XL-EFM404V

G.SHDSL.BIS
VPN ROUTER

USER MANUAL

Context

1 Introduction

1.1 Descriptions

XTENDLAN EFM series G.SHDSL.bis VPN Router is a high performance 4 ports Security Gateway providing Internet access and LAN-to-LAN application over existing copper line for small/medium office. Complying with ITU-T G.991.2 (2004) standard, XTENDLAN EFM series make full use of the advanced G.SHDSL.bis technology to offer data transmission rates of up to 5.696Mbps in 2-wire mode, 11.392Mbps in 4-wire mode and 22.784Mbps in 8-wire mode.

XTENDLAN EFM series VPN Router is integrated high-end Bridging/Routing capabilities with advanced functions of Multi-DMZ, Virtual Server mapping, and VPN pass-through. Because of rapid growth of network, virtual LAN has become one of the major new areas in internetworking industry. XTENDLAN EFM support port-based VLAN and IEEE 802.1q VLAN over ATM network.

With always on connection that DSL features, XTENDLAN EFM series VPN routers provide advanced firewall with SPI (Stateful Packet Inspection) and DoS protection, serving as a powerful firewall to protect from outside intruders of secure connection. It also supports IP precedence to classify and prioritize types of IP traffic. In additional, its VPN feature supports data transmission over the Internet by data encryption/decryption between two sites. VPNs feature allows replacing a private leased line to minimize the expense among global inter-connection.

Not only the much higher bandwidth than convention symmetric digital subscriber loop, XTENDLAN EFM series also provide the network administrators tool of Quality of Service (QoS) to allocate network resources effectively. By classify the priority of services, the functions of bandwidth management increases efficiency and productivity on specific demands such as VoIP, video streaming, video-conferencing or interactive game applications to guarantee all the application get the deserved service quality.

1.2 Features

- Easy configuration and management with password control for various application environments
- Efficient IP routing and transparent learning bridge to support Internet broadband services
- Virtual LANs (VLANs) offer significant benefit in terms of efficient use of bandwidth, flexibility, performance and security
- VPN for safeguarded connections
- Built-in advanced SPI firewall
- IP precedence to partition the traffic into multiple classes of service
- Four 10/100M Base-T Auto-sensing, Auto-negotiation and Auto-MDI/MDIX switching port for flexible local area network connectivity
- USB ports for 3.5G USB dangle modem for Internet access backup(For USB models only)
- Fully ATM protocol stack implementation over SHDSL.bis
- PPPoA and PPPoE support user authentication with PAP/CHAP/MS-CHAP/MS-CHAPv2
- SNMP management with SNMPv1/v2c/v3 agent and MIB II
- Getting enhancements and new features via Internet software upgrade

1.3 Specifications

- **Hardware Interface**
  - ***WAN Port:***
    - SHDSL.bis: ITU-T G.991.2 (2004) Annex A/B/F/G supported
    - Encoding scheme: TC-PAM 16/ TC-PAM 32
    - Data Rate: N x 64kbps (N= 3 ~ 89, 89 as default) (For EFM-2W and EFM-2W/U)
    - Data Rate: N x 128kbps (N= 3 ~ 89, 89 as default) (For EFM-4W and EFM-4W/U)
    - Data Rate: N x 256kbps (N= 3 ~ 89, 89 as default) (For EFM-8W and EFM-8W/U)
    - Impedance: 135 ohms
  - ***LAN Port:*** 4-Ports 10/100M Switch supports
    - Auto-negotiation for 10/100Base-TX and Half/Full Duplex
    - Auto-MDIX
  - ***USB Port:*** 2-ports **USB** (For EFM-2W/U, EFM-4W/U and EFM-8W/U)
    - USB 2.0
  - ***Serial Console Port:*** RJ45 connector
  - ***Factory Default Reset:*** Push Button
  - ***LED:***
    - Power (Green)
    - WAN LINK/ACT(Green), one LED per pair
    - LAN (Port 1~port 4) LINK/ACT (Green)

- ALARM (Red)

- **Bridging and VLAN**
  - IEEE 802.1D Transparent Learning Bridge
  - IEEE 802.1Q and Port Based VLAN
  - Spanning Tree Protocol (STP)
  - Up to 2K Mac Address
- **Routing**
  - Static routing and RIP v1/v2(RFC 1058/2453)
  - NAT/PAT (RFC1631)
  - NAT Application Level Gateways
  - Skype/MSN/Yahoo Messenger (RFC2933)
  - VoIP(SIP) pass through
  - VPN PPTP/L2TP pass through
  - Virtual Server
- **Network Protocol**
  - IPv4 (ARP/RARP, TCP/UDP,ICMP)
  - DHCP Client/Server, Relay
  - DNS Relay/Proxy, Dynamic DNS(DDNS)
  - IGMP v1/v2/v3, IGMP Proxy, IGMP Snooping
  - SNTP and UPnP
- **ATM**
  - 8 PVC
  - OAM F4/F5 Loopback
  - AAL5
  - VC Multiplexing and SNAP/LLC
  - Ethernet over ATM (RFC 2684/RFC1483)
  - Multiple protocol over ATM AAL5(MPOA, REF1483/2684)
  - PPP over ATM (RFC 2364)
  - Classic IP over ATM (RFC 1577)
  - QoS(UBR/CBR/VBR/VBR-RT)
- **PPP**
  - PPPoE
  - PAP/CHAP/MS-CHAP/MS-CHAPv2
  - Configurable timer to auto-reconnect
  - Configurable Idle times for timeout

- **QoS**
  - 802.1P Tag
  - IPv4 TOS/DiffServ
  - Class-based Prioritization
  - Class-based Traffic Shaping
  - Class-based DSCP Mark
  - Up to 8 priority queues
  - IP Precedence Alternation

- **VPN**
  - IPSec (RFC2411) up to 4 Tunnels
  - DES/3DES/AES
  - MD5/SHA-1
  - IKE/Manual Key
  - ISAKMP (RFC 2407/2408/4306)
  - IKE v1 (RFC 2409/4109)
  - PSK
  - L2TP/PPTP

- **Firewall**
  - SPI (Stateful Packet Inspection)
  - Intrusion Detection/DoS (Denial of Service)
  - DMZ
  - Content Filtering
  - URL Blocking
  - Packet Filtering/Access Control List (ACL)

- **Management**
  - Web and Telnet management via LAN ports
  - CLI via serial console port
  - Support SSH (RFC4250/4251/4252/4253/4254/4255/4256)
  - SNMP v1/v2c/v3 (RFC 1157/1901//1905)
  - MIB II (RFC 1213/1493)
  - Syslog with Remote Logging support
  - Firmware Upgrade via TFTP
  - Configuration Data Import/Export
  - Multiple Levels of Administration Privilege
  - Support TR-069 WAN management protocol

- **Physical / Electrical**
  - Dimensions: 18.7 x 3.3 x 14.5cm (WxHxD)
  - Power: 100~240VAC (via power adapter)
  - Power Consumption: 9 watts Max
  - Temperature: 0~45ºC
  - Humidity: 0%~95%RH (non-condensing)

2 Getting to know about the VPN Router

2.1 Front Panel

LED status of VPN Router:

LEDs		Active	Description
PWR		On	The power adaptor is connected to this device
DSL	LINK 1	On	SHDSL.bis line 1 connection is established
		Blink	SHDSL.bis line 1 handshake Transmit or received data over SHDSL.bis link 1
	LINK 2	On	SHDSL.bis line 2 connection is established
		Blink	SHDSL.bis line 2 handshake Transmit or received data over SHDSL.bis link 2
	LINK 3	On	SHDSL.bis line 3 connection is established
		Blink	SHDSL.bis line 3 handshake Transmit or received data over SHDSL.bis link 3
	LINK 4	On	SHDSL.bis line 4 connection is established
		Blink	SHDSL.bis line 4 handshake Transmit or received data over SHDSL.bis link 4
LAN	LINK/ACT1	On	Ethernet cable is connected to LAN 1
		Blink	Transmit or received data over LAN 1
	LINK/ACT2	On	Ethernet cable is connected to LAN 2
		Blink	Transmit or received data over LAN 2
	LINK/ACT3	On	Ethernet cable is connected to LAN 3
		Blink	Transmit or received data over LAN 3
	LINK/ACT4	On	Ethernet cable is connected to LAN 4
		Blink	Transmit or received data over LAN 4
ALM		On	SHDSL.bis line connection is dropped
		Blink	SHDSL.bis self test
		Off	No Alarm

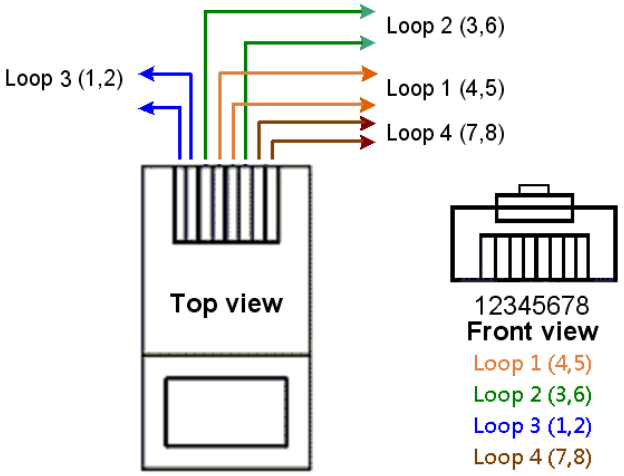
2.2 Rear Panel

Connector	Description
DC-IN	Power adaptor inlet: Input voltage from 9V to 12VDC
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)
USB	USB ports (for EFM-2W/U, EFM-4W/U and EFM-2W/U only)
DSL	G.SHDSL .Bis interface for WAN port (RJ-45)
⏚	Frame Ground / Protective earth

2.3 WAN Port

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

The pin assignments for SHDSL line cable are:



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

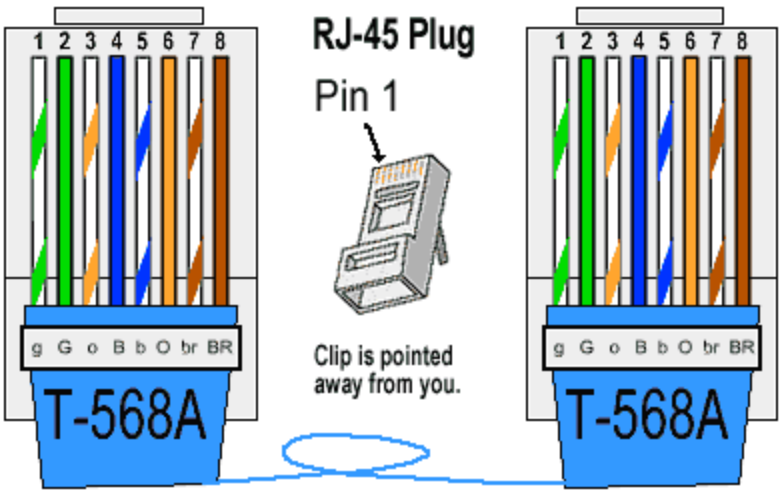
For 4-wire (two pair) model, Loop1 and 2 have been used.

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

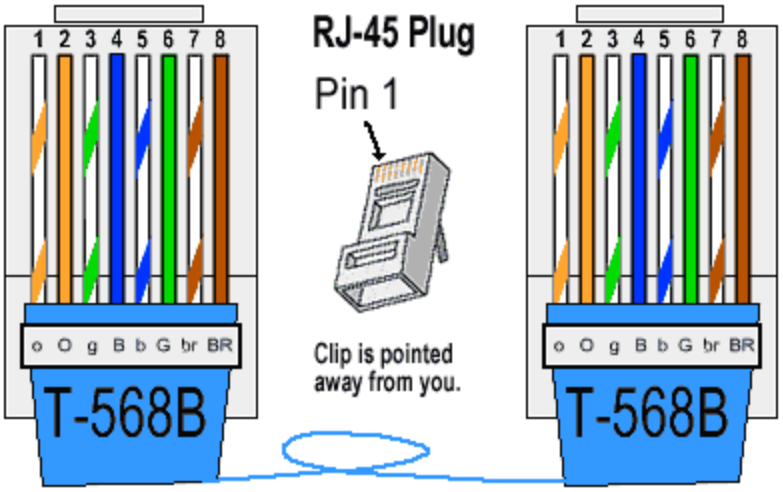
	Channel A	Channel B	Channel C	Channel D
2-wire model (EFM-2W , EFM-2W/U)				
2-wire mode	Loop1 (4,5)			
4-wire model (EFM-4W , EFM-4W/U)				
2-wire mode	Loop1 (4,5)			
4-wire mode	Loop1 (4,5)	Loop2 (3,6)		
8-wire model (EFM-8W , EFM-8W/U)				
2-wire mode	Loop1 (4,5)			
4-wire mode	Loop1 (4,5)	Loop2 (3,6)		
8-wire mode	Loop1 (4,5)	Loop3 (1,2)	Loop4 (7,8)	Loop2 (3,6)

For test on point to point connection purpose, you can use the Straight-Through Ethernet Cable for SHDSL.bis link as the following.

T-568A Straight-Through Ethernet Cable



T-568B Straight-Through Ethernet Cable



Both the T-568A and the T-568B standard Straight-Through cables are been used.

2.2. LAN ports

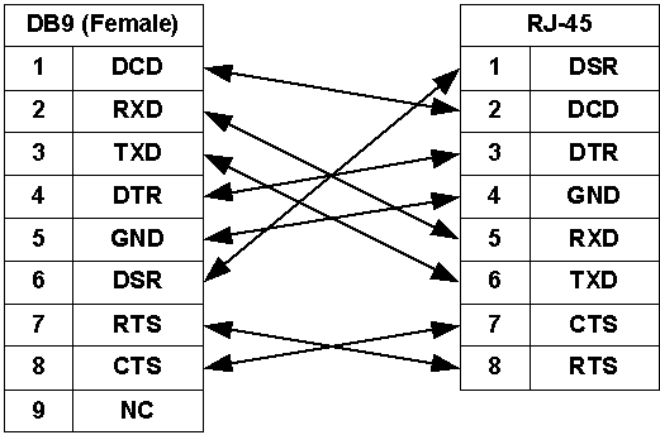
The VPN Router have four LAN ports. Those ports are auto-negotiating, auto-crossover. In 10/100Mbps Fast Ethernet, the speed can be 10Mbps or 100Mbps and the duplex mode can be half duplex or duplex.

The auto-negotiating ports can detect and adjust to the optimum Ethernet speed (10/100 Mbps) and duplex mode (full duplex or half duplex) of the connected device. The auto-crossover (auto-MDI/MDI-X) ports automatically works with a straight-through or crossover Ethernet cable.

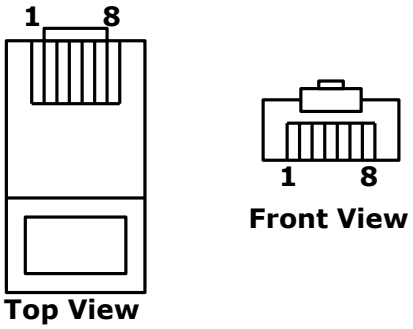
2.3. Console Port

Connect the RJ-45 jack of the console cable to the console port of the VPN Router. 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	DSR	DCE ready	
2	DCD	Received Line Signal Detector	
3	DTR	DTE ready	
4	GND	Signal Ground	
5	RXD	Received Data	
6	TXD	Transmitted Data	
7	CTS	Clear to Send	
8	RTS	Request to Send	

2.4 USB Port

Only for with USB ports models. This is using for connection of 3G/3.5G USB modem.

2.5 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.

2.6 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.

2.7 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

3.1 Configuration Methods

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

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 VPN Router provides a browser interface that allows you to configure and manage this device. After you set up your IP address for the VPN Router, you can access the VPN Router's Web interface applications directly in your browser by entering the IP address of the VPN Router. You can then use your Web browser to list and manage configuration parameters from PC.

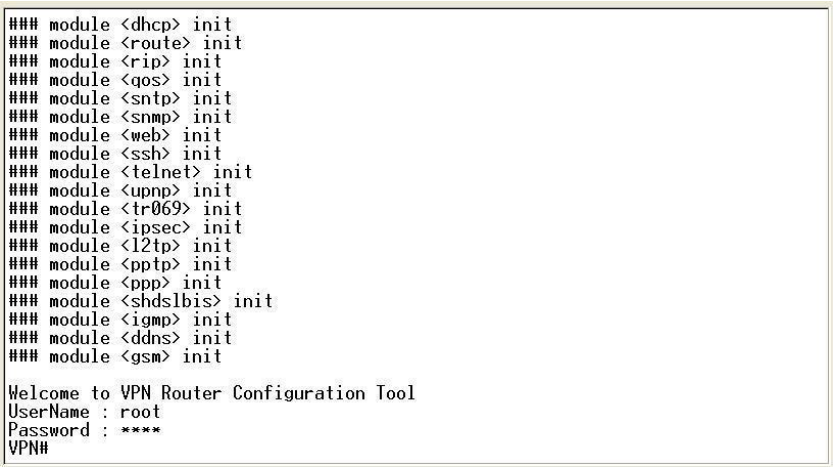
Web Configuration requires Internet Explorer 5.0 or later or Netscape Navigator 6.0 and later versions. The recommended screen resolution is 1024 by 768 pixels.

3.1.2. Serial Console Configuration

The console port is a RJ-45 connector that enables a connection to a PC for monitoring and configuring the VPN Router. Use the supplied serial cable with a female DB-9 connector to serial port of PC and RJ-45 module jack connector to VPN Router'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:

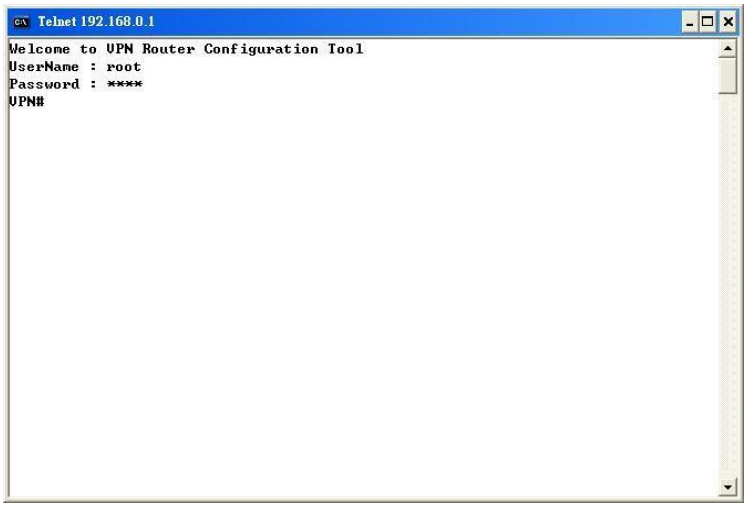
Parameter	Value
Baud Rate	115200
Data Bits	8
Parity Check	None
Stop Bits	1
Flow Control	None

It will ask for user name and password in order to remote login when using telnet, please use "root" for username and "root" for password. Please check the following screen shot for what you will see in your terminal window.



3.1.3. Telnet Configuration

The VPN Router also supports telnet for remote management. Please make sure the correct Ethernet cable connected the LAN ports of device to your computer. The LAN indicator on the front panel shall light on if a correct cable is used. Start your telnet client with a command window or VT100 terminal emulation by key in "192.168.0.1", which is the management IP address of XtendLan EFM series VPN router, and wait for the login page prompts up. Then, key in the user name and the password once the login page shows. The login page is shown as the following screen shot. (The default user name and password are "root" and "root".)



All display screens are as same as serial console configuration. The default IP address is “192.168.0.1” and you can customerize the IP address for you application. In addition, the default Telnet function is disable. Therefore, before using this Telnet function, please enable Telnet with using Web management .

3.1.4. Installation

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

Step 1. Connect the power adapter to the port labeled “DC-IN” on the rear panel of the VPN Router.

