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Networking your world

24 Ports VDSL2 Managed IP DSLAM with POTS splitter

NV-2400H USER'S MANUAL

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For your safety, be sure to read and follow all warning notices and instructions before using the device.

- **DO NOT** open the device or unit. Opening or removing the cover may expose you to dangerous high voltage points or other risks. ONLY qualified service personnel can service the device. Please contact your vendor for further information.
- **Use ONLY** the dedicated power supply for your device. Connect the power to the right supply voltage (110V AC used for North America and 230V AC used for Europe).
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- **DO NOT** expose your device to dampness, dust or corrosive liquids.
- **DO NOT** use this product near water, for example, in a wet basement or near a swimming pool.
- **Connect ONLY** suitable accessories to the device.
- **Make sure** to connect the cables to the correct ports.
- **DO NOT** obstruct the device ventilation slots, as insufficient air flow may harm your device.
- **DO NOT** place items on the device.
- **DO NOT** use the device for outdoor applications directly, and make sure all the connections are indoors or have waterproof protection place.
- **Be careful** when unplugging the power, because it may produce sparks.
- **Keep** the device and all its parts and accessories out of the reach of children.
- **Clean** the device using a soft and dry cloth rather than liquid or atomizers. Power off the equipment before cleaning it.
- This product is **recyclable**. Dispose of it properly.

Attention:

Be sure to read this manual carefully before using this product. Especially Legal Disclaimer, Statement of Conditions and Safety Warnings.

Caution:

The NV-2400H are for **indoor** applications only. This product does not have waterproof protection.

VDSL2 Brief

VDSL2 (Very-High-Bit-Rate Digital Subscriber Line 2, ITU-T G.993.2 Standard) is an access technology that exploits the existing infrastructure of copper wires that were originally deployed for POTS services. It can be deployed from central offices, from fibre-fed cabinets located near the customer premises, or within buildings.

ITU-T G.993.2 VDSL2 is the newest and most advanced standard of DSL broadband wireline communications. Designed to support the wide deployment of Triple Play services such as voice, video, data, high definition television (HDTV) and interactive gaming, VDSL2 enables operators and carriers to gradually, flexibly, and cost efficiently upgrade existing xDSL-infrastructure.

ITU-T G.993.2 (VDSL2) is an enhancement to G.993.1 VDSL that permits the transmission of asymmetric and symmetric (Full-Duplex) aggregate data rates up to 200 Mbit/s on twisted pairs using a bandwidth up to 30 MHz.

VDSL2 deteriorates quickly from a theoretical maximum of 200 Mbit/s at 'source' to symmetric 100 Mbit/s at 0.3 km and 50 Mbit/s at 1 km, but degrades at a much slower rate from there, and still outperforms VDSL. Starting from 1,6 km its performance is equal to ADSL2+.

ADSL-like long reach (LR) performance: ADSL-like long reach performance is one of the key advantages of VDSL2. LR-VDSL2 enabled systems are capable of supporting speeds of around 1-4 Mbit/s (downstream) over distances of 2.5 km, gradually increasing the bit rate up to symmetric 100Mbit/s as loop-length shortens. This means that VDSL2-based systems, unlike VDSL1 systems, are not limited to short loops or MTU/MDUs only, but can also be used for medium range applications.

VDSL2 IP DSLAM

The NV-2400H is a VDSL2 IP DSLAM that aggregates 24 ports into Giga Ethernet uplinks for high-speed data/Internet services. Based on DMT VDSL2 technologies, NV-2400H extends data service with line rate of solution for services such as remote lecturing, telemedicine, video conferencing, Video-on-Demand (VoD), IP-TV, Internet access and other various high-speed data applications.

When the number of subscribers increases, the second uplink Giga Ethernet interface can be used to daisy chain to another NV-2400H. Alternatively, multiple NV-2400H can be connected to another LAN switch to from a two-tier configuration, thus supporting a lot more subscribers. The NV-2400H is an ideal solution for delivering cost-effective, high-performance broadband/multimedia services to Multi-Tenant Units (MTUs) or Multi-Dwelling Units (MDUs) such as hotels, campus, hospitals and sscom.
The NV-2400H provides the important features necessary for robust networks

Key features and benefits :

- **Jumbo packet up to 9k bytes:** In computer networking, jumbo frames are Ethernet frames with more than 1500 bytes of payload. Conventionally, jumbo frames can carry up to 9000 bytes of payload, but variations exist and some care must be taken when using the term.
  The original 1500-byte payload size for Ethernet frames was used because of the high error rates and low speed of communications. Thus, if one receives a corrupted packet, only 1500 bytes (plus 18 bytes for the frame header and other overhead) must be re-sent to correct the error. However, each frame requires that the network hardware and software process it. If the frame size is increased, the same amount of data can be transferred with less effort. This reduces CPU utilization (mostly due to interrupt reduction) and increases throughput by allowing the system to concentrate on the data in the frames.

- **IEEE 802.1q Q-in-Q VLAN for performance & security:** The VLAN feature in the switch offers the benefits of both security and performance. VLAN is used to isolate traffic between different users and thus provides better security. Limiting the broadcast traffic to within the same VLAN broadcast domain also enhances performance. VLAN support enabling advanced techniques such as 802.1Q-in-1Q to be deployed.
  And support GVRP up to 4k V-Lan groups.

- **IEEE 802.1x:** port base network access control, this function for wireless users connecting Authentication.
- **Spanning tree:** Support IEEE 802.1d STP/IEEE 802.1w RSTP/IEEE-802.1s MSTP. For mission critical environments with multiple switches supporting STP, you can configure the switches with a redundant backup bridge path, so transmission and reception of packets can be guaranteed in event of any fail-over switch on the network.

- **IEEEE 802.1p QoS(COS) with Four Priority Queues:**
  The QoS(Quality Of Service) feature provides four internal queues to support four different classifications of traffic. High priority packet streams experience less delay inside the switch, which supports lower latency for certain delay-sensitive traffic. The NV-2400H can classify the packet as one of the 8-level priority to 4 –level queue mapping. I.e. Highest, SecHigh, Lowest, SecLow.

- **Differentiated Services** or **DiffServ:** is a computer networking architecture that specifies a simple, scalable and coarse-grained mechanism for classifying, managing network traffic and providing Quality of Service (QoS) on modern IP networks. DiffServ can, for example, be used to provide low-latency to critical network traffic such as voice or streaming media while providing simple best-effort service to non-critical services such as web traffic or file transfers.
  DiffServ uses the 6-bit **Differentiated Services Code Point** (**DSCP**) field in the IP header for packet classification purposes. DSCP replaces the outdated Type of Service field.

- **IGMP Snooping :** Snooping by 256 IP multicast table for VOD (Video on demand) and Video conference and Internet games application.

- **HTTPS (SSL) Web Access:** Hypertext Transfer Protocol Secure (HTTPS) is a combination of the Hypertext Transfer Protocol with the SSL protocol to provide encrypted communication and secure identification of a network web server. HTTPS connections are often used for payment transactions on the World Wide Web and for sensitive transactions in corporate information systems.

- **SNMP MIB Support:** SNMP v1/v2c/v3 management and trap function
  Support MIB tables: MIB-II (RFC 1213), Bridge MIBs (RFC 1493), Ethernet-like MIB (RFC 1643 & RFC 2665), private-MIB, USM-MIB (RFC 2574), VACM-MIB (RFC 2575) and RMON-MIB 1, 2, 3, 9 groups (RFC 1757& RFC 2819).

- **Broadcast/Multicast/Unknown-unicast Storm Control:** To limit too many broadcast/multicast/unknown-unicast flooding in the network, broadcast/multicast storm control is used to restrict excess traffic. Threshold values are available to control the rate limit for each port. Packets are discarded if the count exceeds the configured upper threshold.

- **ACL(Access Control List):** On some types of proprietary computer hardware, an **Access Control List** refers to rules that are applied to port numbers or network daemon names that are available on a host or other layer 3, each with a list of hosts and/or networks permitted to use the service. Both individual servers as well as routers can have network ACLs. Access control lists can generally be configured to control both inbound and outbound traffic, and in this context they are similar to firewalls. Like Firewalls, ACLs are subject to security regulations and standards.

- **Link Layer Discovery Protocol (LLDP):** is a vendor-neutral Link Layer protocol in the Internet Protocol Suite used by network devices for advertising their identity, capabilities, and neighbors on a IEEE 802 local area network, principally wired Ethernet. The protocol is formally referred to by the IEEE as Station and Media Access Control Connectivity Discovery specified in standards document **IEEE 802.1AB.**

- **Speed Rate Control(Traffic shaping):** Supports speed rate control function from 128k to 100Mbps.
  Note:
  Regarding our NV-2400H's principle of bandwidth control, which must rely on flow control to limit bandwidth over hardware, as long as client side doesn't support flow control, the upstream bandwidth control is invalid, so for this case, client side must support flow control function.
- **In band Management:** Provides a console(RJ45 to D-Sub 9Pin) port for setup IP or other function
- **Out Of Band Management:** Supports remote control by Telnet and Web-based Management easy-to-use configuration and ongoing monitoring. This software is embedded in the switch and delivers remote, intuitive management of the switch and connected NIC devices through a single IP address. The NV-2400H are easy-to-configured and deployed, and offering a compelling option in terms of cost, performance, scalability and services compared to traditional repeater HUB solutions.

- **2 Dual Media for Flexible Fiber Connection:**Dual media port 9 and 10 are provided for flexible fiber/copper auto link connection. You can select to install optional transceiver modules in these slots for short, medium or long distance fiber backbone attachment. Use of the SFP will auto disable their corresponding built-in 10/100/1000Base-T connections.

- **DHCP Client:** Dynamic Host Configuration Protocol (DHCP) for auto configuration management IP.

- **TFTP Protocol:** Trivial File Transfer Protocol(TFTP) for new version firmware remote upgraded
- **Firmware upgrade support :** HTTP / TFTP protocol.

- **Scalability:** Up to **100** Mbps symmetric performance over single-pair wiring for VDSL2 Channel.

- **Interleave delay time:** To prevent the transmission against burst errors. Please note that enable interleave delay function will reduce a few vdsl2 bandwidth.

- **Noise Margin(SNRM):** In electrical engineering, **noise margin** is the amount by which a signal exceeds the minimum amount for proper operation. NV-2400H default value is 6db for telecom standard.

- **INP(Impulse Noise Protection):** Impulse noise in multicarrier communication systems behaves effectively as a modulating signal that controls the first moment of the background Gaussian noise. The composite noise, which is the aggregate of the Gaussian noise and impulse noise, has a probability density function that is conditionally Gaussian with non-zero average, hence referred to as biased-Gaussian. The BER-equivalent power of the composite noise source is defined as the power of a pure Gaussian noise source that yields the same bit-error rate (BER). The BER-equivalent noise for a biased-Gaussian noise is simply the amplified version of the underlying Gaussian noise source. The amplification factor is derived from the characteristics of the impulse interference. Any bit-loading algorithm designed for Gaussian noise sources is also applicable to biased-Gaussian noise sources provided that the BER-equivalent SNR is used in place of the measured SNR.

- **Syslog :** is a standard for logging program messages. It allows separation of the software that generates messages from the system that stores them and the software that reports and analyzes them. It also provides devices which would otherwise be unable to communicate a means to notify administrators of problems or performance.

  Syslog can be used for computer system management and security auditing as well as generalized informational, analysis, and debugging messages. It is supported by a wide variety of devices (like printers and routers) and receivers across multiple platforms. Because of this, syslog can be used to integrate log data from many different types of systems into a central repository.

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Chapter 1. Unpacking Information

1.1 Check list

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

1.2 Package Contents

1. NV-2400H Managed VDSL2 IP DSLAM
(24 x VDSL2 Ports(RJ45)，2x 1000Mbps auto link RJ-45/SFP Port)
2. Serial number sticker on the back there is a user manual hyperlinks QR codes.
3. 1 x AC Power Cord
4. A package contains two Rack Mounting Brackets and screws
5. 4 x Rubber feet
6. 1 x Console Cable (RJ45 to D-sub 9 pin)
7. 2 x RJ21 Cable

Notes:

1. Please inform your dealer immediately for any missing or damaged parts. If possible, retain the carton including the original packing materials. Use them to repack the unit in case there is a need to return for repair.
2. If the product has any issue, please contact your local distributor.
3. Please look for the QR code on the bottom of the product, the user can launch the QR code scanning program to scan and download the user's manual electronic format file.

1.3 Product Outward

1.4 Key Features & Benefits

- 1.5U compact design with 24 VDSL2 ports and built-in POTS splitter.
- Provides 3-FAN cooling mechanism and support low/middle/full speed based on programming temperature.
- Supports VDSL2 Profiles 8a/8b/8c/8d/12a/12b/17a/30a.
- Supports powerful traffic classification tools including QoS, ToS and DSCP.
- Supports Port Security with MAC address filtering.
- Supports Port-Based VLAN, Protocol-Based VLAN and VLAN Mapping.
- Supports IEEE 802.1d STP/IEEE802.1w RSTP & IEEE-802.1s MSTP.
- Supports DHCP /Client/Relay/Option82
- Supports DNS Proxy
- Flexible deployment and maintenance.
- Web-based management with a user friendly interface.
- Configuration backup and restoration.
  - Flow control support: 802.3x pause frame used for full-duplex ports
  - Collision-based back-pressure for half-duplex ports, carrier-based back-pressure not supported
- Half- and full-duplex operations:
  - Full-duplex operation supported on 10/100/1000 Mbps ports
  - Half-duplex operation supported on 10/100 Mbps ports only
- Supports 802.1D bridge self-learning, storing up to 8K+ 256 unicast or multicast addresses
- Supports automatic age-out period between 1 to 1,000,000 seconds
- Broadcast storm filtering based on ingress port bandwidth
- HOL blocking prevention

- Deadlock relief
- Auto-polling via MDC/MDIO management interface for auto-configuration of speed, duplex mode, and flow control capability of all Ethernet ports
- 9K+ jumbo packets supported on per port and per VLAN basis
- Supports layer 2 source filtering
- Flexible per-port VLAN classification option supports port-based VLAN domain and 802.1Q VLAN domain simultaneously
- Supports Independent VLAN Learning (IVL) and Shared VLAN Learning (SVL)
- Supports 802.1X Port-based Network Access Control
- Supports BPDU, LACP, EAPOL suppression based on per port configuration
- Supports 64 VLAN-dependent Spanning Trees
- Supports IP multicast and snooping of IGMP and IP multicast routing protocol PDU
  - Including IGMP, CBT, OSPF, and PIM v2
- IP multicast packets may be forwarded within single VLAN or across multiple VLANs
  - Cross-VLAN mode allows each egress port to have its own tag rule and VID for IP multicast packets
- Port mirroring
- Supports 802.1p Traffic Priority
- ToS-to-802.1p priority mapping is enabled on per-VLAN basis
- Flexible per-port prioritization option:
  - The prioritization result can be made available to other switches in the network by replacing priority field in VLAN tag
- Four priority egress queues per port
- Scheduling algorithms: strict priority or weighted round robin
- Four RMON groups (1,2,3,9)
- Supports MIB of RFC1213, 1573, 1757, 1643, 2233

- MAC address table synchronization assistance
- Asymmetric VLAN membership for better network security:
  - Distinguish ingress VLAN member and egress VLAN member
  - Prevents a station to sneak in VLANs set up for common servers
- Improved VLAN ingress rules may specify:
  - Filtering untagged packets or VLAN tagged packets
  - Filtering packets received on non-ingress VLAN member ports
- Supports insertion of 2nd tag with different TPID to VLAN-tagged packets
- Port-based ingress rate policing and egress rate pacing
- Support L2/L3/4 access control list(ACL).
- Supports Layer 2/3/4 (Layer 2+) classification:
  - Standard-length IPv4 packets can use layer 2 VLAN-tag ID, IP protocol, Source IP, Destination IP, TCP/UDP Destination Port and Source Port, and TCP SYN field for classification
  - Non-standard or non-IPv4 packets use part of layer 2/3 header for classification
  - Up to 256 different classification rules supported
  - Each classification rule is associated with an action code
  - Packet and byte counters for all classification rules to record match statistics
- Supports Layer 2+ based VLAN classification scheme:
  - IP subnet based and Protocol-based VLAN achievable by means of layer 2+ classification
  - May override VID in VLAN-tag
- Supports filtering, redirecting, and/or mirroring of packets based on Layer 2+ classification result
  - Redirects IPv6 packets to IPv6-capable network devices
- SMAC/SIP bindings for IPv4 packets can be implemented

- Layer 2+ packet classification result may be used to define packet priority
- Priority adjustment based on per port profile and per VLAN property
  - Priority of a packet can be upgraded or downgraded based on setting of the ingress port and VLAN
- Supports protected port, protected port group, and unprotected port group
- VID in transmitted packets can be replaced by a fixed VID associated with the egress port
  - The VID to be swapped in by egress port can be different than the default VID for untagged ingress packets
- Programmable event triggered interrupts allowing software to respond to or ignore an array of exceptions

1.5 Product Specifications

Standard:	◆ IEEE802.3/802.3u/802.3ab/802.3z standards ◆ ITU-T G993.2, G993.1,G994.1, G997.1 standards
Hardware Interface:	◆ 2 x Copper / Fiber combo giga port ◆ 1 x RJ-21 connector for 24 x VDSL2 ports connection ◆ 1 x RJ-21 connector for 24 x POTS ports connection ◆ 1 x console port(RJ-45/115200bps) ◆ 1 x RJ-45 Alarm Port for 4 Alarm Inputs
LED Indicators:	◆ System: PWR ◆ Gigabit Port: LINK/ACT, SPEED 1000/100 ◆ Alarm: RUN/ALARM ◆ VDSL: VDSL Link/Sync
Protocol Support:	◆ IGMP Snooping/Proxy v1, v2 and v3 ◆ Multicast Forwarding with IGMP Snooping v1 and v2 (RFC 1112 and RFC 2236) Multicast MAC address mapping ◆ Up to 512 Multicast Channels ◆ Profile-based Access Control (up to 24 profiles)

	◆ Fast and Normal Leave Modes
Security:	◆ L2 Frame Filtering by MAC Addresses ◆ L3 Frame Filtering by IP Addresses, protocol ID, and TCP/UDP ◆ DHCP and ARP Broadcasting Frames Filtering ◆ Support Secured Forwarding
Management:	◆ Local Management:RS-232 and Telnet CLI, Web/SNMP management. ◆ Remote in-band Management: Web/SNMP/Telnet ◆ Support SNMP v1/v2/v3
Electrical:	◆ Power: 100-240 V ac, 50-60 Hz. ◆ Power Consumption: 90Watts maximum
Operating Temperature:	-10 ºC~ 50 ºC (14 ºF ~ 122 ºF)
Storage Temperature:	-40 ºC~ 70 ºC (-40 ºF ~ 158 ºF)
Humidity:	5 to 95% (non-condensing)
Dimensions:	435mm x 260mm x 67mm (17.12" x 10.24" x 2.63")
Regulatory Compliance:	CE, FCC Class B, VCCI, EN60950

Notes:

1. Features and specifications in this manual are subject to change without prior notice.

2. *(*) Firmware upgradeable for future enhancement.*

Chapter 2. General Description

2.1 Hardware Description

This section describes the important parts of the IP DSLAM. It features the front and rear panel drawings LEDs, connectors, and IP DSLAM.

2.2 Front Panel

The following figure shows the front panel.

Figure 2.1 Front Panel description

- **POTS**

  NV-2400H includes 24 build-in splitters, POTS, with a Telco-50/ RJ-21 cable for telephone services.

  Another Model: NV-2400 (without POTS splitter).

- **LINE**

  LINE is for connecting 24 VDSL2 ports with a Telco-50/ RJ-21 cable.

- **ALARM**

  For alarm inputs and outputs.

- **CONSOLE**

  Users are able to access NV-2400H locally with the CONSOLE port. Via CONSOLE, users are able to configure the NV-2400H with menu-driven interface with any terminal emulation program, such as, Hyperterminal and Teraterm. (115200, 8, None, 1, None)

- **GE1 & GE2**

  For connecting Gigabit Ethernet, NV-2400H provides Gigabit Ethernet combo interfaces, TP and SPF.

  TP: 10/100/1000 BaseT copper (RJ-45 connector).

  SFP: 1000 Base-SX/LX mini-GBIC slot.

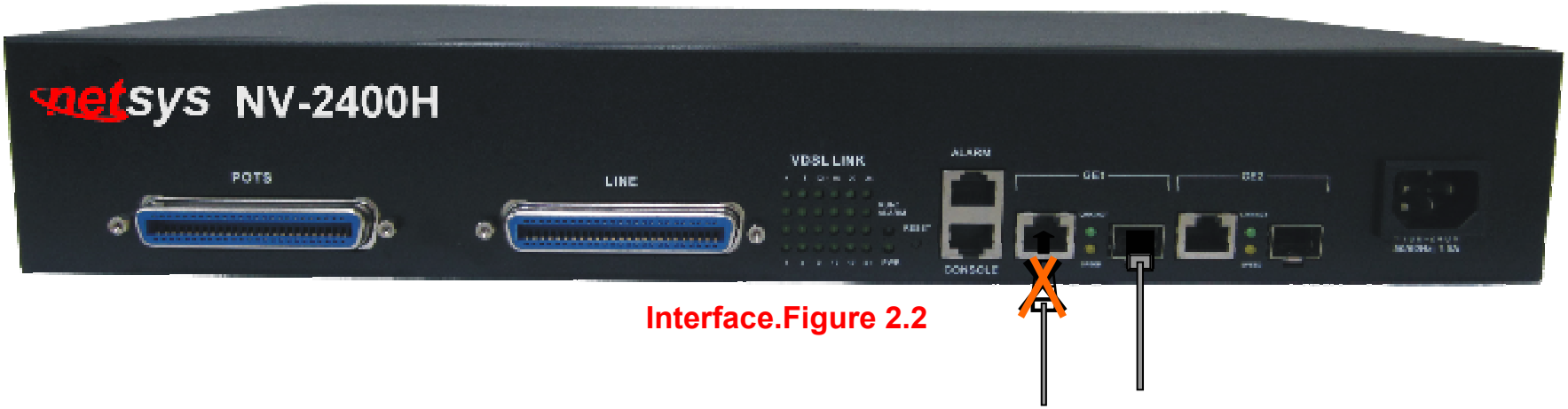
- **POWER**

  The connector is for 100V ~ 240V AC power inputs (50Hz~60Hz, 1.5A).

  Several LED indicators for monitoring the device itself, and the network status. At a quick glance of the front panel, the user would be knew if the product is receiving power; if it is monitoring another IP DSLAM or other devices; or if a problem exists on the network.

Provides two 1000Mbps auto-sensing RJ-45 Ethernet ports and two GIGA Port.

GIGA Port supports RJ-45 or SFP Interface auto link function. **You can use RJ-45 interface or SFP**



Interface.Figure 2.2

Note:

- Please make sure fiber connection has ready, and the IP DSLAM will be auto sensing and establishment link that in the Fiber optic mode.
- **GIGA port RJ-45 and SFP can't use at the same time, else that will be link in Copper mode (default).**

2.3 SFP Fiber Optics

A gigabit interface converter (SFP) is a transceiver that converts electric currents (digital highs and lows) to optical signals, and optical signals to digital electric currents. The SFP is typically employed in fiber optic and Ethernet systems as an interface for high-speed networking. The data transfer rate is 1.25 gigabit per second.

SFP modules allow technicians to easily configure and upgrade electro-optical communications networks. The typical SFP transceiver is a plug-in module that supports hot-plugging (it can be removed and replaced without turning off the system). The devices are economical, because they eliminate the necessity for replacing entire boards at the system level. Upgrading can be done with any number of units at a time, from an individual module to all the modules in a system. SFP (Small Form Pluggable Transceivers), meet the Gigabit Interface Converter specification Rev. 5.4 (MOD_DEF4) industry standard.

	Mode	Wave length	Bit Rate	Voltage	Power Margin
1	LX-Single Mode	10km	1.25Gbps	3.3V	10.5db(10KM or above)
2	SX- Multi Mode	550m	1.25Gbps	3.3V	8.5db(550m)

2.4 LED Indications

The followings describe the function of each LED indicator:

LEDs	Status	Descriptions
PWR (Power LED)	Steady Green	This LED light is located at the left side on the front panel. It will light up (ON) to show that the product is receiving power. Conversely, no light (OFF) means the product is not receiving power.
RUN/ALARM	Steady Green	Alarm is detected
	Blinking	System up
Speed100/Link Speed1000/Link ACT(Active LEDs)	Steady Green	Giga port indicates that communications have been set 10/100/1000 Mbps. Each port on the IP DSLAM is assigned an LED light for 100 or 1000 Base-TX connecting
	Blinking	Blinking to show data on Traffic status. Fiber mode only support.
FULL/Col (Full-Duplex LEDs) (Collision LEDs)	Steady Green	Indicates that communications have been set to full-duplex operation for the indicated port, The indicator lights up working in Full Duplex, and light down working in Half Duplex
	Blinking	Blinking to show collision status.
VDSL2 Link LEDs	Steady Green	LED light up Steady to show VDSL2 Link is established LED light off Steady to show VDSL2 Link is not established

2.5 Reset Button

The reset buttons allows users to reboot the VDSL2 IP DSLAM or load the default settings.

Press and hold for 1-5 seconds: Reboot the IP DSLAM
Press over 5 seconds: Load the default settings

2.6 AC Power Socket

The power cord should be plug into this socket. The AC Socket accepts AC power 100 to 240 voltage.

2.7 Pin Assignment of RJ21 Cable

PIN	COLOR	PORT	PIN	COLOR	PORT	PIN	COLOR	PORT
1	Black	P24	9	White	P16	17	White	P8
26	Orange		34	Brown		42	Gray	
2	Black	P23	10	White	P15	18	Red	P7
27	Blue		35	Green		43	Blue	
3	Red	P22	11	White	P14	19	Red	P6
28	Gray		36	Orange		44	Orange	
4	Red	P21	12	White	P13	20	Red	P5
29	Brown		37	Blue		45	Green	
5	Red	P20	13	White	P12	21	Red	P4
30	Green		38	Blue		46	Brown	
6	Red	P19	14	White	P11	22	Red	P3
31	Orange		39	Orange		47	Gray	
7	Red	P18	15	White	P10	23	Black	P2
62	Blue		40	Green		48	Blue	
8	White	P17	16	White	P9	24	Black	P1
33	Gray		41	Brown		49	Orange	

Chapter 3. Installation

3.1 Hardware Installation

This chapter describes how to install the IP DSLAM and establish network connections. You may install this IP DSLAM on any level surface (table, shelf, 19 inch rack or wall mounting). However, please take note of the following minimum site requirements before you begin.

3.2 Pre-Installation Requirements

Before you start actual hardware installation, make sure you can provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected. Verify the following installation requirements:

- Power requirements: AC 100V to 240 V at 50 to 60 Hz.
  The IP DSLAM power supply automatically adjusts to the input voltage level.
- The IP DSLAM should be located in a cool dry place, with at least 10cm/4in of space at the front and back for well ventilation.
- Place the IP DSLAM out of direct sunlight, and away from heat sources or areas with a high amount of electromagnetic interference.
- Check if network cables and connectors needed for installation are available.
- Please note that the NV-2400H internal splitter, can pass through voice spectrum is 0 ~ 4KHz(POTS only).
- Please note that the cutoff frequency of the splitter is 25kHz.

3.3 General Rules

Before making any connections to the IP DSLAM, note the following rules:

Ethernet Port (RJ-45)

- All network connections to the IP DSLAM Ethernet port must be made using Category 5 UTP for 100Mbps and Category 3,4 UTP for 10Mbps.
- No more than 100 meters (about 328 feet) of cabling may be used between the IP DSLAM and an end node.

3.4 Connection Configuration

The IP DSLAM has 24 x 100 Mbps VDSL2 ports. And 2 Giga Ethernet ports which support connection to 100/1000 Ethernet. Support full or half-duplex operation and Auto MDI/MDIX. The transmission mode is using auto-negotiation. Therefore, the devices attached to these ports must support auto-negotiation unless they will always operate at half duplex. If transmissions must run at full duplex, but the attached device does not support auto-negotiation, then you should upgrade this device to a newer version that supports auto-negotiation.

Use any of the GbE1~GbE2 ports to connect to devices such as a workstation, server, bridge or router. You can also cascade to another compatible IP DSLAM or hub by connecting an MDI or MDIX port.

1. You can connect an station port on the IP DSLAM to any device that uses a standard network interface such as a optical fiber converter, workstation or server, or also to a network interconnection device such as a bridge or router (depending on the port type implemented).

2. Prepare the network devices you wish to network. Make sure you have installed VDSL2 CPE Bridge making a connection to any of the IP DSLAM (1~24) station ports. You also need to prepare **24~26 gauge** with twisted pair phone wire with RJ11 plugs at both ends.
3. Connect one end of the cable to the RJ-45 port of the network interface card, and the other end to any available station port on

the IP DSLAM. Every port support either 100/1000 Mbps connections. When inserting an RJ-45 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated.

4. NV-2400H with NV-202 and NV-500 is fully compatible. If the user would like to connect with the NV-600R for Annex A area. Please configure the NV-2400H band profile to Annex A 17a, and please enter the management of NV-600R and set the tone mode as "A43" from Profile Config (Band Plan is Annex A). If the user would like to connect with the NV-600R for Annex B area. Please configure the NV-2400H band profile to Annex B 17a, and please enter the management of NV-600R and set the tone mode as "B43" from Profile Config (Band Plan is Annex B).

Notes:

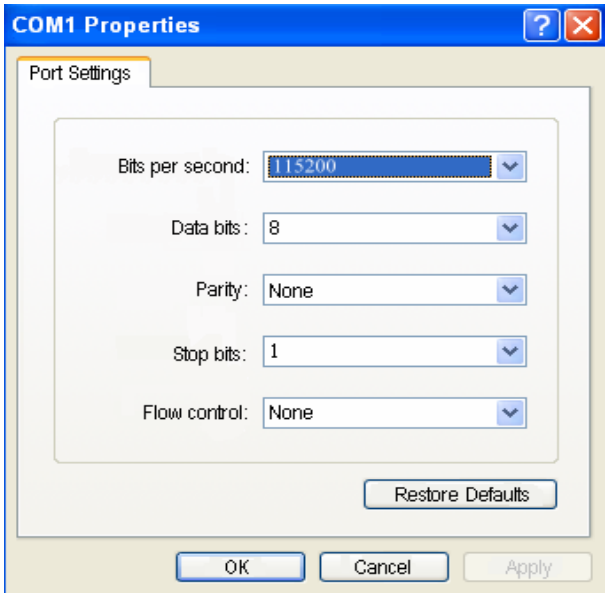
1. Be sure each twisted-pair cable (RJ-45) do not exceeds 100 meters (328 feet).
2. We recommend use Category 5 cable for Cable Modem or router connections or to attach to any high bandwidth device to avoid any confusion or inconvenience.

Chapter 4. Management Configuration

4.0 In-Band Management

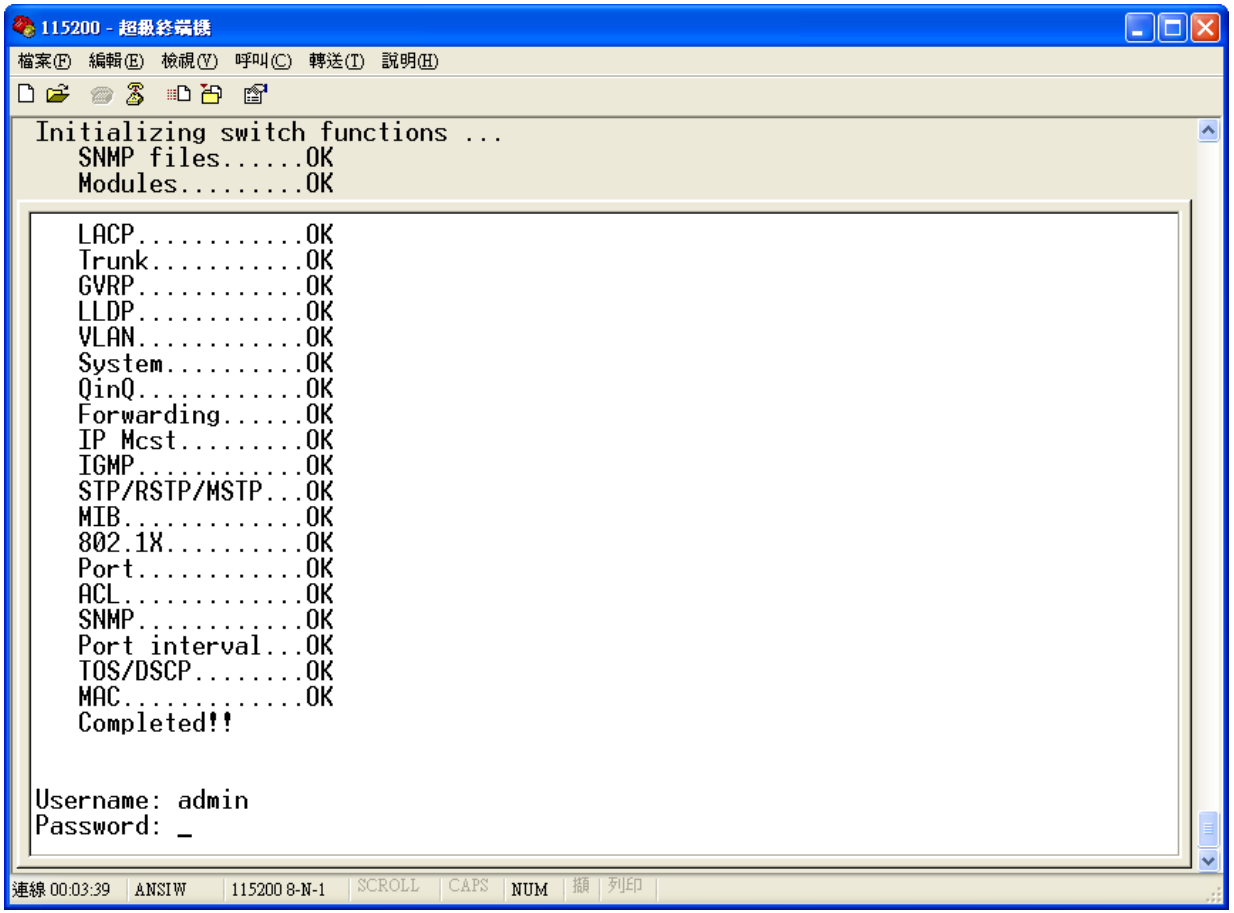
Console port (RS-232) Configuration

You can configure the product with the local serial console port, If one of the Ethernet port is not in use, you can disable it, that procedure is to connect a notebook computer to the RS-232 port, then boot operating systems, such as using the Windows operating system, and run "Hyper-terminal" program into terminal window, and setup step are as follow.



1. Set "Bits per second" at 115200 to the content window.
2. Set "Flow control" at None

3. Connects PC with the IP DSLAM, you will find login manual window on the screen then enter
   Login name ："**admin**" ; password："**admin**"



4. Setting IP Address by Console Port

When you are going to login a IP DSLAM through the web page, you have to configure the IP address first. The default IP address /

netmask / default gateway of a switch is **192.168.0.100 / 255.255.255.0 / 192.168.0.254**, without making any configuration changes in advance, you can login a IP DSLAM with default IP address as long as the default IP address can function properly in your network environment. Otherwise, you have to re-configure the IP address, subnet mask and default gateway. The following show how to configure the IP address of a IP DSLAM.

First, login with the console port.

```
Username: admin
Password: admin
```

Second, you will now enter the "IP Address ", then, setup the IP address, subnet mask and gateway.

```
Switch# configure
Switch(config)# ip address 192.168.1.100 255.255.255.0
Switch(config)# ip default-gateway 192.168.1.254
```

4.0.1 Operation Notice

To enter the "configuration" mode, you need to be in the privileged mode, and then type the command configure

Switch# **configure**

Switch (config) #

4.0.1.0 Command Line Editing

The following generic function keys provide functions in all of the menus:

Keys	Function
<Ctrl>-B; ←	Moves the cursor back one character.
<Ctrl>-D	Deletes the character at the cursor.
<Ctrl>-E	Jumps to the end of the current command line.
<Ctrl>-F; →	Moves the cursor forward one character.
<Ctrl>-K	Deletes from the cursor to the end of the command line.
<Ctrl>-N; ↓	Enters the next command line in the command history.
<Ctrl>-P; ↑	Enters the previous command line in the command history.
<Ctrl>-U	Deletes from the cursor to the beginning of the command line.
<Ctrl>-W	Deletes the last word typed.
<Esc> B	Moves the cursor backward one word.
<Esc> D	Deletes from the cursor to the end of the word.
<Esc> F	Moves the cursor forward one word.
<Backspace>	Delete the character before the cursor.
<Del>	Delete the character at the cursor.

