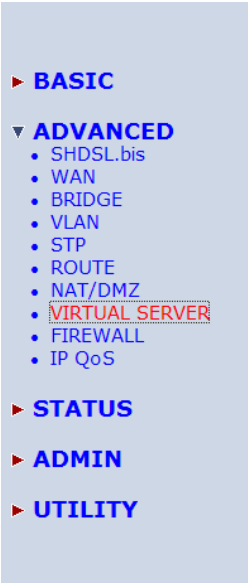
Count: 2

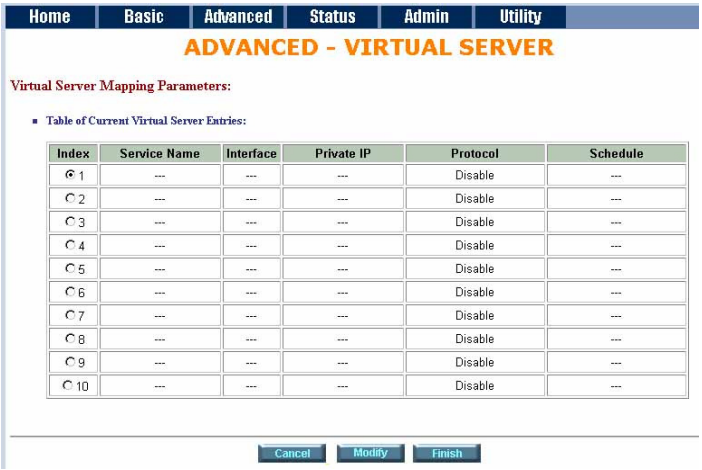
Press Finish to continue to review.

The screen will prompt the parameters that will be written in NVRAM. Check the parameters before writing in NVRAM. Press Restart to restart the line card working with new parameters or Continue to configure another parameter.

3.2.2.7 Virtual Server

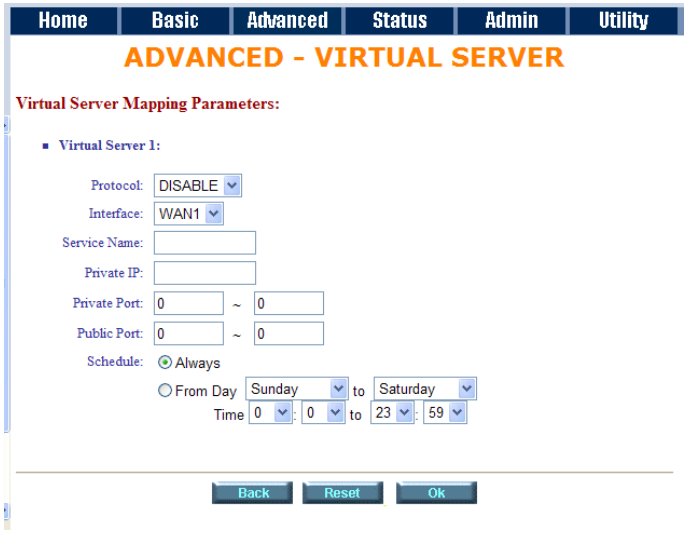
Click Virtual Server to configure the parameters.





There have ten virtual server index form 1 to 10 can been set up.

Press Modify for modify index 1.



Type the necessary parameters and then click OK.

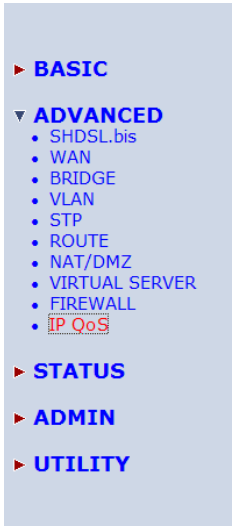
Press Restart to restart the line card or press Continue to setup another function.

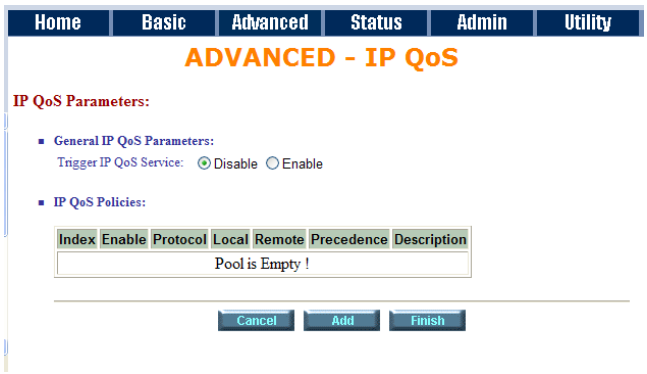
For example: Specific ports on the WAN interface are re-mapped to services inside the LAN. As only 69.210.1.8 (e.g., assigned to WAN from ISP) is visible to the Internet, but does not actually have any services (other than NAT of course) running on gateway, it is said to be a virtual server. Request with TCP made to 69.210.1.8:80 are remapped to the server 1 on 192.168.0.2:80 for working days from Monday to Friday 8 AM to 6PM, other requests with UDP made to 69.210.1.8:25 are remapped to server 2 on 192.168.0.3:25 and always on.

You can setup the line card as Index 1, protocol TCP, interface WAN1, service name test1, private IP 192.168.0.2, private port 80, public port 80, schedule from Day Monday to Friday and time 8:0 to 16:0 and index 2, protocol UDP, interface WAN1, service name test2, private IP 192.168.0.3, private port 25, public port 25, schedule always.

3.2.2.8 IP QoS

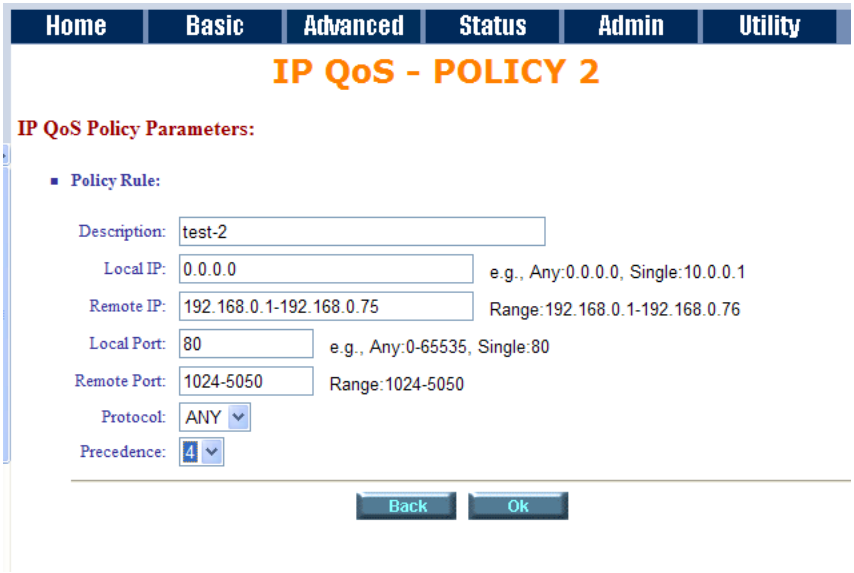
IP QoS is a good function to decide which PCs can get the priorities to pass though line card once if the bandwidth is exhausted or fully saturated.





Click Enable at item Trigger IP QoS Service in General IP QoS Parameter, which will turn on this IP QoS function.

Click Add in the bottom of web page to begin a new entry in IP QoS Policy table.



Description: A brief statement describe this policy

Local IP: type IP address of local host in prioritized session.

Remote IP: type IP address of remote host in prioritized session.

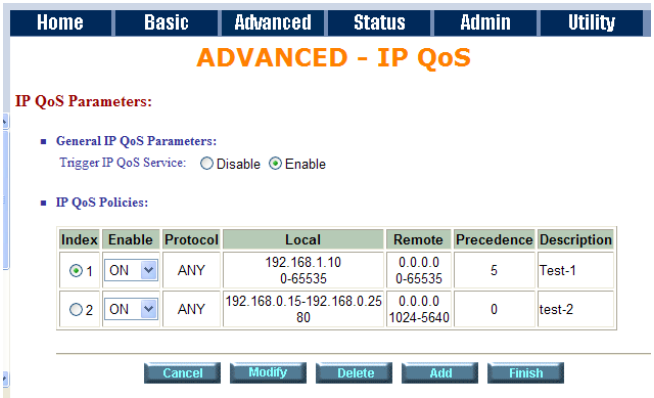
Local Port: type the service port number of local host in prioritized session.

Remote Port: type the service port number of remote host in prioritized session.

Protocol: identify the transportation layer protocol type you want to prioritize, ex: **TCP** or **UDP**. The default is **ANY**.

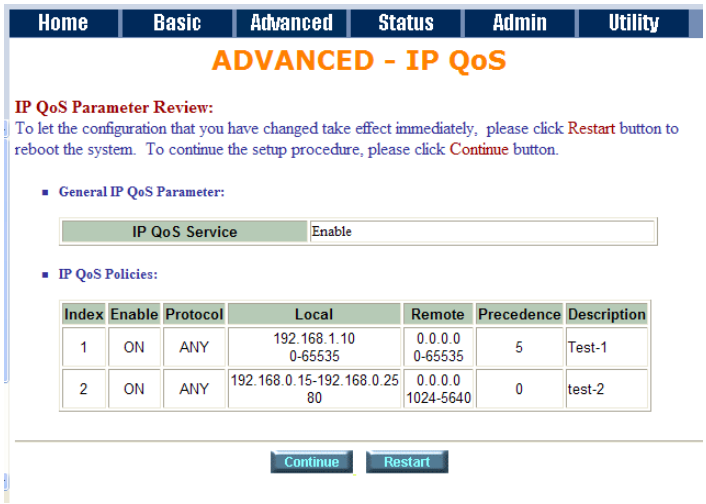
Precedence: type the session's prioritized level you classify, "**0**" is lowest priority, "**5**" is highest priority.

Click OK when all parameters are finish.



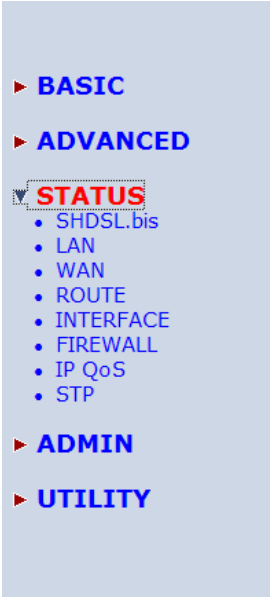
You can modify or delete the policies by click Modify or Delete command

Click Finish can make a review for all IP QoS parameter



To let the IP QoS configuration you have changed and want those take effect immediately, please click Restart button to reboot the system. To continue the setup procedure, please click Continue button.