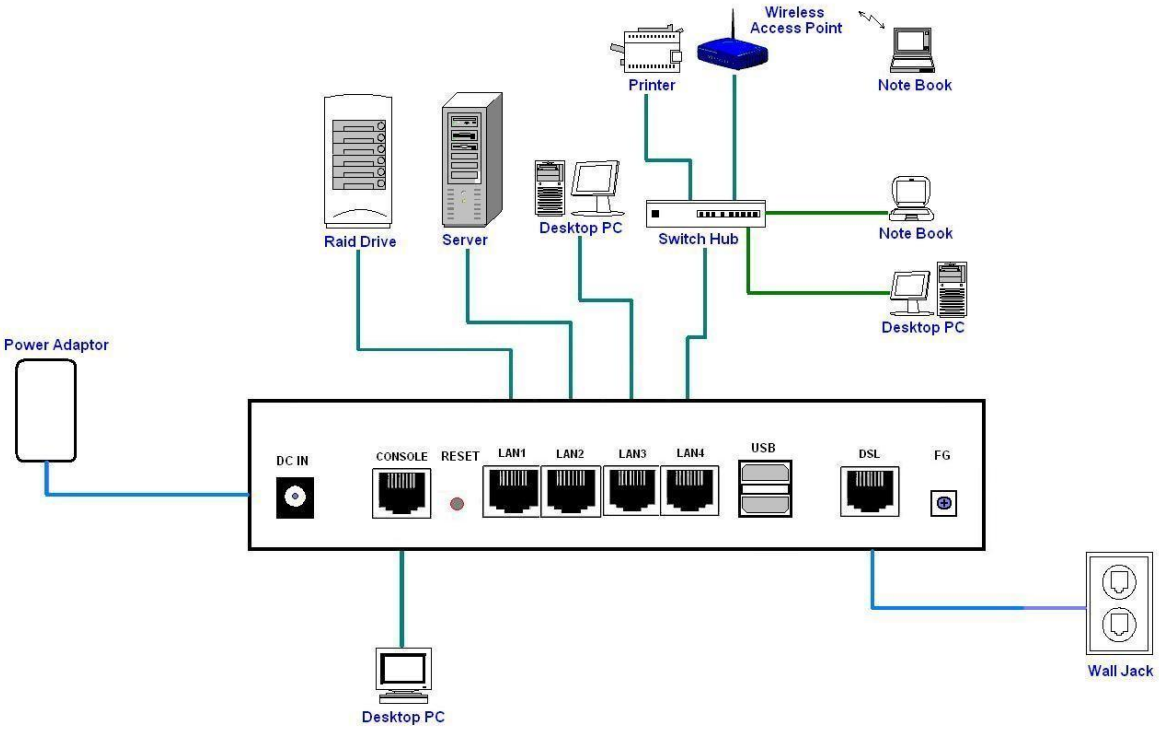
Step 2. Connect the Ethernet cable to LAN ports. (Note: The VPN Router support**s** auto-MDIX switching hub so both straight through and cross-over Ethernet cables can be used.)

Step 3. Connect the phone cable to the VPN Router and the other side of phone cable to wall jack.

Step 4. Connect the power adapter to power source.

Step 5. Turn on the PC or NB, which is used for configuration the VPN Router.

To avoid possible damage to this VPN Router, DO NOT turn on this device before Hardware Installation.



Connection with VPN Router

3.1.5. Login via Web Browser

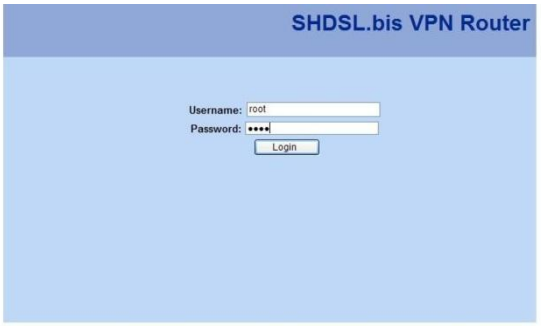
This section introduces the configuration and functions of the web-based management. It is an HTML-based management interface that allows users to setup and manage XtendLan EFM VPN routers. This configuration system offers all monitoring and management features which allow users to access VPN routers from anywhere on the network with a standard browser, such as, Internet Explorer or Firefox.

Step 1. User can use any common browsers, such as, Internet Explorer, on your computer to connect the VPN Router. Then, please type "http://192.168.0.1" in the address bar of the browser.

Step 2. The default IP address and sub net-mask of the management port of VPN Router are "192.168.0.1" and "255.255.255.0".

Step 3. If DHCP function is Disable, your computer can set the same net-mask such as 192.168.0.X which X is from 2 to 254, that are also can connect.

Step 4. Key in user name, "root", and password, "root"; then, click on "Login" button to login the web configuration.



Note: Both the default user name and password are "root". It is suggested to change the user name and the password for security reason.

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

Note: Once you change the user name and password, please login with the new user name and password in the next login process.

3.2 Menu Tree

<table>
<tr><td rowspan="19">Quick Setup</td><td rowspan="15">System Mode</td><td colspan="4">Bridge</td></tr>
<tr><td rowspan="14">Router</td><td colspan="3">WAN IP</td></tr>
<tr><td colspan="3">WAN Netmask</td></tr>
<tr><td rowspan="8">Protocol</td><td colspan="2">Disable</td></tr>
<tr><td colspan="2">EoA</td></tr>
<tr><td colspan="2">EoA + NAT</td></tr>
<tr><td colspan="2">IPoA</td></tr>
<tr><td colspan="2">IPoA + NAT</td></tr>
<tr><td>PPPoA</td><td rowspan="4">PPP User
PPP Password
Confirm Password
PPP Connection Type</td></tr>
<tr><td>PPPoA + NAT</td></tr>
<tr><td>PPPoE</td></tr>
<tr><td>PPPoE + NAT</td></tr>
<tr><td colspan="3">Primary DNS</td></tr>
<tr><td colspan="3">Secondary DNS</td></tr>
<tr><td rowspan="3">DHCP mode</td><td>Disable</td></tr>
<tr><td>Server</td></tr>
<tr><td>Relay</td></tr>
<tr><td rowspan="2">SHDSL.bis Mode</td><td colspan="4">STU-R</td></tr>
<tr><td colspan="4">STU-C</td></tr>
<tr><td colspan="5">WAN ENCAP</td></tr>
<tr><td colspan="5">WAN VPI/VCI</td></tr>
<tr><td colspan="5">Default Gateway</td></tr>
<tr><td rowspan="10">Network</td><td rowspan="8">SHDSL</td><td colspan="4">Mode</td></tr>
<tr><td colspan="4">TCLayer</td></tr>
<tr><td colspan="4">Pair Mode</td></tr>
<tr><td colspan="4">Annex</td></tr>
<tr><td colspan="4">TCPAM</td></tr>
<tr><td colspan="4">Line Probe</td></tr>
<tr><td colspan="4">Max Base Rate</td></tr>
<tr><td colspan="4">Interop Mode</td></tr>
<tr><td rowspan="3">Interfaces</td><td rowspan="2">LAN</td><td colspan="3">IP</td></tr>
<tr><td colspan="3">Netmask</td></tr>
<tr><td>WAN</td><td colspan="3">Protocol</td></tr>
</table>

			ENCAP	
			VPI-VCI	
			QoS Class	
			QoS PCR	
			QoS SCR	
	3.5G Backup	Mode		
		Location		
		ISP		
		Manufacture		
		Dial Number		
		APN		
		Keep-alive Interval		
		Keep-alive Server		
	DNS	Primary		
		Secondary		
	DHCP	Mode	Disable	
			Server	
			Relay	
		DHCP Server	Mode	
			Subnet	
			Netmask	
			IP Range	
			Gateway	
			DNS	
			Lease Time	
		DHCP Relay	IP	
			Interface	
	NAT	Mode		
		Entry (1~16)	Enable	
			Source IP	
			Source Netmask	
			Output Interface	
Advance	STP	Router Mode	Not available	
		Bridge Mode	Mode	
			Aging Time	
	VLAN	Router Mode	Not available	
		Bridge Mode	Mode	Disable
				802.1Q Tag-Based VLAN

				Port-Based VLAN
	QinQ	Router Mode	Not available	
		Bridge Mode	Mode	Disable
				Mapping
				By VLAN
				By WAN
	Switch	Port 1 ~ Port 4	Auto	
			100M/Full	
			100M/Half	
			10M/Full	
			10M/Half	
	Static Route	Destination		
		Netmask		
		Gateway		
		Interface		
	QoS	Mode		
		Traffic Classify	Mode	
			Class ID	
			Protocol	
			Src IP	
			Src Netmask	
			Src Port	
			Dst IP	
			Dst Netmask	
			Dst Port	
		802.1P	Class ID	
		IP DSCP	DSCP	
			Class ID	
		Class Shaping	Mark Mode	
			DSCP	
			TOS	
			Min Rate	
			Max Rate	
	RIP	Mode		
		RIP Version		
		LAN	Mode	
			Passive	
		WAN1~WAN8	Mode	

			Passive	
	Virtual Server	Router Mode	Mode	
			Entry (1~16)	Enable
				Description
				Interface
				Protocol
				Public Port
				Private IP/Port
		Bridge Mode	Not available	
	DMZ	Router Mode	Mode	
			WAN I/F	
			Host IP	
		Bridge Mode	Not available	
	DDNS	Mode		
		Provider		
		Host Name		
		User Name		
		Password		
	IGMP	IGMP Proxy / Snooping		
Security	Firewall	Router Mode	Mode	
		Bridge Mode	Not available	
	VPN	Router Mode	IPSEC	Mode
				Name
				WAN
				Perfect Forward Secrecy
				Local Subnet
				Local Netmask
				Remote Public IP
				Remote Local LAN Subnet
				Remote Local LAN Netmask
				Pre-shared Key
			L2TP	Mode
				Authentication
				Virtual IP
				L2TP/IPSec Mode
				IPSec Interface
				IPSec PSK
				User

			PPTP	Mode
				Authentication
				Virtual IP
				User
		Bridge Mode	Not available	
	Filter	IP Filter	Mode	
			Default Policy	
			Entry(1~16)	Mode
				Action
				Protocol
				Source IP/ Mask
				Source Start/ End Port
				Destination IP/ Mask
				Destination Start/ End Port
		MAC Filter	Mode	
			Default Policy	
			Entry(1~16)	Mode
				MAC
				Action
Management	SNTP	Sync With PC		
		SNTP	Mode	
			Time Server	
			Time Zone	
	SNMP	SNMPv3	Mode	
			V3 User Name	
			V3 Auth. Password	
			V3 Priv. Password	
			V3 Auth. Mode	
			V3 Auth. Type	
			V3 Priv. Type	
			V3 Access	
		Trap	Mode	
			Community	
			Trap Host IP	
	TR069	Mode		
		ACS URL		
		ACS Username		
		ACS Password		

			Periodic Inform Enable
			Periodic Inform Interval
			Periodic Inform Time
			Connection Request IP
			Connection Request Port
			Connection Request Username
			Connection Request Password
			Retry Times
	UPnP		Mode
	Sys Log		Remote Server Mode
			Remote Server Address
			Remote Server Port
	Telnet		Mode
			Port
	SSH		Mode
			Port
	Web		Refresh Time
			Service Port
Show	Information		Hardware MCSV
			Software MCSV
			Software Version
			DSL Chip Name
			DSL Phy Firmware Version
			DSL IDC Firmware Version
			MAC
			Serial No
			Present Time
			System Uptime
	Sys Log		
	Script		
Status	SHDSL		
	WAN		
	Route Table		
	Interfaces		
	STP (not available in router mode)		
Utilities	Upgrade		
	Config Tool	Default	
		Backup	

		Restore	
	Users	User 1~4	Name
			Level
			Password
			Confirm
	Ping	IP Address	
		Size	
		Count	
		Update	
	Trace Route	Host name or IP	
		Packet Datagram	
		Update Interval	

3.3 Quick Setup

"Quick Setup" function guides users to setup their VPN routers step by step. This VPN Router can be set as a bridge or a router. The following sections show how to setup a bridge mode or a router mode.

3.3.1. System Mode

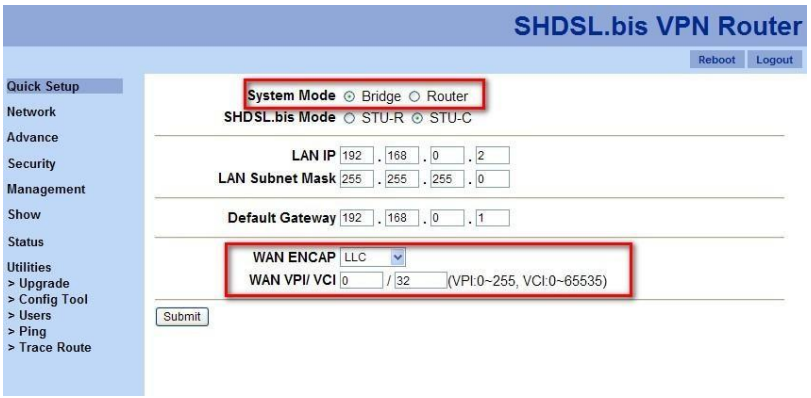
"System Mode" allows users to decide this VPN router should be a bridge device or a router device.

"Router mode" is when the DSL modem performs all the functions that allow you to connect to the Internet which include: all the technical settings (VCI, encapsulation, etc.) and the VPN router also connects to the ISP with your username and password. You can basically just connect to your computer.

"Bridge mode", on the other hand, allows some external device, for example, your computer or a separate router, to do the ISP connection, etc. In bridge mode, all the VPN router does is remembering your VCI, VPI and encapsulation settings. The ISP information and IP address assigned is controlled b your separate router or computer in PPP mode.

3.3.1.1 Bridge Mode

Click on "Bridge" to set this VPN router as a bridge device.



Once a user chooses “Bridge” mode, two more setups will be shown: “WAN ENCAP” and “WAN VPI/VCI”.

WAN ENCAP

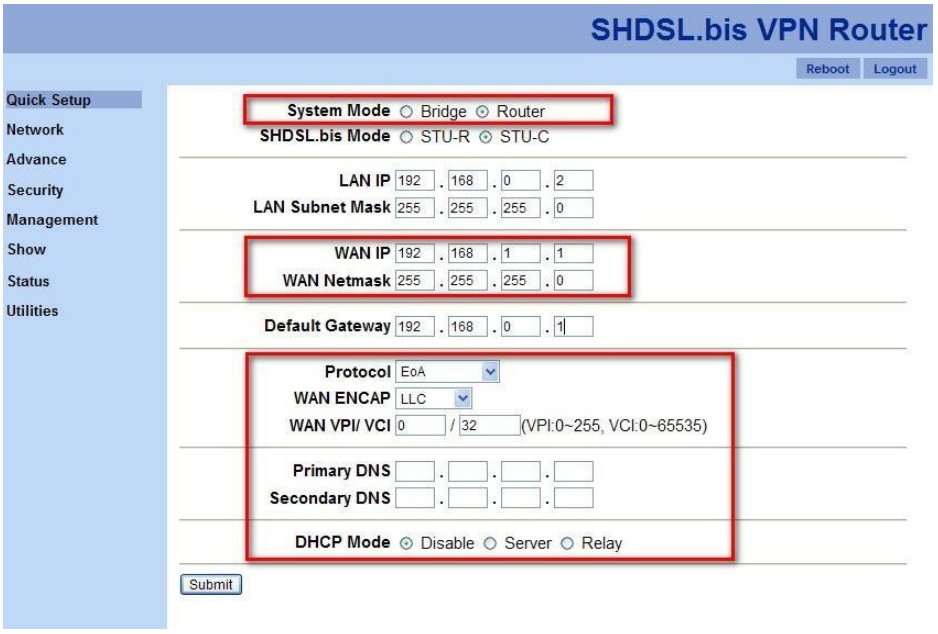
There are two encapsulation types: VC-Mux (Virtual Circuit Multiplexing) and LLC(Logical Link Control). VC-MUX and LLC are two mechanisms for identifying the protocol carried in ATM Adaptation Layer 5 (AAL5) frames.

WAN VPI/VIC

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

3.3.1.2 Router Mode

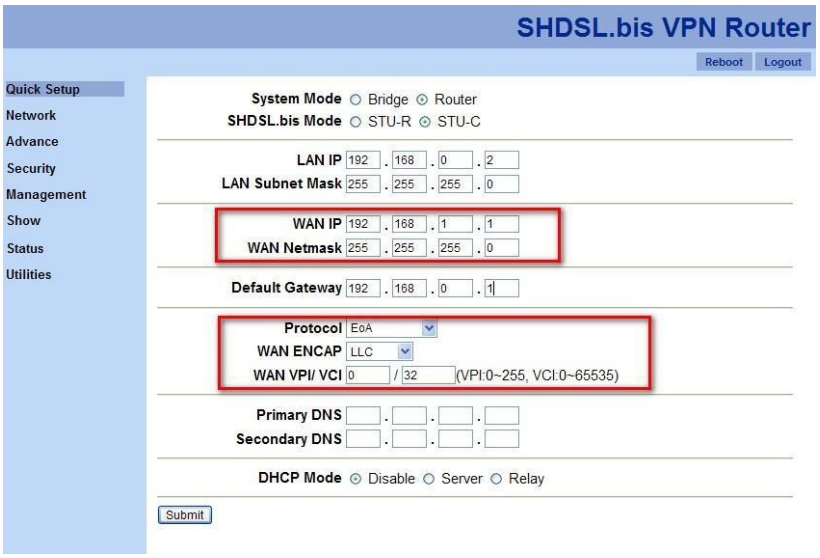
Click on “Router” to assign this VPN router to be a router device.



Once “System Mode” is set to “Router”, more setups will be shown as the screen shot above.

WAN Section

Fill up the information in the circled section in order to complete setting up your VPN router as a router device.



1. WAN IP and WAN Netmask

   Fill up the IP address and the netmask of WAN.

2. Protocol

   Nine options are available for this setup:

   - Disable
   - EoA
   - EoA + NAT
   - IPoA
   - IPoA + NAT
   - PPPoA
   - PPPoA + NAT
   - PPPoE
   - PPPoE + NAT

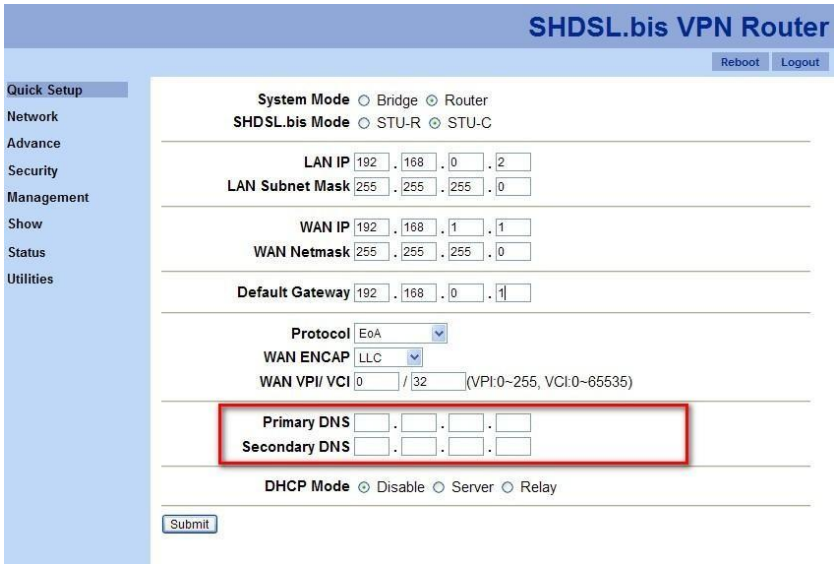
3. WAN ENCAP

   Choose either “LLC” or “VC MUX” for WAN encapsulation.

4. WAN VPI/VCI

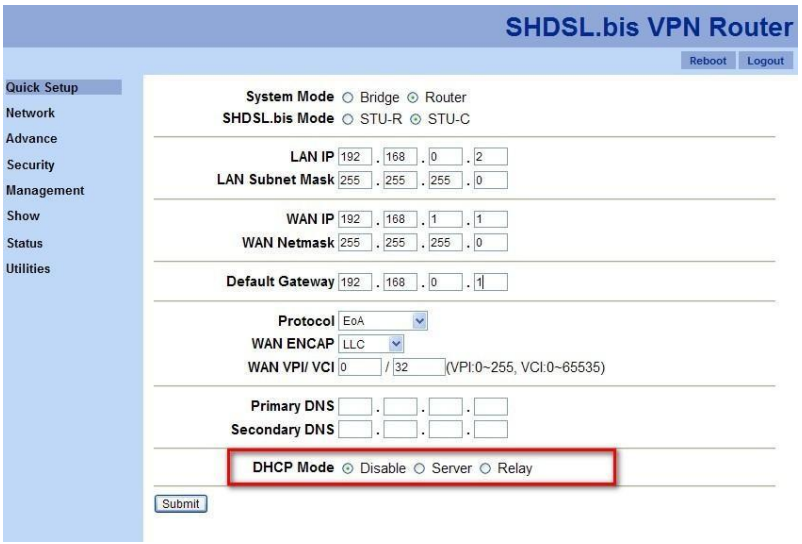
   Define the values of VPI and VCI.