4.0.1.1 Command Help

You may enter "**?**" at any command mode, and the CLI will return possible commands at that point, along with some description of the keywords:

Switch (config) # **copy tftp?**

running-config Running configurations

flash Flash configurations

firmware Download firmware

You may use the <Tab> key to do keyword auto completion:

Switch (config) # **copy tftp r<Tab>**

Switch (config) # **copy tftp running-config**

You do not need to type in the entire commands; you only need to type in enough characters for the CLI to recognize the command as unique. The following example shows you how to enter the **show running-config** command:

Switch (config) # **sh ru**

4.0.1.2 Upgrade firmware via console command line

Please run Hyper terminal into terminal window and setup steps are as bellow:

1. Please connects NV-2400H's console port to PC or laptop PC series port.
2. Launch "Hyper Terminal" into terminal window on your PC.
3. Set "Bits per second" at " 115200 " on the content window.
4. Set "Data bits" at " 8 " on the content window.

5. Set "Parity" at " none " on the content window.
6. Set "Stop bits" at " 1 " on the content window.
7. Set "Flow control" at " none " on the content window.
8. Power on NV-2400H and wait some time until the login menu appears.
9. Please enter login name " admin " ; password " admin " to access configuration menu.
10. You will see a symbol as "Switch#", and ready to management NV-2400H via console.

Note: A TFTP server program is required to be installed in the PC for specified route for following steps.

11. At the CLI command, type the command " conf " and enter to the configuration mode.
12. At the CLI command, type the command "copy tftp firmware <ip-addr> <remote-file>" to upgrade the firmware.
<ip-addr> specifies the IP address of the TFTP server.
<remote-file> specifies the file name to download from the TFTP server.
13. Repeat step 9-11 to enter the configuration mode, and type the command " show info " to show the firmware version, it means that the firmware is updated successfully.

4.0.1.3 Reset system to default via console command line

1. At the CLI command, type the command " erase startup-config " to reset system to default.
2. At the CLI command, type the command " boot " to reboot the NV-2400H.
3. Follow the section 4.0.1.2 step 9-11 to enter the configuration mode, and type the command " show ip " to find the default ip address.

Note: Default ip it shows must be 192.168.0.100.

4.0.2 System Commands

show running-config

Display the running configuration of the IP DSLAM.

copy running-config startup-config

Backup the switch configurations.

erase startup-config

Reset to default factory settings at next boot time.

clear arp [<*ip-addr*>] Clear entries in the ARP cache.

Parameters:

[<*ip-addr*>] specifies the IP address to be cleared. If no IP address is entered, the entire ARP cache is cleared.

show arp

Show the IP ARP translation table.

ping *ip-addr* [<1..999>] Send ICMP ECHO_REQUEST to network hosts.

Parameters:

[<1..999>] specifies the number of repetitions. If not entered, it will continue to ping until you press <Ctrl>-C to stop.

[**no**] **per-vlan-flooding-portmask** Enable or disable per VLAN default flooding portmask.

per-vlan-flooding-portmask <unicast | multicast> *<vlan-id> <port-list>* Set unicast or multicast per VLAN default flooding portmask.

show per-vlan-flooding-portmask

Display unicast and multicast per VLAN default flooding portmask table.

4.0.3 Switch Static Configuration

4.0.3.0 Port Configuration and Status

port state <on | off> [*<port-list>*]

Turn the port state on or off.

Parameters:

<port-list> specifies the ports to be turn on or off. If not entered, all ports are turn on or off.

port nego <force | auto | nway-force> [*<port-list>*]

Set port negotiation.

Parameters:

<port-list> specifies the ports to be set.If not entered, all ports are set.

port speed <10 | 100 | 1000> <full | half> [*<port-list>*]

Set port speed (in mbps) and duplex.

Parameters:

<port-list> specifies the ports to be set. If not entered, all ports are set.

port flow <**enable** | **disable**> <**enable** | **disable**> [<*port-list*>]

Enable or disable port flow control.

Parameters:

1st <**enable** | **disable**> enables or disables flow control in full duplex mode.

2nd <**enable** | **disable**> enables or disables flow control in half duplex mode.

<*port-list*> specifies the ports to be set. If not entered, all ports are set.

port rate <**ingress** | **egress**> <0..8000> [<*port-list*>]

Set port effective ingress or egress rate.

Parameters:

<0..8000> specifies the ingress or egress rate.<0..8000>

<*port-list*> specifies the ports to be set. If not entered, all ports are set.

port security <**on** | **off**> [<*port-list*>]

Set port priority. When port security is on, the port will stop MAC address learning, and forward only packets with MAC address in the static MAC address table.

Parameters:

<*port-list*> specifies the ports to be set. If not entered, all ports are set.

port protected group <1-2> <*port-list*>

Set protected port group member.

Parameters:

<*port-list*> specifies the group member ports.

port protected *<port-list>*

Set protected port list.

Parameters:

<port-list> specifies the protected port list.

port priority <disable | low | high> [*<port-list>*]

Set port priority.

Parameters:

<port-list> specifies the ports to be set. If not entered, all ports are set.

port jumboframe <enable | disable> [*<port-list>*]

Set port jumbo frame. When port jumbo frame is enable, the port forward jumbo frame packet

Parameters:

<port-list> specifies the ports to be set. If not entered, all ports are set.

port interval <0-3600**>**

While flooding CPU port at the speed of 4MB/s or larger, system will close relative port. And system will open this port using this interval value.0 represents system will never enable this after close it for flooding CPU.

show port status

Show port status, including port State,Link,VLAN,Negotiation,Speed,Duplex,Flow control, Rate control ,Priority,Security,BSF control.

show port statistics *<port-id>*

Show port statistics, including TxGoodPkt, TxBadPkt, RxGoodPkt, RxBadPkt,TxAbort, Collision, and DropPkt.

Parameters:

<*port-id*> specifies the port to be shown.

show port protection

Show protected port information.

4.0.3.1 VLAN

4.0.3.1.0 Virtual LANs

A Virtual LAN (VLAN) is a logical network group that limits the broadcast domain. It allows you to isolate network traffic so only members of the VLAN receive traffic from the same VLAN members. Basically, creating a VLAN within a switch is logically equivalent of reconnecting a group of network devices to another Layer 2 switch. However, all the network devices are still plugged into the same switch physically. A station can belong to more than one VLAN group. VLAN prevents users from accessing network resources of another on the same LAN, thus the users can not see the hard disks and printers of another user in the same building. VLAN can also increase the network performance by reducing the broadcast traffic and enhance the security of the network by isolating groups.

This Switch supports two types of VLANs:

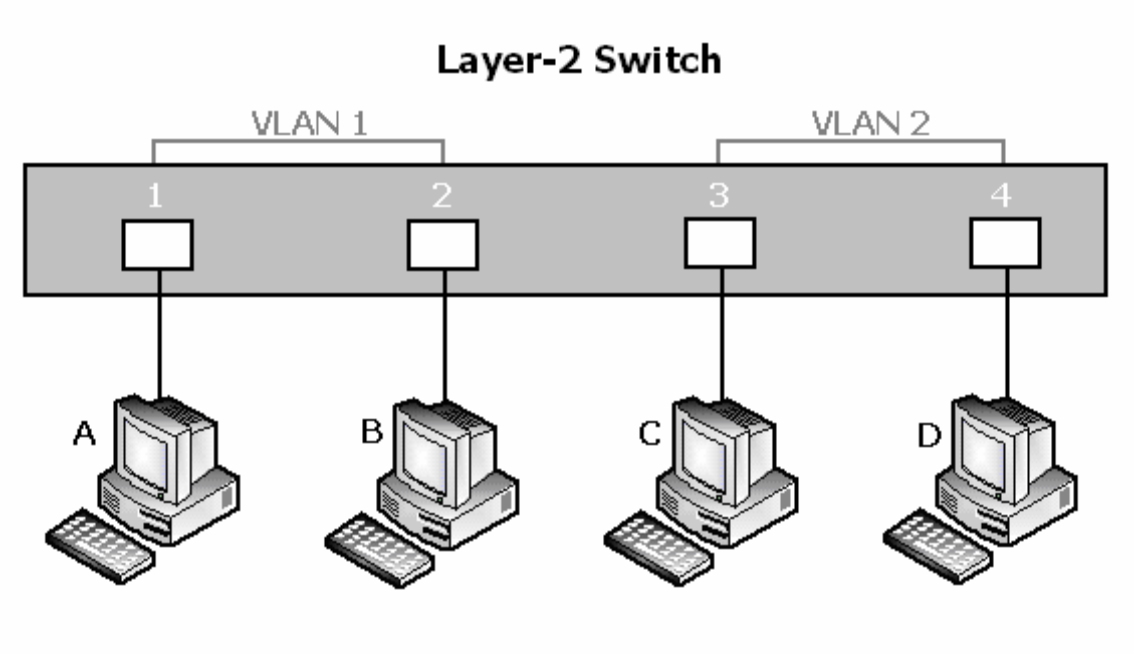
• Port-based

• IEEE 802.1Q (tag) –based

Note:

1. Only one of the two VLAN types can be enabled at one time.
2. Example of VLAN settings, please refer to Appendix B.

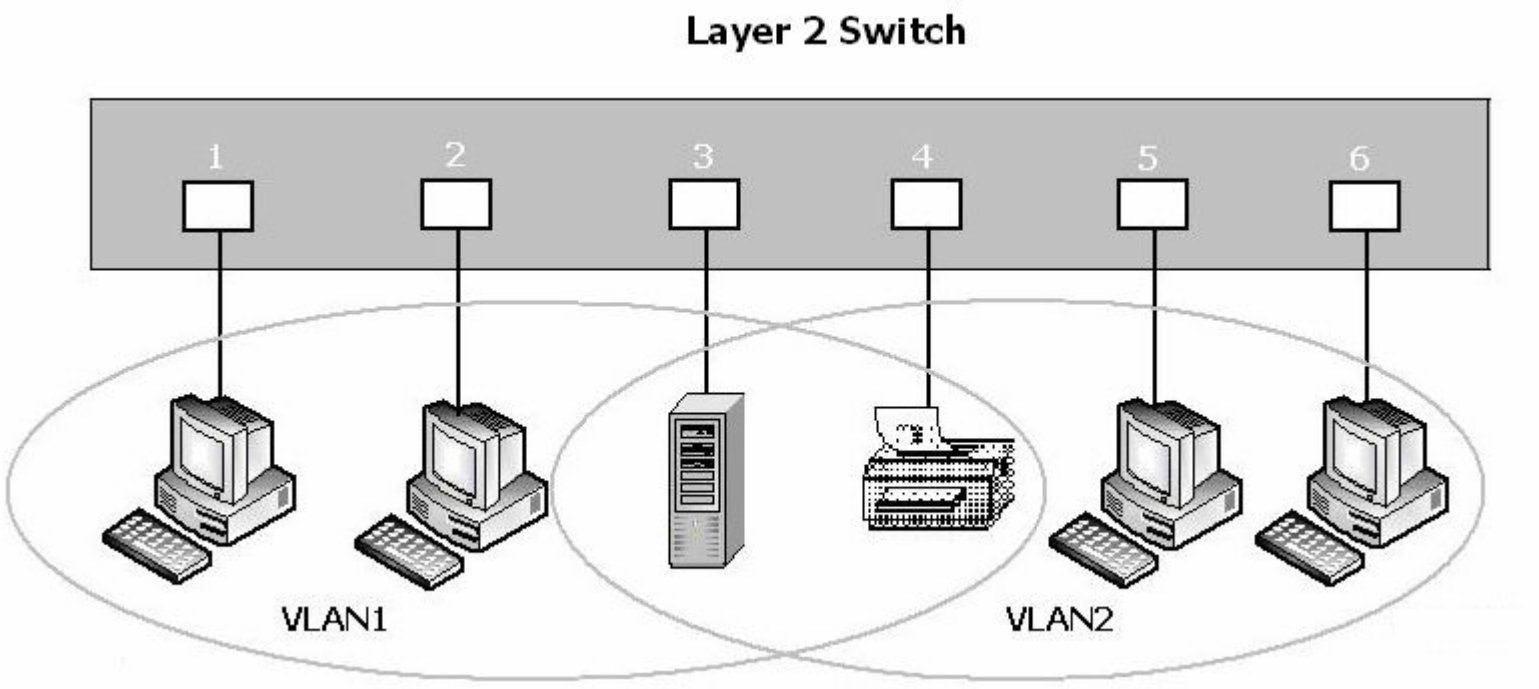
Port-based VLANs are VLANs where the packet forwarding decision is made based on the destination MAC address and its associated port. You must define the outgoing ports allowed for each port when you use port-based VLANs. In port-based VLANs, the packets received from one port can only be sent to the ports which are configured to the same VLAN. As shown in the following figure, the switch administrator configured port 1~2 as VLAN 1 and port 3~4 as VLAN 2. The packets received from port 1 can only be forwarded to port 2. The packets received from port 2 can only be forwarded to port 1. That means the computer A can send packets to computer B, and vice versa. The same situation also occurred in VLAN 2. The computer C and D can communicate with each other. However, the computers in VLAN 1 can not see the computers in VLAN 2 since they belonged to different VLANs.



IEEE 802.1Q (tag) -based VLANs enable the Ethernet functionality to propagate tagged packets across the bridges and provides

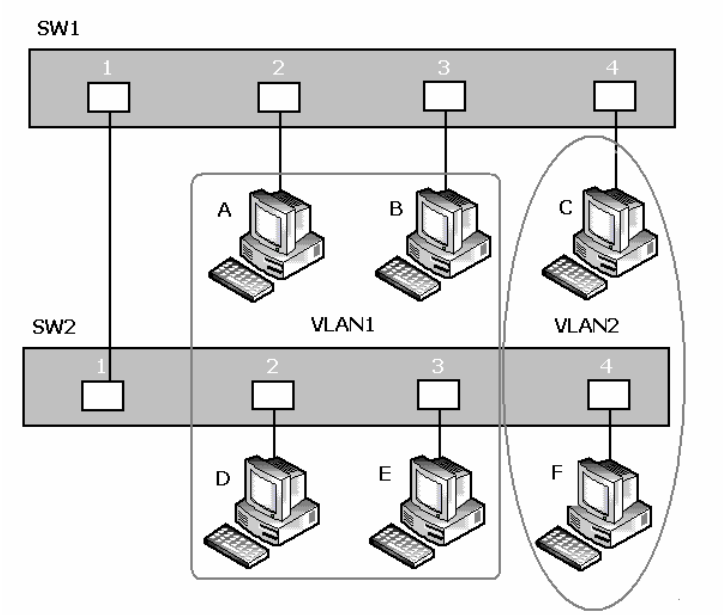
a uniform way for creating VLAN within a network then span across the network. For egress packet, you can choose to tag it or not with the associated VLAN ID of this port. For ingress packet, you can forward this packet to a specific port as long as it is also in the same VLAN group.

The 802.1Q VLAN works by using a tag added to the Ethernet packets. The tag contains a VLAN Identifier (VID) which belongs to a specific VLAN group. And ports can belong to more than one VLAN.



The difference between a port-based VLAN and a tag-based VLAN is that the tag-based VLAN truly divided the network into several logically connected LANs. Packets rambling around the switches can be forwarded more intelligently. In the figure shown

below, by identifying the tag, broadcast packets coming from computer A in VLAN1 at sw1 can be forwarded directly to VLAN1. However, the switch could not be so smart in the port-based VLAN mechanism. Broadcast packets will also be forwarded to port 4 of sw2. It means the port-based VLAN can not operate a logical VLAN group among switches.



The NV-2400H supports both port-based VLAN and tag-based (802.1Q) VLAN modes. The default configuration is tag-based (802.1Q) VLAN. In the 802.1Q VLAN, initially, all ports on the switch belong to default VLAN, VID is 1.

Note:

You cannot delete the default VLAN group in 802.1Q VLAN mode.

4.0.3.1.1 VLAN Mode

VLAN Mode: Port based

Packets can go among only members of the same VLAN group. Note all unselected ports are treated as belonging to another single VLAN. If the port-based VLAN enabled, the VLAN-tagging is ignored.

show vlan mode

Display the current VLAN mode.

vlan mode (disabled|port-based|dot1q)

Change VLAN mode.

Parameters:

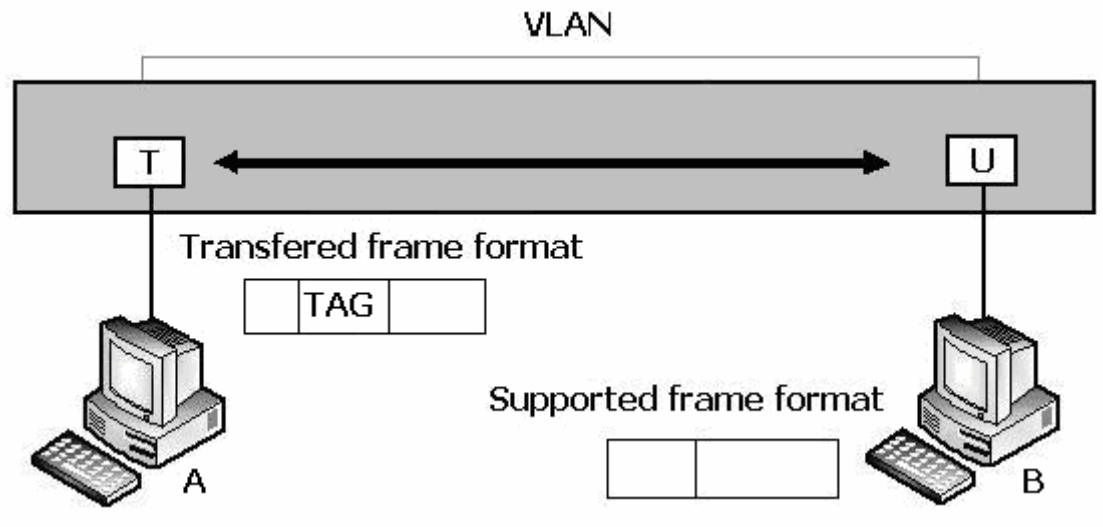
(disabled|port-based|dot1q) specifies the VLAN mode.

Note:

Change the VLAN mode for every time, user have to restart the switch for valid value.

VLAN Mode: 802.1Q

In the setting, port was set to Untagged if devices underneath this port do not support VLAN-tagging. Thus the switch can send untagged frames to this port. Consequently, device that do not support VLAN-tagging or do not enable VLAN tagging could successfully fetch the incoming frames and could communicate with device that transfers tagged frames, and vice versa. In the following figure, two different types of devices want to communicate with each other. Since computer A support 802.1Q VLAN and computer B do not, you have to configure two ports both beneath the same VLAN group, and set left port to "Tagged", right port to "Untagged". Therefore, two devices will receive packet type as they desired.



4.0.3.1.2 Advanced 802.1Q VLAN Setting

Ingress filters configuration

When a packet was received on a port, you can govern the switch to drop it or not if it is an untagged packet. Furthermore, if the received packet is tagged but not belonging to the same VALN group of the receiving port, you can also control the switch to forward or drop the packet. The example below configures the switch to drop the packets not belonging to the same VLAN group and forward the packets not containing VLAN tags.

VLAN Commands

show vlan mode

Display the current VLAN mode.

vlan mode (disabled|port-based|dot1q)

Change VLAN mode.

Parameters:

(disabled|port-based|dot1q) specifies the VLAN mode.

Note:

Change the VLAN mode for every time, user have to restart the switch for valid value.

vlan add <1-4094> <NAME> <cpu-port|no-cpu-port> <LIST> [<LIST>]

Add or edit VLAN entry.

Parameters:

<1-4094> specifies the VLAN id or Group id (if port based VLAN mode)

<NAME> specifies the VLAN group name.

<cpu-port|no-cpu-port> specifies the CPU port belong this VLAN group.

1st <LIST> specifies the ports to be set to VLAN members.

2nd [<LIST>] specifies the ports to be set to tagged members. If not entered, all members set to untagged.

e.g. vlan add 1 vlan1 cpu-port 1-4 . This VLAN entry has four members (from port1 to port4) and all members are untagged.

no vlan <1-4094>

Delete VLAN entry.

Parameters:

<1-4094> specifies the VLAN id or group id (if port based VLAN).

e.g. no vlan 1

show vlan [<1-4094>]

Show VLAN entry information.

Parameters:

[<1-4094>] specifies the VLAN id, null means all valid entries.

e.g. show vlan 1

show vlan static

Show static VLAN entry information.

vlan pvid <LIST> <1-4094>

Set port default VLAN id.

Parameters:

<LIST> specifies the ports to be set.

<1-4094> specifies the port VLAN id.

show vlan pvid [<LIST>]

Show port default VLAN id.

Parameters:

[<LIST>] specifies the ports to be showed. If not entered, all port's PVID will be showed.

vlan filter <enable|disable> <enable|disable> <LIST>

Set ingress filter rules.

Parameters:

1st <enable|disable> specifies the non-members packet will be forwarded or not. If set enable, forward only packets with VID matching this port's configured VID.
2nd <enable|disable> specifies the untagged frame will be dropped or not. If set enable, drop untagged frame.
<LIST> specifies the port list (eg. 3, 6-8)

show vlan filter [<LIST>]

Show VLAN filter setting.
Parameters:
[<LIST>] specifies the ports to be showed. If not entered, all ports' filter rules will be showed.

GVRP Commands

[no] gvrp

Enable or disable GVRP.

show gvrp status

Show GVRP enable or disable status.

[no] port gvrp <LIST>

Enable or disable GVRP by port.
Parameters:
<LIST> specifies the port list to be set

show port gvrp

Show GVRP status by port.

garp timer <join | leave | leave-all> <0..65535>

Set GARP timer.

Parameters:

<join | leave | leave-all> specifies a timer (Join, Leave, or Leave-All) to be set

<0..65535> specifies the timer in seconds.

show garp timer

Show GARP timer.

show gvrp db

Show GVRP DB.

show gvrp gip

Show GVRP GIP.

show gvrp machine

Show GVRP machine.

clear gvrp statistics <LIST>

Clear GVRP statistics by port.

Parameters:

<LIST> specifies the port list to be set

show gvrp statistics <LIST>

Show GVRP statistics by port.

Parameters:

<LIST> specifies the port list to be set

[no] gvrp debug [<sys | err | pdu | db | gen | garp | gvrp | vlan>]

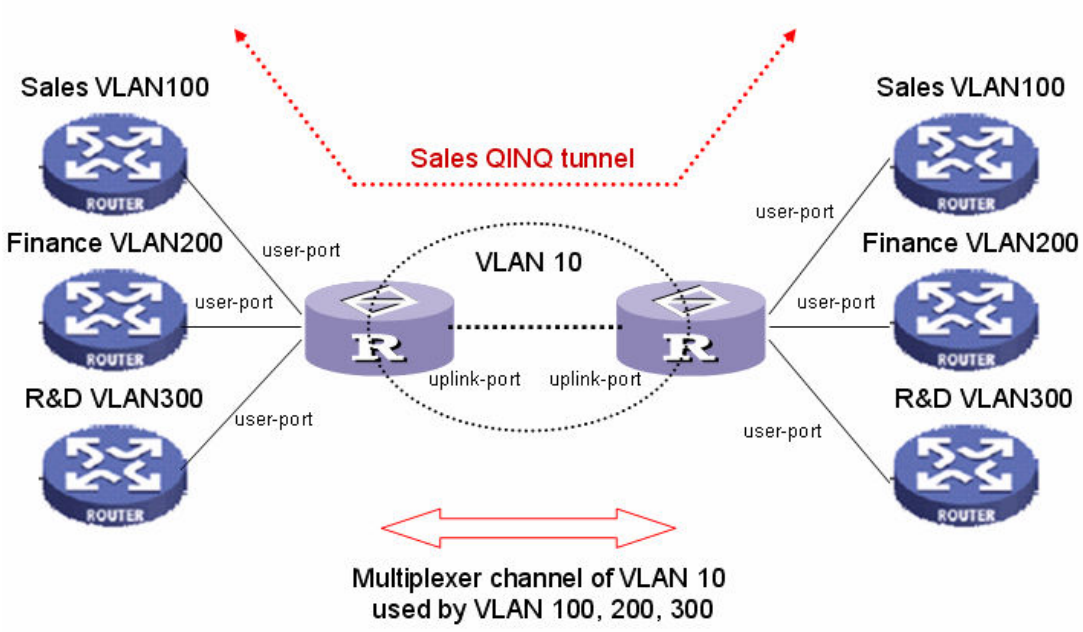
Enable/disable GVRP debugging output.

4.0.3.1.3 QinQ VLAN Setting

Business customers of service providers often have specific requirements for VLAN IDs and the number of VLANs to be supported. The VLAN ranges required by different customers in the same service-provider network might overlap, and traffic of customers through the infrastructure might be mixed. Assigning a unique range of VLAN IDs to each customer would restrict customer configurations and could easily exceed the VLAN limit (4096) of the IEEE 802.1Q specification. Using the QinQ feature, service providers can use a single VLAN to support customers who have multiple VLANs. Customer VLAN IDs are preserved, and traffic from different customers is segregated within the service-provider network, even when they appear to be in the same VLAN. Using QinQ expands VLAN space by using a VLAN-in-VLAN hierarchy and retagging the tagged packets.

Virtual private networks (VPNs) provide enterprise-scale connectivity on a shared infrastructure, often Ethernet-based, with the same security, prioritization, reliability, and manageability requirements of private networks. QinQ is a feature designed for service providers who carry traffic of multiple customers across their networks and are required to maintain the VLAN and Layer 2 protocol configurations of each customer without impacting the traffic of other customers.

The following figure is an example of QinQ VLAN application.



QinQ Commands

qinq enable

Enable QinQ.

[no] qinq

Disable QinQ.

qinq tpid <TPIDVAL>

Set QinQ tpid.

Parameters:

<TPIDVAL> specifies QinQ tpid value (Hex, 1~FFFF)

qinq userport <enable|disable> <LIST>

A port configured to support client end of QinQ tunnel is called a QinQ user-port. Use this command to enable/disable QinQ userport to specified port(s).

qinq uplinkport <enable|disable> <LIST>

A port configured to support network end of QinQ tunnel is called a QinQ uplink-port. Use this command to enable/disabel QinQ uplinkport to specified port(s).

qinq tunnel add <1-25> <1-4094> <LIST>

Add QINQ tunnel.

Parameters:

<1-25> specifies the tunnel ID

<1-4094> specifies the VLAN ID

<LIST> specifies the ports to be set to QINQ tunnel.

qinq tunnel delete <1-25>

Delete QinQ tunnel.

Parameters:

<1-25> specifies the tunnel ID

show qinq configuration

Show QinQ global and portal configuration

show qinq tunnel

Show QinQ tunnel information

For example, refer to the figure of QinQ application in previous page, a QinQ tunnel using VLAN10 wants to be created for Sales VLAN100 across the public network. Port1 on left-side VDLS2 IP DSLAM connects to Sales VLAN100 client. Port16 of switch connects to the public network. The following commands needs to be set:

qinq enable

qinq tpid 8100

qinq userport enable 1

qinq uplinkport enable 16

qinq tunnel add 1 10 1,16

4.0.3.2 Misc Configuration

[no] mac-age-time

Enable or disable MAC address age-out.

mac-age-time <6..1572858> Set MAC address age-out time.

Parameters:

<6..1572858> specifies the MAC address age-out time. The value must be divisible by 6. Type the number of seconds that an inactive MAC address remains in the switch's address table

show mac-age-time

Show MAC address age-out time

broadcast mode <off | 1/2 | 1/4 | 1/8 | 1/16>

Set broadcast storm filter mode to off, 1/2, 1/4, 1/8, 1/16

broadcast select <unicast/multicast | control packet | ip multicast | broadcast>

Select the Broadcast storm filter packet type:

Unicast/Multicast: Flood unicast/multicast filter

Control Packets: Control packets filter

IP multicast: Ip multicast packets filter

Broadcast Packets: Broadcast Packets filter

Collision-Retry <off | 16 | 32 | 48>

Parameters:

<off|16|32|48> In half duplex, collision-retry maximum is 16, 32 or 48 times and packet will be dropped if collisions still happen. In default (off), if collision happens, it will retry forever.

Hash <crc-hash | direct-map>

Set hash algorithm to CRC-Hash or DirectMap.

4.0.3.3 Administration

4.0.3.3.0 Change Username/Password

hostname <*name-str*>

Set switch name.

<*name-str*> specifies the switch name. If you would like to have spaces within the name, use quotes ("") around the name.

no hostname

Reset the switch name to factory default setting.

[no] password <manager | operator | all>

Set or remove username and password for manager or operator. The manager username and password is also used by the web UI.

4.0.3.3.1 IP Configuration

User can configure the IP setting and fill in the new value.

ip address <*ip-addr*> <*ip-mask*>

Set IP address and subnet mask.

ip default-gateway <*ip-addr*>

Set the default gateway IP address.

show ip

Show IP address, subnet mask, and the default gateway.

show info

Show basic information, including system info, MAC address, and firmware version.

dhcp

Set IP DSLAM as dhcp client, it can get ip from dhcp server

Note:

If this command is set, the IP DSLAM will reboot.

show dhcp

show dhcp enable/disable

4.0.3.4 Port Mirroring

Port monitoring is a feature to redirect the traffic occurred on every port to a designated monitoring port on the IP DSLAM . With this feature, the network administrator can monitor and analyze the traffic on the entire LAN segment. In NV-2400H, you can specify one port to be the monitoring port and any single port to be the monitored port. You also can specify the direction of the traffic that you want to monitor. After properly configured, packets with the specified direction from the monitored ports are forwarded to the monitoring port.

Note:

1. The default Port Monitoring setting is disabled.
2. The analysis port is dedicated as mirroring port with duplicated traffic flow from mirrored port. The ordinary network traffic is not available for the analysis port.
3. Any member port is not available for this function

mirror-port <rx | tx | both> *<port-id> <port-list>* Set port monitoring information. (RX only|TX only|both RX and TX)

Parameters:

rx specifies monitoring rx only.

tx specifies monitoring tx only.

both specifies monitoring both rx and tx.

<port-id> specifies the analysis port ID. This port receives traffic from all monitored ports.

<port-list> specifies the monitored port list.

show mirror-port

Show port monitoring information

4.0.3.5 Quality of Service

There are four transmission queues with different priorities in NV-2400H: Highest, SecHigh, SecLow and Lowest. The switch will take packets from the four queues according to its QoS mode setting. If the QoS mode was set to "Disable", the switch will not perform QoS on its switched network. If the QoS mode was set to "High Empty Then Low", the switch will never exhaust packets from a queue until the queues with higher priorities are empty. If the QoS mode was set to "weight ratio", the switch will exhaust packets from the queues according to the ratio. The default value of QoS mode is "weight 8:4:2:1." That means the switch will first exhaust 8 packets from the queue with highest priority, and then exhaust 4 packets from the queue with second high priority, and so on.

When the switch received a packet, the switch has to decide which queue to put the received packet into. In NV-2400H, the switch will put received packets into queues according to the settings of "802.1p Priority" and "Static Port Ingress Priority." When the received packet is an 802.1p tagged packet, the switch will put the packet into a queue according to the 802.1p Priority setting. Otherwise, the switch will put the packet into a queue according the setting of Static Port Ingress Priority.

802.1p Priority: the 802.1p packet has a priority tag in its packet header. The range of the priority is 7~0. The NV-2400H can specify the mapping between 802.1p priority and the four transmission queues. In the default setting, the packets with 802.1p priority 0~1 are put into the queue with lowest priority, the packets with 802.1p priority 2~3 are put into queue with second low priority, and so on.

Static Port Ingress Priority: each port is assigned with one priority 7~0. The priority of the packet received from one port is set to the same priority of the receiving port. When the priority of the received packet was determined, the packet is treated as an 802.1p packet with that priority and will be put into a queue according to the 802.1p Priority setting.

4.0.3.5.0 QoS Configuration

QoS Mode:

First Come First Service: The sequence of packets sent is depending on arrive orders.

All High before Low: The high priority packets sent before low priority packets.

WRR: Weighted Round Robin. Select the preference given to packets in the switch's high-priority queue. These options represent the number of higher priority packets sent before one lower priority packet is sent.

For example, 8 Highest：4 second-high means that the switch sends 8 highest-priority packets before sending 4 second high priority packets.

Qos Level: 0~7 priority level can map to highest, second-high, second-low, lowest queue.

Commands:

qos priority <first-come-first-service | all-high-before-low |weighted-round-robin> [<*highest-weight*>][<sec*highweight*>][<sec *low -weight*>] [<*lowest-weight*>]

Set 802.1p priority.

e.g. qos priority weighted-round-robin 8,4,2,1

qos level < highest | second-high | second-low | lowest > <*level-list*>

Set priority levels to highest, second-high, second-low and lowest.

Parameters:

<*level-list*> specifies the priority levels to be high or low. Level must be between 1 and 7.

e.g. qos level highest 7

e.g. qos level lowest 4

show qos

Show QoS configurations, including 802.1p priority, priority level.

e.g. show qos
QoS configurations:
QoS mode: first come first service
Highest weight: 8
Second High weight: 4
Second Low weight: 2
Lowest weight: 1
802.1p priority[0-7]:
Lowest Lowest SecLow SecLow SecHigh SecHigh Highest Highest

4.0.3.5.1 Per Port Priority

port priority <disable | [0-7]> [<*port-list*>]

Set port priority.

Parameters:

[<*port-list*>] specifies the ports to be set. If not entered, all ports ar

e.g. port priority disable 1-5

4.0.3.6 MAC Address Table

clear mac-address-table

Clear all dynamic MAC address table entries.

mac-address-table static <*mac-addr*> <*vlan-id*> <*port-id* | *port-list*>

Set static unicast or multicast MAC address. If multicast MAC address (address beginning with 01:00:5E) is supplied, the last parameter must be *port-list*. Otherwise, it must be *port-id*.

no mac-address-table static <*mac-addr*> <*vlan-id*>

Delete static unicast or multicast MAC address table entries.

show mac-address-table

Display MAC address table entries.

show mac-address table static

Display static MAC address table entries.

show mac-address-table multicast

Display multicast related MAC address table.

smac-address-table static <*mac-addr*> <*vlan-id*> <*port-id* | *port-list*>

Set static unicast or multicast MAC address in secondary MAC address table. If multicast MAC address (address beginning with 01:00:5E) is supplied, the last parameter must be *port-list*. Otherwise, it must be *port-id*.

show smac-address-table

Display secondary MAC address table entries.

show smac-address-table multicast

Display multicast related secondary MAC address table.

[no] filter <*mac-addr*> <*vlan-id*>

Set MAC address filter. The packets will be filtered if both of the destination MAC address and the VLAN tag matches the filter entry. If the packet does not have a VLAN tag, then it matches an entry with VLAN ID 1.

show filter

Display filter MAC address table.

4.0.3.7 MAC Limit

MAC limit allows users to set a maximum number of MAC addresses to be stored in the MAC address table. The MAC addresses chosen to be stored in MAC address table is the result of first-come-first-save policy. Once a MAC address is stored in the MAC address table, it stays in until it is aged out. When an "opening" is available, the switch stored the first new MAC address it sees in that opening. All packets from MAC addresses not in the MAC address table should be blocked.
User can configure the MAC limit setting and fill in the new value.

mac-limit

Enable MAC limit.

no mac-limit

Disable MAC limit.

Mac-limit <port-list> <1-64>

Set port MAC limit value, 0 to turn off MAC limit of port.

show mac-limit

Show MAC limit information, including MAC limit enable/disable, per-port MAC limit setting.

4.0.4 Protocol Related Configuration

4.0.4.0 STP/RSTP

[no] spanning-tree

Enable or disable spanning-tree.

spanning-tree forward-delay <*4-30*>

Set spanning tree forward delay used, in seconds.

Parameters:

<*4-30*> specifies the forward delay, in seconds. Default value is 15.

Note: The parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

spanning-tree hello-time <*1-10*>

Set spanning tree hello time, in seconds.

Parameters:

<*1-10*> specifies the hello time, in seconds. Default value is 2.

Note: The parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

spanning-tree maximum-age <*6-40*>

Set spanning tree maximum age, in seconds.

Parameters:

<*6-40*> specifies the maximum age, in seconds. Default value is 20.

Note: The parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

spanning-tree priority <*0-61440*>

Set spanning tree bridge priority.

Parameters:

<*0-61440*> specifies the bridge priority. The value must be in steps of 4096.

spanning-tree port path-cost <*1-200000000*> [<*port-list*>]

Set spanning tree port path cost.

Parameters:

<*1-200000000*> specifies port path cost.

[<*port-list*>] specifies the ports to be set. Null means all ports.

spanning-tree port priority <*0-240*> [<*port-list*>]

Set spanning tree port priority.

Parameters:

<*0-240*> specifies the port priority. The value must be in steps of 16.

