

G.SHDSL.bis LRE Network Extender User Manual

G.SHDSL.bis Ethernet in First Mile (LRE) Modem

Version 2.0 March 2018

This Manual supports the following models:

Single pair (2 wire) Ethernet Extender

Two pair (4 wire) Ethernet Extender

Four pair (8 wire) Ethernet Extender

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause harmful interference in which case the user will be required to correct the interference at his own expense. NOTICE: (1) The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (2) Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

Table of Contents

| | | |
|---------|--|--------|
| 1 | INTRODUCTION | - 7 - |
| 1.1 | DESCRIPTIONS | - 7 - |
| 1.2 | FEATURES | - 8 - |
| 1.3 | SPECIFICATIONS | - 9 - |
| 1.4 | APPLICATIONS | - 3 - |
| 2 | GETTING TO KNOW ABOUT THE LRE MODEM..... | - 4 - |
| 2.1 | FRONT PANEL..... | - 4 - |
| 2.2 | REAR PANEL..... | - 6 - |
| 2.2.1 | WAN Port..... | - 7 - |
| 2.2.2 | LAN ports and MGMT port..... | - 7 - |
| 2.2.3 | Console Port..... | - 7 - |
| 2.2.4 | Power connection | - 9 - |
| 2.2.5 | Reset Button | - 9 - |
| 2.2.6 | Protective Earth (Frame Ground) terminal | - 9 - |
| 3 | CONFIGURATION USE WEB BROWSER | - 10 - |
| 3.1 | CONFIGURATION METHOD..... | - 10 - |
| 3.1.1 | Web configuration | - 10 - |
| 3.1.2 | Serial console configuration | - 10 - |
| 3.1.3 | Telnet configuration | - 10 - |
| 3.2 | INSTALLATION..... | - 11 - |
| 3.3 | SETUP UP ON WEB BROWSER | - 12 - |
| 3.4 | BASIC SETUP | - 13 - |
| 3.4.1 | Operation mode and MGMT | - 15 - |
| 3.4.2 | DHCP server | - 16 - |
| 3.4.3 | LAN..... | - 17 - |
| 3.4.4 | Review | - 18 - |
| 3.5 | ADVANCED SETUP | - 19 - |
| 3.5.1 | SHDSL.bis LRE | - 19 - |
| 3.5.1.1 | Link Type | - 20 - |
| 3.5.1.2 | Annex Type | - 20 - |
| 3.5.1.3 | TCPAM Type..... | - 20 - |
| 3.5.1.4 | Main Rate | - 21 - |
| 3.5.1.5 | Line Probe | - 21 - |
| 3.5.1.6 | SNR Margin..... | - 21 - |
| 3.5.1.7 | Threshold SNR Margin | - 22 - |

| | | |
|---------|--|--------|
| 3.5.1.8 | PBO Mode | - 22 - |
| 3.5.1.9 | PBO Offset | - 23 - |
| 3.5.2 | QoS | - 23 - |
| 3.5.2.1 | Port Based Priority | - 25 - |
| 3.5.2.2 | VLAN Tag Priority | - 30 - |
| 3.5.2.3 | IP DSCP Priority | - 33 - |
| 3.5.3 | Rate Limiting | - 37 - |
| 3.5.4 | VLAN | - 37 - |
| 3.5.4.1 | Port-Based VLAN | - 39 - |
| 3.5.4.2 | Tag-Based VLAN | - 41 - |
| 3.5.4.3 | Hybrid Function Description | - 45 - |
| 3.5.5 | Flow Control | - 46 - |
| 3.5.6 | LINK MODE | - 46 - |
| 3.5.7 | LRE OAM | - 46 - |
| 3.5.7.1 | OAM Protocol Data Units (OAMPDUs) Size/Rate | - 48 - |
| 3.5.7.2 | OAM Protocol Data Units (OAMPDUs) Flags field | - 49 - |
| 3.5.7.3 | OAM Critical Link Events / Link Event Notification / Link Event TLVs | - 49 - |
| 3.5.7.4 | OAM Protocol Data Units (OAMPDUs) Codes and Information TLVs | - 50 - |
| 3.5.7.5 | OAM Errored Frame Event | - 52 - |
| 3.5.7.6 | OAM Errored Frame Seconds Summary | - 52 - |
| 3.5.7.7 | OAM Variable Retrieval | - 52 - |
| | OAMPDU: Loopback Control / OAM Remote Loopback | - 53 - |
| 3.6 | STATUS | - 56 - |
| 3.6.1 | DASHBOARD | - 56 - |
| 3.6.2 | SHDSL .Bis LRE | - 57 - |
| 3.6.3 | MGMT | - 57 - |
| 3.6.4 | LAN | - 58 - |
| 3.6.5 | PERFORMANCE | - 59 - |
| 3.6.6 | SYSLOG | - 59 - |
| 3.6.7 | LRE OAM | - 60 - |
| 3.7 | ADMINISTRATION | - 61 - |
| 3.7.1 | Security | - 61 - |
| 3.7.2 | SNMP | - 64 - |
| 3.7.2.1 | Community Pool | - 65 - |
| 3.7.2.2 | Trap Host Pool | - 66 - |
| 3.7.3 | REMOTE SYSLOG | - 66 - |
| 3.7.4 | TIME SYNC | - 67 - |
| 3.7.5 | LRE OAM | - 68 - |
| 3.8 | UTILITY | - 68 - |
| 3.8.1 | System Info | - 68 - |

| | | |
|---------|--|--------|
| 3.8.2 | <i>Config Tool</i> | - 69 - |
| 3.8.3 | <i>Upgrade</i> | - 70 - |
| 3.8.4 | <i>Logout</i> | - 70 - |
| 3.8.5 | <i>Restart</i> | - 71 - |
| 4 | CONFIGURATION USE SERIAL CONSOLE AND TELNET WITH MENU DRIVEN INTERFACE | - 72 - |
| 4.1 | INTRODUCTION | - 72 - |
| 4.1.1 | <i>Login to the Console Interface</i> | - 72 - |
| 4.1.2 | <i>Telnet login</i> | - 73 - |
| 4.1.3 | <i>Menu Driven Interface Commands</i> | - 73 - |
| 4.1.4 | <i>Window structure</i> | - 75 - |
| 4.2 | MAIN MENU TREE | - 75 - |
| 4.2.1 | <i>Menu tree for authorized user</i> | - 75 - |
| 4.2.2 | <i>Menu tree for unauthorized user</i> | - 77 - |
| 4.3 | ENABLE | - 78 - |
| 4.4 | SETUP | - 80 - |
| 4.4.1 | <i>SHDSL.bis</i> | - 80 - |
| 4.4.1.1 | Mode | - 80 - |
| 4.4.1.2 | Link | - 80 - |
| 4.4.1.3 | Annex | - 81 - |
| 4.4.1.1 | TCPAM | - 81 - |
| 4.4.1.2 | Maximum main rate | - 81 - |
| 4.4.1.3 | SNR Margin | - 81 - |
| 4.4.1.4 | Line Probe | - 81 - |
| 4.4.1.5 | Clear | - 82 - |
| 4.4.2 | <i>LAN</i> | - 82 - |
| 4.4.3 | <i>VLAN</i> | - 83 - |
| 4.4.3.1 | Mode | - 83 - |
| 4.4.3.2 | 802.11Q VLAN | - 84 - |
| 4.4.3.3 | Port Based VLAN | - 85 - |
| 4.4.4 | <i>QoS</i> | - 87 - |
| 4.4.4.1 | Mode | - 87 - |
| 4.4.4.2 | Queue schedule | - 87 - |
| 4.4.4.3 | Queue weight | - 88 - |
| 4.4.4.4 | Queue egress rate | - 89 - |
| 4.4.4.5 | Port Based Priority QoS | - 89 - |
| 4.4.4.6 | VLAN Tag Priority QoS | - 90 - |
| 4.4.4.7 | IP DSCP Priority Qos | - 91 - |
| 4.4.4.8 | List | - 92 - |
| 4.4.5 | <i>RATE</i> | - 92 - |

| | | |
|----------|-------------------------------------|---------|
| 4.4.6 | MGMT | - 92 - |
| 4.4.7 | DHCP | - 93 - |
| 4.4.7.1 | DHCP Server | - 93 - |
| 4.4.7.2 | DHCP fixed Host | - 95 - |
| 4.4.8 | DNS proxy | - 95 - |
| 4.4.9 | Host name | - 96 - |
| 4.4.10 | Default | - 96 - |
| 4.5 | STATUS | - 96 - |
| 4.5.1 | Shdsl.bis | - 97 - |
| 4.5.2 | Interface | - 98 - |
| 4.6 | SHOW | - 98 - |
| 4.6.1 | Show system | - 99 - |
| 4.6.2 | Show script | - 99 - |
| 4.7 | WRITE | - 100 - |
| 4.8 | REBOOT | - 100 - |
| 4.9 | PING | - 100 - |
| 4.10 | ADMINISTRATION | - 102 - |
| 4.10.1 | User Profile | - 102 - |
| 4.10.2 | Security | - 104 - |
| 4.10.2.1 | Telnet TCP port | - 104 - |
| 4.10.2.2 | IP address pool | - 104 - |
| 4.10.3 | SNMP | - 105 - |
| 4.10.3.1 | Community | - 105 - |
| 4.10.3.2 | Trap host | - 106 - |
| 4.10.4 | Supervisor Password and ID | - 108 - |
| 4.10.4.1 | Supervisor Password | - 109 - |
| 4.10.4.2 | Supervisor ID | - 109 - |
| 4.11 | UTILITY | - 110 - |
| 4.11.1 | Upgrade main software | - 110 - |
| 4.11.2 | Backup system configuration | - 110 - |
| 4.11.3 | Restore system configuration | - 111 - |
| 4.12 | EXIT | - 112 - |
| 5 | APPENDIX – SETUP TABLE | - 113 - |

1 Introduction

1.1 Descriptions

The LRE Based Network Extender (or say LRE Bridge Modem) which provides a flexible and friendly solution for the Ethernet based services provision to subscribers by the service provider. Additionally, this family of products provides a simple way in a back-to-back deployment to provide point to point configuration. This allows broadband service providers to deploy single DSL lines economically when required for low density geographical areas or during startup phase.

LRE Network Extender provides cost-effectively symmetrical bandwidth at rates up to 45.312 Mbps (for 4-pairs with TCPAM-64 model) which allows service providers to deliver friendly Ethernet services rapidly. LRE Network Extender extends the reach of Ethernet services to the sites with no fiber access to by using bonded copper pairs. Designed with standard-based LRE technology (2BASE-TL), the delivery of Ethernet services with LRE modem can be deployed quickly on the existing copper plant. It is a nice application for back-to-back connection between remote office and enterprise headquarters.

LRE Network Extender implements the management features based on IEEE 802.3ah standard and it enables users to significantly reduce operation expense by eliminating unnecessary transformation between Ethernet and legacy ATM network. As based on user-friendly Ethernet, it saves time and costs because of simple engineering task without additional trainings costs. Packet based technology which architecture utilizes 100% packet transmission technology for optimum throughput and reliability. With a compact form-factor design and optimization for the use over existing copper network, LRE Network Extender reduces the initial investment cost and deployment time in delivering higher speed Ethernet service. It provides minimized risk bearing and quick return on investment to service providers and enterprises

LRE Network Extender can bond up to 4 pairs and deliver up to 45.312 Mbps Ethernet services to all users within their service area by utilizing existing copper infrastructure and LRE 802.3ah PAF bonding technology. Service Providers and enterprises are able to offer symmetrical high speed connectivity for transparent Ethernet service on DSLAM backhaul or Wireless backhaul and more.

LRE Network Extender provides future-proof features meeting Ethernet Quality of Service (QoS) requirements by utilizing 802.1q VLAN capabilities, four levels of priorities, traffic flow control and rate control. This traffic management and QoS features enable service providers to offer highly profitable and value-added services to a vast majority of business and institutional sites.

1.2 Features

- Extending Ethernet Services to sites with existing copper infrastructure
- LRE Bonding up to 61 Mbps (4 pairs, TC-PAM 128)
- Support both LRE mode and ATM mode (Optional)
- Flexible and Rapid Service Deployment
- Flexible configuration as CPE or CO
- Low Delay, Jitter and Packet Loss for delay sensitive applications
- QoS feature for guaranteed Ethernet service
- Future-proof Ethernet traffic management and QoS features

1.3 Specifications

Network Interface

LAN

- 4 –port switching hub
- 10/100BASE-T auto-negotiation & sensing
- Auto MDI/MDI-X

WAN

- ITU-T G.991.2.(2004)
- 2BASE-TL
- LRE bonding (IEEE 802.3ah PAF)
- Data Rate:
 - N x 64 Kbps (N=3~89) using TC-PAM 16/32
 - Max. 5.696Mbps (1-Pair)
 - Max. 11.392Mbps (2-Pair)
 - Max. 22.784Mbps (4-Pair)
 - N x 64 Kbps (N=3~239) using TC-PAM 64/128
 - Max. 15.296 Mbps (1-Pair)
 - Max. 30.592 Mbps (2-Pair)
 - Max. 61.184 Mbps (4-Pair)
- Support of Annex A , Annex B , Annex AF & Annex BG
- Support TC-PAM 16/32/64/128
- Impedance: 135 ohms

LAN Protocols

- Up to 2K MAC Address learning bridge

Hardware Interface

- WAN(DSL) : RJ-45 x 1
- LAN : RJ45 x 4
- Management Port: RJ45 x 1
- Console Port: RJ45 x 1
- Reset Button: Load Factory Default
- DC Power Jack x 1

Indicator

- LAN : Link/Act, 10/100 per port
- WAN: Link per loop
- System: Power, Alarm, MGMT

Management Interface

- Easy to use web-based GUI for quick setup, configuration and management
- Menu-driven interface/Command line interface (CLI) for local console and telnet access
- Password protected management and access control list for administration
- SNMP v1/v2 (RFC1157/1901/1905) agent and MIB II (RFC1213/1493)
- Software upgrade via web-browser/TFTP

ATM Mode (optional)

- Framing ATM, 64B/65B
- 1 PVC
- AAL5
- VC multiplexing and SNAP/LLC
- Ethernet over ATM (RFC 2684/1483)

VLAN Support

- IEEE 802.1q VLAN Tagging
- Port Based VLAN
- Up to 8 802.1q VLANs (ID Range1~4094)
- VLAN Stacking (Q-in-Q)

QoS Support

- Rate limiting by rule-based/port-based
- Traffic classification based on port/802.1p/ DSCP

- WRR (Weighted Round Robin)/SPQ (Strict Priority Queuing) scheduling algorithm

Environment

- Operating Temperature: -20°C ~ +60°C
- Storage Temperature: -40°C ~ +85°C
- Relative Humidity: 98%, non-condensing

Regulatory

- ISO 9001 Quality Management
- CE Approval & EN60950 Certificate

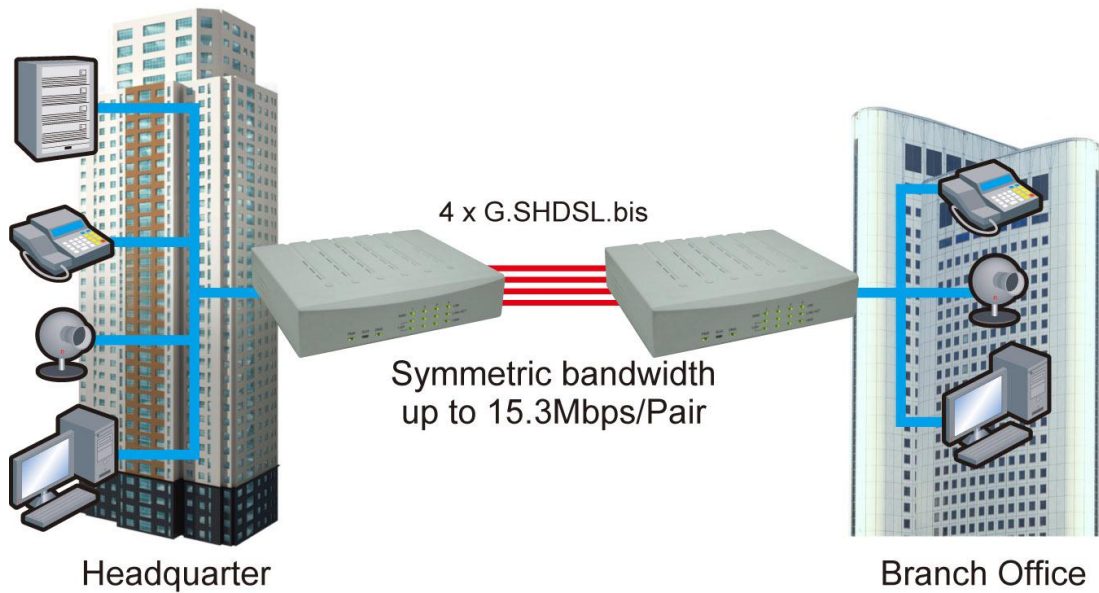
Physical / Electrical

- Dimension (mm): 195 x 48 x 168
- AC Power Adapter (100~240VAC with 50~60Hz)
- Weight: 1340g

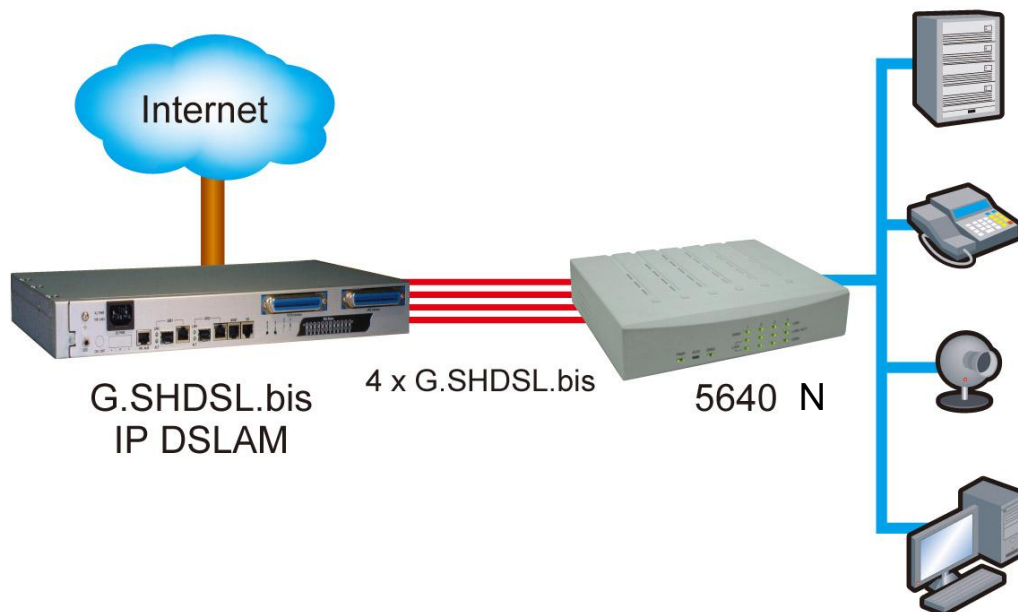
Memory

- 2MB Flash Memory , 16MB SDRAM

Back-to-Back Connectivity



Connection to IP DSLAM

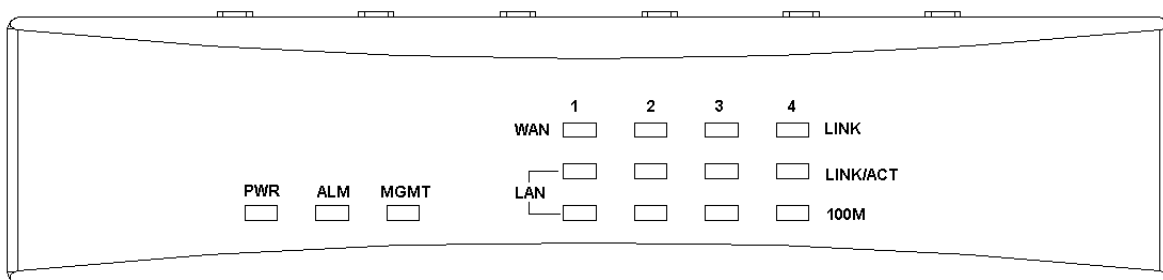


2 Getting to know about the LRE Modem

This section will introduce hardware of the LRE modem.

2.1 Front Panel

The front panel contains LED which show status of the LRE Modem.

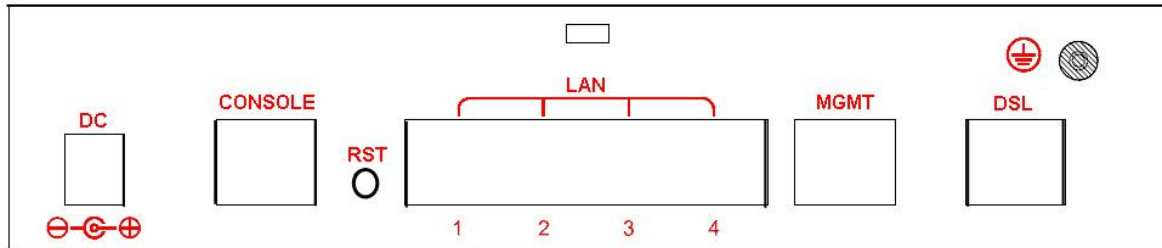



LED status of LRE Modem:

| LEDs | | Active | Description |
|------|-----------|--------|--|
| PWR | | On | Power on |
| ALM | | On | SHDSL.bis line connection is dropped |
| | | Blink | SHDSL.bis self-test |
| MGMT | | On | Management port line connection is established |
| WAN | LINK 1 | On | SHDSL.bis line 1 connection is established |
| | | Blink | SHDSL.bis line 1 handshake |
| | LINK 2 | On | SHDSL.bis line 2 connection is established |
| | | Blink | SHDSL.bis line 2 handshake |
| | LINK 3 | On | SHDSL.bis line 3 connection is established |
| | | Blink | SHDSL.bis line 3 handshake |
| | LINK 4 | On | SHDSL.bis line 4 connection is established |
| | | Blink | SHDSL.bis line 4 handshake |
| LAN | LINK/ACT1 | On | Ethernet cable is connected to LAN 1 |
| | LINK/ACT2 | On | Ethernet cable is connected to LAN 2 |
| | LINK/ACT3 | On | Ethernet cable is connected to LAN 3 |
| | LINK/ACT4 | On | Ethernet cable is connected to LAN 4 |
| LAN | 100M 1 | On | LAN 1 is on 100M mode |
| | | Off | LAN 1 is on 10M mode |
| | 100M 2 | On | LAN 2 is on 100M mode |
| | | Off | LAN 2 is on 10M mode |
| | 100M 3 | On | LAN 3 is on 100M mode |
| | | Off | LAN 3 is on 10M mode |
| | 100M 4 | On | LAN 4 is on 100M mode |
| | | Off | LAN 4 is on 10M mode |

2.2 Rear Panel

The rear panel of G.SHDSL.bis LRE Modem is where all of the connections are made.

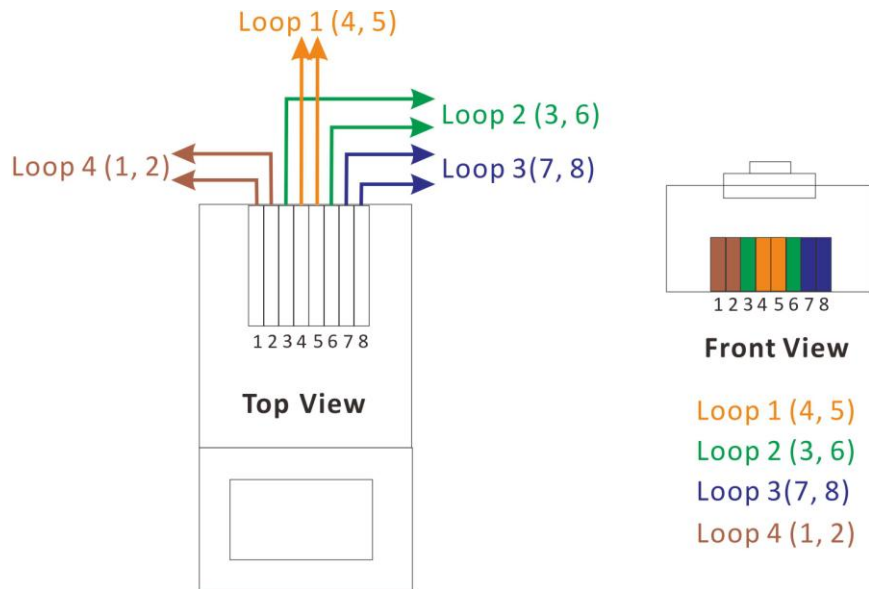


| Connector | Description |
|---|---|
| DC-IN | Power adaptor inlet: Input voltage range from 9V to 18V. |
| CONSOLE | RJ-45 for system configuration and maintenance |
| RST | Reset button for reboot or load factory default |
| LAN (1,2,3,4) | 10/100BaseT auto-sensing and auto-MDIX for LAN port (RJ-45) |
| MGMT | RJ-45 for management port |
| DSL | G.SHDSL.Bis interface for WAN port (RJ-45) |
|  | Frame Ground / Protective earth |

2.2.1 WAN Port

The LRE modem have one port for WAN port connection, this is a G.SHDSL .Bis interface

The pin assignments for SHDSL line cable are:



For one pair (2-wire) model, Loop1 has been used

For two pair (4-wire) model, Loop1 and 2 have been used

For four pair (8-wire) model, Loop1, 2, 3 and 4 have been used

2.2.2 LAN ports and MGMT port

The LRE modem have four LAN ports and one MGMT Ethernet port. Those ports are auto-negotiating, auto-crossover. In 10/100Mbps Fast Ethernet, the speed can be 10Mbps or 100Mbps and the duplex mode can be half duplex or duplex.