DNS



Two sets of DNS addresses can be stored in DNS section.

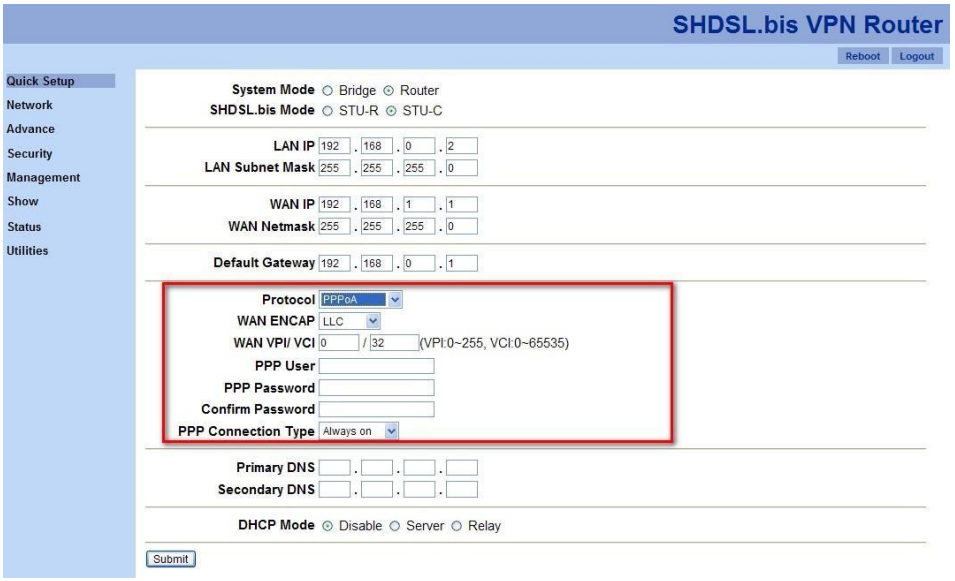
DHCP Mode



Choose whether DHCP mode should be disabled or enabled. If the DHCP mode should be enabled, decide the mode should be “Server” or “Relay”.

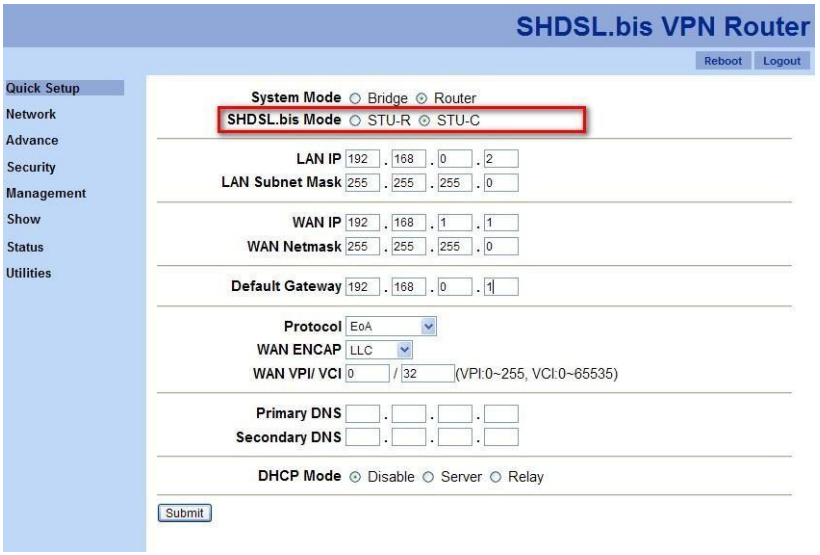
PPP

This section is only available when the protocol is PPPoA, PPPoA + NAT, PPPoE, or PPPoE + NAT.



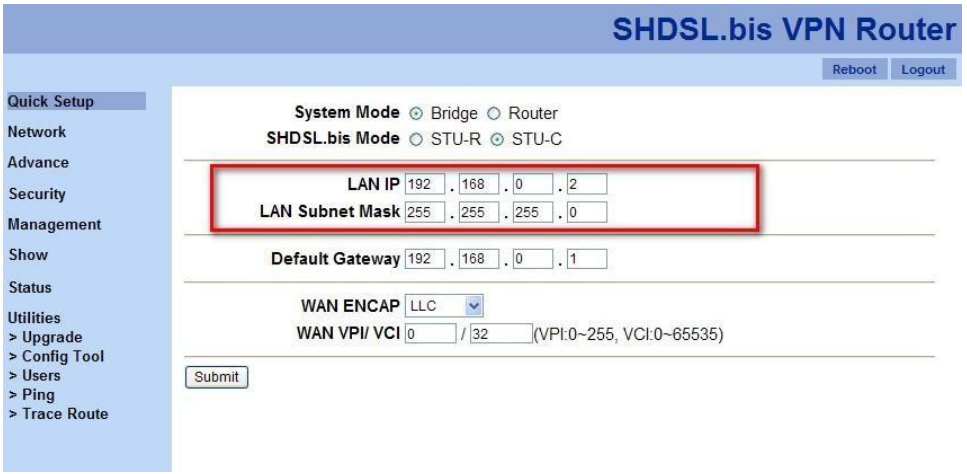
In this section, you are able to set PPP user, PPP password, and PPP connection type. In addition, the connection type can be set as either “Always on” or “On demand”.

3.3.1.3 SHDSL.bis mode



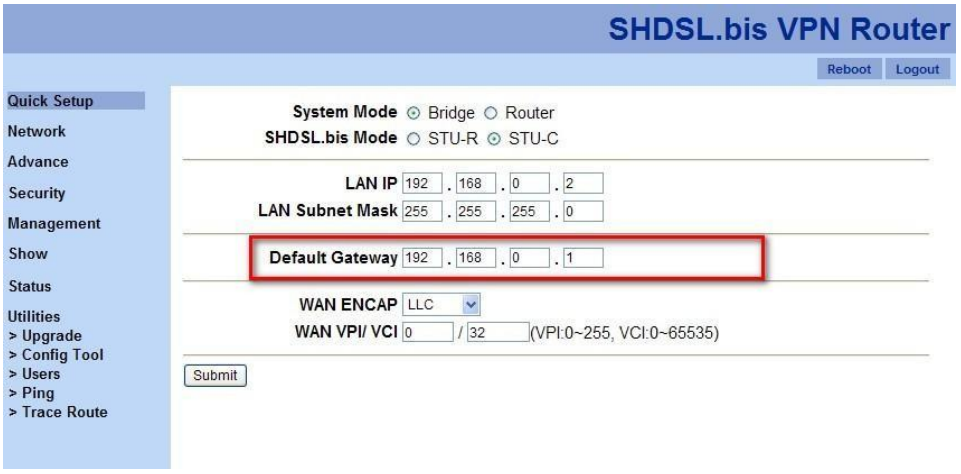
There are two SHDSL.bis modes: STU-C and STU-R. “STU-C” means the terminal of central office (CO) and “STU-R” means customer premise equipment (CPE). Click STU-R side or STU-C side to setup the operation mode. When connected with DSLAM, the mode should be CPE. When “LAN to LAN” connection, one side must be CO and the other side must be CPE.

3.3.1.4 *LAN IP and Subnet Mask*



In both “Bridge” mode and “Router” mode, the IP address and subnet mask of LAN should be provided.

3.3.1.5 *Default Gateway*



“Default Gateway” allows users to fill up the gateway IP address in both “Bridge” mode and “Router” mode.

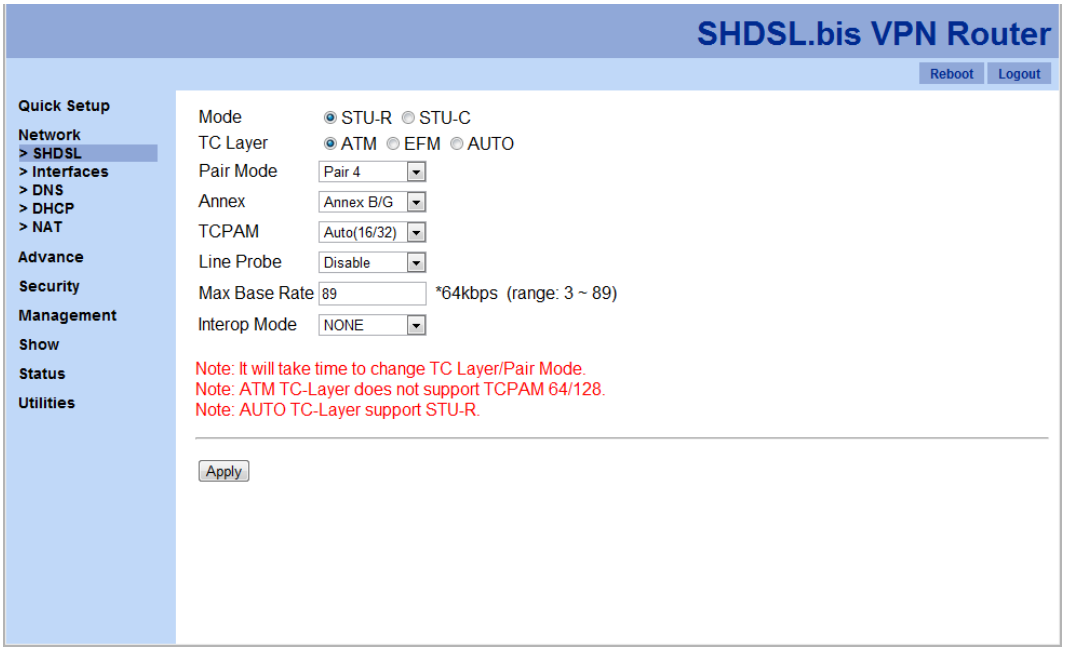
3.4 Network

Network section allows users to setup the following functions.

1. SHDSL
2. Interfaces
3. 3.5G Backup
4. DNS
5. DHCP
6. NAT

Please check the sections for detail information on how to use these functions.

3.4.1. SHDSL



1. Mode:

   You are able to change your VPN router's mode to STU-R or STU-C in here.

2. TC Layer

   Three options are available for this function: ATM, EFM or AUTO. You are able to define the network type as an ATM connection or an EFM connection. Or you are able to set TC layer as AUTO so the VPN router will define by itself.

   Note: AUTO will be only available when the VPN router is in STU-R mode.

3. Pair Mode

This feature allows you to choose how many wire you would like to use on SHDSL.bis connection.

Line Type Mode / VPN Router		2-wire (1 pair)	4-wire (2 pair)	8-wire (4 pair)
EFM-2W	EFM-2W/U	●		
EFM-4W	EFM-4W/U	●	●	
EFM-8W	EFM-8W/U	●	●	●

The table above indicates the model number and its corresponding available wire numbers. For example:

EFM-2W and EFM-2W/U (2-wire model) can select 2-wire line type only.

EFM-4W and EFM-4W/U (4-wire model) can select 2-wire and 4-wire line types.

EFM-8W and EFM-8W/U (8-wire model) can select 2-wire, 4-wire or 8-wire line types.

4. Annex

There are four Annex types, Annex A, Annex B, Annex A/F and Annex B/G. Please confirm with your ISP.

5. TCPAM

Three options are available for TCPAM feature, “Auto”, “TCPAM-16” and “TCPAM-32”. “Auto” means the system will choose TCPAM automatically and this option is only available when the Annex type is “Annex A/F” or “Annex B/G”.

ATM Mode

SHDSL.bis VPN Router	Annex A	Annex B	Annex A/F	Annex B/G
Auto			●	●
TCPAM-16			●	●
TCPAM-32			●	●
TCPAM-64				
TCPAM-128				

EFM Mode

SHDSL.bis VPN Router	Annex A/F	Annex B/G
Auto	●	●
TCPAM-16	●	●
TCPAM-32	●	●
TCPAM-64	●	●
TCPAM-128	●	●

6. Line Probe

   You are able to choose to disable or enable “Line Probe” function for adpative mode of data rate. When “Line Probe” function is enabled, the system will search on the best connection based on the value of “Max Base Rate” automatically.

7. Max Base Rate

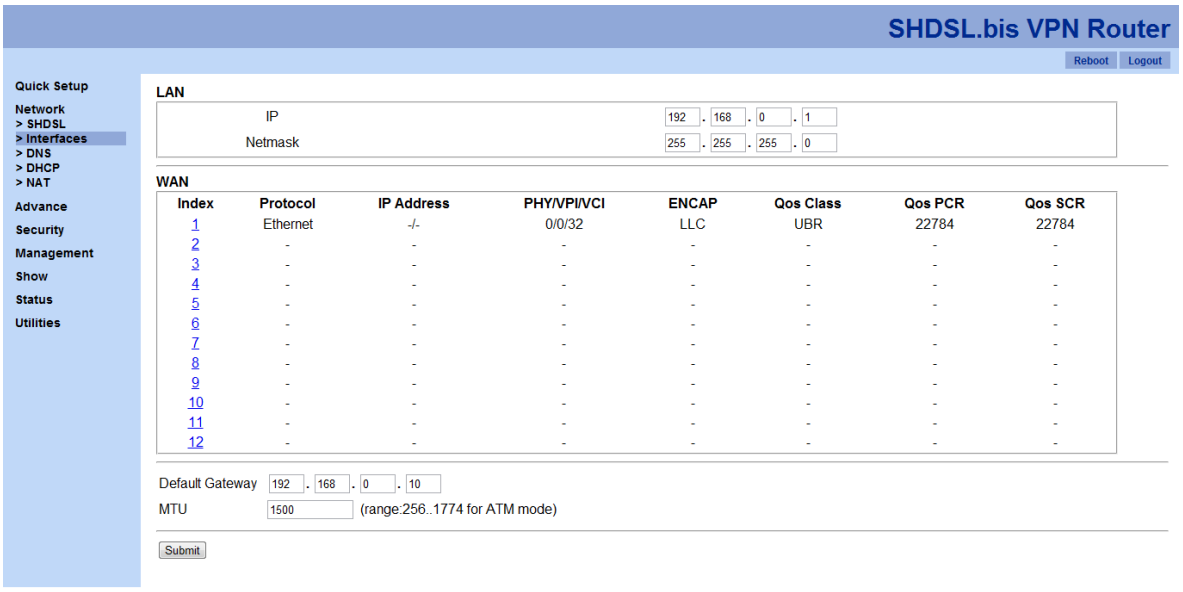
   This value will be used for “Line Probe” in order to find the best connection when line probe function is enabled. In addition, the value range is differed according to Annex type.

SHDSL.bis VPN Router	Annex A	Annex B	Annex A/F	Annex B/G
Range	3 ~ 36	3 ~ 36	3 ~ 89	3 ~ 89

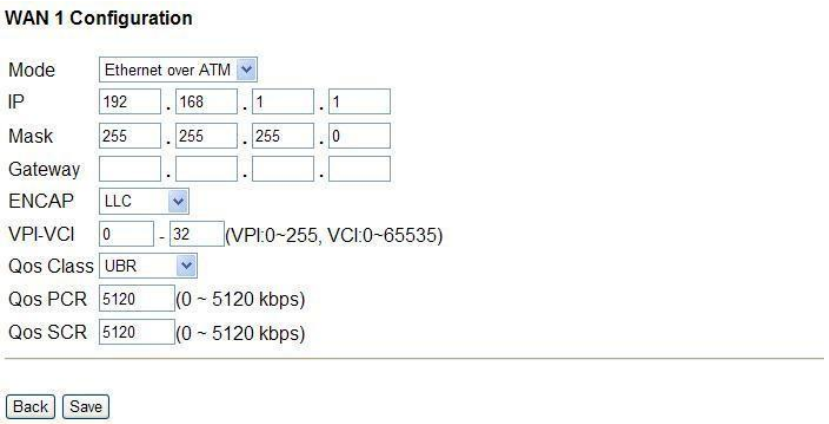
8. Interop Mode

   This feature allows you to enable or disable the interoperability of G.SHDSL version for the VPN router by choosing “NONE” or “GSPN”.

3.4.2. Interfaces



Three sections in “Interface” function. In the first section, the top-most part, you are able to change the IP address of LAN and its netmask. The middle section is for WAN. You are allowed to have 12 PVCs in the VPN router. To configure a PVC, please click on the number in this section and the following image will be showed.



In the last section of this page, you can define the IP address of the default gateway and the size of MTU.

QoS Class

The router supports UBR, CBR, VBR-rt and VBR-nrt.

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

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

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

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

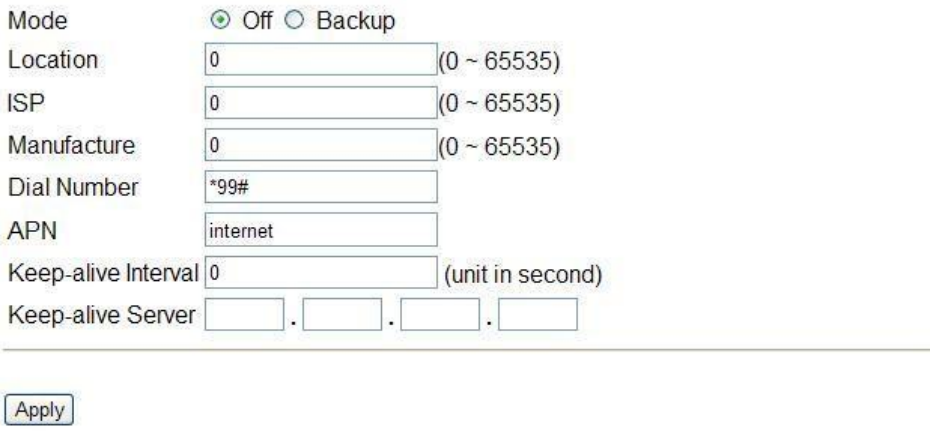
QoS PCR

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

QoS SCR

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

3.4.3. 3.5G Backup



This function is for EFM-2W/U, EFM-4W/U and EFM-8W/U.

VPN Router with USB models are supports automatic backup function. When connecting with SHDSL.bis, it will enable the 3G/3.5G broadband connection automatically when SHDSL.bis Internet connection is not available. You can surf Internet anywhere and anytime via this device.

3G/3.5G Modem card installation:

If you have 3G/3.5G modem card and SIM card, please follow the following instructions to establish connection

1. Connect power adapter to VPN router
2. Connect another Ethernet cable from the any LAN ports (1~4) on VPN router to the Ethernet socket on the PC
3. Insert SIM card into 3G/3.5G modem card, and connect the modem card with one of USB ports of VPN router.

3G/3.5G Internet Configuration

XtendLan VPN Router supports most of 3G/3.5G modem cards, just connect the modem card to the USB port of this

device will recognize it automatically, no additional setup procedure required.

Only one Internet connection (3G/3.5G wireless / DSL wired) can be used at the same time.

At first, DSL wired Internet connection will be selected, and use wireless connection (3G/3.5G) as backup. For example, if you connect 3G/3.5G modem card with VPN Router when you're using wired Internet connection, when DSL wired connection dropped and 3G/3.5G wireless connection will start up.

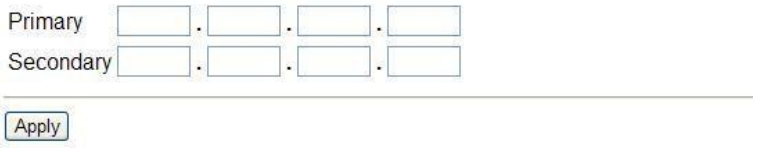
PIN code or user name / password required

Please check the authentication method you want to use. Most of telecomm service providers require you to input Dial Number and APN (Access Point Name), please those items provided by telecomm service provider.

After finish type those items, then click 'APPLY' button.

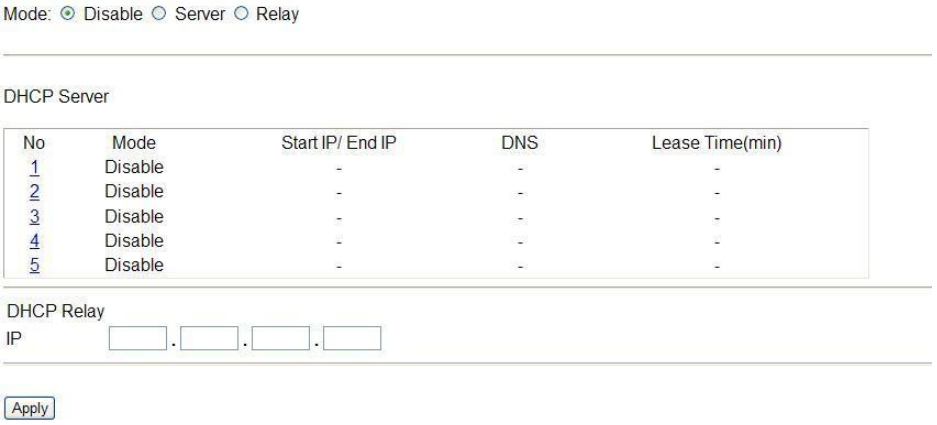
Note: Different ISP's require Dial Number and APN for connecting to the Internet, please check with your ISP as to the type of connection it requires.