[<*port-list*>] specifies the ports to be set. Null means all ports.

show spanning-tree

Show spanning-tree information.

show spanning-tree port [<*port-list*>]

Show spanning tree per port information.

Parameters:

[<*port-list*>] specifies the port to be shown. Null means all ports.

The remaining commands in this section are only for system with RSTP (rapid spanning tree, 802.1w) capability:

[no] spanning-tree debug

Enable or disable spanning tree debugging information.

spanning-tree protocol-version <stp | rstp>

Change spanning tree protocol version.

Parameters:

stp specifies the original spanning tree protocol (STP,802.1d).

rstp specifies rapid spanning tree protocol (RSTP,802.1w).

[no] spanning-tree port mcheck [<*port-list*>]

Force the port to transmit RST BPDUs. No format means not force the port to transmit RST BPDUs.

Parameters:

[<*port-list*>] specifies the ports to be set. Null means all ports.

[no] spanning-tree port edge-port [<*port-list*>]

Set the port to be edge connection. No format means set the port to be non-edge connection.

Parameters:

[<*port-list*>] specifies the ports to be set. Null means all ports.

[no] spanning-tree port non-stp [<*port-list*>]

Disable or enable spanning tree protocol on this port.

Parameters:

[<*port-list*>] specifies the ports to be set. Null means all ports.

spanning-tree port point-to-point-mac <auto | true | false> [<*port-list*>]

Set the port to be point to point connection.

Parameters:

auto specifies point to point link auto connection.

true specifies point to point link true.

false specifies point to point link false.

[<*port-list*>] specifies the ports to be set. Null means all ports.

4.0.4.1 MSTP

[no] spanning-tree

Enable or disable multiple spanning tree.

[no] spanning-tree debug

Enable or disable multiple spanning tree debugging information.

spanning-tree forward-delay <*4-30*>

Set spanning tree forward delay of CIST, in seconds.

Parameters:

<*4-30*> specifies the forward delay, in seconds. Default value is 15.

Note: The parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

spanning-tree hello-time <*1-10*>

Set spanning tree hello time of CIST, in seconds.

Parameters:

<*1-10*> specifies the hello time, in seconds. Default value is 2.

Note: The parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

spanning-tree maximum-age <*6-40*>

Set spanning tree maximum age of CIST, in seconds.

Parameters:

<*6-40*> specifies the maximum age, in seconds. Default value is 20.

Note: The parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

spanning-tree priority <*0-61440*>

Set spanning tree bridge priority of CIST and all MSTIs.

Parameters:

<*0-61440*> specifies the bridge priority. The value must be in steps of 4096. Default value is 32768.

spanning-tree protocol-version { stp | mstp }

Set spanning tree protocol version of CIST.

Parameters:

stp specifies the original spanning tree protocol (STP,802.1d).

mstp specifies the multiple spanning tree protocol (MSTP,802.1s).

spanning-tree max-hops <*1-40*>

Set spanning tree bridge maximum hops of CIST and all MSTIs.

Parameters:

<*1-40*> specifies the bridge maximum hops. Default value is 20.

spanning-tree name [<*name-string*>]

Set spanning tree bridge name of CIST.

Parameters:

[<*name-string*>] specifies the bridge name. Default name is null.

spanning-tree revision <*1-65535*>

Set spanning tree bridge revision of CIST.

Parameters:

<*1-65535*> specifies the bridge revision. Default value is 0.

spanning-tree port path-cost <*1-200000000*> [<*port-list*>]

Set spanning tree port path cost of CIST.

Parameters:

<*1-200000000*> specifies port path cost.

[<*port-list*>] specifies the ports to be set. Null means all ports.

spanning-tree port priority <*0-240*> [<*port-list*>]

Set spanning tree port priority of CIST.

Parameters:

<*0-240*> specifies the port priority. The value must be in steps of 16.

[<*port-list*>] specifies the ports to be set. Null means all ports.

[no] spanning-tree port mcheck [<*port-list*>]

Force the port of CIST to transmit MST BPDUs. No format means not force the port of CIST to transmit MST BPDUs.

Parameters:

[<*port-list*>] specifies the ports to be set. Null means all ports.

[no] spanning-tree port edge-port [<*port-list*>]

Set the port of CIST to be edge connection. No format means set the port of CIST to be non-edge connection.

Parameters:

[<*port-list*>] specifies the ports to be set. Null means all ports.

[no] spanning-tree port non-stp [<*port-list*>]

Disable or enable spanning tree protocol on the CIST port.

Parameters:

[<*port-list*>] specifies the ports to be set. Null means all ports.

spanning-tree port point-to-point-mac <auto | true | false> [<*port-list*>]

Set the port of CIST to be point to point connection.

Parameters:

auto specifies point to point link auto connection.

true specifies point to point link true.

false specifies point to point link false.

[<*port-list*>] specifies the ports to be set. Null means all ports.

spanning-tree mst <*0-15*> priority <*0-61440*>

Set spanning tree bridge priority of MSTI.

Parameters:

<*0-15*> specifies the MSTI instance ID.

<*0-61440*> specifies the MSTI bridge priority. The value must be in steps of 4096. Default value is 32768.

spanning-tree mst <*0-15*> vlan [<*vlan-list*>]

Set MSTI to map VLAN list.

Parameters:

<*0-15*> specifies the MSTI instance ID.

[<*vlan-list*>] specifies the mapped VLAN list. Null means all VLANs.

spanning-tree mst <*0-15*> port path-cost <*1-200000000*> [<*port-list*>]

Set spanning tree port path cost of MSTI.

Parameters:

<*1-200000000*> specifies port path cost.

[<*port-list*>] specifies the ports to be set. Null means all ports.

spanning-tree mst <*0-15*> port priority <*0-240*> [<*port-list*>]

Set spanning tree port priority of MSTI.

Parameters:

<*0-240*> specifies the port priority. The value must be in steps of 16.

[<*port-list*>] specifies the ports to be set. Null means all ports.

no spanning-tree mst <*0-15*>

Delete the specific MSTI.

Parameters:

<*0-15*> specifies the MSTI instance ID.

show spanning-tree

Show spanning-tree information of CIST.

show spanning-tree port [<*port-list*>]

Show spanning tree port information of CIST.

Parameters:

[<*port-list*>] specifies the port to be shown. Null means all ports.

show spanning-tree mst configuration

Show MST instance map.

show spanning-tree mst <*0-15*>

Show MST instance information.

Parameters:

<*0-15*> specifies the MSTI instance ID.

show spanning-tree mst <*0-15*> port <*1-26*>

Show specific port information of MST instance.

Parameters:

<*0-15*> specifies the MSTI instance ID.

<*1-26*> specifies port number.

show vlan spanning-tree

Show per VLAN per port spanning tree status.

4.0.4.2 SNMP

Any Network Management running the simple Network Management Protocol (SNMP) can be management the IP DSLAM .

4.0.4.2.0 System Options

Snmp /no snmp

Enable or disable SNMP.

Show snmp status

Show enable or disable status of SNMP.

snmp system-name <name-str>

Set agent system name string.

Parameters:

<name-str> specifies the system name string.

e.g. snmp system-name SWITCH

snmp system-location <location-str>

Set agent location string.

Parameters:

<location-str> specifies the location string.

e.g. snmp system-location office

snmp system-contact <contact-str>

Set agent system contact string.

Parameters:

<contact-str> specifies the contact string.

e.g. snmp system-contact abc@sina.com

show snmp system

Show SNMP system information.

4.0.4.2.1 Community Strings

snmp community <read-sysinfo-only | read-all-only | read-write-all> <community-str>

Set SNMP community string.

Parameters:

<community-str> specifies the community string.

e.g. snmp community read-all-only public

no snmp community <community-str>

Delete SNMP community string.

Parameters:

<community-str> specifies the community string.

e.g. no snmp community public

show snmp community

Show SNMP community strings.

4.0.4.2.2 Trap Managers

snmp trap <ip-addr> [<community-str>] [<1..65535>]

Set SNMP trap receiver IP address, community string, and port number.

Parameters:

<ip-addr> specifies the IP address.

<community-str> specifies the community string.

<1..65535> specifies the trap receiver port number.

e.g. snmp trap 192.168.200.1 public

no snmp trap <ip-addr> [<1..65535>]

Remove trap receiver IP address and port number.

Parameters:

<ip-addr> specifies the IP address.

<1..65535> specifies the trap receiver port number.

e.g. no snmp trap 192.168.200.1

show snmp trap

Show all trap receivers.

4.0.4.2.3 SNMP V3 VACM (optional)

snmp group <group-name> <v1 | v2c | usm> <security-name>

Join a group.

Parameters:

<group-name> specifies the group name.

<**v1** | **v2c** | **usm**> specifies the security model.

<security-name> specifies the security name.

e.g. snmp group test usm testuser

no snmp group <v1 | v2c | usm> <security-name>

Leave a group.

Parameters:

<**v1** | **v2c** | **usm**> specifies the security model.

<security-name> specifies the security name.

e.g. no snmp group usm testuser

show snmp group

Show group list.

snmp view <view-name> <included | excluded> <view-subtree> <view-mask>

Add a view.

Parameters:

<view-name> specifies the view name.

<included | excluded> specifies the view type.

<view-subtree> specifies the view subtree (e.g. .1.3.6.1.2.1).

<view-mask> specifies the view mask, in hexadecimal digits.

e.g. snmp view testview included 1.3.6.1.2.1 0xff

no snmp view <view-name>

Delete a view.

Parameters:

<view-name> specifies the view name.

e.g. no snmp view system

show snmp view

Show view list.

snmp access <group-name> <v1 | v2c | usm> <noauth | auth | authpriv> <read-name> <write-name> <notify-name>

Add an access control.

Parameters:

<group-name> specifies the group name.

<v1 | v2c | usm> specifies the security model.

<noauth | auth | authpriv> specifies the security level.

<read-name> specifies the access read view name.

<write-name> specifies the access write view name.

<notify-name> specifies the access notify view name.

e.g. snmp access test usm testauth all all all

no snmp access <group-name> <v1 | v2c | usm> <noauth | auth | authpriv>

Delete an access control.

Parameters:

<group-name> specifies the group name.

<v1 | v2c | usm> specifies the security model.

<noauth | auth | authpriv> specifies the security level.

e.g. no snmp access test usm auth

show snmp access

Show access list.

4.0.4.2.4 SNMP V3 USM (optional)

snmp engine-id <enterprise-id> <engine-id>

Setup SNMPv3 engine ID.

Parameters:

<engine-id> specifies the engine ID, in the format of text string.

e.g. snmp engine-id 123456789123456789123456

show snmp engine-id

Show SNMPv3 engine ID.

snmp usm-user <user-name> [<md5 | none>]

Add SNMPv3 USM user.

Parameters:

<user-name> specifies the user name.

<md5 | none> specifies the authentication type.

e.g. Create a user name is testuser and password is 12345678, use auth md5 then enter CLI command:

snmp usm-user testuser md5 <cr>

New password for authentication (8<=length<=32):

12345678<cr>

Retype new password:

12345678<cr>

no snmp usm-user <user-name>

Delete SNMPv3 USM user.

Parameters:

<user-name> specifies the user name.

e.g. no snmp usm-user testuser

show snmp usm-user

Show all SNMPv3 USM users.

4.0.4.3 IGMP

The Internet Group Management Protocol (IGMP) is an internal protocol of the Internet Protocol (IP) suite.

[no] igmp Enable/disable IGMP snooping.

[no] igmp fastleave Enable/disable IGMP snooping fast leave. If enable, switch will fast delete member who send leave report, else wait one second.

[no] igmp querier Enable/disable IGMP snooping querier.

[no] igmp CrossVLAN Enable/disable IGMP snooping CrossVLAN

[no] igmp debug Enable/disable IGMP snooping debugging output.

show igmp <status | router | groups | table>

Show IGMP snooping information.

Parameters:

status specifies IGMP snooping status and statistics information.

router specifies IGMP snooping router's IP address.

groups specifies IGMP snooping multicast group list.

table specifies IGMP snooping IP multicast table entries.

igmp clear_statistics

Clear IGMP snooping statistics counters.

4.0.4.4 802.1x

This IP DSLAM supports IEEE 802.1x standard which provides port-based access control by validating end user's authorization through authentication (RADIUS) server. EAP- MD5/TLS/PEAP authentication types are supported for this IP DSLAM .

[no] dot1x

Enable or disable 802.1x.

radius-server host <ip-addr> <1024..65535> <1024..65535>

Set radius server IP, port number, and accounting port number.

Parameters:

<ip-addr> specifies server's IP address.

1st <1024..65535> specifies the server port number.

2nd <1024..65535> specifies the accounting port number.

radius-server key <*key-str*>

Set 802.1x shared key.

Parameters:

<key-str> specifies shared key string.

radius-server nas <id-str>

Set 802.1x NAS identifier.

Parameters:

<id-str> specifies NAS identifier string.

show radius-server

Show radius server information, including radius server IP, port number, accounting port number, shared key, NAS identifier,

dot1x timeout quiet-period <0..65535>

Set 802.1x quiet period. (default: 60 seconds).

Parameters:

<0..65535> specifies the quiet period, in seconds.

dot1x timeout tx-period <0..65535>

Set 802.1x Tx period. (default: 15 seconds).

Parameters:

<0..65535> specifies the Tx period, in seconds.

dot1x timeout supplicant <1..300>

Set 802.1x supplicant timeout (default: 30 seconds)

Parameters:

<1..300> specifies the supplicant timeout, in seconds.

dot1x timeout radius-server <1..300>

Set radius server timeout (default: 30 seconds).

Parameters:

<1..300> specifies the radius server timeout, in seconds.

dot1x max-req <1..10>

Set 802.1x maximum request retries (default: 2 times).

Parameters:

<1..10> specifies the maximum request retries.

dot1x timeout re-authperiod <30..65535>

Set 802.1x re-auth period (default: 3600 seconds).

Parameters:

<30..65535> specifies the re-auth period, in seconds.

show dot1x

Show 802.1x information, quiet period, Tx period, supplicant timeout, server timeout, maximum requests, and re-auth period.

dot1x port <fu | fa | au | no> <port-list>

Set 802.1x per port information.

Parameters:

fu specifies forced unauthorized.

fa specifies forced authorized.

au specifies authorization.

no specifies disable authorization.

<port-list> specifies the ports to be set.

show dot1x port

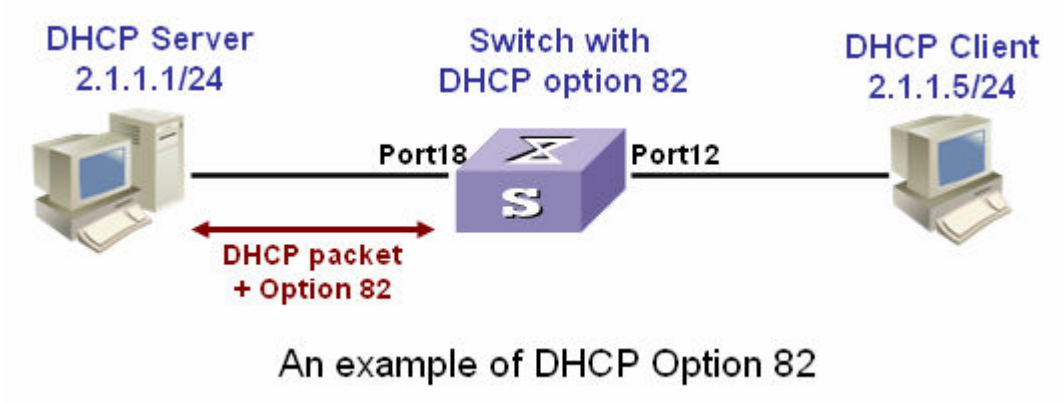
Show 802.1x per port information.

4.0.4.5 DHCP Relay & Option 82

DHCP is widely used in LAN environments to dynamically assign host IP addresses from a centralized server, which significantly reduces the overhead of administration of IP addresses. DHCP also helps conserve the limited IP address space because IP addresses no longer need to be permanently assigned to hosts.

When the **DHCP Option 82** feature is enabled on the switch, a subscriber device is identified by the switch port through which it connects to the network (in addition to its MAC address). Multiple hosts on the subscriber LAN can be connected to the same port on the access switch and are uniquely identified. Option82 Information is inserted by the switch enabled option-82 feature when forwarding client-originated DHCP packets to a DHCP server (RFC 3046). Servers may use this information to implement IP address or other parameter assignment policies. This will significantly enhance the security of DHCP and effectively prevent the attack of DHCP flood.

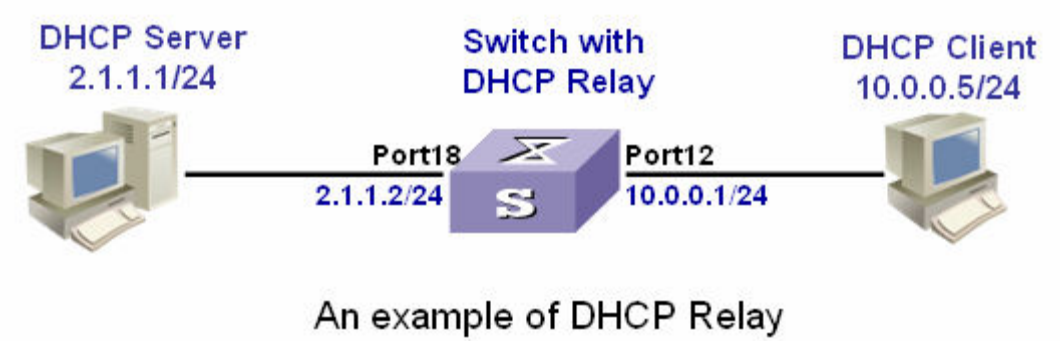
The following figure is an example of DHCP Option 82:



An example of DHCP Option 82

If the **DHCP relay** feature is enabled on the switch, it forwards requests and replies between clients and servers when they are not on the same physical subnet. Relay agent forwarding is different from the normal Layer 2 forwarding, in which IP datagrams are switched transparently between networks. Relay agents receive DHCP messages and generate new DHCP messages to send on output interfaces. So DHCP server can provide IP addresses to clients spanning multiple subnets instead of deploying a DHCP server on every subnet.

The following figure is an example of DHCP relay:



An example of DHCP Relay

The following commands are provided for DHCP option82 / relay configuration:

[no] dhcp-option82

Enable/disable DHCP option82 function.

[no] dhcp-relay

Enable/disable DHCP relay function.

dhcp-option82 <enable | disable> <LIST>

Enable/disable port-based option82 function.

dhcp-relay <enable | disable> <LIST> <IP address>

Enable/disable port-based DHCP relay function.

dhcp router <LIST>

Set DHCP router port

show dhcp configuration

Show DHCP configuration information

For example, refer to the figure of DHCP option 82 in the previous page, use the following commands to achieve:

dhcp-option82

dhcp router 18

dhcp-option82 enable 12

Refer to the example figure of DHCP relay application, use the following commands to achieve:

dhcp-relay

dhcp router 18

dhcp-relay enable 10.0.0.1 12

4.0.4.6 LLDP

Link Layer Discovery Protocol (LLDP) operates on data link layer. It stores and maintains the information about the local device and the devices directly connected to it for network administrators to manage networks through NMS (network management systems). In LLDP, device information is encapsulated in LLDP PDUs in the form of TLV (meaning type, length, and value) triplets and is exchanged between directly connected devices. Information in LLDP PDUs received is restored in its MIB.

Note:

Currently the LLDP neighbor(s) can be seen through the console only. SNMP browser will be supported in the future.

LLDP Operation Mode

LLDP can operate in one of the following modes.

LLDP Mode	Description
TxRx mode	A port in this mode sends and receives LLDP PDUs
Tx mode	A port in this mode only sends LLDP PDUs
Rx mode	A port in this mode only receives LLDP PDUs
Disable mode	A port in this mode does not send or receive LLDP PDUs

LLDP is initialized when an LLDP-enabled port changes to operate in another LLDP operating mode. To prevent LLDP from being initialized too frequently, LLDP undergoes a period before being initialized on an LLDP-enabled port when the port changes to operate in another LLDP operating mode. The period is known as initialization delay, which is determined by the re-initialization delay timer.

Sending LLDP PDUs

A LLDP-enabled device operating in the TxRx mode or Tx mode sends LLDP PDUs to its directly connected devices periodically. It also sends LLDP PDUs when the local configuration changes to inform the neighboring devices of the change timely. In any of the two cases, an interval exists between two successive operations of sending LLDP PDUs. This prevents the network from being overwhelmed by LLDP PDUs even if the LLDP operating mode changes frequently.

To enable the neighboring devices to be informed of the existence of a device or an LLDP operating mode change (from the disable mode to TxRx mode, or from the Rx mode to Tx mode) timely, a device can invoke the fast sending mechanism. In this case, the interval to send LLDP PDUs changes to one second. After the device sends specific number of LLDP PDUs, the interval restores to the normal. (A neighbor is discovered when a device receives an LLDPDU and no information about the sender is locally available.)

Receiving LLDP PDUs

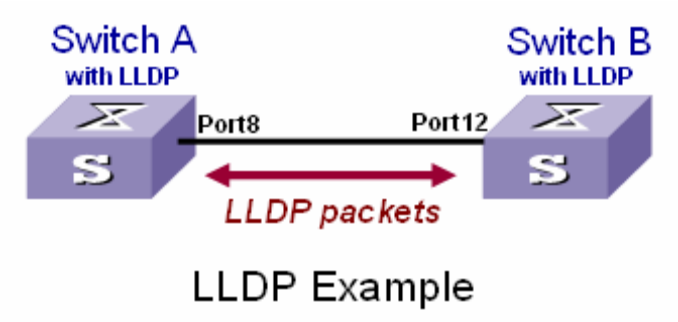
An LLDP-enabled device operating in the TxRx mode or Rx mode validates the TLVs carried in the LLDP PDUs which receive and store the valid neighboring information. An LLDP PDU also carries a TTL (time to live) setting with it. The information about a neighboring device maintained locally ages out when the corresponding TTL expires.

The TTL of the information about a neighboring device is determined by the following expression:

TTL = LLDP hold time × LLDP PDU sending interval (hello-time)

You can set the TTL by configuring the LLDP hold-time and hello-time. Note that the TTL can be up to 65535 seconds. TTL longer than it will be rounded off to 65535 seconds.

The following figure is an example of LLDP connection:



LLDP Example

LLDP Commands

[no] lldp

Enable/Disable LLDP global option

lldp hello-time <5-32768>

Set LLDP hello time which is the time interval between the transmission LLDP info packets. The range is from 5 to 32768 seconds. Default is 30 seconds.

lldp hod-time <2-10>

Set LLDP hold time. The range is from 2 to 10. Default is 4.

lldp port <rx|tx|both> [<PORT-LIST>]

Set LLDP port-based receive and transmit packet mode.

Parameters:

<rx|tx|both> **rx:** the port only receive LLDP packets; **tx:** the port only transmit LLDP packets;

both: the port can receive and transmit LLDP packets.

[<PORT-LIST>] specifies the ports to be set. If not specified, all ports are set.

no lldp port [<PORT-LIST>]

Disable LLDP port-based receive and transmit packet mode.

Parameters:

[<PORT-LIST>] specifies the ports to be set. If not specified, all ports are set.

show lldp

Show the LLDP global option, all the ports configuration and the neighbor's information.

show lldp port [<PORT-LIST>]

show LLDP port configuration and the neighbor's information..

Parameters:

[<PORT-LIST>] specifies the ports to be set. If not specified, all ports are set.

An LLDP example refer to the figure in previous page, the following commands will be used:

lldp (for switch A & B)

lldp port both 8 (for switch A)

lldp port both 12 (for switch B)

show lldp port 8 (for switch A to see the switch B's LLDP info learned by Switch A)

Port8 Information

State : RX and TX
Pkt Tx : 3868
Pkt Rx : 46409
Neighbor Count : 1
Neighbor 1 information
TTL Time : 5879
Class ID : 56:78:17:45:25:00
Port ID : port(12)
System Name :
System Description : Switch v2.16
Port Description : Port 12
Port SetSpeed : Auto
Port ActualSpeed : FULL-100

4.0.5 Syslog

syslog-server <server-ip> <logging-level>

Setting the syslog server and loging level.

Parameters:

<server-ip> specifies the syslog server IP

<logging-level> specifies the logging level (0: none; 1: major; 2: all)

show syslog-server

Display the syslog server IP and logging level

4.0.6 Reboot switch

4.0.6.0 Reset to Default

erase startup-config

Reset configurations to default factory settings at next boot time.

4.0.6.1 Restart

boot

Reboot (warm-start) the switch.

4.0.7 TFTP Function

4.0.7.0 TFTP Firmware Update

copy tftp firmware <ip-addr> <remote-file>

Download firmware from TFTP server.

Parameters:

<ip-addr> specifies the IP address of the TFTP server.

<remote-file> specifies the file to be downloaded from the TFTP server.

4.0.7.1 Restore Configure File

copy tftp <running-config | flash> <ip-addr> <remote-file>

Retrieve configuration from the TFTP server. If the remote file is the text file of CLI commands, use the keyword **running-config**. If the remote file is the configuration flash image of the switch instead, use the keyword **flash**.

Parameters:

<ip-addr> specifies the IP address of the TFTP server.

<remote-file> specifies the file to be downloaded from the TFTP server.

4.0.7.2 Backup Configure File

Send configuration to the TFTP server. If you want to save the configuration in a text file of CLI commands, use the keyword

running-config

If you want to save the configuration flash image instead, use the keyword **flash**.

Parameters:

<ip-addr> specifies the IP address of the TFTP server.

<remote-file> specifies the file to be backed up to the TFTP server.

4.0.8 Access Control List

Packets can be forwarded or dropped by ACL rules include IPv4 or non-IPv4 packets. This switch can be used to block packets by maintaining a table of packet fragments indexed by source and destination IP address, protocol, and so on.

Note:

This function is available only in the 802.1q VLAN enabled environment.

4.0.8.0 IPv4 ACL commands

no acl <group id>

Delete ACL group.

Parameters:

<group id> specifies the group id (1~220).

e.g. no acl 1

no acl count <group id>

Reset the ACL group count

Parameters:

<group id> specifies the group id (1~220).

Enable/Disable acl <group id>

Reset the ACL group count

Parameters:

<group id> specifies the group id (1~220)

show acl [<group id>]

Show all or ACL group information by group id

Parameters:

<group id> specifies the group id, null means all valid groups.

e.g. show acl 1

```
Group Id : 1
Action : Permit
Rules:
Vlan ID : Any
IP Fragement : Uncheck
Src IP Address : Any
Dst IP Address : Any
L4 Protocol : Any
Port ID : Any
Hit Octet Count : 165074
Hit Packet count : 472
```

acl (add|edit) <group id> (permit|deny) <0-4094> ipv4 <0-255> A.B.C.D A.B.C.D A.B.C.D A.B.C.D (check|unCheck) <0-65535> <0-26>

Add or edit ACL group for IPv4 packets.

Parameters:

(add|edit) specifies the operation.

<group id> specifies the group id (1~220).

(permit|deny) specifies the action. permit: permit packet cross switch; deny: drop packet.

<0-4094> specifies the VLAN id. 0 means don't care.

<0-255> specifies the IP protocol. 0 means don't care.

1st A.B.C.D specifies the **Source IP address**. 0.0.0.0 means don't care.

2nd A.B.C.D specifies the **Mask**. 0.0.0.0 means don't care, 255.255.255.255 means compare all.

3rd A.B.C.D specifies the **Destination IP Address**. 0.0.0.0 means don't care.

4th A.B.C.D specifies the **Mask**. 0.0.0.0 means don't care, 255.255.255.255 means compare all.

(check|unCheck) specifies the IP Fragment. check: Check IP fragment field; unCheck: Not check IP fragment field.

<0-65535> specifies the Destination port number if TCP or UDP. 0 means don't care.

<0-26> specifies the Port id. 0 means don't care.

e.g. acl add 1 deny 1 ipv4 0 192.168.1.1 255.255.255.255 0.0.0.0 0.0.0.0 unCheck 0 0

This ACL rule will drop all packet from IP is 192.168.1.1 with VLAN id=1 and IPv4.

acl (add|edit) <group id> (qosvoip) <0-4094> <0-7> <0-1F> <0-1F> <0-FF> <0-FF> <0-FFFF> <0-FFFF> <0-FFFF> <0-FFFF>

Add or edit ACL group for Ipv4.

Parameters:

(add|edit) specifies the operation.

<group id>specifies the group id (1~220).

(qosvoip) specifies the action, do qos voip packet adjustment.

<0-4094> specifies the VLAN id. 0 means don't care.

<0-1F> specifies the port ID value.

<0-1F> specifies the port ID mask.

<0-FF> specifies the protocol value.

<0-FF> specifies the protocol mask.

<0-FFFF> specifies the source port value.
<0-FFFF> specifies the source port mask.
<0-FFFF> specifies the destination port value.
<0-FFFF> specifies the destination mask.
e.g. acl add 1 qosvoip 1 7 1 1 0 0 0 0 0 0

4.0.8.1 Non-IPv4 ACL commands

no acl <group id> and **show acl [<group id>]** commands are the same as in Ipv4 ACL commands.

acl (add|edit) <1-220> (permit|deny) <0-4094> nonipv4 <0-65535>

Add or edit ACL group for non-Ipv4.

Parameters:

(add|edit) specifies the operation.
<group id> specifies the group id (1~220).
(permit|deny) specifies the action. permit: permit packet cross switch; deny: drop packet.
<0-4094> specifies the VLAN id. 0 means don't care.
<0-65535> specifies the Ether Type. 0 means don't care.

e.g. acl add 1 deny 0 nonipv4 2054
This ACL rule will drop all packets for ether type is 0x0806 and non-IPv4

4.0.8.2 SIP/SMAC Binding

Source IP (SIP) / Source MAC (SMAC) address binding is another type of ACL rule to provide secured access to the switch. Only the traffic which matches all criteria of specified source IP address, source MAC address, VLAN ID and port number can be

allowed to access to the switch. This function is also called IP-MAC lock.

bind

Enable binding function.

no bind

Disable binding function.

no bind <group id>

Delete Binding group.

Parameters:

<group id> specifies the group id (1~220).

e.g. no bind 1

show bind [<group id >]

Show Binding group information.

Parameters:

<group id> specifies the group id (1~220), null means all valid groups.

e.g. show bind 1

bind add < group id > A:B:C:D:E:F <0-4094> A.B.C.D <1-26>

Add Binding group.

Parameters:

< group id > specifies the group id (1~220).

1st A.B.C.D specifies the MAC address.

<0-4094> specifies the VLAN id. 0 means don't care.

2nd A.B.C.D specifies the Source IP address. 0.0.0.0 means don't care.

3rd A.B.C.D specifies the IP Address.

<1-26> specifies the Port id.

e.g. bind add 1 00:11:22:33:44:55 0 192.168.1.1 1. This Binding rule will permit all packet cross switch from device's IP is 192.168.1.1 and MAC is 00:11:22:33:44:55 and this device connect to switch port id=1.

4.1 Remote Network Management

IP Setting

You must setup the "IP Address" with the local serial console port (RS-232 Port), and then you can use this IP address to control this Ethernet Switch by **Telnet** and **WEB.** Or you can change your computer's IP domain same with Ethernet Switch. Then use the default IP address to control this Switch

1. Remote control by "Telnet"

To enter Telnet, type the IP address of the Ethernet Switch to connect management system. And type User name and password.

Default User Name: admin

Default Password: admin

Notes:

1. For security purpose, we limit the user log-in number on Telnet and Console port. Thus you can't log-in Telnet and Console port at the same time. But you can log-in Telnet and Console port at a different time.
2. WEB Login does not have user login limitation.
   When you would like to finish console port configuration, you need log-out to leave. Otherwise you can't access Telnet.
3. Please note that you need logout when you exit the telnet function.

2. Network control by "WEB"

1.It provide a WEB browser to manage and monitor the switch, that default values are as followings：

If you need change IP address in first time，you can use console mode to modify it.

Default IP Address：192.168.0.100

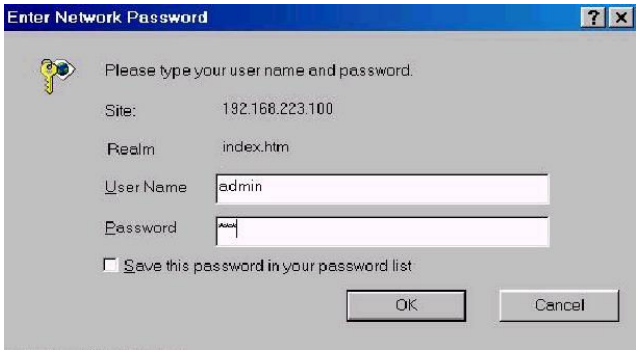
Subnet Mask： 255.255.255.0

Default Gateway：192.168.0.254

User Name：admin

Password： admin

2. Please access **http://192.168.0.100** via web ui to browser the management page, please enter user name and password as above.



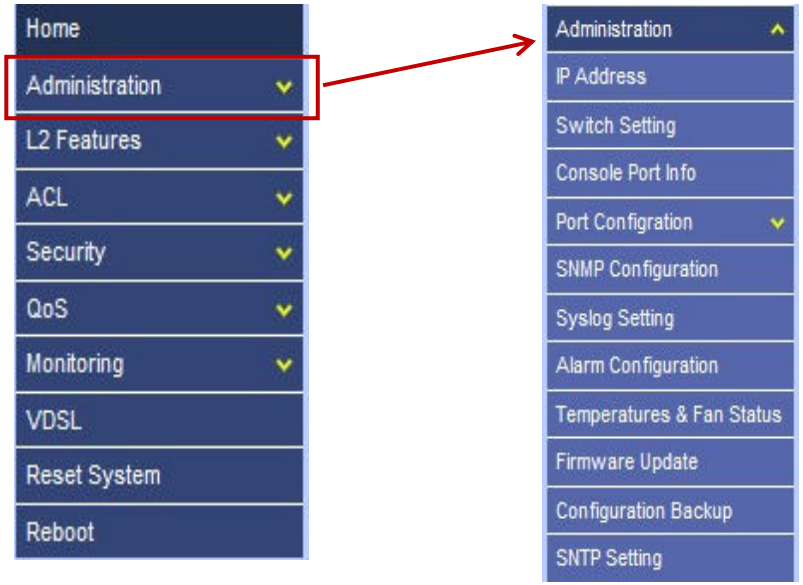
This is the ***Web Management Home Overview***

Fig. 4.1 Web Management Home Overview

4.2 Administration

There are many management functions can be set or performed if you expand the submenus of **Administrator** in MENU area. These functions are:

- **IP address Setting (See section 4.2.0)**
- **Switch Settings (See section 4.2.1)**
- **Console Port information(See section 4.2.2)**
- **Port Configuration (See section 4.2.3)**
- **SNMP Configuration (See section 4.2.4)**
- **Syslog Setting (See section 4.2.5)**
- **Alarm configuration (See section 4.2.6)**
- **Temperatures & Fan status (See section 4.2.7)**
- **Firmware Update (See section 4.2.8)**
- **Configuration Backup (See section 4.2.9)**
- **SNTP Setting (See section 4.2.10)**



4.2.0 IP Address Setting

User can see and modify the IP address, subnet mask and default gateway in this page, then clicks "Apply" button to confirm (save) the settings, then the switch **reboot** must be done to activate the updates. The IP address can be statically set or dynamically be assigned by enabling DHCP option.

Notes:

1.If any value is changed in this field, reboot is necessary.

2.The "DHCP" is a client function, you can choose disable or enable.

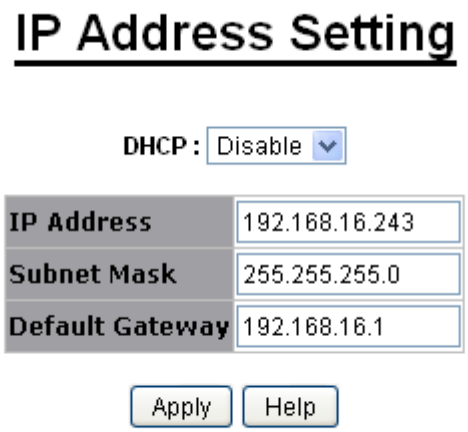


Fig. 4.2.0 IP Address Setting

4.2.1 Switch Setting

4.2.1.0 Basic

All information in **Basic** page is all read only, user can't modify the contents.

Model name: Display the switch's model name.

Description: Display the name of device type.

MAC Address: The unique hardware address assigned by manufacturer (default)

Firmware version: Display the IP DSLAM's driver firmware version.

Web Interface version: Display the switch's web interface firmware version.