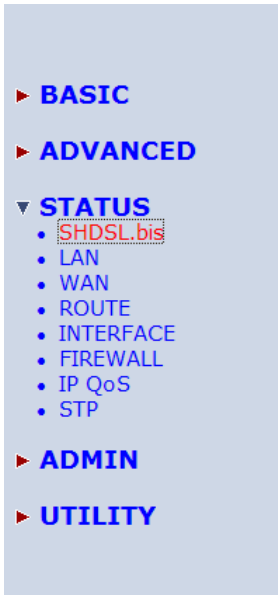
3.2.3 Status

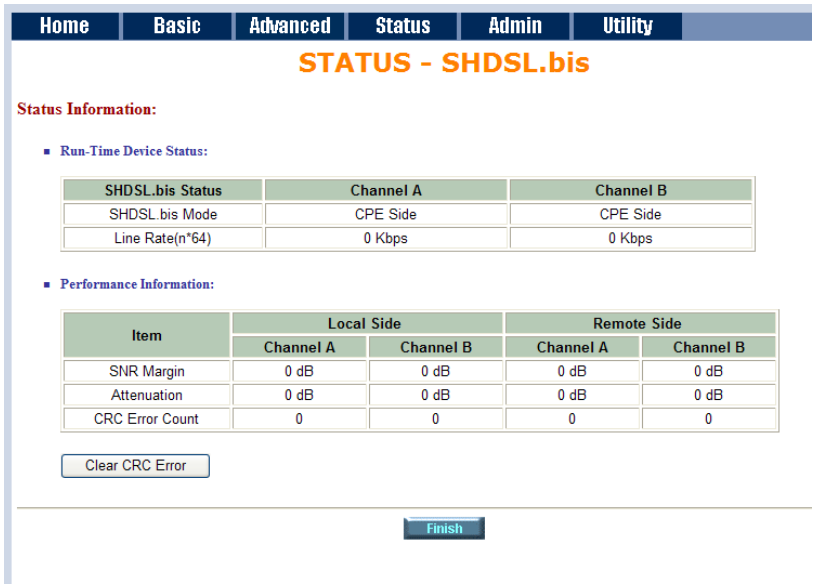


On STATUS item, you can monitor the following:

SHDSL.bis	Mode, Line rate and Performance information including SNR margin, atteunation and CRC error count.
LAN	IP type, MAC address, IP address, Subnet mask and DHCP client table: Type, IP address and MAC address.
WAN	WAN interface information. 8 WAN interface including IP address, Subnet Mask, VPI/VCI, Encapsulation, Protocol and Flag.
ROUTE	IP routing table including Flags, Destination IP/Netmask.Gateway, Interface and Portname.
INTERFACE	LAN and WAN statistics information.
FIREWALL	Current DoS protection status and dropped packets statistics.
IP QoS	IP QoS statistics on LAN interface
STP	STP information include Bridge parameter and Ports Parameter

3.2.3.1 SHDSL.bis



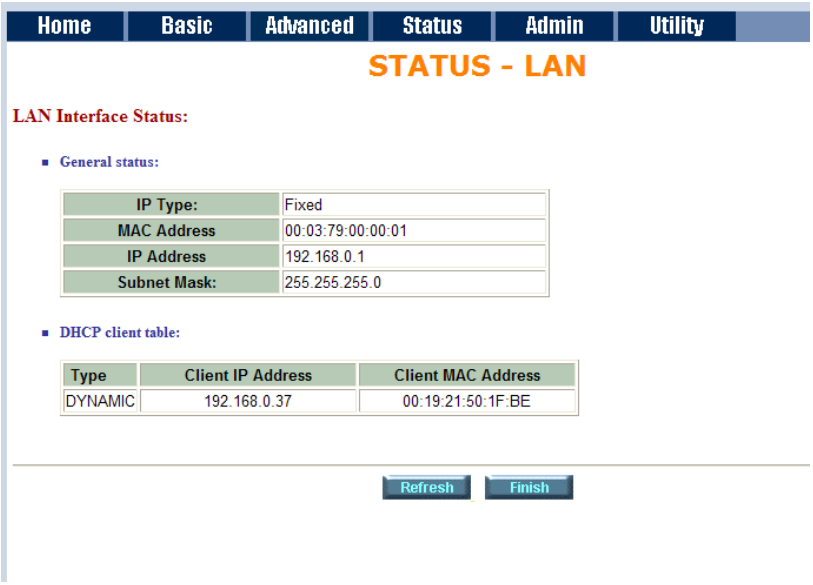


The status information shows this is 4-wire model which have channel A and B. If the line card have connected to remote side, it can also show the performance information of remote side.

It the line card is 2-wire model (3110B), no any channel B information you can see.

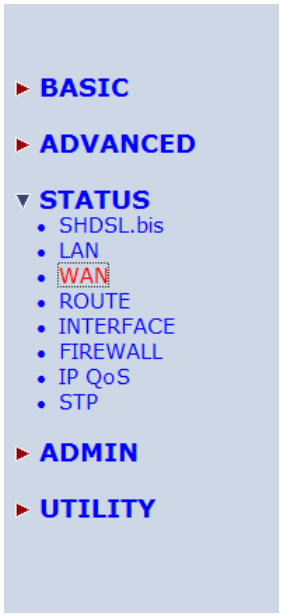
Click Clear CRC Error can clear the CRC error count.

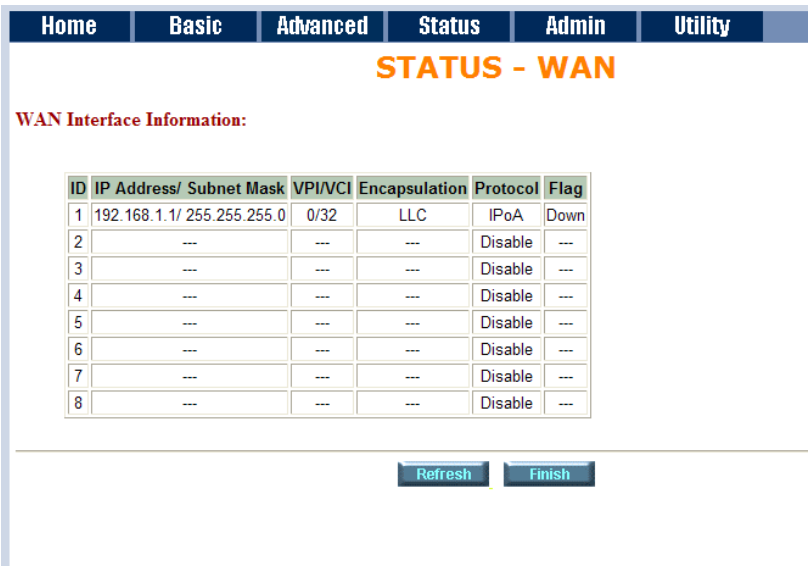
3.2.3.2 LAN



This information shows the LAN interface status and DHCP client table.

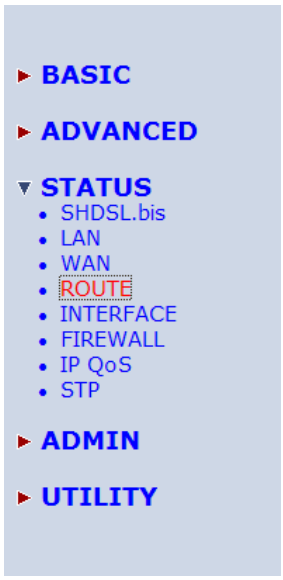
3.2.3.3 WAN

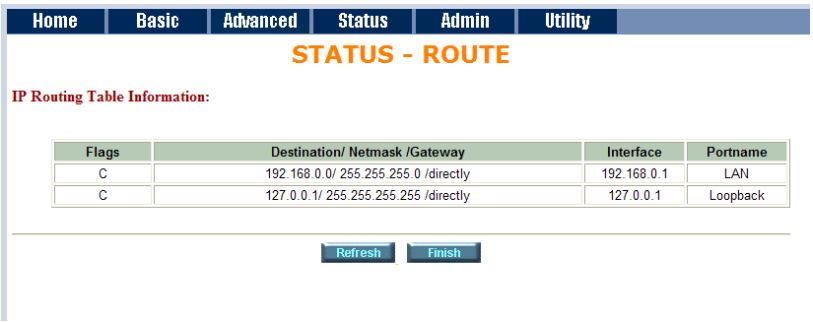




This information shows all eight WAN interface.

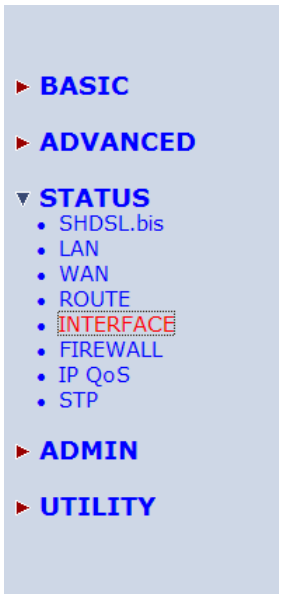
3.2.3.4 ROUTE

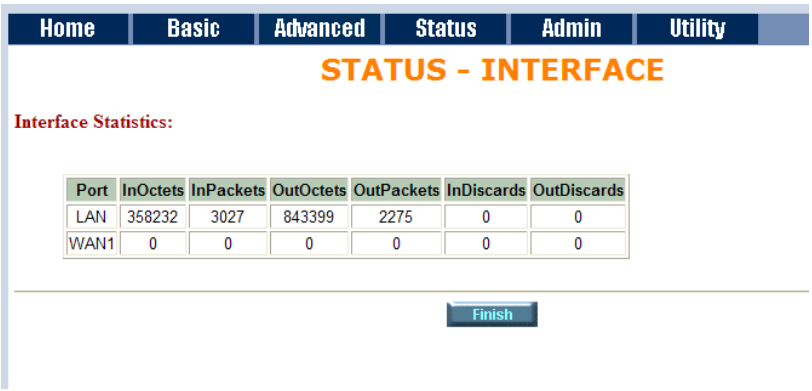




This information shows the IP routing table.

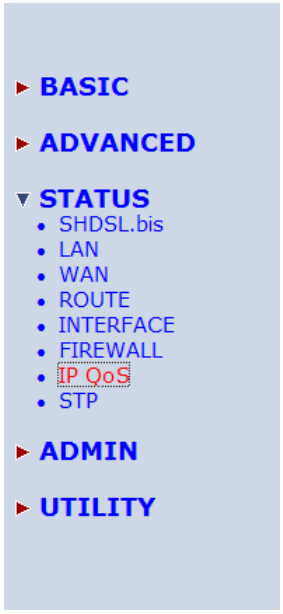
3.2.3.5 INTERFACE

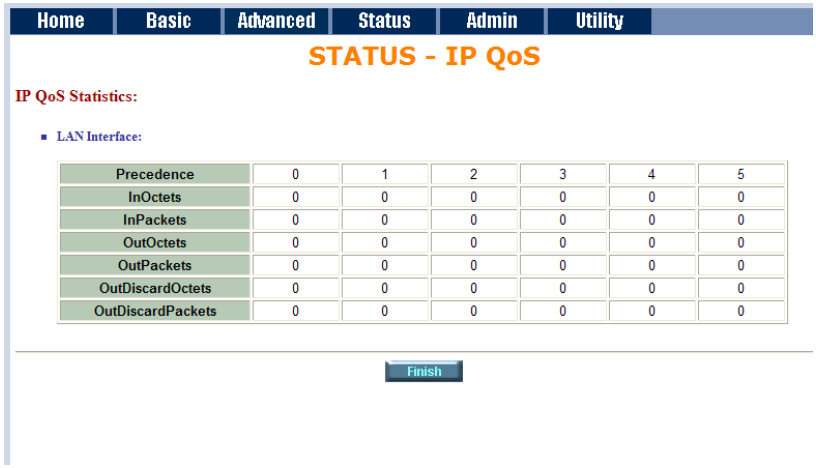




This table shows the interface statistics.

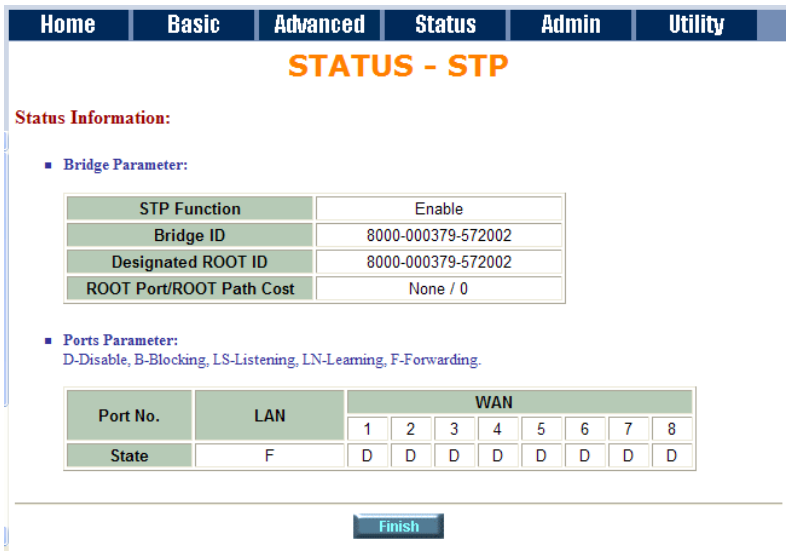
3.2.3.6 IP QoS





This information shows IP QoS statistics.

3.2.3.7 STP



This information shows the STP parameter:

The bridge parameters have:

Bridge ID: The bridge ID of a configuration message is an 8-byte field. The six low order bytes are the MAC address of the switch. The high order two-byte (unsigned 16-bit integer) field is the bridge priority number.

Designated Root ID: The unique Bridge Identifier of the Bridge assumed to be the Root, this parameter is used as the value of the Root Identifier parameter in all CBPDUs transmitted by the Bridge.

