DrayTek

VigorSwitch P1100

PoE Websmart Giga Switch

Your reliable networking solutions partner

User's Guide

V1.4

VigorSwitch P1100

PoE 8 + 2 Gigabit Port Web Smart Switch

User's Guide

Version: 1.4

Firmware Version: V2.1.0_RC1

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(For future update, please visit DrayTek web site for further information)

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European Community Declarations

Manufacturer:	DrayTek Corp.
Address:	No. 26, Fu Shing Road, HuKou township, HsinChu Industrial Park, Hsin-Chu, Taiwan 303
Product:	VigorSwitch Series Device

The product conforms to the requirements of Electro-Magnetic Compatibility (EMC) Directive 2004/108/EC by complying with the requirements set forth in EN55022/Class A and EN55024/Class A.

The product conforms to the requirements of Low Voltage (LVD) Directive 2006/95/EC by complying with the requirements set forth in EN6095-1.

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Version 2, June 1991

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Chapter 1: Introduction

1.1 Overview

PoE 8+2 Gigabit Ports Web Smart Switch is a standard switch that meets all IEEE 802.3/u/x/z Gigabit, Fast Ethernet specifications. The switch supports console, telnet, http and SNMP interface for switch management. The network administrator can logon the switch to monitor, configure and control each port's activity. In addition, the switch implements the QoS (Quality of Service), VLAN, and Trunking. It is suitable for office application.

Others the switch increases support the Power saving for reduce the power consumption with "ActiPHY Power Management" and "PerfectReach Power Management" two techniques. It could efficient saving the switch power with auto detect the client idle and cable length to provide different power.

10/100/1000Mbps TP is a standard Ethernet port that meets all IEEE 802.3/u/x/z Gigabit, Fast Ethernet specifications. 1000Mbps SFP Fiber transceiver is a Gigabit Ethernet port that fully complies with all IEEE 802.3z and 1000Base-SX/LX standards.

Below shows key features of this device:

QoS

The switch offers powerful QoS function. This function supports 802.1p VLAN tag priority and DSCP on Layer 3 of network framework.

VLAN

Support Port-based VLAN and IEEE802.1Q Tag VLAN. Support 24 active VLANs and VLAN ID 1~4094.

Port Trunking

Allows one or more links to be aggregated together to form a Link Aggregation Group by the static setting.

Power Saving

The Power saving using the "ActiPHY Power Management" and "PerfectReach Power Management" two techniques to detect the client idle and cable length automatically and provides the different power. It could efficient to save the switch power and reduce the power consumption.

1.2 Features

The VigorSwitch P1100, a standalone off-the-shelf switch, provides the comprehensive features listed below for users to perform system network administration and efficiently and securely serve your network.

Hardware

- 8 10/100/1000Mbps Auto-negotiation Gigabit Ethernet TP ports
- 512KB on-chip frame buffer

- Jumbo frame support 9KB
- Programmable classifier for QoS (Layer 2/Layer 3)
- 8K MAC address and support VLAN ID(1~4094)
- Per-port shaping, policing, and Broadcast Storm Control
- Power Saving with "ActiPHY Power Management" and "Perfect Reach Power Management" techniques.
- IEEE802.1ad Q-in-Q nested VLAN support
- Full-duplex flow control (IEEE802.3x) and half-duplex backpressure
- Extensive front-panel diagnostic LEDs; System: Power, TP Port1-24: LINK/ACT, 10/100/1000Mbps

Management

- Supports per port traffic monitoring counters
- Supports a snapshot of the system Information when you login
- Supports port mirror function
- Supports the static trunk function
- Supports 802.1Q VLAN
- Supports user management and limits three users to login
- Maximal packet length can be up to 9600 bytes for jumbo frame application
- Supports Broadcasting Suppression to avoid network suspended or crashed
- Supports to send the trap event while monitored events happened
- Supports default configuration which can be restored to overwrite the current configuration which is working on via Web UI and Reset button of the switch
- Supports on-line plug/unplug SFP modules
- Supports Quality of Service (QoS) for real time applications based on the information taken from Layer 2 to Layer 3
- Built-in web-based management and CLI management, providing a more convenient UI for the user

1.3 Packing List

Before you start installing the switch, verify that the package contains the following:

- VigorSwitch P1100
- AC Power Cord
- Quick Start Guide
- Rubber feet
- Rack mount kit

Please notify your sales representative immediately if any of the aforementioned items is missing or damaged.

1.4 LED Indicators and Connectors

Before you use the Vigor device, please get acquainted with the LED indicators and connectors first.

There are 8 Ethernet ports on the front panel of the switch. LED display area, locating on the front panel, contains an ACT, Power LED and 8 ports working status of the switch.