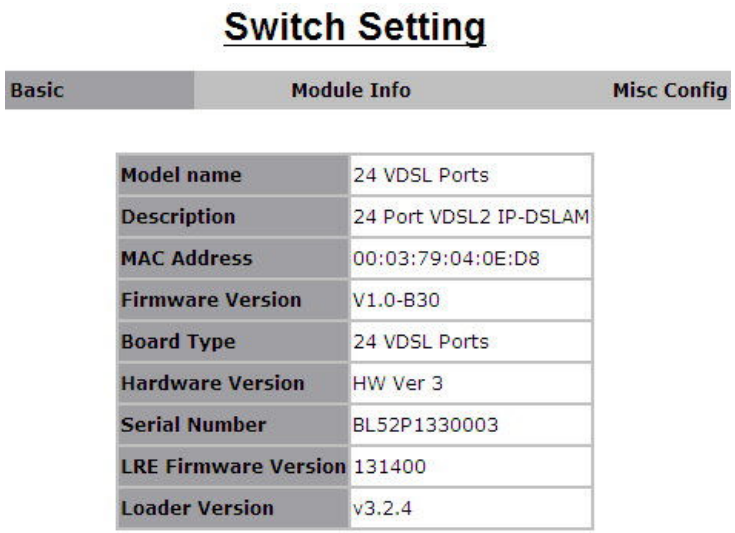


Fig. 4.2.1.0 Switch Setting

4.2.1.1 Module Info

All information in this field is read only, user can't modify its contents. It is only to display the module port information.

Basic	Module Info	Misc Config

	TYPE	DESCRIPTION
Module1	8	GIGA COMBO
Module2	8	GIGA COMBO

Fig. 4.2.1.1 Module Info

4.2.1.2 MISC CONFIG

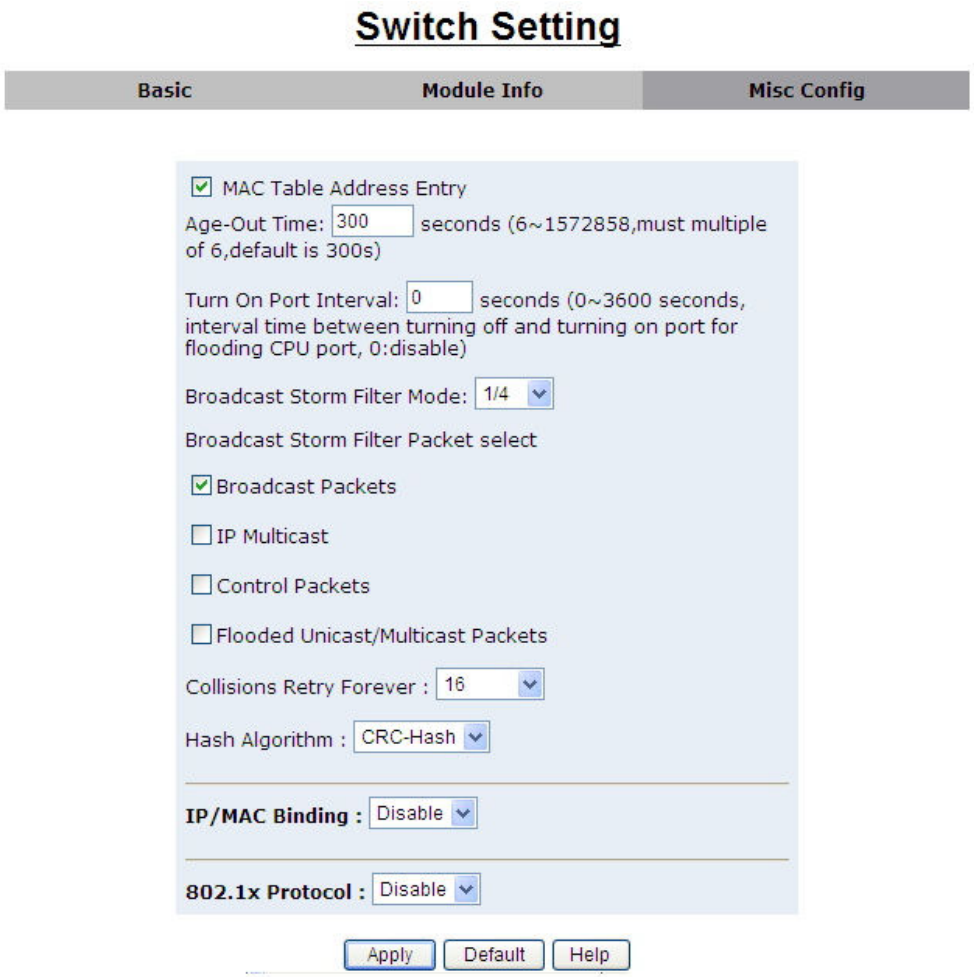


Fig. 4.2.1.2 MISC CONFIG

MAC Address Age-out Time: Type the number of seconds that an inactive MAC address remains in the switch's address table. The valid range is 6~1572858 seconds. **Default is 300 seconds.** The value is a multiple of 6.

Turn on Port Interval: while flooding CPU port at the speed of 4MB/s or larger, system will close relative port.
And system will open this port using this interval value.0 represents system will never enable this after close it for flooding CPU.

Broadcast Storm Filter Mode: To configure broadcast storm control, enable it and set the upper threshold for individual ports. The threshold is the percentage of the port's ingress bandwidth used by broadcast traffic. When broadcast traffic for a port rises above the threshold you set, broadcast storm control becomes active. The valid threshold value are 1/2, 1/4, 1/8, 1/12, and off.
If NV-2400H continued occur hangs up issue, please enable this function to 1/4, and if 1/4 can not solve broadcast storm, please config higher value to 1/8 or 1/12.

Broadcast Storm Filter Packets Select: To select broadcast storm Filter Packets type. If no packets type by selected, mean can not filter any packets .The Broadcast Storm Filter Mode will show OFF. Collisions Retry Forever: In half duplex, collision-retry maximum is 16, 32, or 48 times and packet will be dropped if collisions still happen. In default (Disable), system will retry forever if collisions happen. **Broadcast strom filter packet of default value was selected.**

Collision Retry Forever: Default value is 16.
Hash Algorithm: Select Hash Algorithm.
IP/MAC Bing: Enable or disable SMAC and SIP binding.
802.1x Protocol: Enable or disable 802.1x protocol.

4.2.2 Console Port Information

Console is a standard UART (RS-232) interface to communicate with Serial Port.

User can use windows HyperTerminal program to link the switch. Connect To -> Configure:

Bits per seconds: **115200**
Data bits: **8**
Parity: **none**
Stop Bits: **1**
Flow control: **none**

Console Information

Baurate(bits/sec)	115200
Data Bits	8
Parity Check	none
Stop Bits	1
Flow Control	none

Help

Fig. 4.2.2 Console Information

4.2.3 Port Configuration

4.2.3.0 Port Controls

The following webpage is to provide the display and modification for the port settings. Use the dropdown in Port field to select one or multiple ports in the upper control area. The lower display area will show the port settings for the selected port(s). Use the other control fields in the upper area to modify the port settings for the selected port(s). Press Apply to save and activate the port settings. "Port Control" is for users to setting up the details of Gigabit Ethernet ports and trunking ports if there exists any trunking ports. If user would like to configure VDSL port, please access VDSL site.

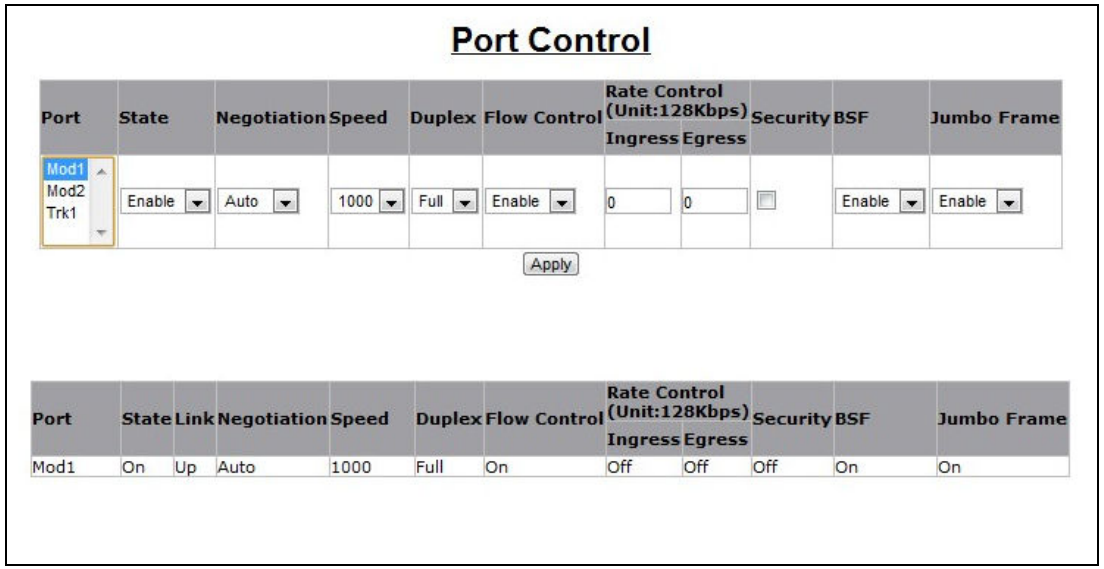


Fig. 4.2.3.0 Port Controls

State: User can disable or enable this port.

Negotiation: User can set auto negotiation mode is Auto, Nway (specify the speed/duplex on this port and enable auto-negotiation), Force of per port.

Speed: User can set 1000Mbps, 100Mbps or 10Mbps speed on GbE1~GbE2 (depend on module card mode).

Duplex: User can set full-duplex or half-duplex mode of per port.

Flows control:
Full: User can set flow control function is enable or disable in full mode.
Half: User can set backpressure is enable or disable in half mode.

Rate Control(Traffic shaping): port1 ~ port 24, supports by-port Up(ingress) and Down(egress) rate control. For example, assume port 1 is 10Mbps, users can set its effective egress rate at 1Mbps and ingress rate at 500Kbps. Device will perform flow control or backpressure to confine the ingress rate to meet the specified rate.

Up(Ingress): Type the port effective ingress rate. The valid range is 0 ~ 8000. The unit is 128Kbps.
0: disable rate control.
1 ~ 8000: valid rate value

Down(Egress): Type the port effective egress rate. The valid range is 0 ~ 8000. The unit is 128Kbps.
0: disable rate control.
1 ~8000: valid rate value.

Port Security: A port in security mode will be "locked" without permission of address learning. Only the incoming packets with

SMAC already existing in the address table can be forwarded normally. User can disable the port from learning any new MAC addresses, then use the static MAC addresses screen to define a list of MAC addresses that can use the secure port. Enter the settings, and then click Apply to change on this page.

BSF: User can disable/Enable port broadcast storm filtering option by port. The filter mode and filter packets type can be select in Switch Setting > Misc Config page.

Jumbo Frame: User can disable/Enable port jumbo frame option by port. When port jumbo frame is enable, the port forward jumbo frame packet

Note1:

Only Giga port support Jumbo Frame function.

Note2:

Rate control(Traffic shaping) configuration example. The valid range is 0 ~ 8000. The unit is 128Kbps.

Rate	256k	512K	1M	2M	4M	8M	10M	20M	30M	40M	50M	60M	70M	80M	90M
Up(Ingress)	2	4	8	16	32	64	80	160	240	320	400	480	560	640	720
Down(Egress)	2	4	8	16	32	64	80	160	240	320	400	480	560	640	720

4.2.3.1 Port Sniffer

The Port Sniffer (mirroring) is a method for monitor traffic in switched networks. Traffic through a port can be monitored by one specific port. That is, traffic goes in or out a monitored port will be duplicated into sniffer port.

Sniffer Type: Select a sniffer mode: Disable / Rx / Tx / Both.

Analysis (Monitoring) Port: It' means Analysis port can be used to see the traffic on another port you want to monitor. You can connect Analysis port to LAN analyzer.

Monitored Port: The port you want to monitor. The monitor port traffic will be copied to Analysis port. You can select one monitor ports in the IP DSLAM. User can choose which port that they want to monitor in only one sniffer type.

Notes:

1. The Analysis port is dedicated for monitoring usage. That is the ordinary port function will be unavailable.
2. If you want to disable this function, you must select monitor port to none.

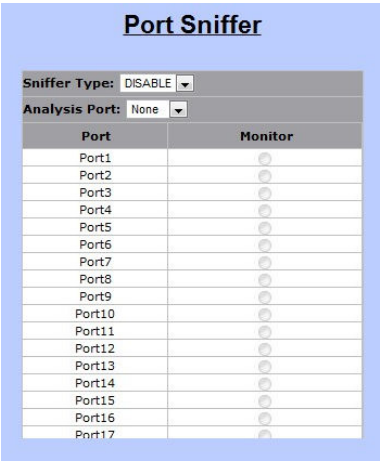


Fig. 4.2.3.1 Port Sniffer

4.2.3.2 Protected Port

There are two protected port groups. Ports in different groups can't communicate each other.

In the same group, protected ports can't communicate each other, but can communicate with unprotected ports. Unprotected ports can communicate with any ports, including protected ports. In default, all ports are in Group1 and not protected.

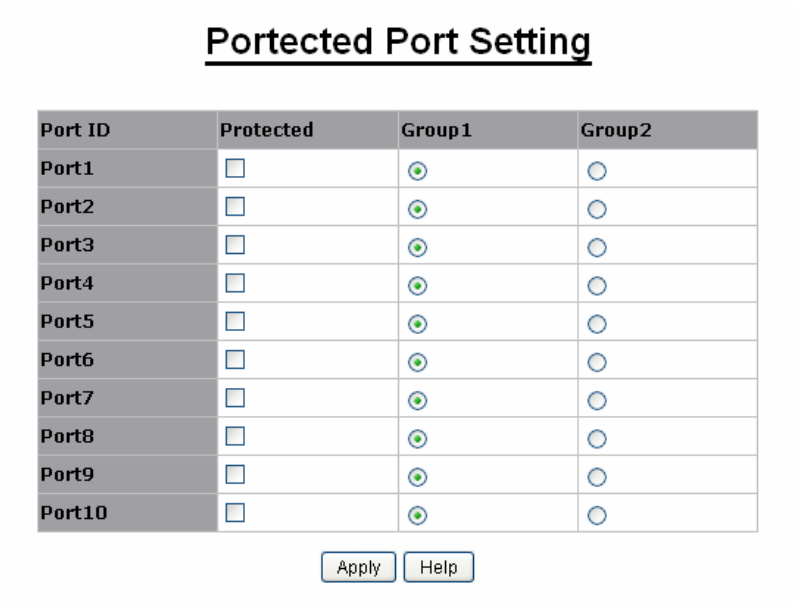


Fig. 4.2.3.2 Protected Port Setting

For example, in the above configuration page for protected port, Port4 in Group2, other ports in Group1, and both Port1& Port2 are protected. These settings provide Port4 can't communicate with other ports in Group1. Port1 & Port2 can't communicate each other but can communicate with other ports in Group1.

4.2.3.3 VDSL Port Status

"VDSL Port Status" allows users to monitor the current information of each VDSL port, such as, status, upstream rate, downstream rate, SNR margins for upstream and downstream, and firmware version. In addition, it includes "Advance" button for checking the details of the selected port in another window, as the following.

Vdsl Port Status Status : Load OK

Port	Status	Upstream Rate(Unit:Kb/s)	Downstream Rate(Unit:Kb/s)	SNR Margin(US) (Unit:0.1db)	SNR Margin(DS) (Unit:0.1db)	Firmware Version	Detail
Port1	Idle	0	0	NA	NA	NA	Advance
Port2	Idle	0	0	NA	NA	NA	Advance
Port3	Idle	0	0	NA	NA	NA	Advance
Port4	Idle	0	0	NA	NA	NA	Advance
Port5	Idle	0	0	NA	NA	NA	Advance
Port6	Idle	0	0	NA	NA	NA	Advance
Port7	Idle	0	0	NA	NA	NA	Advance
Port8	Idle	0	0	NA	NA	NA	Advance
Port9	Idle	0	0	NA	NA	NA	Advance
Port10	Idle	0	0	NA	NA	NA	Advance
Port11	Idle	0	0	NA	NA	NA	Advance
Port12	Idle	0	0	NA	NA	NA	Advance
Port13	Idle	0	0	NA	NA	NA	Advance
Port14	Showtime	100966	100966	97	236	0	Advance
Port15	Idle	0	0	NA	NA	NA	Advance
Port16	Idle	0	0	NA	NA	NA	Advance
Port17	Idle	0	0	NA	NA	NA	Advance
Port18	Idle	0	0	NA	NA	NA	Advance
Port19	Idle	0	0	NA	NA	NA	Advance
Port20	Idle	0	0	NA	NA	NA	Advance
Port21	Idle	0	0	NA	NA	NA	Advance
Port22	Idle	0	0	NA	NA	NA	Advance
Port23	Idle	0	0	NA	NA	NA	Advance
Port24	Idle	0	0	NA	NA	NA	Advance

Fig. 4.2.3.3 VDSL Port status

-----UpStream--------		-----DownStream--------	
Delay	NA ms	Delay	(null) ms
INP	0 0.1 symbols	INP	(null) 0.1 symbols
CRC 15M	NA	CRC 15M	(null)
CRC 1Delay	131400	CRC 1Delay	(null)
CRC Total	5	CRC Total	5
Error Correction 15M	20	Error Correction 15M	20
Error Correction 1Delay	0	Error Correction 1Delay	0
Error Correction Total	0	Error Correction Total	0
xdsl2ChStatusPrevDataRate	0 Kbps	xdsl2ChStatusPrevDataRate	0 Kbps
xdsl2LineStatusAttainableRate	0 Kbps	xdsl2LineStatusAttainableRate	0 Kbps
xdsl2LineStatusElectricalLength	0 0.1 dB	xdsl2LineStatusElectricalLength	0 0.1 dB
xdsl2LineBandStatusSnrMargin	0 (US0) 0.1dB	xdsl2LineBandStatusSnrMargin	0 (--) 0.1dB
xdsl2LineBandStatusSnrMargin	0 (US1) 0.1dB	xdsl2LineBandStatusSnrMargin	0 (DS1) 0.1dB
xdsl2LineBandStatusSnrMargin	108836 (US2) 0.1dB	xdsl2LineBandStatusSnrMargin	164356 (DS2) 0.1dB
xdsl2LineBandStatusSnrMargin	12 (US3) 0.1dB	xdsl2LineBandStatusSnrMargin	12 (DS3) 0.1dB
xdsl2LineBandStatusSnrMargin	NA (US4) 0.1dB	xdsl2LineBandStatusSnrMargin	-- (DS4) 0.1dB
xdsl2PMLCurr15MTimeElapsed	100 secs	xdsl2PMLCurr15MTimeElapsed	237 secs
xdsl2PMLCurr15MFecs	96	xdsl2PMLCurr15MFecs	236
xdsl2PMLCurr15MEs	96	xdsl2PMLCurr15MEs	236
xdsl2PMLCurr15MSes	NA	xdsl2PMLCurr15MSes	NA
xdsl2PMLCurr15MLoss	NA	xdsl2PMLCurr15MLoss	--
xdsl2PMLCurr15MUas	0	xdsl2PMLCurr15MUas	0
xdsl2PMLCurr1DayTimeElapsed	0 secs	xdsl2PMLCurr1DayTimeElapsed	0 secs
xdsl2PMLCurr1DayFecs	0	xdsl2PMLCurr1DayFecs	0
xdsl2PMLCurr1DayEs	NA	xdsl2PMLCurr1DayEs	NA
xdsl2PMLCurr1DaySes	NA	xdsl2PMLCurr1DaySes	--
xdsl2PMLCurr1DayLoss	0	xdsl2PMLCurr1DayLoss	0

Fig. 4.2.3.3-1 VDSL Port advance status

4.2.4 SNMP Configuration

Any Network Management platform running the simple Network Management Protocol (SNMP) can manage the switch, provided the Management Information Base (MIB) is installed correctly on the management station. The SNMP is a Protocol that governs the transfer of information between management station and agent.

4.2.4.0 System Options

Use this page to define management stations as trap managers and to enter SNMP community strings. User can also define a name, location, and contact person for the switch. Fill in the system options data, and then click Apply to update the changes on this page.

Name: Enter a name to be used for the switch.
Location: Enter the location of the switch.
Contact: Enter the name of a person or organization.
SNMP Status: Enable/Disable SNMP Function

Fig. 4.2.4.0 System Options

4.2.4.1 Community strings

Serve as passwords and can be entered as one of the following:

RO: Read only. Enables requests accompanied by this string to display MIB-object information.

RW: Read write. Enables requests accompanied by this string to display MIB-object information and to set MIB objects.

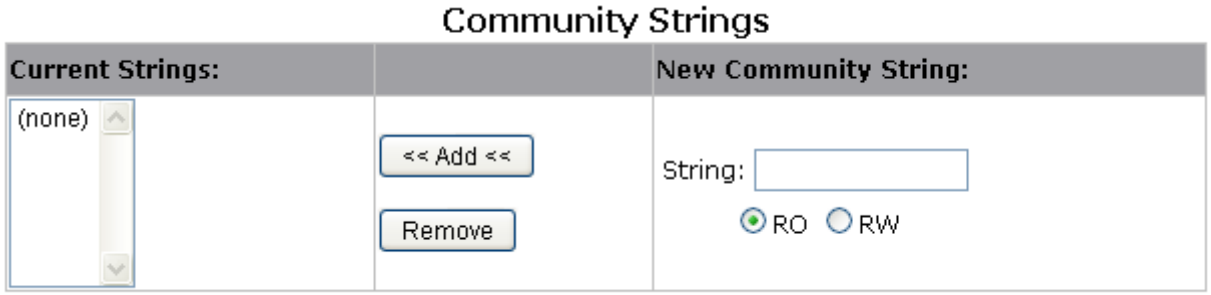


Fig. 4.2.4.1 Community strings

4.2.4.2 Trap Manager

Trap Manager is a management station that receives traps, the system alerts generated by the switch. If no trap manager is defined, no traps are issued. Create a trap manager by entering the IP address of the station and a community string.

Fig. 4.2.4.2 Trap Manager

4.2.4.3 SNMPv3 Group

Maintain SNMPv3 group.

Group Name: specifies the group name.

v1 | v2c | USM: specifies the security model.

Security Name: specifies the security name.

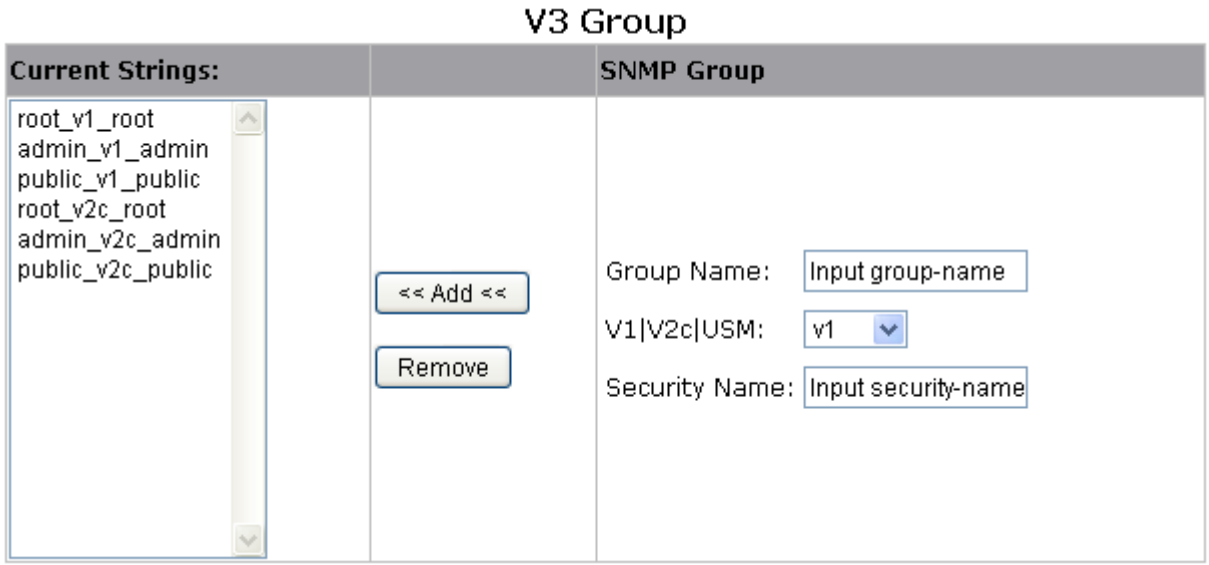


Fig. 4.2.4.3 SNMPv3 Group

4.2.4.4 SNMPv3 View

Maintain SNMPv3 view.

View Name: specifies the view name.

Included | Excluded: specifies the view type.

View Subtree: specifies the view subtree (e.g. .1.3.6.1.2.1).

View Mask: specifies the view mask, in hexadecimal digits.

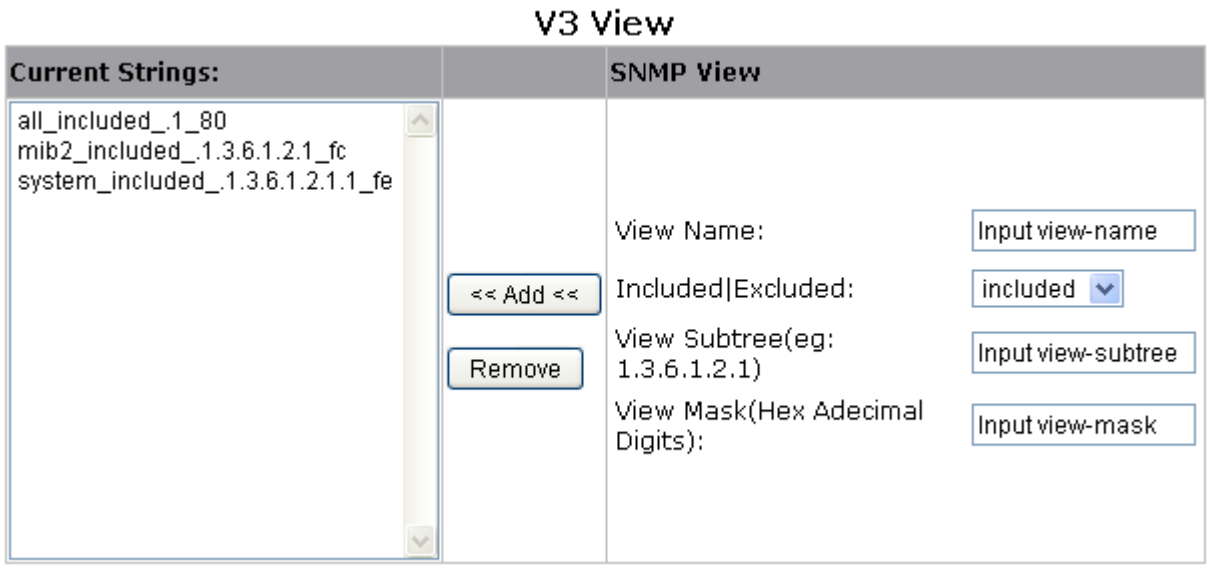


Fig. 4.2.4.4 SNMPv3 View

4.2.4.5 SNMPV3 ACCESS

Group Name: specifies the group name.

v1 | v2c | USM: specifies the security model.

SNMP Access: specifies the security level (**noauth | auth | authpriv**)

Read View: specifies the access read view name.

Write Name: specifies the access write view name.

Notify Name: specifies the access notify view name.

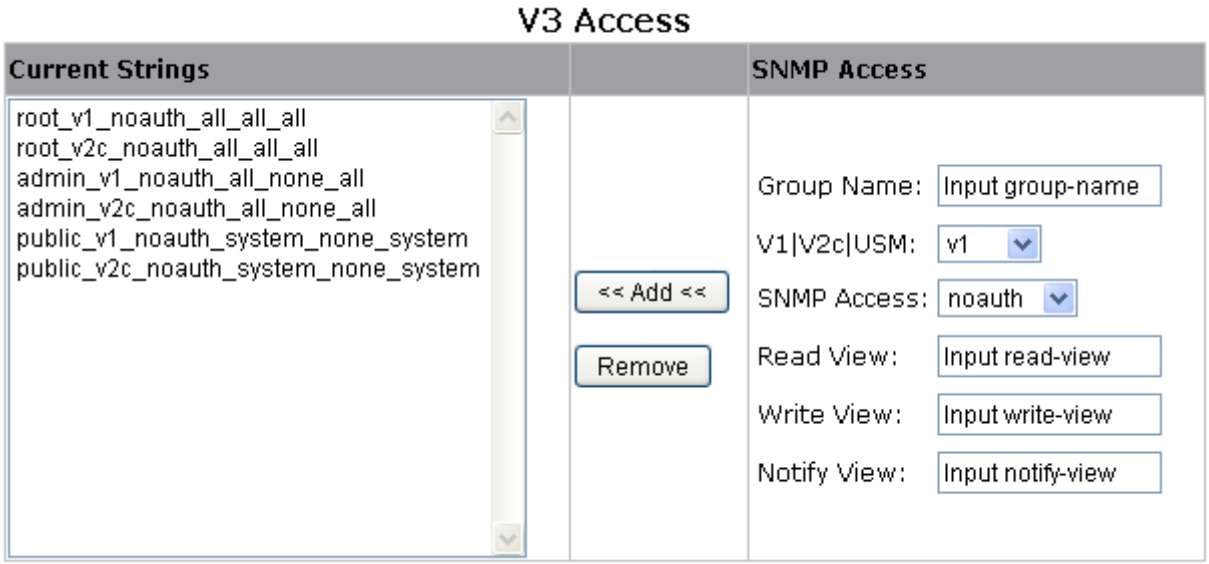


Fig. 4.2.4.5 SNMPV3 ACCESS

4.2.4.6 SNMPv3 USM-User

Maintain SNMPv3 USM-user.

User Name: Specifies the user name (should be the security name defined in group)

Auth Type: Specifies the authorization type (**md5 / none**)

Auth-Key: Specifies the authorization key (8~32 chars)

Private Key: Specifies the encrypt key (8~32 chars)

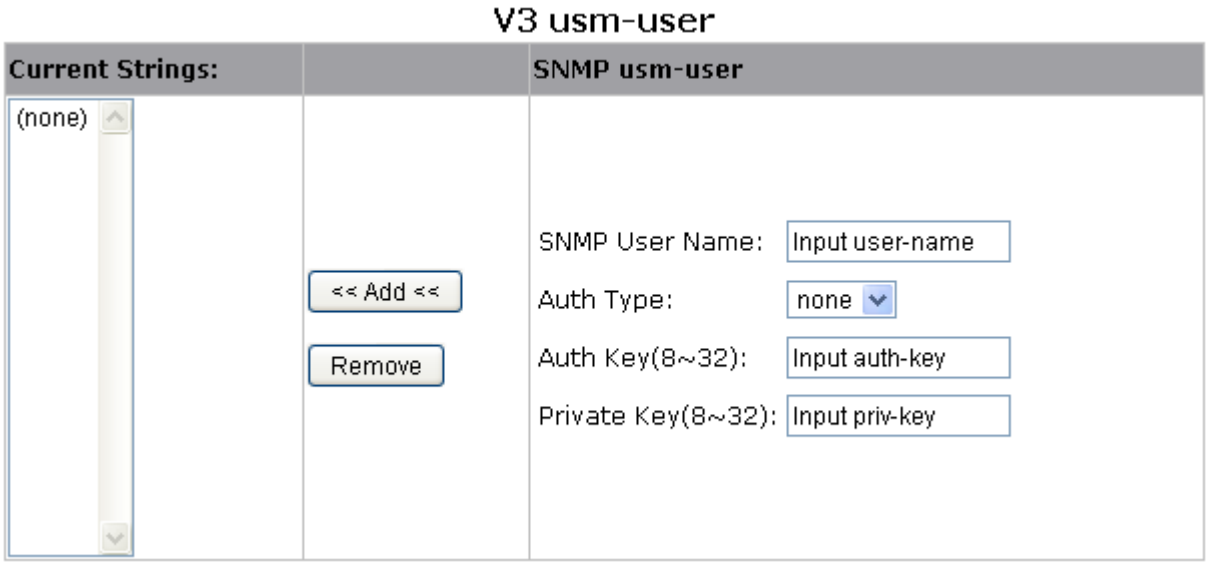


Fig. 4.2.4.6 SNMPv3 USM-User

4.2.5 Syslog

This system supports syslog sent to a remote syslog server. Currently system will do syslog for 3 events: **cold start, warm start and link change**. In this page, user needs to setup the following parameters to activate the syslog:

Syslog server IP: The IP address of remote syslog server
Log level: None / Major / All

Then click Apply button to activate the syslog function.

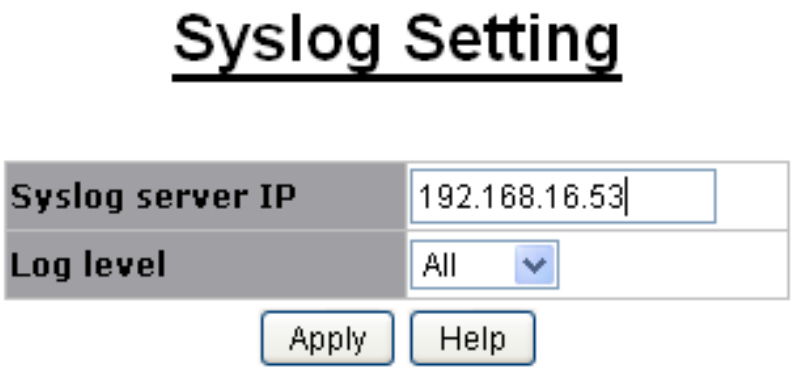


Fig.4.2.5 Syslog

4.2.6 Alarm configuration

Alarm Configuration" is distinguished into two tables: Configure Alarm Information and Alarm Information. Users are able to setup alarms and monitor alarm status.

- Configure Alarm Information (configuration section)
  - Alarm Item
    - Total of four alarms can be set in the VDSL2 IP DSLAM
  - Admin
    - Options: Disable or Enable
  - Security
    - The level of the alarm
  - Title
    - The name of the alarm
- Alarm Information (monitor section)
  - Alarm Item
  - Admin
  - Security
  - Title

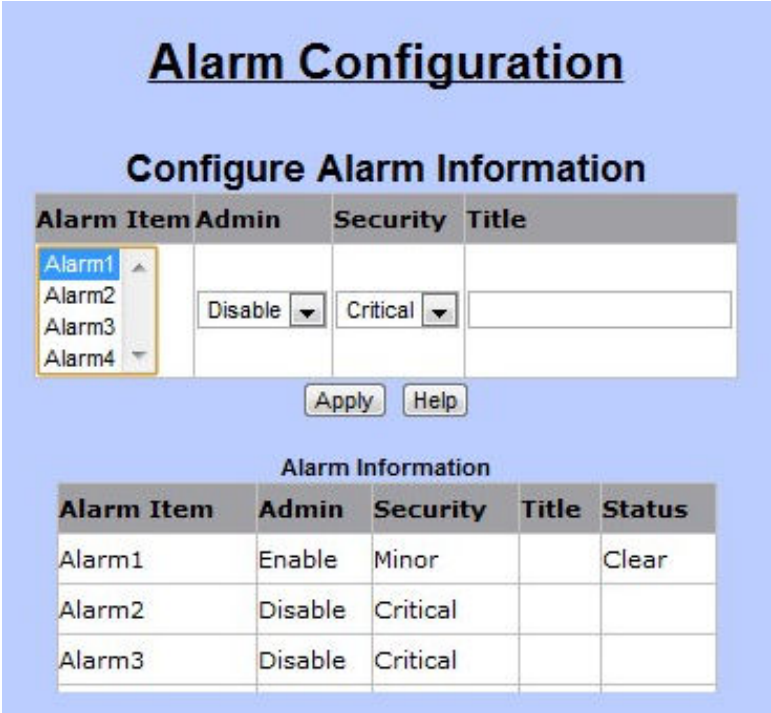


Fig.4.2.6 Alarm configuration

4.2.7 Temperatures & Fan Status

"Temperatures & Fan Status" allows users to monitor the real-time information of the VDSL2 IP DSLAM's temperatures and FANs.