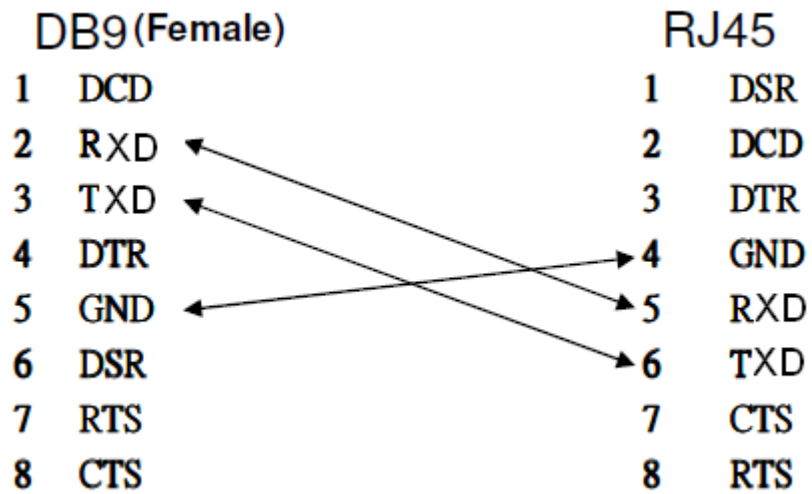
An auto-negotiating port can detect and adjust to the optimum Ethernet speed(10/100 Mbps) and duplex mode(full duplex or half duplex) of the connected device.

An auto-crossover(auto-MDI/MDI-X) port automatically works with a straight-through or crossover Ethernet cable.

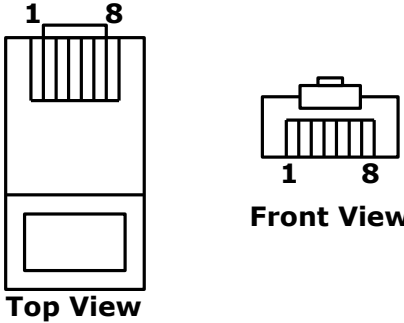
2.2.3 Console Port

Connect the RJ-45 jack of the console cable to the console port of the LRE modem. Connect the DB-9 female end to a serial port(COM1 , COM2 or other COM port) of your computer.

The wiring diagram of console cable is as following:



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

| Pin Number | Abbrev. | Description | Figure |
|------------|---------|------------------|---|
| 1 | x | none |  <p>Top View</p> <p>Front View</p> |
| 2 | x | none | |
| 3 | DTR | DTE ready | |
| 4 | GND | Signal Ground | |
| 5 | RXD | Received Data | |
| 6 | TXD | Transmitted Data | |
| 7 | x | none | |
| 8 | x | none | |

2.2.4 Power connection

Make sure you are using the correct power source as the AC/DC adaptor. Inset the female end of power adaptor's cord into the power receptacle on the rear panel. Connect the power adaptor to an appropriate power source.

2.2.5 Reset Button

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

- (1) Press the Reset Button for two second will cause system reboot.
- (2) Pressing the Reset Button for eight 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 eight seconds with a paper clip or sharp pencil.

2.2.6 Protective Earth (Frame Ground) terminal



The marked lug or terminal should be connected to the building protective earth bus.

The function of protective earth does not serve the purpose of providing protection against electrical shock, but instead enhances surge suppression on the DSL lines for installations where suitable bonding facilities exist.

The connector type is M3 machine screw.

3 Configuration use Web Browser

3.1 Configuration method

There are three methods to configure the LRE modem: serial console, Telnet and Web Browser. Users have to choose one method to configure the LRE modem.

3.1.1 Web configuration

Make sure that Ethernet Adapter had been installed in PC or NB used for configuration of the modem. TCP/IP protocol is necessary for web configuration, so please check the TCP/IP protocol whether it has been installed.

The LRE modem provides a browser interface that lets you configure and manage the LRE modem. After you set up your IP address for the LRE modem. You can access the LRE modem's Web interface applications directly in your browser by entering the IP address of the LRE modem. You can then use your Web browser to list and manage configuration parameters from PC.

Web Configuration requires Internet Explorer 10, Mozilla Firefox v50.0, Google Chrome v49.0 or above. The recommended screen resolution is 1024 by 768 pixels.

3.1.2 Serial console configuration

For Serial Console, users can directly connecting a terminal or a PC equipped with a terminal-emulation program (such as Hyper Terminal) to the LRE modem's serial console port.

Use the supplied serial cable (RJ-45 to DB9F) is required to connect the LRE modem to PC. After marking this connection, configure the terminal-emulation program to use the following parameters: 115200 Bd, 8 data bits, no parity and 1 stop bit.

3.1.3 Telnet configuration

Make sure that Ethernet Adapter had been installed in PC or NB used for configuration of the modem. The LRE modem also supports telnet for remote configuration. The command is "telnet 192.168.1.1". It with asks for user name and password for remote login when using telnet, please use "admin" for username and "admin" for password. All display screen are as same as serial console configuration.

The IP address 192.168.1.1 is the default value and you can change to another one for your application.

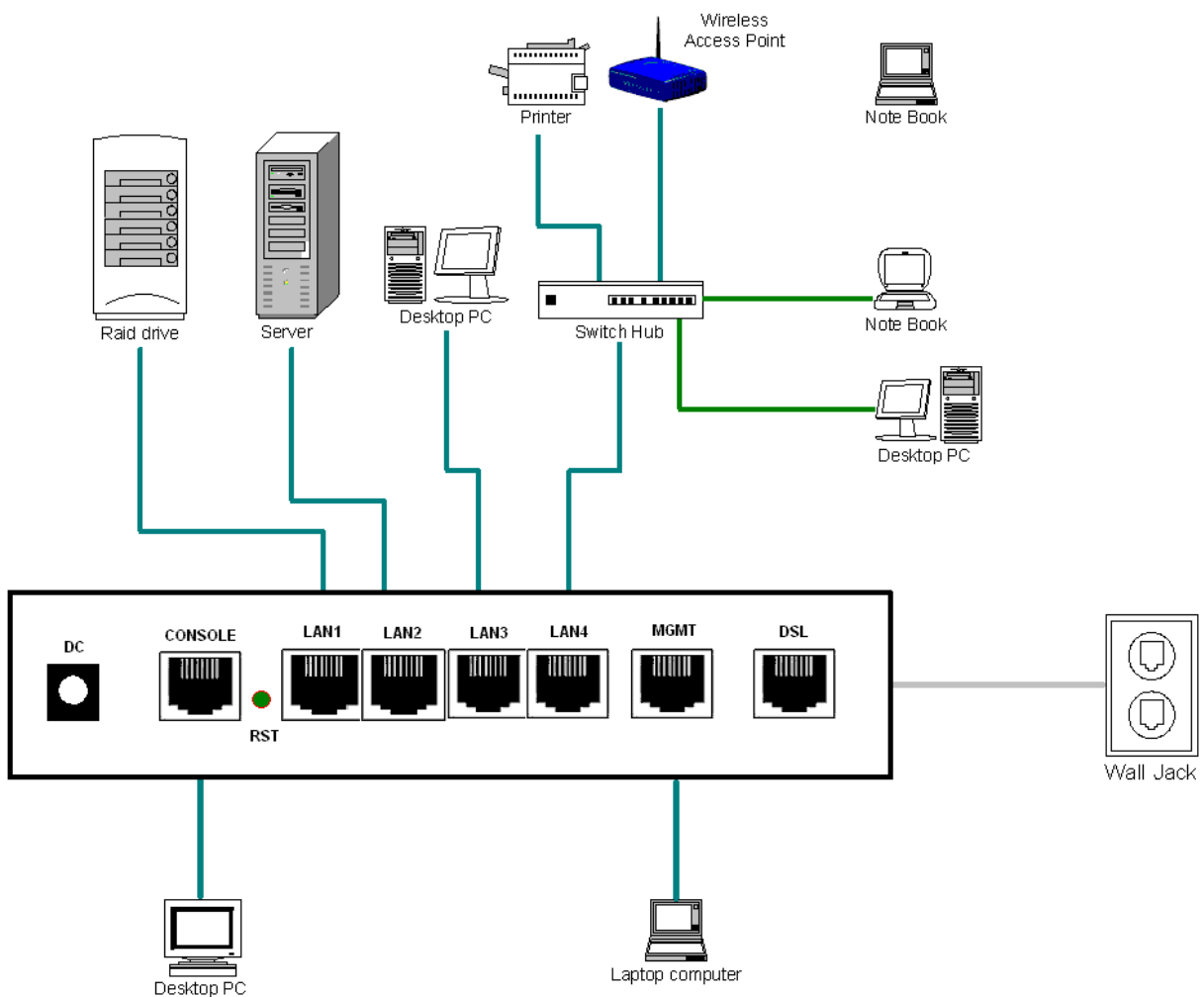
3.2 Installation

This following guide is designed to lead users through Web Configuration of G.shdsl.bis LRE Modem in the easiest and quickest way possible. Please follow the instructions carefully.

1. Connect the power adapter to the port labeled "DC" on the rear panel of the LRE modem.
2. Connect the Ethernet cable to MGMT port.
(Note: The LRE modem supported auto-MDIX switching hub so both straight through and cross-over Ethernet cable can be used.)
3. Connect the phone cable to the LRE modem and the other side of phone cable to wall jack.
4. Connect the power adapter to power source.
5. Turn on the PC or NB, which is used for configuration the LRE modem.



To avoid possible damage to this LRE modem, do not turn on the LRE modem before Hardware Installation.



Connection with SHDSL .Bis LRE Modem

3.3 Setup up on Web Browser

This section introduces the configuration and functions of the web-based management.

It is an HTML-based management interface that allows easy LRE modem setup and management.

The LRE modem offers all monitoring and management features that allow users to manage this LRE modem form anywhere on the network through a standard browser such as Internet Explorer.

TCP/IP setup

When DHCP function is **Enable**, the LRE modem acts as DHCP server in your network, the LRE modem will automatically assign IP address for PC for management port connection.

For Window System, click the **start** button. Select setting and **control panel**.

Double click the **network** icon.

In the Configuration window, select the **TCP/IP protocol** line that has been associated with your network card and then click **property** icon.

Choose **IP address** tab and select **Obtain IP address automatically** and then Click **OK** button.

System Login

User can use browser program such as Internet Explorer on your PC to connect the LRE Modem. Type "http://" and the IP address like as "<http://192.168.1.1>".

The default IP address and sub net-mask of the management port of LRE Modem are 192.168.1.1 and 255.255.255.0.

If DHCP function is **Disable**, your PC can set the same net-mask such as 192.168.1.X which X is from 2 to 254, that are also can connect.

Type User Name **root** and Password **root** and then click **OK**.



The default user name and password both is **root**. For the system security, suggest changing them after configuration.

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

Note: After changing the User Name and Password, strongly recommend you to save them because another time when you login, the User Name and Password have to be used the new one you changed.

Following is the first screen that displays when you access the web configurator.



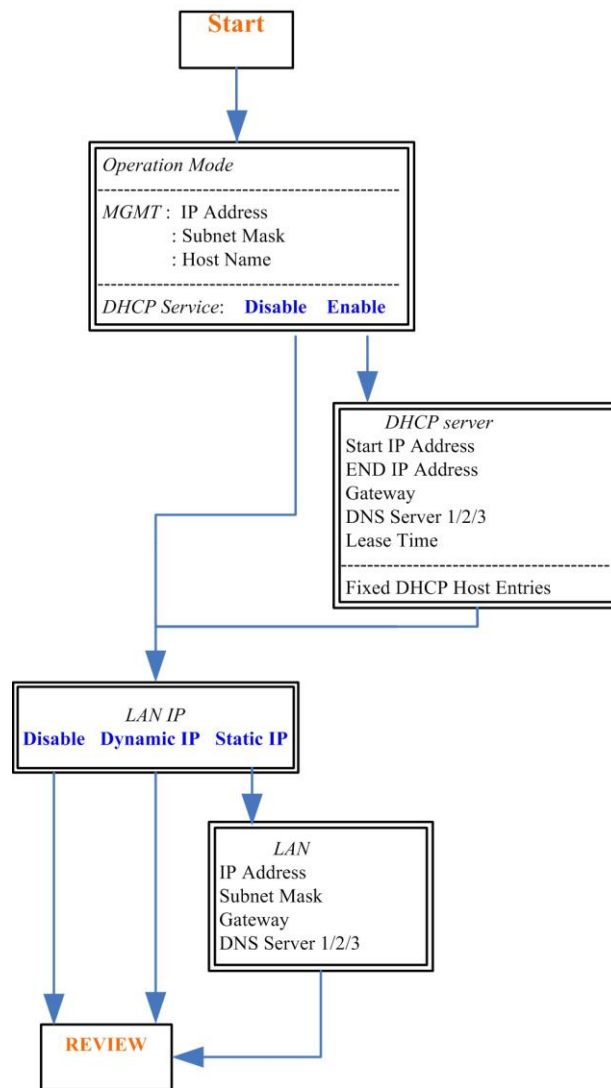
3.4 Basic Setup

The Basic Setup contains:

- Operation mode and MGMT port IP
- DHCP server
- LAN

User can use it to completely basic setup the LRE modem.

Below diagram is showed as Basic Setup's flowchart.



3.4.1 Operation mode and MGMT

Click **Basic** for basic installation.

SHDSL.bis LRE

Home Basic Advanced Status Admin Utility

BASIC - STEP1

Operation Mode:

SHDSL.bis LRE: ☐ CO Side ☒ CPE Side

MGMT:

IP Address: 192 168 0 241

Subnet Mask: 255 255 255 0

Host Name: SOHO

DHCP Server:

Mode: ☒ Disable ☐ Enable

Cancel Reset Next

Click **CPE** (Customer Premises Equipment) side or **CO** (Central Office) side to setup the operation mode. When connection with LRE DSLAM, the SHDSL.bis LRE modem's working mode is CPE. When "LAN to LAN" connection, one side must be CO and the other side must be CPE.

Enter Parameters in **MGMT** item.

The LRE modem needs an IP address for it to be managed over the network. The factory default IP address is 192.168.1.1. The subnet mask specifies the network number portion of an IP address. The factory default subnet mask is 255.255.255.0 . You can configure another IP address in a different Subnet Mask for management purposes.

IP: 192.168.1.1

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.

And then, click **Trigger DHCP service** is **Disable** or **Server**. If you don't need the DHCP service, please click **Disable**.

3.4.2 DHCP server

Press **Next** to set the next page:

SHDSL.bis LRE

Home Basic Advanced Status Admin Utility

DHCP SERVER:

- General DHCP Parameter:
 - Start IP Address: 192.168.0.2
 - End IP Address: 192.168.0.51
 - Default Gateway: 192.168.1.1
 - DNS Server 1: 192.168.1.1
 - DNS Server 2:
 - DNS Server 3:
 - Lease Time: 72 hours
- Table of Fixed DHCP Host Entries:

Hint: The format of the MAC Address is 12:34:56:78:9A:BC

| Index | MAC Address | IP Address |
|-------|-------------|------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

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.

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

For example: If the LAN IP address is 192.168.0.1, the IP range of LAN is 192.168.0.2 to 192.168.0.254. 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 than 1.

Lease time 72 hours indicates that the DHCP server will reassign IP information in every 72 hours.

The default value is 72 hours .You can set up from 1 to 720 hours according to your application.

Moreover, 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**.

3.4.3 LAN

Press **Next** to set the next page:

SHDSL.bis LRE

Home Basic Advanced Status Admin Utility

BASIC - STEP3

LAN:

Type: ☒ Disable ☐ Dynamic IP ☐ Static IP

Static IP:

IP Address: 192 . 168 . 2 . 1

Subnet Mask: 255 . 255 . 255 . 0

Gateway: 0 . 0 . 0 . 0

DNS Server 1: 168.95.1.1

DNS Server 2: 168.95.192.1

DNS Server 3:

Back Cancel Reset Next

Enter Parameters in LAN:

LAN type item can be selected as: **Disable**, **Dynamic IP** and **Static IP**.

If you select **Disable** and **Dynamic IP**, can't need input all IP address etc.

If you select **Static IP**, you can enter the following: IP, Subnet Mask, Gateway and DNS Server's IP.

You must type the dotted decimal notation for DNS Server's IP address

The default values are as following:

IP Address: 192.168.2.1

Subnet Mask: 255.255.255.0

Gateway: 0.0.0.0

DNS Server 1: 168.95.1.1

DNS Server 2: 168.95.192.1

DNS Server 3:

3.4.4 Review

Press **Next** to set the next page:

The screenshot displays the SHDSL.bis LRE configuration web interface. At the top right, the text "SHDSL.bis LRE" is visible. Below it is a navigation bar with tabs: Home, Basic, Advanced, Status, Admin, and Utility. The "Basic" tab is selected, and the page title is "BASIC - REVIEW".

On the left side, there is a vertical menu with the following items: BASIC, ADVANCED, STATUS, ADMIN, and UTILITY. The "BASIC" item is highlighted.

The main content area is titled "REVIEW:" and contains the following text: "To let the configuration that you have changed take effect immediately, please click **Restart** button to reboot the system. To continue the setup procedure, please click **Continue** button."

The configuration parameters are listed as follows:

- Operation Mode:**

| | |
|---------------|----------|
| SHDSL.bis LRE | CPE Side |
|---------------|----------|
- MGMT:**

| | |
|-------------|---------------|
| IP Address | 192.168.0.241 |
| Subnet Mask | 255.255.255.0 |
| Hostname | SOHO |
- DHCP Server:**

| | |
|----------------------|--------|
| Trigger DHCP Service | Enable |
|----------------------|--------|
- LAN:**

| | |
|------|---------|
| Type | Disable |
|------|---------|

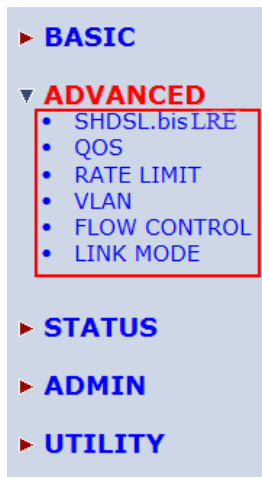
At the bottom right, there are two buttons: "Continue" and "Restart".

The screen will prompt the new configured parameters. Checking the parameters and Click **Restart** The LRE modem will reboot and working with new parameters or press or **Continue** to configure another parameters.

3.5 Advanced Setup

Note: 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 disconnection.

In “ADVANCED” section, users are allowed to change settings by different areas: SHDSL.bis LRE, QoS, Rate Limiting, VLAN, and Flow Control.



3.5.1 SHDSL.bis LRE

You can setup the Link (number of wires), Annex type, TCPAM type, Main Rate, Main Rate, Line Probe, SNR margin, Threshold SNR Margin, PBO Mode and PBO Offset for SHDSL.bis LRE parameters.

Click SHDSL.bis LRE

ADVANCED - SHDSL.bis LRE

Configuraions:

▪ Common:

| | |
|------|----------|
| Mode | CPE Side |
| Link | 8-Wire ▼ |

▪ Channel Specific:

| Channel | 1 | 2 | 3 | 4 |
|----------------------|---------------|---------------|---------------|---------------|
| Annex | BG ▼ | BG ▼ | BG ▼ | BG ▼ |
| TCPAM | Auto(16/32) ▼ | Auto(16/32) ▼ | Auto(16/32) ▼ | Auto(16/32) ▼ |
| Main Rate | 5696kbps ▼ | 5696kbps ▼ | 5696kbps ▼ | 5696kbps ▼ |
| Probe | Enable ▼ | Enable ▼ | Enable ▼ | Enable ▼ |
| SNR Margin | 5 dB ▼ | 5 dB ▼ | 5 dB ▼ | 5 dB ▼ |
| Threshold SNR Margin | Disable ▼ | Disable ▼ | Disable ▼ | Disable ▼ |
| PBO Mode | Normal ▼ | Normal ▼ | Normal ▼ | Normal ▼ |
| EPL Mode | Enabled ▼ | Enabled ▼ | Enabled ▼ | Enabled ▼ |
| PBO Value | 0 dB ▼ | 0 dB ▼ | 0 dB ▼ | 0 dB ▼ |
| PBO Offset | 0 dB ▼ | 0 dB ▼ | 0 dB ▼ | 0 dB ▼ |

Cancel

Reset

Finish

3.5.1.1 Link Type

Line type means how many wire you want to use on SHDSL.bis connection.

| Line Type LRE Modem | 2-wire | 4-wire | 8-wire |
|------------------------|--------|--------|--------|
| 2-wire model | • | | |
| 4-wire model | • | • | |
| 8-wire model | • | • | • |

For example, 8-wire model can select 2-wire, 4-wire or 8-wire line type.

3.5.1.2 Annex Type

There are two Annex types: Annex AF and Annex BG in SHDSL.bis . Check with your ISP about it.

3.5.1.3 TCPAM Type

The default option is Auto. You may assign the different type manually as the following options.

1. Auto(16/32)
2. TCPAM-16
3. TCPAM-32
4. TCPAM-64
5. TCPAM-128
6. Optimal

3.5.1.4 Main Rate

You can setup the SHDSL.bis main rate is in the multiple of 64kbps , 128kbps or 256 kbps according using which model.

Main Rate (Unit: kbps)

| SHDSL.bis LRE Modem | multiple | TCPAM-16 N=3~60 | TCPAM-32 N=12~89 | TCPAM-128 N=2~239 |
|------------------------|----------|--------------------|---------------------|----------------------|
| 2-wire model | 64 | 192 ~ 3840 | 768 ~ 5696 | 128 ~15296 |
| 4-wire model | 128 | 384 ~ 7680 | 1536 ~ 11392 | 256 ~ 30592 |
| 8-wire model | 256 | 768 ~ 15360 | 3072 ~ 22784 | 512 ~ 61184 |

2-wire mode : Line Rate = Main Rate x 1

4-wire mode : Line Rate = Main Rate x 2

8-wire mode : Line Rate = Main Rate x 4

3.5.1.5 Line Probe

For adaptive mode, you can setup the Line Prodbe is **Enable**. The LRE modem will adapt the data rate according to the line status. Otherwise, setup to **Disbale**.

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

NVRAM. Press Restart to restart the LRE modem working with new parameters or press continue to setup another

parameter.

3.5.1.6 SNR Margin

SNR margin 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.

For example, 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 range of SNR margin setting are -10 to 21.

3.5.1.7 Threshold SNR Margin

This section allows you to monitor the quality of DSL. If current SNR margin is less than the Threshold SNR margin, a Threshold Close Alarm (TCA) will be sent to SNMP Trap server to notify SNR margin is too low. The TCA can also be saved in system log.