LED Explanation

LED	Color	Explanation
PWR	On (Green)	The device is powered on.
	Off	The device is powered off.
SYS	On (Green)	The switch finishes system booting.
	Blinking (Green)	The switch is powered on and starts system booting.
	Off	The power is off or the system is not ready / malfunctioning.
ACT (Port 1~10)	On (Green)	Port is connected at 1000 Mps.
	Off	LAN is disconnected.
	Blinking (Green)	Data is transmitting (sending/receiving).
PoE	On (Green)	A Power Device is connected.
	Off	No Power Device is connected.

Connector Explanation

Interface	Description
	Power inlet for AC input (100~240V/AC, 50/60Hz).
	1/0 (ON/OFF) - Power switch.

Power Output -- IEEE 802.3af Max. 15.4W Output Supported;
IEEE 802.3at Max. 30W Output Supported

PoE Power Budget -- 130 Watts (Max)

User Interfaces on the Rear Panel

(

8-PORT GBE WEB SMART SWITCH

1.5 Hardware Installation

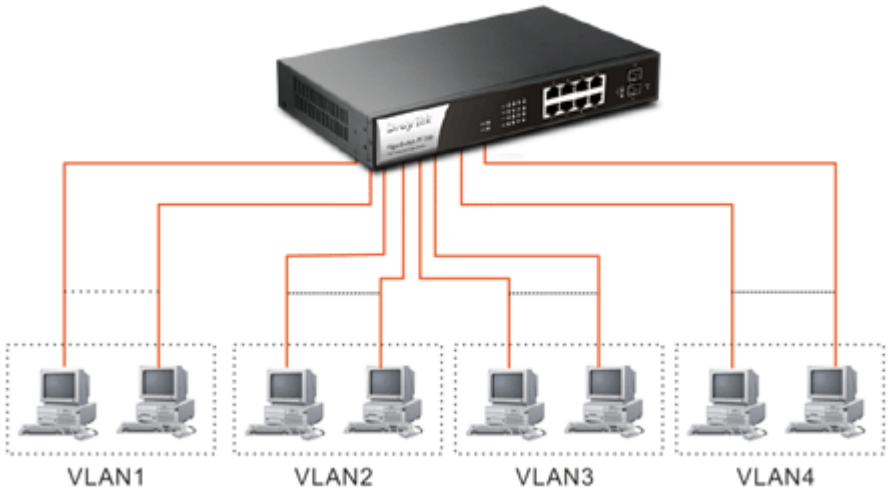
Case 1: All switch ports are in the same local area network.

Every port can access each other. (*The switch image is sample only.)

If VLAN is enabled and configured, each node in the network that can communicate each other directly is bounded in the same VLAN area.

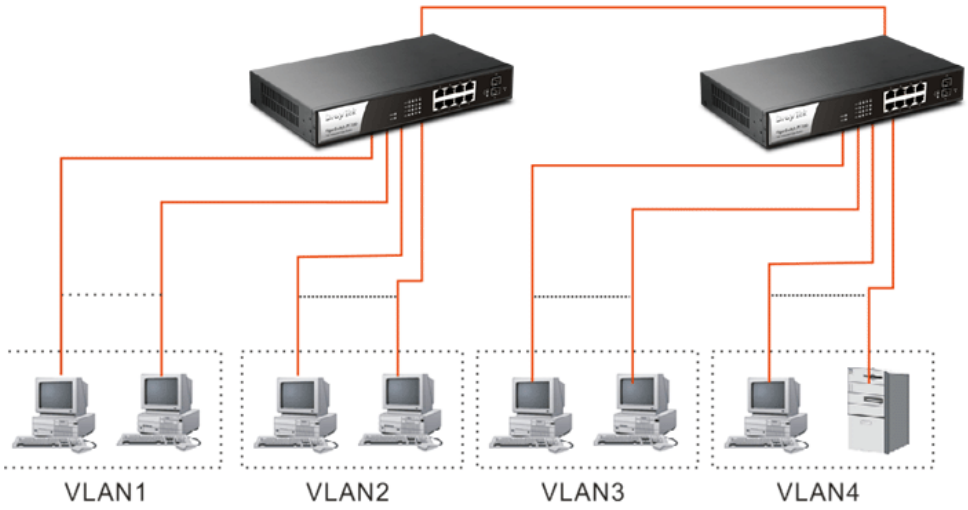
Here VLAN area is defined by what VLAN you are using. The switch supports both port-based VLAN and tag-based VLAN. They are different in practical deployment, especially in physical location. The following diagram shows how it works and what the difference they are.

Case 2: Port-based VLAN -1 (*The switch image is sample only.)