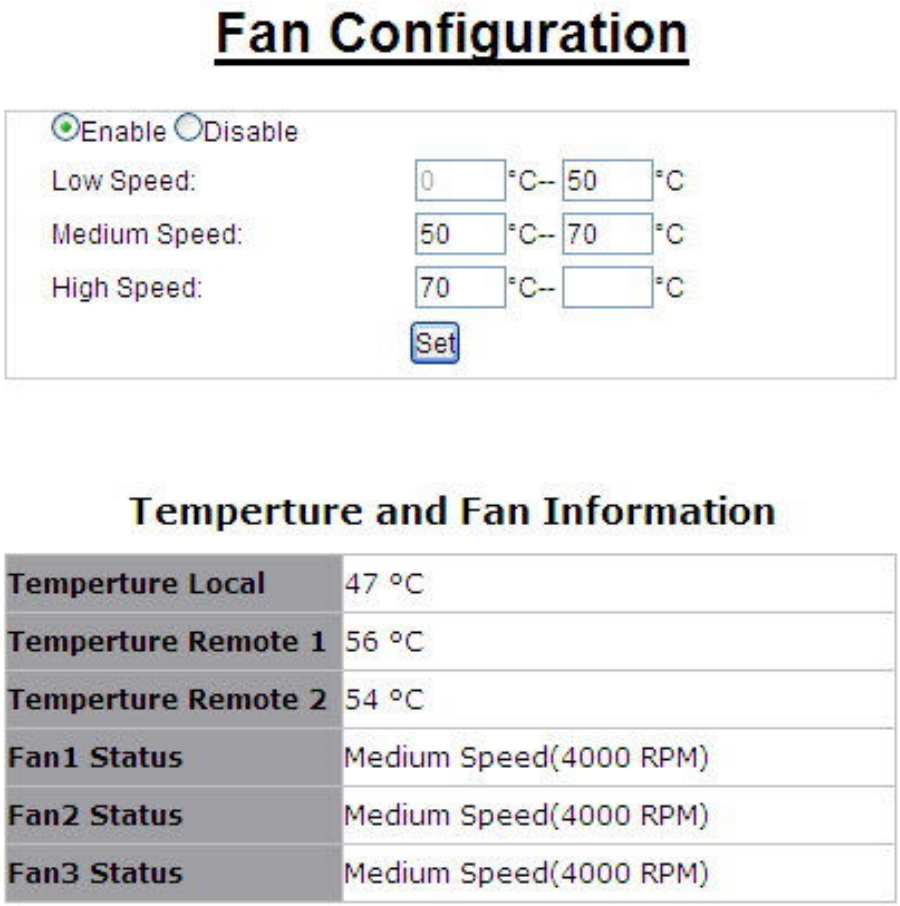
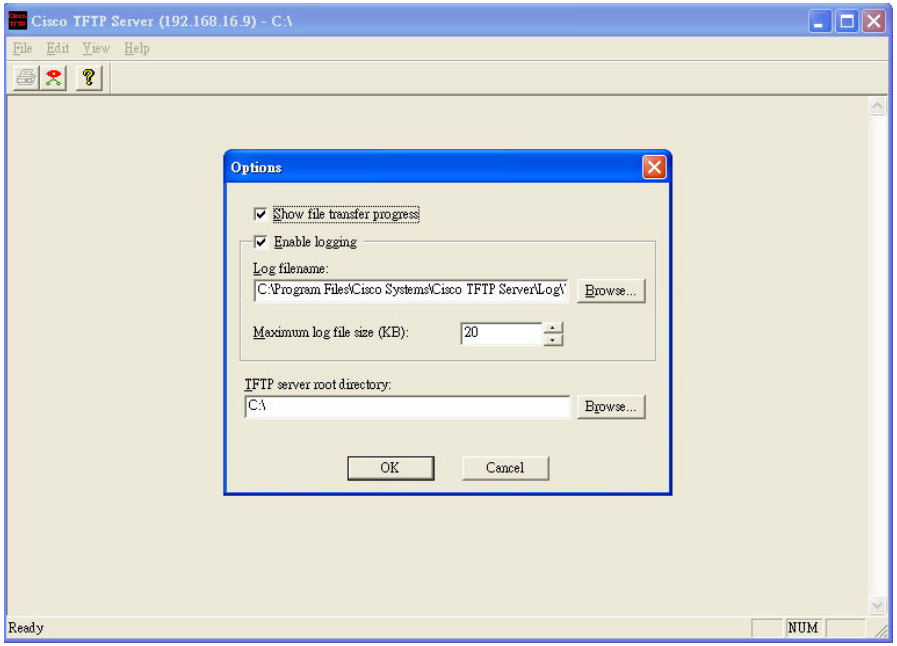


Fig.4.2.7 Temperatures & Fan Status

The following example figure shows the syslog server application (e.g. Tftpd32.exe) got the messages from switch which link status is changed on port 9.



4.2.8 Firmware Update

This system supports firmware update through two different ways: TFTP and HTTP.

4.2.8.0 TFTP Update

Use this page to assign a TFTP server IP address and an existing firmware image file. Then press Apply button to start the firmware update process.

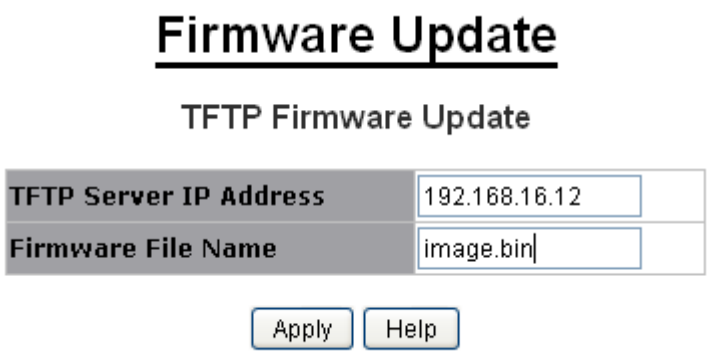


Fig.4.2.8.0 TFTP Update

The firmware image will first update to the RAM area in system. Hit the Update Firmware button to confirm to write to the system's flash memory.

When the whole process is completed, system needs to be rebooted by pressing the reboot button to activate the new firmware.

4.2.8.1 HTTP Update

An alternative for firmware updating is using HTTP transfer. Just like the file copy in Windows, select the valid firmware image file to be uploaded to the switch and hit Submit to start the updating process. This is easier than ordinary TFTP file transfer.

Fig.4.2.8.1 HTTP Update

When the firmware image is completely uploaded, system will automatically be rebooted.

4.2.9 Configuration Backup

Just like the firmware update, this system also supports configuration backup/restore through either TFTP or HTTP transfer.

4.2.9.0 TFTP Restore Configuration

Use this page to assign a TFTP server IP address and an existing configuration filename to be restored. Then press Apply button to start the restore process.

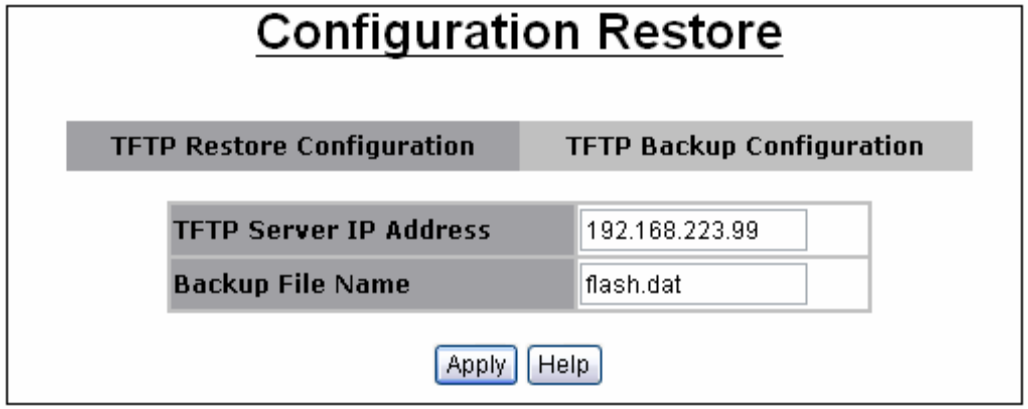


Fig.4.2.9.0 HTTP Update

4.2.9.1 TFTP Backup Configuration

Use this page to assign a TFTP server IP address and a filename to be stored. Then press Apply button to start the backup process.

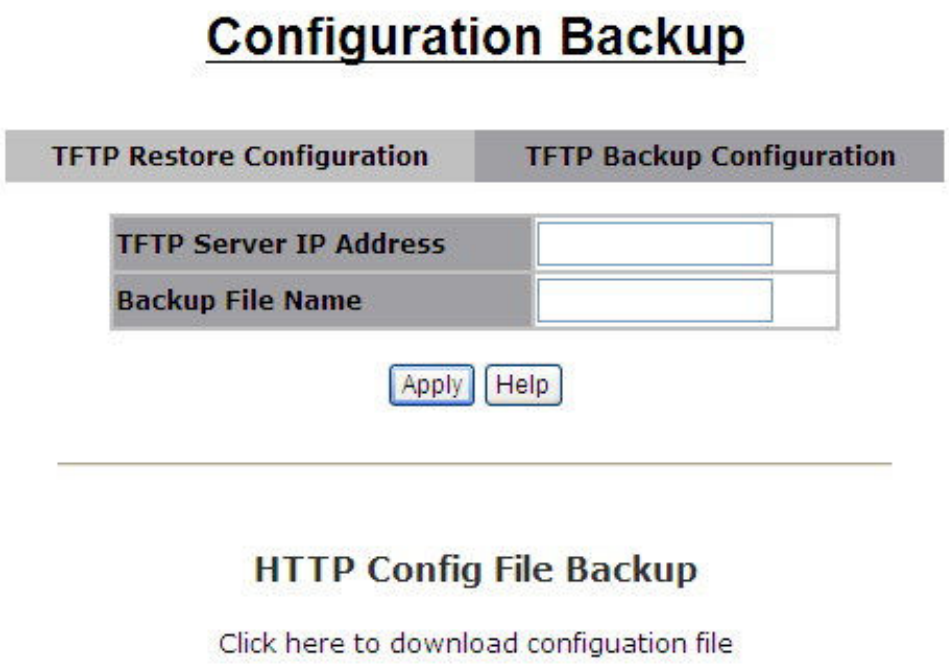


Fig.4.2.9.1 TFTP Backup Configuration

4.2.10 SNTP Setting

SNTP stands for "Simple Network Time Protocol". SNTP is a simpler version of "Network Time Protocol" (NTP), which is a system for synchronizing the clocks of network computer systems. By enabling SNTP function, users are able to configure this switch to send time synchronization requests to the assigned servers with servers' IP addresses.

SNTP Setting

SNTP	Disable
SNTP server IP	
UTC Type	Before-UTC
Time Range(0~24)	0
Time	

Apply Help

Fig.4.2.10 SNTP Setting

- SNTP: To enable or disable SNTP feature.
- SNTP server IP: The IP address of the assigned SNTP server.
- UTC Type: To decide the time zone.
  - After-UTC: UTC+hh (hh: hours)
    - For example, Taipei (UTC+08), choose "After-UTC".
  - Before-UTC: UTC-hh (hh: hours)
    - For example, San Francisco (UTC-08), choose "Before-UTC".
- Time Range: This field is for setting up the hour data in "UTC-hh/UTC+hh".
  - For example, UTC-08, then, choose "Before-UTC" in UTC type and fill in "8" in Time Range.
- Time: This section is for displaying the current time once the switch is connected to the assigned NTP server.

4.3 L2 Features

This switch provides the following L2 features:

- **VLAN Configuration (See section 4.3.0)**
- **Forwarding & Filtering (See section 4.3.1)**
- **IGMP Snooping (See section 4.3.2)**
- **Spanning Tree (STP) (See section 4.3.3)**
- **DHCP Relay & Option 82 (See section 4.3.4)**
- **Trunking (See section 4.3.5)**

4.3.0 VLAN Configuration

A Virtual LAN (VLAN) is a logical network grouping that limits the broadcast domain. It allows you to isolate network traffic so only members of the VLAN receive traffic from the same VLAN members. Basically, creating a VLAN from a switch is logically equivalent of reconnecting a group of network devices to another Layer 2 switch. However, all the network devices are still plug into the same switch physically.

This switch supports port-based, 802.1Q (tagged-based) or no VLAN in web management page. In default, 802.1Q VLAN is enabled for common and advanced operations.

- Static VLAN (See section 4.3.0.0)
- GVRP VLAN (See section 4.3.0.1)
- QinQ VLAN (See section 4.3.0.2)

4.3.0.0 Static VLAN

4.3.0.0.0 Port Based VLAN

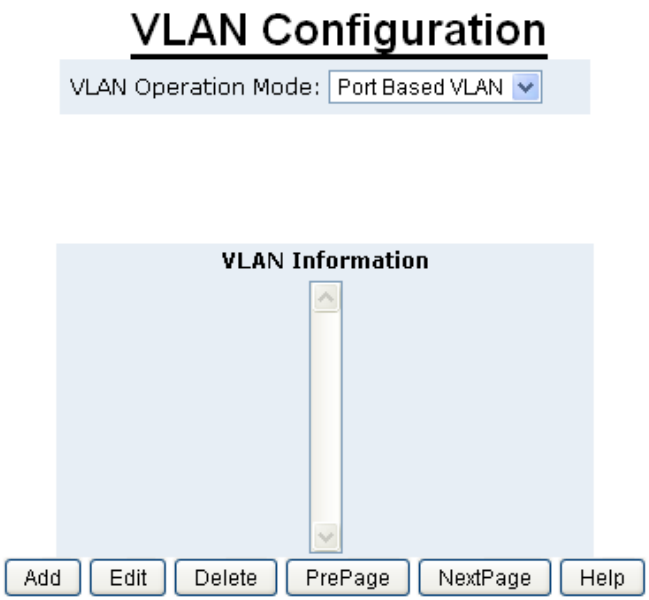


Fig. 4.3.0.0.0 Port Based VLAN

First select Port-based VLAN in VLAN Operation Mode. Then click Add to create a new VLAN group.
Enter the VLAN name, group ID and select the members for the new VLAN. Then click Apply to activate the setting.
If there are many groups that over the limit of one page, you can click the Next Page to view other VLAN groups.

4.3.0.0.1 802.1Q VLAN

In this page, user can create 802.1Q (tag-based) VLAN.

There are up to 512 VLAN groups to provide configuration. While VLAN Operation Mode is changed to 802.1Q VLAN, all ports on the switch belong to default VLAN group which VID is 1. The default VLAN group can't be deleted.

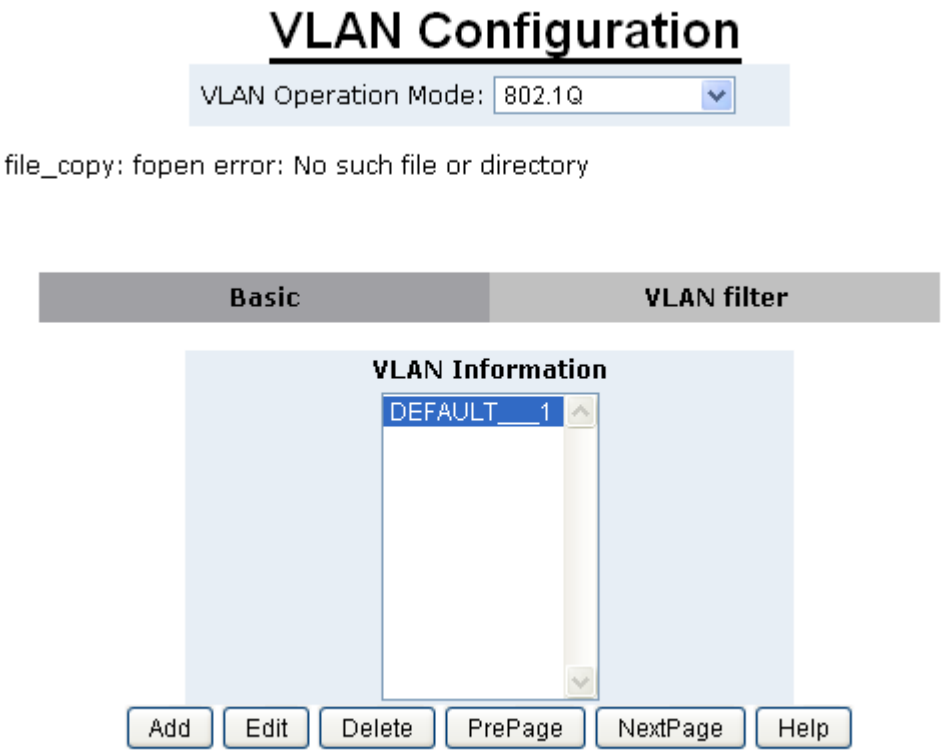


Fig. 4.3.0.0.1 802.1Q VLAN

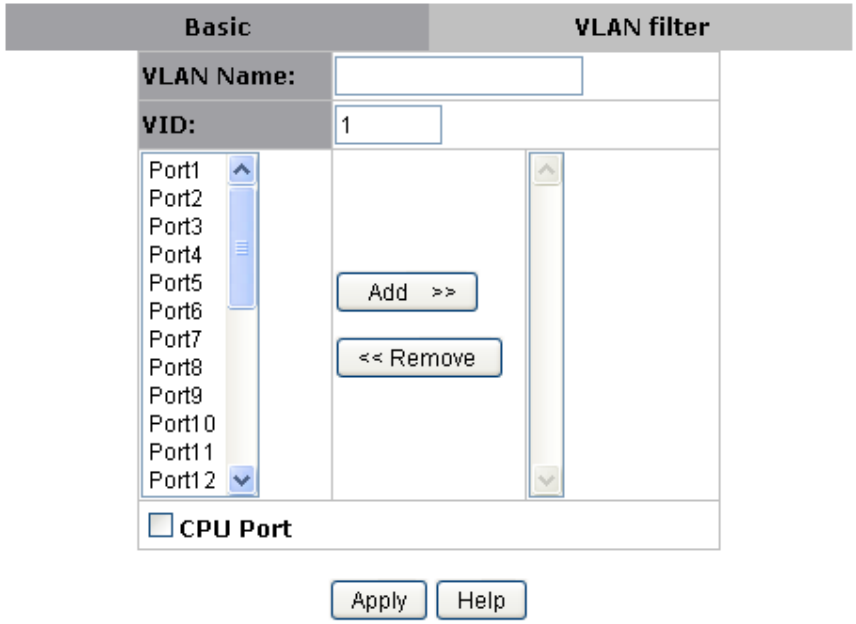


Fig. 4.3.0.0.2 802.1Q VLAN Add

Basic

Create a VLAN and add tagged member ports to it.

1. From the main menu, click Administrator □VLAN configuration, click Add then you will see the page as follow.

2. Type a name for the new VLAN.

3. Type a VID (1~4094). The default is 1.

4. From the Available ports box, select ports to add to the switch and click "Add >>".

5. Click Next. Then you can view the page as follow：

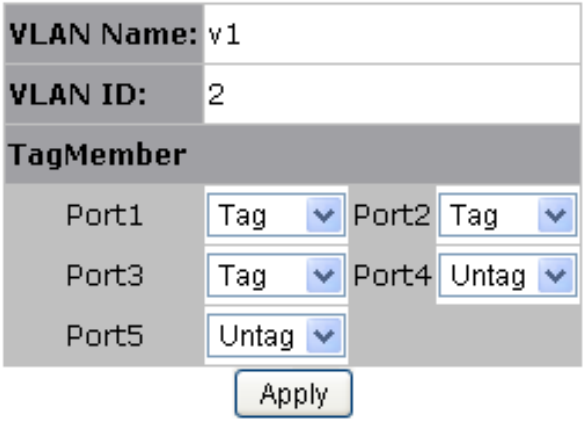


Fig. 4.3.0.0.3 802.1Q VLAN Add

6. Uses this page to set the outgoing frames are VLAN-Tagged frames or no. Then click Apply.

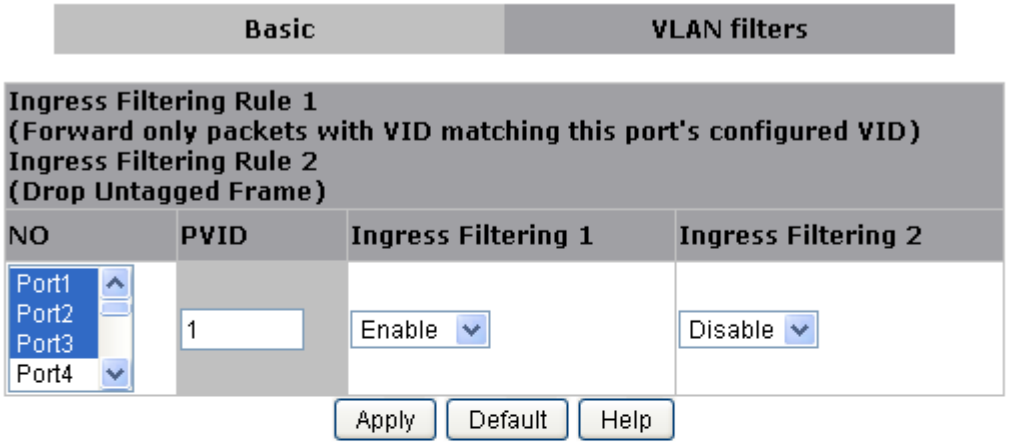
Tag: outgoing frames with VLAN-Tagged.

Untag: outgoing frames without VLAN-Tagged.

Note:

- CPU Port: Click on this checkbox to choose this VLAN group as the management group of this VDSL2 IP DSLAM.

VLAN Filters



NO	PVID	Ingress Filtering 1	Ingress Filtering 2
Port1	1	ENABLE	DISABLE
Port2	50	ENABLE	DISABLE
Port3	1	ENABLE	DISABLE

Fig. 4.3.0.0.4 VLAN Filters

Port NO.

Port number(s) to be assigned to see or configure the settings.

Port VID (PVID)

Port VLAN ID will be assigned to untagged traffic on a given port. This feature is useful for accommodating devices that you want to participate in the VLAN but that don't support tagging. This switch allows user to set one PVID for each port, the range is 1~4094, default PVID is 1. The PVID must as same as the VLAN ID that the port belong to VLAN group, or the untagged traffic will be dropped.

Ingress Filtering

Ingress filtering lets frames belonging to a specific VLAN to be forwarded if the port belongs to that VLAN. This switch has two ingress filtering rule as follows:

Ingress Filtering Rule 1: A forward only packet with VID matching this port's configured VID.

Ingress Filtering Rule 2: Drop Untagged Frame.

4.3.0.1 GVRP VLAN

4.3.0.1.0 GVRP Setting

GVRP (GARP VLAN Registration Protocol or Generic VLAN Registration Protocol) is a protocol that facilitates control of virtual local area networks (VLANs) within a larger network. GVRP conforms to the IEEE 802.1Q specification, which defines a method of tagging frames with VLAN configuration data. GVRP allows automatic VLAN configuration between the switch and nodes. If the switch is connected to a device with GVRP enabled, you can send a GVRP request using the VID of a VLAN defined on the switch, the switch will automatically add that device to the existing VLAN

GVRP can be enabled per port basis. To enable GVRP function for a port, both global GVRP and special port GVRP are required to configure.

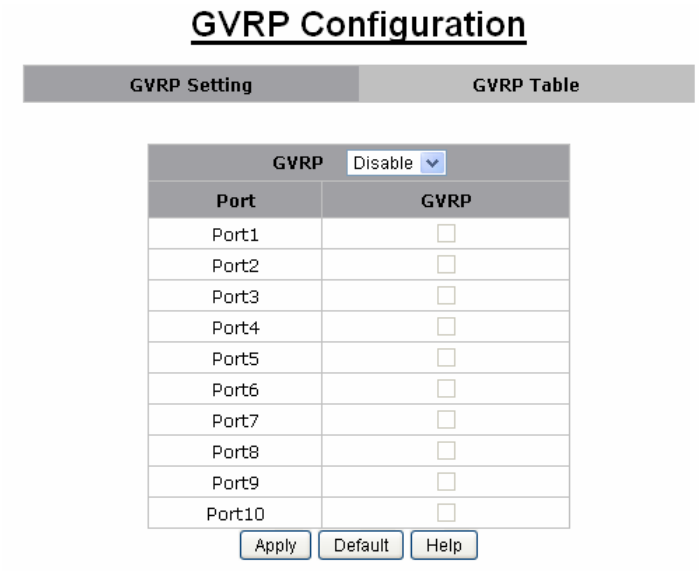


Fig.4.3.0.1.0 GVRP VLAN

4.3.0.1.1 GVRP Table

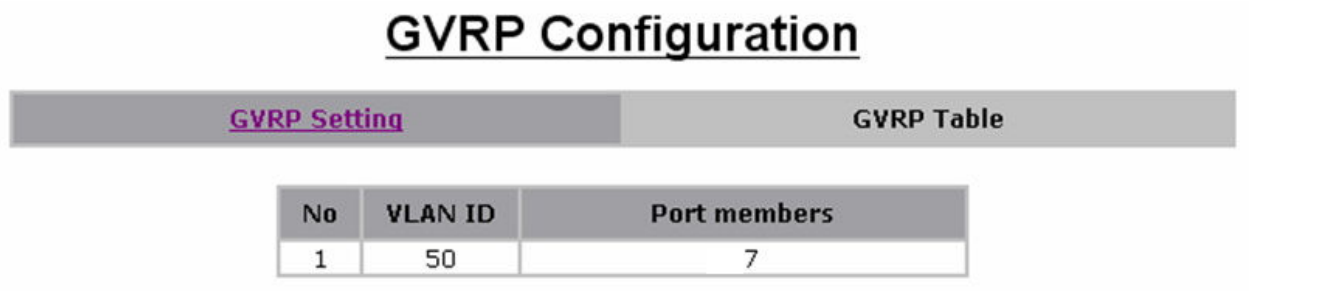


Fig. 4.3.0.1.1 GVRP Table

In this page, the VLAN group(s) dynamically created by GVRP can be displayed with VID and port member(s).

4.3.0.2 QinQ VLAN

4.3.0.2.0 QinQ Port Setting

Business customers of service providers often have specific requirements for VLAN IDs and the number of VLANs to be supported. The VLAN ranges required by different customers in the same service-provider network might overlap, and traffic of customers through the infrastructure might be mixed. Assigning a unique range of VLAN IDs to each customer would restrict customer configurations and could easily exceed the VLAN limit (4096) of the IEEE 802.1Q specification. Using the QinQ feature, service providers can use a single VLAN to support customers who have multiple VLANs. Customer VLAN IDs are preserved, and traffic from different customers is segregated within the service-provider network, even when they appear to be in the same VLAN. Using QinQ expands VLAN space by using a VLAN-in-VLAN hierarchy and retagging the tagged packets. A port configured to support QinQ is called a QinQ user-port. A port configured to support QinQ Uplink is called a QinQ uplink-port.

To enable QinQ function, the global **QinQ** option, QinQ **Tpid** and specified port-based QinQ **User** or **Uplink** port option need to be configured.

QinQ Configuration

QinQ Port Setting | QinQ Tunnel Setting

QinQ	Disable
QinQ Tpid	8100

Port	QinQ	QinQ Uplink
Port1	☐	☐
Port2	☐	☐
Port3	☐	☐
Port4	☐	☐
Port5	☐	☐
Port6	☐	☐
Port7	☐	☐
Port8	☐	☐
Port9	☐	☐
Port10	☐	☐

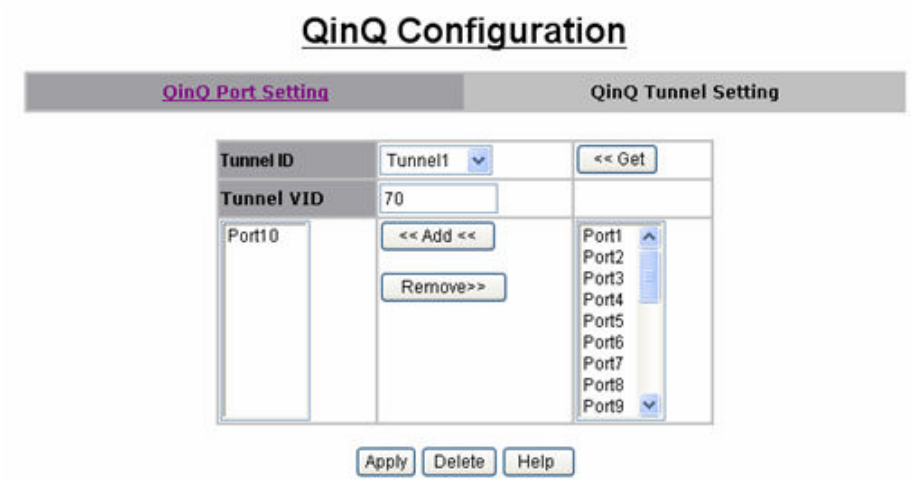
Apply Default Help

Fig 4.3.0.2 QinQ VLAN

4.3.0.2.1 QinQ Tunnel Setting

Virtual private networks (VPNs) provide enterprise-scale connectivity on a shared infrastructure, often Ethernet-based, with the same security, prioritization, reliability, and manageability requirements of private networks. QinQ tunnel is a feature designed for service providers who carry traffic of multiple customers across their networks and are required to maintain the VLAN and Layer 2 protocol configurations of each customer without impacting the traffic of other customers. When you configure QinQ tunnel, you assign the QinQ user-port and uplink-port to a VLAN ID that is dedicated to QinQ tunnel.

To add QinQ tunnel, you first select QinQ Tunnel ID, then fill VLAN ID QinQ dedicated to QinQ tunnel, and select user-port and uplink-port to be added to QinQ tunnel.



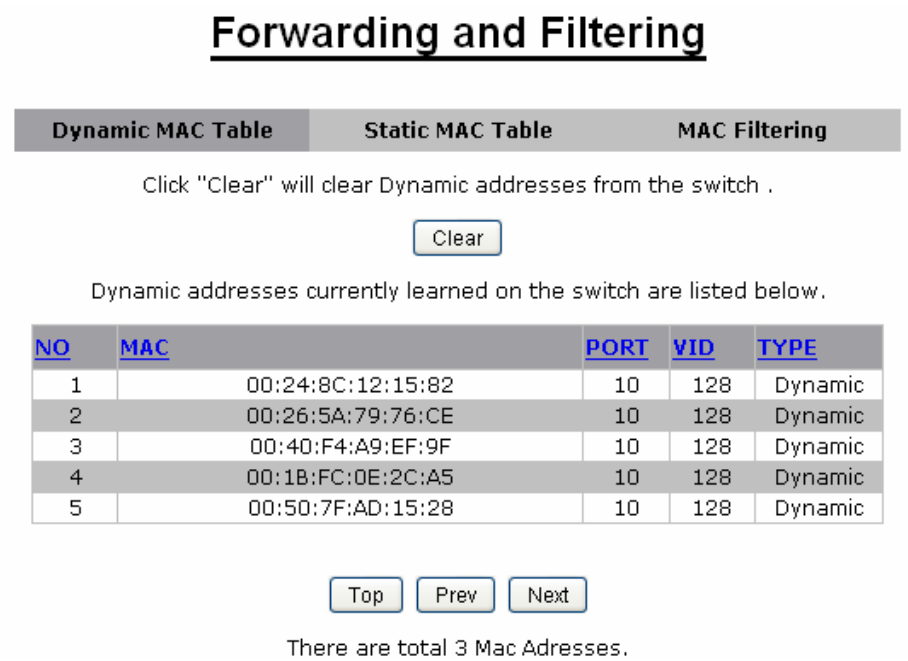
4.3.1 Forwarding and Filtering

In this submenu, the following functions related to forwarding and filtering are provided:

- Dynamic MAC Table (See section 4.3.1.0)
- Static MAC Table (See section 4.3.1.1)
- MAC Filtering (See section 4.3.1.2)

4.3.1.0 Dynamic MAC Address

The switch will dynamically learn the device's MAC address when it corresponding with the switch. MAC address will be stored in MAC address table. Dynamic MAC Table shows the MAC addresses learned by the switch. The table will be shown by pages if larger than 500 MAC Addresses.



NO	MAC	PORT	VID	TYPE
1	00:24:8C:12:15:82	10	128	Dynamic
2	00:26:5A:79:76:CE	10	128	Dynamic
3	00:40:F4:A9:EF:9F	10	128	Dynamic
4	00:1B:FC:0E:2C:A5	10	128	Dynamic
5	00:50:7F:AD:15:28	10	128	Dynamic

Fig .4.3.1.0 Dynamic MAC Address

Click Clear to clear Dynamic MAC address table.

Click Top to show the first page of MAC address table.

Click Prev to show the previous page of MAC address table. If there is nothing to shown or NO is 1, it is the first page.

Click Next to show the next page of MAC address table. If there is nothing to shown, it is the end page.

4.3.1.1 Static MAC Table

When you add a static MAC address, it permanently remains in the switch's address table, regardless of whether the device is physically connected to the switch. This saves the switch from having to re-learn a device's MAC address when the disconnected or powered-off device is active on the network again.

This table can associate with the **Security** field in **Port Controls** configuration to achieve the access control by source MAC / port / VID binding. That is only ingress traffic with matched lookup (with specified MAC address, port number and VID) in this table can be allowed to access to the switch.

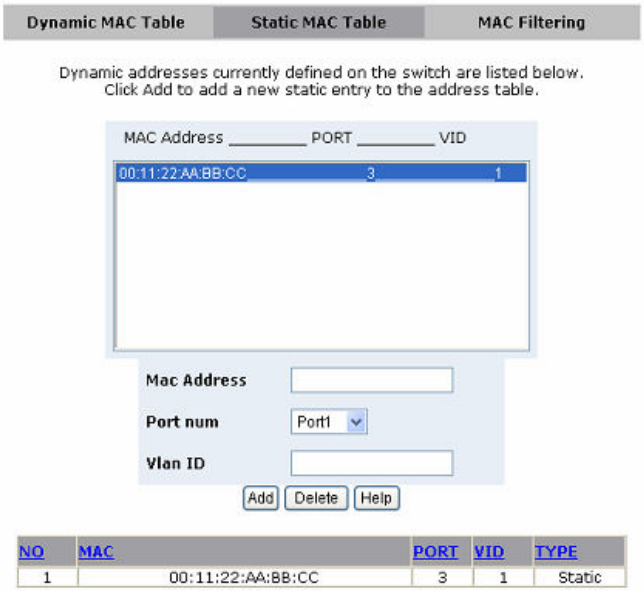


Fig. 4.3.1.1 Static MAC Table

The following parameters can be associated to setup the Static MAC table:

MAC Address: Static MAC address in a MAC entry

Port number: Switch port number to associate with the MAC address in a MAC entry

Vlan ID: If tag-based (IEEE 802.1Q) VLANs are enabled, static MAC address can be associated with individual VLANs. Type the VID in this field to associate with the MAC address.

Click Add to add a new entry. Click Delete to remove a specified entry.

The MAC entries in this table can be sorted by clicking the column NO / MAC / PORT / VID / TYPE.

4.3.1.2 MAC Filtering

MAC address filtering allows the switch to drop unwanted traffic. Traffic is filtered based on the destination MAC addresses.

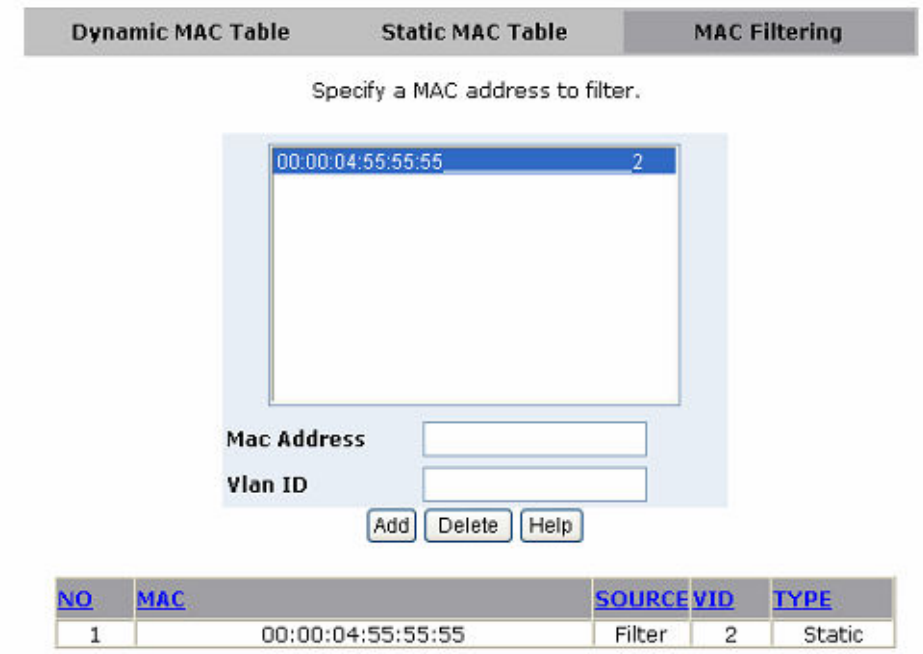


Fig. 4.3.1.2 MAC Filtering

MAC Address: MAC address that wants to be filtered.

Vlan ID: If tag-based (802.1Q) VLAN are enabled, type the VID in this field to associate with the MAC address.

Click Add to add a new entry. Click Delete to remove a specified entry.

The MAC entries in this table can be sorted by clicking the column NO / MAC / PORT / VID / TYPE.

4.3.2 IGMP Snooping

This switch supports multicast IP, one can enable IGMP protocol on web management's switch setting advanced page, then display the IGMP snooping information in this page, you can view difference multicast group, VID and member port in here, IP multicast addresses range from 224.0.0.0 through 239.255.255.255.