3.4.4. DNS



The Domain Name Service (DNS) is a system designed to allow the identification of Internet servers to be based on names rather than IP addresses. Because Internet communication is based on IP addresses, all names must be translated into an IP address. This is the purpose of a Domain Name Server.

3.4.5. DHCP



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

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

3.4.6. NAT

NAT (Network Address Translation) is the translation of an Internet Protocol address (IP address) used within one

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

3.5. Advance

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.

3.5.1. STP

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

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

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

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

3.5.2. VLAN

VLAN is for Bridge mode only.

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.

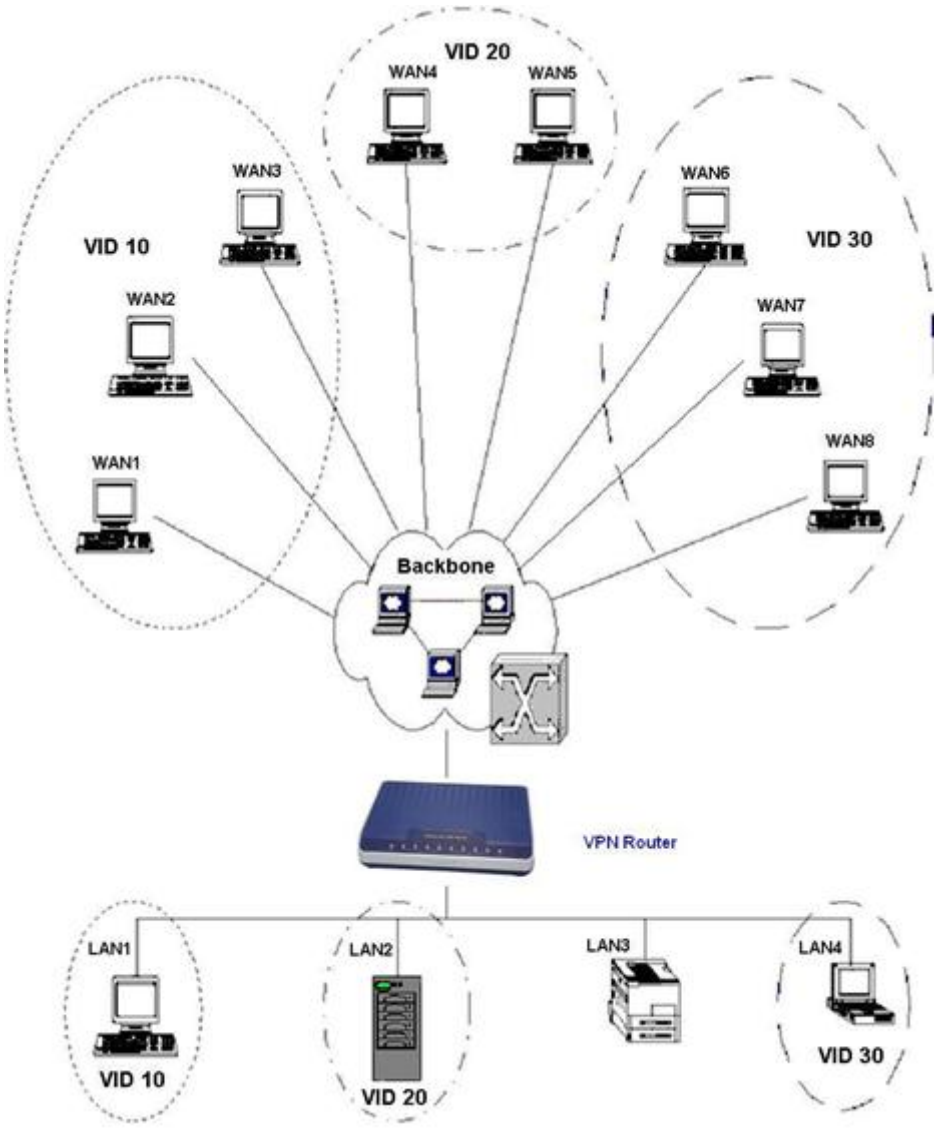
With MTU (Multi-Tenant Unit) applications, VLAN is vital in providing isolation and security among the subscribers. When properly configured, VLAN prevents one subscriber from accessing the network resources of another on the same LAN.

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.

User can choose three types of VLAN: 802.1Q Tag-Based VLAN and Port-Based VLAN. You can also set Disable the VLAN function.

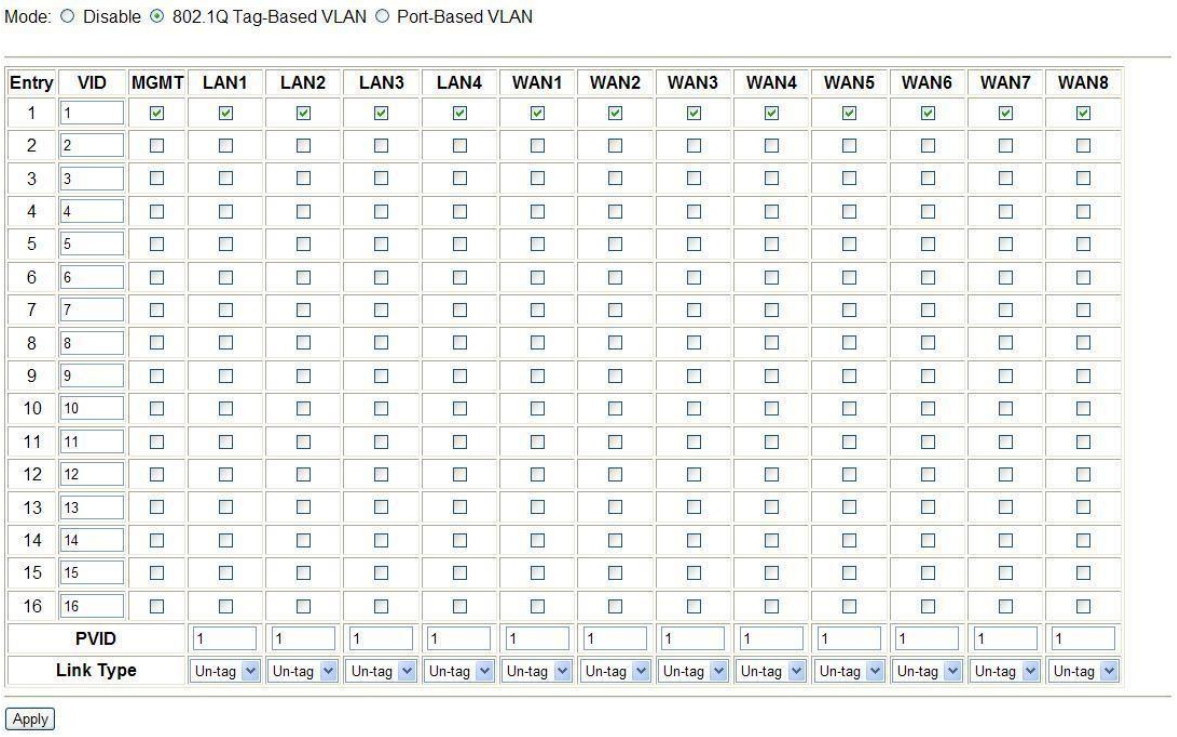
The VLAN Setup screen changes depending on whether you choose 802.1Q Tag-Based VLAN type and Port Based VLAN types in this screen.

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


VID 20
WAN4
WAN5
WAN3
VID 10
WAN2
WAN1
WAN6
VID 30
WAN7
WAN8
Backbone
VPN Router
LAN1
LAN2
LAN3
LAN4
VID 10
VID 20
VID 30

802.1Q Tag-Based VLAN

Click the 802.1Q Tag-Based VLAN to configure the VPN Router.



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.

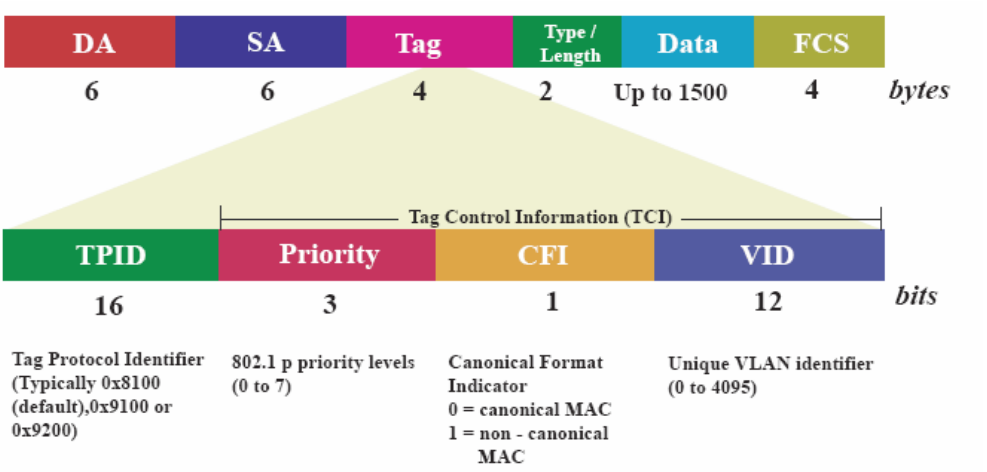
A VID defines the member of a port group. A packet can only travel inside a member port when the member port is part of a VID port group. Different VID groups aren't visible to one another

VID: (Virtual LAN ID) It is an 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: Access means the port can receive or send untagged packets.

Trunk means that the prot 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)

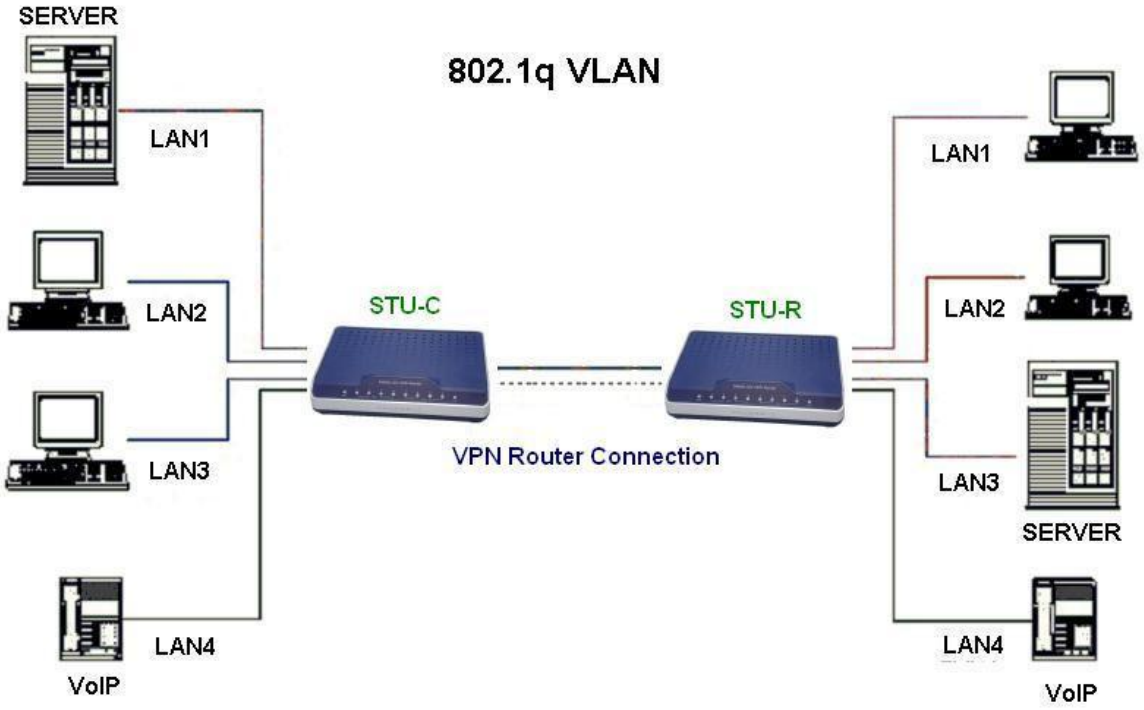
CFI(Canonical Format Indicator) is always set to zero for Ethernet switches. CFI is used for compatibility reason between Ethernet type network and Token Ring type network. If a frame received at an Ethernet port has a CFI set to 1, then that frame should not be forwarded as it is to an untagged port.

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 VPN Router 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 VPN Router has memory in its VLAN table to store them.

Ports in the same VLAN group share the same frame broadcast domin 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 VPN Router, 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 VPN Router 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 VPN Router receives a frame, it classifies the frame in one of two ways. If the frame is untagged, the VPN Router assigns the frame to an associated VLAN (based on the default VLAN ID of the receiving port). But if the frame is tagged, the VPN Router 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.

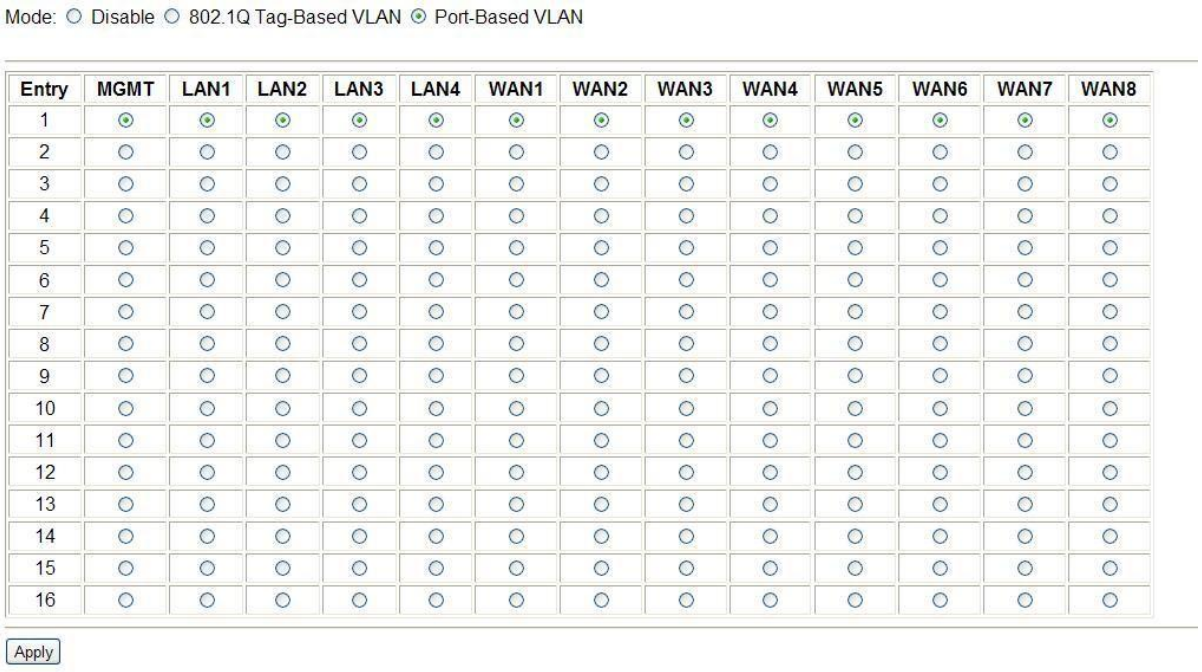
Untagged VLANs – Untagged (or static) VLANs are typically used to reduce broadcast traffic and to increase security. A group of network users assigned to a VLAN form a broadcast domain that is separate from other VLANs configured on the VPN Router. Packets are forwarded only between ports that are designated 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 prot can only receive or send tagged frame types.

Port-Based VLAN

Click Port-Based VLAN to configure the VPN Router.

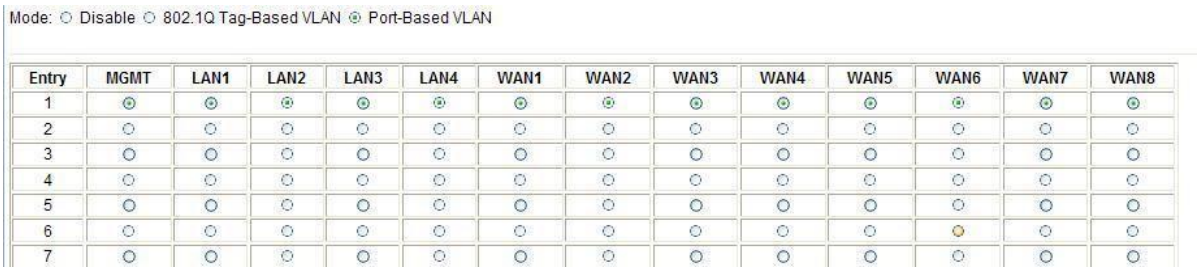


Port-Based VLANs are VLANs where the packet forwarding decision is based on the destination MAC address and its associated port.
When using the port-based VLAN, the port is assigned to a specific VLAN independent of the user or system attached to the port. This means all users attached to the port should 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.

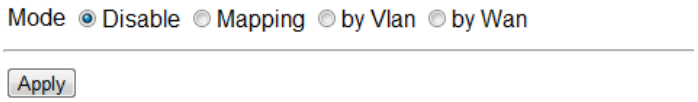
As with other VLAN approaches, the packets forwarded using this method do not leak into other VLAN domains on the network. After a port has been assigned to a VLAN, the port cannot send to or receive from devices in another VLAN.

For example,



The default setting is all ports connected which means all ports can communicate with each other. That is, there are no virtual LANs. The option is the most flexible but the least secure.

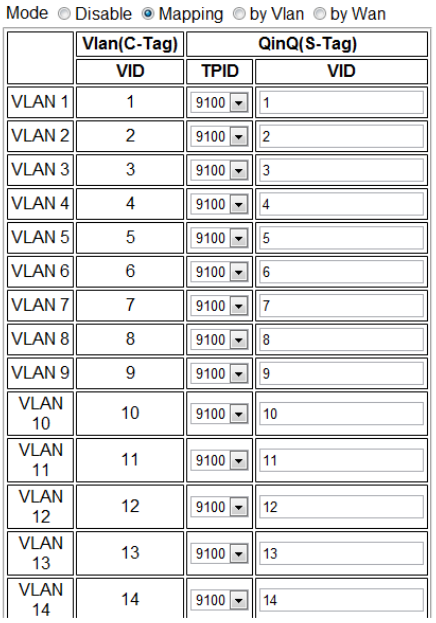
3.5.3. Q-in-Q



VPN router allows users to setup Q-in-Q function in 4 modes.

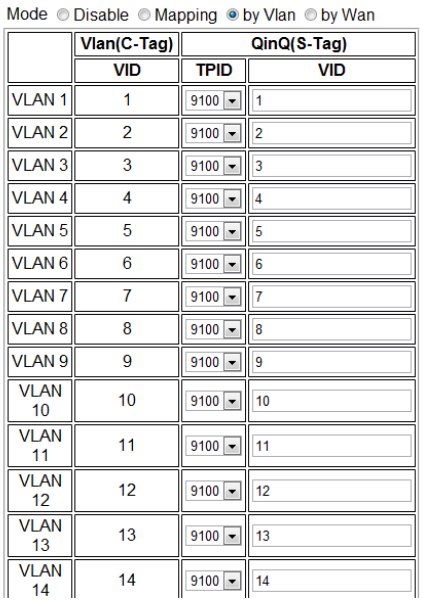
1. Disable
2. Mapping
3. By VLAN
4. By WAN

Mapping



Total of 16 rules are allowed for users to setup.