ADVANCED - SHDSL.bis LRE

Configuraions:

Common:

| | |
|------|---------|
| Mode | CO Side |
| Link | 8-Wire |

Channel Specific:

| Channel | 1 | 2 | 3 | 4 |
|----------------------|-----------|-----------|-----------|-----------|
| Apply to All | | | | |
| Disable/Retrain | Enable | Enable | Enable | Enable |
| Annex | BG | BG | BG | BG |
| TCPAM | Optimal | Optimal | Optimal | Optimal |
| Main Rate | 15288kbps | 15288kbps | 15288kbps | 15288kbps |
| Probe | Enable | Enable | Enable | Enable |
| SNR Margin | 5 dB | 5 dB | 5 dB | 5 dB |
| Threshold SNR Margin | 12 dB | Disable | Disable | Disable |
| PBO Mode | Normal | Normal | Normal | Normal |
| EPL Mode | Enable | Enable | Enable | Enable |
| PBO Value | 0 dB | 0 dB | 0 dB | 0 dB |
| PBO Offset | 0 dB | 0 dB | 0 dB | 0 dB |

Cancel Reset Finish

STATUS - SYSLOG

| System Log |
|---|
| 2016/01/01 08:00:16 Device Cold Start |
| 2016/01/01 08:01:03 Ch1 Link up |
| 2016/01/01 08:01:16 ch:0 TCA on: SNR=11, threshold=12 |
| 2016/01/01 08:01:16 Ch1 Rate:15288kbps, SNR:11 dB, Attn:0 dB |
| 2016/01/01 08:01:25 Ch1 Rate:15288kbps, SNR:11 dB, Attn:1 dB (Remote) |

Reset Finish

3.5.1.8 PBO Mode

PBO Mode allows you to set up Power Back-off and select from Normal or Force.

PBO_NORMAL: The power backoff values are requested by each device. The value in the capability list sent to the far end is determined as maximum of the value depending on estimated power loss (EPL) and the value entered in the capability list. The transmit power backoff of the local transceiver is the value found in the mode select.

PBO_FORCED: The power backoff values forced by local device.

Configuraions:

Common:

| | |
|------|---------|
| Mode | CO Side |
| Link | 8-Wire |

Channel Specific:

| Channel | 1 | 2 | 3 | 4 |
|----------------------|-----------|-----------|-----------|-----------|
| Apply to All | | | | |
| Disable/Retrain | Enable | Enable | Enable | Enable |
| Annex | BG | BG | BG | BG |
| TCPAM | Optimal | Optimal | Optimal | Optimal |
| Main Rate | 15288kbps | 15288kbps | 15288kbps | 15288kbps |
| Probe | Enable | Enable | Enable | Enable |
| SNR Margin | 5 dB | 5 dB | 5 dB | 5 dB |
| Threshold SNR Margin | 12 dB | Disable | Disable | Disable |
| PBO Mode | Normal | Normal | Normal | Normal |
| EPL Mode | Normal | Enable | Enable | Enable |
| PBO Value | 0 dB | 0 dB | 0 dB | 0 dB |
| PBO Offset | 0 dB | 0 dB | 0 dB | 0 dB |

3.5.1.9 PBO Offset

EPL (Estimated Power Loss) is used for PBO calculation.

PBO Offset takes effect only in case of EPL (Estimated Power Loss) mode is enabled. The power backoff as function of EPL is implemented according to the "Default Power Backoff" in table 6-2 of G.991.2

3.5.2 QoS

QoS(Quality of Service) refers to both a network's ability to deliver data with minimum delay, and the networking methods used to control the use of bandwidth. Without QoS, all traffic date is equally likely to be dropped when the network is congested. This can cause a reduction in network performance and mark the network inadequate for time-critical application such as video-on-demand.

Click **QoS** to configure QoS

SHDSL.bis LRE

Home
Basic
Advanced
Status
Admin
Utility

ADVANCED - QOS

Quality of Service Parameters:

Priority Mode:

Mode:
☒ Disable
☐ Port Based Priority
☐ VLAN Tag Priority
☐ IP DSCP Priority

Cancel
Reset
Finish

BASIC
ADVANCED
SHDSL.bis LRE
QOS
RATE LIMIT
VLAN
FLOW CONTROL
LINK MODE

STATUS
ADMIN
UTILITY

QoS (Quality of Service) is to decide which PCs can get the priorities to pass through LRE modem once if the bandwidth is exhausted or fully saturated.

The priority modes have three types: Port Based Priority, VLAN Tag Priority and IP DSCP Priority. You can also set Disable the QoS function.

3.5.2.1 Port Based Priority

When you click Port Based Priority, it will show the following:

Mode: ☐ Disable ☒ Port Based Priority ☐ VLAN Tag Priority ☐ IP DSCP Priority

■ Scheduling Configuration:

| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

■ WRR Configuration:

| | Queue | | | |
|--------|-------|---|---|---|
| | 0 | 1 | 2 | 3 |
| Weight | 1 | 2 | 4 | 8 |

■ WFQ Configuration: Rate = n * 1024 kbps (n = 0 means no limit)

| Port | Egress Queue | | | |
|------|--------------|----|----|----|
| | 0 | 1 | 2 | 3 |
| LAN1 | 00 | 00 | 00 | 00 |
| LAN2 | 00 | 00 | 00 | 00 |
| LAN3 | 00 | 00 | 00 | 00 |
| LAN4 | 00 | 00 | 00 | 00 |
| DSL | 00 | 00 | 00 | 00 |

■ Port Based Priority:

| Port | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|-------|------|------|------|------|-----|----------|
| Queue | 3 | 3 | 3 | 3 | 3 | 3 |

Select the ports to which the rule should be applied.

There have six ports can be applied: LAN1, LAN2, LAN3, LAN4, DSL and Sniffing

For Port Based Priority, it can setup the queue type from type 0 to type 3.

The common setting tables are:

WRR configuration: Each queue type can setup the queue weight form 1 to 15.

WFQ configuration: Each ports and their queue type can set the bandwidth.

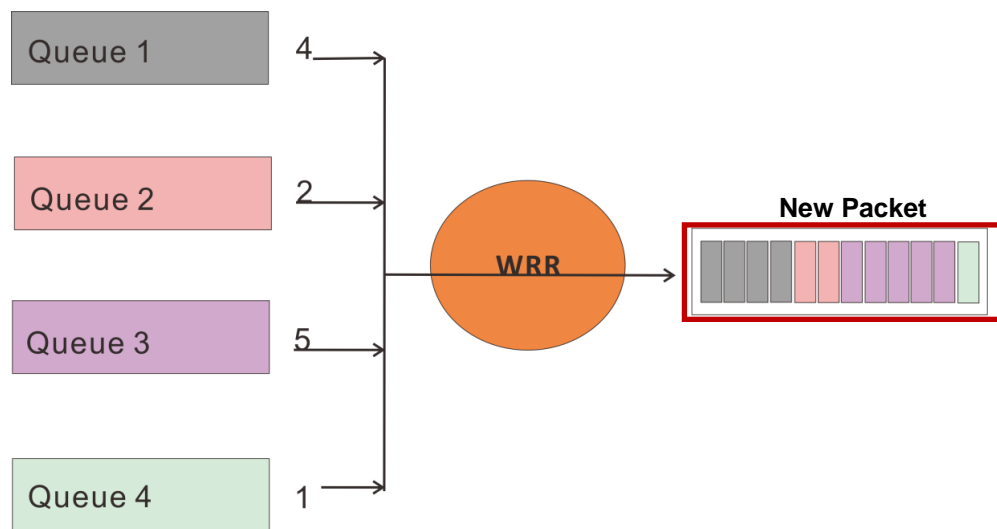
1. Scheduling Configuration

This modem provides three combinations of four commonly used techniques, type1, type 2 and type 3. Choose which combination you would like to apply and fill up the corresponding information.

▪ **Scheduling Configuration:**

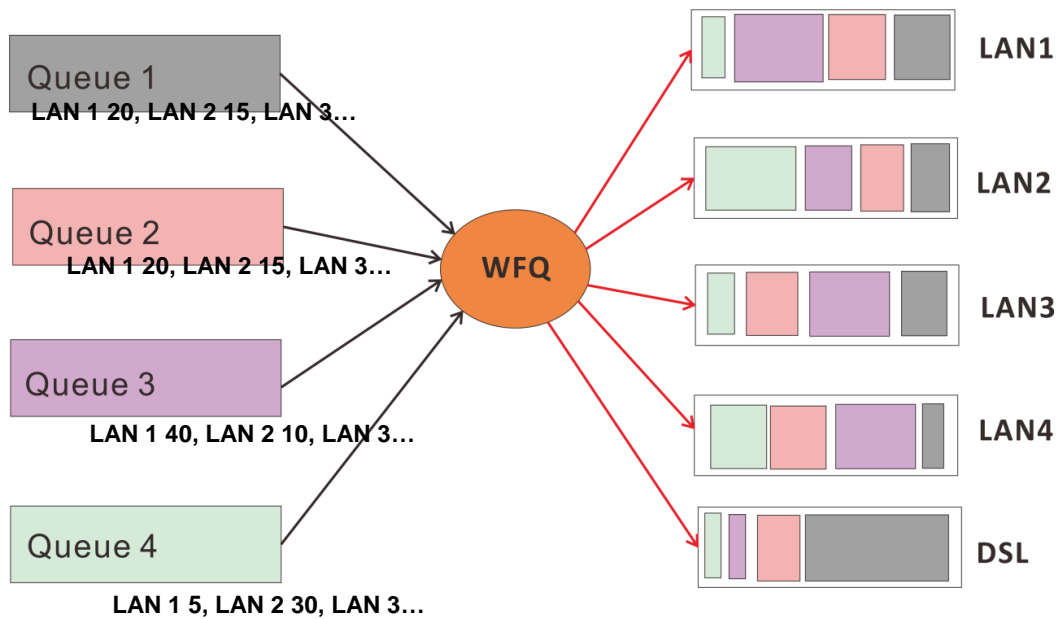
| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

WRR (Weighted Round Robin): All received packets will be stored into queue 1, queue 2, queue 3, and queue 4. Users will assign a weighting for each queue. Then, WRR will re-pack all packets from four queues based on the weightings.



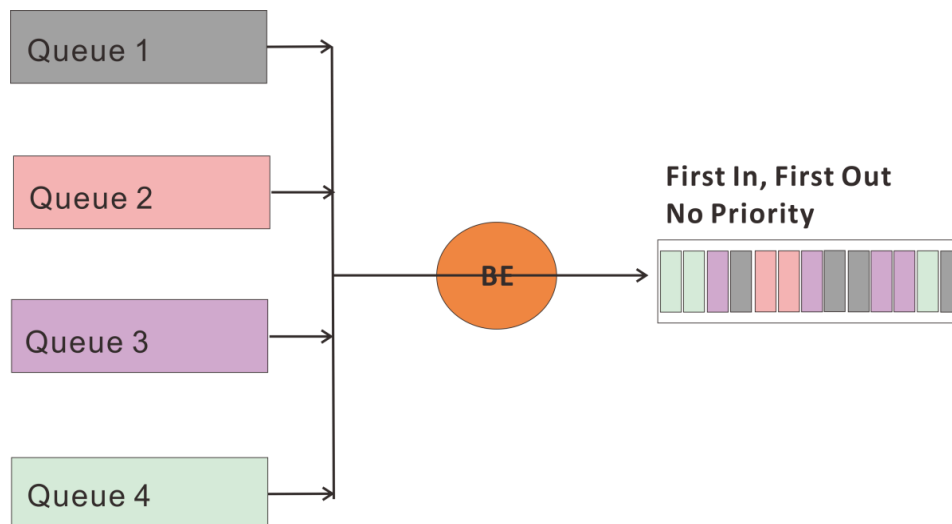
For example, as showed in the above image, the weightings of each queue are 4, 2, 5, and 1. When the device starts to process all packets in these queues with WRR algorithm, a new packet will look like the packet showed on the right hand side. Then, the device sends out the new packets.

WFQ (Weighted Fair Queuing): WFQ is a generalization of processor sharing, which allows several sessions share the same link.

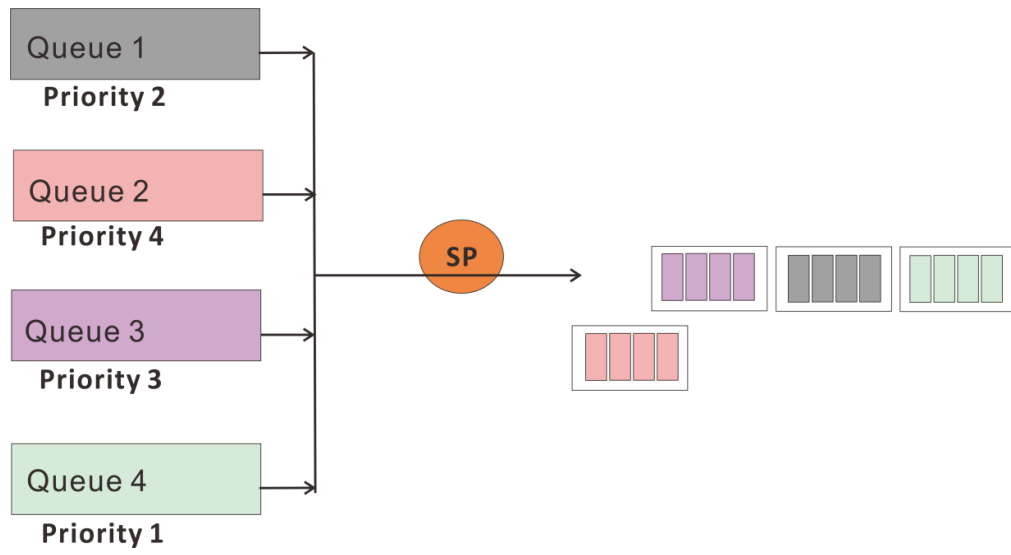


Users assign data size of each queue can be accepted by each port in “WFQ Configuration” section.

BE (Best Effort): Best Effort QoS is mainly used for data which has lower priority or can be delay. No traffic priority will be given in BE algorithm. Hence, this algorithm is not suitable for data that has higher priority, such as, video or voice data.



SP (Strictly Priority): Strictly Priority Algorithm simply follows priorities only. This means the algorithm transmits the highest priority queue first, then, the next highest priority queue, and so on. However, if there are always some content in the highest priority queue, then the other packets in the rest of queues will not be sent until the highest priority queue is empty. This algorithm is preferred when the received packets contain some high priority data, such as, voice and video.



2. WRR Configuration

If the user chooses “Type 1” in “Scheduling Configuration” section, then the information in “WRR Configuration” section is required to be filled in. Users are able to assign from 1 to 15 for the value of a weight for each queue.

▪ WRR Configuration:

| | Queue | | | |
|--------|-------|---|---|---|
| | 0 | 1 | 2 | 3 |
| Weight | 1 | 2 | 4 | 8 |

3. WFQ Configuration

If users choose to apply “Type 2” or “Type 3” as the QoS algorithm, users should assign the bandwidth for each queue in each port.

▪ WFQ Configuration: Rate = n * 1024 kbps (n = 0 means no limit)

| Port | Egress Queue | | | |
|------|--------------|----|----|----|
| | 0 | 1 | 2 | 3 |
| LAN1 | 00 | 00 | 00 | 00 |
| LAN2 | 00 | 00 | 00 | 00 |
| LAN3 | 00 | 00 | 00 | 00 |
| LAN4 | 00 | 00 | 00 | 00 |
| DSL | 00 | 00 | 00 | 00 |

4. Port Based Priority

The last step is to assign queues with their corresponding ports, LAN 1, LAN 2, LAN 3, LAN 4, DSL and Sniffing.

▪ Port Based Priority:

| Port | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|-------|------|------|------|------|-----|----------|
| Queue | 3 | 3 | 3 | 3 | 3 | 3 |

Example:

▪ Scheduling Configuration:

| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

▪ Port Based Priority:

| Port | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|-------|------|------|------|------|-----|----------|
| Queue | 3 | 3 | 3 | 3 | 3 | 3 |

If we choose “Type 3”, then we know our queues will apply BE, WFQ, WFQ, and SP techniques. Then, we assign which port should go to which queue.

Assume the following settings...

| Port | Queue | Algorithm |
|----------|-------|-----------|
| LAN 1 | 3 | SP |
| LAN 2 | 0 | BE |
| LAN 3 | 1 | WFQ |
| LAN 4 | 1 | WFQ |
| DSL | 2 | WFQ |
| Sniffing | 2 | WFQ |

Then, we can know the corresponding algorithm for each port as the table above.

3.5.2.2 VLAN Tag Priority

When you click VLAN Tag Priority, it will show the following:

Mode: ☐ Disable ☐ Port Based Priority ☒ VLAN Tag Priority ☐ IP DSCP Priority

■ Scheduling Configuration:

| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

■ WRR Configuration:

| | Queue | | | |
|--------|-------|---|---|---|
| | 0 | 1 | 2 | 3 |
| Weight | 1 | 2 | 4 | 8 |

■ WFQ Configuration: Rate = n * 1024 kbps (n = 0 means no limit)

| Port | Egress Queue | | | |
|------|--------------|----|----|----|
| | 0 | 1 | 2 | 3 |
| LAN1 | 00 | 00 | 00 | 00 |
| LAN2 | 00 | 00 | 00 | 00 |
| LAN3 | 00 | 00 | 00 | 00 |
| LAN4 | 00 | 00 | 00 | 00 |
| DSL | 00 | 00 | 00 | 00 |

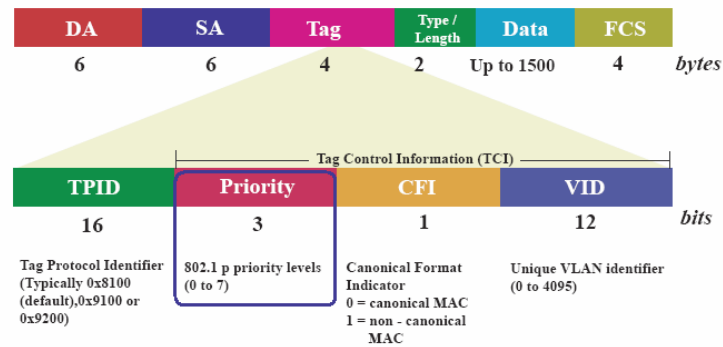
■ VLAN Tag Priority:

| Priority | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|---|---|---|---|---|---|---|---|
| Queue | 1 | 0 | 0 | 1 | 2 | 2 | 3 | 3 |

Cancel Reset Finish

VLAN Tag Priority uses the tag field information which has been inserted into an Ethernet frame. If a port has an 802.1Q-compliant device attached (such as this modem), these tagged frames can carry VLAN membership information.

IEEE 802.1Q Tagged Frame for Ethernet:



User priority is giving eight ($2^3 = 8$) priority levels. The default value is 0, indicating normal treatment.

| Priority Level | Traffic Type |
|----------------|--|
| 0 (default) | Best Effort |
| 1 | Background |
| 2 | Spare |
| 3 | Excellent Effort |
| 4 | Controlled Load |
| 5 | Video, less than 100 milliseconds latency and jitter |
| 6 | Voice, less than 10 milliseconds latency and jitter |
| 7 | Network Control |

Each Priority level can be set queue from 0 to 3.

Scheduling Configuration item can setup the type is from 1 to 3. Queue from 0 to 3 can set up their Queue Weight form 1 to 15.

1. Scheduling Configuration:

Choose which algorithm combination you would like to apply.

2. WRR Configuration:

If you would like to apply WRR as the QoS algorithm for your LRE modem, then, please assign the weight for each queue. “Weight” means how important the queue is; therefore, 15 is the most important queue and 0 is the least important queue. Hence, in the image below, we know queue 3 is the most important queue among all.

▪ WRR Configuration:

| | Queue | | | |
|--------|-------|---|---|---|
| | 0 | 1 | 2 | 3 |
| Weight | 1 | 2 | 4 | 8 |

3. WFQ Configuration:

Same as other priority style, assign a bandwidth for a queue in one port in this section if WFQ algorithm is chose.

4. VLAN Tag Priority

“VLAN Tag Priority” section allows users to choose a packet with an assigned priority goes to which queue.

▪ VLAN Tag Priority:

| Priority | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|---|---|---|---|---|---|---|---|
| Queue | 1 | 0 | 0 | 1 | 2 | 2 | 3 | 3 |

Example:

▪ Scheduling Configuration:

| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

▪ WRR Configuration:

| | Queue | | | |
|--------|-------|---|---|---|
| | 0 | 1 | 2 | 3 |
| Weight | 1 | 2 | 4 | 8 |

▪ VLAN Tag Priority:

| Priority | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|---|---|---|---|---|---|---|---|
| Queue | 1 | 0 | 0 | 1 | 2 | 2 | 3 | 3 |

Assume we choose “Type 1” in “Scheduling Configuration” section.

| | | Queue | | | |
|--------|--|-------|----|---|---|
| | | 0 | 1 | 2 | 3 |
| Weight | | 2 | 15 | 7 | 8 |

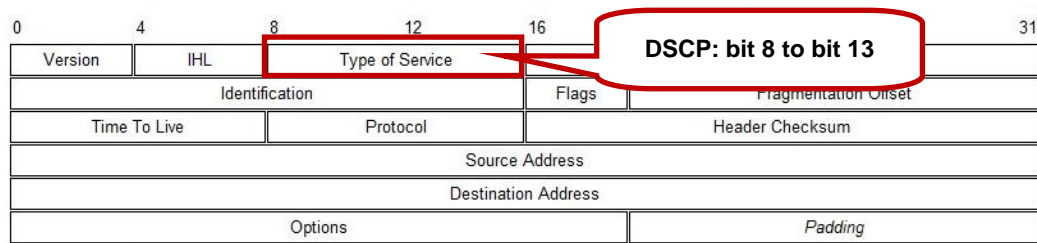
| | | | | | | | | |
|----------|---|---|---|---|---|---|---|---|
| Priority | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Queue | 0 | 0 | 2 | 2 | 3 | 3 | 1 | 1 |

Hence, we know...

1. Packets with priority 0 and priority 1 go to Queue 0.
 2. Packets with priority 2 and priority 3 go to Queue 2.
 3. Packets with priority 4 and priority 5 go to Queue 3.
 4. Packets with priority 6 and priority 7 go to Queue 1.
 5. When, data flow traffic is jammed...
- ✓ Queue 1 Packets will go first because weight is equal to 15 (the biggest value).
 - ✓ Queue 3 Packets will go next because the weight is the second largest value.
 - ✓ Queue 2 Packets are the next after Queue 3 Packets.
 - ✓ Queue 0 Packets are the last one to send.