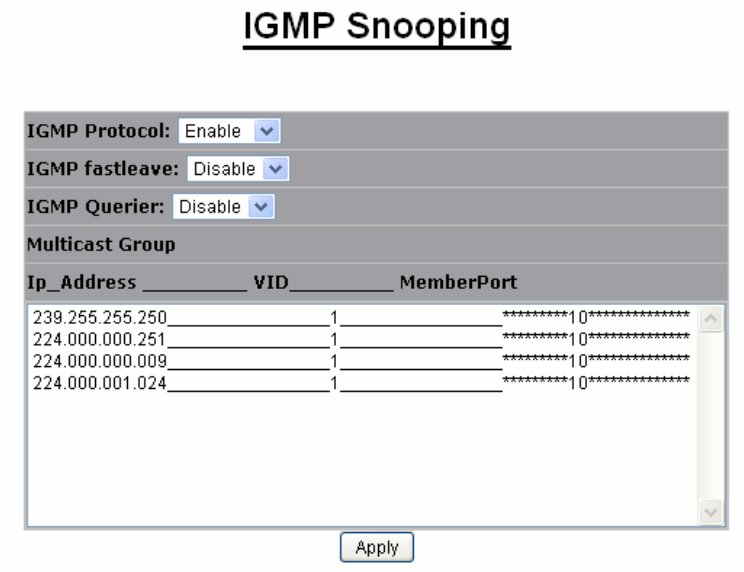


Fig. 4.3.2 IGMP Snooping

The Internet Group Management Protocol (IGMP) is an internal protocol of the Internet Protocol (IP) suite.
IP manages multicast traffic by using switches, routers, and hosts that support IGMP. Enabling IGMP allows the ports to detect IGMP queries and report packets and manage IP multicast traffic through the switch. IGMP have three fundamental types of message as follows:

Message	Description
Query	A message sent from the queries (IGMP router or switch) asking for a response from each host belonging multicast group.
Report	A message sent by a host to the queries to indicate that the host wants to be or is a member of a given group indicated in the report message.
Leave Group	A message sent by a host to the queries to indicate that the host has quit being a member of a specific multicast group.

- **IGMP protocol:** Enable/disable IGMP snooping.
- **IGMP fast leave:** Enable/disable IGMP snooping fast leave. If enable, switch will fast delete member who send leave report, else wait one second.
- **IGMP Querier:** Enable/disable IGMP snooping querier. If select disable, the switch can't send query report.

Note:

Do Not use Port based VLAN and IGMP snooping function at the same time.

4.3.3 Spanning Tree

4.3.3.0 STP system

The Spanning Tree Protocol (STP) is a standardized method (IEEE 802.1d) for avoiding loops in switching networks. Enable STP to ensure that only one path at a time is active between any two nodes on the network. You can enable STP on web management's switch setting advanced item, select enable STP. We are recommended that you enable STP on all switches ensures a single active path on the network. You can view STP information about the Root Bridge. Such as following screen.

Root Bridge Information

Priority	32768
MAC Address	00:00:24:15:17:67
Root Path Cost	0
Root Port	0
Maximum Age	20
Hello Time	2
Forward Delay	15

Fig. 4.3.3.0a STP system

You can view STP port status about the switch. Such as following screen.

STP Port Status

PortNum	PathCost	Priority	PortState	PortEdge	PortNonSTP	PortP2P	Migration Check
Port1	2000000	128	Disabled	NO	NO	NO	undefined
Port2	2000000	128	Disabled	NO	NO	NO	undefined
Port3	2000000	128	Disabled	NO	NO	NO	undefined
Port4	2000000	128	Disabled	NO	NO	NO	undefined
Port5	2000000	128	Disabled	NO	NO	NO	undefined
Port6	2000000	128	Disabled	NO	NO	NO	undefined
Port7	2000000	128	Disabled	NO	NO	NO	undefined
Port8	2000000	128	Disabled	NO	NO	NO	undefined
Port9	200000	128	Forwarding	NO	NO	YES	undefined
Port10	2000000	128	Disabled	NO	NO	NO	undefined

Fig. 4.3.3.0b STP system

You can configure STP parameters, then click Apply button to set the values. Such as following screen.

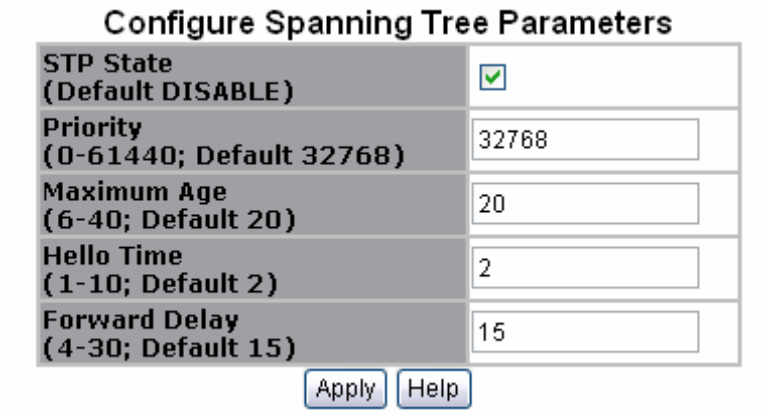


Fig. 4.3.3.0c STP system

You can select STP state item to enable STP. If you want to disable STP, please cancel the item. Default value of STP sate is disabled.

Parameter	Description
Priority	You can change priority value, A value used to identify the root bridge. The bridge with lowest value has the highest priority and is selected as the root. Value range <0-61440>, the value must be in steps of 4096. Default value is 32768.
Max Age	You can change Max Age value. The maximum age of received protocol information before it is discarded. Value range <6-40>. Default value is 20.
Hello Time	You can change Hello time value. The time interval between the transmission of Configuration BPDUs by a Bridge that is attempting to become the Root or is the Root. Value range <1-10>. Default value is 2.

Forward Delay time	You can change forward delay time. The time spent by a Port in the Listening State and the Learning State before moving to the Learning or Forwarding State, respectively. It is also the value used for the ageing time of dynamic entries in the Filtering Database, while received BPDU indicate a topology change. Value range <4-30>. Default value is 15.

NOTE:

The above parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

The following parameters can be configured on each port, click Apply button to set the values.

STP Port Status

PortNum	PathCost	Priority	PortState	PortEdge	PortNonSTP	PortP2P	Migration Check
Port1	200000	128	Discarding	NO	NO	YES	undefined
Port2	200000	128	Discarding	NO	NO	YES	undefined
Port3	200000	128	Discarding	NO	NO	YES	undefined
Port4	200000	128	Discarding	NO	NO	YES	undefined
Port5	200000	128	Discarding	NO	NO	YES	undefined
Port6	200000	128	Discarding	NO	NO	YES	undefined
Port7	200000	128	Discarding	NO	NO	YES	undefined
Port8	200000	128	Discarding	NO	NO	YES	undefined
Port9	2000000	128	Disabled	NO	NO	NO	undefined
Port10	200000	128	Forwarding	NO	NO	YES	undefined

Fig. 4.3.3.0d STP system

You can select one port in the Port Number item to configure the parameters of the port.

Parameter	Description
Path Cost	The contribution of the path through this port, when the port is the root port, to the total cost of the path to the root for this bridge. Value range <1-65535>.
Port Priority	You can make it more or less likely to become the root port, the lowest number has the highest priority. Value range <0-240>, the value must be in steps of 16. Default value is128.

4.3.3.1 MSTP system

The Multiple Spanning Tree Protocol (MSTP) is a standardized method (IEEE 802.1S) for providing simple and full connectivity for frames assigned to any given VLAN throughout a Bridged Local Area Network comprising arbitrarily interconnected Bridges, each operating MSTP, STP , or RSTP. MSTP allows frames assigned to different VLANs to follow separate paths, each based on an independent Multiple Spanning Tree Instance (MSTI), within Multiple Spanning Tree (MST) Regions composed of LANs and or MST Bridges. These Regions and the other Bridges and LANs are connected into a single Common Spanning Tree (CST). You can enable MSTP on web management's switch setting advanced item, select enable MSTP. We are recommended that you enable MSTP on all switches ensures a single active path on the network.

You can view MSTP information about the CIST Root Bridge. Such as following screen.

Root Bridge Information

Priority	32768
MAC Address	00:00:24:15:17:67
Root Path Cost	0
Root Port	0
Maximum Age	20
Hello Time	2
Forward Delay	15

Fig. 4.3.3.1a MSTP system

You can view MSTP CIST port status about the switch. Such as following screen

STP Port Status

PortNum	PathCost	Priority	PortState	PortEdge	PortNonSTP	PortP2P	Migration Check
Port1	2000000	128	Disabled	NO	NO	NO	undefined
Port2	2000000	128	Disabled	NO	NO	NO	undefined
Port3	2000000	128	Disabled	NO	NO	NO	undefined
Port4	2000000	128	Disabled	NO	NO	NO	undefined
Port5	2000000	128	Disabled	NO	NO	NO	undefined
Port6	2000000	128	Disabled	NO	NO	NO	undefined
Port7	2000000	128	Disabled	NO	NO	NO	undefined
Port8	2000000	128	Disabled	NO	NO	NO	undefined
Port9	200000	128	Forwarding	NO	NO	YES	undefined
Port10	2000000	128	Disabled	NO	NO	NO	undefined

Fig. 4.3.3.1b MSTP system

You can configure MSTP parameters, then click Apply button to set the values. Such as following screen.

Configure Spanning Tree Parameters

STP State (Default DISABLE)	☑
STP Debug (Default DISABLE)	☐
STP protocol version (Default RSTP)	MSTP
Priority (0-61440; Default 32768)	32768
Maximum Age (6-40; Default 20)	20
Hello Time (1-10; Default 2)	2
Forward Delay (4-30; Default 15)	15

Apply Help

Fig. 4.3.3.1c MSTP system

You can select STP state item to enable MSTP. If you want to disable MSTP, please cancel the item. Default value of STP sate is disabled.

You can select STP Debug item to output MSTP debug information. If you want to disable the debug, please cancel the item. Default value of STP Debug is disabled.

STP protocol version item has two values for you to choose. If you want the protocol version to be STP, you can choose STP. If you want the protocol version to be MSTP, you can choose MSTP. Default value of STP protocol version is MSTP.

Parameter	Description
Priority	You can change priority value, A value used to identify the root bridge. The bridge with lowest value has the highest priority and is selected as the root. Value range <0-61440>, the value must be in steps of 4096. Default value is 32768.
Max Age	You can change Max Age value. The maximum age of received protocol information before it is discarded. Value range <6-40>. Default value is 20.
Hello Time	You can change Hello time value. The time interval between the transmission of Configuration BPDUs by a Bridge that is attempting to become the Root or is the Root. Value range <1-10>. Default value is 2.
Forward Delay time	You can change forward delay time. The time spent by a Port in the Listening State and the Learning State before moving to the Learning or Forwarding State, respectively. It is also the value used for the ageing time of dynamic entries in the Filtering Database, while received BPDU indicate a topology change. Value range <4-30>. Default value is 15.

Note:

The above parameters must enforce the following relationships:

2*(hello-time + 1) <= maximum-age <= 2*(forward-delay - 1)

The following parameters can be configured on each CIST port, click Apply button to set the values.

Configure Spanning Tree Port Parameters

Port Number	Path Cost (1-200000000)	Priority (0 - 240; Default 128)	Admin Edge (Default NO)	Admin Non-STP (Default NO)	Admin P2P (Default AUTO)
Port1 Port2 Port3 Port4 Port5	200000	128	NO	NO	AUTO

Apply Help

Fig. 4.3.3.1d MSTP system

You can select one port in the Port Number item to configure the parameters of the CIST port.

Parameter	Description
Path Cost	The contribution of the path through this port, when the port is the root port, to the totalcost of the path to the root for this bridge. Value range <1-200000000>.
Port Priority	You can make it more or less likely to become the root port, the lowest number has thehighest priority. Value range <0-240>, the value must be in steps of 16. Default value is 28.
Admin Edge	You can choose the value of YES if you want the port to be edge port. If the port is edgeport, when the port becomes a Designated Port it can rapidly transition to the Forwarding Port State. Value range <NO | YES>. Default value is NO.
Admin Non -STP	If you want to disable spanning tree protocol on the port, you can choose the value of YES to this port. Value range <NO | YES>. Default value is NO.
Admin P2P	If you want point-to-point link auto detection on the port, you can choose the value of AUTO to this port. If you want point-to-point link of the port always be true, you can choose the value of YES to this port. If you want point-to-point link of the port always be false, you can choose the value of NO to this port. Value range <AUTO | NO | YES>.Default value is AUTO.

4.3.4 DHCP Relay and Option 82

The Relay Agent Information option (Option82) is inserted by the DHCP relay agent when forwarding client-originated DHCP packets to a DHCP server (RFC 3046). Servers recognizing the Relay Agent Information option may use the information to implement IP address or other parameter assignment policies. The DHCP Relay can forward the DHCP broadcast packets to a DHCP server in a different subnet (RFC 1542). So DHCP server can provide IP addresses to clients spanning multiple subnets instead of deploying a DHCP server on every subnet.

4.3.4.0DHCP Option82

To enable DHCP option82 function, need to enable global option82 and special port option82. Then select DHCP router port.

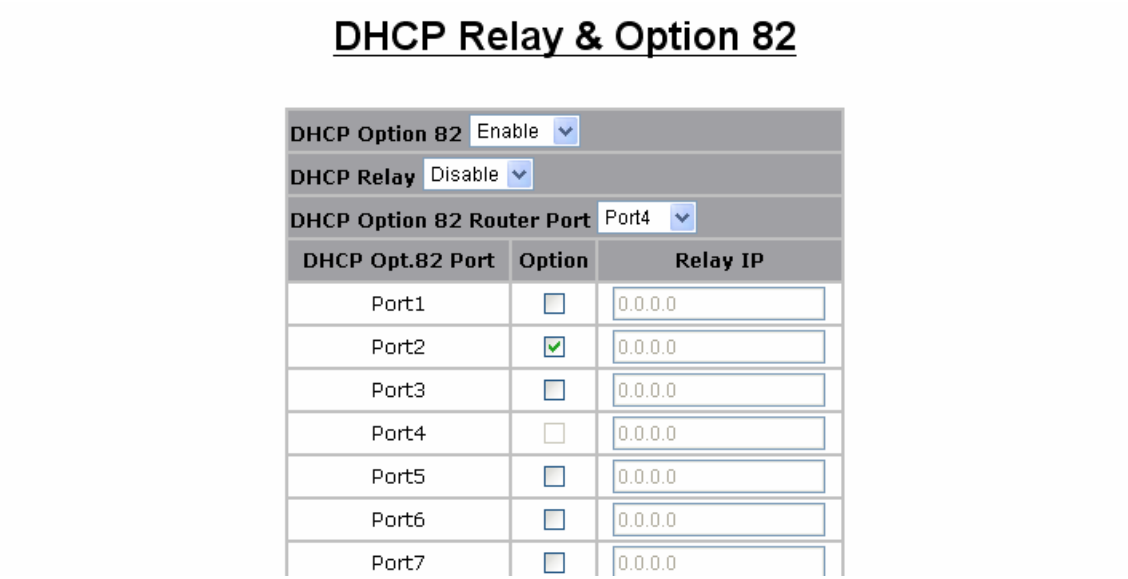


Fig. 4.3.4.0DHCP Option82

4.3.4.1 DHCP Relay

To enable DHCP relay function, need to enable global dhcp-relay and special port dhcp-relay. Then select DHCP router port.

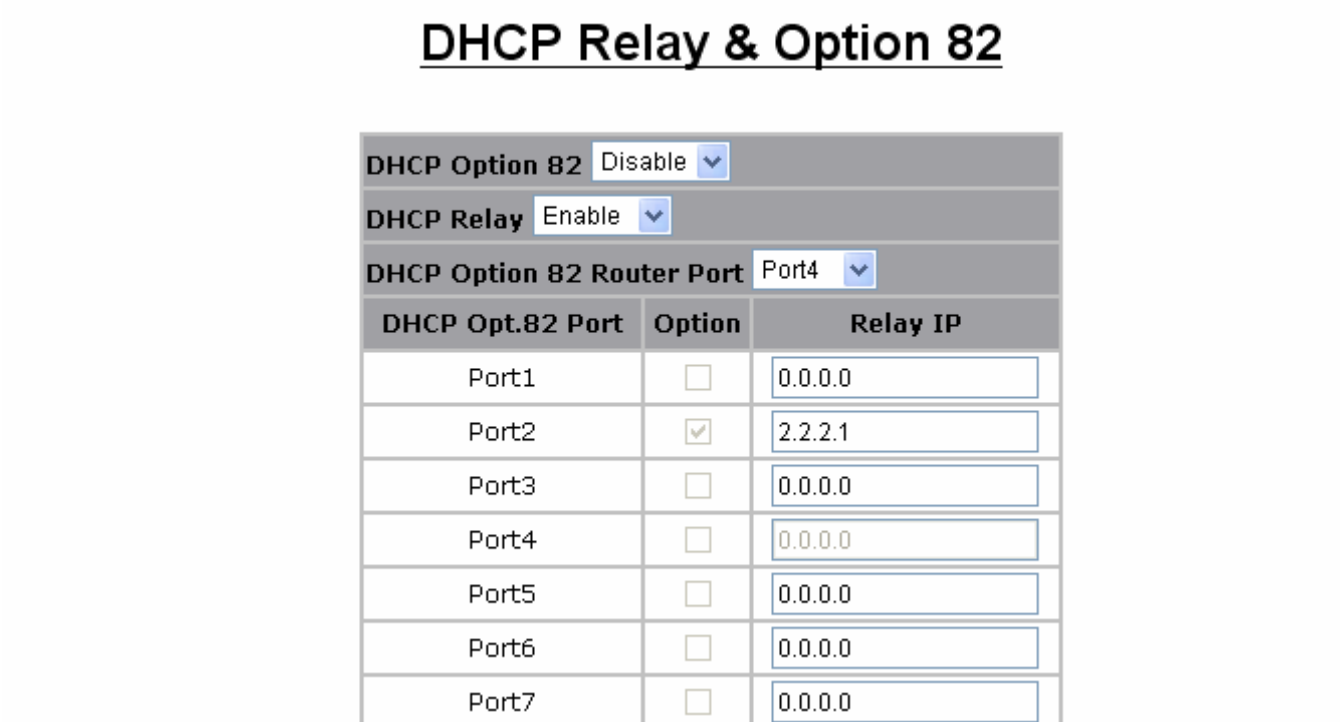
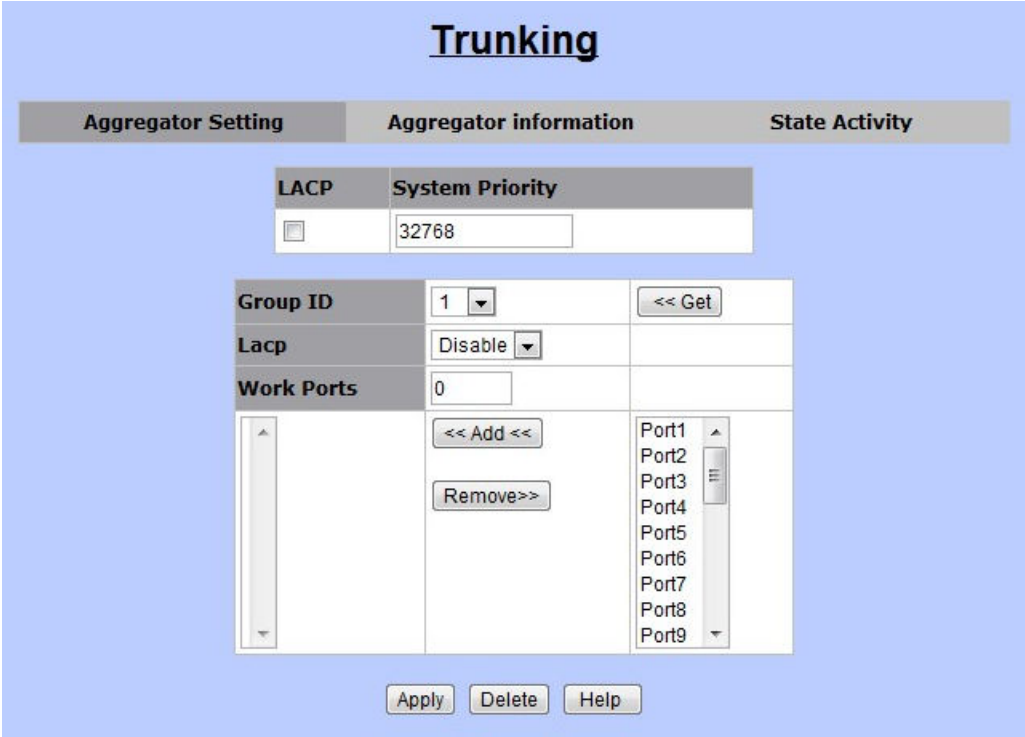


Fig. 4.3.4.1 DHCP Relay

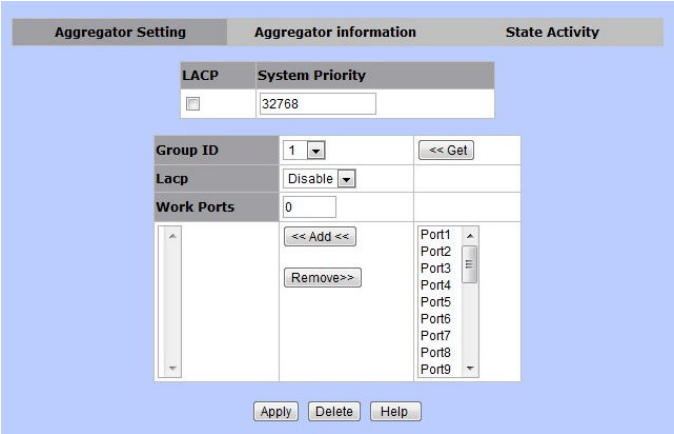
4.3.5 Trunking



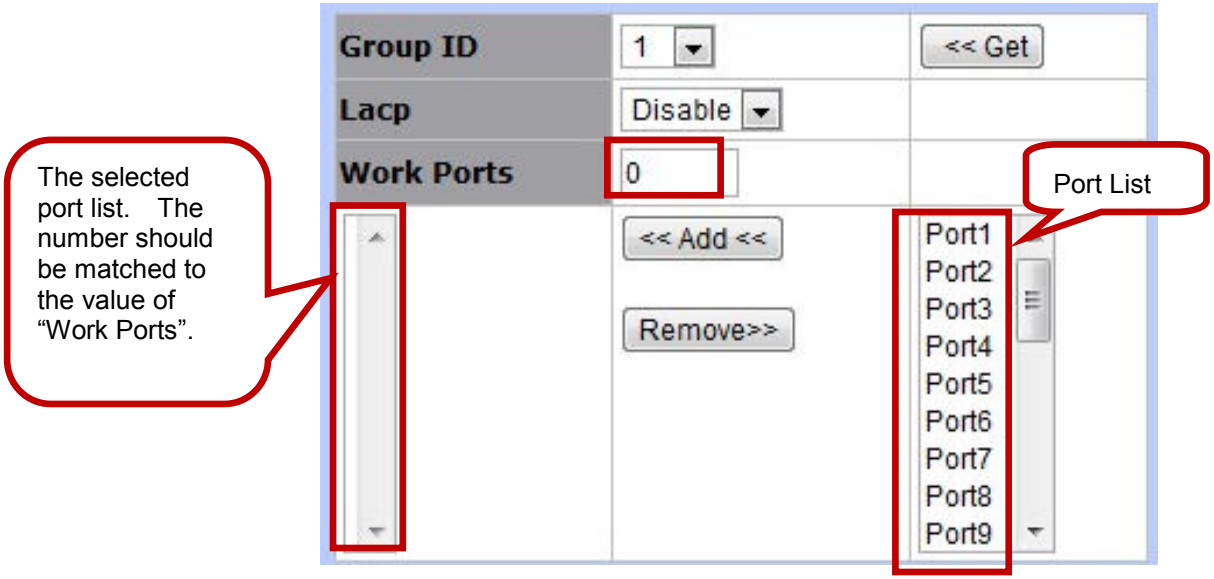
Trunking function allows users to combine several ports or connections together to create one single connection which has a higher and faster connection speed. "Trunking" is also called "Link Aggregation". Two trunking techniques are available in this VDSL2 IP DSLAM:

- Static Trunk
- LACP

- Aggregator Setting

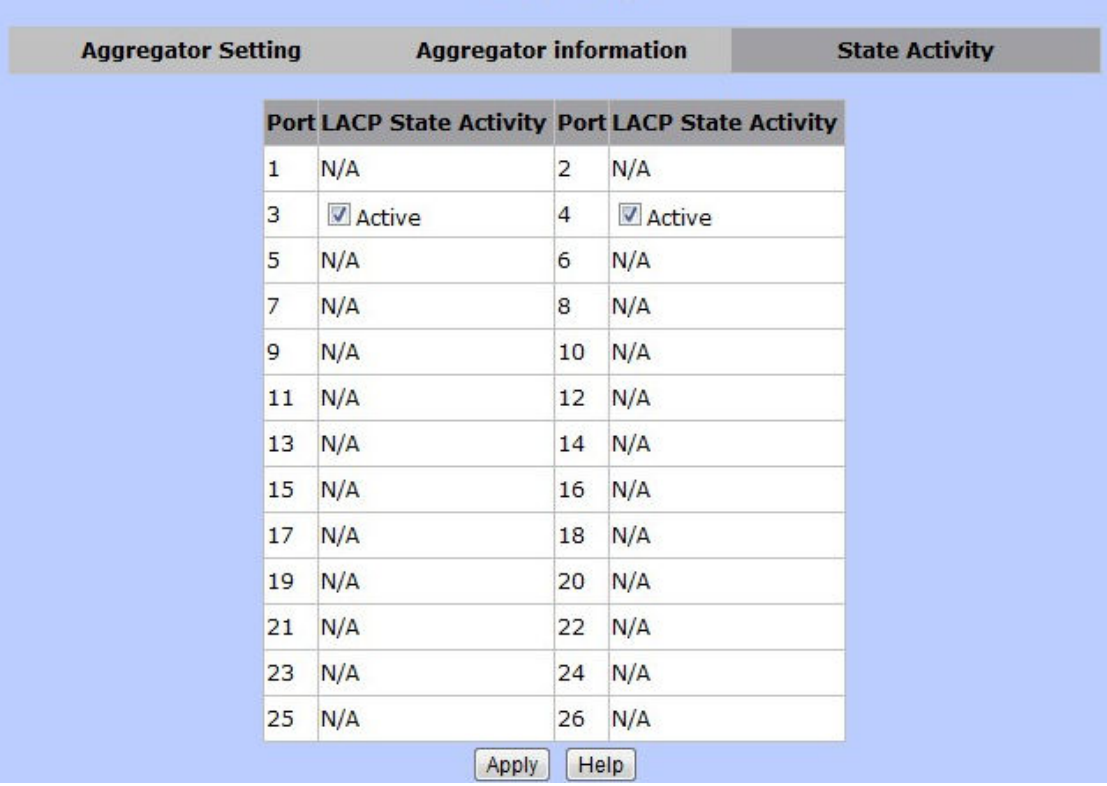


- This section allows users to setup trunking groups and details.
- The following information is needed for setting up a trunk group.
  - LACP (checkbox): for enable or disable LACP algorithm by check on the checkbox.
  - System Priority: this value is for identifying the active LACP of this VDSL2 IP DSLAM. (Note: the lowest value presents the highest priority.)
  - Trunk Group Table
    - Group ID: the trunk group ID (1~13)
    - LACP: Enable or Disable LACP algorithm for this trunk group.
    - Work Ports: the total port number of the group member. (Please select the group number in the following port list.)



- Aggregator information
  - This section allows users to review trunk information.
  - Two data are reviewed in this section:
    - Group Key: the trunk group ID.
    - Port No: the port member of this trunk group. (Port1 ~ Port24, Mod1, Mod2)

- Static Activity



- This area is for setting up LACP mode (active or passive)
  - Active: the active port will send LACP packets automatically.
  - Passive: the passive port will not send LACP packets but it will respond if and only if it receives LACP packets from the other end.

4.4 Access Control List

Packets can be forwarded or dropped by ACL rules include IPv4 or non-Ipv4. NV802S can be used to block packets by maintaining a table of packet fragments indexed by source and destination IP address, protocol, and so on.

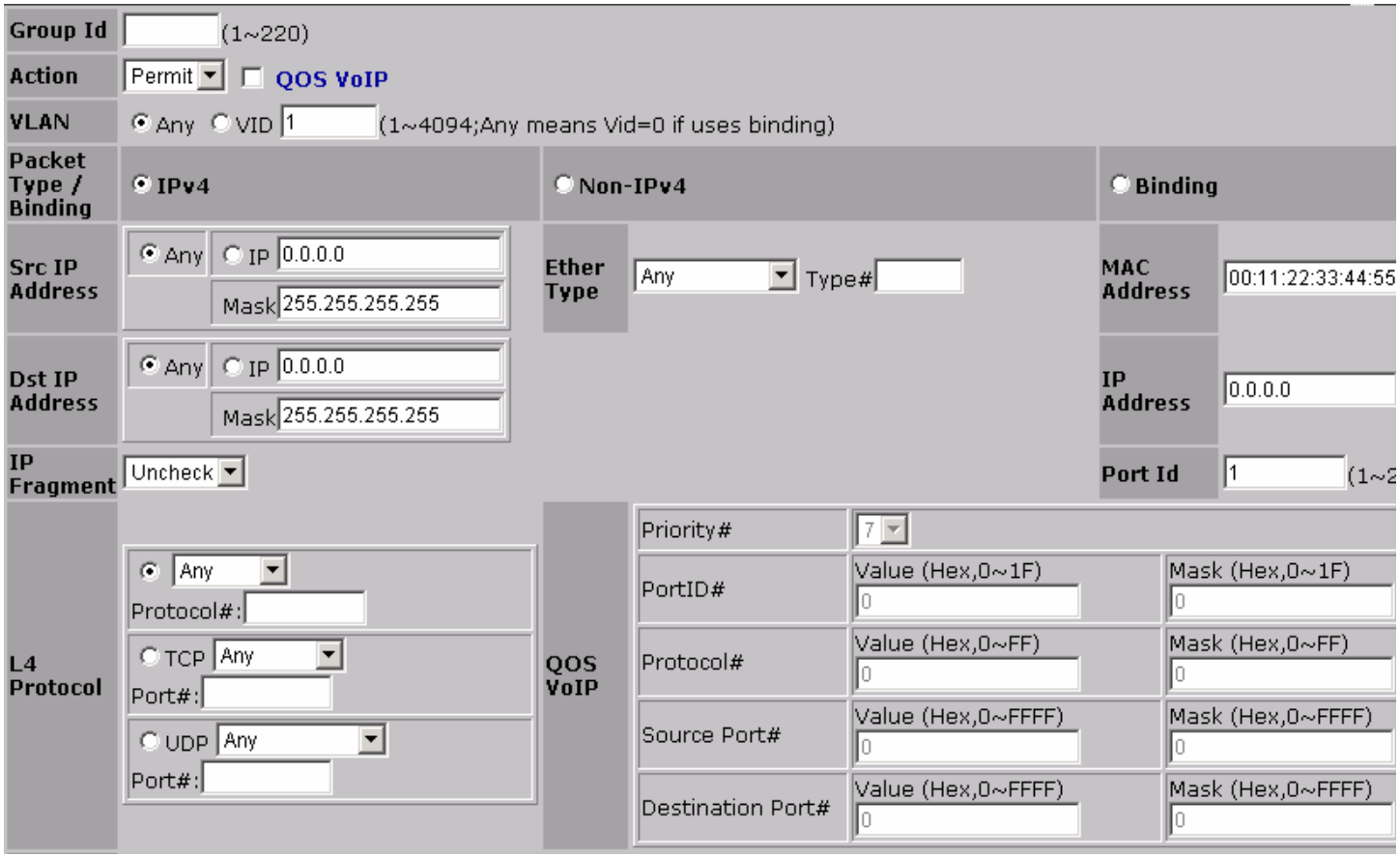


Fig. 4.4a Access Control List

There are 2 main ACL rule types to setup: **Packet Type** (IPv4 and Non-IPv4) and **Binding** (SIP-SMAC-Port).

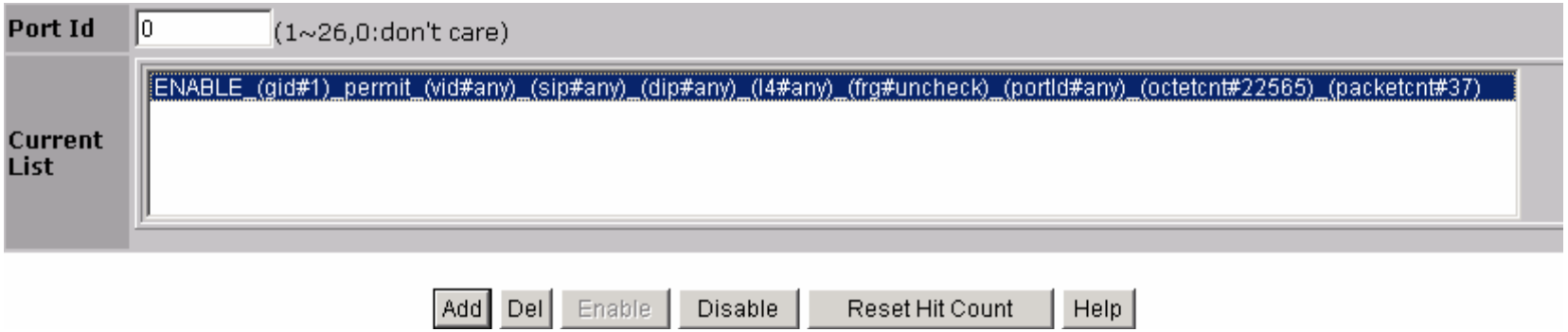


Fig. 4.4b Access Control List

Enable/Disable ACL rule: Select an ACL entry which you want to enable/disable in the Current List. Then click Enable / Disable to execute.

Reset ACL count: Select an ACL entry which you want to reset its counts (**octetcnt** and **packetcnt** fields) in the Current List. Then click Reset Hit Count to do the action.

4.4.0 IPv4

In "Packet Type / Binding" box should select "IPv4".

Action	Permit ☐ QOS VoIP				
VLAN	◉ Any ○ VID 1 (1~4094;Any means Vid=0 if uses binding)				
Packet Type / Binding	◉ IPv4	○ Non-IPv4		○ Binding	
Src IP Address	◉ Any ○ IP 0.0.0.0 Mask 255.255.255.255	Ether Type	Any Type#	MAC Address	00:11:22:33:44:55
Dst IP Address	◉ Any ○ IP 0.0.0.0 Mask 255.255.255.255			IP Address	0.0.0.0
IP Fragment	Uncheck			Port Id	1 (1~26)
L4 Protocol	◉ Any Protocol#:	QOS VoIP	Priority#	7	
			PortID#	Value (Hex,0~1F) 0	Mask (Hex,0~1F) 0
	○ TCP Any Port#:		Protocol#	Value (Hex,0~FF) 0	Mask (Hex,0~FF) 0
	○ UDP Any Port#:		Source Port#	Value (Hex,0~FFFF) 0	Mask (Hex,0~FFFF) 0
			Destination Port#	Value (Hex,0~FFFF) 0	Mask (Hex,0~FFFF) 0
Port Id	0 (1~26,0:don't care)				
Current List	(gid#1)_permit_(vid#any)_(sip#any)_(dip#any)_(l4#any)_(frg#uncheck)_(portId#any)_(octetcnt#52135)_(packetcnt#105)				

Fig. 4.4.0 IPv4

The related parameters are shown in the following table:

Items	Option	Default value
Group ID	1 ~ 220 (max. 220 ACL group)	
Action	Permit / Deny. a. Permit : Permit packet cross switch. b. Deny: Drop packet.	**Permit**
VLAN	Any / VID. a. Any: Any Vlan id. b. VID: 1~4094. A certain vlan id.	**Any**
Packet Type	IPv4 / Non-IPv4 / Binding a. IPv4: Set Ipv4 packet field. b. Non-IPv4: Set non-Ipv4 packet field. c. Binding: Set binding entry.	**IPv4**
Src IP Address	(Set this field if Packet Type is IPv4, else ignore.) Any / IP and Mask a. Any: Any IP address. b. IP :A certain IP address. Mask: ***.***.***.*** * is represent a digit from 0~9, *** is range from 0 to 255 **Notice: This is not subnet mask.**	**Any**

Dst IP Address	(Set this field if Packet Type is IPv4, else ignore.) Any / IP and Mask a. Any: Any IP address. b. IP :A certain IP address. Mask: ***.***.***.*** * is represent a digit from 0~9, *** is range from 0 to 255	**Any**
IP Fragment	(Set this field if Packet Type is IPv4, else ignore.) Uncheck / Check a. Uncheck: Not check IP fragment field. b. Check: Check IP fragment field.	**Uncheck**
L4 Protocol	(Set this field if Packet Type is IPv4, else ignore.) Any / ICMP(1) / IGMP(2) / TCP(6) / UDP(17)	**Any**
Protocol	(Set this field if Packet Type is IPv4, else ignore.) 0~255. If protocol not find in **L4 Protocol field, you can direct assign number.**	
TCP	(Set this field if Packet Type is IPv4, else ignore.) Any / FTP(21) / HTTP(80)	**Any**

Port	(Set this field if Packet Type is IPv4, else ignore.) 0~65535 If TCP port not find in TCP field, you can direct assign number.	
UDP	(Set this field if Packet Type is IPv4, else ignore.) Any / DHCP(67) / TFTP(69) / NetBios(137)	**Any**
Port	(Set this field if Packet Type is IPv4, else ignore.) 0~65535 If UDP port not find in **UDP field, you can direct assign number.**	
Port Id	Source port id, from 1~10, 0 means don't care.	**0**
Current List	You create ACL and Binding groups.	
Count	The octetcnt is octet number of the packets hiting the ACL rule. The packetcnt is the packet number Hiting the ACL rule.	**0**

4.4.1 Non-IPv4

In "Packet Type / Binding" box should select "Non-IPv4".