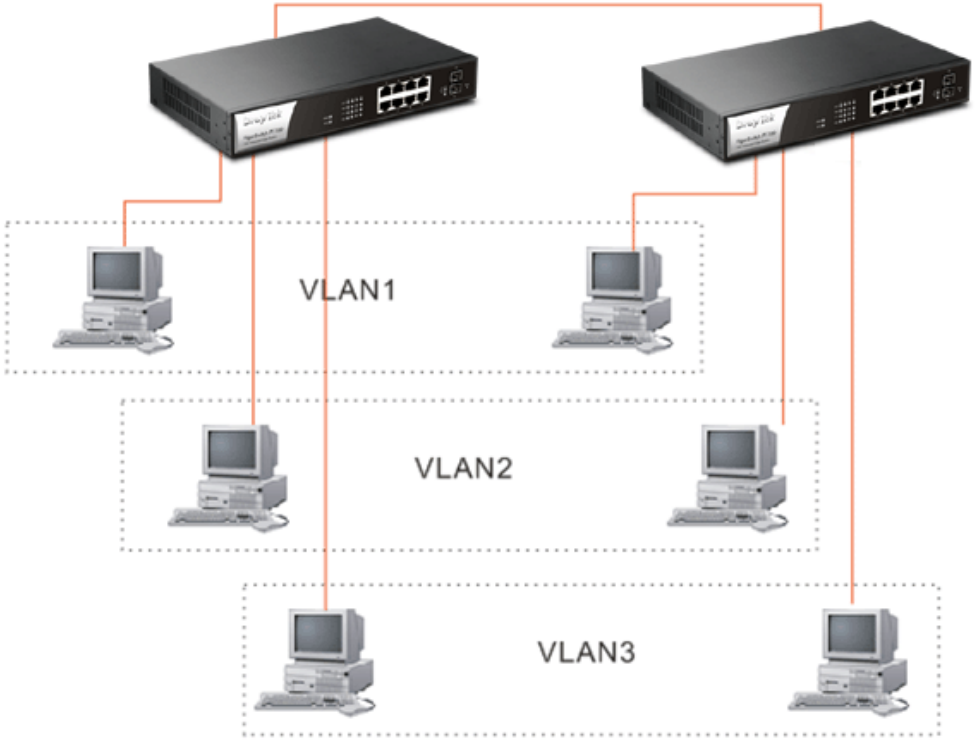
- The same VLAN members could not be in different switches.
- Every VLAN members could not access VLAN members each other.
- The switch manager has to assign different names for each VLAN groups at one switch.

Case 3: Port-based VLAN - 2



- VLAN1 members could not access VLAN2, VLAN3 and VLAN4 members.
- VLAN2 members could not access VLAN1 and VLAN3 members, but they could access VLAN4 members.
- VLAN3 members could not access VLAN1, VLAN2 and VLAN4.
- VLAN4 members could not access VLAN1 and VLAN3 members, but they could access VLAN2 members.

Case 4: The same VLAN members can be at different switches with the same VID



Desktop Installation

1. Install the switch on a level surface that can support the weight of the unit and the relevant components.
2. Plug the switch with the female end of the provided power cord and plug the male end to the power outlet.

Rack-mount Installation

The switch may be standalone, or mounted in a rack. Rack mounting facilitate to an orderly installation when you are going to install series of networking devices.

Procedures to Rack-mount the switch:

1. Disconnect all the cables from the switch before continuing.
2. Place the unit the right way up on a hard, flat surface with the front facing you.
3. Locate a mounting bracket over the mounting holes on one side of the unit.
4. Insert the screws and fully tighten with a suitable screwdriver.
5. Repeat the two previous steps for the other side of the unit.
6. Insert the unit into the rack and secure with suitable screws.
7. Reconnect all the cables.

Installing Network Cables

- Crossover or straight-through cable: All the ports on the switch support Auto-MDI/MDI-X functionality. Both straight-through or crossover cables can be used as the media to connect the switch with PCs as well as other devices like switches, hubs or router.
- Category 3, 4, 5 or 5e, 6 UTP/STP cable: To make a valid connection and obtain the optimal performance, an appropriate cable that corresponds to different transmitting/receiving speed is required. To choose a suitable cable, please refer to the following table.