3.5.2.3 IP DSCP Priority

IP DSCP: DSCP stands for “Differentiated Services Code Point”, which is the 6-bit field in the header of IP packets, and it is for packet classification purposes. Hence, this algorithm is based on IP DSCP fields in the IP header. Therefore, there are 64 levels of priority degrees. (0 to 63)



Mode: ☐ Disable ☐ Port Based Priority ☐ VLAN Tag Priority ☒ IP DSCP Priority

• Scheduling Configuration:

| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

• WRR Configuration:

| | Queue | | | |
|--------|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| Weight | 1 ▾ | 2 ▾ | 4 ▾ | 8 ▾ |

• WFQ Configuration: Rate = n * 1024 kbps (n = 0 means no limit)

| Port | Egress Queue | | | |
|------|--------------|------|------|------|
| | 0 | 1 | 2 | 3 |
| LAN1 | 00 ▾ | 00 ▾ | 00 ▾ | 00 ▾ |
| LAN2 | 00 ▾ | 00 ▾ | 00 ▾ | 00 ▾ |
| LAN3 | 00 ▾ | 00 ▾ | 00 ▾ | 00 ▾ |
| LAN4 | 00 ▾ | 00 ▾ | 00 ▾ | 00 ▾ |
| DSL | 00 ▾ | 00 ▾ | 00 ▾ | 00 ▾ |

• IP DSCP Priority:

| DSCP | Queue | DSCP | Queue | DSCP | Queue | DSCP | Queue |
|------|-------|------|-------|------|-------|------|-------|
| 0 | 0 ▾ | 16 | 1 ▾ | 32 | 2 ▾ | 48 | 2 ▾ |
| 1 | 0 ▾ | 17 | 1 ▾ | 33 | 2 ▾ | 49 | 2 ▾ |
| 2 | 0 ▾ | 18 | 1 ▾ | 34 | 2 ▾ | 50 | 2 ▾ |
| 3 | 0 ▾ | 19 | 1 ▾ | 35 | 2 ▾ | 51 | 2 ▾ |
| 4 | 0 ▾ | 20 | 1 ▾ | 36 | 2 ▾ | 52 | 2 ▾ |
| 5 | 0 ▾ | 21 | 1 ▾ | 37 | 2 ▾ | 53 | 2 ▾ |
| 6 | 0 ▾ | 22 | 1 ▾ | 38 | 2 ▾ | 54 | 2 ▾ |
| 7 | 0 ▾ | 23 | 1 ▾ | 39 | 2 ▾ | 55 | 2 ▾ |
| 8 | 0 ▾ | 24 | 2 ▾ | 40 | 3 ▾ | 56 | 2 ▾ |
| 9 | 0 ▾ | 25 | 2 ▾ | 41 | 3 ▾ | 57 | 2 ▾ |
| 10 | 0 ▾ | 26 | 2 ▾ | 42 | 3 ▾ | 58 | 2 ▾ |
| 11 | 0 ▾ | 27 | 2 ▾ | 43 | 3 ▾ | 59 | 2 ▾ |
| 12 | 0 ▾ | 28 | 2 ▾ | 44 | 3 ▾ | 60 | 2 ▾ |
| 13 | 0 ▾ | 29 | 2 ▾ | 45 | 3 ▾ | 61 | 2 ▾ |
| 14 | 0 ▾ | 30 | 2 ▾ | 46 | 3 ▾ | 62 | 2 ▾ |
| 15 | 0 ▾ | 31 | 2 ▾ | 47 | 3 ▾ | 63 | 2 ▾ |

Cancel

Reset

Finish

1. Scheduling Configuration:
Choose which combination you would like to apply: "Type 1", "Type 2", or "Type 3".
2. WRR Configuration:
If you choose to apply WRR technique, fill up weights to indicate how important the queue is. (Weight: 0 to 15)
3. WFQ Configuration:
If WFQ is applied, fill up the bandwidth for a queue in a port.
4. IP DSCP Priority:

▪ IP DSCP Priority:

| DSCP | Queue | DSCP | Queue | DSCP | Queue | DSCP | Queue |
|------|-------|------|-------|------|-------|------|-------|
| 0 | 0 | 16 | 1 | 32 | 2 | 48 | 2 |
| 1 | 0 | 17 | 1 | 33 | 2 | 49 | 2 |
| 2 | 0 | 18 | 1 | 34 | 2 | 50 | 2 |
| 3 | 0 | 19 | 1 | 35 | 2 | 51 | 2 |
| 4 | 0 | 20 | 1 | 36 | 2 | 52 | 2 |
| 5 | 0 | 21 | 1 | 37 | 2 | 53 | 2 |
| 6 | 0 | 22 | 1 | 38 | 2 | 54 | 2 |
| 7 | 0 | 23 | 1 | 39 | 2 | 55 | 2 |
| 8 | 0 | 24 | 2 | 40 | 3 | 56 | 2 |
| 9 | 0 | 25 | 2 | 41 | 3 | 57 | 2 |
| 10 | 0 | 26 | 2 | 42 | 3 | 58 | 2 |
| 11 | 0 | 27 | 2 | 43 | 3 | 59 | 2 |
| 12 | 0 | 28 | 2 | 44 | 3 | 60 | 2 |
| 13 | 0 | 29 | 2 | 45 | 3 | 61 | 2 |
| 14 | 0 | 30 | 2 | 46 | 3 | 62 | 2 |
| 15 | 0 | 31 | 2 | 47 | 3 | 63 | 2 |

In “IP DSCP Priority” section, you can decide which queue a DSCP level should go to.

Example:

▪ Scheduling Configuration:

| Operation | Queue | | | |
|---|-------|-----|-----|-----|
| | 0 | 1 | 2 | 3 |
| <input checked="" type="radio"/> Type 1 | WRR | WRR | WRR | WRR |
| <input type="radio"/> Type 2 | BE | WFQ | WFQ | WFQ |
| <input type="radio"/> Type 3 | BE | WFQ | WFQ | SP |

▪ WFQ Configuration: Rate = n * 1024 kbps (n = 0 means no limit)

| Port | Egress Queue | | | |
|------|--------------|----|----|----|
| | 0 | 1 | 2 | 3 |
| LAN1 | 00 | 00 | 00 | 00 |
| LAN2 | 00 | 00 | 00 | 00 |
| LAN3 | 00 | 00 | 00 | 00 |
| LAN4 | 00 | 00 | 00 | 00 |
| DSL | 00 | 00 | 00 | 00 |

▪ IP DSCP Priority:

| DSCP | Queue | DSCP | Queue | DSCP | Queue | DSCP | Queue |
|------|-------|------|-------|------|-------|------|-------|
| 0 | 0 | 16 | 1 | 32 | 2 | 48 | 2 |
| 1 | 0 | 17 | 1 | 33 | 2 | 49 | 2 |
| 2 | 0 | 18 | 1 | 34 | 2 | 50 | 2 |
| 3 | 0 | 19 | 1 | 35 | 2 | 51 | 2 |
| 4 | 0 | 20 | 1 | 36 | 2 | 52 | 2 |
| 5 | 0 | 21 | 1 | 37 | 2 | 53 | 2 |
| 6 | 0 | 22 | 1 | 38 | 2 | 54 | 2 |
| 7 | 0 | 23 | 1 | 39 | 2 | 55 | 2 |
| 8 | 0 | 24 | 2 | 40 | 3 | 56 | 2 |
| 9 | 0 | 25 | 2 | 41 | 3 | 57 | 2 |
| 10 | 0 | 26 | 2 | 42 | 3 | 58 | 2 |
| 11 | 0 | 27 | 2 | 43 | 3 | 59 | 2 |
| 12 | 0 | 28 | 2 | 44 | 3 | 60 | 2 |
| 13 | 0 | 29 | 2 | 45 | 3 | 61 | 2 |
| 14 | 0 | 30 | 2 | 46 | 3 | 62 | 2 |
| 15 | 0 | 31 | 2 | 47 | 3 | 63 | 2 |

WFQ Configuration

| Port | Queue | | | |
|-------|-------|---|----|---|
| | 0 | 1 | 2 | 3 |
| LAN 1 | | 5 | 10 | |
| LAN 2 | | 5 | 0 | |
| LAN 3 | | 0 | 10 | |
| LAN 4 | | 0 | 0 | |
| DSL | | 5 | 0 | |

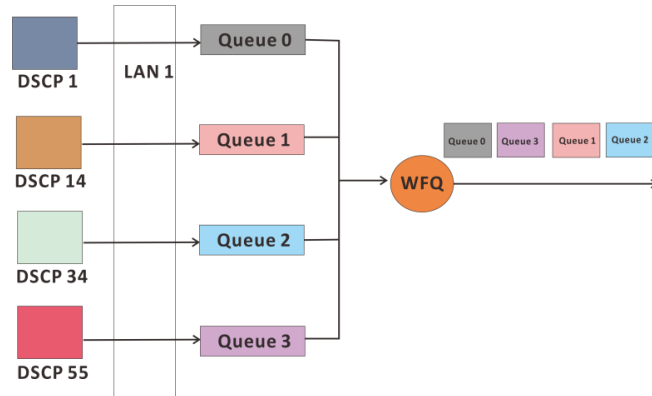
Since we choose “Type 3”, Queue 0 and Queue 3 do not apply WFQ algorithm. Hence, we only need to setup WFQ configurations for Queue 1 and Queue 2.

Assume...

1. Assign DSCP 1 to Queue 0.

2. Assign DSCP 14 to Queue 1.
3. Assign DSCP 34 to Queue 2.
4. Assign DSCP 55 to Queue 3.

Now we check LAN 1 only, and you will see the following results.



3.5.3 Rate Limiting

Click **Rate Limiting** to configure the LRE modem.

ADVANCED - RATE LIMIT

Configuration:

- Rate = n * 1024 kbps (n = 0 means no limit)

| Port | LAN1 | LAN2 | LAN3 | LAN4 |
|--------------|------|------|------|------|
| Ingress Rate | 00 ▾ | 00 ▾ | 00 ▾ | 00 ▾ |

Cancel

Reset

Finish

Limiting bandwidth to specific users and ports helps control network congestion, ensure high performance, create efficient networks, and prevent a small number of users from monopolizing network bandwidth.

Rate limiting control can be used to intelligently manage bandwidth allocation in the networking. It can prevent one user or device from dominating the available network bandwidth, and it allows IT managers to allocate greater bandwidth to the departments and applications that need it.

You can setup the date rates limit on each port from 0 to 22. (00 means No limit, the **Ingress Rate x 1024kbps** is the limit rate of their ports. The default setting is **No limit** on each ports.)

3.5.4 VLAN

Click **VLAN** to configure VLAN.

SHDSL.bis LRE

Home Basic **Advanced** Status Admin Utility

ADVANCED - VLAN

Virtual LAN Configuration:

Operation Mode:
Mode: ☒ Disable ☐ Port-based VLAN ☐ Tag-based

Cancel Reset Finish

BASIC

ADVANCED

- SHDSL.bis LRE
- QOS
- RATE LIMIT
- VLAN**
- FLOW CONTROL
- LINK MODE

STATUS

ADMIN

UTILITY

VLAN (Virtual Local Area Network) allows a physical network to be partitioned into multiple logical networks. Devices on a logical network belong to one group. A device can belong to more than one group. With VLAN, a device cannot directly talk to or hear from devices that are not in the same group.

With MTU (Multi-Tenant Unit) applications, VLAN is vital in providing isolation and security among the subscribers. When properly configured, VLAN prevents one subscriber from accessing the network resources of another on the same LAN.

VLAN also increases network performance by limiting broadcasts to a smaller and more manageable logical broadcast domain. In traditional switched environments, all broadcast packets go to each every individual port. With VLAN, all broadcasts are confined to a specific broadcast domain.

For VLAN Configuration, users are able to choose the following options:

1. Disable: to disable VLAN feature.
2. Port-based VLAN: to group ports and their mode (access or trunk)
3. Tag-based VLAN: to assign a VID and group ports with their modes (access or trunk).

3.5.4.1 Port-Based VLAN

Click **Port-Based VLAN** to configure the LRE modem.

ADVANCED - VLAN

Virtual LAN Configuration:

■ **Operation Mode:**

Mode: ☐ Disable ☒ Port-based VLAN ☐ Tag-based

■ **Port-based VLAN Configuration:**

| Group ID | Mgmt | Port | | | | | S-VLAN Tunnel | |
|----------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------|-----|
| | | LAN1 | LAN2 | LAN3 | LAN4 | DSL | TPID | VID |
| 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| 2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 3 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 5 | <input type="checkbox"/> | Access ▾ | Access ▾ | Access ▾ | Access ▾ | Access ▾ | 0x0000 | 0 |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

Port-Based VLANs are VLANs where the packet forwarding decision is based on the destination MAC address and its associated port.

When using the port-based VLAN, the port is assigned to a specific VLAN independent of the user or system attached to the port. This means all users attached to the port should be members in the same VLAN. The network administrator typically performs the VLAN assignment. The port configuration is static and cannot be automatically changed to another VLAN without manual reconfiguration.

As with other VLAN approaches, the packets forwarded using this method do not leak into other VLAN domains on the network. After a port has been assigned to a VLAN, the port cannot send to or receive from devices in another VLAN.

ADVANCED - VLAN

Virtual LAN Configuration:

■ **Operation Mode:**

Mode: ☐ Disable ☒ Port-based VLAN ☐ Tag-based

■ **Port-based VLAN Configuration:**

| Group ID | Mgmt | Port | | | | | S-VLAN Tunnel | |
|----------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------|-----|
| | | LAN1 | LAN2 | LAN3 | LAN4 | DSL | TPID | VID |
| 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| 2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 3 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 5 | <input type="checkbox"/> | Access ▾ | Access ▾ | Access ▾ | Access ▾ | Access ▾ | 0x0000 | 0 |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

MGMT: check if the rule is for management purpose.

Port: port interfaces, including LAN1, LAN2, LAN3, LAN4, and DSL. Check the port interface you need if you

want to include the port.

Access: allows all packets passing through the port interface

Tunnel: check the VLAN ID of all packets with VID assigned.

S-VLAN Tunnel:

TPID: Tag Protocol Identifier, a 16-bit field set to a value of 0x8100 (the typical value) for identifying the frame as an IEEE 802.1Q-tagged frame.

VID: VLAN ID.

EXAMPLE:

Port-based VLAN Configuration:

| Group ID | Mgmt | Port | | | | | S-VLAN Tunnel | |
|----------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------|-----|
| | | LAN1 | LAN2 | LAN3 | LAN4 | DSL | TPID | VID |
| 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| 2 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 3 | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | |
| 4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | |
| 5 | <input type="checkbox"/> | Access | Tunnel | Access | Access | Access | 0x8100 | 10 |
| 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

Cancel Reset Finish

| Group ID | MGMT | Port | | | | | | | S-VLAN Tunnel | |
|----------|------|--------|--------|--------|--------|--------|--|--|---------------|-----|
| | | LAN1 | LAN2 | LAN3 | LAN4 | DSL | | | TPID | VID |
| 1 | ✓ | ✓ | ✓ | | | ✓ | | | | |
| 2 | ✓ | | | ✓ | ✓ | | | | | |
| 3 | | ✓ | ✓ | | ✓ | ✓ | | | | |
| 4 | | | | | | | | | | |
| 5 | | Access | Tunnel | Access | Access | Access | | | 0x8100 | 10 |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |

From the image, you can conclude the information showed as above table.

We know there are three rules created.

(1) Group ID = 1

This group is allowed to manage the LRE modem. LAN1, LAN2 and DSL are in this group. Only LAN2 (in "Tunnel" mode) will check the VLAN ID of incoming packets. The VLAN ID should be equal to 10 and its TPID should be "0x8100".

(2) Group ID = 2

This group is allowed to manage the LRE modem. LAN3 and LAN4 are in this group. This rule will not check any VLAN ID from any group member (both ports are "Access").

(3) Group ID = 3

This group is not allowed to manage the LRE modem. LAN1, LAN2, LAN4 and DSL are in this group. Only packets with VLAN ID = 10 and TPID = 0x8100 can access LAN2; otherwise, packets which do not meet this requirement will be dropped.

3.5.4.2 Tag-Based VLAN

Click the **Tag-Based VLAN** to configure the LRE modem.

ADVANCED - VLAN

Virtual LAN Configuration:

■ **Operation Mode:**

Mode: ☐ Disable ☐ Port-based VLAN ☒ Tag-based

■ **Tag-based VLAN Configuration:**

| Group ID | En | VID | Mgmt | Port | | | | | S-VLAN Tunnel | | |
|----------|-------------------------------------|-----|-------------------------------------|--|--|--|--|--|---------------|--------|-----|
| | | | | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Mode | TPID | VID |
| 1 | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> Access | <input checked="" type="checkbox"/> Access | <input checked="" type="checkbox"/> Access | <input checked="" type="checkbox"/> Access | <input checked="" type="checkbox"/> Access | Off | 0x8100 | 0 |
| 2 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| 3 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| 4 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| 5 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| 6 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| 7 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| 8 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Down | Off | 0x8100 | 0 |
| PVID | | | | 1 | 1 | 1 | 1 | 1 | | | |

En: Check if you want to apply this rule.

VID: VLAN ID

MGMT: Check if you want this rule to manage the modem.

Port: port interfaces, including LAN1, LAN2, LAN3, LAN4, and DSL. Check the port interface you need if you want to include the port.

Access: allows all packets passing through the port interface

Trunk: only these packets with assigned VLAN ID can pass through via the port interface.

Hybrid: if the incoming packet carries a VLAN ID, then, the LRE modem will check the VLAN ID with the assigned PVID. If the packet includes no VLAN ID, then, the LRE will not check.

Tunnel: if you would like to enable Q-in-Q mode or VLAN mapping feature, please choose this access mode.

S-VLAN Tunnel: this section is for "Tunnel" mode.

Mode: to choose either you want to run "Q-in-Q" or "VLAN mapping".

TPID: Tag Protocol Identifier, a 16-bit field set to a value of 0x8100 (the typical value) for identifying the frame as an IEEE 802.1Q-tagged frame. Note: when you choose "Mapping", you are not allowed to change this value.

VID: VLAN ID.

EXAMPLE:

| Group ID | Enable | VID | MGM T | Port | | | | | | | | | | S-VLAN Tunnel | | |
|----------|--------|-----|----------|------|--|------|--|------|--|------|--|-----|--|---------------|------|-----|
| | | | | LAN1 | | LAN2 | | LAN3 | | LAN4 | | DSL | | Mode | TPID | VID |
| 1 | | 10 | | | | | | | | | | | | | | |
| 2 | | 20 | | | | | | | | | | | | | | |
| 3 | | 30 | | | | | | | | | | | | | | |
| 4 | | 40 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | |
| PVID | | | | 20 | | 30 | | 40 | | | | | | | | |

“VID” is basically for grouping port interfaces. This means only group members can access the other group members. For example, there is a VID group with LAN1, LAN3 and DSL. This means packets come from DSL can only access to LAN1 and LAN3. Others cannot access to these group members.

“PVID” is for the LRE modem to check target packets, such as an ingress packet or an egress packet, for their validity.

In 802.1q, the VLAN information is written into the Ethernet packet itself. Each packet carries a VLAN ID (Virtual LAN ID), called a tag. This allows VLANs to be configured across multiple switches. Note that it’s possible for VLAN tags to be stripped by H/W and/or S/W.

When using 802.1q, four bytes are added to the Ethernet frame, of which 12 bits are used for the VLAN ID.

Theoretically, there can be up to 4096 VLANs per network.

An Ethernet packet that contains a VLAN ID is called a tagged packet. Conversely, an Ethernet packet with no VLAN ID is called an untagged packet. Typically all packets leave untagged, unless tagged by the adapter prior to arriving at the switch port.

Egress and Ingress Rules:

Egress rules determine which frames can be transmitted out of a port, based on the Egress List of the VLAN associated with it. Each VLAN has an Egress List that specifies the ports out of which frames can be forwarded, and specifies whether the frames will be transmitted as tagged or untagged frames.

Ingress rules are a means of filtering out undesired traffic on a port. When Ingress Filtering is enabled, a port determines if a frame can be processed based on whether the port is on the Egress List of the VLAN associated with the frame.

When an untagged packet arrives at the switch port, the switch will write a VLAN ID into the header of the frame according to the PVID (port VLAN) port definition. Typically, most switches today have all ports are set to a default PVID of 1. When a tagged frame arrives at a switch port the tag is respected.

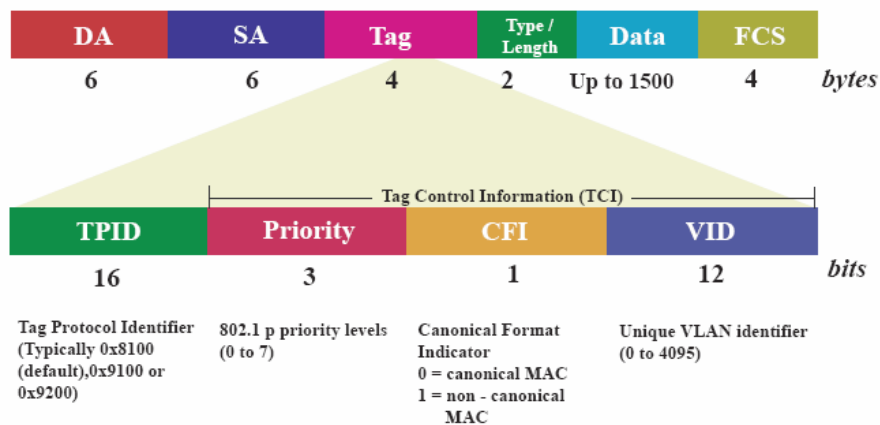
A VID defines the member of a port group. A packet can only travel inside a member port when the member port is part of a VID port group. Different VID groups aren't visible to one another

VID: (Virtual LAN ID) It is a definite number of ID which number is from 1 to 4094.

PVID: (Port VID) It is an untagged member from 1 to 4094 of default VLAN.

Link Type:

1. **Access** means the port can receive or send untagged packets.
2. **Trunk** means that the port can receive or send tagged packets.



TCI (Tag Control Information field) including user priority, Canonical format indicator(CFI) and VLAN ID.

TPID(Tag Protocol Identifier) defined value of 8100 in hex. When a frame has the EtherType equal to 8100H, this frame carries the tag IEEE 802.1Q / 802.1P.

Priority field defines user priority, giving eight ($2^3 = 8$) priority levels. IEEE 802.1P defines the operation for these 3 user priority bits.(Refer to following table)

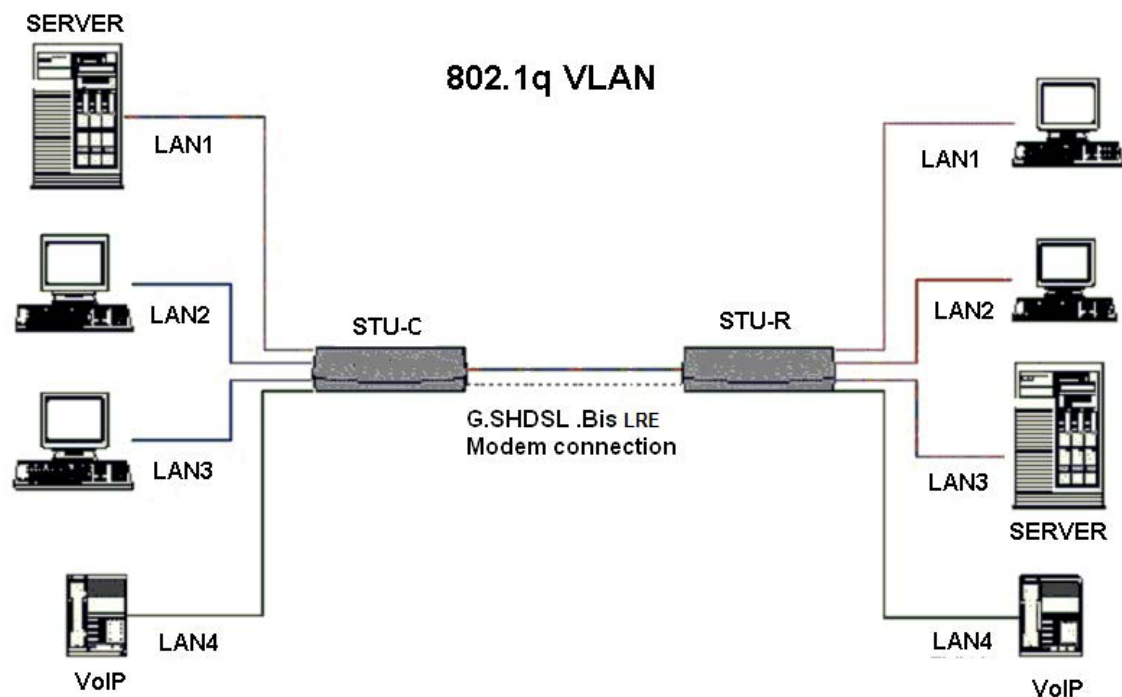
CFI(Canonical Format Indicator) is always set to zero for Ethernet switches. CFI is used for compatibility reason between Ethernet type network and Token Ring type network. If a frame received at an Ethernet port has a CFI set to 1, then that frame should not be forwarded as it is to an untagged port.

VID (VLAN ID) is the identification of the VLAN, which is basically used by the standard 802.1Q. It has 12 bits and allow the identification of 4096 (2^{12}) VLANs. Of the 4096 possible VIDs, a VID of 0 is used to identify priority frames and value 4095 (FFF) is reserved, so the maximum possible VLAN configurations are 4,094.

The LRE modem initially default configures one VLAN, VID=1.

A port such as LAN1 to 4, DSL or sniffing can have only one PVID, but can have as many VID as the LRE modem has memory in its VLAN table to store them.

Ports in the same VLAN group share the same frame broadcast domain thus increase network performance through reduced boardcast traffic. VLAN groups can be modified at any time by adding, moving or changing ports without any re-cabling.



Before enabling VLANs for the LRE modem, you must first assign each port to the VLAN group(s) in which it will participate. By default all ports are assigned to VLAN1 as untagged ports. Add a port as a tagged port if you want it to carry traffic for one or more VLANs, and any intermediate network devices or the host at the other end of the connection supports VLANs. Then assign ports on the other VLAN-aware network devices along the path that will carry this traffic to the same VLAN(s), either manually or dynamically using GVRP. However, if you want a port on this LRE modem to participate in one or more VLANs, but none of the intermediate network devices nor the host at the other end of the connection supports VLANs, then you should add this port to the VLAN as an untagged port.

Note: VLAN-tagged frames can pass through VLAN-aware or VLAN-unaware network

Inter-connection devices, but the VLAN tags should be stripped off before passing it on to any end-node host that does not support VLAN tagging.

VLAN Classification – When the LRE modem receives a frame, it classifies the frame in one of two ways. If the frame is untagged, the LRE modem assigns the frame to an associated VLAN (based on the default VLAN ID of the receiving port). But if the frame is tagged, the LRE modem uses the tagged VLAN ID to identify the port broadcast domain of the frame.