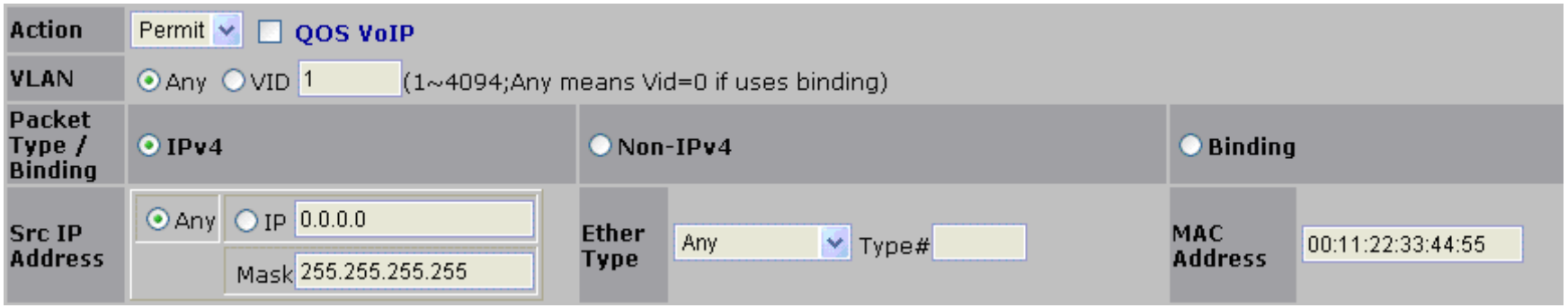


Fig. 4.4.1 Non-IPv4

The related parameters are shown in the following table:

Items	Option	Default value
Group ID	1 ~ 220 (max. 220 ACL group)	
Action	Permit / Deny. c. Permit : Permit packet cross switch. d. Deny: Drop packet.	**Permit**
VLAN	Any / VID. a. Any: Any Vlan id. b. VID: 1~4094. A certain vlan id.	**Any**

Packet Type	IPv4 / Non-IPv4 / Binding d. IPv4: Set Ipv4 packet field. e. Non-IPv4: Set non-Ipv4 packet field. f. Binding: Set binding function.	**IPv4**
Ether Type	(Set this field if Packet Type is Non-IPv4, else ignore.) Any / ARP(0x0806) / IPX(0x8137)	**Any**
Type	(Set this field if Packet Type is Non-IPv4, else ignore.) 0~0xFFFF If ether type not find in Ether Type field, you can direct assign number.	
Current List	You create ACL and Binding groups.	

4.4.2 Binding

Let device that has specific IP address and MAC address can use network. We can set specific IP address, MAC address, VLAN id and port id to bind, and device can cross switch if all conditions match.

Use binding function; we should enable it first in following page.

In "Packet Type / Binding" box should select "Binding".

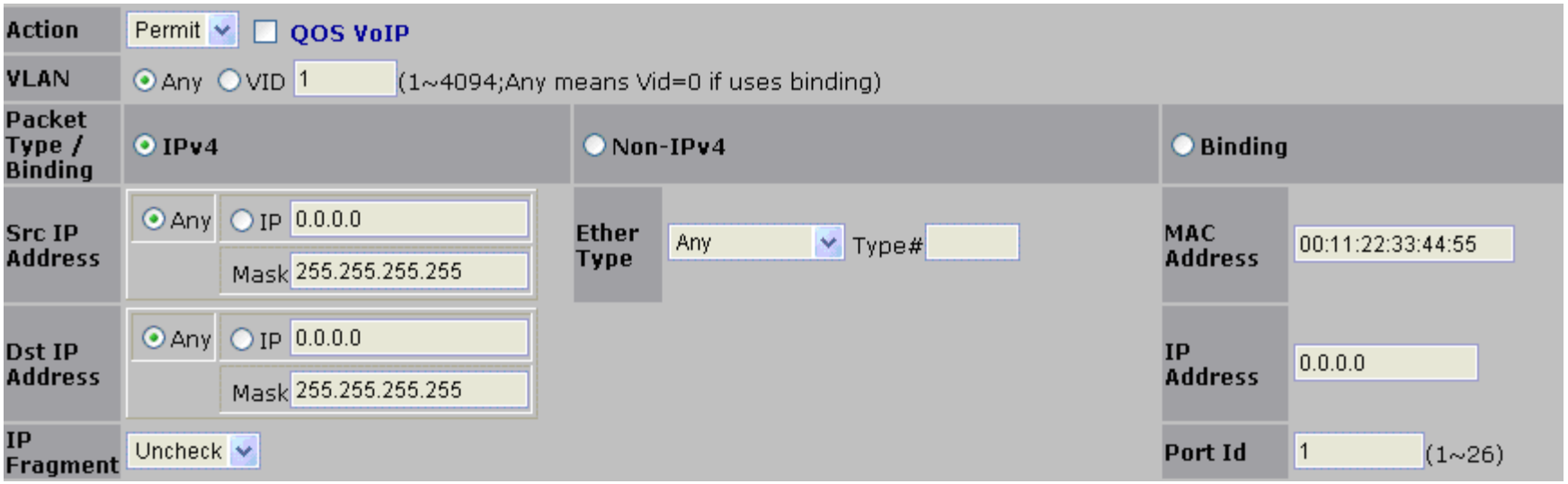


Fig. 4.4.2 Binding

The related parameters are shown in the following table:

Items	Option	Default value
Group ID	1 ~ 220 (max. 220 ACL group)	
Action	Permit / Deny. e. Permit : Permit packet cross switch. f. Deny: Drop packet.	**Permit**
VLAN	Any / VID. e. Any: Any Vlan id. f. VID: 1~4094. A certain vlan id.	**Any**
Packet Type	IPv4 / Non-IPv4 / Binding g. IPv4: Set Ipv4 packet field. h. Non-IPv4: Set non-Ipv4 packet field. i. Binding: Set binding function.	**IPv4**
Mac address	**:**:**:**:**:** * is represent a digit from 0~9 and A~F, *** is range from 0 to FF.	**00:11:22:33:44:55**
IP address	***.***.***.*** * is represent a digit from 0~9, *** is range from 0 to 255.	**0.0.0.0**
Port Id	Source port id, from 1~10.	**1**
Current List	You create ACL and Binding groups.	

4.4.3 QoS VoIP

QoS VoIP option in Action field is to provide ingress VoIP packets can be forwarded out with higher priority through the ACL function.

In "Action" box select the "QoS VoIP" checkbox to make QoS VoIP parameter area available to configure.

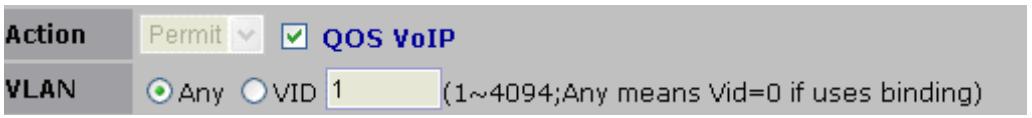


Fig. 4.4.3 QoS VoIP

QoS VoIP Parameter	Option	Default value
Priority	0 ~ 7	7
PortID	0~1F	0
PortID Mask	0~1F	0
Protocol	0~FF	0
Protocol Mask	0~FF	0
Source Port	0~FFFF	0
Source Port Mask	0~FFFF	0
Destination Port	0~FFFF	0
Destination Port Mask	0~FFFF	0

All parameters with HEX format provide settings in continuous range.

For example, if we want VoIP packets, with UDP protocol type (17) and source port number is in range of 10000~10015, to be forwarded out with highest priority while network congestion happens, an ACL rule can be created like the following setting:

Parameter	Value
GID	1
Action	QoS VoIP
VLAN	Any
Priority	7
PortID	0
PortID Mask	0
Protocol	11h
Protocol Mask	1FH
Source Port	2710h
Source Port Mask	FF00h
Destination Port	0
Destination Port Mask	0

4.5 Security

4.5.0 Security Manager

In this page, user can change user name and password with the following parameters.

User Name: Type the new user name.
Assign/Change password: Type the new password.
Reconfirm password: Retype the new password.

Fig. 4.5.0 Security Manager

Click Apply to activate the setting.

4.5.1 MAC Limit

MAC limit allows users to set a maximum number of MAC addresses to be stored in the MAC address table. The MAC addresses chosen to be stored in MAC address table is the result of first-come-first-save policy. Once a MAC address is stored in the MAC address table, it stays in until it is aged out. When an "opening" is available, the switch stored the first new MAC address it sees in that opening. All packets from MAC addresses not in the MAC address table should be blocked.

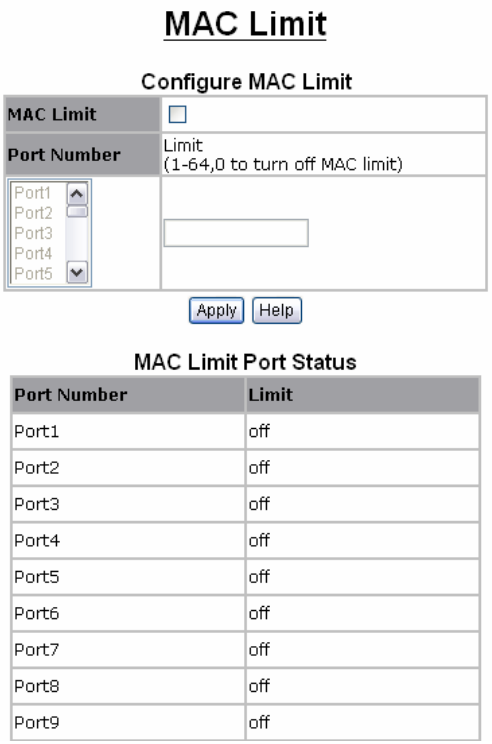


Fig. 4.5.1 MAC Limit

MAC Limit: enable/disable MAC limit function

Limit: select port number and input Limit value (0~64, 0 to turn off MAC limit)

Click Apply to activate the setting.

4.5.2 802.1x Configuration

802.1x makes use of the physical access characteristics of IEEE 802 LAN infrastructures in order to provide a means of authenticating and authorizing devices attached to a LAN port that has point-to-point connection characteristics, and of preventing access to that port in cases in which the authentication and authorization process fails.

In the beginning, 802.1x configuration page is disabled because 802.1x is disabled in default. To enable 802.1x, go to **Administration** ->**Switch setting** ->**Misc Configs** page to enable the **802.1x protocol** field. After clicked Apply, the 802.1x configuration page will be shown up.

4.5.2.0 System Configuration

In this page, the parameters related to authentication (Radius) server are provided:

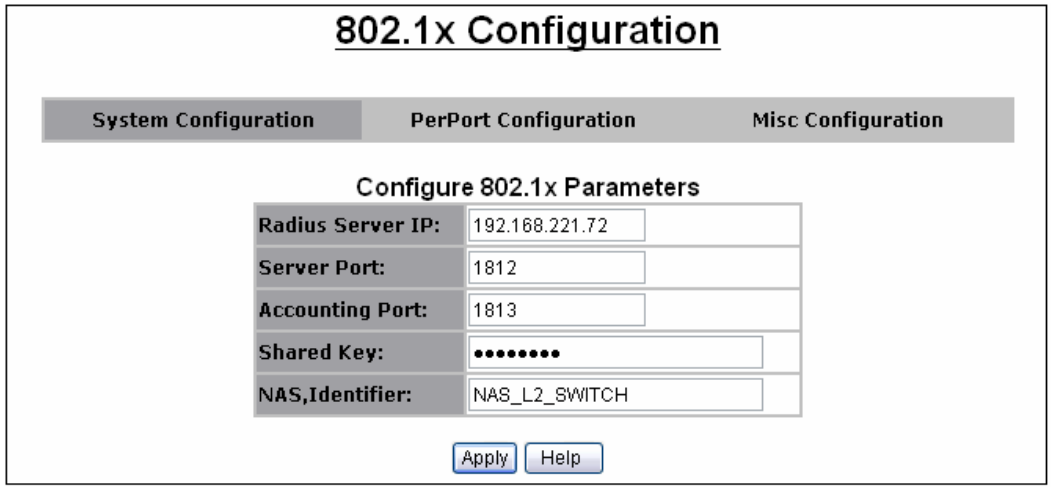


Fig 4.5.2.0 System Configuration

Radius Server IP: the IP address of the authentication server.
Server Port: The UDP port number used by the authentication server to authenticate (default: 1812).
Accounting Port: The UDP port number used by the authentication server to retrieve accounting information (default: 1813).
Shared Key: A key shared between this switch and authentication server.
NAS, Identifier: A string used to identify this switch.

4.5.2.1 Perport Configuration

In this page, you can select the specific port and configure the authorization state. There are 4 kinds of authorization state to provide for each port.

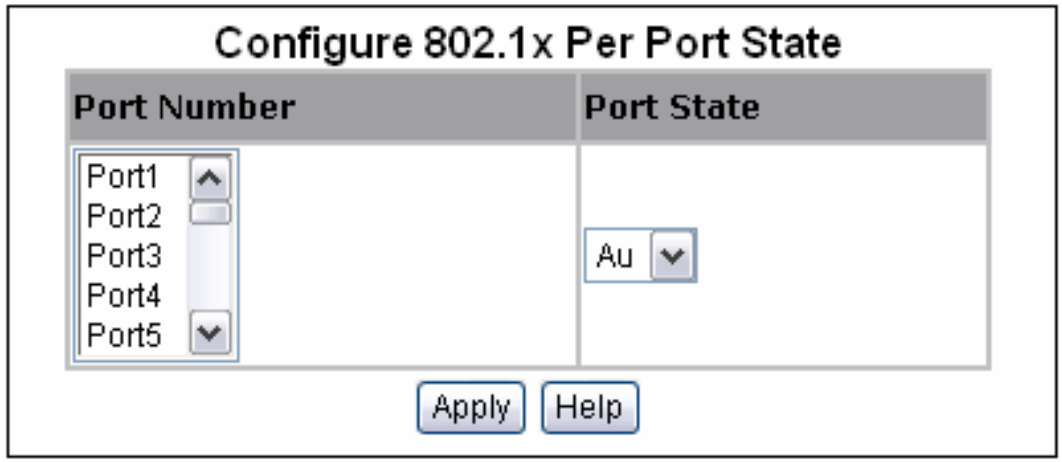


Fig. 4.5.2.1 Perport Configuration

Fu: Force the specific port to be unauthorized.

Fa: Force the specific port to be authorized.

Au: The state of the specific port was determined by the outcome of the authentication.

No: The specific port didn't support 802.1x function.

4.5.2.2 Misc Configuration

In this page, you can change the default configuration for the 802.1x standard:

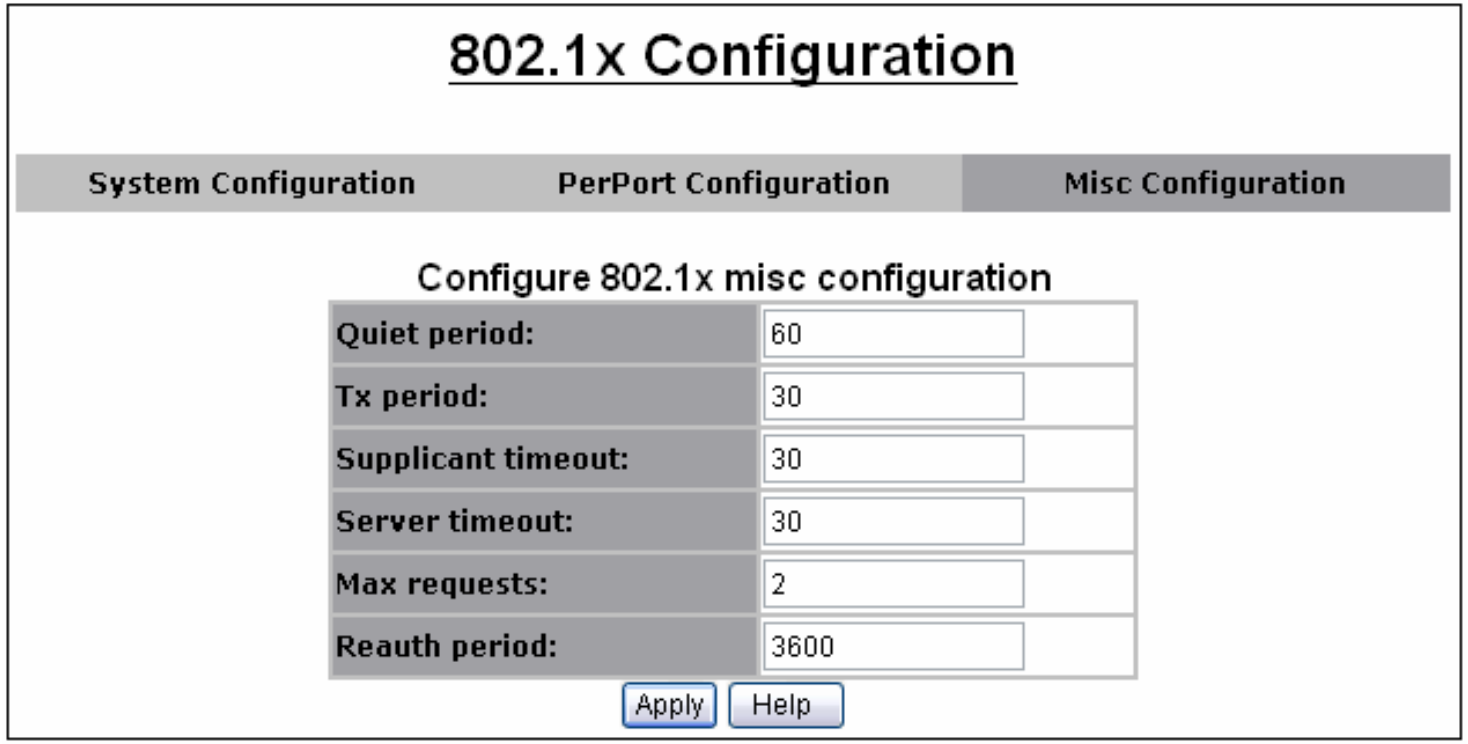


Fig. 4.5.2.2 Misc Configuration

Quiet Period: Used to define periods of time during which it will not attempt to acquire a supplicant (default time: 60 seconds).
Tx Period: Used to determine when an EAPOL PDU is to be transmitted (Default value is 30 seconds).
Supplicant Timeout: Used to determine timeout conditions in the exchanges between the supplicant and authentication server (default value: 30 seconds).
Server Timeout: Used to determine timeout conditions in the exchanges between the authenticator and authentication server (default value: 30 seconds).
ReAuthMax: Used to determine the number of re-authentication attempts that are permitted before the specific port becomes unauthorized (default value: 2 times).
Reauth Period: Used to determine a nonzero number of seconds between periodic re-authentication of the supplications (default value: 3600 seconds).

4.6 QoS

This switch provides quality of service (QoS) to prioritize the packet forwarding when traffic congestion happens. This switch supports port-based (4-level output queue) and 802.1p (8-level priority to 4-level queue mapping) QoS functions. Strict and weight round robin (WRR) QoS mode are supported.

4.6.0 QoS Configuration

This page is mainly to set the QoS mode (First Come First Service, All High before Low, and WRR) and 8-level priority to 4 – level queue mapping.

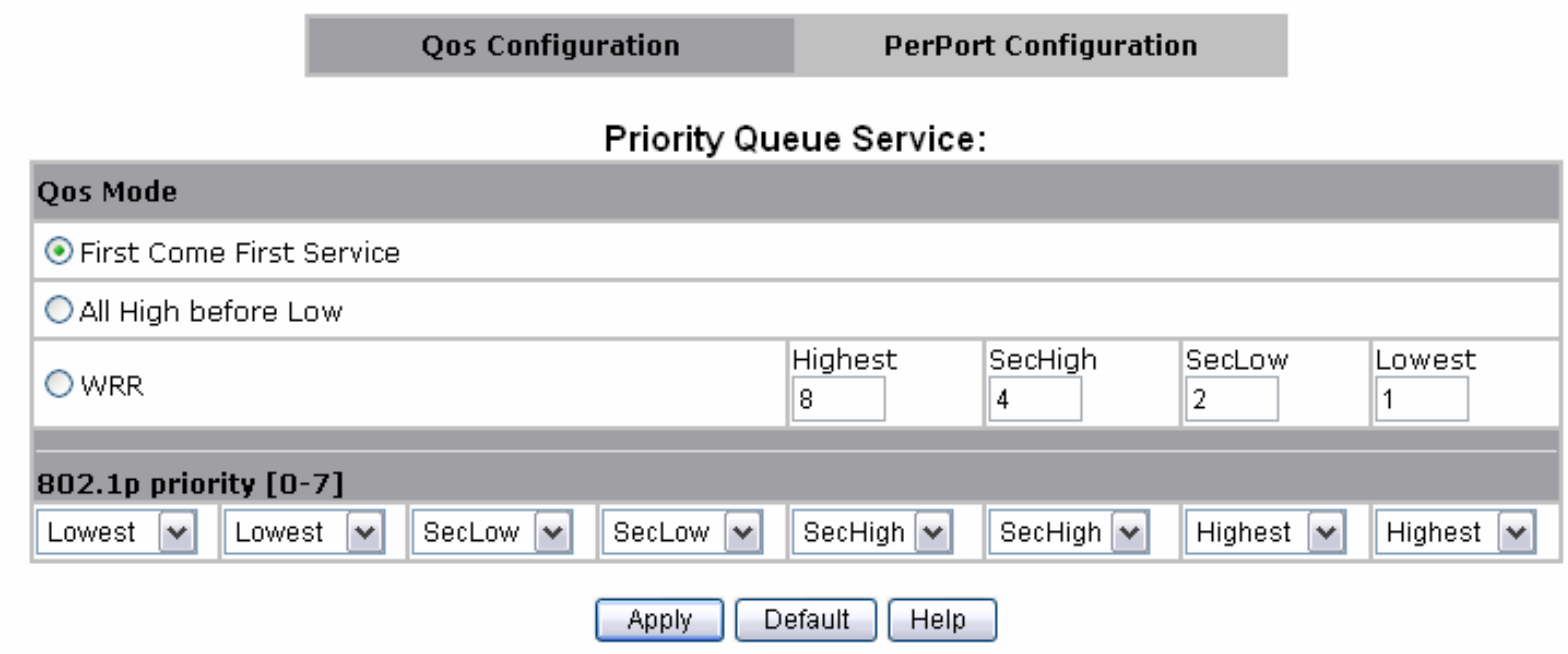


Fig. 4.6.0 QoS Configuration

First Come First Service: The sequence of packets sent is depending on arrive orders. This mode can be regarded as QoS is

disabled.

All High before Low: The high priority packets sent before low priority packets.

WRR: Weighted Round Robin. Select the preference given to packets in the switch's high-priority queue. These options represent the number of higher priority packets sent before one lower priority packet is sent. For example, 8 Highest：4 second-high means that the switch sends 8 highest-priority packets before sending 4 second-high priority packets.

QoS Priority: 8-level (0~7) priority can be mapped to 4-level (Highest, Second-High, Second-Low, Lowest) queue.

4.6.1 Per-Port Configuration

Per-port priority can be configured and shown in this page.

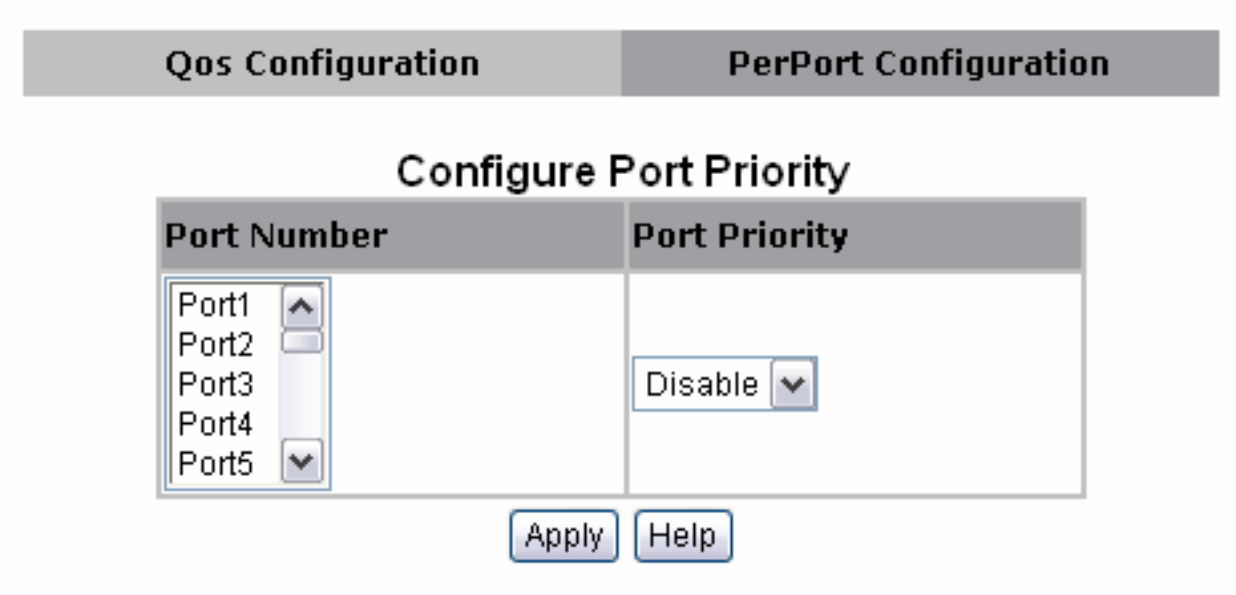


Fig. 4.6.1a Per-Port Configuration

Port Number: the ports in the switch.

Port Priority: port priority can be disable or 0-7.

Per-Port priority setting can be displayed like the following figure.

Port Priority

PortNum	Priority
Port1	Disable
Port2	Disable
Port3	Disable
Port4	Disable
Port5	Disable
Port6	Disable
Port7	Disable
Port8	Disable
Port9	Disable
Port10	Disable

Fig. 4.6.1b Per-Port Configuration

4.6.2 ToS/DSCP Configuration

The IP Type of Service Header Field

The Type of Service field in the IP header was originally defined in RFC 791. It defined a mechanism for assigning a priority to each IP packet as well as a mechanism to request specific treatment such as high throughput, high reliability or low latency.

In practice, only the IP Precedence part of the field was ever used. At its simplest, the higher the value of the IP Precedence field, the higher the priority of the IP packet.

In RFC 2474 the definition of this entire field was changed. It is now called the "DS" (Differentiated Services) field and the upper 6 bits contain a value called the "DSCP" (Differentiated Services Code Point). Since RFC 3168, the remaining two bits (the two least siginficant bits) are used for Explicit Congestion Notification.

The diagram below illustrates the relationship between the bits in the Type of Services/Differeniated Services field in the IP header:

Type of Service (TOS)	X	X	X	X	X	X	X	0
	7	6	5	4	3	2	1	0
Differentiated Services (DS)	X	X	X	X	X	X	X	X

DSCP priority of ToS setting can be displayed like the following figure.

ToS/DSCP Configuration

ToS/DSCP Configuration | ToS/DSCP Port Configuration

Configure ToS/DSCP

ToS/DSCP : Disable

DSCP	Priorty
DSCP0 DSCP1 DSCP2 DSCP3 DSCP4	0

Apply Help

ToS/DSCP Configure

DSCP	Priorty	DSCP	Priorty
DSCP0	0	DSCP1	0
DSCP2	0	DSCP3	0
DSCP4	0	DSCP5	0
DSCP6	0	DSCP7	0
DSCP8	0	DSCP9	0
DSCP10	0	DSCP11	0
DSCP12	0	DSCP13	0
DSCP14	0	DSCP15	0
DSCP16	0	DSCP17	0
DSCP18	0	DSCP19	0
DSCP20	0	DSCP21	0
DSCP22	0	DSCP23	0
DSCP24	0	DSCP25	0
DSCP26	0	DSCP27	0
DSCP28	0	DSCP29	0
DSCP30	0	DSCP31	0
DSCP32	0	DSCP33	0
DSCP34	0	DSCP35	0
DSCP36	0	DSCP37	0
DSCP38	0	DSCP39	0
DSCP40	0	DSCP41	0
DSCP42	0	DSCP43	0
DSCP44	0	DSCP45	0
DSCP46	0	DSCP47	0
DSCP48	0	DSCP49	0
DSCP50	0	DSCP51	0
DSCP52	0	DSCP53	0
DSCP54	0	DSCP55	0
DSCP56	0	DSCP57	0
DSCP58	0	DSCP59	0
DSCP60	0	DSCP61	0
DSCP62	0	DSCP63	0

Fig. 4.6.2a Per-DSCP Configuration

Per-Port status setting can be displayed like the following figure.

ToS/DSCP Configuration

ToS/DSCP Configuration | ToS/DSCP Port Configuration

Configure Port ToS/DSCP Status

Port Number	ToS/DSCP Status
Port1 Port2 Port3 Port4 Port5	Disable

Apply Help

ToS/DSCP Port Status

PortNum	ToS/DSCP Port Status
Port1	Enable
Port2	Disable
Port3	Disable
Port4	Disable
Port5	Disable
Port6	Disable
Port7	Disable
Port8	Disable
Port9	Disable
Port10	Disable

Fig. 4.6.2b Per-Port status configuration

DSCP comparison table example(Reference only):

IP Precedence (3 Bits)			DSCP (6bits)						
Name	Value	Bits	Per-Hop Behavior	Drop Precedence	Codepoint Name	Application	DSCP (Binary)	DSCP (Decima)	ToS (Decimal)
Rountine	0	000	Default		Default				
Priotity	1	001	AF	1:Low	AF11	Leased Line	001 010	10(0x0a)	40(0x28)
				2:Medium	AF12	Leased Line	001 100	12(0x0c)	48(0x30)
				3:High	AF13	Leased Line	001 110	14(0x0e)	56(0x38)
Immediate	2	010	AF	1:Low	AF21	IPTV VOD	010 010	18(0x12)	72(0x48)
				2:Medium	AF22	IPTV VOD	010 100	20(0x14)	80(0x50)
				3:High	AF23	IPTV VOD	010 110	22(0x16)	88(0x58)
Flash	3	011	AF	1:Low	AF31	IPTV Broadcast	011 010	26(0x1a)	104(0x68)
				2:Medium	AF32	IPTV Broadcast	011 100	28(0x1c)	112(0x70)
				3:High	AF33	IPTV Broadcast	011 110	30(0x1e)	120(0x78)
Flash Override	4	100	AF	1:Low	AF41	NGN/3G Singaling	100 010	34(0x22)	136(0x88)
				2:Medium	AF42	NGN/3G Singaling	100 100	36(0x24)	144(0x90)
				3:High	AF43	NGN/3G Singaling	100 110	38(0x26)	152(0x98)
Critical	5	101	EF		EF	NGN/3G voice	101 110	46(0x2e)	184(0xb8)
Internetwork Control	6	110	- -		CS6	Protocol	110 100	48(0x30)	192(0xc0)
Network Control	7	111	- -		CS7	Protocol	111 000	56(0x38)	224(0xe0)

4.7 Monitoring

The following items are provided in Monitoring section:

- Port status
- Port statistics

4.7.0 Port Status

This page provides current status of every port that depends on user's setting and the negotiation result.

Port Status

The following information provides a view of the current status of the unit.

Port	State	Link	Negotiation	Speed	Duplex	Flow Control	Rate Control (Unit: 128Kbps)		Security	BSF	Jumbo Frame
							Up	Down			
Port1	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port2	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port3	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port4	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port5	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port6	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port7	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port8	On	Up	Force	100	Full	On	Off	Off	Off	On	On
Port9	On	Down	---	---	---	---	Off	Off	Off	On	On
Port10	On	Up	Auto	100	Full	On	Off	Off	Off	On	On

Fig. 4.7.0 Port Status

State: Display port statuses: **disable or enable**. "Unlink" will be treated as "off".

Link Status: Down means "No Link"; Up means "Link up".

Auto Negotiation: Display the auto negotiation mode: auto/force/nway-force.

Speed status: Display 100Mbps speed, port 1- 8 are 10/100Mbps, Port 9~10 are 10/100/1000Mbps.

Duplex status: Display full-duplex or half-duplex mode.

Flow Control: Display the flow control state

Full: Display the flow control is enabled or disabled in full mode.

Half: Display the backpressure is enabled or disabled in half mode.

Rate Control(Traffic shaping): Display the rate control setting.

Up(Ingress): Display the port effective ingress rate of user setting.

Down(Egress): Display the port effective egress rate of user setting.

Port Security: Display the port security is enabled or disabled.

BSF: Display the port broadcast storm filter control is enable or disable.

Jumbo Frame: Display the jumbo frame is supported or not for the port.

Note:

Please click the Browser's Refresh button or press <F5> to refresh the latest status.

4.7.1 Port Statistics

The following information provides a view of the current status of the whole unit.

Press Reset button to clean all count.

Port Statistics

The following information provides a view of the current status of the unit.

Port	State	Link	TxGoodPkt	TxBadPkt	RxGoodPkt	RxBadPkt	TxAbort	Collision	DropPkt
Port1	On	Up	4	0	0	0	0	0	0
Port2	On	Up	4	0	0	973	0	0	0
Port3	On	Up	4	0	0	1156	0	0	0
Port4	On	Up	4	0	0	6	0	0	0
Port5	On	Up	4	0	0	0	0	0	0
Port6	On	Up	4	0	0	797	0	0	0
Port7	On	Up	4	0	0	16	0	0	0
Port8	On	Up	4	0	0	21	0	0	0
Port9	On	Down	0	0	0	0	0	0	0
Port10	On	Up	11251	0	18374	0	0	0	1915

Reset

Fig. 4.7.1 Port Statistics

4.8 Reset System

The page to reset the switch to default configuration is shown as below.

Warning:

All configuration settings are restored to factory default setting.

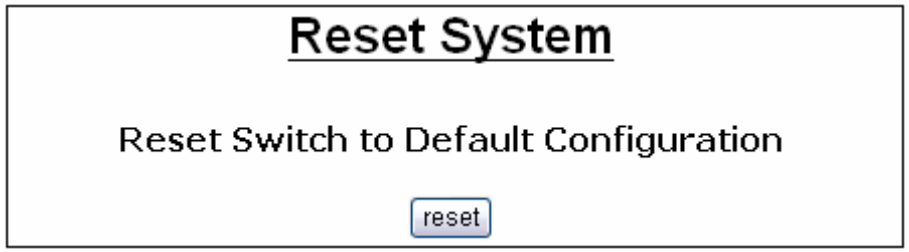


Fig. 4.8 Reset System

4.9 Reboot

The page to reboot (warm restart) the switch is shown as below.

Fig. 4.9 Reboot

Chapter 5. VDSL2 functions

The page to configure and show VDSL2 functions.