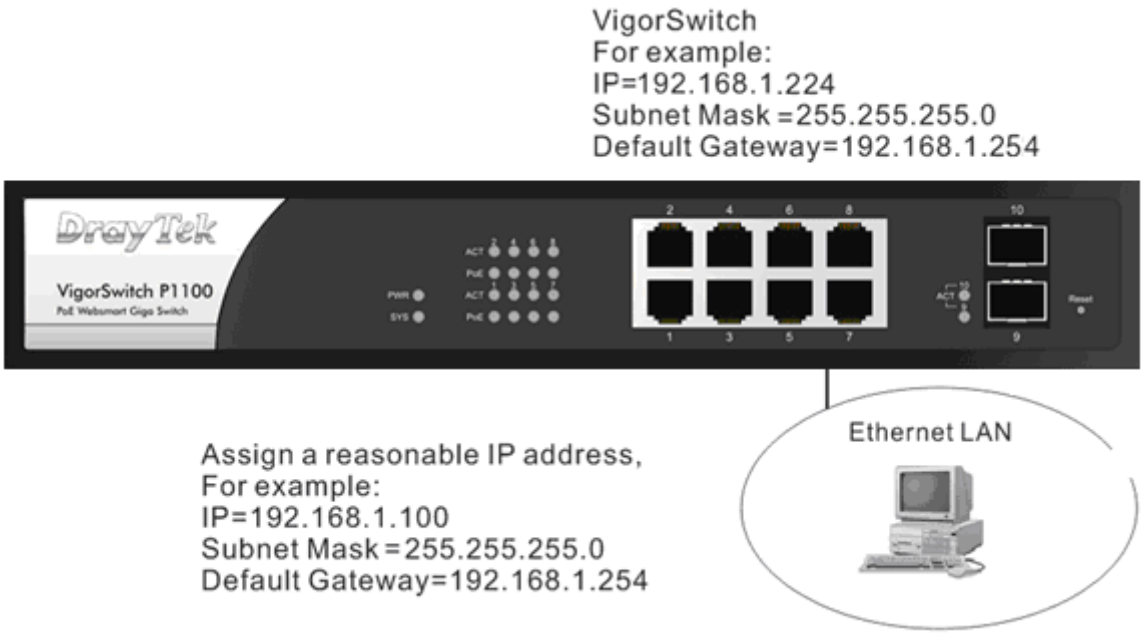
Media	Speed	Wiring
10/100/1000 Mbps copper	10 Mbps	Category 3,4,5 UTP/STP
	100Mbps	Category 5 UTP/STP
	1000 Mbps	Category 5e, 6 UTP/STP

1.5.5 Configuring the Management Agent of Switch

Users can monitor and configure the switch through the following procedures.

Configuring the Management Agent of VigorSwitch P1100 through the Ethernet Port.

There are two ways to configure and monitor the switch through the switch's Ethernet port. They are Web browser and SNMP manager. We just introduce the first type of management interface. Web-based UI for the switch is an interface in a highly friendly way.



Managing VigorSwitch P1100 through Ethernet Port

Before start using the switch, the IP address setting of the switch should be done, then perform the following steps:

1. Set up a physical path between the configured the switch and a PC by a qualified UTP Cat. 5 cable with RJ-45 connector.

   Note: If PC directly connects to the switch, you have to setup the same subnet mask between them. But, subnet mask may be different for the PC in the remote site. Please refer to the above figure about the 24-Port GbE Web Smart Switch default IP address information.

2. Run web browser and follow the menu. Please refer to Chapter 3.

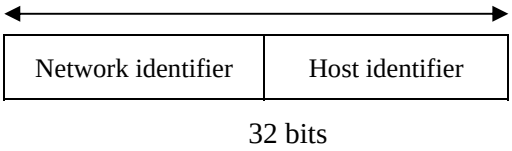
1.5.6 IP Address Assignment

For IP address configuration, there are three parameters needed to be filled in. They are IP address, Subnet Mask, Default Gateway and DNS.

IP address:

The address of the network device in the network is used for internetworking communication. Its address structure looks is shown below. It is “classful” because it is split into predefined address classes or categories.

Each class has its own network range between the network identifier and host identifier in the 32 bits address. Each IP address comprises two parts: network identifier (address) and host identifier (address). The former indicates the network where the addressed host resides, and the latter indicates the individual host in the network which the address of host refers to. And the host identifier must be unique in the same LAN. Here the term of IP address we used is version 4, known as IPv4.

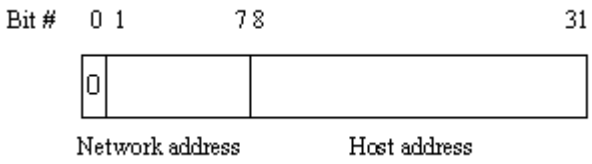


32 bits

With the classful addressing, it divides IP address into three classes, class A, class B and class C. The rest of IP addresses are for multicast and broadcast. The bit length of the network prefix is the same as that of the subnet mask and is denoted as IP address/X, for example, 192.168.1.0/24. Each class has its address range described below.

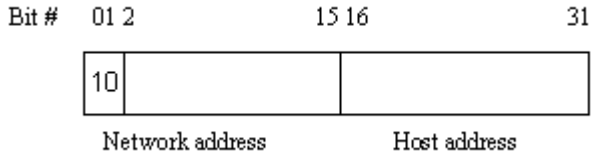
Class A:

Address is less than 126.255.255.255. There are a total of 126 networks can be defined because the address 0.0.0.0 is reserved for default route and 127.0.0.0/8 is reserved for loopback function.



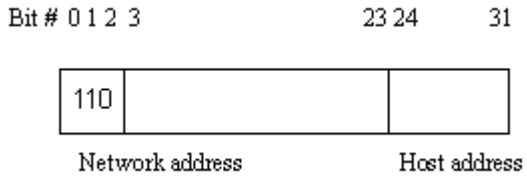
Class B:

IP address range between 128.0.0.0 and 191.255.255.255. Each class B network has a 16-bit network prefix followed 16-bit host address. There are 16,384 (2^14)/16 networks able to be defined with a maximum of 65534 (2^16 –2) hosts per network.