Port Overlapping – Port overlapping can be used to allow access to commonly shared network resources among different VLAN groups, such as file servers or printers.

Untagged VLANs – Untagged (or static) VLANs are typically used to reduce broadcast traffic and to increase security. A group of network users assigned to a VLAN form a broadcast domain that is separate from other VLANs configured on

the LRE modem. Packets are forwarded only between ports that are designated for the same VLAN. Untagged VLANs can be used to manually isolate user groups or subnets.

PVID - VLAN ID assigned to untagged frames received on the interface. (Default: 1)

If an interface is not a member of VLAN 1 and you assign its PVID to this VLAN, the interface will automatically be added to VLAN 1 as an untagged member. For all other VLANs, an interface must first be configured as an untagged member before you can assign its PVID to that group.

Link Type - Sets the port to accept the frame types: “Access” means the port can only receive or send untagged frame types. “Trunk” means that the port can only receive or send tagged frame types.

3.5.4.3 Hybrid Function Description

Hybrid ports carry both untagged and 802.1Q tagged packets. Hybrid ports are equivalent to trunk ports, with a limited amount of allowed VLANs and native VLANs. Hybrid ports carry the traffic of one or more VLANs. Any router port can be configured as a hybrid port.

In 56xxN, all router ports by default come up in hybrid mode. Users need to explicitly add the hybrid ports to all the required VLANs as either tagged or untagged interfaces. A hybrid port could be configured simultaneously as a tagged port on one or more VLANs and as an untagged port on any one VLAN. Similar to access ports, hybrid ports may be an untagged port on only one VLAN, but may be a tagged port on many VLANs.

Users need to configure the PVID for hybrid ports to correctly handle the incoming untagged packets.

ADVANCED - VLAN

Virtual LAN Configuration:

Operation Mode:

Mode: ☐ Disable ☐ Port-based VLAN ☒ Tag-based

Tag-based VLAN Configuration:

| Group ID | En | VID | Mgmt | Port | | | | | S-VLAN Tunnel | | |
|----------|-------------------------------------|-----|-------------------------------------|--|--|--|--|--|---------------|--------|-----|
| | | | | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Mode | TPID | VID |
| 1 | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> Hybrid | <input checked="" type="checkbox"/> Hybrid | <input checked="" type="checkbox"/> Hybrid | <input checked="" type="checkbox"/> Hybrid | <input checked="" type="checkbox"/> Hybrid | Off | 0x8100 | 0 |
| 2 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| 3 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| 4 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| 5 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| 6 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| 7 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| 8 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Trunk | Trunk | Trunk | Trunk | Down | Off | 0x8100 | 0 |
| PVID | | | | 1 | 1 | 1 | 1 | 1 | | | |

Cancel

Reset

Finish

3.5.5 Flow Control

ADVANCED - FLOW CONTROL

Flow Control Configuration:

▪ Operation Mode:

Mode: ☐ Disable ☒ Enable

Cancel

Reset

Finish

“Flow Control” Section allows users to decide whether this modem should control the packet size.

3.5.6 LINK MODE

ADVANCED - LAN LINK MODE

Configuration:

| Port | LAN1 | LAN2 | LAN3 | LAN4 |
|-----------|--------|--------|--------|--------|
| Link Mode | Auto ▼ | Auto ▼ | Auto ▼ | Auto ▼ |

Cancel

Reset

Finish

“Link Mode” Section allows users to decide whether this modem should control the transmit speed. The options are “Auto”, “100M Full”, “100M Half”, “10M Full”, “10M Half”

3.5.7 LRE OAM

Operations, administration and management or operations, administration and maintenance (**OA&M** or **OAM**) is the processes, activities, tools, standards etc. involved with operating, administering, managing and maintaining any system. This commonly applies to computer networks or computer hardware.

In particular, Ethernet operations, administration and maintenance (EOAM) is the protocol for installing, monitoring and troubleshooting Ethernet metropolitan area network (MANs) and Ethernet WANs. It relies on a new, optional sublayer in the data link layer of the Open Systems Interconnection (OSI) model. The OAM features covered by this protocol are discovery, link monitoring, remote fault detection, and remote loopback.

ADVANCED - LRE OAM

Configuration:

OAM Mode: ☒ Passive ☐ Active
 Unidirectional Support: ☐ No ☒ Yes
 Remote Loopback Support: ☐ No ☒ Yes
 Link Events Support: ☐ No ☒ Yes
 Variable Retrieval Support: ☐ No ☒ Yes

Event Notification

Errored Frame Window: 1 second(s)
 Errored Frame Threshold: 1 frame error(s)
 Errored Frame Seconds Summary Window: 60 seconds
 Errored Frame Seconds Summary Threshold: 1 error second(s) (<= Errored Frame Seconds Summary Window)

Cancel Reset Finish

Remote LoopBack Configuration:

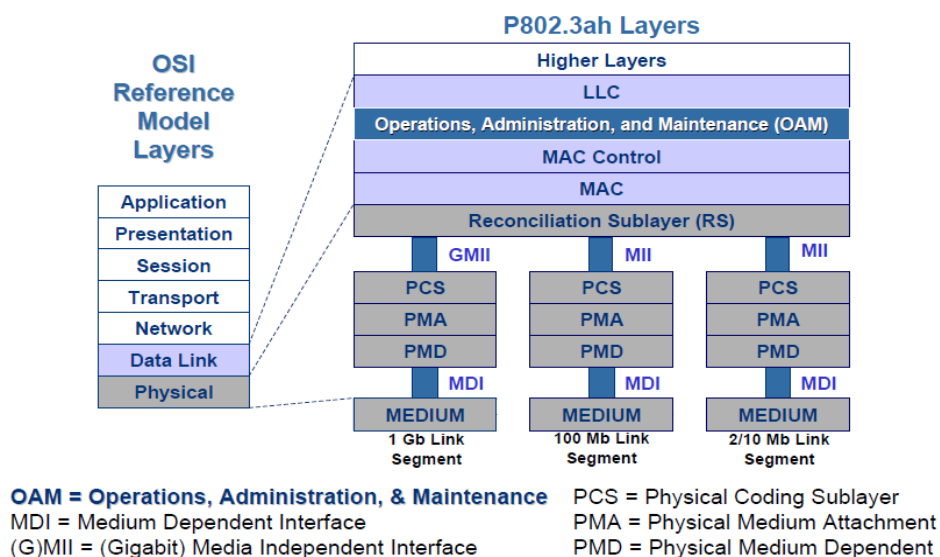
Remote OAM Loop Back Mode: ☒ Disable ☐ Enable

Cancel Reset Finish

Operations, administration and management or operations, administration and maintenance (**OA&M or OAM**) is the processes, activities, tools, standards etc. involved with operating, administering, managing and maintaining any system. This commonly applies to computer networks or computer hardware.

In particular, Ethernet operations, administration and maintenance (EOAM) is the protocol for installing, monitoring and troubleshooting Ethernet metropolitan area network (MANs) and Ethernet WANs. It relies on a new, optional sublayer in the data link layer of the Open Systems Interconnection (OSI) model. The OAM features covered by this protocol are discovery, link monitoring, remote fault detection, and remote loopback.

OSI Layer Stack



OAM provides mechanisms to:

- Monitor link operation and health.
- Improve fault isolation.

Method: OAM data conveyed in basic (Untagged) 802.3 Slow Protocol frames

- Sent between two ends of a single link. Note: called a “DTE” in 802.3 terminology.
- Slow Protocols allows S/W implementation.

Fills major requirement to reduce LRE OpEx

| |
|--|
| 3.5.7.1 OAM Protocol Data Units (OAMPDUs) Size/Rate |
|--|

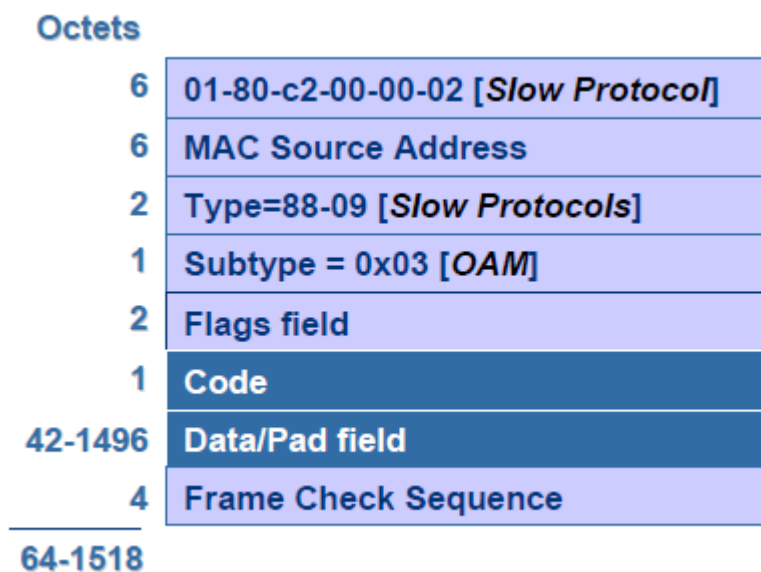
Must be standard frame length

- 64-1518 octets.
- Maximum PDU size determined during Discovery process.

Must be untagged

Maximum of (10) OAMPDUs per second

- Max rate defined in Annex 43B as modified by LRE.
- May be sent multiple times to increase likelihood of reception by remote device (e.g., in the case of high bit errors).

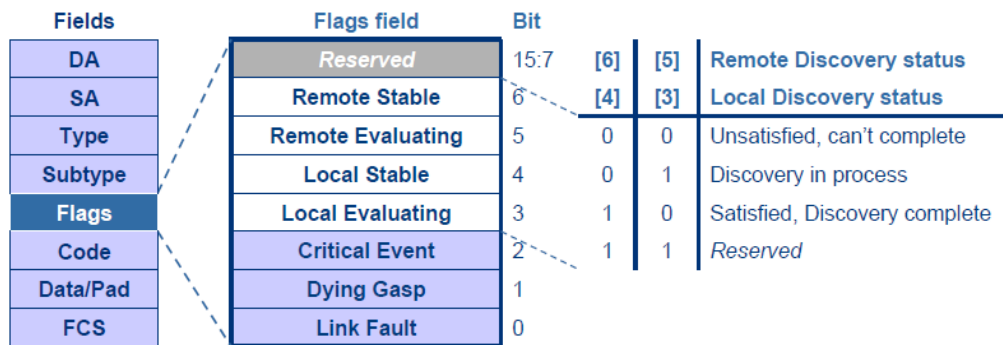


3.5.7.2 OAM Protocol Data Units (OAMPDUs) Flags field

■ Length: 2 octets

■ Legend: Critical Link Event bit

State information bit



3.5.7.3 OAM Critical Link Events / Link Event Notification / Link Event TLVs

Link Fault

- Signal remote device that receive path is broken.
- Sent once per second in Information OAMPDU.

Dying Gasp

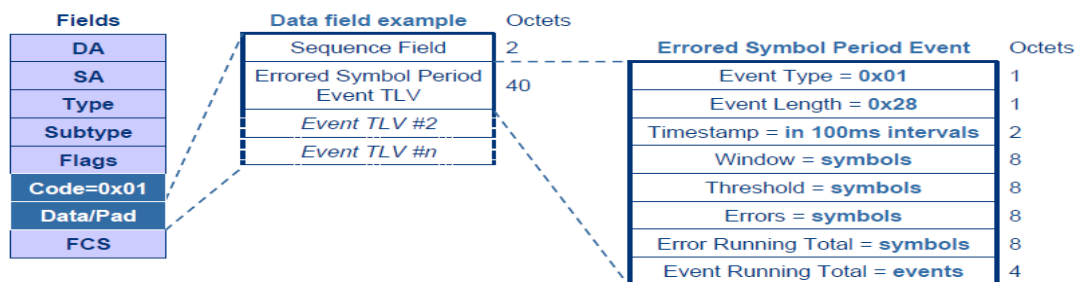
- Signal remote device that unrecoverable local fault (e.g., power failure) has occurred.
- May be sent immediately/continuously.

Critical Event

- An unspecified critical event has occurred.
- May be sent immediately/continuously.

Link Event Notification

- **Code: 0x01**
- **Data field: One or more Link Event TLV(s)**
- **Length: *Variable***



Link Event TLVs

| Event Type | Event TLV Name |
|------------|--|
| 0x00 | <i>End of TLV marker</i> |
| 0x01 | Errored Symbol Period Event |
| 0x02 | Errored Frame Event |
| 0x03 | Errored Frame Period Event |
| 0x04 | Errored Frame Seconds Summary Event |
| 0x05-0xFD | <i>Reserved</i> |
| 0xFE | Organization Specific Event TLV |
| 0xFF | <i>Reserved</i> |

Sent as Link Event TLVs within Event Notification PDU:

- May be sent multiple times to increase likelihood of reception (e.g., in the case of high bit errors).
- Includes time reference when generated.

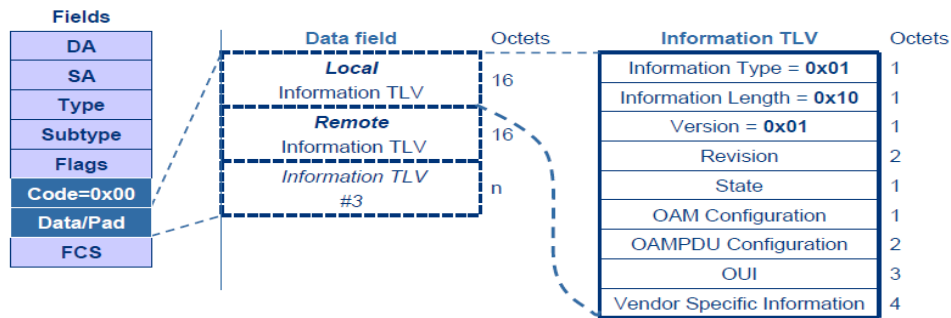
3.5.7.4 OAM Protocol Data Units (OAMPDUs) Codes and Information TLVs

| Code | OAMPDU | Length |
|-----------|------------------------------|------------------|
| 0x00 | Information | <i>varies</i> |
| 0x01 | Event Notification | <i>varies</i> |
| 0x02 | Variable Request | <i>varies</i> |
| 0x03 | Variable Response | <i>varies</i> |
| 0x04 | Loopback Control | 64 octets |
| 0x05-0xFD | <i>Reserved</i> | |
| 0xFE | Organization Specific | <i>varies</i> |
| 0xFF | <i>Reserved</i> | |

- Unknown/unsupported OAMPDUs sent to OAM client.
- Different than 802.3x behavior, which filtered unsupported opcodes.

Information

- **Code: 0x00**
- **Data field: Information TLVs**
- **Length: varies**



Information TLVs

| Information Type | Information TLV Name |
|------------------|-----------------------------------|
| 0x00 | End of TLV marker |
| 0x01 | Local Information |
| 0x02 | Remote Information |
| 0x03-0xFD | Reserved |
| 0xFE | Organization Specific Information |
| 0xFF | Reserved |

Sent as Information TLVs within Information PDU:

- Local & Remote used for Discovery Process.
- Optional Organization Specific Information used for extension purposes.

| | | | | | | | | |
|----------------------|---|---|---|------|--------|-----------------|---------------|------|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Information Type | 8-bit Type | | | | | | | |
| Information Length | 0x10 | | | | | | | |
| OAM Version | 0x01 | | | | | | | |
| Revision | 16-bit Revision | | | | | | | |
| State | reserved | | | | | Mux | Parser Action | |
| OAM Configuration | reserved | | | Vars | Events | LB | Unidir | Mode |
| OAMPDU Configuration | reserved | | | | | Max OAMPDU Size | | |
| Vendor Identifier | Maximum OAMPDU Size | | | | | | | |
| | 24-bit Organizationally Unique Identifier | | | | | | | |
| | 32-bit Vendor Specific Information | | | | | | | |

3.5.7.5 OAM Errored Frame Event

A window, measured in 100ms intervals, where number of errored frames exceeded a threshold.

- Type: 0x02
- Length: 0x1A (26 octets)
- Value:

| Fields | Width | Description |
|--------------|---------|--|
| Timestamp | 16-bits | Time reference, in 100ms units, when generated |
| Window | 16-bits | Lower bound: 1 second Upper bound: 60 seconds |
| Threshold | 32-bits | Lower bound: 0 Upper bound: unspecified |
| Errors | 32-bits | # of frame errors in <i>Window</i> |
| Total Errors | 64-bits | Total # of frame errors since reset |
| Total Events | 32-bits | Total # of events sent since reset |

3.5.7.6 OAM Errored Frame Seconds Summary

A window, in 100ms intervals, where number of errored frame seconds exceeded a threshold.

- Type: 0x04
- Length: 0x16 (22 octets)
- Value:

| Fields | Width | Description |
|--------------|---------|---|
| Timestamp | 16-bits | Time reference, in 100ms units, when generated |
| Window | 16-bits | Lower bound: 10 seconds Upper bound: 900 seconds |
| Threshold | 16-bits | Lower bound: 0 Upper bound: unspecified |
| Errors | 16-bits | # of errored frame seconds in <i>Window</i> |
| Total Errors | 64-bits | Total # of errors causing since reset |
| Total Events | 32-bits | Total # of events sent since reset |

3.5.7.7 OAM Variable Retrieval

- Transfer Ethernet counters and statistics via Variable Containers/Descriptors.
- Variables are referenced using Annex 30A CMIP registration arcs.
- Can be used to emulate L2 Ping. (i.e., Tx Variable Request, Rx Variable Response)

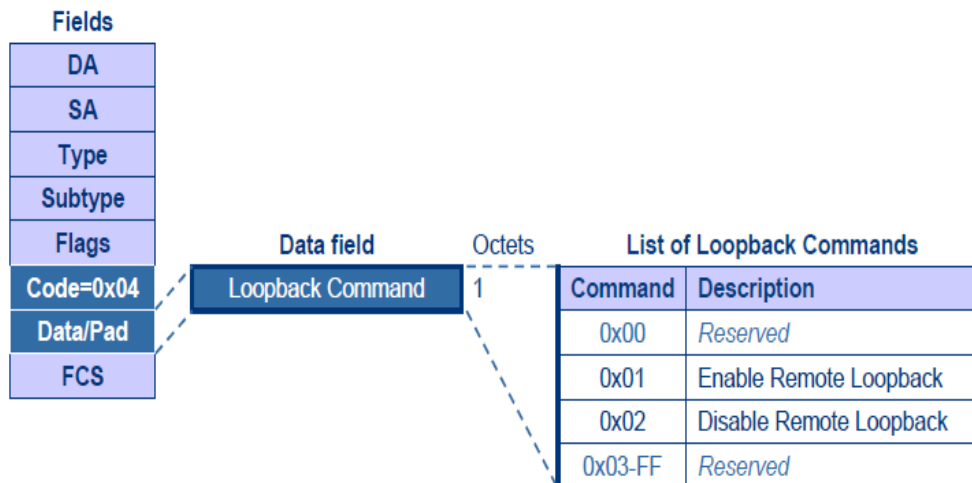
Examples:

| CMIP Registration Arcs | | |
|---------------------------|--------|--------|
| Variable | Branch | Leaf |
| aFramesTransmittedOK | 0x07 | 0x0002 |
| aFrameCheckSequenceErrors | 0x07 | 0x0006 |
| aOctetsReceivedOK | 0x07 | 0x000E |

OAMPDU: Loopback Control / OAM Remote Loopback

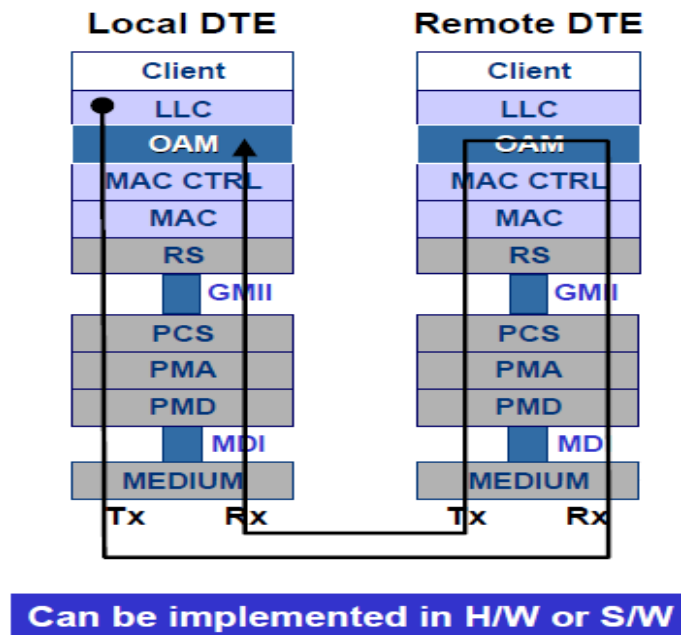
Loopback Control

- Code: 0x04
- Data field: Loopback Command (1 octet)
- Length: 64 octets

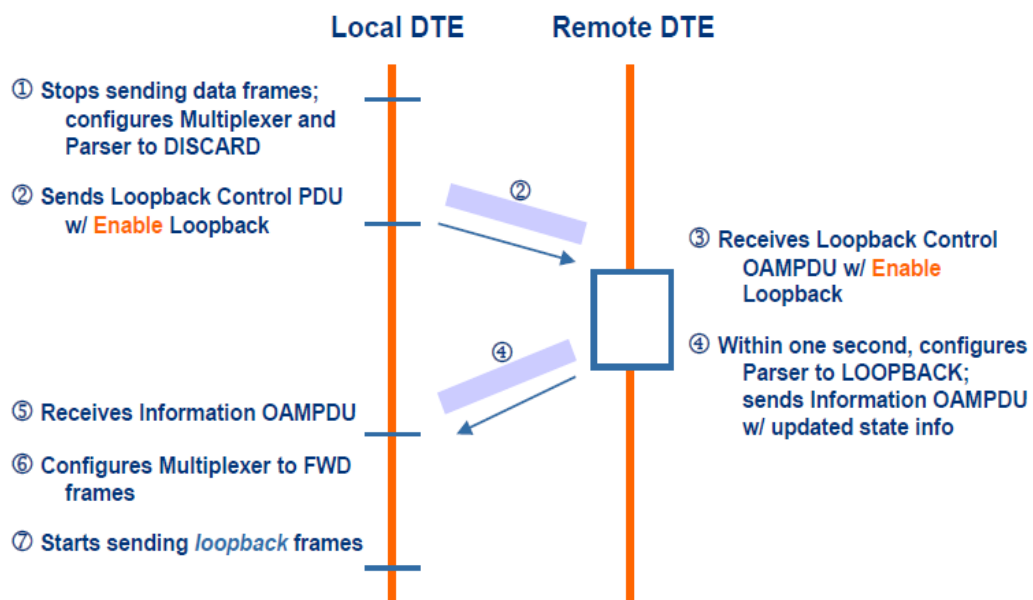


Remote Loopback

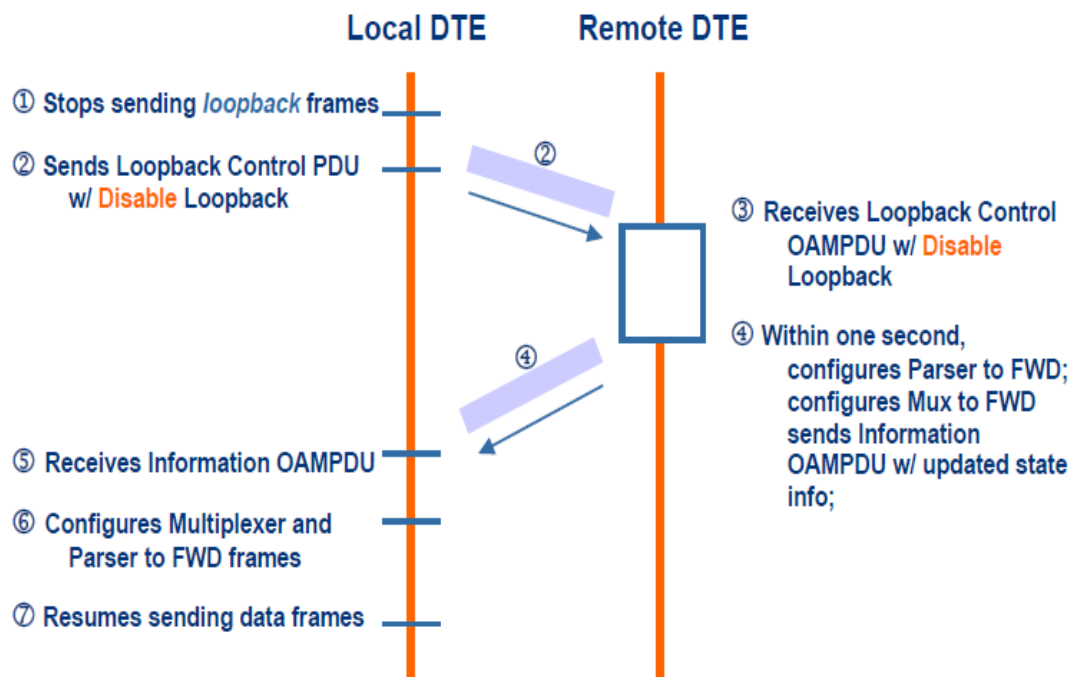
- Local DTE sends arbitrary data frames
- Remote DTE returns data frames