By VLAN



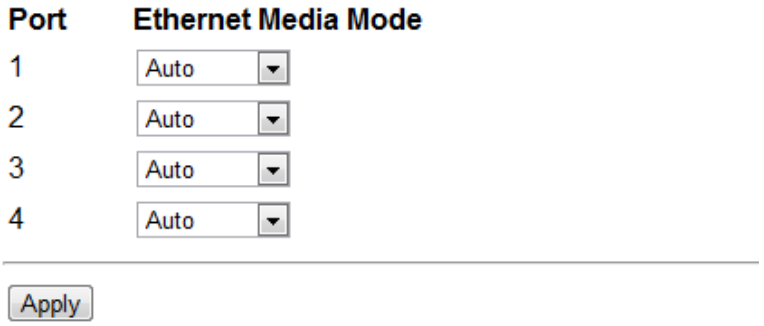
By WAN

Mode ○ Disable ○ Mapping ○ by Vlan ◉ by Wan

Index	TPID	VID
WAN 1	9100	1
WAN 2	9100	2
WAN 3	9100	3
WAN 4	9100	4
WAN 5	9100	5
WAN 6	9100	6
WAN 7	9100	7
WAN 8	9100	8
WAN 9	9100	9
WAN 10	9100	10
WAN 11	9100	11
WAN 12	9100	12

Apply

3.5.4. Switch



“Switch” function allows users to setup each LAN port individually. 5 options are available for a LAN port.

1. Auto
2. 100M/Full
3. 100M/Half
4. 10M/Full
5. 10M/Half

3.5.5. Static Route

A static route is one that is manually installed by your network administrator. This is a very efficient way to transfer data from one subnet to another despite the fact that this type of route is manually intensive.

Static route is a path in the router that indicates how it will reach a certain subnet by taking a specific path.

The opposite of a static route is a dynamic route. Dynamic routes are created by routing protocols.

Static routes have advantages and disadvantages as compares to dynamic routes.

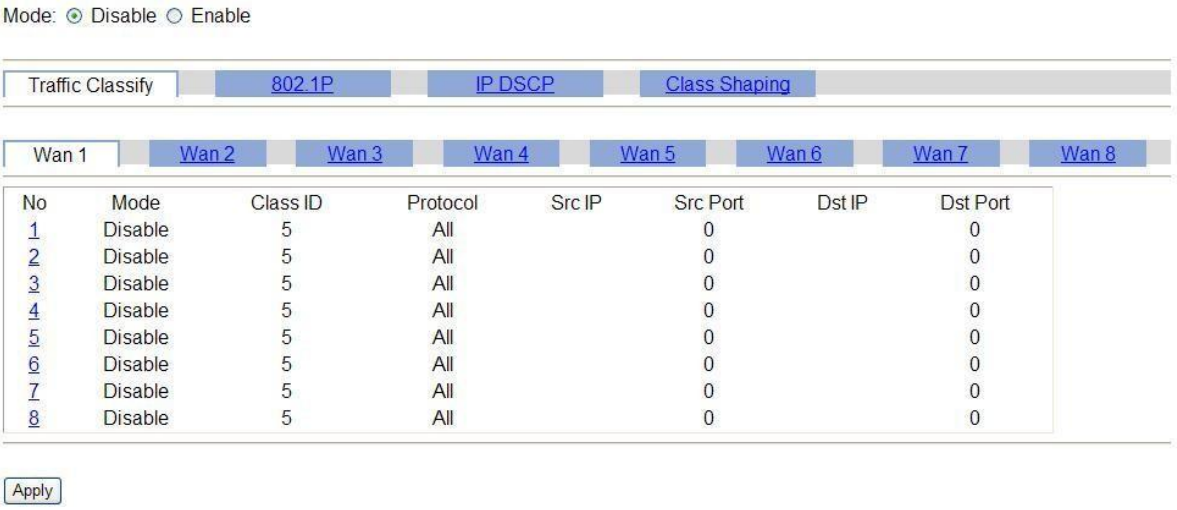
Advantages of Static Routes
Static routes are easier to configure
No need for overhead on the routing protocol
As long as you have a tight IP mask, this offers you reliable security
Disadvantages of Static Routes
In order to make changes in the network, you have to manually configure the route
When network outage is experienced, it does not automatically route around
Although this is quite easy to configure, it might not work for large and complicated networks

It is important that any network administrator have substantial knowledge about static routes. Although this type of route may not be as effective with large networks, they are quite useful in any size of networks. Meanwhile, even if you have setup a dynamic route, there are cases that still require a static route.

3.5.6. 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.
QoS (Quality of Service) is to decide which PCs can get the priorities to pass though VPN Router once if the bandwidth is exhausted or fully saturated.

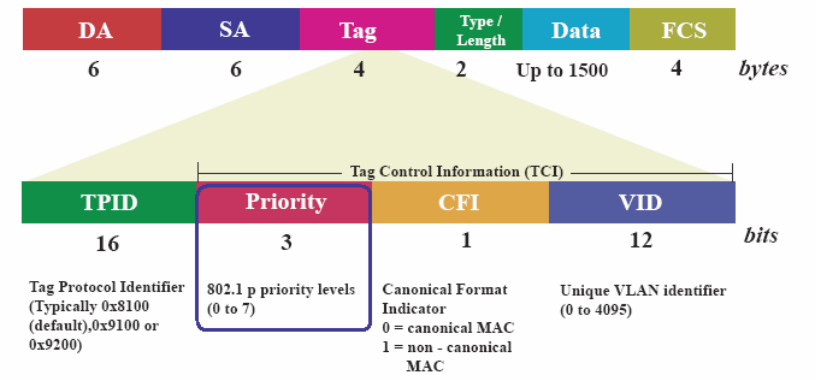
Traffic Classify



802.1P

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.

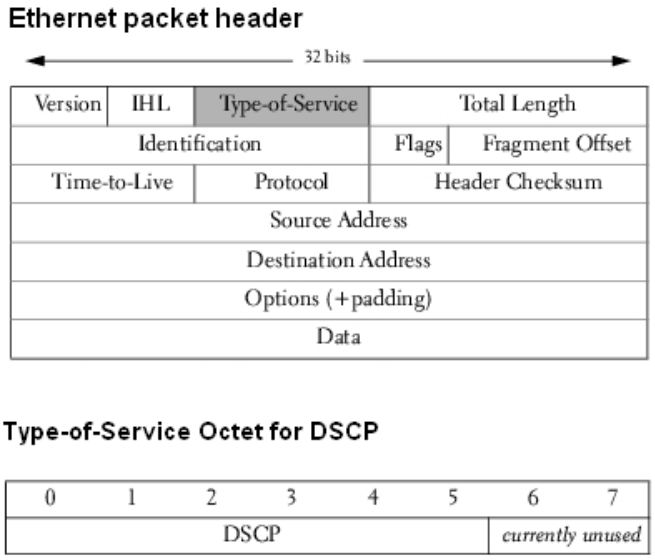
Scheduling Configuration item can setup the type is from 1 to 3. Queue from 0 to 3 can set up their Queue Weight form 1 to 15.

IP DSCP

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. Packet 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.

DiffServ defines a new DS(Differentiated Services) field to replace the Type of Service(ToS) field in the IP header. The DS field contains a 2-bits unused field and 6-bits DSCP field which can define up to 64 service levels.

The following figure illustrates the DS field:



The DSCP value used to identify 64 levels (2^6=64) 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.

The following is an illustration about how the bits are used in DSCP field.

Bit 0	Bit 1	Bit 2	Precedence	Usage
1	1	1	7	Stays the same(link layer and routing protocol keep alive)
1	1	0	6	Stays the same(used for IP routing Protocols)
1	0	1	5	Express Forwarding (EF)
1	0	0	4	Class 4
0	1	1	3	Class 3
0	1	0	2	Class 2
0	0	1	1	Class 1
0	0	0	0	Best effort

Bit 3	Bit 4	Bit 5	Usage	Meaning
0	--	--	Delay	Normal
1	--	--	Delay	Low
--	0	--	Throughput	Normal
--	1	--	Throughput	High

--	--	0	Reliability	Normal
--	--	1	Reliability	High

The standardized DiffServ field of the packet is marked with a value so that the packet receives a particular forwarding treatment at each network node.

RFC 2597 defines the assured forwarding (AF) classes. There are four AF classes, AF1x through AF4x. Within each class, there are three drop probabilities. Depending on a given network's policy, packets can be selected for a PHB based on required throughput, delay, jitter, loss, or according to priority of access to network services.

Classes 1 through 4 are referred to as AF classes.

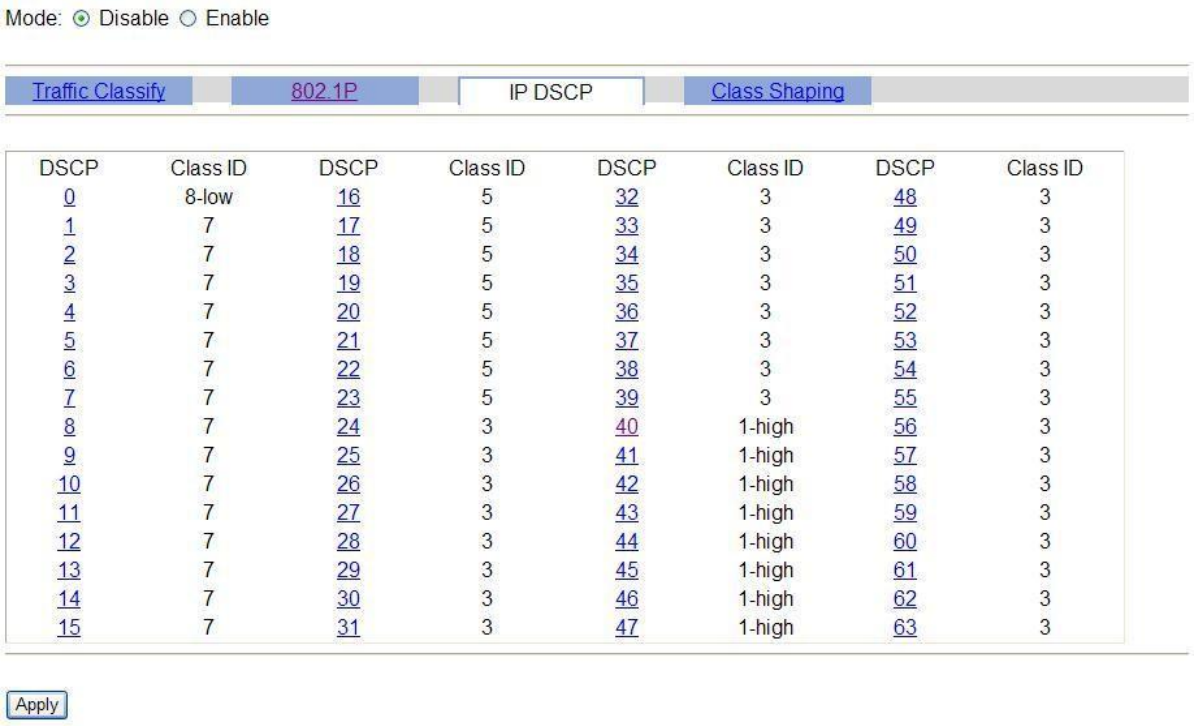
The following table illustrates the DSCP coding for specifying the AF class with the probability. Bits 0, 1, and 2 define the class; bits 3 and 4 specify the drop probability; bit 5 is always 0.

	Class 1	Class 2	Class 3	Class 4
Low Drop	001010 AF11 DSCP 10	010010 AF21 DSCP 18	011010 AF31 DSCP 26	100010 AF41 DSCP 34
Medium Drop	001100 AF12 DSCP 12	010100 AF22 DSCP 20	011100 AF32 DSCP 28	100100 AF42 DSCP 36
High Drop	001110 AF13 DSCP 14	010110 AF23 DSCP 22	011110 AF33 DSCP 30	100110 AF43 DSCP 38

The recommended DSCP values which are based on RFC 4594 are in the following table:

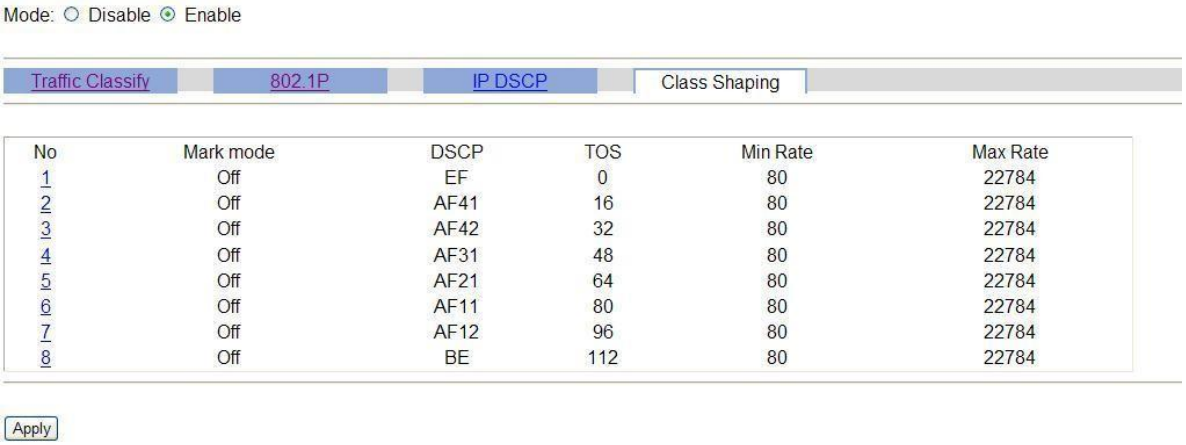
Service Class Name	DSCP Name	DSCP Value	Application Examples
Network Control and OAM	CS6	110000 (48)	Network routing and OAM (e.g. SNMP, Ethernet CFM, proprietary NMS traffic)
Signaling	CS5	101000 (40)	Signaling (e.g. H.323, SIP)
Telephony	EF	101110 (46)	IP Telephony bearer
Multimedia Conferencing	AF41, AF42, AF43	100010 (34), 100100 (36), 100110(38)	Videoconferencing
Real-Time Interactive	CS4	100000 (32)	Interactive control (e.g. CAM), real-time e-learning, games, e-arts
Multimedia Streaming	AF31,AF32, AF33	011010 (26), 011100 (28), 011110 (30)	Streaming video and audio on demand
Broadcast Video	CS3	011000 (24)	Broadcast TV & live events

Low-Latency Data	AF21,AF22, AF23	010010 (18), 010100 (20), 010110 (22)	Transactional applications, database access, interactive data applications
High-Throughput Data	AF11,AF12, AF13	001010 (10), 001100 (12), 001110 (14)	Bandwidth channels
Standard (Best Effort)	DF (CS0)	000000 (0)	Undifferentiated applications
Low-Priority Data (LBE)	CS1	001000 (8)	Mirror service, remote backups, etc



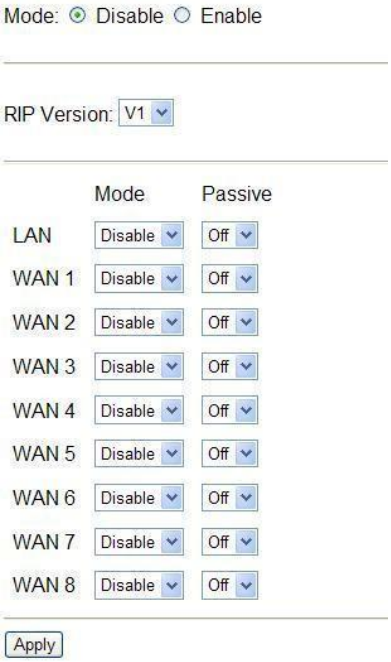
Each DSCP value (from 0 to 63) is mapped to a Queue value (from 1 to 8) from the drop-down list box. The number 1 represents the highest priority and number 8 represents the lowest priority and according various queuing strategies to tailor performance to requirements. You are easy to change the table setting. If you want to save the changes, click Apply.

Class Shaping



Traffic policing can propagates bursts. When the traffic rate reaches the configured maximum rate, excess traffic is dropped (or remarked). The result is an output rate that appears as a saw-tooth with crests and troughs. In contrast to policing, traffic shaping retains excess packets in a queue and then schedules the excess for later transmission over increments of time. The result of traffic shaping is a smoothed packet output rate.

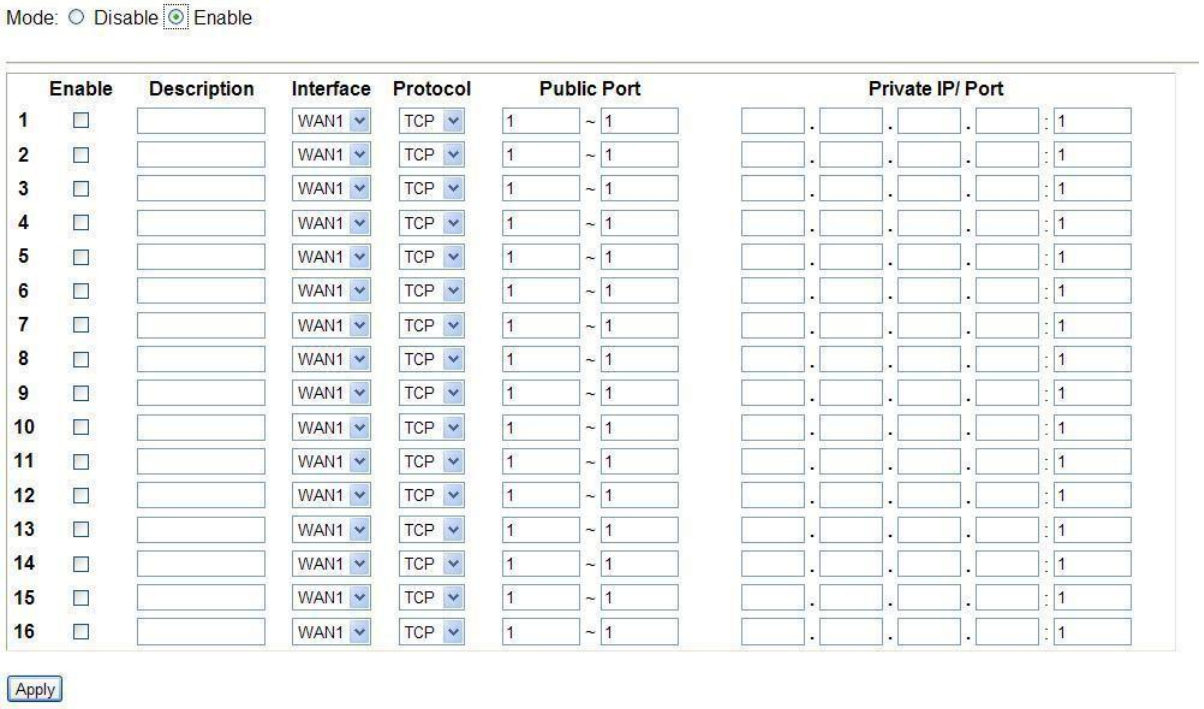
3.5.7. RIP



The RIP (Routing Information Protocol) is a dynamic routing protocol used in local and wide area networks. It's a very simple protocol, based on distance-vector routing algorithms. As such it is classified as an IGP (interior gateway protocol). VPN Router is support version 1 (RFC1058) and Version 2 (RFC2453).

It can set the specified interface (LAN, WAN1 to WAN8) to passive mode. On passive mode interface, all receiving packets are processed as normal and rip does not send either multicast or unicast RIP packets.

3.5.8. Virtual Server



This feature allows you to make servers on your LAN accessible to Internet users. Normally, Internet users would not be able to access a server on your LAN because:-

(1) Your server does not have a valid external IP address.

(2) Attempts to connect to devices on your LAN are blocked by the firewall in this device IP address seen by Internet Users

To interface users, all virtual servers on your LAN have the same IP address. The IP address is allocated by your ISP.

This address should be static, rather than dynamic, to make it easier for Interface users to connect to your Servers.

Once configured, anyone on the Internet can connect your virtual servers. They must use the Internet IP address .The IP address allocated to you by your ISP.

It is more convenient if you are using fixed IP address from your ISP, rather than dynamic.

However, you can use the dynamic DNS feature to allow users to connect to your Virtual servers using a URL, rather than an IP address.

TCP (Transmission Control Protocol) is a connection-oriented protocol that is responsible for reliable communication between two end processes. The unit of data transferred is called a stream, which is simply a sequence of bytes.