Root Port: Identifies the Port through which the path to the Root is established, and is not significant when the Bridge is the Root and is set to zero. It is the Port Identifier of the Port that offers the lowest Cost Path to the Root

Root Path Cost: The Cost of the Path to the Root from this Bridge, this is equal to the sum of the values of the Designated Cost and Path Cost parameters held for the Root Port. When the Bridge is the Root, this parameter is zero.

The ports parameters have:

Learning: This is when the modem creates a switching table that will map MAC addresses to port number.

Listening: This is when the modem processes BPDU's that allow it to determine the network topology.

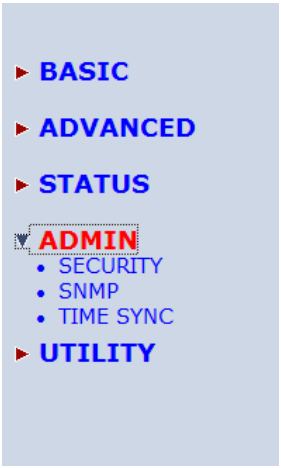
Forwarding: When a port receives or sends data. In other words, this is operating normally.

Disabled: This is when the network administrator has disabled the port.

Blocking: this means the port was blocked to stop a looping condition.

3.2.4 Administration

This session introduces security and simple network management protocol (SNMP) and time synchronous.

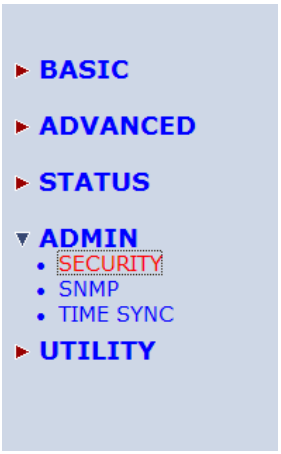


3.2.4.1 Security

For system secutiry, suggest to change the default user name and password in the first setup otherwise unauthorized persons can access the line card and change the parameters.

There are three ways to configure the line card: Web browser, telnet and serial console.

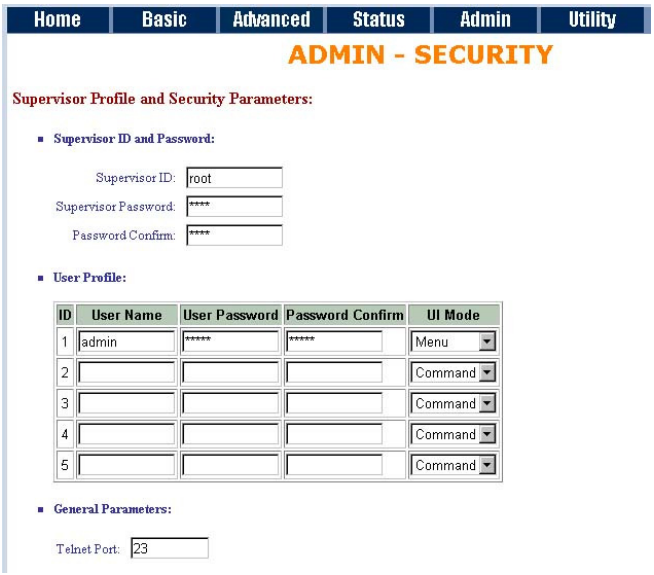
Press **Security** to setup the parameters.

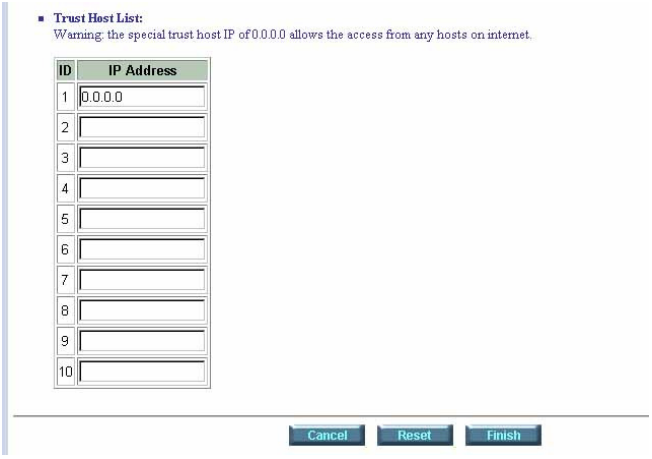


For greater security, change the Supervisor ID and password for the line card. If you don't set them, all users on your network can be able to access the gateway using the default IP and Password root.

You can authorize five legal users to access the line card via telnet or console. There are two UI modes: **menu driven mode** and **line command mode** to configure the line card.

Legal address pool will setup the legal IP addresses from which authorized person can configure the gateway. This is the more secure function for network administrator to setup the legal address of configuration.





This is the default supervisor ID and password is “root”. It is highly recommended that you change these for security purpose.

Supervisor ID: Type the new ID

Supervisor Password: Type the existing password (“root” is the default password when shipped)

Password Confirm: Retype your new password for confirmation.

Telnet Port: For Telnet, you may change the default service port by typing the new port number. If you change the default port number then you will have to let user who wish to use the service know the new port number.

On trust host list, configured 0.0.0.0 will allow all hosts on Internet or LAN to access the line card.

Leaving blank of trust host list will cause blocking all PC from WAN to access the line card. On the other

hand, only PC in LAN can access the line card.

If you type the excact IP address in the filed, only the host on this listing can access to the line card.
Click Finish to finish the setting.

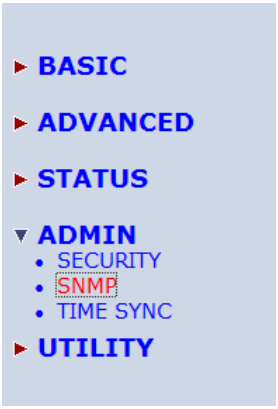
The browser will prompt the all configured parameters and check it before writing into NVRAM.
Press Restart to restart the gateway working with the new parameters and press Continue to setup other parameters.

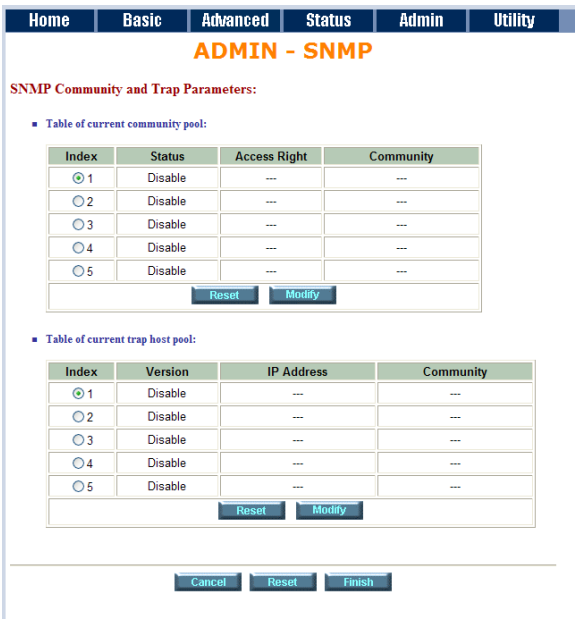
3.2.4.2 SNMP

Simple Network Management Protocol (SNMP) provides for the exchange of messages between a network management client and a network management agent for remote management of network nodes. These messages contain requests to get and set variables that exist in network nodes in order to obtain statistics, set configuration parameters, and monitor network events. SNMP communications can occur over the LAN or WAN connection.

The line card can generate SNMP traps to indicate alarm conditions, and it relies on SNMP community strings to implement SNMP security.
This line card support both MIB I and MIB II.

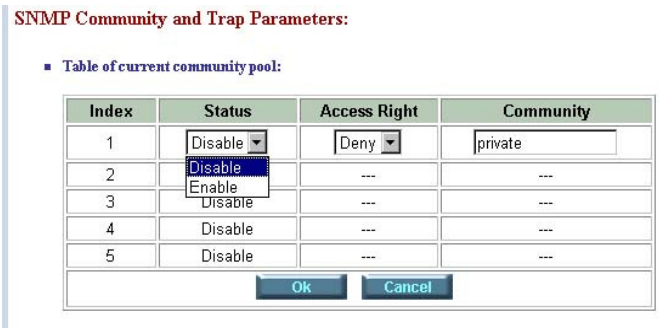
Click SNMP to configure the parameters.



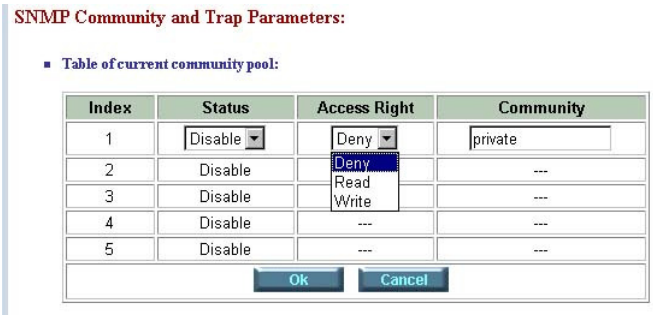


3.2.4.2.1 Community pool

Press Modify to modify the community pool. You can setup the access authority.



SNMP **Status**: Enable



Access Right: Deny for deny all access

Read for access read only

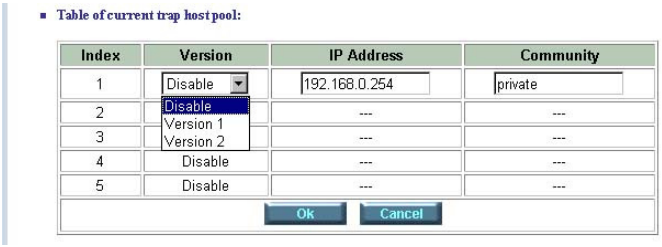
Write for access read and write.

Community: it serves as password for access right.

After configuring the community pool, press OK.

3.2.4.2.2 Trap host pool

SNMP trap is an informational message sent from an SNMP agent to a manager. Click Modify to modify the trap host pool.



Version: select version for trap host. (Version 1 is for SNMPv1; Version 2 for SNMPv2).

IP Address: type the trap host IP address

Community: type the community password. The community is setup in community pool.

Press OK to finish the setup.

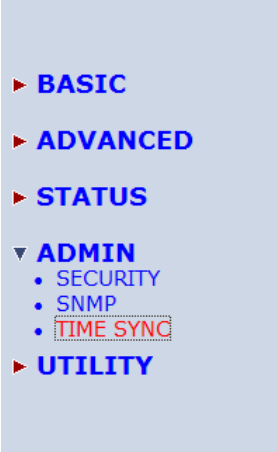
The browser will prompt the configured parameters and check it before writing into NVRAM.

Press Restart to restart the gateway working with the new parameters and press Continue to setup other parameters.

3.2.4.3 *Time Sync*

Time synchronization is an essential element for any business, which relies on the IT system. The reason for this is that these systems all have clock that is the source of timer for their filing or operations. Without time synchronization, these system's clocks vary and cause the failure of firewall packet filtering schedule processes, compromised security, or virtual server working in wrong schedule.

Click TIME SYNC.

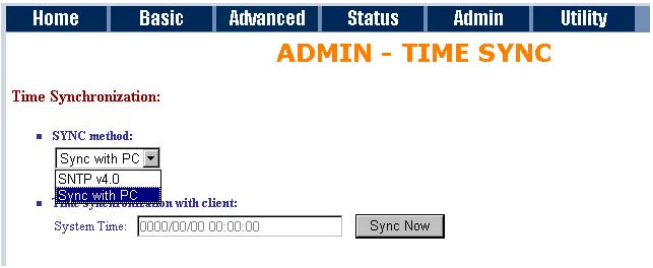


Time synchronization has two methods:

Sync with PC	Synchronization with PC
SNTP v4.0.	Simple Network Time Protocol with Version 4

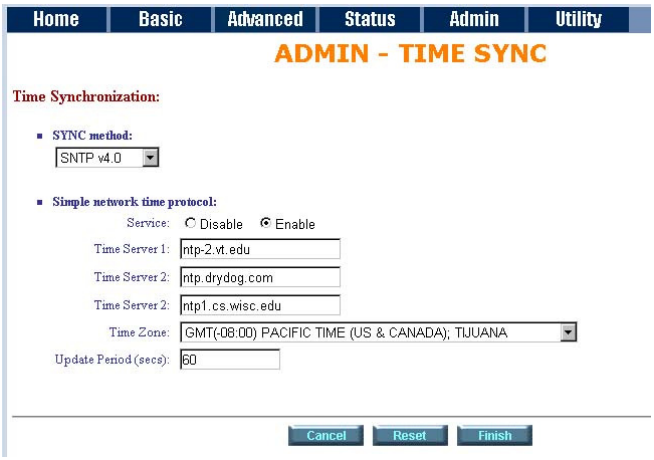
3.2.4.3.1 Synchronization with PC

For synchronization with PC, select Sync with PC. The line card will synchronize the time with the connecting PC.