Starting Remote Loopback

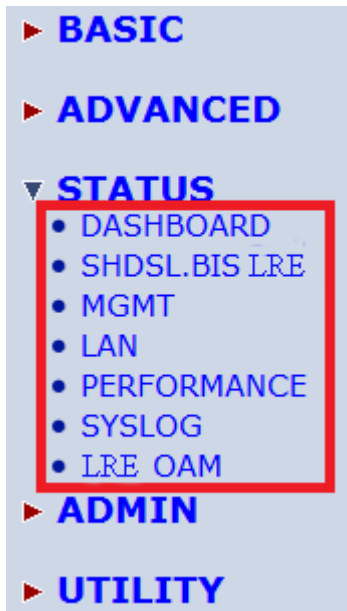


Exiting Remote Loopback



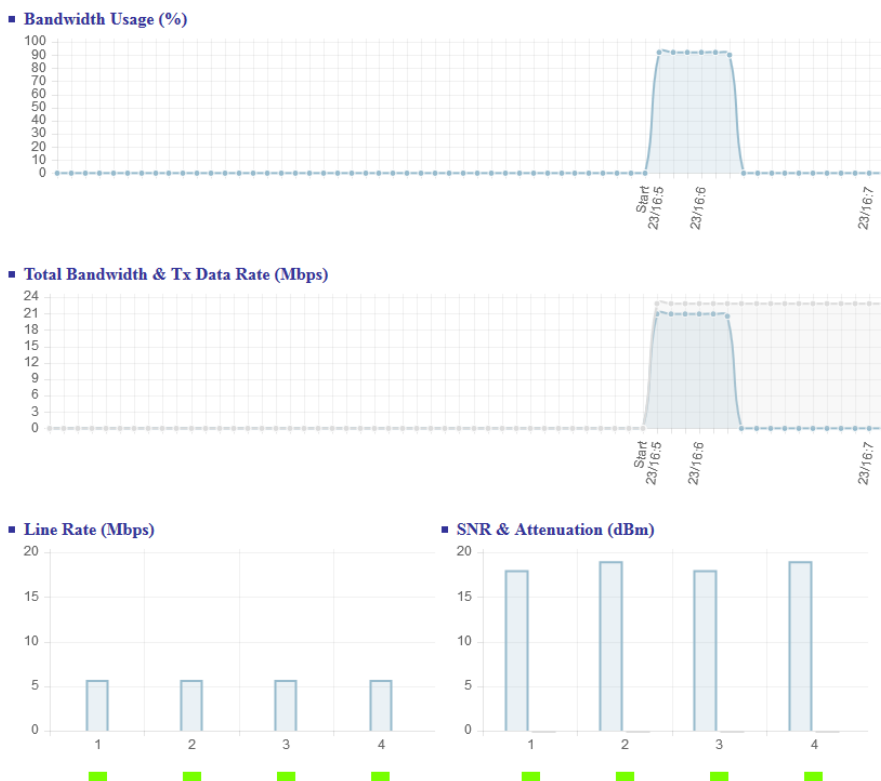
3.6 Status

When you click STATUS You can monitor the following : DASHBOARD, SHDSL.bis LRE, MGMT, LAN, PERFORMANCE and SYSLOG, LRE OAM.



3.6.1 DASHBOARD

DASHBOARD provides run-time status : Bandwidth usage, Tx data rate, Line Rate, SNR and attenuation.



3.6.2 SHDSL .Bis LRE

SHDSL.bis status including run-time device status : SHDSL.bis mode and Line Rate and Performance information: SNR margin, attenuation and CRC error count.

4-pairs model (8 wire model) will be shown as following, you can know about their four channel run-time status (from channel 1 to 4).

Below display screen is from four pair model (8 wire model):

STATUS - SHDSL.BIS

Status Information:

Bandwidth Usage:

0 %

Run-Time Device Status:

| SHDSL.bis Status | Channel 1 | Channel 2 | Channel 3 | Channel 4 |
|------------------|------------|------------|------------|------------|
| SHDSL.bis Mode | CPE Side | CPE Side | CPE Side | CPE Side |
| Target Rate | CO Defined | CO Defined | CO Defined | CO Defined |
| Current Rate | 0 Kbps | 0 Kbps | 0 Kbps | 0 Kbps |

Performance Information:

| Item | Local Side | | | | Remote Side | | | |
|-----------------|------------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|
| | Channel 1 | Channel 2 | Channel 3 | Channel 4 | Channel 1 | Channel 2 | Channel 3 | Channel 4 |
| SNR | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB |
| Attenuation | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB | 0 dB |
| CRC Error Count | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Clear CRC Error

Finish

If two LRE modem have been linking together, you can know about their run-time line rate status and performance information from this screen.

Note: CPE side's line rate according to the setting of CO side.

If you want to clear the performance data on CRC Error Count, click Clear CRC Error is O.K.

3.6.3 MGMT

MGMT status will display the MGMT interface information.

STATUS - MGMT

MGMT Interface Status:

General status:

| | |
|--------------|-------------------|
| IP Type: | Fixed |
| MAC Address | 00:03:79:00:00:01 |
| IP Address | 192.168.0.241 |
| Subnet Mask: | 255.255.255.0 |

DHCP client table:

| Type | Client IP Address | Client MAC Address |
|------------------|-------------------|--------------------|
| Table is Empty ! | | |

[Refresh](#)[Finish](#)

You can view the general status of MGMT interface and DHCP client table.

3.6.4 LAN

LAN status will prompt the setting on IP type, IP address and Subnet mask.

STATUS - LAN

LAN Interface Status:

General status:

| | |
|--------------|---------|
| IP Type: | Disable |
| IP Address | 0.0.0.0 |
| Subnet Mask: | 0.0.0.0 |

Port status:

| Port | LAN1 | LAN2 | LAN3 | LAN4 |
|-------------|------|------|------|------|
| Link Status | Off | Off | Off | Off |
| 10/100M | -- | -- | -- | -- |
| Duplex | -- | -- | -- | -- |

[Refresh](#)[Finish](#)

For example, it shows the IP type of LAN interface is Fixed:

LAN Interface Status:

General status:

| | |
|--------------|---------------|
| IP Type: | Fixed |
| IP Address | 192.168.2.100 |
| Subnet Mask: | 255.255.255.0 |

3.6.5 PERFORMANCE

STATUS - PERFORMANCE

Performance Monitoring:

Current Performance:

| Channel | Current Quarter 00:03:06 Passed | | | | Current Day 00:33:06 Passed | | | | Intervals |
|---------|------------------------------------|-----|-------|-----|--------------------------------|-----|-------|------|-----------|
| | es | ses | losws | uas | es | ses | losws | uas | |
| 1 | 0 | 0 | 0 | 186 | 0 | 0 | 0 | 1986 | Error |
| 2 | 0 | 0 | 0 | 186 | 0 | 0 | 0 | 1986 | Error |
| 3 | 0 | 0 | 0 | 186 | 0 | 0 | 0 | 1986 | Error |
| 4 | 0 | 0 | 0 | 186 | 0 | 0 | 0 | 1986 | Error |

Channel 1 Intervals:

| Quarter Intervals | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 |
| 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 |

| Day Intervals | | | | | | |
|---------------|----|----|----|----|----|----|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 |

Quarter Interval 1 (0 Hours 15 Mins ago) Status:

| Quarter Status | | | |
|----------------|-----|-------|-----|
| es | ses | losws | uas |
| 0 | 0 | 0 | 900 |

Reset PM Counter

NOTE:

| |
|------------------------------|
| Invalid interval |
| Valid interval with no error |
| Valid interval with errors |

3.6.6 SYSLOG

STATUS - SYSLOG

| System Log |
|--|
| 2002/01/01 08:00:30: Device Cold Start 2002/01/01 08:00:30: Wait for SNMP reply packet timed out! |

Reset Finish

SH

| Home | Basic | Advanced | Status | Admin |
|------|-------|----------|--------|-------|
|------|-------|----------|--------|-------|

STATUS - LRE OAM

► **BASIC**

▼ **ADVANCED**

- SHDSL.BIS LRE
- QOS
- RATE LIMIT
- VLAN
- FLOW CONTROL
- LINK MODE
- LRE OAM

▼ **STATUS**

- DASHBOARD
- SHDSL.BIS LRE
- MGMT
- LAN
- PERFORMANCE
- SYSLOG
- LRE OAM

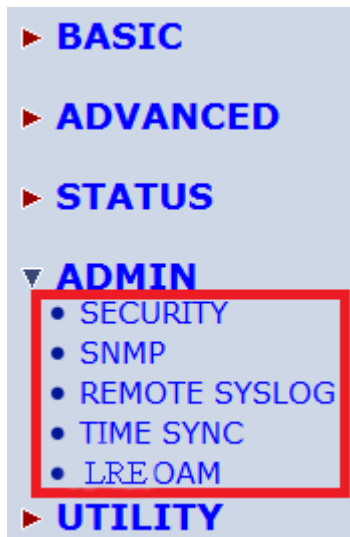
► **ADMIN**

Status:

| | |
|-----------------------------|---------|
| ■ State | |
| Discovery State: | FAULT |
| ■ Local DTE | |
| OAM Mode: | Passive |
| Unidirectional Support: | Yes |
| Remote Loopback Support: | Yes |
| Link Events Support: | Yes |
| Variable Retrieval Support: | Yes |
| Parser Action: | FWD |
| Multiplexer Action: | FWD |
| ■ Remote DTE | |
| OAM Mode: | -- |
| Unidirectional Support: | -- |
| Remote Loopback Support: | -- |
| Link Events Support: | -- |
| Variable Retrieval Support: | -- |
| Parser Action: | -- |
| Multiplexer Action: | -- |

3.7 Administration

This session introduces Administration including SECURITY, SNMP (simple network management protocol), REMOTE SYSLOG and TIME SYNC.



3.7.1 Security

For system security, suggest to change the default user name and password in the first setup otherwise unauthorized persons can access the LRE modem and change the parameters.

Press **Security** to setup the parameters.

ADMIN - SECURITY

Supervisor Profile and Security Parameters:

■ Supervisor ID and Password:

Supervisor ID:

Supervisor Password:

Password Confirm:

■ User Profile:

| ID | User Name | User Password | Password Confirm | UI Mode |
|----|----------------------|--------------------------|--------------------------|-----------|
| 1 | admin | ••••• | ••••• | Menu ▼ |
| 2 | <input type="text"/> | <input type="password"/> | <input type="password"/> | Command ▼ |
| 3 | <input type="text"/> | <input type="password"/> | <input type="password"/> | Command ▼ |
| 4 | <input type="text"/> | <input type="password"/> | <input type="password"/> | Command ▼ |
| 5 | <input type="text"/> | <input type="password"/> | <input type="password"/> | Command ▼ |

■ General Parameters:

Telnet Port:

For better security, change the **Supervisor ID** and **Supervisor password** for the LRE modem. If you don't set them, all

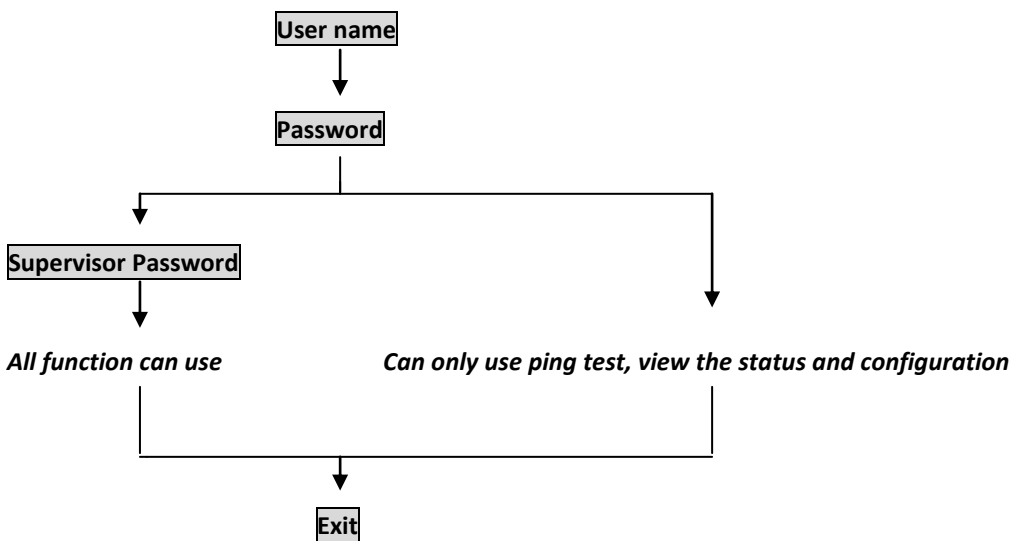
users can be able to access the LRE modem using the default Supervisor ID and Supervisor Password is “root”.

You can authorize five legal users to access the LRE modem via telnet or console only. There are two UI modes, menu driven mode and command mode to configure the LRE modem.

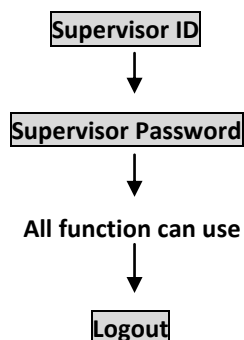
The default user name on and Password are “admin”.

There are two UI modes, menu and command mode for telnet or console mode to setup the LRE modem. The menu is meaning menu driven interface mode and Command is meaning line command mode. We will not discuss command mode in this manual.

Telnet Console mode:



Web Brower mode:



There have a Telnet Port number setting. The default value is 23.

■ Remote Management Host:

Modify legal management host IP address.

Note, an empty pool or a 0.0.0.0 entry in the pool will allow all management connections from any host.

| ID | IP Address |
|----|------------|
| 1 | 0.0.0.0 |
| 2 | 0.0.0.0 |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

Cancel

Reset

Finish

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

Configured 0.0.0.0 will allow all hosts on Internet or LAN to access the LRE modem.

Leaving blank of trust host list will cause blocking all PC from WAN to access the LRE modem. On the other hand, only PC in LAN can access the LRE modem.

If you type the exact IP address in the filed, only the host can access the LRE modem.

Click **Finish** to finish the setting.

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

Press **Restart** to restart the LRE modem working with the new parameters and press **Continue** to setup other parameters.

3.7.2 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 LRE modem can generate SNMP traps to indicate alarm conditions, and it relies on SNMP community strings to implement SNMP security.

This LRE modem support both MIB I and MIB II.

Click **SNMP** to configure the parameters.

ADMIN - SNMP

SNMP Parameters:

Version: ☒ SNMPv1 / SNMPv2c ☐ SNMPv3

■ Table of current community pool:

| Index | Status | Access Right | Community |
|------------------------------------|---------|--------------|-----------|
| <input checked="" type="radio"/> 1 | Disable | --- | --- |
| <input type="radio"/> 2 | Disable | --- | --- |
| <input type="radio"/> 3 | Disable | --- | --- |
| <input type="radio"/> 4 | Disable | --- | --- |
| <input type="radio"/> 5 | Disable | --- | --- |
| <div>Reset Modify</div> | | | |

■ Table of current trap host pool:

| Index | Version | IP Address | Community |
|------------------------------------|---------|------------|-----------|
| <input checked="" type="radio"/> 1 | Disable | --- | --- |
| <input type="radio"/> 2 | Disable | --- | --- |
| <input type="radio"/> 3 | Disable | --- | --- |
| <input type="radio"/> 4 | Disable | --- | --- |
| <input type="radio"/> 5 | Disable | --- | --- |
| <div>Reset Modify</div> | | | |

Cancel Reset Finish

3.7.2.1 Community Pool

An SNMP community is the group that devices and management stations running SNMP belong to. It helps define where information is sent. The community name is used to identify the group. A SNMP device or agent may belong to more than one community. It will not request from management stations that do not belong to one of its communities.

SNMP default communities are:

| Access Right | Community |
|--------------|-----------|
| Read | public |
| Write | private |

Press **Modify** to set up community pool.

■ Table of current community pool:

| Index | Status | Access Right | Community |
|-------|-----------|--------------|-----------|
| 1 | Enable | Write | private |
| 2 | Disable ▾ | Deny ▾ | private |
| 3 | Disable ▾ | --- | --- |
| 4 | Enable ▾ | --- | --- |
| 5 | Disable | --- | --- |
| | | Cancel | Ok |

In the table of current community pool, you can setup the access authority.

Status: **Enable:** for turn on the SNMP function

Disable: for turn off the SNMP function

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 **Finish**.

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

Press **Restart** to restart the LRE modem working with the new parameters and press **Continue** to setup other parameters.

3.7.2.2 Trap Host Pool

In the table of **current trap host pool**, you can setup the trap host.

SNMP trap is an informational message sent from an SNMP agent to a manager. It is a management station (SNMP application) that receives traps.

If no trap host pool is defined, no traps are issued.

Press **Modify** to set up trap host pool.

■ Table of current trap host pool:

| Index | Version | IP Address | Community |
|----------------------|-----------|---------------|-----------|
| 1 | Version 1 | 192.168.0.254 | private |
| 2 | Disable | 192.168.0.200 | test |
| 3 | Disable | --- | --- |
| 4 | Version 1 | --- | --- |
| 5 | Disable | --- | --- |
| <div>Cancel Ok</div> | | | |

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

Disable for turn off

IP Address: type the trap host IP address

Community: type the community password.

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 LRE modem working with the new parameters and press **Continue** to setup other parameters.

3.7.3 REMOTE SYSLOG

Setup IP and port for Syslog server.

Default port is 514.

ADMIN - REMOTE SYSLOG

Remote Syslog Configuration:

■ Service Setup

Mode: ☒ Disable ☐ Enable

Facility: LOCAL_USE0

■ Protocol Setup

Server IP:

Port: 514

Cancel Reset Finish

3.7.4 TIME SYNC

This session allows to enable SNTP setting.

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.

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. The function only supported on router mode.

There are two methods to synchronize time, synchronize with PC or SNTP. If you choose synchronize with PC, the VPN Router will synchronize with PC's internal timer. If you choose SNTP, the VPN Router will use the protocol to synchronize with the time server. For synchronization the time server with SNTP, needs to configure service, time server and time zone. For synchronization with PC, doesn't need to configure the above parameters.

ADMIN - TIME SYNC

Time Synchronization:

■ Setting:

Sync to SNTP Server ☐ Disable ☒ Enable

■ Current Time:

System: 2016/01/02 01:45:38 ☐ Set by user

PC: 2018/03/07 11:03:06 ☒ Sync to PC time

■ Simple network time protocol:

Time Server 1: ntp-2.vt.edu

Time Server 2: ntp.drydog.com

Time Server 3: ntp1.cs.wisc.edu

Time Zone: GMT(+05:30) India ▼

Update Period (secs): 3600

Cancel

Reset

Finish

3.7.5 LRE OAM

UTILITY - LRE OAM

Variable Retrieval:

Request:

| | | |
|-----------|---|---|
| Object | <input type="text" value="select one object"/> | <input type="button" value="Request whole object"/> |
| Package | <input type="text" value="select one package"/> | <input type="button" value="Request whole package"/> |
| Attribute | <input type="text" value="select one attribute"/> | <input type="button" value="Request some attribute"/> |

Response:

Please request first

3.8 Utility

This section will describe the **UTILITY** of the LRE modem.



The **UTILITY** menu including:

SYSTEM INFO: system information,

CONFIG TOOL: load the factory default configuration,

UPGRADE: upgrade the firmware

LOGOUT: logout the system

RESTART: restart the LRE modem.

3.8.1 System Info

For review the information, click **SYSTEM INFO** to display the screen as shown below.

UTILITY - SYSTEM INFO

General System Information:

| | |
|------------------|---------------------|
| MCSV | 1609-FFFF-FFFFFFFF |
| Software Version | 1609-0000-60327169 |
| Chipset | PEF24628V1.2 |
| Firmware Version | 1.1-1.9.0_001 |
| Host Name | SOHO |
| System Time | 2002/01/08 09:53:04 |
| System Up Time | 7DAY/1HR/52MIN |

[Finish](#)[Refresh](#)[Help](#)

You can check the MCSV, Software Version, Chipset, Firmware Version, Host Name and System Up Time. The System Up Time item let you know the LRE modem how long time after power on.

3.8.2 Config Tool

This configuration tool has three functions: load Factory Default, Restore Configuration, and Backup Configuration. Press CONFIG TOOL, you can view the following:

UTILITY - CONFIG TOOL

Select Configuration Tool:

Configuration Tool:

[Cancel](#)[Finish](#)

Choose the function and then press **Finish**.

Load Factory Default: It will load the factory default parameters to the LRE modem.

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

Restore Configuration:

In case of the configuration crashed 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**. The LRE modem will automatically restore the saved configuration.

Backup Configuration:

After configuration, suggest using the function to backup your LRE modem parameters in the PC. Select the **Backup Configuration** and then press **Finish**. Browse the place of backup file named backup. Press **Finish**. The LRE modem will automatically backup the configuration.

3.8.3 Upgrade

You can upgrade the firmware of LRE modem using the upgrade function.

Press **Upgrade** in UTILITY menu.

UTILITY - FIRMWARE UPGRADE

Firmware Upgrade:

Please select the firmware file that you want, and press Ok button to upgrade the system, then the system will restart automatically.



Type the path and file name of the firmware file you wish to upload to the LRE modem in text box or click Browse to locate it. Press **OK** button to upgrade. The system will reboot automatically after finishing. (Firmware upgrades are only applied after a reboot)

After the firmware upgrade process is complete, you can see the **SYSTEM INFO** screen to verify your current firmware version number.

3.8.4 Logout

To exit the web configurator, press **LOGOUT**. You have to log in with your password again after you log out. This is recommended after you finish a management session for security reasons.

UTILITY - LOGOUT

This page offers you the opportunity to quit your LRE Bridge. When the YES button be clicked, the LRE Bridge is logout and your browser window will be closed.

The system is not logout yet. Please click LOGOUT item to quit system and close the browser window.

3.8.5 Restart

For restarting the LRE modem, press **Restart** to reboot the LRE modem.

UTILITY - RESTART

This page offers you the opportunity to restart your [LRE Bridge](#). When the restart button be clicked, the [LRE Bridge](#) is restarting and your browser session will be disconnected. This may appear as if your browser session is hungup. After the server restarts, you may either press your browser's reload button, or close your browser and re-open it several minutes later.



When you press **Restart**, display screen is as following:

UTILITY - RESTART

Save configuration successfully.
The system will reboot automatically in 5 seconds.
Please close your browser and re-open it one minute later.

It show the configuration is success. When the system have rebooted later, you can re-open the browser.

4 Configuration use Serial Console and Telnet with Menu Driven Interface

4.1 Introduction

4.1.1 Login to the Console Interface

The console port is a RJ-48C connector that enables a connection to a PC for monitoring and configuring the LRE modem. Use the supplied serial cable with a female DB-9 connector to serial port of PC and RJ-48C module jack connector to LRE modem's console port. Start your terminal access program by terminal emulation program or Hyper Terminal and configure its communication parameters to match the following default characteristics of the console port:

| Parameter | Value |
|--------------|--------|
| Baud rate | 115200 |
| Data Bits | 8 |
| Parity Check | None |
| Stop Bits | 1 |
| Flow-control | None |

After finished the parameter settings, press the **SPACE** key until the login screen appears. When you see the login screen, you can logon to this LRE Modem.

Note: Only **SPACE** key invoke the login prompt. Pressing other keys does not work.

The system asks for User and Password, please enter "admin" both for the factory default password. As show in the following:

User: admin

Password: *****

4.1.2 Telnet login

The LRE modem also supports telnet for remote management.