Class C:

IP address range between 192.0.0.0 and 223.255.255.255. Each class C network has a 24-bit network prefix followed 8-bit host address. There are 2,097,152 (2^21)/24 networks able to be defined with a maximum of 254 (2^8 –2) hosts per network.



Class D and E:

Class D is a class with first 4 MSB (Most significance bit) set to 1-1-1-0 and is used for IP Multicast. See also RFC 1112. Class E is a class with first 4 MSB set to 1-1-1-1 and is used for IP broadcast.

According to IANA (Internet Assigned Numbers Authority), there are three specific IP address blocks reserved and able to be used for extending internal network. We call it Private IP address and list below:

Class A	10.0.0.0 --- 10.255.255.255
Class B	172.16.0.0 --- 172.31.255.255
Class C	192.168.0.0 --- 192.168.255.255

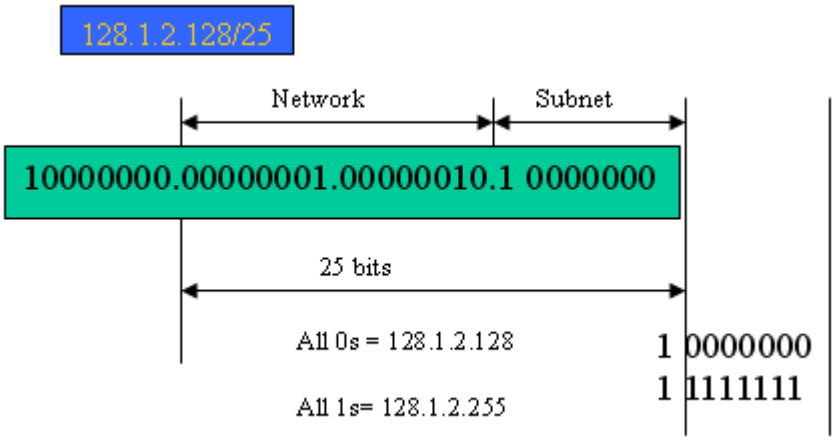
Please refer to RFC 1597 and RFC 1466 for more information.

Subnet mask:

It means the sub-division of a class-based network or a CIDR block. The subnet is used to determine how to split an IP address to the network prefix and the host address in bitwise basis. It is designed to utilize IP address more efficiently and ease to manage IP network.

For a class B network, 128.1.2.3, it may have a subnet mask 255.255.0.0 in default, in which the first two bytes is with all 1s. This means more than 60 thousands of nodes in flat IP address will be at the same network. It's too large to manage practically. Now if we divide it into smaller network by extending network prefix from 16 bits to, say 24 bits, that's using its third byte to subnet this class B network. Now it has a subnet mask 255.255.255.0, in which each bit of the first three bytes is 1. It's now clear that the first two bytes is used to identify the class B network, the third byte is used to identify the subnet within this class B network and, of course, the last byte is the host number.

Not all IP address is available in the sub-netted network. Two special addresses are reserved. They are the addresses with all zero's and all one's host number. For example, an IP address 128.1.2.128, what IP address reserved will be looked like? All 0s mean the network itself, and all 1s mean IP broadcast.



In this diagram, you can see the subnet mask with 25-bit long, 255.255.255.128, contains 126 members in the sub-netted network. Another is that the length of network prefix equals the number of the bit with 1s in that subnet mask. With this, you can easily count the number of IP addresses matched. The following table shows the result.

Prefix Length	No. of IP matched	No. of Addressable IP
/32	1	-
/31	2	-
/30	4	2
/29	8	6
/28	16	14
/27	32	30
/26	64	62
/25	128	126
/24	256	254
/23	512	510
/22	1024	1022
/21	2048	2046
/20	4096	4094
/19	8192	8190
/18	16384	16382
/17	32768	32766
/16	65536	65534

According to the scheme above, a subnet mask 255.255.255.0 will partition a network with the class C. It means there will have a maximum of 254 effective nodes existed in this sub-netted network and is considered a physical network in an autonomous network. So it owns a network IP address which may looks like 168.1.2.0.