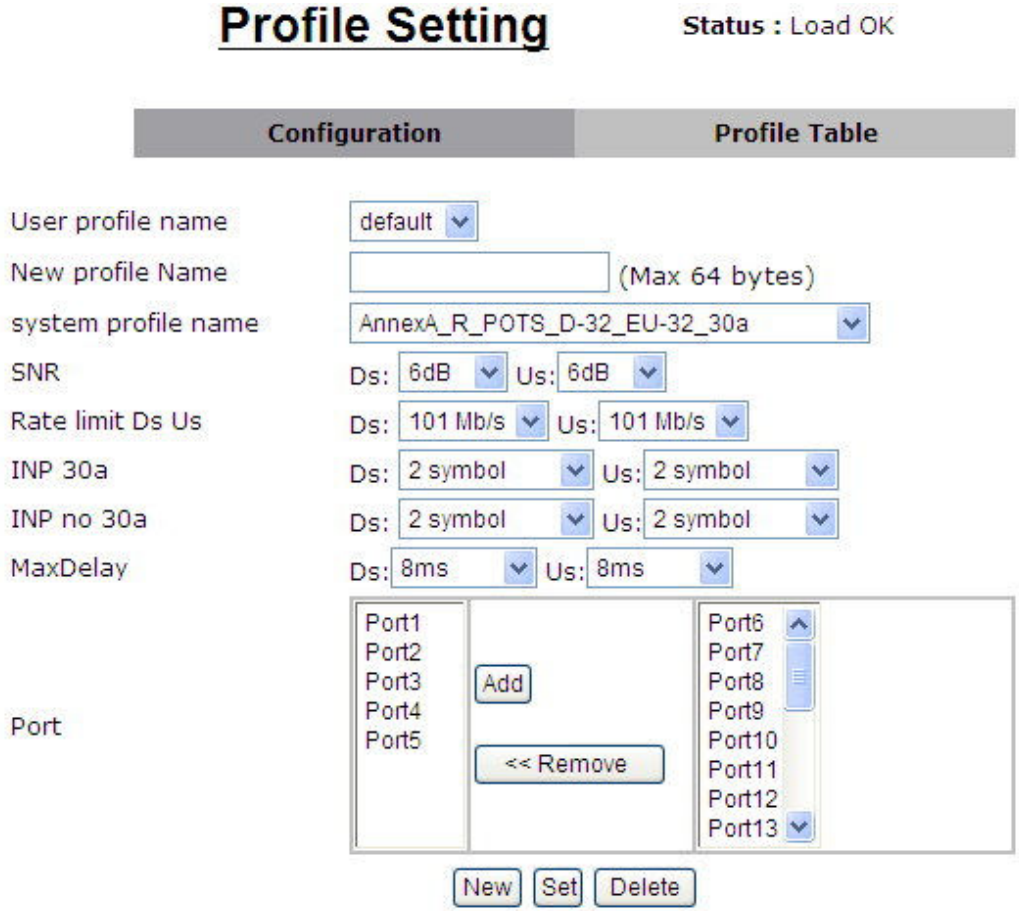


Figure 5.1.1 VDSL2 Configuration

5.1 Profile Config

The page to configure VDSL2 Profile, BandPlan, VDSL2 ports rate control and Tone Mode.
For this function, NV-2400H provides world wide telecom standard band plan, such as meet European telecom standard band plan 998(17a), USA telecom standard band plan 997(8a, 8b) and APAC Telecom standard band plan (30a) etc.

- **Annex A** specifies bandplans for the North American region and enables NV-2400H to be deployed with traditional POTS telephony or in an all-digital mode.
- **Annex B** specifies bandplans for Europe and enables NV-2400H deployment with underlying POTS and ISDN services.
- **Annex C** allows NV-2400H to coexist with TCM-ISDN services, found primarily in APAC.

NV-2400H has numerous configuration profiles and bandplans to meet regional service provider requirements. The frequency bandwidth has increased to 30 MHz, with configuration options at 8.5 MHz, 12 MHz, 17.7 MHz and 30 MHz.

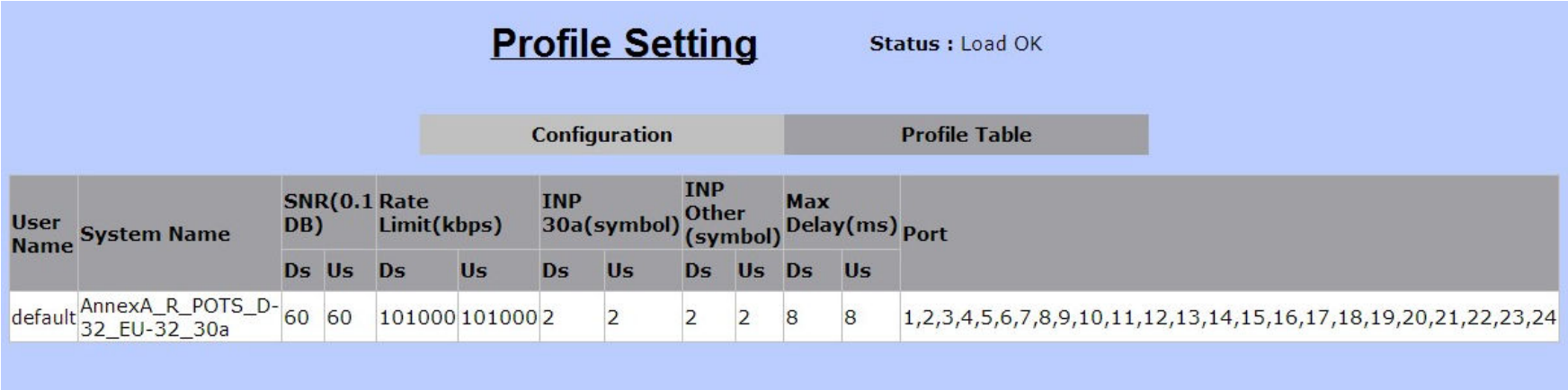
Band profile and band plan can only be configured at NV-2400H as NV-202 will auto-follow up on the settings of NV-2400H. The only thing that NV-202 must be configured so that the routers will link is the tone mode. However, the default tone mode for NV-2400H / NV-202 is fully compitable, so at default there's no need to change the tone mode unless it is required by the telecom companies to use different tone mode. Another important thing is that band profile and band plan setting must be compatible to each other if not access error will show when applied. Please deactivate and activate once the setting has been changed.

Note: If NV-2400H connect to NV-600R, NV-600R tone mode need configure to **A43**, and the NV-2400H band profile need configure to **AnnexA_R_POTS_D-32_EU-64_17a**. The link will be established.

Item	Description
User Profile Name	The name of user-defined profile. Note: There are 21 pre-defined profiles. These names are not changeable. Users are allowed to save new profiles with "New" button.
New Profile Name	New profile name (up to 64 characters)
System Profile Name	This option is for setting up VDSL band profile. Different profile results in different connection status of data rate and distance. 1. AnnexA_R_POTS_D-64_EU-64_30a 2. AnnexA_R_POTS_D-32_EU-32_17a 3. AnnexA_R_POTS_D-32_EU-32_12b 4. AnnexA_R_POTS_D-32_EU-32_12a 5. AnnexA_R_POTS_D-32_EU-32_8a 6. AnnexA_R_POTS_D-32_EU-32_8b 7. AnnexA_R_POTS_D-32_EU-32_8c 8. AnnexA_R_POTS_D-32_EU-32_8d 9. AnnexA_R_POTS_D-32_EU-64_30a_NUS0 10. AnnexA_R_POTS_D-32_EU-64_17a 11. AnnexB_B7-1_997-M1c-A-7 12. AnnexB_B7-2_997-M1x-M-8 13. AnnexB_B7-3_997-M1x-M 14. AnnexB_B7-4_997-M2x-M-8 15. AnnexB_B7-5_997-M2x-A 16. AnnexB_B7-6_997-M2x-M 17. AnnexB_B7-9_997E17-M2x-A 18. AnnexB_B7-10_997E30-M2x-NUS0 19. AnnexB_B8-1_998-M1x-A 20. AnnexB_B8-1_998-M1x-B

	21. AnnexB_B8-4_998-M2x-A 22. AnnexB_B8-5_998-M2x-M 23. AnnexB_B8-6_998-M2x-B 24. AnnexB_B8-8_998E17-M2x-NUS0 25. AnnexB_B8-9_998E17-M2x-NUS0-M 26. AnnexB_B8-10_998ADE17-M2x-NUS0-M 27. AnnexB_B8-11_998ADE17-M2x-A 28. AnnexB_B8-12_998ADE17-M2x-B 29. AnnexB_B8-13_998E30-M2x-NUS0 30. AnnexB_B8-14_998E30-M2x-NUS0-M 31. AnnexB_B8-15-998ADE30-M2x-NUS0-M 32. AnnexB_B8-16-998ADE30-M2x-NUS0-A 33. AnnexC_POTS_25-138_b 34. AnnexC_POTS_25-276_b 35. AnnexC_TCM_ISDN
SNR	SNR values for both downstream and upstream (6dB ~ 24dB)
Rate Limit Ds Us	The data rates for both downstream and upstream
INP 30a	INP levels for VDSL2 profile 30a for both downstream and upstream
INP no 30a	INP levels for other VDSL2 profiles (8a, 8b, 8c, 8d, 12a, 12b, and 17a) for both downstream and upstream
Max Delay	The maximum delay time for both downstream and upstream Options: No limit, No delay, 1ms ~ 63ms
Port	For assigning which ports should be applied the profile to.

5.2 Profile Table



Profile Setting Status : Load OK

Configuration | Profile Table

User Name	System Name	SNR(0.1 DB)		Rate Limit(kbps)		INP 30a(symbol)		INP Other (symbol)		Max Delay(ms)		Port
		Ds	Us	Ds	Us	Ds	Us	Ds	Us	Ds	Us	
default	AnnexA_R_POTS_D-32_EU-32_30a	60	60	101000	101000	2	2	2	2	8	8	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

"Profile Table" is for users to review the details of existing profiles in the following details.

User Name	The profile name
System Name	VDSL2 Band profile
SNR (Ds / Us)	SNR value
Rate Limit (Ds / Us)	The data rate
INP 30a (Ds / Us)	INP level for VDSL2 profile 30a
INP Other (Ds / Us)	INP level for the other VDSL2 profiles
Max Delay	Maximum delay
Port	The port members of this profile

5.3 Compatibility Table

The following shows the band profile and band plan compatibility:

Band Profile and Band Plan	NV-202	NV-600R (A43/B43)	NV-600A/W
AnnexA_R_POTS_D-32_EU-32_ 30a	○	X	X
AnnexA_R_POTS_D-32_EU-32_ 17a	○	○(A43)	○
AnnexA_R_POTS_D-32_EU-32_ 12b	○	○(A43)	○
AnnexA_R_POTS_D-32_EU-32_ 12a	○	○(A43)	○
AnnexA_R_POTS_D-32_EU-32_ 8a	○	○(A43)	○
AnnexA_R_POTS_D-32_EU-32_ 8b	○	○(A43)	X
AnnexA_R_POTS_D-32_EU-32_ 8c	○	○(A43)	○
AnnexA_R_POTS_D-32_EU-32_ 8d	○	○(A43)	○
AnnexA_R_POTS_D-64_EU-64_30A_NUSO	X	X	X
AnnexA_R_POTS_D-64_EU-64_ 17a	X	X	○
AnnexB_B7-1_997-M1c-A-7	○	○(B43)	○
AnnexB_B7-2_997-M1x-M-8	○	X	X
AnnexB_B7-3_997-M1x-M	○	X	X
AnnexB_B7-4_997-M2x-M-8	○	○(B43)	X
AnnexB_B7-5_997-M2x-A	○	X	X
AnnexB_B7-6_997-M2x-M	○	X	X
AnnexB_B7-9_997E17-M2x-A	○	X	X
AnnexB_B7-10_997E30-M2x-MUS0	○	X	X

Band Profile and Band Plan	NV-202	NV-600R (A43/B43)	NV-600A/W
AnnexB_B8-1_998-M1x-A	○	X	X
AnnexB_B8-2_998-M1x-B	○	X	X
AnnexB_B8-4_998-M2x-A	○	X	○
AnnexB_B8-5_998-M2x-M	○	X	X
AnnexB_B8-6_998-M2x-B	○	X	X
AnnexB_B8-8_998E17-M2x-MUS0	○	○(B43)	○
AnnexB_B8-9_998E17-M2x-MUS0-M	○	○(B43)	○
AnnexB_B8-10_998ADE17-M2x-MUS0-M	○	○(B43)	○
AnnexB_B8-11_998ADE17-M2x-A	○	○(B43)	○
AnnexB_B8-12_998ADE17-M2x-B	○	X	X
AnnexB_B8-13_998E30-M2x-NUS0	○	X	X
AnnexB_B8-14_998E30-M2x-NUS0-M	○	X	X
AnnexB_B8-15_998ADE30-M2x-MUS0-M	○	X	X
AnnexB_B8-16_998ADE30-M2x-MUS0-A	○	X	X
Annex-C_POTS_25-138_b	○	X	X
Annex-C_POTS_25-276_b	○	X	X
Annex-C_TCM-ISDN	○	○(A43)	○

Chapter 6. Applications

The Switch provides segmented network architecture. When a port is connected to an end-node, or to a device that breaks up the collision domain (e.g., another switch, bridge or router), the attached device has access to the full bandwidth provided by that port.

Bridging Functions – The Switch provides fully transparent bridging functions which automatically learn node addresses, which are subsequently used to filter and forward all traffic based on the destination address. When traffic passes between devices attached to the same shared collision domain, those packets are filtered from the switch. But when traffic must be passed between unique segments (i.e., different ports on the switch), a temporary link is set up between the switch ports which need to pass this traffic, via the high-speed switching fabric.

Flexible Configuration–This Switch is not only designed to segment your network, but also to provide a wide range of options in setting up network connections. It can be used as a simple stand-alone switch; or can be connected with standard hub, switches, or other network interconnection devices in various configurations. Some of the common applications for the Switch are described in this chapter.

Switch Used as Collapsed Backbone for Starter Network

This Switch is an excellent choice for new Ethernet installations where significant growth is expected in the near future. You can easily build on this basic configuration, adding direct full-duplex connections to workstations or servers (i.e., up to 20 Mbps or even 200 Mbps of dedicated bandwidth per node).Then, when the time comes for further expansion, just daisy-chain any IEEE 802.3 or IEEE 802.3u compliant switch or hub. This Switch can also be easily integrated with upper-level protocol devices you later add into the network.

Last Mile of FTTx Deployment

The NV-2400H is an ideal solution for FTTx (FTTB / FTTH, etc.) applications. It support high bandwidth over existing telephone wires in the "last mile" from the ISP / Telecom / Service Provider's fiber node to the buildings and customers' houses.

The Intelligent NV-2400H provides a high speed, 100Mbps transmission over phone wiring over a single Internet account to provide simultaneous independent Internet access to multiple users. It is excellent for phone line network built under internet because the whole building could share the internet to the wider area network with minimum cost and get max efficiency.

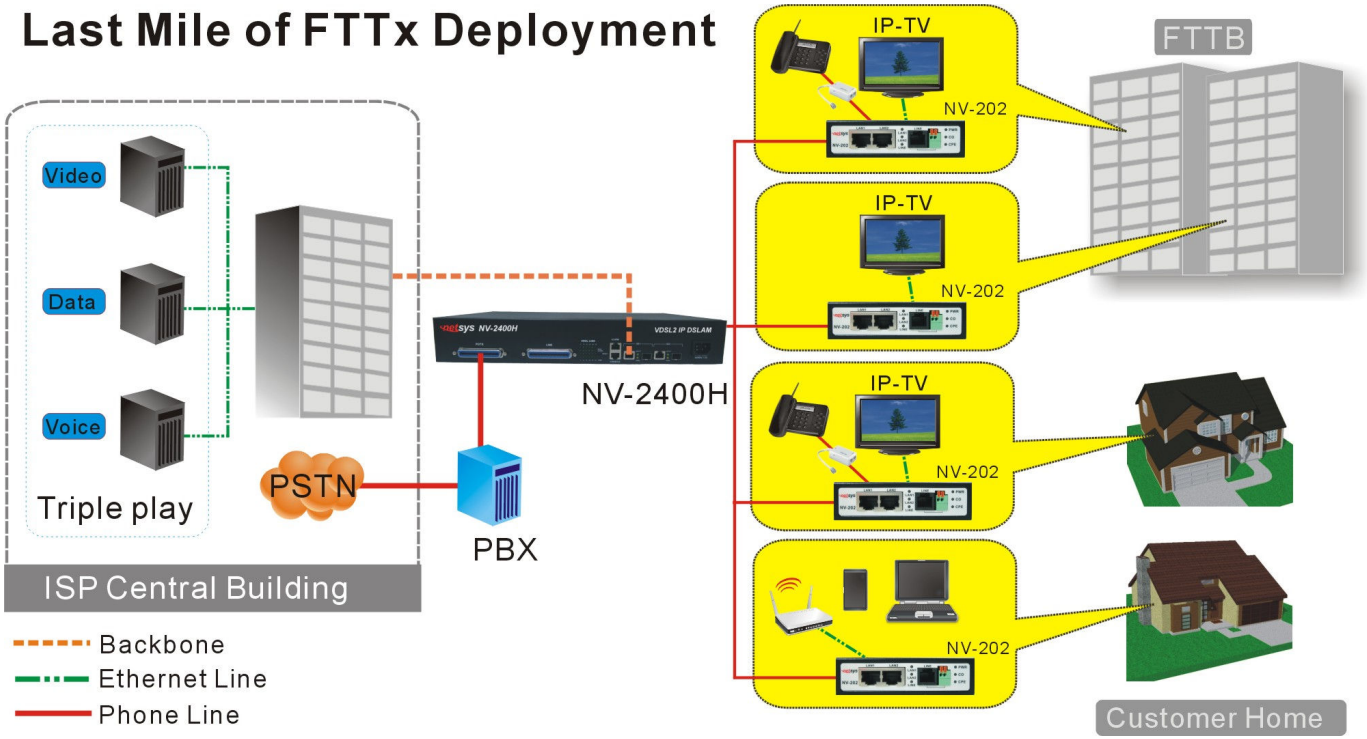


Figure 6.1 VDSL2 application diagram

Application for Sharing a single internet account

If multiple users would like to share a single internet account using the switch, which is to be connected to a IP sharing device, then to a xDSL or Cable Modem.

Note:

For network applications that actually require a Router (e.g., Interconnecting dissimilar network types), attaching the SWITCH directly to a router can significantly improve overall home networking performance.

High bandwidth backbone ready

The NV-2400H provides 10/100/1000Mbps auto sensing for external trunk device (Fiber optics, Wireless Bridge, xDSL & other WAN services).

Appendix A: Troubleshooting

Diagnosing IP DSLAM Indicators

The Switch can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the Switch may encounter. This section describes common problems you may encounter and possible solutions

1. Symptom:	**POWER indicator does not light up (green) after power on.**
Cause:	Defective power outlet, power cord, internal power supply
Solution:	Cheek the power outlet by plugging in another that is functioning properly. Check the power cord with another device. If these measures fail to resolve the problem, have the unit power supply replaced by an qualified distributor.

2. Symptom:	**Link indicator does not light up (green) after making a connection.**
Cause:	Network interface (e.q., a network adapter card on the attached device), network cable, or switch port is defective.
Solution:	2.1 Verify if both of the switch and attached device are powered on. 2.2 Be sure the cable is plugged into both the switch and corresponding device. 2.3 Verify that the proper cable type is used and its length does not exceed specified limits. 2.4 Check the adapter on the attached device and cable connections for possible defects. 2.5 Replace the defective adapter or cable if necessary.

3. Symptom:	**Upstream bandwidth control failed.**
Cause:	NIC(Networking Interface Card) does not have flow control function.
Solution:	Be sure the NIC(**Networking Interface Card**) supports flow control function.

4. Question:	**The customer reported that bandwidth control did not work in either direction when the port was set to 1 on the ingress and 1 on the Down(egress). One of our new HP laptops should bandwidth control at around 125K on the download, but around 1.7Mbps on the upload. On my laptop, it was around 100K on the download and 225K on the upload. Is there a reason why we are seeing such varied results and has there been any other reported problem with this feature lately?**
Answer:	Regarding our VDSL2 IP DSLAM' principle of bandwidth control, which must rely on flow control to limit bandwidth over hardware, as long as client side doesn't support flow control, the upstream bandwidth control is invalid, so for this case, client side must support flow control function.

5. Question:	**Why VDSL2 configure change invalid ?**
Answer:	After any change to VDSL2 configure. Line must be deactivated then activated once or reboot, then new configure will be valid.

6. Question:	**Is that possible to use ADSL2+ modems with the VDSL2 IP DSLAM ?**
Answer:	Please Note that it is not possible to use ADSL2+ modems with the VDSL2 IP DSLAM, since ADSL2+ is based on ATM frame and our VDSL2 IP DSLAM is based on EFM frame. Two frames are not compatible.

7. Question:	Sometimes the CPE lose the connection to DSLAM.
Cause:	Due to heavy noise of field environment or phone wiring does not meet specifications.
Solution:	1. We strong recommend all VDSL2 ports must use **24** gauge with twisted pair phone wiring. 2. Please replace the head of RJ11 wiring, if it has been oxidized or damaged. 3. Using phone cable must be stretched straight, without using reel phone cable, this will cause heavy crosstalk noise. 4. If port link problem, please change band profile to long reach mode as 12a or 8d AnnexB.

8. Question:	Sometimes the IP DSLAM unstable.
Cause:	Due to heavy noise or impulse noise of field environment caused unstable.
Solution:	1. If NV-2400H hangs up, please enable broadcast strom function, please refer to section 4.2.1.2. 2. If CPE happened sync issue, please adjust interleave delay time to anti-noise, please refer to section 5.2 3. Enable INP(impulse noise protection) to 8 or above and enable "Force INP" for preventing impulse noise.
Notes:	1. Please note that enable interleave delay function will reduce a few vdsl2 bandwidth. 2. Interleave delay value must greater than or equal to INP value, otherwise VDSL2 will not establish a connection. 3. Please note you must deactivate then activate once on config port when you adjust INP and interleave dalay value.

Appendix B: Example of VLAN Setting

Example 1:

4 users join to Internet by VDSL system like following drawing, and have 7 demands.

1. User A connects to port 1 and join to Internet through port 10.
2. User B connects to port 2 and join to Internet through port 10.
3. User C connects to port 3 and join to Internet through port 10.
4. User D connects to port 4 and join to Internet through port 10.
5. User A isolate with Users B, C and D.
6. User B isolate with Users A, C and D.
7. User C and D in the same Group and isolate with Users A and B.

Setup Procedure:

Setup Port VID: Assign a Port VLAN ID (1~4094) for untagged traffic on each port like following: Port 1 PVID=21, Port 2 PVID=22, Port 3, 4 PVID=23

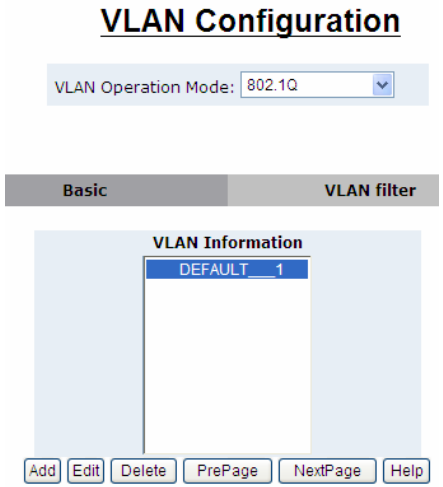
NO	PVID	Up Stream Filtering 1	Up Stream Filtering 2
Port1	21	ENABLE	DISABLE
Port2	22	ENABLE	DISABLE
Port3	23	ENABLE	DISABLE
Port4	23	ENABLE	DISABLE

VLAN Filters

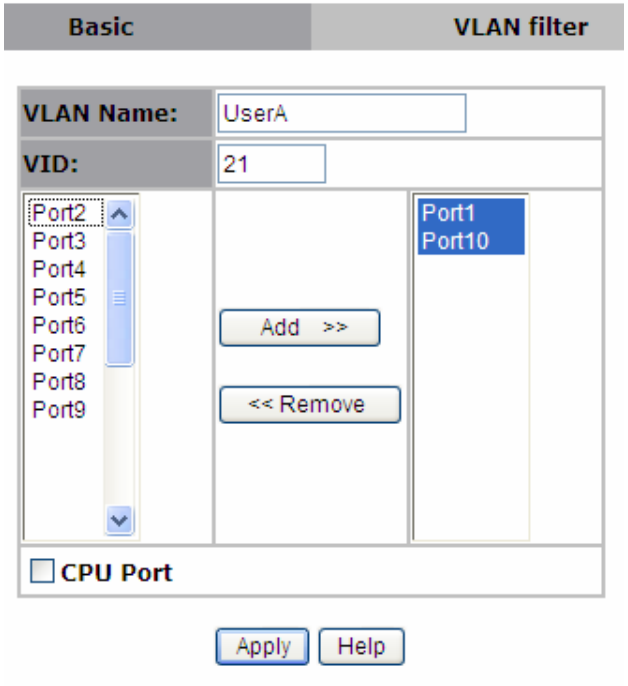
Add VLAN Group:

There are 256 VLAN groups available for configuration. Add a VLAN Group VID=21 member ports = port 1 & port 10

Note: Do not change the default_1 group.



Setup VLAN Name=UserA, VID=21, select member ports 1 & 10.



Note:

If Vlan group include cpu port. The member of this group can management this vdsl2 Ipdslam.

Select Untag or Tag Setup. Unless the device (computer or switch) which connect to port 1 or port 10 can support Tagging VLAN, otherwise select Untag.

VLAN Configuration

VLAN Operation Mode: 802.1Q

VLAN Name:	UserA		
VLAN ID:	21		
Tag Member			
Port1	Untag	Port10	Untag

Apply

Add a VLAN Group Name=UserB, VID=22, member ports = port 2 & port 10 with Untag.

Add a VLAN Group Name=UserCD, VID=23, member ports = port 3, port 4 & port 10 with Untag.

Example 2:

4 users join to Internet through 2 IP DSLAMs like the following drawing, and have 7 demands.

1. User A connect to port 1 of VDSL2-1 and join to Internet through port 10 of VDSL2-2.
2. User B connect to port 2 of VDSL2-1 and join to Internet through port 10 of VDSL2-2.
3. User C connect to port 1 of VDSL2-2 and join to Internet through port 10 of VDSL2-2.
4. User D connect to port 2 of VDSL2-2 and join to Internet through port 10 of VDSL2-2.
5. User A isolate with Users B, C and D.
6. User C isolate with Users A, B and D.
7. User B and D in the same Group and isolate with Users A and B.

Setup Procedure:

VDSL2-1 Setup:

a. Setup Port VID: Port 1 PVID=11, Port 2 PVID=12

b. Add VLAN Group:

Note: Do not change the default_1 group.

Add a VLAN Group, Group name=UserA VID=11 member ports = port 1 & port 26

Select Untag or Tag Setup for VID=11 group:

Port Number	Untag/Tag Select
1	Untag
10	Tag

Add a VLAN Group, Group name=UserBD VID=12, member ports = port 2 & port 26

Select Untag or Tag Setup for VID=12 group:

Port Number	Untag/Tag Select
2	Untag
10	Tag

VDSL2-2 Setup:

a. Setup Port VID: Port 1 PVID=21, Port 2 PVID=12

b. Add VLAN Group:

Do not change the default_1 group settings.

Add a VLAN Group, Group name=UserA VID=11 member ports = port 9 & port 10

Select Untag or Tag Setup for VID=11 group:

Port Number	Untag/Tag Select
9	Tag
10	Untag

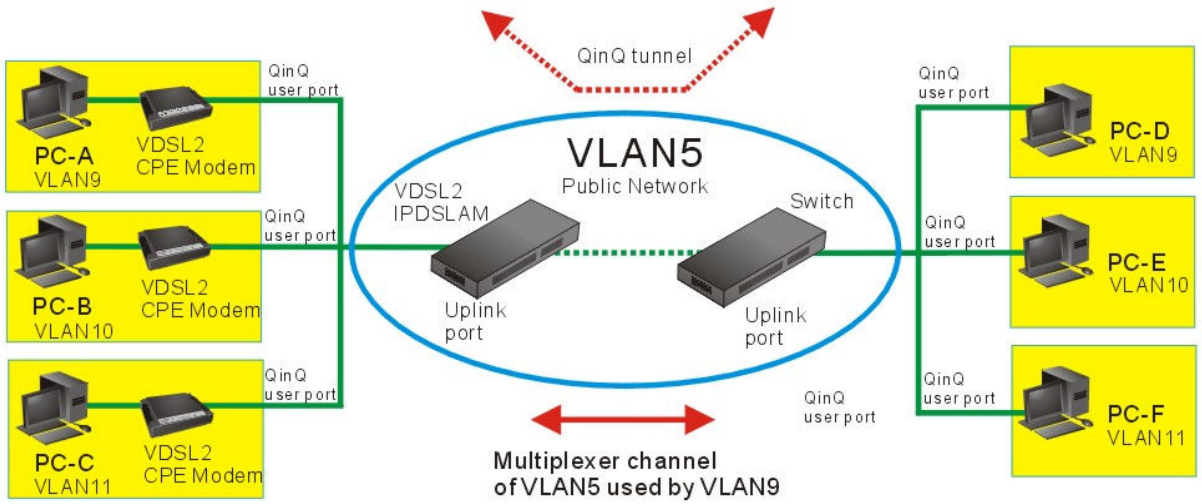
Add a VLAN Group, Group name=UserBD VID=12 member ports = port 2 & port 25 & port 26 Select Untag or Tag Setup for VID=12 group:

Port Number	Untag/Tag Select
1	Untag
2	Untag
9	Tag
10	Untag

Example 3:

6 x PC join to Internet through NV-2400H like the following drawing, and have 8 demands.

1. PC-A connect to port 1 of VDSL2 and join to Internet through port 9 of VDSL2
2. PC-B connect to port 2 of VDSL2 and join to Internet through port 9 of VDSL2
3. PC-C connect to port 3 of VDSL2 and join to Internet through port 9 of VDSL2
4. PC-D connect to port 1 of Switch and join to Internet through port 25 of Switch.
5. PC-E connect to port 2 of Switch and join to Internet through port 25 of Switch.
6. PC-F connect to port 3 of Switch and join to Internet through port 25 of Switch.
7. VDSL2 and Switch join a vlan group and VID set 5.
8. PC-A, -B, -C and PC-D, -E, -F join a vlan group and VID set 9,10,11, QinQ tunnel using VLAN5 wants to be created for VLAN9,10,11 across the public network.

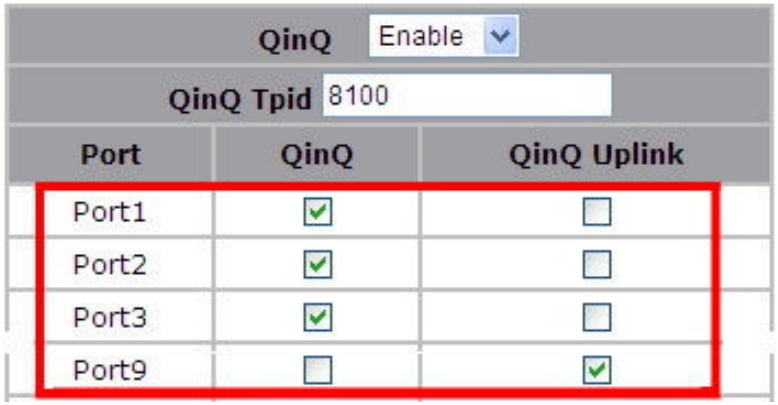


Setup Procedure:

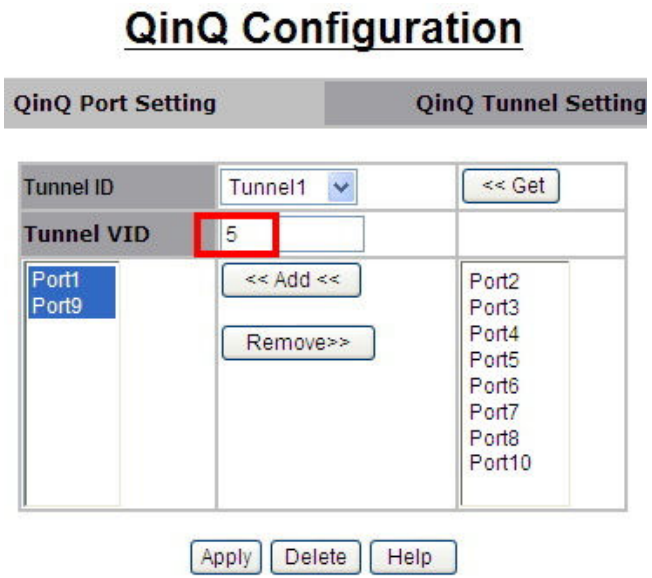
1. Enable 802.1Q VLAN and remove port1,2,3 for 802.1Q VLAN from default group.
2. A QinQ tunnel using VLAN5 wants to be created for VLAN9 across the public network.
3. Port 1,2,3 on left-side of the NV-2400H connects to VLAN9 client. Port 9 of the NV-2400H connects to public network.
4. Add six VLAN Groups as follow form.

VDSL2 VLAN Group	Switch VLAN Group	VLAN VID	Untag/Tag Select
1,9	1,25	9	Port1/2/3 Untag Port9/25 Tag
2,9	2,25	10	
3,9	3,25	11	

1. NV-2400H port9 connects to Switch Port 25.



1. QinQ Tpid: 8100(default).
2. VDSL2 QinQ Userport: Port1, 2, 3. QinQ uplink port Port9.
3. Switch QinQ Userport: Port1, 2, 3. QinQ uplink port :Port25.



1. Set tunnel1 VID5 within port1,9 for VDSL2 and Switch set tunnel1 VID5 within port1,25.
2. Set tunnel2 VID5 within port2,9 for VDSL2 and Switch set tunnel2 VID5 within port2,25.
3. Set tunnel3 VID5 within port3,9 for VDSL2 and Switch set tunnel3 VID5 within port3,25.

1. Set port 1,9 / 2,9 / 3,9 in the group within the VLAN VID9,10,11 for VDSL2.
2. Set port 1,25 / 2,25 / 3,25 in the group within the VLAN VID9,10,11 for Switch.

Appendix C: Compliance and Safety Information

System Diagnosis

Power and Cooling Problems

If the POWER indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section. However, if the unit should turn itself off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fan on back of the unit is unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, contact your supplier for assistance.

Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g., the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

Transmission Mode

The default methods of selecting the transmission mode for all RJ-45 ports are auto-negotiation. Therefore, if the Link signal is disrupted (e.g., by unplugging the network cable and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation. If auto-negotiation fails, then communications are set to half duplex by default. Based on this type of industry-standard connection policy, if you are using a full-duplex device that does not support auto-negotiation, communications can be easily lost (i.e., reset to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to versions which support auto-negotiation.

Cabling

1. Verify that the cable type is correct. Be sure RJ-45 cable connectors are securely seated in the required ports. Use 100Ω straight-through cables for all standard connections. Use Category 5 cable for 100Mbps Fast Ethernet connections, or Category 3, 4 or 5 cables for standard 10Mbps Ethernet connections.
2. Make sure all devices are connected to the network. Equipment any have been unintentionally disconnected from the network.
3. When cascading two devices using RJ-45 station ports at both ends of the cable (i.e., an Auto-MDIX port), if supports a auto-MDIX used, crossover cable is not need.

External Adapters

Make sure the network interface hardware and software drivers for the attached devices are functioning properly. Check the adapter cards and associated drivers used in any attached workstation or server.

Physical Configuration

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation do not exceed recommendations

System Integrity

As a last resort verify the switch integrity with a power-on reset. Turn the power to the switch off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, contact your dealer for assistance.

Installation

No need for driver(Plug & Play).

Use a computer (notebook) to do the installation.

Connect with the RS232 port of the switch with the notebook.

Remote Network Control by Telnet and Web.

FCC Mark Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

This is a CE class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Warranty

The original product that the owner delivered in this package will be free from defects in material and workmanship for one year parts after purchase.

There will be a minimal charge to replace consumable components, such as fuses, power transformers, and mechanical cooling devices. The warranty will not apply to any products which have been subjected to any misuse, neglect or accidental damage, or which contain defects which are in any way attributable to improper installation or to alteration or repairs made or performed by any person not under control of the original owner.

The above warranty is in lieu of any other warranty, whether express, implied, or statutory, including but not limited to any warranty of merchantability, fitness for a particular purpose, or any warranty arising out of any proposal, specification, or sample. Shall not be liable for incidental or consequential damages. We neither assumes nor authorizes any person to assume for it any other liability.

Note: Please do not tear off or remove the warranty sticker as shown, otherwise the warranty will be void.

Chinese SJ/T 11364-2006

部件名称	有 毒 有 害 物 质 或 元 素					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬[Cr(VI)]	多溴联苯(PBB)	多溴二苯醚(PBDE)
结构壳体	○	○	○	○	○	○
电路组	○	○	○	○	○	○
电源供应器	○	○	○	○	○	○
风扇	○	○	○	○	○	○
线材	○	○	○	○	○	○
包装及配件	○	○	○	○	○	○

○：表示该有毒物质在该部件所有均质材料中的含量均在 SJ/T 11364/2006 标准规定的限量要求以下。

╳：表示该有毒物质至少在该部件的某依均质材料中的含量超出 SJ/T 11364-2006 标准规定的限量要求。

上述规范仅适用於中国法律