Make sure the correct Ethernet cable connected the MGMT port of LRE modem to your computer. The MGMT indicator on the front panel shall light if a correct cable is used. Starting your Telnet client with VT100 terminal emulation and connecting to the management IP of LRE modem, wait for the login prompt appears. Input User and Password after login screen pop up. The system asks for User and Password, please enter “admin” both for the factory default password. As show in the following:

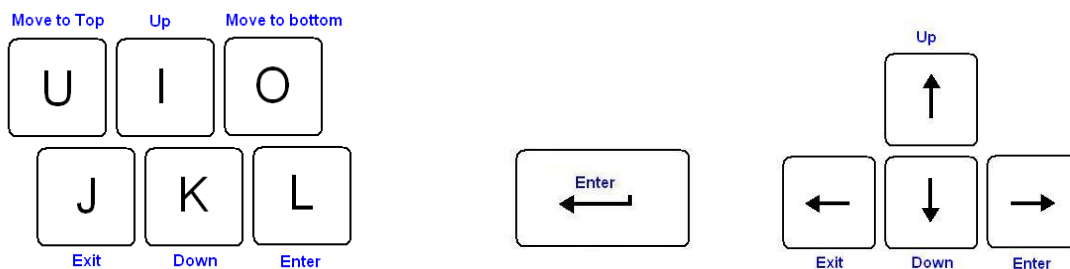
User: admin

Password: *****

Note: The default IP address is 192.168.1.1. So that the line command is “telnet 192.168.1.1” on DOS mode.

4.1.3 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 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. |
| [LEFT] or J | Move back to previous menu. |
| [RIGHT] , L or [ENTER] | Move forward to submenu. |
| [HOME]or U | Move to first field |
| [END] or O | Move to last field |
| [TAB] | To choose another parameters. |

| | |
|----------|-------------------------------|
| Ctrl + C | To quit the configuring item. |
| Ctrl + Q | For help |

For serial console and Telnet management, the LRE Modem implements the menu driven interface. It can show 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 ; you also can scroll to top/bottom by pressing Key U/O.

For example, to show the system information, just logon to the LRE Modem, 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.

You can press the Enter key for select command same as key L.

```

SHDSL.bis LRE Bridge
-----
>> enable      Modify command privilege
   status      Show running system status
   show        View system configuration
   ping        Packet internet groper command
   exit        Quit system

-----

Command: enable <CR>
Message:

-----

<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help

```

4.1.4 Window structure

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

Product name: SHDSL.bis LRE Bridge

Menu field: Menu tree prompts on this field. Symbol ">>" indicates the cursor place.

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.

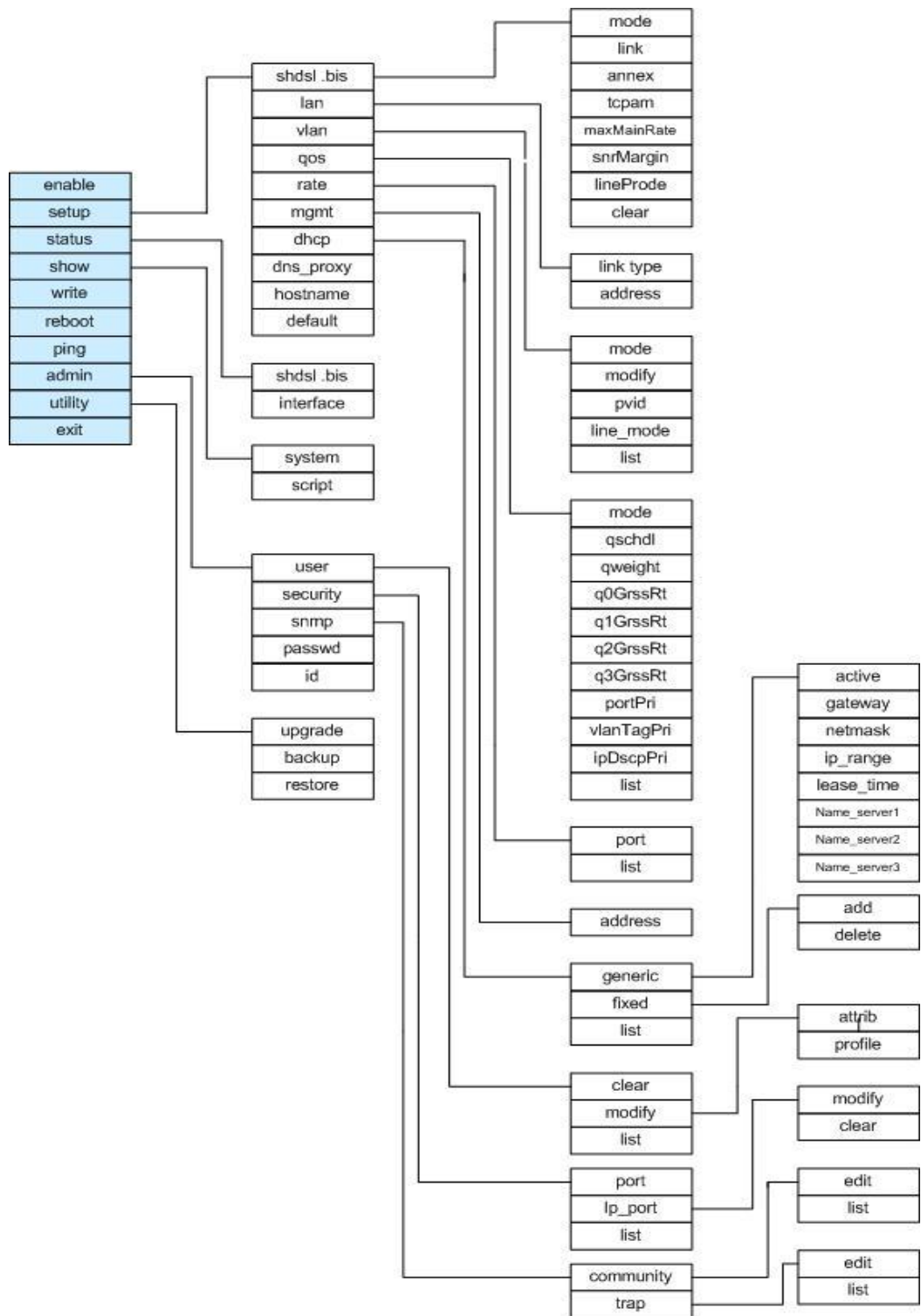
Operation command for help

4.2 Main Menu Tree

The main menu tree is as following figures. All of the configuration commands are placed in the subdirectories of Enable protected by supervisor password. Unauthorized user cannot change any configurations but can view the status and configuration of the LRE Modem and use ping command to make sure the LRE modem is working.

4.2.1 Menu tree for authorized user

If you are the authorized user, the menu tree is the following:



If you are the authorized user, you can view the display screen as the following:

```

SHDSL.bis LRE Bridge
-----
>> 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: enable <CR>_
Message:

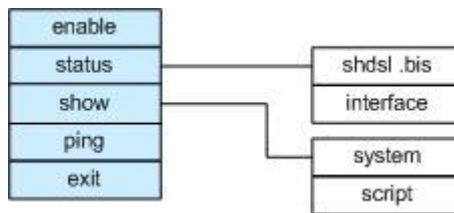
-----

<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help

```

4.2.2 Menu tree for unauthorized user

If you are the unauthorized user, the menu tree is the following:



If you are the unauthorized user, you can view the display screen as below. Only have view status, show system and ping function.

```

SHDSL.bis LRE Bridge
-----
>> enable      Modify command privilege
   status      Show running system status
   show        View system configuration
   ping        Packet internet groper command
   exit        Quit system
-----

Command: enable <CR>_
Message:

-----

<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help

```

4.3 Enable

To setup the LRE modem, 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 LRE modem 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 LRE modem 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 product, you have to use the setup command. |
| status | View the status of product. |
| show | Show the system and configuration of product. |
| 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 |

4.4 Setup

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

```
>> shdsl.bis      Configure SHDSL.bis parameters
lan              Configure LAN interface profile
vlan            Configure virtual LAN parameters
qos             Configure Quality of Service parameters
rate           Configure Rate Limiting parameters
mgmt           Configure management interface profile
dhcp           Configure DHCP parameters
dns_proxy      Configure DNS proxy parameters
hostname       Configure local host name
default        Restore factory default setting
```

4.4.1 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
link            Configure shdsl.bis link
annex          Configure shdsl.bis annex type
tcpam          Configure shdsl.bis TCPAM type
maxMainRate    Configure shdsl.bis max main data rate
snrMagrin      Configure Shdsl.bis SNR margin
lineProbe      Configure shdsl.bis line probe
clear          Clear current CRC error count
```

4.4.1.1 Mode

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

4.4.1.2 Link

Line type means how many wire you want to use on SHDSL.bis connection. Link type will be **2-wire**, **4-wire** or **8-wire** mode according to the product type. 4-wire product can be worked under 2-wire mode. 8-wire product can be worked under 4-wire mode and 2-wire mode.

| Link type LRE modem | 2-wire | 4-wire | 8-wire |
|------------------------|--------|--------|--------|
| 2-wire model | • | | |
| 4-wire model | • | • | |

| | | | |
|--------------|---|---|---|
| 8-wire model | • | • | • |
|--------------|---|---|---|

4.4.1.3 Annex

There are two types of SHDSL .bis Annex type: **Annex-AF**, and **Annex-BG**.

4.4.1.1 TCPAM

There are two TCPAM modes for SHDSL .Bis: **TCPAM-16** and **TCPAM-32**. You also can select **Auto** mode.

4.4.1.2 Maximum main rate

You can setup the SHDSL.bis main rate is in the multiple of 64kbps , 128kbps or 256 kbps, according using which model.

Main Rate (Unit: kbps)

| SHDSL.bis LRE Modem | multiple | Annex AF/BG | |
|------------------------|----------|-------------|--------------|
| | | TCPAM-16 | TCPAM-32 |
| | | N=3~60 | N=12~89 |
| 2-wire model | 64 | 192 ~ 3840 | 768 ~ 5696 |
| 4-wire model | 128 | 384 ~ 7680 | 1536 ~ 11392 |
| 8-wire model | 256 | 768 ~ 15360 | 3072 ~ 22784 |

4.4.1.3 SNR Margin

Generally, you aren't necessary 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 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.

4.4.1.4 Line Probe

For adaptive mode, you can setup the Line Probe is **Enable**. The LRE modem will adapt the data rate according to the line status. Otherwise, setup to **Disbale**.

4.4.1.5 Clear

The **Clear** command can clear CRC error count.

SHDSL.bis:

| | |
|---------------|---|
| Mode | <input type="checkbox"/> STU-C <input type="checkbox"/> STU-R |
| Link Type | <input type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire <input type="checkbox"/> 8-wire |
| Annex Type | <input type="checkbox"/> AF <input type="checkbox"/> BG |
| TCPAM | <input type="checkbox"/> Auto <input type="checkbox"/> TCPAM-16 <input type="checkbox"/> TCPAM-32 |
| Max Main Rate | (3~177) |
| SNR Margin | (-10~21) |
| Line Probe | <input type="checkbox"/> Disable <input type="checkbox"/> Enable |

4.4.2 LAN

You can setup the LAN parameters by the command **lan**. Move the cursor ">>" to **lan** and press enter.

Command: setup lan <1~1>

Message: Please input the following information.

Interface number <1~1>: 1

The default interface number is 1.

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

Select **link_type** item:

>> link_type Configure Link type
 address LAN address and subnet mask

Command: setup lan 1 link_type <Disable|Dynamic|Static>

Message: Please input the following information.

Link type (TAB Select) <Disable>:

You can select the lan 1 link type is **Disable**, **Dynamic** or **Static**.

Select address item:

link_type Configure Link type
>> address LAN address and subnet mask

Command: setup lan 1 address <ip> <netmask>
Message: Please input the following information.

IP address (ENTER for default) <192.168.2.1>:
Subnet mask (ENTER for default) <255.255.255.0>:

You can configure LAN IP address, subnet mask. The default value is 192.168.2.1 and 255.255.255.0

LAN:

| | |
|-------------|---|
| Link Type | <input type="checkbox"/> Disable <input type="checkbox"/> Dynamic <input type="checkbox"/> Static |
| IP Address | |
| Subnet mask | |

4.4.3 VLAN

Virtual LAN (VLAN) is defined as a group of devices on one or more LANs that are configured so that they can communicate as if they were attached to the same wire, when in fact they are located on a number of different LAN segments. Because VLAN is based on logical instead of physical connections, it is extremely flexible.

You can setup the Virtual LAN (VLAN) parameters in VLAN command. The LRE modem support the implementation of VLAN-to-PVC only for bridge mode operation, i.e., the VLAN spreads over both the CO and CPE sides, where there is no layer 3 routing involved. The unit supports up to 8 active VLANs with shared VLAN learning (SVL) bridge out of 4096 possible VLANs specified in IEEE 802.1Q.

Move the cursor “>>” to `vlan` and press enter.

>> mode Trigger virtual LAN function
 modify Modify virtual LAN table
 pvid Modify port default VID
 link_mode Modify port link type
 list Show VLAN configuration

To active the VLAN function, move the cursor “>>” to `mode` and press enter. The products support two types of VLAN, 802.1Q and Port-Based.

The 802.1Q defines the operation of VLAN bridges that permit the definition, operation, and administration of VLAN topologies within a bridged LAN infrastructure.

Port-Based VLANs are VLANs where the packet forwarding decision is based on the destination MAC address and its associated port.

4.4.3.1 Mode

User can choose two types of VLAN: 802.1Q Tag-Based VLAN or Port Based VLAN. When you don't use VLAN, set to Disable.

Command: setup vlan mode <Disable|8021Q|Port>
Message: Please input the following information.

Trigger VLAN function (TAB Select) <Disable>:

VLAN Mode:

| | | | |
|-----------|----------------------------------|--|--|
| VLAN Mode | <input type="checkbox"/> Disable | <input type="checkbox"/> 802.1Q Tag VLAN | <input type="checkbox"/> Port Based VLAN |
|-----------|----------------------------------|--|--|

4.4.3.2 802.11Q VLAN

To modify the VLAN rule, move the cursor to **modify** and press enter.

Command: setup vlan modify <1~8> <0~4094> <string>
Message: Please input the following information.

VLAN table entry index <1~8>: 1
VID value (ENTER for default) <1>: 10
VLAN port membership (ENTER for default) <111111>:

The VLAN Port membership represents with string 1 or 0.

VLAN port membership is a 6-digit binary number in which bit 0 to bits 5 represents LAN1 to LAN4, DSL and Sniffing ports respectively.

For example: [setup vlan modify 1 10 111111] means use index as 1 , VID = 10 and all six ports are as same membership (VLAN ID=10).

Use **PVID** command to change the member port to untagged members:

Command: setup vlan pvid <1~6> <1~4094>
Message: Please input the following information.

Port index <1~6>:
VID value (ENTER for default) <1>:

PVID (Port VID) : It is an untagged member from 1 to 4094 of default VLAN.

For example:

[set vlan pvid 1 100]

[set vlan pvid 2 100]

[set vlan pvid 3 100]

[set vlan pvid 4 100]

[set vlan pvid 5 100]

[set vlan pvid 6 100]

Those means all untagged on all ports are as same membership (VLAN ID=100)

To modify the link type of the port, move the cursor to `link_mode` and press enter. There are two types of link: `access` and `trunk`. Trunk link will send the tagged packet form the port and Access link will send un-tagged packet form the port. The port index 1 to 4 represents LANs ports, index 5 represents DSL and index 6 represents Sniffing respectively.

Command: setup vlan link_mode <1~6> <Access|Trunk>

Message: Please input the following information.

Port index <1~6>: 1

Port link type (TAB Select) <Access>:

| | |
|--------|---|
| Access | The port can receive or send untagged packets |
| Trunk | The port can receive or send tagged packets |

802.11Q VLAN:

| | | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------|-----|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| No. | VID | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| PVID | | | | | | | |
| Link Type | | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access |
| | | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk |

4.4.3.3 Port Based VLAN

With port-based VLAN, the port is assigned to a specific VLAN independent of the user or system attached to the port. This means all users attached to the port should be members in the same VLAN. The port based setting performs the VLAN assignment. The port configuration is static and cannot be automatically changed to another VLAN without manual reconfiguration.

For Port Based VLAN, user must set up the table using 802.11Q methods. But don't care the value of VID , PVID or link type.

Port Based VLAN:

| No. | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|-----|------|------|------|------|-----|----------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |

Use `List` command can show the setup table for you check:

Virtual LAN Parameter

VLAN Mode : Port-Based VLAN

Virtual LAN Table

No LAN1 LAN2 LAN3 LAN4 DSL Sniffing

| No | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|----|------|------|------|------|-----|----------|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | - | - | - | - | - | - |
| 3 | - | - | - | - | - | - |
| 4 | - | - | - | - | - | - |
| 5 | - | - | - | - | - | - |
| 6 | - | - | - | - | - | - |
| 7 | - | - | - | - | - | - |
| 8 | - | - | - | - | - | - |

4.4.4 QoS

QoS(Quality of Service) is to decide which PCs can get the priorities to pass through LRE modem once if the bandwidth is exhausted or fully saturated.

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

```
>> mode          Trigger Quality of Service function
   qSchdl         Modify queue schedule type
   qweight        Modify queue weight
   q0GrssRt       Modify queue 0 egress rate
   q1GrssRt       Modify queue 1 egress rate
   q2GrssRt       Modify queue 2 egress rate
   q3GrssRt       Modify queue 3 egress rate
   portPri        Modify port priority
   vlanTagPri     Modify VLAN TAG priority
   ipDscpPri      Modify IP DSCP priority
   list           Show QoS configuration
```

4.4.4.1 Mode

User can choose three types of QoS: Port Based, VLAN Tag, IP DSCP. When you don't use QoS, set to Disable.

Command: setup qos mode <Disable|PortBased|VlanTag|IpDscp>

Message: Please input the following information.

Trigger qos function (TAB Select) <Disable>:

QoS Mode:

| | | | | |
|----------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|
| QoS Mode | <input type="checkbox"/> Disable | <input type="checkbox"/> Port Based | <input type="checkbox"/> VLAN Tag | <input type="checkbox"/> IP DSCP |
|----------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|

4.4.4.2 Queue schedule

There are three types queue schedule: **Type 1** and **Type 2** for your selection.

The schedule types according to following table:

| | Queue 0 | Queue 1 | Queue 2 | Queue 3 |
|--------|---------|---------|---------|---------|
| Type 1 | WRR | WRR | WRR | WRR |

| | | | | |
|--------|----|-----|-----|-----|
| Type 2 | BE | WFQ | WFQ | WFQ |
| Type 3 | BE | WFQ | WFQ | SP |

Command: setup qos qSchdl <Type1|Type2| Type3|>

Message: Please input the following information.

Operation type (TAB Select) <Type1>: Type1

The queuing algorithms:

| | |
|-----|-----------------------|
| WRR | Weight Round Robin |
| WFQ | Weighted Fair Queuing |
| BE | Best Effort |
| SP | Strictly Priority |

Queue Schedule:

| | | | |
|----------------|---------------------------------|---------------------------------|---------------------------------|
| Queue Schedule | <input type="checkbox"/> Type 1 | <input type="checkbox"/> Type 2 | <input type="checkbox"/> Type 3 |
|----------------|---------------------------------|---------------------------------|---------------------------------|

4.4.4.3 Queue weight

This setting can set weight value on each queue for WRR configuration.

Command: setup qos qweight <0~3> <1~15>

Message: Please input the following information.

Queue index <0~3>: 0

Weight value (ENTER for default) <1>: 1

For example, the default values are as following

[setup qos qweight 0 1]

[setup qos qweight 1 2]

[setup qos qweight 2 4]

[setup qos qweight 3 8]

Queue Weight:

| | | | | |
|--------------|---|---|---|---|
| Queue Index | 0 | 1 | 2 | 3 |
| Weight Value | | | | |

4.4.4.4 Queue egress rate

The queue 0 to 3 can setup their egress rate for WFQ configuration.

| | |
|----------|----------------------------|
| q0GrssRt | Modify queue 0 egress rate |
| q1GrssRt | Modify queue 1 egress rate |
| q2GrssRt | Modify queue 2 egress rate |
| q3GrssRt | Modify queue 3 egress rate |

The Egress rate N value can set 0 to 22. The N value 0 means no limits

The egress data rate is multiple of 1024kbps.

Such that, the egress data rate = N value (1 to 22) x 1024 Kbps

Egress rate (N value):

| Port | Egress Queue | | | |
|------|--------------|---|---|---|
| | 0 | 1 | 2 | 3 |
| LAN1 | | | | |
| LAN2 | | | | |
| LAN3 | | | | |
| LAN4 | | | | |
| DSL | | | | |

4.4.4.5 Port Based Priority QoS

Command: setup qos portPri <1~6> <0~3>

Message: Please input the following information.

Port index <1~6>: 1

Queue index (ENTER for default) <3>: 3

Set up queue value (0, 1, 2 or 3) on each ports.

Port Based Priority QoS:

| Port | 1(LAN1) | 2(LAN2) | 3(LAN3) | 4(LAN4) | 5(DSL) | 6(Sniffing) |
|-------------|---------|---------|---------|---------|--------|-------------|
| Queue Index | | | | | | |

4.4.4.6 VLAN Tag Priority QoS

Command: setup qos vlanTagPri <0~7> <0~3>
Message: Please input the following information.

VLAN TAG index <0~7>: 0
Queue index (ENTER for default) <1>: 1

Set up queue index(0, 1, 2 or 3) on each Priority of VLAN Tag.

VLAN Tag Priority uses the tag field information which has been inserted into an Ethernet frame. If a port has an 802.1Q-compliant device attached (such as this modem), these tagged frames can carry VLAN membership information.

User priority is giving eight priority levels. The default value is 0, indicating normal treatment.

| Priority Level | Traffic Type |
|----------------|--|
| 0 (default) | Best Effort |
| 1 | Background |
| 2 | Spare |
| 3 | Excellent Effort |
| 4 | Controlled Load |
| 5 | Video, less than 100 milliseconds latency and jitter |
| 6 | Voice, less than 10 milliseconds latency and jitter |
| 7 | Network Control |

Each Priority level can be set queue index from 0 to 3.

For example, you can set the LRE modem use Weighted Round-Robin (WRR) queuing (Type 1) that specifies a relative weight of each queue. WRR uses a predefined relative weight for each queue that determines the percentage of service time to services each queue before moving on to the next queue.

VLAN Tag Priority QoS:

| VLAN Tag Index | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------|---|---|---|---|---|---|---|---|
| Queue Index | | | | | | | | |

4.4.4.7 IP DSCP Priority Qos

Differentiated Services (DiffServ) is a class of service (CoS) model that enhances best-effort Internet services by differentiating traffic by users, service requirements and other criteria. Packets are specifically marked, allowing network nodes to provide different levels of service, as appropriate for video playback, voice calls or other delay-sensitive applications, via priority queuing or bandwidth allocation.

The DSCP value used to identify 64 levels of service determines the forwarding behavior that each packet gets across the DiffServ network. Based on the marking rule different kinds of traffic can be marked for different priorities of forwarding. Resources can then be allocated according to the DSCP values and the configured policies.

Set up queue index (0, 1, 2 or 3) on each DSCP:

Command: setup qos ipDscpPri <0~63> <0~3>
Message: Please input the following information.

IP DSCP index <0~63>: 0
Queue index (ENTER for default) <0>:

IP DSCP QoS:

| DSCP | Queue Index | DSCP | Queue Index | DSCP | Queue Index | DSCP | Queue Index |
|------|-------------|------|-------------|------|-------------|------|-------------|
| 0 | | 16 | | 32 | | 48 | |
| 1 | | 17 | | 33 | | 49 | |
| 2 | | 18 | | 34 | | 50 | |
| 3 | | 19 | | 35 | | 51 | |
| 4 | | 20 | | 36 | | 52 | |
| 5 | | 21 | | 37 | | 53 | |
| 6 | | 22 | | 38 | | 54 | |
| 7 | | 23 | | 39 | | 55 | |
| 8 | | 24 | | 40 | | 56 | |
| 9 | | 25 | | 41 | | 57 | |
| 10 | | 26 | | 42 | | 58 | |
| 11 | | 27 | | 43 | | 59 | |
| 12 | | 28 | | 44 | | 60 | |
| 13 | | 29 | | 45 | | 61 | |
| 14 | | 30 | | 46 | | 62 | |
| 15 | | 31 | | 47 | | 63 | |

4.4.4.8 List

This command can show the setup table for you check.

4.4.5 RATE

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

```
-----
>> port          Modify port rate
  list           Show Rate Control configuration
-----
```

Select which port you want to modify and then set up the data rate.