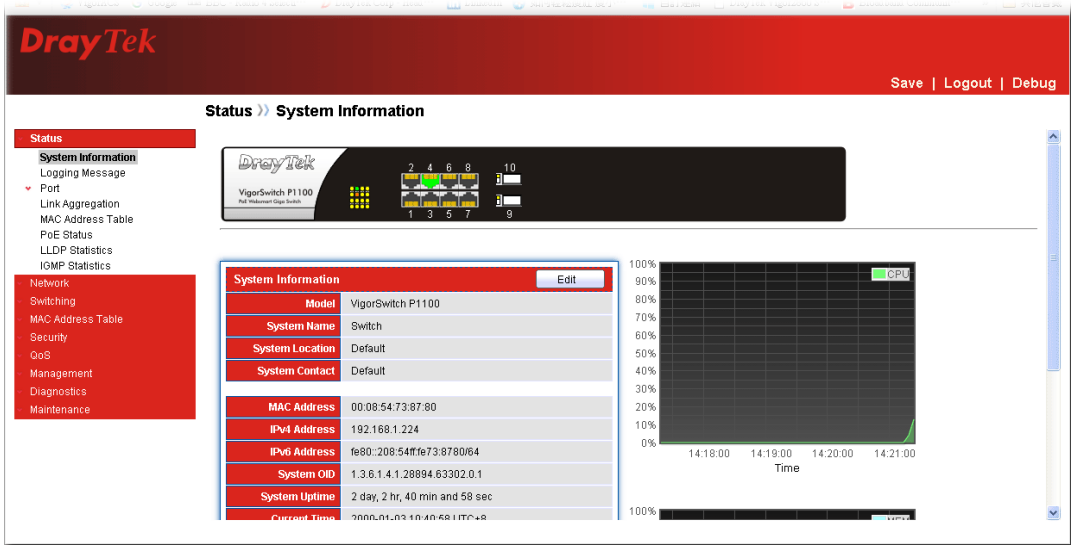
With the subnet mask, a bigger network can be cut into small pieces of network. If we want to have more than two independent networks in a worknet, a partition to the network must be performed. In this case, subnet mask must be applied.

For different network applications, the subnet mask may look like 255.255.255.240. This means it is a small network accommodating a maximum of 15 nodes in the network.

Default gateway:

For the routed packet, if the destination is not in the routing table, all the traffic is put into the device with the designated IP address, known as default router. Basically, it is a routing policy. The gateway setting is used for Trap Events Host only in the switch.

For assigning an IP address to the switch, you just have to check what the IP address of the network will be connected with the switch. Use the same network address and append your host address to it.



First, IP Address: as shown above, enter “192.168.1.224”, for instance. For sure, an IP address such as 192.168.1.x must be set on your PC.

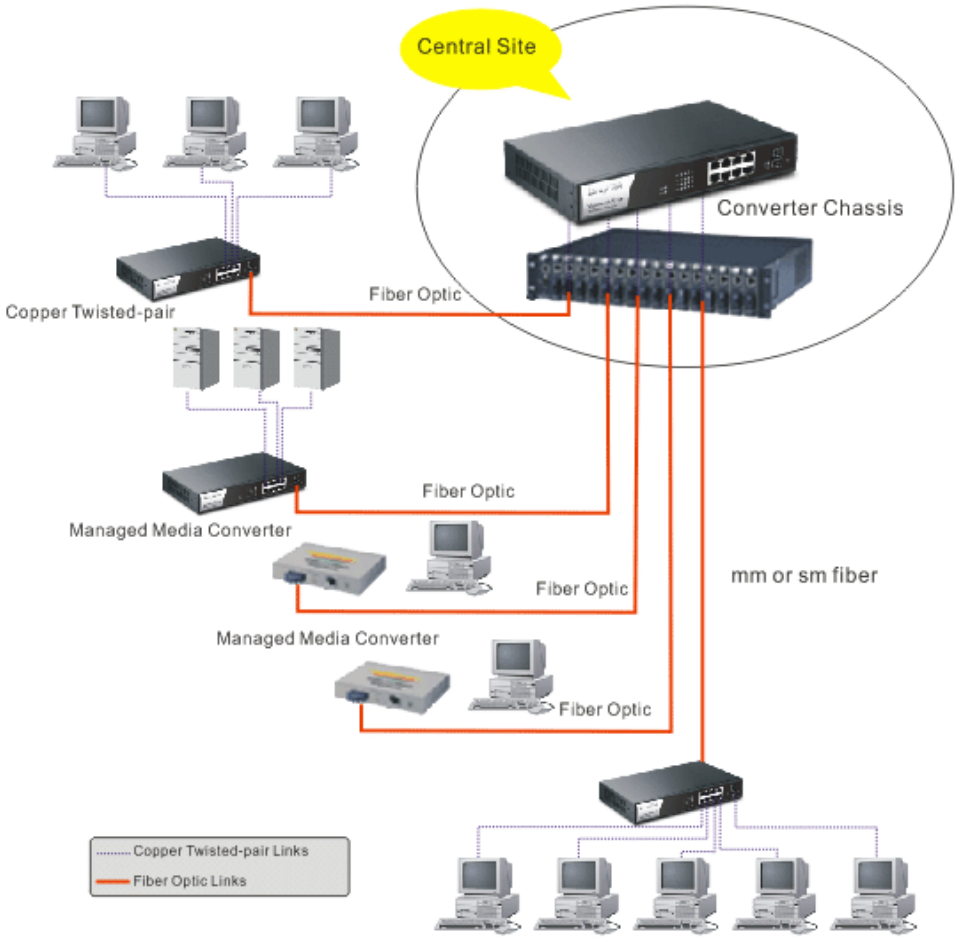
Second, Subnet Mask: as shown above, enter “255.255.255.0”. Any subnet mask such as 255.255.255.x is allowable in this case.