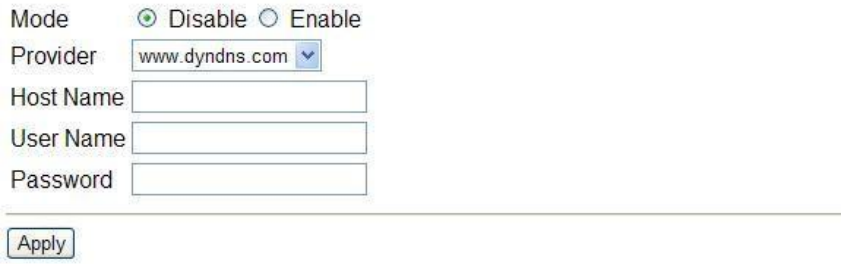
UDP (User Datagram Protocol) offers only a minimal transport service (non-guaranteed datagram delivery) and gives applications direct access to the datagram service of the IP layer. UDP is used by applications that do not require the level of service of TCP or that wish to use communications services (e.g., multicast or broadcast delivery) not available from TCP.

3.5.9. DMZ

In computer security, DMZ (demilitarized zone) is a physical or logical sub-network that contains and exposes an organization's external services to a larger untrusted network, usually the Internet. The term is normally referred to as a DMZ by IT professionals. It is sometimes referred to as a Perimeter Network. The purpose of a DMZ is to add an additional layer of security to an organization's LAN (Local Area Network); an external attacker only has access to equipment in the DMZ, rather than any other part of the network.

If enabled this feature, allows one or more computers on your LAN to be exposed to all users on the internet. You can set a DMZ PC for each WAN IP address. If you only have 1 WAN IP address, only 1 DMZ PC can be used.

3.1.6. DDNS

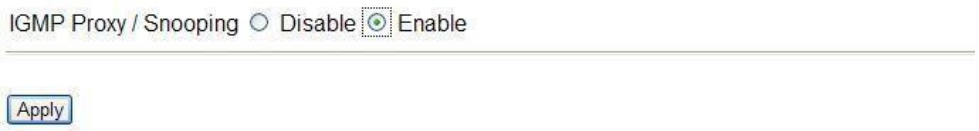


DDNS (Dynamic DNS Free) allows you to create a hostname that points to your home or office IP address, providing an easy-to-remember URL for quick access.

You must register for the service at one of the listed service providers. You can reach the service provider's Web Site by selecting them in the list. Apply for a domain name, and ensure it is allocated to you.

Details of your DDNS account (Host name, Name, password) must then be entered and saved on this screen.
The device will then automatically ensure that you current IP address is recorded by the DDNS service provider from the internet, users will now be able to connect to your Virtual Servers using your Domain name.

3.5.10. IGMP



IGMP (Internet Group Management Protocol) proxy can be used to implement multicast routing. It works by IGMP frame forwarding. VPN Router's IGMP proxy supports IGMP version 2 (RFC2236).

IGMP proxy enables the system to issue IGMP host messages on behalf of hosts that the system discovered through standard IGMP interfaces. The system acts as a *proxy* for its hosts.

IGMP snooping is the process of listening to IGMP network traffic. IGMP snooping, as implied by the name, is a feature that allows VPN Router to "listen in" on the IGMP conversation between hosts to this VPN Router by processing the IGMP packets sent in a multicast network.

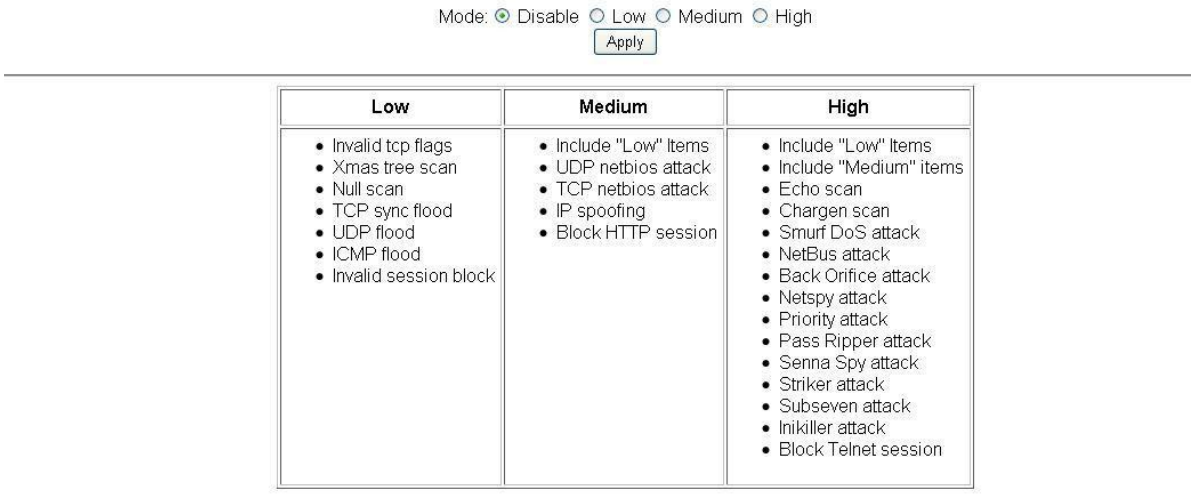
When IGMP snooping is enabled, VPN router will analyzes all IGMP packets between hosts connected to the VPN router and multicast routers in the network. When the VPN router hears an IGMP report from remote side for a given multicast group, the VPN router adds the host's port number to the multicast list for that group. And, when the VPN Router hears an IGMP leave, it removes the host's port from the table entry.

3.6. Security

3.6.1. Firewall

A firewall is a set of related programs that protects the resources of a private network from other networks. It is helpful to users that allow preventing hackers to access its own private data resource accidentally.

There have three security levels for setting: Basic firewall security, Automatic firewall security and advanced firewall security.



X'mas tree scan: It can send a TCP frame to a remote device with the URG, PUSH, and FIN flags set. This is called a Xmas tree scan because of the alternating bits turned on and off in the flags byte, much like the lights of a Christmas tree.

Null scan: The null scan turns off all flags, creating a lack of TCP flags that should never occur in the real world.

SYN flood: A SYN flood is a form of denial-of-service attack, attempts to slow your network by requesting new connections but not completing the process to open the connection. Once the buffer for these pending connections is full a server will not accept any more connections and will be unresponsive.

ICMP flood: A sender transmits a volume of ICMP request packets to cause all CPU resources to be consumed serving the phony requests.

UDP Flood: A UDP flood attack is a denial-of-service (DoS) attack using the User Datagram Protocol(UDP). A sender transmits a volume of requests for UDP diagnostic services which cause all CPU resources to be consumed serving the phony requests.

Ping of Death: A ping of death (POD) attack attempts to crash your system by sending a fragmented packet, when reconstructed is larger than the maximum allowable size.

Land attack: A land attack is an attempt to slow your network down by sending a packet with identical source and destination addresses originating from your network.

IP Spoofing: IP Spoofing is a method of masking the identity of an intrusion by making it appeared that the traffic came from a different computer. This is used by intruders to keep their anonymity and can be used in a Denial of Service attack.

Smurf attack: The Smurf attack is a way of generating a lot of computer network traffic to a victim host. That is a type of denial-of-service attack. A Smurf attack involves two systems. The attacker sends a packet containing a ICMP echo request (ping) to the network address of one system. This system is known as the amplifier. The return address of the ping has been faked (spoofed) to appear to come from a machine on another network (the victim). The victim is then flooded with responses to the ping. As many responses are generated for only one attack, the attacker is able use many amplifiers on the same victim.

Fraggle attack: A Fraggle attack is a type of denial-of-service attack where an attacker sends a large amount of UDP echo traffic to IP broadcast addresses, all of it having a fake source address. This is a simple rewrite of the smurf attack code.

3.6.2. VPN

A VPN (Virtual Private Network) provides a secure connection between 2 points, over an insecure network. The Secure is called a VPN Tunnel.

The VPN Router supports three main type of VPN: IPsec, L2TP and PPTP.

IPsec

IPsec is a near-ubiquitous VPN security standard, designed for use with TCP/IP networks. It works at the packet level, and authenticates and encrypts all packets traveling over the VPN Tunnel. Thus, it does not matter what applications are used on your PC. Any application can use the VPN like any other network connection.

IPsec VPNs exchange information through logical connections called SAs(Security Associations). An SA is simply a definition of the protocols, algorithms and keys used between the two VPN devices(endpoints)

There are two security modes possible with IPsec:

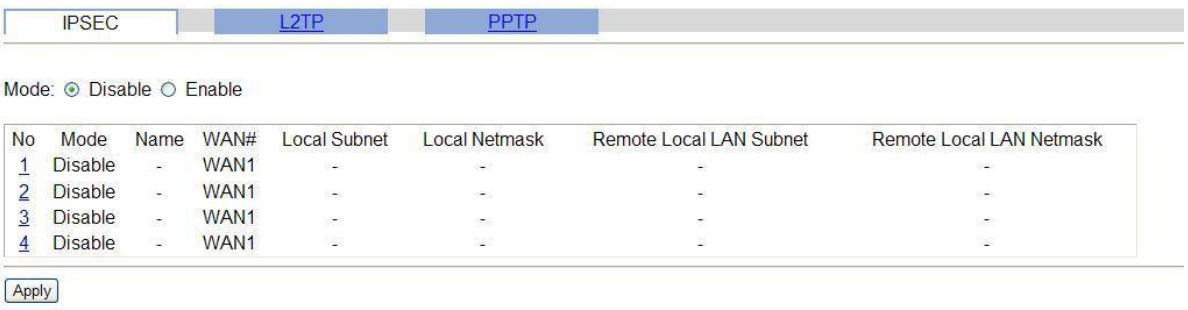
Transport Mode – the payload (data) part of the packet is encapsulated through encryption but the IP header remains in the clear (unchanged)

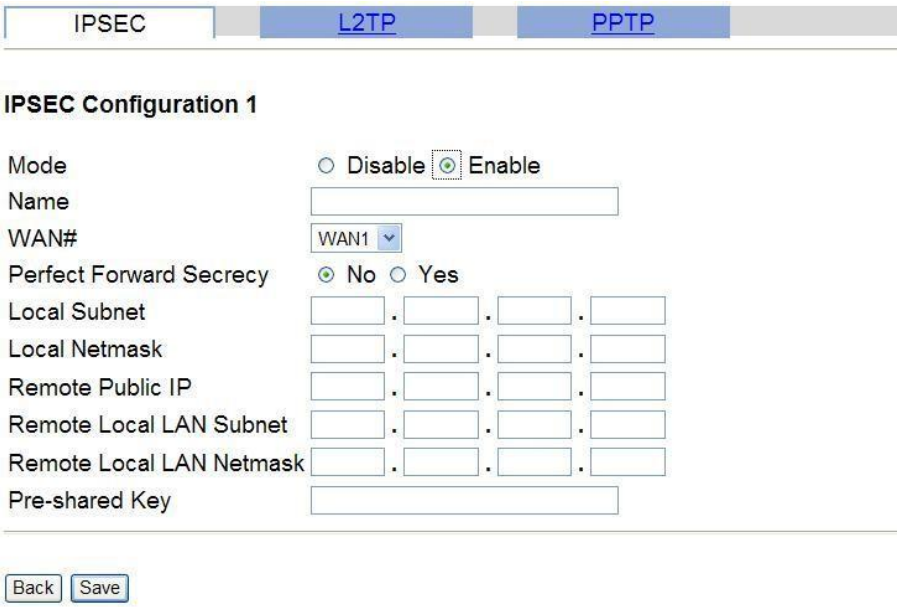
Tunnel Mode – everything is encapsulated including the original IP header, and a new IP header is generated. Only the new header in the clear (i.e. not protected). This system provides enhanced security.

IKE(Interface Key Exchange) is an optional, but widely used, component of IPsec.

IKE provides a method of negotiating and generating the keys and IDs required by IPsec. If using IKE, only a single key is required to be provided during configuration. Also, IKE supports using Certificates to authenticate the identify of the remote user or gateway.

If IKE is not used, then all keys and IDs(SPIs) must be entered manually, and Certificates can't be used, This is called a "Manual Key Exchange".





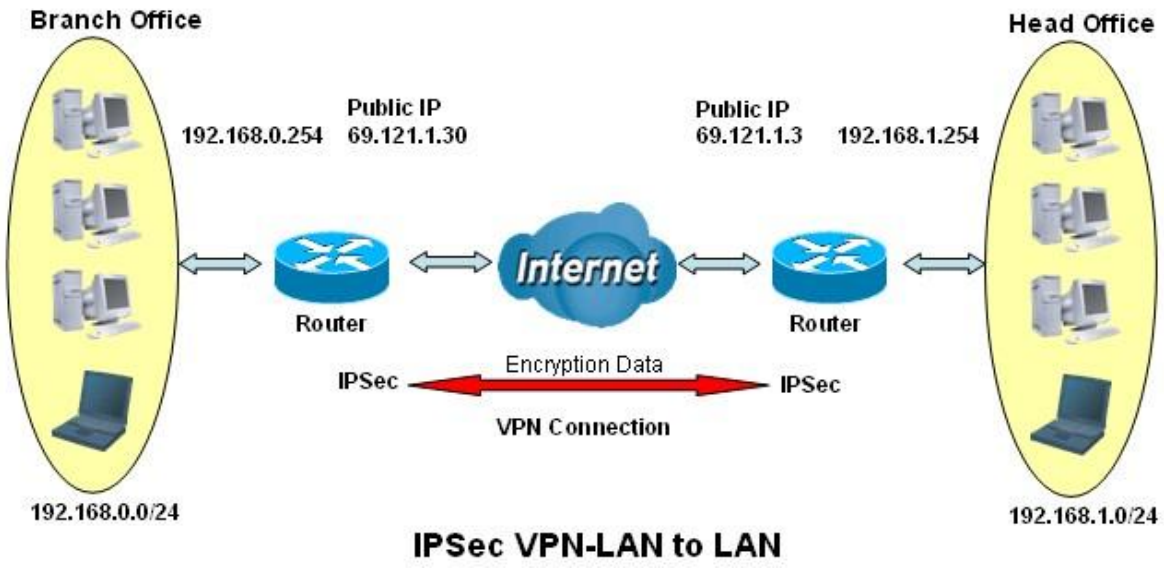
Enable

This indicates whether or not the policy is currently enabled. Use the Enable/Disable to toggle the state the selected policy.

Policy name

The name of the policy. When creating a policy, you should select a suitable name.

Example: Configuring a IPSec LAN-to-LAN VPN Connection



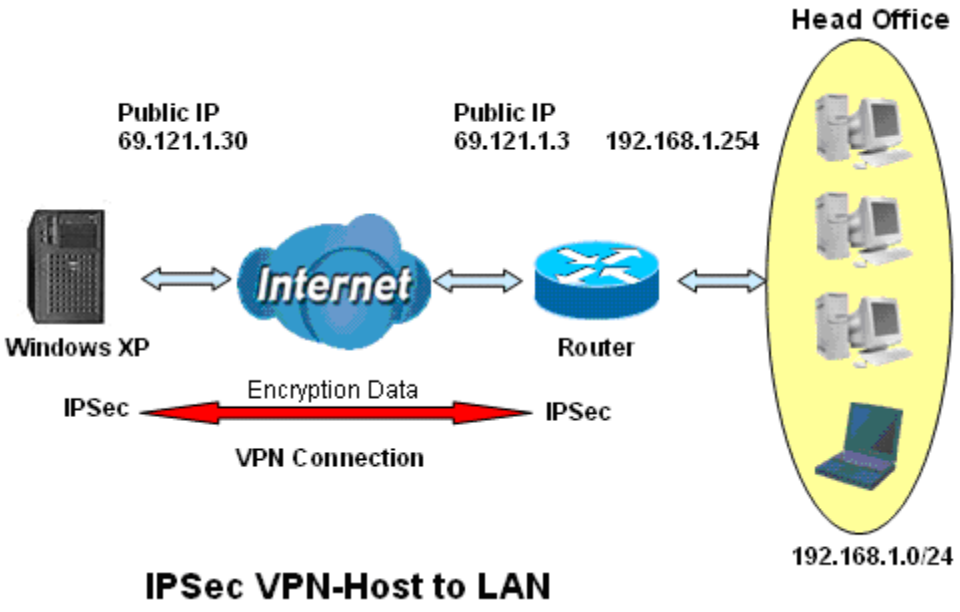
Network Configuration and Security Plan

	Branch Office	Head Office
Local Network ID	192.168.0.0/24	192.168.1.0/24
Local Router IP	69.1.121.30	69.1.121.3
Remote Network ID	192.168.1.0/24	192.168.0.0/24
Remote Router IP	69.1.121.3	69.1.121.30
IKE Pre-shared Key	12345678	12345678
VPN Connection Type	Tunnel mode	Tunnel mode
Security Algorithm	ESP:MD5 with AES	ESP:MD5 with AES

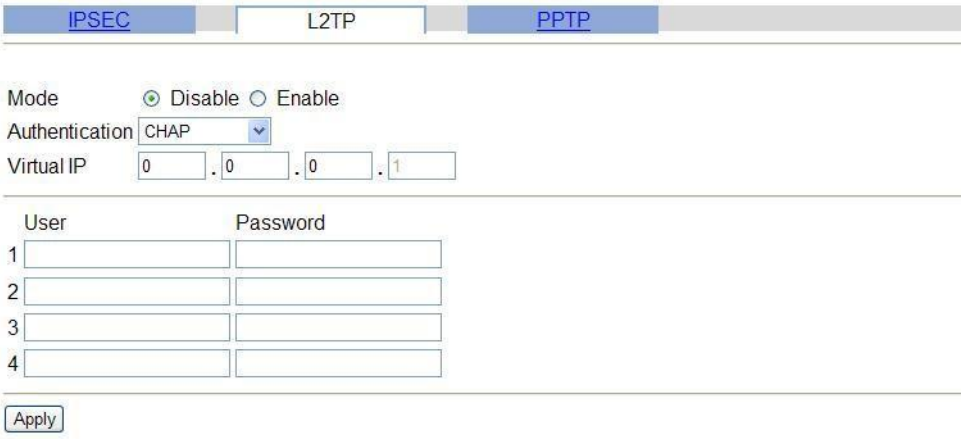
Both office LAN networks must in different subnet with LAN to LAN application.

Functions of Pre-shared Key, VPN Connection, type and Security Algorithm must be identically set up on both sides.

Example: Configuring a IPSec Host-to-LAN VPN Connection



L2TP

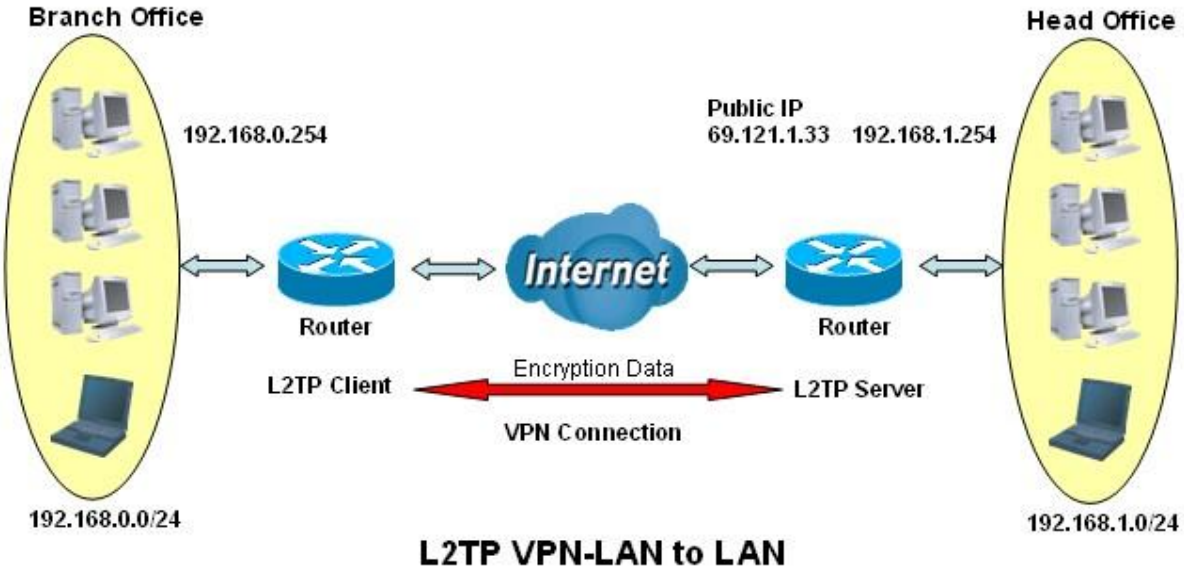


L2TP (Layer 2 Tunneling Protocol) is a tunneling protocol used to support VPNs. It doesn't provide any encryption or confidentiality by itself; it relies on an encryption protocol that it passes within the tunnel to provide privacy.