```
-----
Command: setup rate port <1~5> <0~22>
Message: Please input the following information.
```

```
Port index <1~5>: 1
rate (ENTER for default) <0>:
-----
```

The data rate is multiple of 1024kbps with the setup rate.

Rate Control per port:

| | | |
|--------|------|--|
| Port 1 | LAN1 | |
| Port 2 | LAN2 | |
| Port 3 | LAN3 | |
| Port 4 | LAN4 | |
| Port 5 | DSL | |

4.4.6 MGMT

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

MGMT interface parameters can be configured **MGMT IP address** and **subnet mask**.

```
-----
Command: setup mgmt <1~1> <more...>
```

Message: Please input the following information.

Interface number <1~1>:

The LRE modem only has one MGMT interface can use, so that use the default interface number is 1. The default IP address and subnet mask are 196.168.1.1 and 255.255.255.0 .

>> address MGMT IP address and subnet mask

Command: setup mgmt 1 address <ip> <netmask>

Message: Please input the following information.

IP address (ENTER for default) <192.168.1.1>:

Subnet mask (ENTER for default) <255.255.255.0>:

MGMT interface:

| | |
|-------------|--|
| IP Address | |
| Subnet Mask | |

4.4.7 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 an unique IP address. When an organization sets up its computer users with 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.

4.4.7.1 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.

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

```

>> generic      DHCP server generic parameters
    fixed       DHCP server fixed host IP list
    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 |

DHCP Server:

| | |
|---------------------|--|
| DHCP Server | <input type="checkbox"/> Disable <input type="checkbox"/> Enable |
| DHCL Client gateway | |
| DHCP Client Netmask | |
| Start IP address | |
| Address Range | |
| Lease Time | |
| Name Server 1 IP | |
| Name Server 2 IP | |
| Name Server 3 IP | |

4.4.7.2 DHCP fixed Host

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

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

You can add and delete a fixed host entry 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.

DHCP Server with Fixed Host:

| | Mac Address | IP Address |
|----|-------------|------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

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

4.4.8 DNS proxy

You can setup three DNS servers on LRE modem. The number 2 and 3 DNS servers are option. 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:

DNS Server IP:

| | |
|-----------------|--|
| DNS Server 1 IP | |
| DNS Server 2 IP | |
| DNS Server 3 IP | |

4.4.9 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.

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.

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.

Host Name:

| | |
|-----------|--|
| Host Name | |
|-----------|--|

4.4.10 Default

If you want to restore factory default, first 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

4.5 Status

You can view running system status of SHDSL.bis and interface via **status** command.

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

 >> shdsl.bis Show SHDSL.bis status

interface Show interface statistics status

| Command | Description |
|-----------|---|
| shdsl.bis | The SHDSL.bis status includes mode, line rate, SNR margin, attenuation, and CRC error count of the local side modem, and SNR margin, attenuation and CRC error count of remote side modem. The modem can access remote side information via EOC (embedded operation channel). |
| interface | The statistic status of MGMT interface can be monitor by interface command. |

4.5.1 Shdsl.bis

Move cursor ">>" to **shdsl.bis** and press enter.

```

SHDSL.bis LRE Bridge
-----
Monitoring Window...
<SHDSL.bis Status>
Channel      :      1      /      2      /      3      /      4
SHDSL.bis Mode : CPE Side / CPE Side / CPE Side / CPE Side
Line Rate(n*64) :      0kbps /      0kbps /      0kbps /      0kbps
Current SNR Margin :      0dB /      0dB /      0dB /      0dB
Attenuation   :      0dB /      0dB /      0dB /      0dB
CRC Error Count :      0 /      0 /      0 /      0

SHDSL Remote Side Status
Channel      :      1      /      2      /      3      /      4
Current SNR Margin :      0dB /      0dB /      0dB /      0dB
Attenuation   :      0dB /      0dB /      0dB /      0dB
CRC Error Count :      0 /      0 /      0 /      0

Refresh counter:7. Press 'Ctrl+C' to quit...

-----
<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help

```

The SHDSL.bis status includes mode, line rate, SNR margin, attenuation, and CRC error count of the local side modem, and SNR margin, attenuation and CRC error count of remote side modem.

4.5.2 Interface

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

```
SHDSL.bis.LRE Bridge
-----
Monitoring Window...
<Interface Statistics>
Port      InOctets   InPackets   OutOctets   OutPackets  InDiscards  OutDiscards
-----
MGMT             0           0          1920         30           0           0
Refresh counter:6. Press 'Ctrl+C' to quit...

-----
<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help
```

Octet is a group of 8 bits, often referred to as a byte.

Packet is a formatted block of data carried by a packet mode computer networks, often referred to the IP packet.

| | |
|-------------|--|
| 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 |

4.6 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
    script     Show all configuration in command script
.....
```

| Command | Description |
|---------|--|
| system | The general information of the system will show in system command. |
| script | Configuration information will prompt in command script. |

4.6.1 Show system

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

```

-----SHDSL.bis LRE Bridge-----
Status Window...
General system information
MCSV      :1608-0000-107162CF
Software Version :1608-0000-107162BC
Chipset    :PEF 24628
Firmware Version :1.1-1.5.8__002
Hostname   :SOHO
Serial No   :BKM5D2TV0028
System Up Time :0DAY/2HR/55MIN

Press 'Enter' to Return Menu Window...

-----
<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help

```

4.6.2 Show script

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

```

-----SHDSL.bis LRE Bridge-----
Status Window...
Showing System Configuration.....

setup shdsl.bis mode STU-R
setup shdsl.bis link 8-Wire
setup shdsl.bis annex Annex_BG
setup shdsl.bis tcpam Auto(16/32)
setup shdsl.bis maxMainRate 89
setup shdsl.bis snrMargin 5
setup shdsl.bis lineProbe Disable
setup lan 1 link_type Disable
setup lan 1 address 192.168.2.1 255.255.255.0
setup vlan mode Disable
setup vlan modify 1 1 11111
setup vlan modify 2 0 000000
setup vlan modify 3 0 000000
setup vlan modify 4 0 000000
setup vlan modify 5 0 000000
--- MORE ---

-----
<I/K> Move up/down, <L/J> Select/Unselect, <U/O> Move top/bottom, <^Q> Help

```

4.7 Write

For any changes of configuration, you must write the new configuration to flash component using `write` command and then reboot the LRE modem to take affect.

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

Command: `write <CR>`

Message: Please input the following information.

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

4.8 Reboot

To reboot the LRE modem, move cursor ">>" to `reboot` command and press enter.

Command: `reboot <CR>`

Message: Please input the following information.

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

Type "y" can start reboot operation.

4.9 Ping

Ping command can use to diagnose basic network connectivity of LRE modem. Move move cursor to `ping` command 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 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

4.10 Administration

You can modify the user profile, telnet access, SNMP (Sample Network Management Protocol) and supervisor information (supervisor password and ID) 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
-----
```

Change User name and Password points to **user**
Change supervisor password points to **passwd**
Change supervisor ID points to **id**

4.10.1 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 LRE modem via console port or telnet in user profile table however users who have the supervisor password can change the configuration of the LRE modem. 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.

Select which profile number you want to modify.

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
```

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

Command: admin user modify 2 attrib <Command|Menu>

Message: Please input the following information.

User interface (TAB Select) <Menu>:

There are two UI mode, **command** and **menu** mode, to setup the LRE modem.

The **menu** is meaning menu driven interface mode and **Command** is meaning line command mode. We will not discuss command mode in this manual.

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

Command: admin user modify 2 profile <name> <pass_conf>

Message: Please input the following information.

Legal user name (ENTER for default) <test>:

Input the old Access password: ****

Input the new Access password: ****

Re-type Access password: *****

Input the user name and setup the new access password. The new access password must key in two times for your confirmation.

Finally, you can use **list** command to check the listing of five profiles including on user name and their UI mode. On next time you re-enter this system, you can use this set of username and password. You can set up maximum to five profiles such that five sets of username and their password.

User Profile:

| User profile | User name | Password | Attrib | |
|--------------|-----------|----------|-------------------------------|----------------------------------|
| 1 | | | <input type="checkbox"/> Menu | <input type="checkbox"/> Command |
| 2 | | | <input type="checkbox"/> Menu | <input type="checkbox"/> Command |
| 3 | | | <input type="checkbox"/> Menu | <input type="checkbox"/> Command |
| 4 | | | <input type="checkbox"/> Menu | <input type="checkbox"/> Command |
| 5 | | | <input type="checkbox"/> Menu | <input type="checkbox"/> Command |

4.10.2 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 address IP address pool
   list          Show security profile
```

4.10.2.1 Telnet TCP port

User can set up the telnet TCP **port** from 1 to 65534. The default port is 23.

```
Command: admin security port <1~65534>
Message: Please input the following information.
```

Telnet Listening TCP Port (ENTER for default) <23>:

4.10.2.2 IP address pool

For **ip_pool** setting, the default legal address is 0.0.0.0. (on entry number 1). It means that there is no restriction of IP to access the LRE modem via telnet.

Use **modify** command to setup ip_pool

```
Command: admin security ip_pool modify <1~16> <ip>
Message: Please input the following information.
```

```
Client address pool entry number <1~16>: 1
Client IP address (ENTER for default) <0.0.0.0>:
```

There have sixteen address pool entry number can be setup.

Use **clear** command can clear legal client IP address on any pool entry number.

When move the cursor ">>" to **list** and press enter, you can view the full listing on security profile including the Telnet TCP port and 16 host IP address listing for your confirmation.

Telnet TCP Port:

| | |
|-----------------|--|
| Telnet TCP Port | |
|-----------------|--|

Legal client IP Address pool:

| | |
|--|------------------------------|
| | Legal client IP Address pool |
|--|------------------------------|

| | |
|----|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |

4.10.3 SNMP

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

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

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

```

>> community      Configure community parameter
   trap           Configure trap host parameter

```

4.10.3.1 Community

There are 5 number 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.

Command: ... 2 edit <Disable|Enable> <string> <Read_Only|Read_Write|Denied>
Message: Please input the following information.

Validate (TAB Select) <Enable>: Enable
Community (ENTER for default) <private>:
Access right (TAB Select) <Denied>:

You can setup the following:

Validate: Set **Enable** or **Disable**.

Community: Key in the string which is serves as password for access right.

Access right: Set **Read only**, **Read Write** or **Denied**

| | |
|------------|-----------------------|
| Read_Only | Access read only |
| Read_Write | Access read and write |
| Denied | Deny all access |

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.

SNMP Community:

| | |
|-----------------|--|
| SNMP entry(1~5) | |
| Validate | <input type="checkbox"/> Enable <input type="checkbox"/> Disable |
| Community | |
| Access Right : | <input type="checkbox"/> Read only <input type="checkbox"/> Read Write <input type="checkbox"/> Denied |

4.10.3.2 Trap host

There have 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:

Command: admin snmp trap 1 edit <Disable|1|2> <ip> <string>
Message: Please input the following information.

Version (TAB Select) <Disable>:
Trap host IP address (ENTER for default) <192.168.0.254>:
Community (ENTER for default) <private>:

Version: Disable, Version 1 or Version 2

Trap host IP address: Type the trap host IP address

Community: Type the community password (string)

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

SNMP Trap Host:

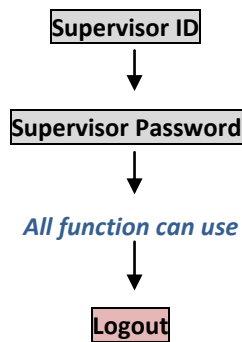
| | |
|----------------------|--|
| Trap Host entry(1~5) | |
| Version | <input type="checkbox"/> Disable <input type="checkbox"/> Ver.1 <input type="checkbox"/> Ver.2 |
| IP Address | |
| Community | |

4.10.4 Supervisor Password and ID

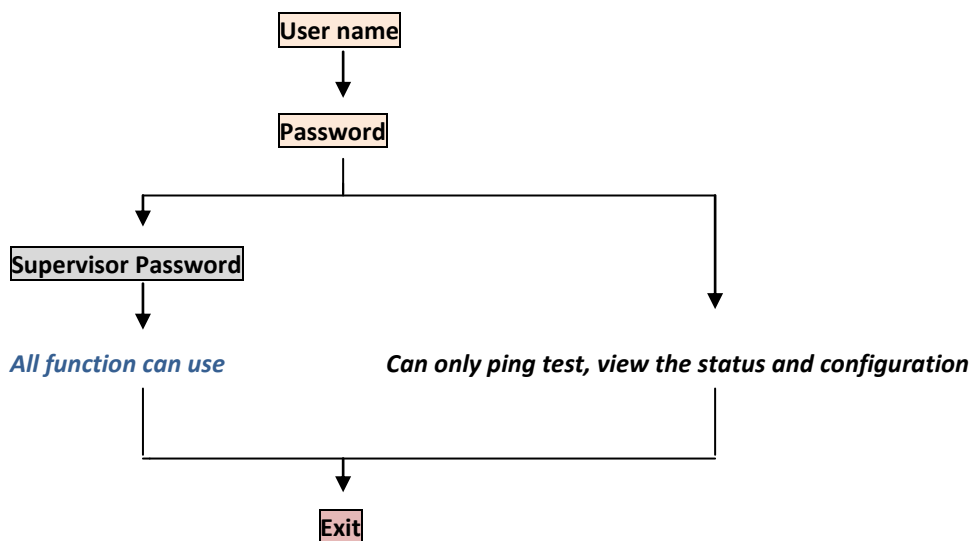
The supervisor ID and password is the last door for security but the most important. Users who access the LRE modem via web browser have to use the ID and password to configure the LRE model and users who access the LRE modem via telnet or console mode have to use the password to configure the LRE modem.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

| | Supervisor ID | Supervisor Password |
|---------------------|---------------|---------------------|
| Web Brower | • | • |
| Telnet/Console mode | | • |

Web Brower mode:



Telnet / Console mode:



4.10.4.1 Supervisor Password

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

Command: admin passwd <pass_conf>

Message: Please input the following information.

Input old Supervisor password: ****

Input new Supervisor password: *****

Re-type Supervisor password: *****

The default supervisor password is **root**.

4.10.4.2 Supervisor ID

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

Command: admin id <name>

Message: Please input the following information.

Legal user name (ENTER for default) <root>:

The default legal user name is **root**.

Supervisor ID and Password:

| | |
|---------------------|--|
| Supervisor ID | |
| Supervisor Password | |

4.11 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, backup the configuration via TFTP backup tool and restore the configuration via TFTP restore tool. For upgrade the firmware, you must have the new firmware file named *.bin which will be supported by supplier but you must have your own TFTP server. For backup and restore, you must also have your own TFTP server to backup and restore the configuration files.

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

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

4.11.1 Upgrade main software

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

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

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

```
-----
```

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

4.11.2 Backup system configuration

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

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

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

```
-----
```

Type TFTP server IP address and back up filename of system configuration.

4.11.3 Restore system configuration

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

Command: utility restore <ip> <file>

Message: Please input the following information.

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

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

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

4.12 EXIT

If you want to exit the system without saving, move the cursor “>>” to **exit** and press enter.

```
-----
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: exit <CR>
```

Message: Please input the following information.

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

```
-----
```

Please press “y”, you can quit this system.

The screen will display:

```
-----
```

Connection closed...

Press SPACE key to enter console mode configuration!

```
-----
```

You can press SPACE key to enter this system again.

5 Appendix – Setup table

SHDSL.bis:

| | |
|---------------|--|
| Mode | <input type="checkbox"/> STU-C <input type="checkbox"/> STU-R |
| Link type | <input type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire <input type="checkbox"/> 8-wire |
| Annex Type | <input type="checkbox"/> AF <input type="checkbox"/> BG |
| TCPAM | <input type="checkbox"/> Auto(TCPAM-16/32) <input type="checkbox"/> TCPAM-16 <input type="checkbox"/> TCPAM-32 <input type="checkbox"/> TCPAM-64 |
| Max Main Rate | (3~177) |
| SNR Margin | (-10~21) |
| Line Probe | <input type="checkbox"/> Disable <input type="checkbox"/> Enable |

LAN:

| | |
|-------------|---|
| Link Type | <input type="checkbox"/> Disable <input type="checkbox"/> Dynamic <input type="checkbox"/> Static |
| IP Address | |
| Subnet mask | |

DNS Server IP:

| | |
|-----------------|--|
| DNS Server 1 IP | |
| DNS Server 2 IP | |
| DNS Server 3 IP | |

MGMT interface:

| | |
|-------------|--|
| IP Address | |
| Subnet Mask | |

DHCP Server:

| | |
|---------------------|--|
| DHCP Server | <input type="checkbox"/> Disable <input type="checkbox"/> Enable |
| DHCL Client gateway | |
| DHCP Client Netmask | |
| Start IP address | |
| Address Range | |
| Lease Time | |
| Name Server 1 IP | |
| Name Server 2 IP | |
| Name Server 3 IP | |

DHCP Server with Fixed Host:

| | Mac Address | IP Address |
|----|-------------|------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

Data rate limit per port:

| | | |
|--------|----------|-----------|
| Port 1 | LAN1 | (0 to 22) |
| Port 2 | LAN2 | (0 to 22) |
| Port 3 | LAN3 | (0 to 22) |
| Port 4 | LAN4 | (0 to 22) |
| Port 5 | DSL | (0 to 22) |
| Port 6 | Sniffing | (0 to 22) |

VLAN Mode:

| | | | | |
|-----------|----------------------------------|--|--|--|
| VLAN Mode | <input type="checkbox"/> Disable | <input type="checkbox"/> 802.1Q Tag VLAN | <input type="checkbox"/> Port Based VLAN | <input type="checkbox"/> Port Based QinQ |
|-----------|----------------------------------|--|--|--|

802.11Q VLAN:

| | | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------|-----|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| No. | VID | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| PVID | | | | | | | |
| Link Type | | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access |
| | | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk |

Port Based VLAN:

| No. | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|-----|------|------|------|------|-----|----------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |

Port Based QinQ:

| No | LAN1 | LAN2 | LAN3 | LAN4 | DSL | Sniffing |
|-----------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| PVID | | | | | | |
| Line Type | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access | <input type="checkbox"/> Access |
| | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk | <input type="checkbox"/> Trunk |
| TPID | | | | | | |

QoS Mode:

| | | | | |
|----------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|
| QoS Mode | <input type="checkbox"/> Disable | <input type="checkbox"/> Port Based | <input type="checkbox"/> VLAN Tag | <input type="checkbox"/> IP DSCP |
|----------|----------------------------------|-------------------------------------|-----------------------------------|----------------------------------|

Queue Schedule:

| | | | |
|----------------|---------------------------------|---------------------------------|---------------------------------|
| Queue Schedule | <input type="checkbox"/> Type 1 | <input type="checkbox"/> Type 2 | <input type="checkbox"/> Type 3 |
|----------------|---------------------------------|---------------------------------|---------------------------------|

WRR Configuration -- Queue Weight:

| | | | | |
|--------------|---|---|---|---|
| Queue Index | 0 | 1 | 2 | 3 |
| Weight Value | | | | |

WFQ Configuration – Data rate limit

| Port | Egress Queue | | | |
|------|--------------|---|---|---|
| | 0 | 1 | 2 | 3 |
| LAN1 | | | | |
| LAN2 | | | | |
| LAN3 | | | | |
| LAN4 | | | | |
| DSL | | | | |

Port Based Priority QoS:

| | | | | | | |
|-------------|---------|---------|---------|---------|--------|-------------|
| Port | 1(LAN1) | 2(LAN2) | 3(LAN3) | 4(LAN4) | 5(DSL) | 6(Sniffing) |
| Queue Index | | | | | | |

VLAN Tag Priority QoS:

| | | | | | | | | |
|----------------|---|---|---|---|---|---|---|---|
| VLAN Tag Index | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Queue Index | | | | | | | | |

IP DSCP QoS:

| DSCP | Queue Index | DSCP | Queue Index | DSCP | Queue Index | DSCP | Queue Index |
|------|-------------|------|-------------|------|-------------|------|-------------|
| 0 | | 16 | | 32 | | 48 | |
| 1 | | 17 | | 33 | | 49 | |
| 2 | | 18 | | 34 | | 50 | |
| 3 | | 19 | | 35 | | 51 | |
| 4 | | 20 | | 36 | | 52 | |
| 5 | | 21 | | 37 | | 53 | |
| 6 | | 22 | | 38 | | 54 | |
| 7 | | 23 | | 39 | | 55 | |
| 8 | | 24 | | 40 | | 56 | |
| 9 | | 25 | | 41 | | 57 | |
| 10 | | 26 | | 42 | | 58 | |
| 11 | | 27 | | 43 | | 59 | |
| 12 | | 28 | | 44 | | 60 | |
| 13 | | 29 | | 45 | | 61 | |
| 14 | | 30 | | 46 | | 62 | |
| 15 | | 31 | | 47 | | 63 | |

User Profile:

| User profile | User name | Password | Attrib |
|--------------|-----------|----------|--|
| 1 | | | <input type="checkbox"/> Menu <input type="checkbox"/> Command |
| 2 | | | <input type="checkbox"/> Menu <input type="checkbox"/> Command |
| 3 | | | <input type="checkbox"/> Menu <input type="checkbox"/> Command |
| 4 | | | <input type="checkbox"/> Menu <input type="checkbox"/> Command |
| 5 | | | <input type="checkbox"/> Menu <input type="checkbox"/> Command |

Telnet TCP Port:

| | |
|-----------------|--|
| Telnet TCP Port | |
|-----------------|--|

Legal client IP Address pool:

| | Legal client IP Address pool |
|----|------------------------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |

Supervisor ID and Password:

| | |
|---------------------|--|
| Supervisor ID | |
| Supervisor Password | |

Host Name:

| | |
|-----------|--|
| Host Name | |
|-----------|--|

SNMP Community:

| | |
|----------------|--|
| SNMP entry (1) | |
| Validate | <input type="checkbox"/> Enable <input type="checkbox"/> Disable |
| Community | |
| Access Right : | <input type="checkbox"/> Read only <input type="checkbox"/> Read Write <input type="checkbox"/> Denied |

| | |
|----------------|--|
| SNMP entry (2) | |
| Validate | <input type="checkbox"/> Enable <input type="checkbox"/> Disable |
| Community | |
| Access Right : | <input type="checkbox"/> Read only <input type="checkbox"/> Read Write <input type="checkbox"/> Denied |

| | |
|----------------|--|
| SNMP entry (3) | |
| Validate | <input type="checkbox"/> Enable <input type="checkbox"/> Disable |
| Community | |
| Access Right : | <input type="checkbox"/> Read only <input type="checkbox"/> Read Write <input type="checkbox"/> Denied |

| | |
|----------------|--|
| SNMP entry (4) | |
| Validate | <input type="checkbox"/> Enable <input type="checkbox"/> Disable |
| Community | |
| Access Right : | <input type="checkbox"/> Read only <input type="checkbox"/> Read Write <input type="checkbox"/> Denied |

| | |
|----------------|--|
| SNMP entry (5) | |
| Validate | <input type="checkbox"/> Enable <input type="checkbox"/> Disable |
| Community | |
| Access Right : | <input type="checkbox"/> Read only <input type="checkbox"/> Read Write <input type="checkbox"/> Denied |

SNMP Trap Host:

| | |
|---------------------|--|
| Trap Host entry (1) | |
| Version | <input type="checkbox"/> Disable <input type="checkbox"/> Ver.1 <input type="checkbox"/> Ver.2 |
| IP Address | |
| Community | |

| | |
|---------------------|--|
| Trap Host entry (2) | |
| Version | <input type="checkbox"/> Disable <input type="checkbox"/> Ver.1 <input type="checkbox"/> Ver.2 |
| IP Address | |
| Community | |

| | |
|---------------------|--|
| Trap Host entry (3) | |
| Version | <input type="checkbox"/> Disable <input type="checkbox"/> Ver.1 <input type="checkbox"/> Ver.2 |
| IP Address | |
| Community | |

| | |
|---------------------|--|
| Trap Host entry (4) | |
| Version | <input type="checkbox"/> Disable <input type="checkbox"/> Ver.1 <input type="checkbox"/> Ver.2 |
| IP Address | |
| Community | |

| | |
|---------------------|--|
| Trap Host entry (5) | |
| Version | <input type="checkbox"/> Disable <input type="checkbox"/> Ver.1 <input type="checkbox"/> Ver.2 |
| IP Address | |
| Community | |

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