Note: The DHCP Setting is enabled in default.

1.6 Typical Applications

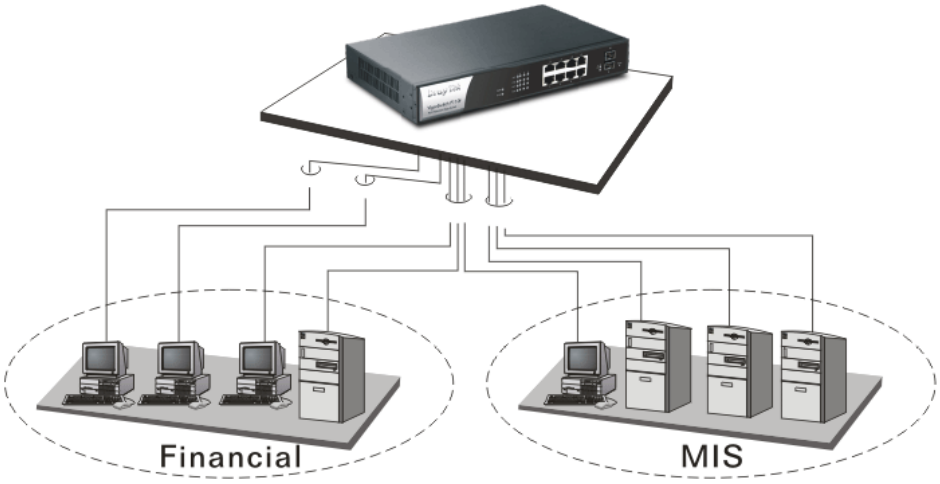
The VigorSwitch implements 8 Gigabit Ethernet TP ports with auto MDIX and two slots for the removable module supporting comprehensive fiber types of connection including LC and BiDi-LC SFP modules. The switch is suitable for the following applications.

- Central Site/Remote site application is used in carrier or ISP

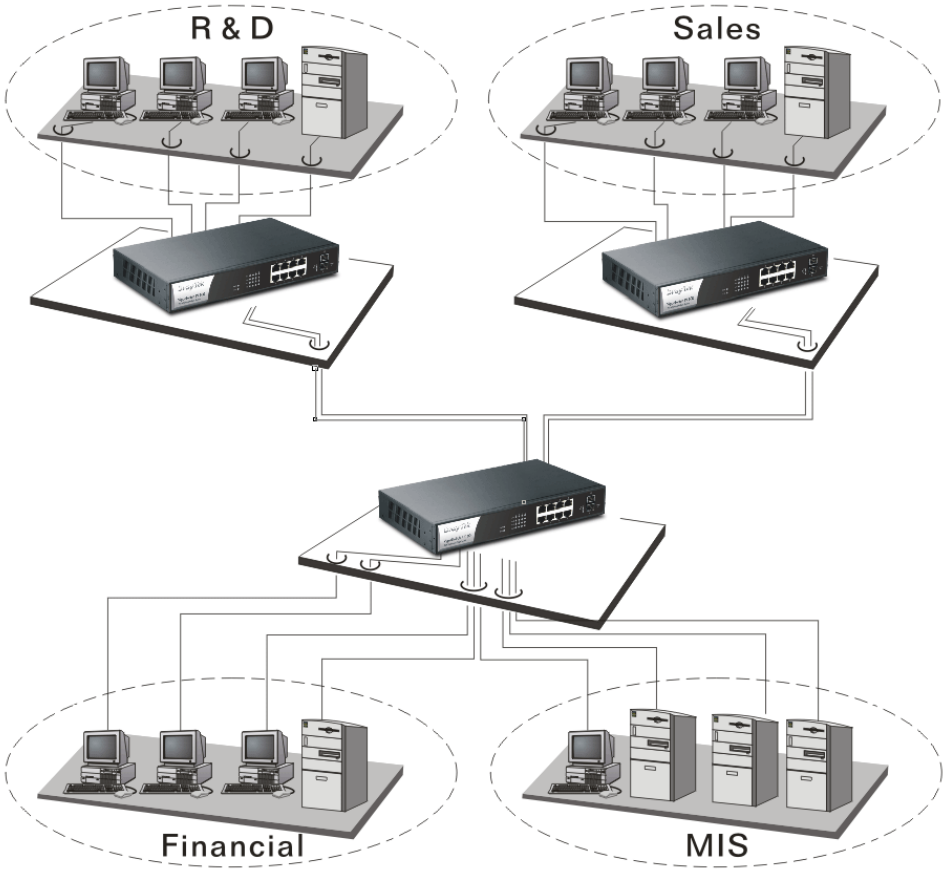


It is a system wide basic reference connection diagram. This diagram demonstrates how the switch connects with other network devices and hosts.