3.2.4.3.2 SNTP v4.0

For using the SNTP, select SNTP v4.0.



SNTP is the acronym for Simple Network Time Protocol, which is an adaptation of the Network Time Protocol (NTP) used to synchronize computer clocks in the Internet. SNTP can be used when the ultimate performance of the full NTP implementation.

Service: Enable

Time Server 1, Time Server 2 and Time Server 3: All of the time server around the world can be used but suggest using the time server nearby to your country. You can set up maximum three time server on here.

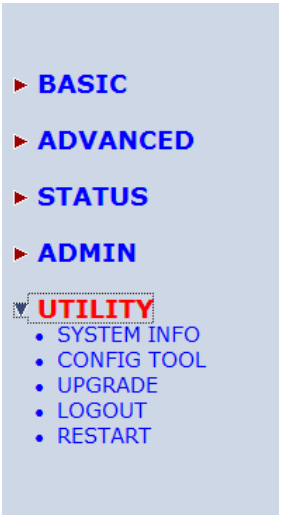
Time Zone: Select the time difference between UTC(Universal Time Coordinated, formerly known as GMT, Greenwich Mean Time) and your time zone from the drop-down list box.

Update Period: How many times the line card can resynchronize to time server. The unit is second.

Press Finish to finish the setup. The browser will prompt the configured parameters and check it before writing into NVRAM.

.

3.2.5 Utility

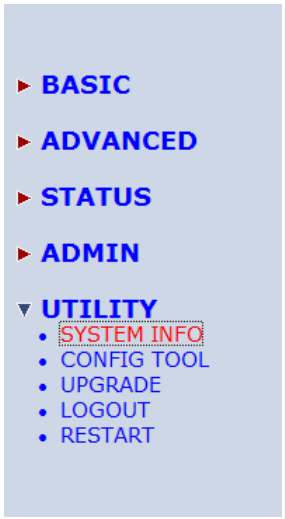


This section will describe the utility of the product including:

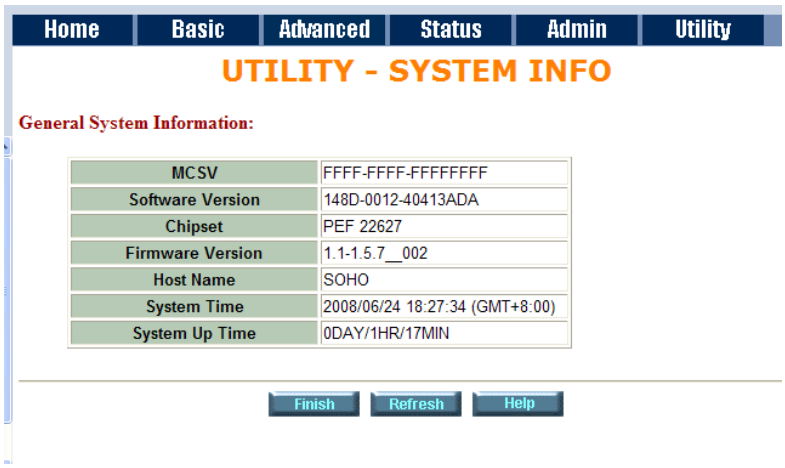
SYSTEM INFO	Show the system information
CONFIG TOOL	Load the factory default configuration, restore configuration and backup configuration
UPGRADE	Upgrade the firmware
LOGOUT	Logout the system
RESTART	Restart the line card

3.2.5.1 System Info

Click System Info for review the information.



The browser will prompt the system information.



There will display general system information including: MCSV, software version, chipset, firmware version, Host Name, System Time and System Up Time.

MCSV: For internal identification purposes.

Software Version: This is the modem's firmware version. This is sometimes needed by technicians to help troubleshoot problems.

Chipset: This is the SHDSL.bis chipset model name.

Firmware Version: This is the chipset's firmware version.

Host Name: This is the system name you enter in BASIC Setup. It is for identification purposes.

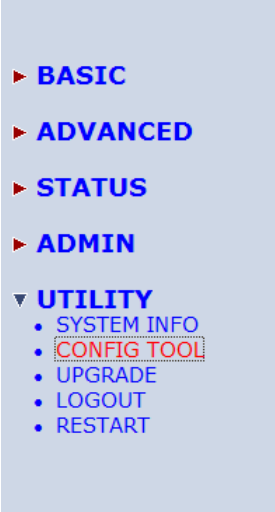
System Time: This field display your modem's present date and time.

System Up Time: This is the total time on the modem has been on.

3.2.5.2 Config Tool

This configuration tool has three functions: load Factory Default, Restore Configuration, and Backup Configuration.

Press CONFIG TOOL.



Choose the function and then press Finish

3.2.5.2.1 Load Factory Default

Load Factory Default: It will load the factory default parameters to the line card.

Note: This action will change all of the settings to factory default value. On the other hand, you will lose all the existing configured parameters.

3.2.5.2.2 Restore Configuration

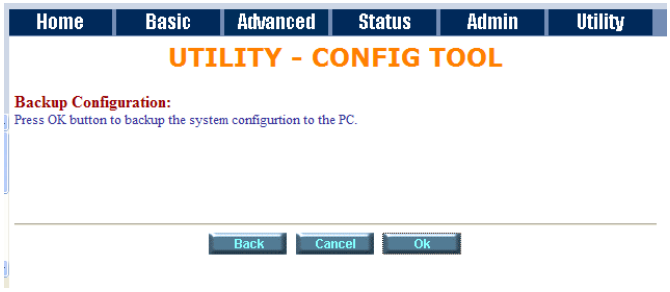
Sometime the configuration crushed occasionally. It will help you to recover the backup configuration easily.

Click Finish after selecting Restore Configuration.

Browse the route of backup file then press Finish. Brower the place of restore file name or put the name. Then press OK. The line card will automatically restore the saved configuration.

3.2.5.2.3 Backup Configuration

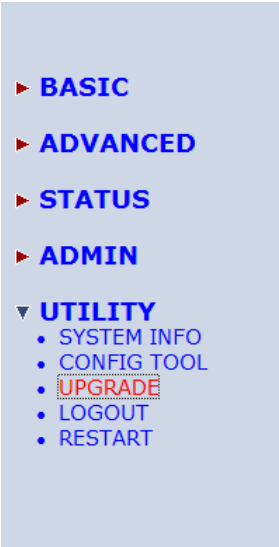
After configuration, suggest using the function to backup your line card parameters in the PC. Select the Backup Configuration and then press Finish. Browse the place of backup file name or put the name. Then press OK. The line card will automatically backup the configuration. If you don't put the file name, the system will use the default: *config1.log*

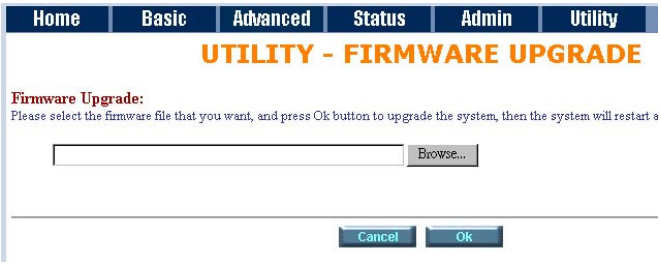


3.2.5.3 Upgrade

You can upgrade the gateway using the upgrade function.

Press Upgrade in UTILITY.

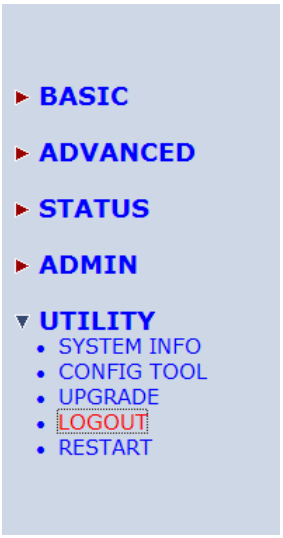




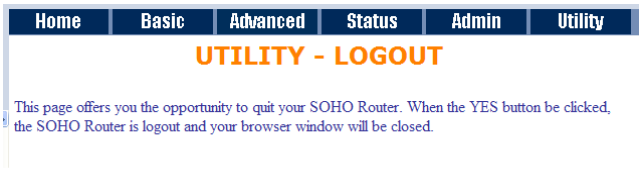
Select the firmware file name by click Browse on your PC or NB and press OK button to upgrade. The system will reboot automatically after finish the firmware upgrade operation.

3.2.5.4 Logout

To logout the line card, press LOGOUT in UTILITY.



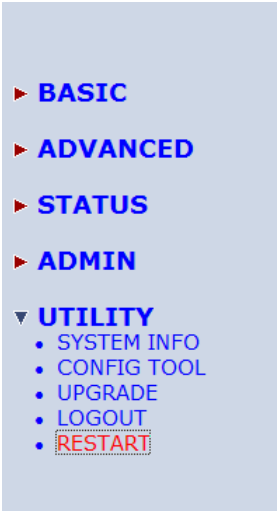
For logout system and close window, click the LOGOUT in UTILITY

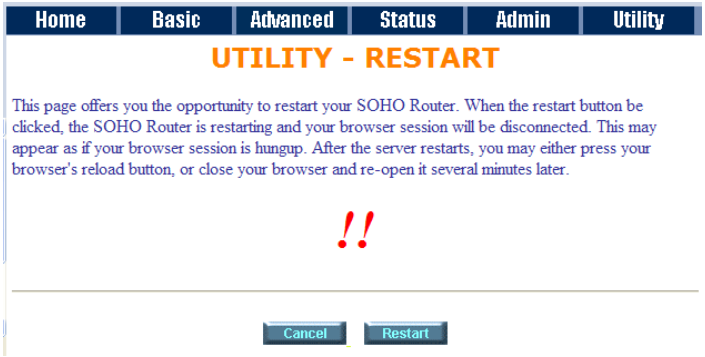


When click the Yes button, the line card will logout and browser window will be closed.

3.2.5.5 Restart

For restarting the line card, click the RESTART in UTILITY.





Press Restart to reboot the line card.

When the restart button been clicked, the line card will restarting and the browser session will be disconnected. This may appear as if your browser session is hung up. After the line card restarts, you may either click the browser's reload button or close the browser and re-open it later.