L2TP allows a PPP session to travel over multiple links and networks. PPP is used to encapsulate IP packets from the user's PC or mobile device to the ISP, and L2TP extends that session across the Internet.

Example: Configuring L2TP LAN-to-LAN VPN Connection

The branch office establishes a L2TP VPN tunnel with head office to connect two private networks over the Internet. The routers are installed in the head office and branch office accordingly.

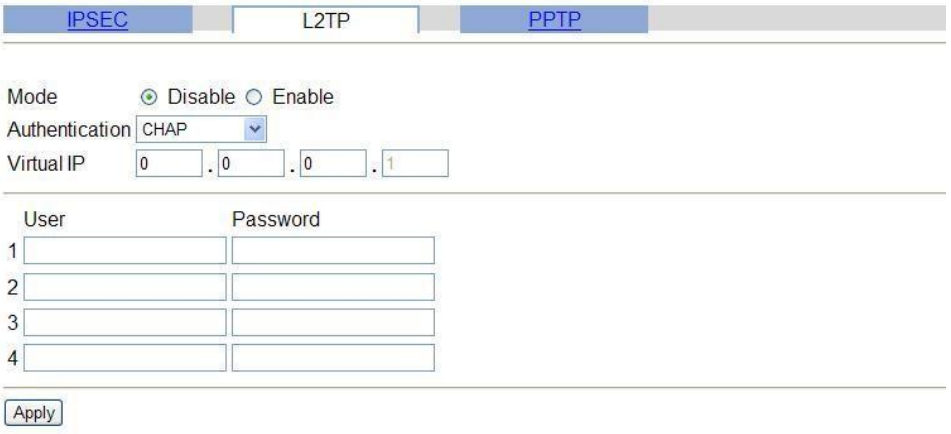


L2TP VPN-LAN to LAN

Both office LAN networks must in different subnet with LAN to LAN application.

Functions of Pre-shared Key, VPN Connection Type and Security Algorithm must be identically set up on both sides.

PPTP

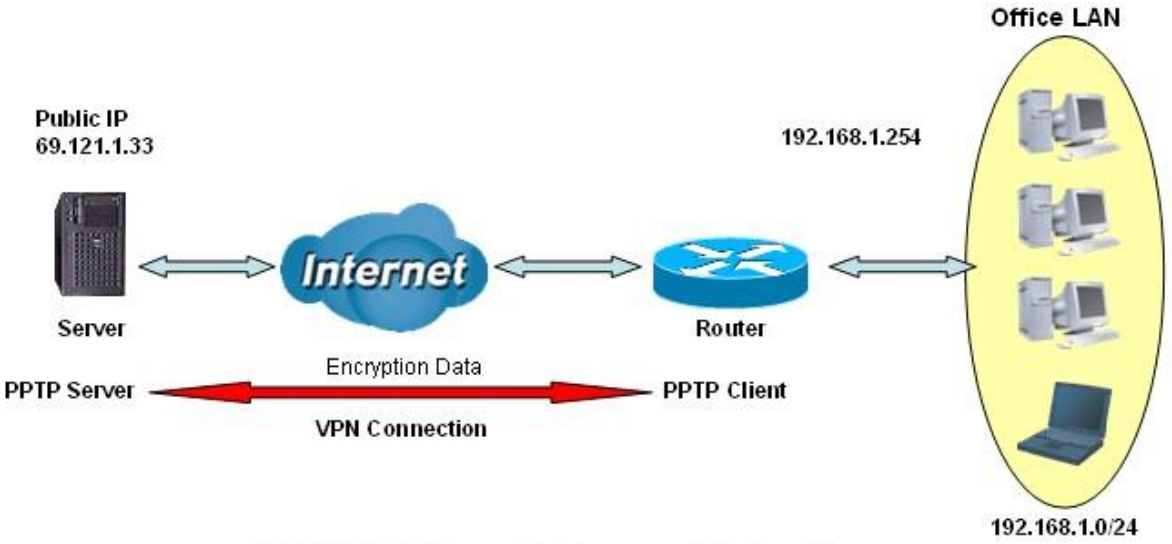


PPTP(Point-to-Point Tunneling Protocol)is a private network of computers that uses the public Internet to connect some nodes. Because the Internet is essentially an open network, the PPTP is used to ensure that messages transmitted from one VPN node to another are secure. With PPTP, users can dial in to their corporate network via the Internet.

There are two types of PPTP VPN supported; **Remote Access** and **LAN-to-LAN.**

Example: Configuring a Remote Access PPTP VPN Dial-out Connection

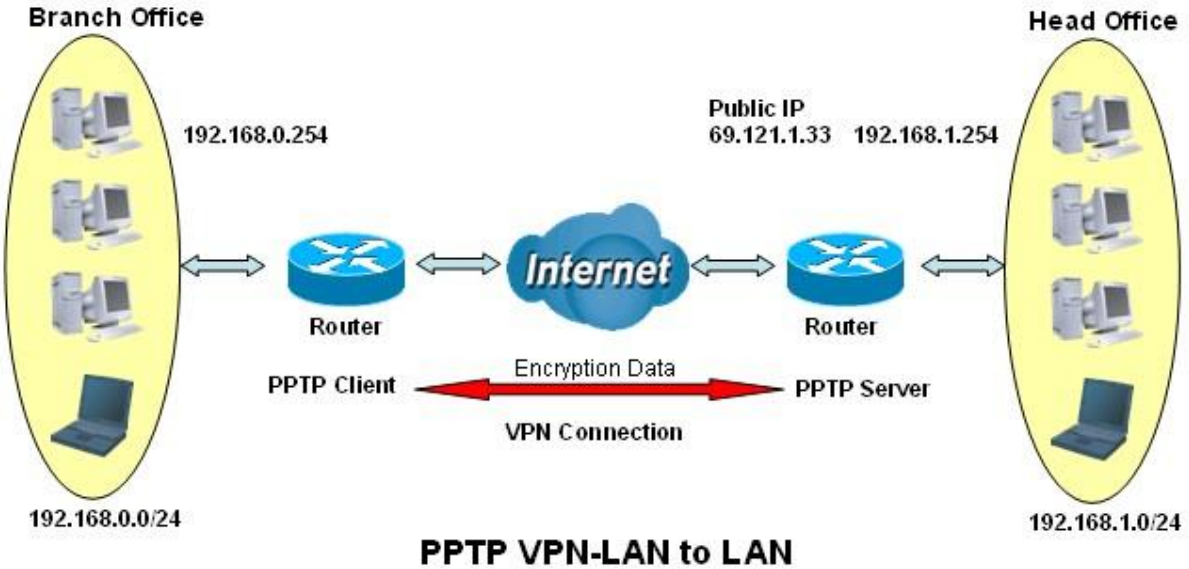
A company's office establishes a PPTP VPN connection with a file server located at a separate location. The router is installed in the office, connected to a couple of PCs and Servers.



PPTP VPN-Remote Access (Dial-out)

Example: Configuring a PPTP LAN-to-LAN VPN Connection

The branch office establishes a PPTP VPN tunnel with head office to connect two private networks over the Internet. The routers are installed in the head office and branch office accordingly.



PPTP VPN-LAN to LAN

Both office LAN networks MUST in different subnet with LAN to LAN application.

Configuring PPTP VPN in the Head Office

The IP address 192.168.1.254 will be assigned to the router located in the branch office. Please make sure this IP is not used in the head office LAN.

Configuring PPTP VPN in the Branch Office

The IP address 69.1.121.33 is the Public IP address of the router located in head office. If you registered the DDNS (please refer to the DDNS section of this manual), you can also use the domain name instead of the IP address to reach the router.

VPN Configuration

VPN Endpoint address

Each VPN endpoint must be configured to initiate or accept connections to the remote VPN client gateway. Usually, this requires having a fixed Internet IP address. However, it possible for a VPN gateway to accept incoming connections from a possible for remote client where the client's IP address is not known in advance.

If connecting 2 LANs, this requires that:

Each endpoint must be aware of the IP address used on the other endpoint.

The 2 LANs must use different IP address ranges.

VPN Pass-through

Here, a PC on the LAN behind the VPN router is using VPN software, but the VPN router is not acting as CPN endpoint, It is only allowing the VPN connection.

The PC software can use any VPN protocol supported by the remote VPN.

The remote VPN server must support client PCs which are behind a NAT router, and so have an IP address which is not valid on the Internet.

The VPN router requires no VPN configuration, since it is not acting as a VPN endpoint.

Client PC to VPN Gateway

Here, the PC must run appropriate VPN client software in order to connect, via the Internet to VPN router. Once connected, the client PC has same access to LAN resources as PCs on the local LAN.

Connecting 2 VPN gateways

This allows two LANs to be connected PCs on each endpoint gain secure access to the remote LAN.

The 2 LANs must use different IP address ranges.

The VPN policies at each end determine when a VPN tunnel will be established, and what system on the remote LAN can be accessed once the VPN connection is established.

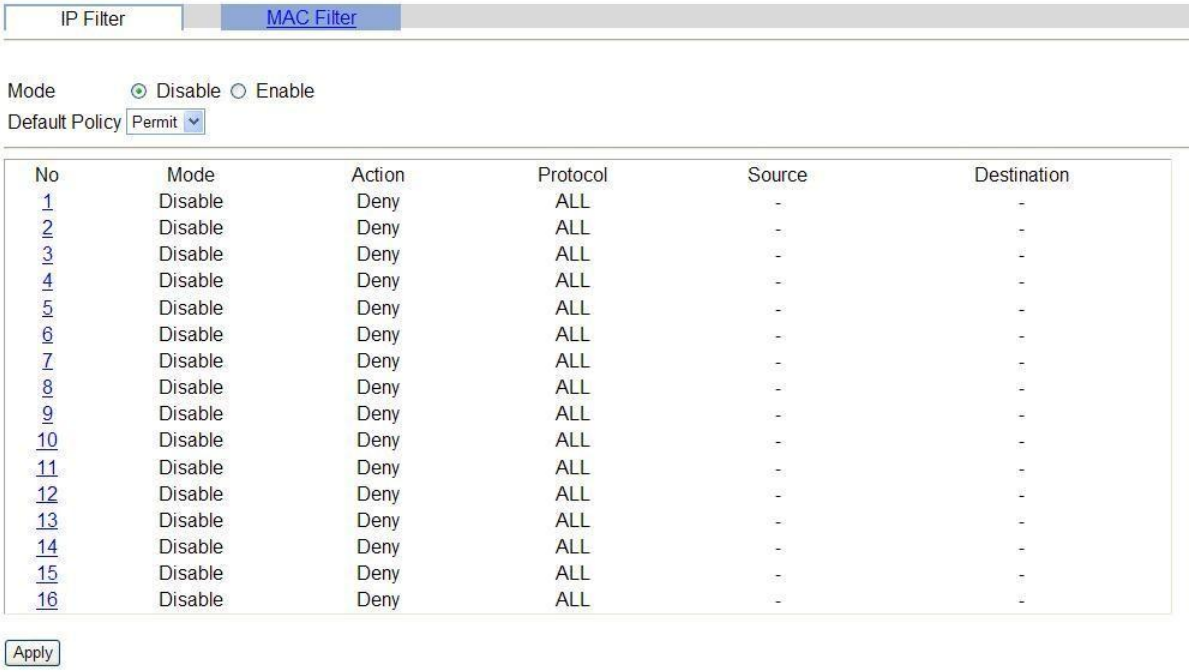
It is possible to have simultaneous VPN connections to many remote sites.

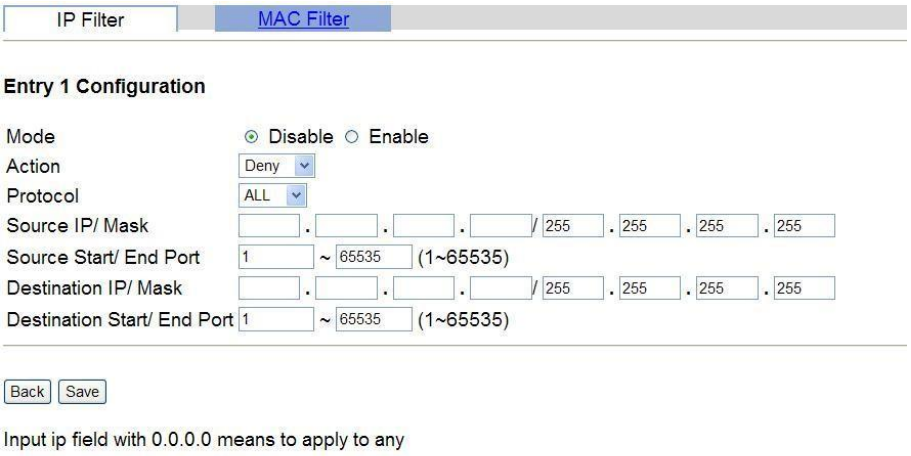
Remote VPN Endpoint

The IP address of the remote VPN end point (Gateway or client)

3.6.3. Filter

IP filter





Source IP Address(es) / Destination IP Address(es): This is the Address-Filter used to allow or block traffic to/from

particular IP address(es). Selecting the Subnet Mask of the IP address range you wish to allow/block the traffic to or form; set IP address and Subnet Mask to 0.0.0.0 to inactive the Address-Filter rule.

Protocol: It is the packet protocol type used by the application, select among from TCP or UDP or both of TCP/UDP.

Source Port: This Port or Port Ranges defines the port allowed to be used by the Remote/WAN to connect to the application. Default is set from range 0 ~ 65535. It is recommended that this option be configured by an advanced user.

Destination Port: This is the Port or Port Ranges that defines the application.

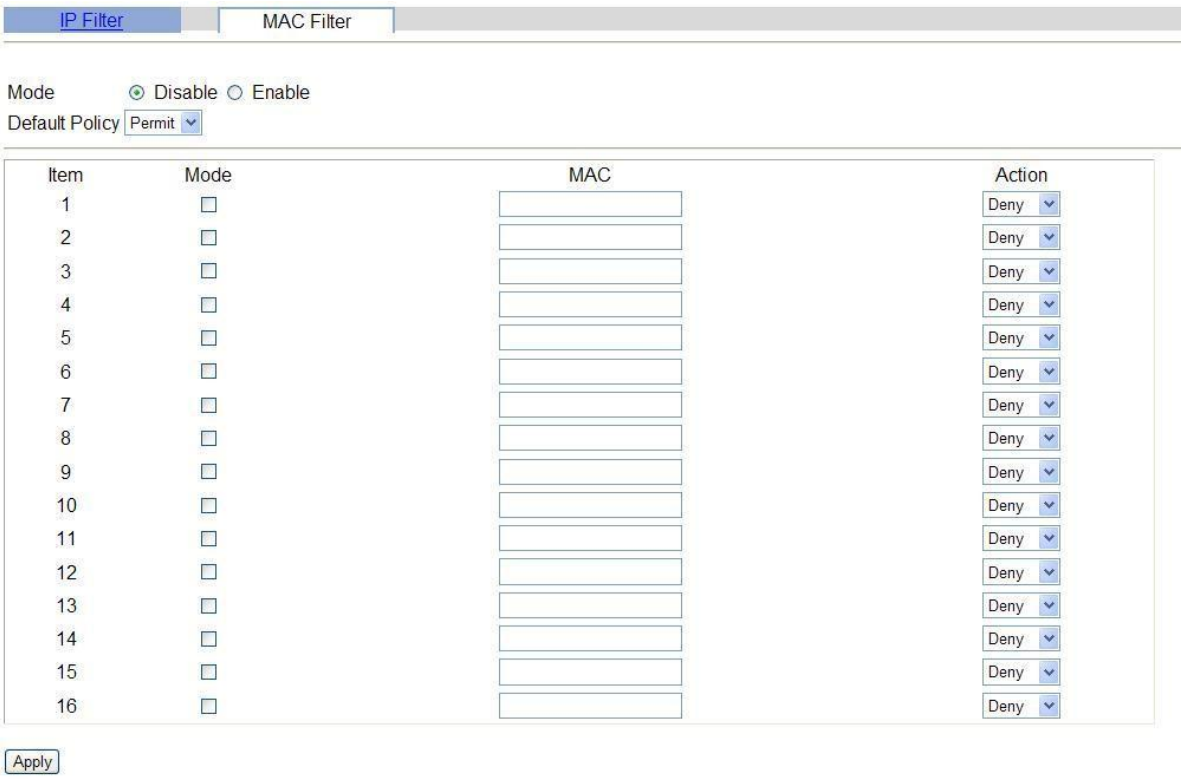
Application	Protocol	Port Number	
		Start	End
HTTP	TCP	80	80
DNS	UDP	53	53
DNS	TCP	53	53
FTP	TCP	21	21
Telnet	TCP	23	23
SMTP	TCP	25	25
POP3	TCP	110	110
NEWS(NNTP)	TCP	119	119
Real Audio/ Real Video	UDP	7070	7070
PING	ICMP	N/A	N/A
H.323	TCP	1720	1720
T.120	TCP	1503	1503
SSH	TCP	22	22
NTP /SNTP	UDP	123	123
HTTP/HTTP Proxy	TCP	8080	8080
HTTPS	TCP	443	443
ICQ	TCP	5190	5190
MSN(1863)	TCP	1863	1863
MSN(7001)	UDP	7001	7001
MSB video	TCP	9000	9000

MAC filter

In computer networking, MAC Filtering refers to a security access control methodology whereby the 48-bit address(XX:XX:XX:XX:XX:XX) assigned to each network device is used to determine access to the network.

MAC addresses are uniquely assigned to each network device, so using MAC filtering on a network permits and denies network access to specific devices through the use of black lists and white lists. While the restriction of network access through the use of lists is straightforward, an individual person is not identified by a MAC address, rather a device only, so an authorized person will need to have a white list entry for each device that he would use to access the network.

While giving a wireless network some additional protection, MAC Filtering can be circumvented by scanning a valid MAC and then changing the own MAC into a validated one.



3.7 Management

3.7.1. SNTP

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.

Sync with PC

Synchronize with PC, the VPN Router will synchronize with PC's internal timer.

SNTP

Service: Enable

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

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

3.7.2. SNMP

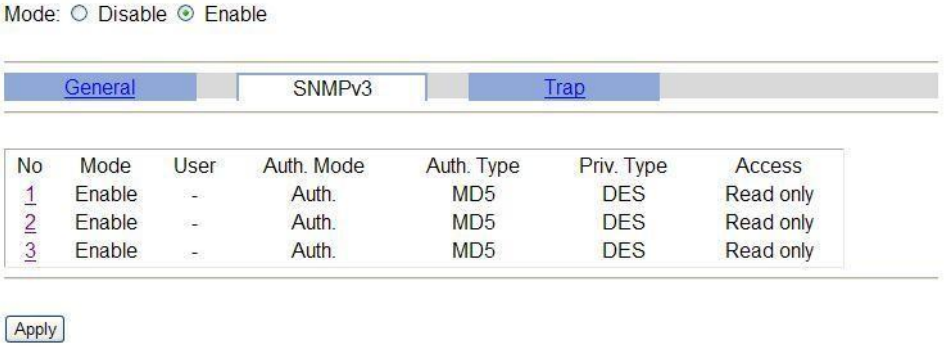
Simple Network Management Protocol (SNMP) provides for the exchange of messages between a network management client and a network management agent for remote management of network nodes. These messages contain requests to get and set variables that exist in network nodes in order to obtain statistics,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

The router can generate SNMP traps to indicate alarm conditions, and it relies on SNMP community strings to implement SNMP security.

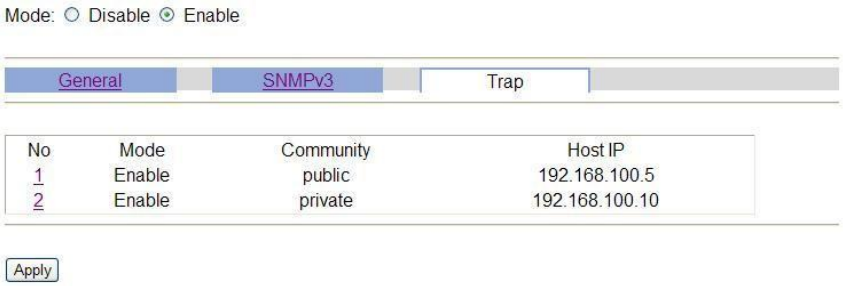
This router support both MIB I and MIB II.