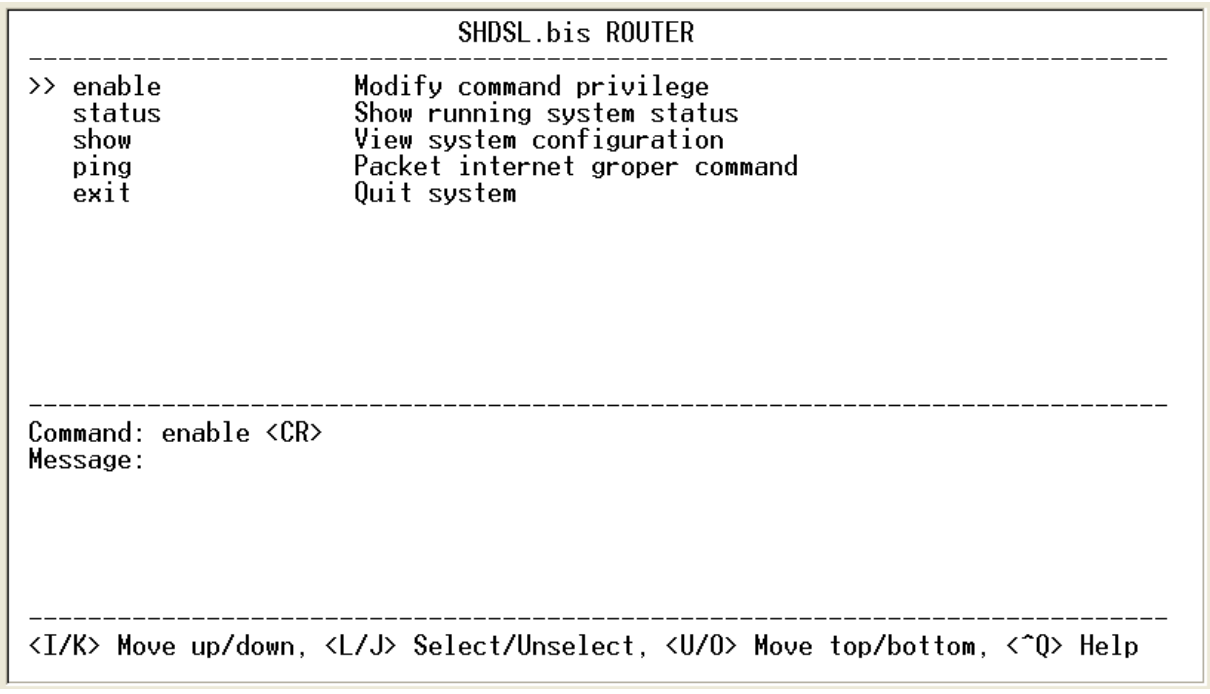
3.3 Configuration by Serial Console and Telnet

3.3.1 General

3.3.1.1 Operation Interface

For serial console and Telnet management, the line card implements two operational interfaces: Command Line Interface (CLI) and menu driven interface. The CLI mode provides users a simple interface, which is better for working with script file. The menu driven interface is a user-friendly interface to general operations. The command syntax for CLI is the same as that of the menu driven interface. The only difference is that the menu driven interface shows you all of available commands for you to select. You don't need to remember the command syntax and save your time on typing the whole command line.

The following figure gives you an example of the menu driven interface. In the menu, you scroll up/down by pressing key I / K, select one command by key L, and go back to a higher level of menu by key J. For example, to show the system information, just logon to the line card, move down the cursor by pressing key K twice and select "show" command by key L, you shall see a submenu and select "system" command in this submenu, then the system will show you the general information.



3.3.1.2 Window structure

From top to bottom, the window is divided into four parts:

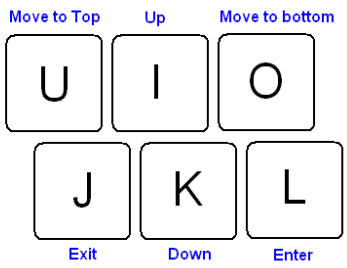
1. **Product name**: “SHDSL.bis ROUTER”
2. **Menu field**: Menu tree prompts on this field. Symbol “**>>**” indicates the cursor place.
3. **Configuring field**: You will configure the parameters in this field. **< parameters >** indicates the parameters you can choose and **< more…>** indicates that there have submenu in the title.
4. Operation command for help

The following table shows the parameters in the brackets.

Command	Description
<ip>	An item enclosed in brackets is required. If the item is shown in lower case bold, it represents an object with special format. For example, **<ip>** may be **192.168.0.3**.
<Route|Bridge>	Two or more items enclosed in brackets and separated by vertical bars means that you must choose exactly one of the items. If the item is shown in lower case bold with leading capital letter, it is a command parameter. For example, **Route** is a command parameter in **<Route|Bridge>**.
[1~1999]	An item enclosed in brackets is optional.
[1~65534|-t]	Two or more items enclosed in brackets and separated by vertical bars means that you can choose one or none of the items.

3.3.1.3 Menu Driven Interface Commands

Before changing the configuration, familiarize yourself with the operations list in the following table. The operation list will be shown on the bottom field of the window.



Menu Driven Interface Commands

Keystroke	Description
[UP] or I	Move to above field in the same level menu.
[DOWN] or K	Move to below field in the same level menu.
U	Move to top field in the same level menu
O	Move to bottom field in the same level menu
[LEFT] or J	Move back to previous menu
[RIGHT] or L	Move forward to submenu
[ENTER]	Move forward to submenu
[TAB]	To choose another parameters
Ctrl + C	To quit the configuring item
Ctrl + D	Disconnection
Ctrl + U	Hot-key switch to command line interface
Ctrl + Q	Display help menu

After you have completed all necessary setting for line card, make sure to write the new configuration to NVRAM by “write” command and reboot the system. Otherwise, all of your changes will not take effect.

3.3.1.4 Main menu before enable

When enter to menu on the following. All of the configuration commands are placed in the subdirectories of Enable protected by supervisor password. On the other hand, unauthorized user cannot change any configurations but viewing the status of the line card and using ping command to make sure the line card and their Ethernet cable is working and ready.

```
-------------------------------------------------------------------------
>> enable              Modify command privilege
    status               Show running system status
   show              View system configuration
   ping              Packet internet groper command
   exit              Quit system

-------------------------------------------------------------------------
```

If you need setup and manage the line card, you must set **enable** command before

3.3.2 Enable

To setup the line card, move the cursor " >>" to **enable** and press **enter** key. While the screen appears, type the supervisor password. The default supervisor password is ***root***. The password will be prompted as " * " symbol for system security.

```
-------------------------------------------------------------------------
Command: enable <CR>
Message: Please input the following information.

Supervisor password: ****
-------------------------------------------------------------------------
```

In this sub menu, you can setup management features and upgrade software, backup the system configuration and restore the system configuration via utility tools.

For any changes of configuration, you have to write the new configuration to NVRAM and reboot the line card to work with new setting.

The screen will prompt as follow.

```
-------------------------------------------------------------------------------------------
>> enable          Modify command privilege
   setup           Configure system
   status          Show running system status
   show            View system configuration
   write           Update flash configuration
   reboot          Reset and boot system
   ping            Packet internet groper command
   admin           Setup management features
   utility         TFTP upgrade utility
   exit            Quit system
-------------------------------------------------------------------------------------------
```

Command Description:

Command	Description
enable	Modify command privilege. When you login via serial console or Telnet, the line card defaults to a program execution (read-only) privileges to you. To change the configuration and write changes to nonvolatile RAM (NVRAM), you must work in enable mode.
setup	To configure the line card, you have to use the setup command.
status	View the status of line card.
show	Show the system and configuration of line card.
write	Update flash configuration. After you have completed all necessary setting, make sure to write the new configuration to NVRAM by "**write**" command and reboot the system, or all of your changes will not take effect.
reboot	Reset and boot system. After you have completed all necessary setting, make sure to write the new configuration to NVRAM and reboot the system by "**reboot**" command, or all of your changes will not take effect.
ping	Internet ping command.
admin	You can setup management features in this command.
utility	Upgrade software and backup and restore configuration are working via "**utility**" command.
exit	Quit system

3.3.3 Status

You can view running system status of SHDSL.bis, WAN, route, interface, fireware, ip_qos and stp via **status** command.

Move cursor " **>>** " to **status** and press enter.

```
>> shdsl.bis       Show SHDSL.bis status
   wan             Show WAN interface status
   route           Show routing table
   interface       Show interface statistics status
   stp             Show STP status
   clear           Reset statistics
```

Command	Description
shdsl.bis	The SHDSL.bis status includes line rate, SNR margin, TX power, attenuation, and CRC error of the product, and SNR margin, attenuation and CRC error of remote side. The line card can access remote side's information via EOC (embedded operation channel).
wan	WAN status shows all their parameters including IP address ,Net mask, PVC and protocol information
route	You can see the routing table via route command.
interface	The statistic status of WAN and LAN interface can be monitor by interface command.
stp	Show the STP status on all LANs and WANs
clear	Clear all the statistics data

3.3.3.1 Shdsl.bis

```
------------------------------------------------------------------------------
Monitoring Window...
<SHDSL.bis Status>
SHDSL.bis Mode      : CPE Side
Line Rate(n*64)     :   0kbps
Current SNR Margin  :   0dB
Attenuation         :   0dB
CRC Error Count     :   0

SHDSL Remote Side Status
Current SNR Margin  :   0dB
Attenuation         :   0dB
CRC Error Count     :   0

Refresh counter:131. Press 'c' to clear crc, Press 'Ctrl+C' to quit...
 ------------------------------------------------------------------------------
```

Show SHDSL.bis status includes the Mode, Line Rate, Current SNR Margin, Attenuation and CRC error count on both side.

You can press "c" to clear the CRC error count, press Ctrl+C to quit this page.

3.3.3.2 Wan

Move cursor " **>>** " to **Wan** and press enter.

```
------------------------------------------------------------------------
Monitoring Window...
 WAN    IP address   /    NetMask     VPI/ VCI  Encap  Protocol Active
----- -------------- --------------- --- ----- ------ -------- ------
WAN1  192.168.  1.  1/255.255.255.  0   0/   32  LLC      IPoA   No
WAN2  192.168.  2.  1/255.255.255.  0   0/   34  LLC   Ethernet   No
WAN3  192.168.  3.  1/255.255.255.  0   0/   34  LLC   Ethernet   No
WAN4  192.168.  4.  1/255.255.255.  0   0/   35  LLC      IPoA   No
WAN5  192.168.  5.  1/255.255.255.  0   0/   36  LLC     PPPoA    No
WAN6  192.168.  6.  1/255.255.255.  0   0/   37  LLC   Ethernet   No
WAN7  192.168.  7.  1/255.255.255.  0   0/   38  LLC   Ethernet   No
WAN8  192.168.  8.  1/255.255.255.  0   0/   39  LLC   Ethernet   No
 ------------------------------------------------------------------------
```

Show WAN status include IP address, Net Mask, VPI/VCI, encapsulation type, protocol on each WAN ports

3.3.3.3 Route

Move cursor " **>>** " to **Route** and press enter.

```
------------------------------------------------------------------------
Monitoring Window...
Flag   Destination   /    Netmask   /    Gateway       Interface    Portname
---- ------------------------------------------------ ----------- -------
 C       192.168.0.0/  255.255.255.0/    directly       192.168.0.1     LAN
 C         127.0.0.1/255.255.255.255/    directly         127.0.0.1 Loopback

------------------------------------------------------------------------
```

You can view the routing table on here.

3.3.3.4 Interface

Move cursor " **>>** " to **Interface** and press enter.

```
------------------------------------------------------------------------------
Monitoring Window...
<Interface Statistics>
Port    InOctets    InPackets   OutOctets   OutPackets InDiscards OutDiscards
---- ------------ ---------- ------------ ---------- ---------- -----------
 LAN           0         0         512         8         0          0
WAN1           0         0           0         0         0          0
WAN2           0         0           0         0         0          0
WAN3           0         0           0         0         0          0
WAN4           0         0           0         0         0          0
WAN5           0         0           0         0         0          0
WAN6           0         0           0         0         0          0
WAN7           0         0           0         0         0          0
WAN8           0         0           0         0         0          0

------------------------------------------------------------------------------
```

You can view interface statistics data on one LAN port and eight WAN ports.

InOctets	The field shows the number of received bytes on this port
InPactets	The field shows the number of received packets on this port
OutOctets	The field shows the number of transmitted bytes on this port
OutPactets	The field shows the number of transmitted packets on this port
InDiscards	The field shows the discarded number of received packets on this port
OutDiscards	The field shows the discarded number of transmitted packets on this port

3.3.3.5 STP

Move cursor " **>>** " to STP and press enter.

```
------------------------------------------------------------------------------

<STP Status>
Bridge ID / Designated ROOT ID  : 8000-000379-000001 / 8000-000379-000001
ROOT Port / ROOT Path Cost      : None /     0
Max Age/Forward Delay/Hello Time:   20 /   15 /    2(secs)

           LAN1 LAN2 LAN3 LAN4 WAN1 WAN2 WAN3 WAN4 WAN5 WAN6 WAN7 WAN8
 ----------  ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
     State     D   LN    D    D    D     D    D    D    D    D    D    D
   Priority   128  128  128  128  128  128  128  128  128  128  128  128
  Path Cost   100  100  100  100  500  500  500  500  500  500  500  500

<Hint> D-Disable, B-Blocking, LS-Listening, LN-Learning, F-Forwarding.

 ------------------------------------------------------------------------------
```

You can view all STP status on all LANs and WANs ports.

The STP state per LANs and WANs are as following:

Blocking - A port that would cause a switching loop, no user data is sent or received but it may go into forwarding mode if the other links in use were to fail and the spanning tree algorithm determines the port may transition to the forwarding state. BPDU data is still received in blocking state.

Listening - The switch processes BPDUs and awaits possible new information that would cause it to return to the blocking state.

Learning - While the port does not yet forward frames (packets) it does learn source addresses from frames received and adds them to the filtering database (switching database)

Forwarding - A port receiving and sending data, normal operation. STP still monitors incoming BPDUs that would indicate it should return to the blocking state to prevent a loop.

Disabled - Not strictly part of STP, a network administrator can manually disable a port

3.3.3.6 Clear

Move cursor " **>>** " to clear and press enter.

```
--------------------------------------------------------------------------------
 Command: status clear <CR>
 Message: Clear OK!



 --------------------------------------------------------------------------------
```

It will clear/reset all statistics data to zero.

3.3.4 Show

You can view the system information, configuration, and configuration in command script by **show** command.

Move cursor " **>>** " to **show** and press enter.

```
>> system          Show general information
   config          Show all configuration
   script          Show all configuration in command script
```

Command	Description
system	The general information of the system will show in system command.
config	Config command can display detail configuration information.
script	Configuration information will prompt in command script.

3.3.4.1 System information

Move cursor to " **>>** " to **system** and press enter.

```
------------------------------------------------------------------------------
Status Window...
General system information
 MCSV              :EBE0-FFFF-30311498
 Software Version  :0C4E-0020-40413BB5
 Chipset           :PEF21627V1.1
 Firmware Version  :1.1-1.5.7__004
 Hostname          :SOHO
 System Up Time    :0DAY/1HR/10MIN

------------------------------------------------------------------------------
```

From this screen, you can know more about the general information of this line card.

3.3.4.2 Configuration information

Move cursor to " **>>** " to **config** and press enter.

You can view all setting using table format.

3.3.4.3 Configuration with Script format

Move cursor to " **>>** " to **script** and press enter.

You can view all setting using script format.

3.3.5 Write

For any changes of configuration, you must write the new configuration to NVRAM using **write** command and reboot the line card to take affect.

Move cursor to " **>>** " to **write** and press enter.

```
------------------------------------------------------------------------
Command: write <CR>
Message: Please input the following information.

Are you sure? (y/n): y
------------------------------------------------------------------------
```

Press "y" to confirm the write operation.

3.3.6 Reboot

To reboot the line card, please use "**reboot**" command. Move cursor to " **>>** " to **reboot** and press enter.

```
------------------------------------------------------------------------
Command: reboot <CR>
Message: Please input the following information.

Do you want to reboot? (y/n): y
------------------------------------------------------------------------
```

Press "y" to confirm the reboot operation.

3.3.7 Ping

Ping command can use to diagnose basic network connectivity of line card. Move cursor " **>>** " to **ping** and press enter.

The ping command sends an echo request packet to an address, and then awaits a reply. The ping output can help you evaluate path-to-host reliability, delays over the path, and whether the host can be reached or is functioning.

```
------------------------------------------------------------------------
Command: ping <ip> [1~65534|-t] [1~1999]
Message: Please input the following information.

IP address <IP> : 10.0.0.1
Number of ping request packets to send (TAB select): -t
Data size [1~1999]: 32
------------------------------------------------------------------------
```

There are 3 parameters for ping command:

<ip> [1~65534|-t] [1~1999]

IP address: The IP address which you want to ping.

Number of ping request packed to send, key TAB for further selection:

- Default: It will send 4 packets only
- 1~65534: Set the number of ping request packets from 1 to 65534
- -t : It will continuous until you key Ctrl+C to stop

Data Size: From 1 to 1999

3.3.8 Administration

You can modify the user profile, security, SNMP (Sample Network Management Protocol), supervisor information and SNTP (Simple Network Time Protocol) in **admin**.

For configuration the parameters, move the cursor " **>>** " to **admin** and press enter.

```
>> user             Manage user profile
   security         Setup system security
   snmp             Configure SNMP parameter
   passwd           Change supervisor password
   id               Change supervisor ID
   sntp             Configure time synchronization
```

3.3.8.1 User Profile

You can use **user** command to clear, modify and list the user profile. You can setup at most five users to access the line card via console port or telnet in user profile table however users who have the supervisor password can change the configuration of the line card. Move the cursor " **>>** " to **user** and press enter key.

```
>> clear            Clear user profile
   modify           Modify the user profile
   list             List the user profile
```

You can delete the user by number using **clear** command. If you do not make sure the number of user, you can use **list** command to check it. **Modify** command is to modify an old user information or add a new user to user profile.

To modify or add a new user, move the cursor to **modify** and press enter.

```
------------------------------------------------------------------
Command: admin user modify <1~5> <more...>
Message: Please input the following information.

Legal access user profile number <1~5> : 2
------------------------------------------------------------------
```

The screen will prompt as follow.

```
>> Attrib           UI mode
   Profile          User name and password
```

There are two UI mode, **command** and **menu** mode, to setup the line card. We will not discuss command mode in this manual.

Move the cursor to **Attrib** to change the UI mode on this profile
Move the cursor to **Profile** and press enter, you can change the username and their password on this profile.

The screen will prompt as follow:

```
-------------------------------------------------------------------------
 Command: admin user modify 5 profile <name> <pass_conf>
 Message: Please input the following information.

 Legal user name (ENTER for default) <superman>: tester
 Input the old Access password: **
 Input the new Access password: **
 Re-type Access password: **
 -------------------------------------------------------------------------
```

Finally, you can use **list** command to check the listing of five profiles including on user name and their UI mode.

The screen will prompt as follow:

```
-------------------------------------------------------------------------
Legal Access User Profile
  No     User  Name        UI Mode
 ---- ------------------ -----------
   1             test      Menu
   2           test-1       Menu
   3           test-2    Command
   4           test-3    Command
   5         superman       Menu

-------------------------------------------------------------------------
```

3.3.8.2 Security

Security command can be configured sixteen legal IP address for telnet access and telnet port number.

Move the cursor " **>>** " to **security** and press enter.

```
>> port            Configure telnet TCP port
   ip_pool         Legal client IP address pool
   list            Show security profile
```

Move the cursor to **port** and press enter. You can setup port number form 1 to 65534.

Move the cursor to **IP Pool** and press enter, there are sixteen legal IP address for telnet access. The default legal address is 0.0.0.0. It means that there is no restriction of IP to access the line card via telnet.

Move the cursor to **list** and press enter, you can view full listing on security profile including the Telnet listing TCP port and 16 host IP address.

3.3.8.3 SNMP

Simple Network Management Protocol (SNMP) is the protocol not only governing network management, but also the monitoring of network devices and their functions.

The line card can generate SNMP traps to indicate alarm conditions, and it relies on SNMP community strings to implement SNMP security. This line card support MIB I & II.

Move the cursor " **>>** " to **snmp** and press enter.

```
>> community       Configure community parameter
   trap            Configure trap host parameter
```

5 entries of SNMP community can be configured in this system.
Move the cursor to **community** and press enter.

```
-------------------------------------------------------------------------
Command: admin snmp community <1~5> <more...>
Message: Please input the following information.

Community entry number <1~5> : 2
-------------------------------------------------------------------------
```

The screen will prompt as follow:

```
>> edit            Edit community entry
   list            Show community configuration
```

Move the cursor to **edit** and press enter. You can setup the following:

Validate : Set **Enable** or **Disable**
Community : Key in the string
Access right : Set **Read only**, **Read Write** or **Denied**

Move the cursor to **list** and press enter, you can view full listing on SNMP Community Pool.

5 entries of SNMP trap are allowed to be configured in this system.
Move the cursor to **trap** and press enter.

```
-------------------------------------------------------------------------
Command: admin snmp trap <1~5> <more...>
Message: Please input the following information.

Trap host entry number <1~5> : 2
-------------------------------------------------------------------------
```

The screen will prompt as follow:

```
>> edit            Edit trap host parameter
   list            Show trap configuration
```

Move the cursor to **edit** and press enter, you can setup the following:

Version : **Disable**, **1** or **2**

Trap host IP address : Key in the IP address
Community : Key in the string

Move the cursor to **list** and press enter, you can view full listing on SNMP Trap Host Pool.

3.3.8.4 Supervisor Password and ID

The supervisor password and ID is the last door for security but the most important. Users who access the line card via web browser have to use the ID and password to configure the line card and users who access the line card via telnet or console mode have to use the password to configure the line card. Suggest to change the ID and password after the first time of configuration, and save it. At next time when you access to the line card, you have to use the new password.

```
------------------------------------------------------------------------
Command: admin passwd <pass_conf>
Message: Please input the following information.

Input old Supervisor password: ****
Input new Supervisor password: ********
Re-type Supervisor password: ********
------------------------------------------------------------------------


------------------------------------------------------------------------
Command: admin id <pass_conf>
Message: Please input the following information.

Legal user name (Enter for default) <root> : test
------------------------------------------------------------------------
```

3.3.8.5 SNTP

Time synchronization is an essential element for any business that relies on an IT system. The reason for this is that these systems all have clocks, which are the source of time for files or operations they handle. Without time synchronization, time on these systems varies with each other or with the correct time and this can cause- virtual server schedule processes to fail and system log exposures with wrong data.

There are two methods to synchronize time, **synchronize with PC** or **SNTPv4**. If you choose synchronize with PC, the line card will synchronize with PC's internal timer. If you choose SNTPv4, the line card will use the protocol to synchronize with the time server. For synchronization the time server with SNTP v4, needs to configure service, **time_server** and **time_zone**. For synchronization with PC, doesn't need to configure the above parameters.

Move the cursor " **>>** " to **sntp** and press enter.

```
>> method          Select time synchronization method
   service         Tigger SNTP v4.0 service
   time_server1    Configure time server 1
   time_server2    Configure time server 2
   time_server3    Configure time server 3
   Update_rate     Configure update period
   time_zone       Configure GMT time zone offset
   list            Show SNTP configuration
```

To configure SNTP v4 time synchronization, follow the below procedures:

Move the cursor to **method** and press enter.

```
-------------------------------------------------------------------------
Command: admin sntp method <SNTPv4|SyncWithPC>
Message: Please input the following information.

SYNC method (Enter for default) <SyncWithPC> : SNTPv4
-------------------------------------------------------------------------
```

Move the cursor to **service** and press enter.

```
-------------------------------------------------------------------------
Command: admin sntp service <Disable|Enable>
Message: Please input the following information.

Active SNTP v4.0 service (Tab Select) <Enable> : Enable
-------------------------------------------------------------------------
```

Move the cursor to **time_server1** and press enter.

```
-------------------------------------------------------------------------
Command: admin sntp time_server1 <string>
Message: Please input the following information.

Time server address(Enter for default) <ntp-2.vt.edu> : ntp-2.vt.edu
-------------------------------------------------------------------------
```

You can configure three time servers in this system with time_server1, time_server2 and time_server3. The default time servers are the following:

- time_server1 : ntp-2.vt.edu
- time_server2 : ntp.drydog.com

- time_server3 : ntp1.cs.wisc.edu

Move the cursor to **update_rate** and press enter.

```
------------------------------------------------------------------------
Command: admin sntp update_rate <10~268435455>
Message: Please input the following information.

Update period (secs) (Enter for default) <3600> : 86400
------------------------------------------------------------------------
```

Move the cursor to **time_zone** and configure where your line card is placed. The easiest way to know the time zone offset hour is from your PC clock. Double click the clock at the right corner of monitor and check the time zone of your country. There will have a (GMT+XX:XX) or (GMT-XX.XX) information.

```
------------------------------------------------------------------------
Command: admin sntp time_zone <-12~12>
Message: Please input the following information.

GMT time zone offset (hours) (Enter for default) : -8
------------------------------------------------------------------------
```

Move the cursor to **list** for review the SNTP setting.

```
------------------------------------------------------------------------
Status Window...

Time Synchronization Parameters
 Method                    : SNTP v4.0
 Service                   : Enable
 Time Server 1             : ntp-2.vt.edu
 Time Server 2             : ntp.drydog.com
 Time Server 3             : ntp1.cs.wisc.edu
 Update Period             : 3600 secs
 GMT Time Zone Offset      : 8 hours

------------------------------------------------------------------------
```

3.3.9 Utility

There are three utility tools, upgrade, backup and restore, which embedded in the firmware. You can update the new firmware via TFTP upgrade tools and backup the configuration via TFTP backup tool and restore the configuration via TFTP restore tool. For operation on firmware upgrade and backup or restore the system configuration, you must have your own TFTP server software.