General

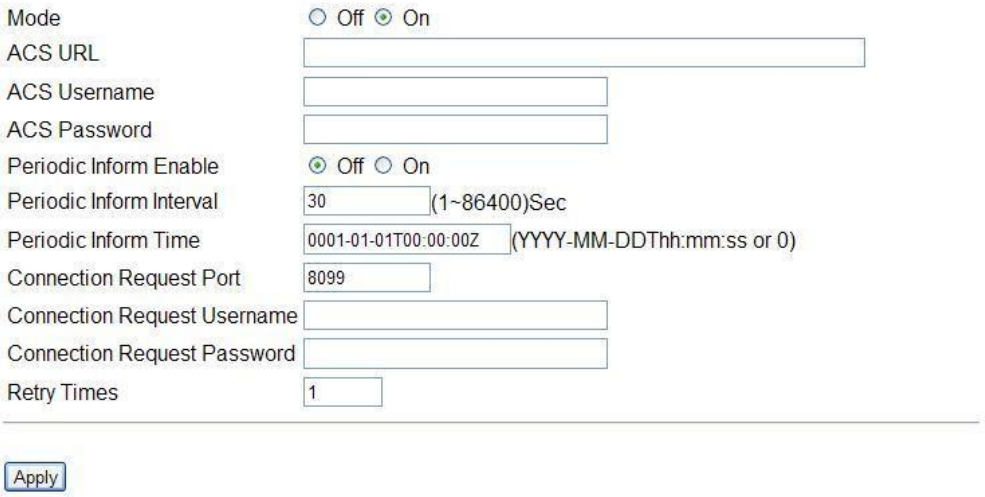
SNMPv3



Trap



3.7.3. TR-069



TR-069 (short for Technical Report 069) is a DSL Forum technical specification entitled CPE WAN Management Protocol (CWMP). It defines an application layer protocol for remote management of end-user devices.

As a bidirectional HTTP based protocol it provides the communication between CPE (customer premises equipment) and ACS (Auto Configuration Servers). It includes both a safe auto configuration and the control of other CPE management functions within an integrated framework. Using TR-069 the terminals can get in contact with the ACS (Auto Configuration Servers) and establish the configuration automatically.

ACS URL

URL for the CPE to connect to the ACS using the CPE WAN Management Protocol. This parameter MUST be in the form of a valid HTTP or HTTPs URL. An HTTPs URL indicates that the ACS supports SSL. The “host” portion of this URL is used

by the CPE for validating the certificate from the ACS when using certificate-based authentication.

ACS User Name

Username used to authenticate the CPE when making a connection to the ACS using the CPE WAN Management Protocol. This username is used only for HTTP-based authentication of the CPE.

ACS Password

Password used to authenticate the CPE when making a connection to the ACS using the CPE WAN Management Protocol. This password is used only for HTTP-based authentication of the CPE.

Periodic Inform Interval

The duration in seconds of the interval, for which the CPE must attempt to connect with the ACS and call the Inform method.

Connection Request Username

Username used to authenticate an ACS making a Connection Request to the CPE.

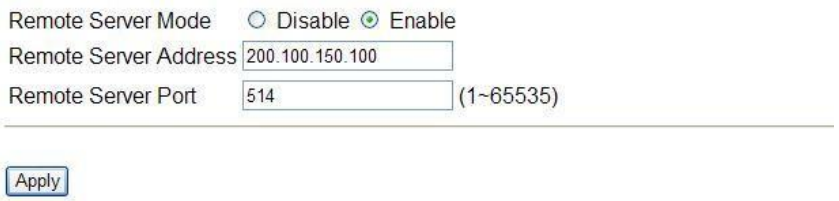
Connection Request Password

Password used to authenticate an ACS making a Connection Request to the CPE.

3.7.4. UPnP

Enable UPnP(Universal Plug and Play) allow automatic discovery and configuration of equipment attached to your LAN.
UPnP is supported by Windows ME, XP or later.
If Enabled, this VPN Router will be visible via UPnP
If Disabled, this VPN Router will not be visible via UPnP
Press Apply to finish the setup.

3.7.5. Sys Log



Syslog is a standard method of centralizing various logs. You can use a syslog server to store your servers logs in a remote location for later perusal or long-term storage.

To send logs to the LOG server, you must configure the other servers from your network to send logs to that server.

1. Click the enable item of Syslog Server Service to turn on syslog service.
2. Input the syslog remote server address. The remote server address allows you to send logs to different files in the syslog server.
3. Specify a UDP port number to which the syslog server is listening. The default value is 514.
   Make sure this is not blocked from your firewall.

Press Apply to finish the setup.

3.7.6. Telnet

There are quite a few Telnet clients available, many of which are free. For example, the Windows operating systems are shipped with a Telnet client included (found at "c:\windows\telnet.exe"). This Telnet client is simple and functional. For Telnet, you may change the default service port by typing the new port number. If you change the default port number then you will have to let user who wish to use the service know the new port number. The default value is 23.

Press Apply to finish the setup.

3.7.7. SSH

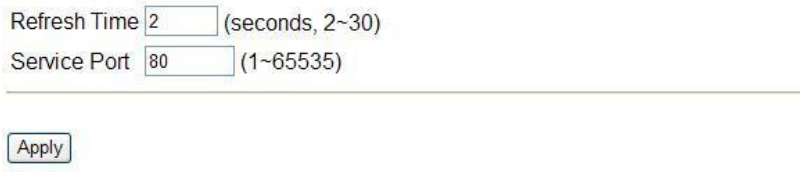
SSH (or Secure Shell) is a protocol that can be used to log into a remote machine (your Virtual Server) and provide secure encrypted communications between your VON Router and your local computer. All of the commands you would use in a Telnet client, you can use in an SSH client. The only difference is that the communication is made via encrypted channels to and from your VPN Router.

Once you have chosen a SSH (or Telnet) client, connecting to your Virtual Server is extremely simple. Although SSH (and Telnet) clients vary in their exact configuration, most of them will simply require you to specify a "remote host". Your remote host is your VPN Router, so you would specify your domain name (or your temporary domain, if applicable) or IP address.

Once you are connected, you will be prompted for your login name and login password. You specified both your login name and login password when you ordered your VPN Router. After the login process is successful, you will have gained access to your VPN Router and can now issue commands at the command prompt.

For SSH, you may change the default service port by typing the new port number. If you change the default port number then you will have to let user who wish to use the service know the new port number. The default value is 22.
Press Apply to finish the setup.

3.7.8. Web



It can re-fresh web pages when you are viewing your dynamic status data pages. You can setup the refresh time from 2 to 30 seconds. The default value is 2 seconds.
For Web Browser, you may change the default service port by typing the new port number. If you change the default port number then you will have to let user who wish to use the service know the new port number. The default value is 80.
Press Apply to finish the setup.

3.8 Show

3.8.1. Information

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

Hardware MCSV	1860000LM00000005
Software MCSV	1860000004016452
Software Version	040
DSLChip Name	PEF24628V1.1
DSL Phy Firmware Version	1.1-1.5.8__003
DSL IDC Firmware Version	1.5.2
MAC	00:83:23:b3:05:01
Serial No	
Present Time	2009/01/01 00:01:15
System Uptime	0 days 0 hours 1 mins 22 secs

MCSV: MCSV is the Manufacture's Concurrent Software Version. This version is the original factory version and remains even after upgrading the router in the field. This is for internal identification purposes.

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

Chipset Name: This is the G.SHDSL chipset's name.

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

Present Time: This field display your VPN Router's present date and time.

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

3.8.2. Sys Log

3.8.3. CPU Info

- Load Average

1 min	5 mins	15 mins
0.12	0.24	0.16

- Memory

Totle(kB)	Used(kB)	Free(kB)	Buffers(kB)	Cached(kB)
125896	10596	115300	0	4908

- CPU

User	Nice	System	Idle	IoWait	IRQ	SoftIRQ
2.2%	0.0%	5.2%	92.5%	0.0%	0.0%	0.0%

3.8.4. Script

```
config shdslbis mode STU-R
config shdslbis pairmode PAIR-1
config shdslbis annex G
config shdslbis tcpam auto
config shdslbis maxbaserate 89
config shdslbis lineprobe disable
config network interface mode bridge
config network interface mtu 1500
config network interface default 192.168.0.254
config network interface lan ipaddr 192.168.0.1
config network interface lan netmask 255.255.255.0
config network interface wan 1 mode EOA
config network interface wan 1 encaps llc
config network interface wan 1 vpi 0
config network interface wan 1 vci 32
config network interface wan 1 ipaddr 192.168.2.1
config network interface wan 1 ipmask 255.255.255.0
config network interface wan 1 gateway 192.168.2.2
config network interface wan 1 qos-class ubr
config network interface wan 1 qos-pcr 22784
config network interface wan 1 qos-scr 22784
config network interface wan 1 conn-type always-on
config network interface wan 1 timeout 300
config network interface wan 2 mode DISABLE
```

Export

3.9 Status

3.9.1. SHDSL

For 2-wire models:

Item	Local Side	Remote Side
	Channel A	Channel A
State	IDLE	IDLE
Base-Rate	0 kbps	0 kbps
Sub-rate	0 kbps	0 kbps
SNR Margin	0	0
LoopAttn	0 dB	0 dB
ES	0	0
SES	0	0
UAS	0	0
LOSWS	0	0
CRC	0	0
Clear CRC		

For 4-wire models:

Item	Local Side		Remote Side	
	Channel A	Channel B	Channel A	Channel B
State	IDLE	IDLE	IDLE	IDLE
Base-Rate	0 kbps	0 kbps	0 kbps	0 kbps
Sub-rate	0 kbps	0 kbps	0 kbps	0 kbps
SNR Margin	0	0	0	0
LoopAttn	0 dB	0 dB	0 dB	0 dB
ES	0	0	0	0
SES	0	0	0	0
UAS	0	0	0	0
LOSWS	0	0	0	0
CRC	0	0	0	0
Clear CRC				

For 8-wire models:

Item	Local Side				Remote Side			
	Channel A	Channel B	Channel C	Channel D	Channel A	Channel B	Channel C	Channel D
State	IDLE	IDLE	IDLE	IDLE	IDLE	IDLE	IDLE	IDLE
Base-Rate	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps
Sub-rate	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps	0 kbps
SNR Margin	0	0	0	0	0	0	0	0
LoopAttn	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB
ES	0	0	0	0	0	0	0	0
SES	0	0	0	0	0	0	0	0
UAS	0	0	0	0	0	0	0	0
LOSWS	0	0	0	0	0	0	0	0
CRC	0	0	0	0	0	0	0	0
Clear CRC								

If the VPN router have connected to remote side, it can also show the performance information of remote side.

Click Clear CRC can clear the CRC error count.

3.9.2. WAN

This information shows all eight WAN interface.

WAN Interface Information

	IP Address/ Subnet Mask	VPI-VCI	Encap	Protocol	Status
WAN1	192.168.2.1/ 255.255.255.0	0-32	LLC	Ethernet over ATM	UP
WAN2	-	-	-	-	-
WAN3	-	-	-	-	-
WAN4	-	-	-	-	-
WAN5	-	-	-	-	-
WAN6	-	-	-	-	-
WAN7	-	-	-	-	-
WAN8	-	-	-	-	-

3.9.3. Route Table

Routing tables contain a list of IP address. Each IP address identifies a remote router (or other network gateway) that the local router is configured to recognize. For each IP address, the routing table additionally stores a network mask and other data that specifies the destination IP address ranges that remote device will accept.

IP Routing Table Information

Destination	Netmask	Gateway	Hop Count	Interface
192.168.0.0	255.255.255.0	0.0.0.0	0	lan
127.0.0.0	255.0.0.0	0.0.0.0	0	lo
0.0.0.0	0.0.0.0	192.168.0.254	0	lan

3.9.4. Interfaces

Interface Statistic

Port	InOctets	InPackets	OutOctets	OutPackets	InDrops	OutDrops	Status
LAN	877624	7774	886243	3314	0	0	UP
WAN1	0	0	0	0	0	0	DOWN
WAN2	0	0	0	0	0	0	DOWN
WAN3	0	0	0	0	0	0	DOWN
WAN4	0	0	0	0	0	0	DOWN
WAN5	0	0	0	0	0	0	DOWN
WAN6	0	0	0	0	0	0	DOWN
WAN7	0	0	0	0	0	0	DOWN
WAN8	0	0	0	0	0	0	DOWN

This table shows the interface statistics.

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
InDrops	The field shows the discarded number of received packets on this port
OutDrops	The field shows the discarded number of transmitted packets on this port

3.9.5. STP

Stp Staus

- Bridge Information

Brige Name	Bridge ID	Designated Root ID	Root Port/ Root Path Cost
lan	8000.008323000220	8000.008323000220	0/0

- Port State

	Lan	Wan							
PortNo		1	2	3	4	5	6	7	8
lan	F	F							

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

3.9.6. Switch

Switch Ethernet Media Status

Port	Ethernet Media Status
1	Off
2	Off
3	Off
4	100M/Full

3.10 Utilities

3.10.1. Upgrade

Upgrade Firmware

Click the “Browser” button and browse to the location on your PC where you stored the firmware upgrade.

Select the upgrade file. There name will appear in the Upgrade file field.

Click the “Upgrade” button to commence the firmware upgrade.

3.10.2. Config Tool

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

Load Factory Default

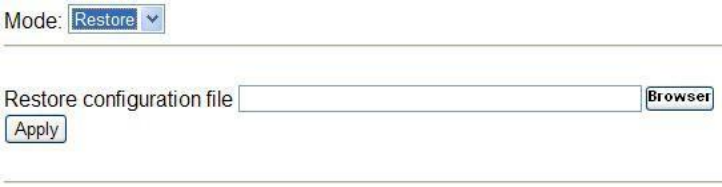
Load Factory Default: It will load the factory default parameters to the router.

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

Backup Configuration

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

Restore Configuration



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

Click Apply after selecting Restore Configuration.
Browse the route of backup file then press Apply. Brower the place of restore file name or put the name. Then press OK. The router will automatically restore the saved configuration.

3.10.3. Users

No	Name	Level
1	root	Administrator
2		Guest
3		Guest
4		Guest
5		Guest

For greater security, change the Administrator Name and password for the VPN router. If you don't set them, all users on your network can be able to access your VPN router using the default Administrator Name and password is "*root*".

You can authorize other four legal users to access the VPN Router via Web, telnet or console. There has CLI (command line) mode for telnet or console mode to setup the VPN Router.
We will not discuss CLI (command line) mode in this manual.

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

Level
Administrator
Normal
Guest

This is the default administrator ID and password is "***root***". It is highly recommended that you change these for security purpose.

Name: Type the new User Name ("***root***" is the default name when shipped)

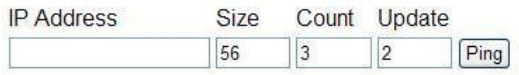
Level: Administrator, Normal and Guest

Password: Type the existing password ("***root***" is the default password when shipped)

Password Confirm: Retype your new password for confirmation.

Click Apply to finish the setting.

3.10.4. Ping



Ping test determines whether your VPN router can communicate with another computer or other web sites over the network. Then, if network communication is established, ping tests also determine the connection latency (technical term for delay) between the two device. You can use a ping test to troubleshoot connectivity problems with your home network. Ping tests are also commonly used to measure the delay ("lag") with some Internet servers.

To execute a ping test, you simply identify the Web site or other remote server / computer by its IP address. The result of a ping test includes confirmation that connection was successful, along with a series of numbers that represent the communication delay in milliseconds (ms).

Ping reports the percentage of packets acknowledged by the remote host. Typically this number will be 100% (as in the example above) or 0%. When an Internet host pings at 0%, this does not necessarily mean the server is "down" or unavailable. Internet Web servers especially may be configured to disregard ping requests for security purposes.

The results of a ping test vary depending on the quality of the Internet / network connection. A good broadband Internet connection typically results in ping test latency of less than 100 ms, often less than 30ms. A satellite Internet connection normally suffers from latency above 500ms.

On intranets and other private LANs, ping can be an especially useful network diagnostic tool. One scenario that will result in a ping response rate of other than 0% or 100% occurs when a host is shutdown and leaves the network (or boots and joins the network).

It is also possible for ping packets to be lost in transit, causing ping to report a host as unavailable when in fact it is available but unreachable. One cause of lost or dropped packets is extreme levels of traffic. In general, ping utilities will be unusable on heavily-loaded networks.

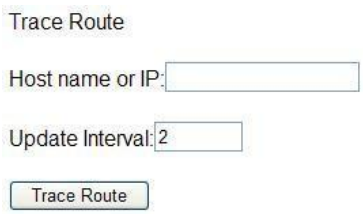
IP Address : Which IP address you want to ping

Size : Size of byte packets to the destination, default is 56

Count : Ping count number, default is 3

Update : Updated time, default is 2

3.10.5. Trace Route



The trace route command traces the network path of Internet routers that packets take as they are forwarded from your VPN router to a destination address. The "length" of the network connection is indicated by the number of Internet routers in the trace route path.

Trace routes can be useful to diagnose slow network connections. For example, if you can usually reach an Internet site but it is slow today, then a trace route to that site should show you one or more hops with either long times or marked with "*" indicating the time was *really* long. If so, the blockage could be anywhere from your Internet service provider to a backbone provider, and there is likely little you can do except wait with the infinite patience of the mighty oak.

Host name or IP: Type which Host name and IP address you want to ping.

Update Interval: Set the amount of seconds to wait for an answer from each host before giving up, default of 2

4 Terminology

Abbrev.	Full Term	Meaning
EoA	Ethernet-over-ATM	EoA protocol is commonly used to carry data between local area networks that use the Ethernet protocol and wide-area networks that use the ATM protocol. Many telecommunications industry networks use the ATM protocol. ISPs who provide DSL services often use the EoA protocol for data transfer with their customers' DSL modems.
VPI	Virtual Path Identifier	for set up ATM Permanent Virtual Channels(PVC).
VCI	Virtual Channel Identifier	for set up ATM Permanent Virtual Channels(PVC).

EoA

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

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

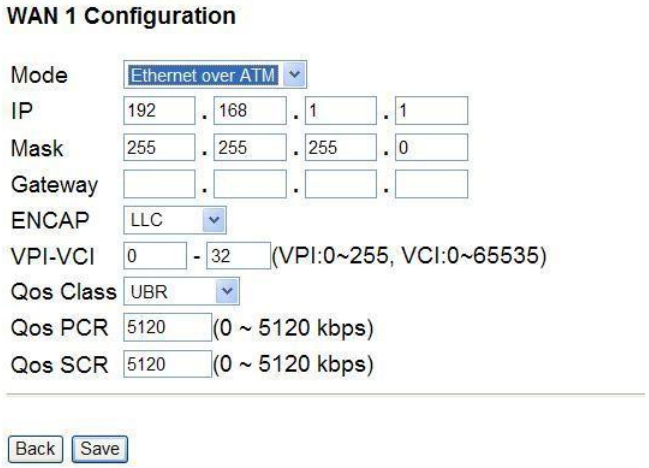
IPoA

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

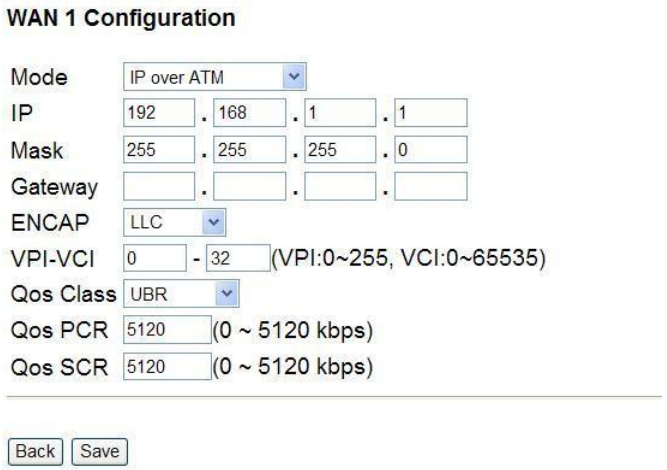
PPPoA / PPPoE

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

EoA

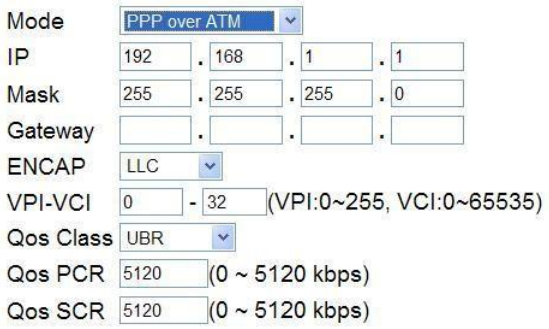


IPoA



PPPoA

WAN 1 Configuration



PPPoE

WAN 1 Configuration