Move the cursor " **>>** " to **utility** and press enter.

```
>> upgrade        Upgrade main software
   backup         Backup system configuration
   Restore        Restore system configuration
```

3.3.9.1 Upgrade

Move the cursor " **>>** " to **upgrade** and press enter.

```
-------------------------------------------------------------------------
 Command: utility upgrade <ip> <file>
 Message: Please input the following information.

 TFTP server IP address (ENTER for default) <192.168.0.2>: 192.168.0.100
 Upgrade filename (ENTER for default) <default.bin>: K5890000.bin

-------------------------------------------------------------------------
```

Type TFTP server IP address and upgrade filename of the software.

3.3.9.2 Backup

Move the cursor " **>>** " to **backup** and press enter.

```
-------------------------------------------------------------------------
 Command: utility backup <ip> <file>
 Message: Please input the following information.

 TFTP server IP address (ENTER for default) <192.168.0.2>: 192.168.0.120
 Upgrade filename (ENTER for default) <default.bin>: backup001.bin


-------------------------------------------------------------------------
```

Type TFTP server IP address and backup filename of system configuration..

3.3.9.3 Restore

Move the cursor " **>>** " to **restore** and press enter.

```
-------------------------------------------------------------------------
 Command: utility restore <ip> <file>
 Message: Please input the following information.

 TFTP server IP address (ENTER for default) <192.168.0.2>: 192.168.0.150
```

```
Upgrade filename (ENTER for default) <default.bin>: backup002.bin

-------------------------------------------------------------------------
```

Type TFTP server IP address and restore filename of system configuration.

3.3.10 Exit

If you want to exit the system without saving, use **exit** command to quit system.

```
-------------------------------------------------------------------------
Command: exit <CR>
Message: Please input the following information.

Do you want to disconnect? (y/n):

-------------------------------------------------------------------------
```

Press “y” to confirm the exit operation.

3.3.11 Setup

All of the setup parameters are located in the subdirectories of setup. Move the cursor " **>>** " to **setup** and press enter.

```
>> mode             Switch system operation mode
   shdsl.bis        Configure SHDSL.bis parameters
   wan              Configure WAN interface profile
   bridge           Configure transparent bridging
   stp              Configure bridge STP parameters
   route            Configure routing parameters
   lan              Configure LAN interface profile
   ip_share         Configure NAT/PAT parameters
   dhcp             Configure DHCP parameters
   dns_proxy        Configure DNS proxy parameters
   hostname         Configure local host name
   default          Restore factory default setting
```

3.3.11.1 Mode

The product can act as routing mode or bridging mode. The default setting is routing mode. You can change the system operation mode by using mode command. Move the cursor " **>>** " to **mode** and press enter.

```
------------------------------------------------------------------------
Command: setup mode <Route|Bridge>
Message: Please input the following information.

System operation mode (TAB select) <Route>: Route
------------------------------------------------------------------------
```

3.3.11.2 SHDSL.bis

You can setup the SHDSL.bis parameters by the command **shdsl.bis**. Move the cursor " **>>** " to shdsl.bis and press enter.

```
`>> mode             Configure SHDSL.bis mode
   n*64             Configure SHDSL.bis data rate
   type             Configure SHDSL.bis annex type
   margin           Configure SHDSL.bis SNR margin
   Clear            Clear current CRC error count
```

There are two types of SHDSL.bis mode, STU-C and STU-R. STU-C means the terminal of central office and STU-R means customer premise equipment.

You can setup the data rate by the multiple of 64Kbps where n is from 3 to 36.

For adaptive mode, you have to setup n=0. The router will adapt the data rate according to the line status.

There are two types of SHDSL.bis Annex type : **Annex-A**, **Annex-B**.

Clear command can clear CRC error count.

Generally, you cannot need to change SNR margin, which range is from -10 to 21. SNR margin is an index of line connection. You can see the actual SNR margin in STATUS SHDSL.bis. The larger is SNR

margin; the better is line connection quality. If you set SNR margin in the field as 3, the SHDSL.bis connection will drop and reconnect when the SNR margin is lower than 3. On the other hand, the device will reduce the line rate and reconnect for better line connection.

3.3.11.3 WAN

The line card supports 8 PVC, private virtual circuit, and so you can setup eight WAN, such as WAN1 to WAN8. Move the cursor " **>>** " to **wan** and press enter.

For example, to set up WAN1, type **1** on interface number.

```
------------------------------------------------------------------------
Command: setup wan <1~8>
Message: Please input the following information.

Interface number <1~8>: 1
------------------------------------------------------------------------
```

```
>> protocol        Link type protocol
   address         IP address and subnet mask
   vpi_vci         Configure VPI/VCI value
   encap           Configure encapsulation type
   qos             Configure VC QoS
   isp             Configure account name, password and idle time
   ip_type         Configure IP type in PPPoA and PPPoE
   list            WAN interface configuration
```

There are four types of protocols, IPoA, EoA, PPPoA and PPPoE, which you can setup.

For dynamic IP of PPPoA and PPPoE, you do not need to setup IP address and subnet mask.

There is an unique VPI and VCI value for Internet connection supported by ISP. The range of VIP is from 0 to 255 and VCI from 0 to 65535.

VPI *(Virtual Path Identifier) : for set up ATM Permanent Virtual Channels(PVC).*

VCI *(Virtual Channel Identifier) : for set up ATM Permanent Virtual Channels(PVC).*

There are two types of encapsulation types, **VC-Mux** and **LLC**.

You can setup virtual circuit quality of service, VC QoS, using **qos** command. The line card supports **UBR**, **CBR**, **VBR-rt** and **VBR-nrt**. Move the cursor to **qos** and press enter.

```
>> class           Configure QoS class
   pcr             Configure peak cell rate (kbps)
   scr             Configure sustainable cell rate (kbps)
   mbs             Configure max. burst size (cell)
```

UBR *(Unspecified Bit Rate) is the simplest service provided by ATM networks. There is no guarantee of anything. It is a primary service used for transferring Internet traffic over the ATM network.*

CBR *(Constant Bit Rate) is used by connections that requires a static amount of bandwidth that is avilable during the connection life time. This bandwidth is characterized by Peak Cell Rate (PCR). Based*

on the PCR of the CBR traffic, specific cell slots are assigned for the VC in the schedule table. The ATM always sends a signle cell during the CBR connection's assigned cell slot.

***VBR-rt** (Varible Bit Rate real-time) is intended for real-time applications, such as compressed voice over IP and video comferencing, that require tightly constrained delays and delay variation. VBR-rt is characterized by a peak cell rate (PCR), substained cell rate (SCR), and maximun burst rate (MBR).*

***VBR-nrt** (Varible Bit Rate non-real-time) is intended for non-real-time applications, such as FTP, e-mail and browsing.*

***PCR** (Peak Cell Rate) in kbps: The maximum rate at which you expect to transmit data, voice and video. Consider PCR and MBS as a menas of reducing lantency, not increasing bandwidth. The range of PCR is 384kbps to 11392kbps*

***SCR** (Substained Cell Rate): The sustained rate at which you expect to transmit data, voice and video. Consider SCR to be the true bandwidth of a VC and not the lone-term average traffic rate. The range of SCR is 384kbps to 11392kbps.*

***MBS** (Maximum Burst Size): The amount of time or the duration at which the line card sends at PCR. The range of MBS is 1 cell to 255 cells.*

ISP command can configure account name, password and idle time. Idle time is from 0 minute to 300 minutes.
Most of the ISP use dynamic IP for PPP connection but some of the ISP use static IP. You can configure the IP type: **Dynamic**, **Fixed** and **Unnumbered**. The setting is via **ip_type** command.

You can review the WAN interface configuration via **list** command.

3.3.11.4 Bridge

You can setup the bridge parameters in bridge command. If the line card is configured as router mode line card, you do not want to setup the bridge parameters.

Move the cursor " **>>** " to **bridge** and press enter.

```
>> gateway          Default gateway
   static           Static bridging table
```

You can setup default gateway IP via gateway command.

You can setup 20 sets of static bridge in static command. After entering **static** menu, the screen will prompt as below:

```
>> deny_PCs         Deny PCs to access Internet
   add              Add static MAC entry
   delete           Delete static MAC entry
   modify           Modify static MAC entry
   list             Show static bridging table
```

You can deny PCs to access Internet for security purpose.

After enter **add** menu, the screen will prompt as follow

```
>> mac              Configure MAC address
   lan_port         Configure LAN interface bridging type
   wan1_port        Configure WAN1 interface bridging type
   wan2_port        Configure WAN2 interface bridging type
   wan3_port        Configure WAN3 interface bridging type
   wan4_port        Configure WAN4 interface bridging type
   wan5_port        Configure WAN5 interface bridging type
   wan6_port        Configure WAN6 interface bridging type
   wan7_port        Configure WAN7 interface bridging type
   wan8_port        Configure WAN8 interface bridging type
```

3.3.11.5 STP

Spanning-Tree Protocol (STP) is a link management protocol that provides path redundancy while preventing undesirable loops in the network. For an Ethernet network to function properly, only one active path can exist between two stations

The default is disable.

```
>> active          Trigger Bridge STP function
```

Once you enable the STP feature, you can see the STP status will follow IEEE 802.1d standard to work. The working steps are Blocking, Listening, Learning and forwarding.

3.3.11.6 Route

You can setup the routing parameters in route command. If the line card is configured as a bridge mode, you don't need to setup the route parameters.
Move the cursor " **>>** " to **route** and press enter.

```
>> static          Configure static routing table
   Rip             Configure RIP tool
```

If the line card is connected to more than one network, it may be necessary to set up a static route between them. A static route is a pre-determined pathway that network information must travel to reach a specific host or network.

With Dynamic Routing, you can enable the line card to automatically adjust to physical changes in the network's layout. If the line card using the RIP protocol, determines the network packets' route based on the fewest number of hops between the source and the destination. The RIP protocol regularly broadcasts routing information to other routers on the network.

You can setup 20 sets of static route in static command. After entering **static** menu, the screen will show as follow:

```
>> add             Add static route entry
   delete          Delete static route entry
   List            Show static routing table
```

You can add 20 sets of static route entry by using **add** command. Type the IP information of the static route including IP address, subnet mask and gateway.

You can delete the static route information via **delete** command.

You can review the static route entry by using list command.

To configure Routing Information Protocol (RIP), you can use **rip** command to setup the parameters.
Move the cursor "**>>**" to **rip** and press enter.

```
>> generic          Configure operation and auto summery mode
   lan              Configure LAN interface RIP parameters
   wan              Configure WAN interface RIP parameters
   list             Show RIP configuration
```

Generic command can setup RIP mode and auto summery mode.

If there are any line cards in your LAN, you can configure LAN interface RIP parameters via **lan** command.

The product supports 8 PVCs and you can configure the RIP parameters of each WAN via **wan** command. Move the cursor "**>>**" to **wan** and press enter.

```
-------------------------------------------------------------------------
Command: setup route rip wan <1~8> <more...>
Message: Please input the following information.

Active interface number <1~8>: 1
-------------------------------------------------------------------------
```

The screen will prompt as follow:

```
>> attrib           Operation, authentication and Poison reverse mode
   version          RIP protocol version
   authe            Authentication code
```

Attrib command can configure RIP mode, authentication type and Poison reverse mode.

Version command can configure RIP protocol version.

Authe command can configure authentication code.

You can review the list of RIP parameters via **list** command.

3.3.11.7 LAN

LAN interface parameters can be configured LAN IP address, subnet mask and NAT network type.

```
>> Ip_type          IP type
   Address          LAN IP address and subnet mask
   Attrib           NAT network type
```

3.3.11.8 IP share

You can configure Network Address Translation (NAT), Port Address Translation (PAT) and Demilitarized Zone (DMZ) parameters in **ip_share** menu.

3.3.11.8.1 NAT

NAT (Network Address Translation) is the translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated

the inside network and the other is the outside. Typically, a company maps its local inside network addresses to one or more global outside IP addresses and reverse the global IP addresses of incoming packets back into local IP addresses. This ensure security since each outgoing or incoming request must go through a translation process, that also offers the opportunity to qualify or authenticate the request or match it to a previous request. NAT also conserves on the number of global IP addresses that a company needs and lets the company to use a single IP address of its communication in the Internet world.

To configure Network Address Translation (NAT), Move the cursor "**>>**" to **ip_share** then press enter.

```
>> nat              Configure network address translation
   pat              Configure port address translation
   dmz              Configure DMZ host function
```

You can configure NAT parameters in **nat** menu.

```
>> virtual          Virtual IP address pool
   global           Global IP address pool
   Fixed            Fixed IP address mapping
```

The **virtual** menu contains range of virtual IP address, delete virtual IP address, and show virtual IP address.

```
>> range            Edit virtual IP address pool
   delete           Delete virtual IP address pool
   List             Show virtual IP address pool
```

You can create five virtual IP address pool range in **range** command.

```
-------------------------------------------------------------------------
Command: setup ip_share nat virtual range <1~5> <ip> <1~253>
Message: Please input the following information.

NAT local address range entry number <1~5>: 1
Base address: 192.168.0.2
Number of address: 49
-------------------------------------------------------------------------
```

You can delete virtual IP address range from 1 to 5 by using **delete** command.

You can view the virtual IP address range via **list** command.

To setup global IP address pool, move the cursor "**>>**" to **global** command and press enter.

```
>> range            Edit global IP address pool
   interface        Bind address pool to specific interface
   delete           Delete global IP address pool
   list             Show global IP address pool
```

You can create five global IP address pool range via **range** command.

```
-------------------------------------------------------------------------
Command: setup ip_share nat global range <1~5> <ip> <1~253>
Message: Please input the following information.

NAT global IP address range entry number <1~5>: 1
Base address: 122.22.22.2
Number of address: 3
-------------------------------------------------------------------------
```

After configuration global IP address range, you can bind address pool to specific interface via bind

command.

```
------------------------------------------------------------------------
Command: setup ip_share nat global interface <1~5> <1~8>
Message: Please input the following information.

NAT global ddress range entry number <1~5>: 1
Active interface number <1~8>: 1
------------------------------------------------------------------------
```

You can delete global IP address range “from 1 to 5” by using **delete** command.

You can view the global IP address range via **list** command.

To modify fixed IP address mapping, move the cursor “**>>**” to **fixed** command and press enter.

```
>> modify          Modify fixed NAT mapping
   interface       Bind address pair to specific interface
   delete          Delete fixed NAT mapping
   list            Show fixed IP address mapping
```

You can create up to 10 fixed NAT mapping entry via **range** command.

```
------------------------------------------------------------------------
Command: setup ip_share nat fixed modify <1~1o> <ip> <ip>
Message: Please input the following information.

Fixed NAT mapping entry number <1~10>: 1
Local address: 192.168.0.250
Global address: 122.22.22.2
------------------------------------------------------------------------
```

After configuration fixed IP address entry, you can bind the entry to specific interface via **interface** command.

```
------------------------------------------------------------------------
Command: setup ip_share nat fixed interface <1~5> <1~8>
Message: Please input the following information.

Fixed NAT mapping entry number <1~5>: 1
Active interface number (Enter for default) <1~8>: 1
------------------------------------------------------------------------
```

You can delete fixed NAT mapping entry- from 1 to 5- by using **delete** command.

You can view the fixed NAT mapping entry via **list** command.

3.3.11.8.2 PAT

Port Address Translation (PAT) is a feature of a network device that translates TCP or UDP communications made between hosts on a private network and hosts on a public network. It allows a single public IP address to be used by many hosts on the private network, which is usually called a Local Area Network or LAN.

A PAT device transparently modifies IP packets as they pass through it. The modifications make all the packets which it sends to the public network from the multiple hosts on the private network appear to originate from a single host “the PAT device” on the public network.

In PAT, both the sender's private IP and port number are modified; the PAT device chooses the port numbers which will be seen by hosts on the public network.

In PAT there is generally only one publicly exposed IP address and incoming packets from the public network are routed to their destinations on the private network by reference to a table held within the PAT device which keeps track of public and private port pairs. This is often called connection tracking.

To configure Port Address Translation, move the cursor "**>>**" to **pat** and press enter.

```
>> clear           Clear virtual server mapping
   modify          Modify virtual server mapping
   list            Show virtual server mapping pool
```

You can delete virtual server mapping entry" from 1 to 10" by using **clear** command.

You can create up to 10 virtual server mapping entry via **modify** command.

```
-------------------------------------------------------------------
Command: setup ip_share pat modify <1~10>
Message: Please input the following information.

Virtual server entry number <1~10>: 1
-------------------------------------------------------------------
```

After key in enter, the screen will prompt as below.

```
>> interface       Active interface
   port            TCP/UDP port number
   server          Host IP address and port number
   protocol        Transport protocol
   name            Service name
   begin           The schedule of beginning time
   end             The schedule of ending time
```

Set the active interface number via **interface** command.

You can configure the global port number by using **port** command.

The local server, host, IP address and port number are configured via **server** command.

The authorized access protocol is setup via **protocol** command.

Name command can be used to configure the service name of the host server.

Begin and **end** command is used to setup the local server schedule to access.

You can view the fixed NAT mapping entry via **list** command.

3.3.11.8.3 DMZ

DMZ (demilitarized zone) is a computer host or small network inserted as a "neutral zone" between a company private network and the outside public network. It prevents outside users from getting direct access to a server that has company private data.

To setup demilitarized zone, move the cursor ">>" to **dmz** and press enter.

```
>> active          Tigger DMZ host function
   address         Configure virtual IP address and interface
```

You can enable the demilitarized zone via **active** command.

After enabling the DMZ, shift the cursor to **address** and press enter.

```
-------------------------------------------------------------------------
Command: setup ip_share dmz address <ip> <1~10>
Message: Please input the following information.

Virtual IP address: 192.168.0.251
Active interface number (Enter for default) <1>: 1
-------------------------------------------------------------------------
```

3.3.11.9 DHCP

Dynamic Host Configuration Protocol (DHCP) is a communication protocol that lets network administrators to manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Using the Internet Protocol, each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine.

Without DHCP, the IP address must be entered manually at each computer. If computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator to supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

To configure DHCP server, move the cursor to **dhcp** and press enter.

```
>> generic          DHCP server generic parameters
   fixed            DHCP server fixed host IP list
   relay            DHCP relay parameter
   List             Show DHCP configuration
```

The generic DHCP parameters can be configured via **generic** command.

```
>> active           Trigger DHCP server function
   gateway          Default gateway for DHCP client
   netmask          Subnet mask for DHCP client
   ip_range         Dynamic assigned IP address range
   lease_time       Configure max lease time
   name_server1     Domain name server1
   name_server2     Domain name server2
   name_server3     Domain name server3
```

Command	Description
Active	Trigger DHCP server function
Gateway	Configure default gateway for DHCP client
Net mask	Configure subnet mask for DHCP client
IP range	Configure dynamic assigned IP address range.
Lease time	Set up dynamic IP maximum lease time
Name server 1	Set up the IP address of name server #1
Name server 2	Set up the IP address of name server #2
Name server 3	Set up the IP address of name server #3

Fixed Host IP Address list are setup via **fixed** command.

```
>> add              Add a fixed host entry
   delete           Delete a fixed host entry
```

When use the fixed host entry, you must enter the MAC address and IP address as the same time.

There can be set up to 10 maximum fixed host IP address.

Active the DHCP relay and remote server IP address via **relay** command

You can view the DHCP configuration via **list** command.

3.3.11.10 DNS proxy

Enter the IP address via DNS proxy command. Move cursor " **>>** " to **dns_proxy** and press enter.

```
------------------------------------------------------------------------
Command: setup dns_proxy <IP> [IP] [IP]
Message: Please input the following information.

DNS server 1 (ENTER for default) <168.95.1.1>: 10.0.10.1
DNS server 2: 10.10.10.1
DNS server 3:
------------------------------------------------------------------------
```

You can setup three DNS servers in the line card. The number 2 and 3 DNS servers are option.

3.3.11.11 Host name

A Host Name is the unique name by which a network-attached. The hostname is used to identify a particular host in various forms of electronic communication.

Enter local host name via hostname command. Move cursor " **>>** " to **hostname** and press enter.

```
------------------------------------------------------------------------
Command: setup hostname <name>
Message: Please input the following information.

Local hostname (ENTER for default) <SOHO>: test
------------------------------------------------------------------------
```

The host name can't use more than 15 characters and don't use space character.

Some of the ISP requires the Host Name as identification. You may check with ISP to see if your Internet service has been configured with a host name. In most cases, this field can be ignored.

3.3.11.12 Default

If you want to restore factory default, move the cursor " >> " to **default** and then press enter.

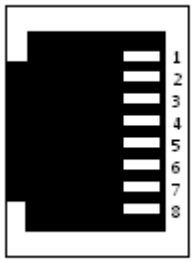
```
-------------------------------------------------------------------------
Command: setup default <name>
Message: Please input the following information.

Are you sure? (Y/N): y
-------------------------------------------------------------------------
```

Press "y" to confirm the restore factory setting operation.

4 Appendix

4.1 Console Cable

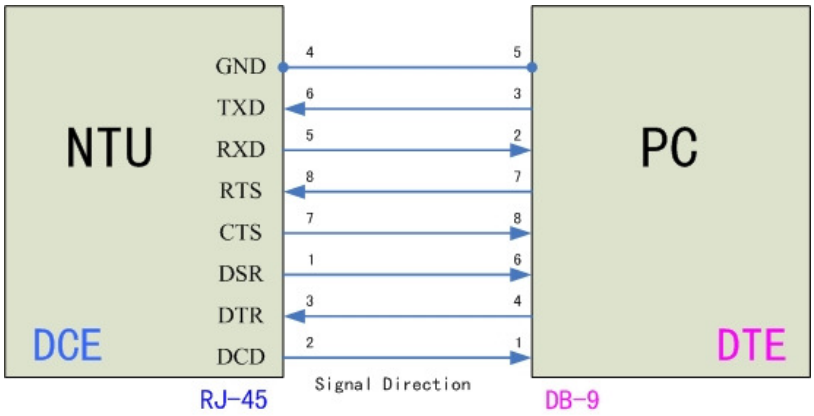
The front view of RJ-45 console cable socket on front panel:



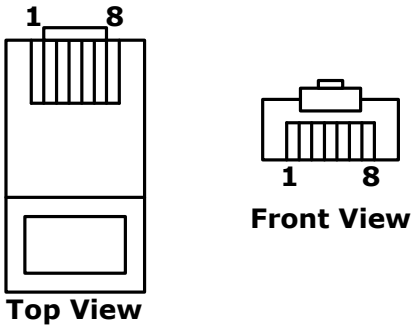
The wire connection of console cable DB-9(Female) to RJ-45:

DB9 (Female)		RJ-45	
1	DCD	1	DSR
2	RXD	2	DCD
3	TXD	3	DTR
4	DTR	4	GND
5	GND	5	RXD
6	DSR	6	TXD
7	RTS	7	CTS
8	CTS	8	RTS
9	NC		

The signal direction of console cable:



The pin assignment of RJ-45 modular jack on the console cable:

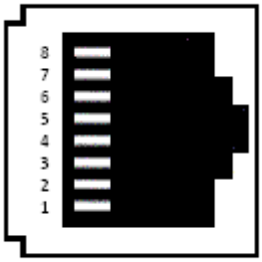
Pin Number	Abbrev.	Description	Figure
1	DSR	DCE ready	
2	DCD	Received Line Signal Detector	
3	DTR	DTE ready	
4	GND	Signal Ground	
5	RXD	Received Data	
6	TXD	Transmitted Data	
7	CTS	Clear to Send	
8	RTS	Request to Send	

4.2 Ethernet cable

The Ethernet cables should be 4 pair unscreened cable (UTP) or screened (STP) of type CAT5 (or higher). Both crossed and normal wiring styles are supported by the auto-crossover feature of the Line card.

We do not provide the cable. It is widely available from other sources.

The front view of RJ-45 Ethernet cable socket on rear panel:



The pin out of RJ-45 Ethernet Connector:

Pin number	Signal Name
1	Transmit Data +
2	Transmit Data -
3	Receive Date +
4	Not used
5	Not used
6	Receive Date -
7	Not used
8	Not used