- Peer-to-peer application is used in two remote offices



- Office network

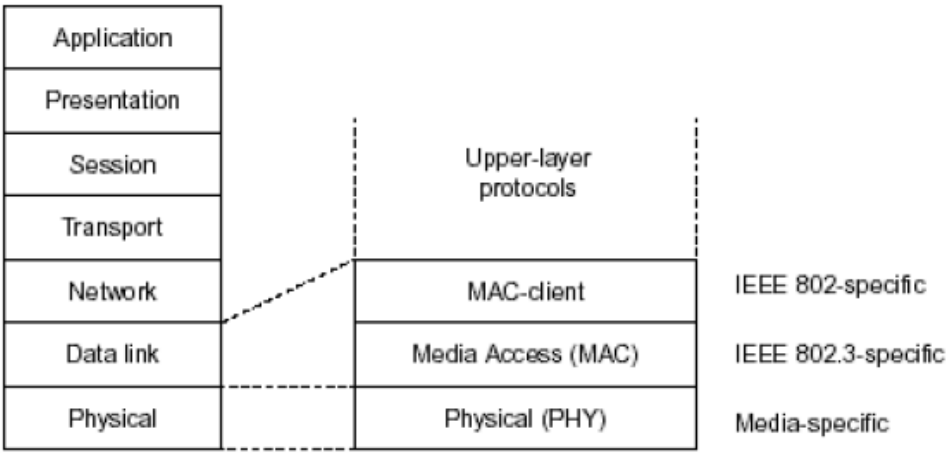


Chapter 2: Basic Concept and Management

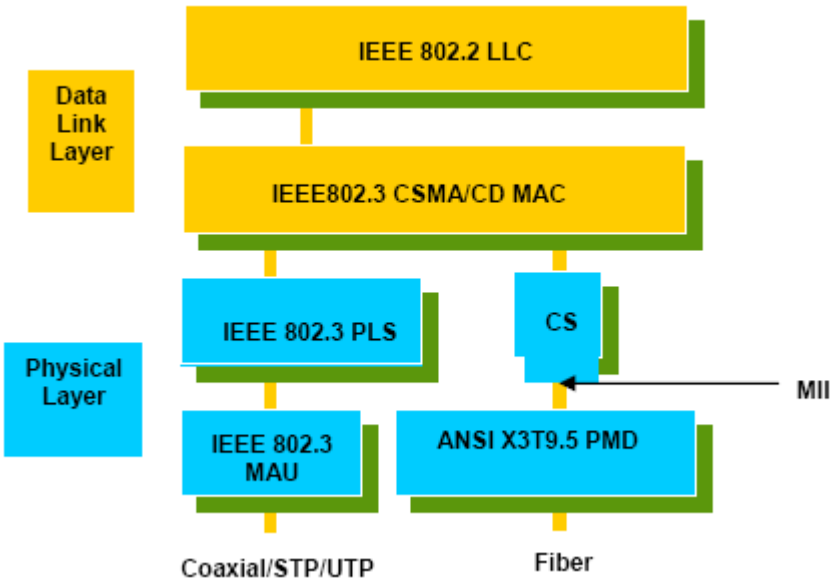
This chapter will tell you the basic concept of features to manage this switch and how they work.

2.1 What's the Ethernet

Ethernet originated and was implemented at Xerox in Palo Alto, CA in 1973 and was successfully commercialized by Digital Equipment Corporation (DEC), Intel and Xerox (DIX) in 1980. In 1992, Grand Junction Networks unveiled a new high speed Ethernet with the same characteristic of the original Ethernet but operated at 100Mbps, called Fast Ethernet now. This means Fast Ethernet inherits the same frame format, CSMA/CD, software interface. In 1998, Gigabit Ethernet was rolled out and provided 1000Mbps. Now 10G/s Ethernet is under approving. Although these Ethernet have different speed, they still use the same basic functions. So they are compatible in software and can connect each other almost without limitation. The transmission media may be the only problem.



In the above figure, we can see that Ethernet locates at the Data Link layer and Physical layer and comprises three portions, including logical link control (LLC), media access control (MAC), and physical layer. The first two comprises Data link layer, which performs splitting data into frame for transmitting, receiving acknowledge frame, error checking and re-transmitting when not received correctly as well as provides an error-free channel upward to network layer.



This above diagram shows the Ethernet architecture, LLC sub-layer and MAC sub-layer, which are responded to the Data Link layer, and transceivers, which are responded to the Physical layer in OSI model. In this section, we are mainly describing the MAC sub-layer.

Logical Link Control (LLC)

Data link layer is composed of both the sub-layers of MAC and MAC-client. Here MAC client may be logical link control or bridge relay entity.

Logical link control supports the interface between the Ethernet MAC and upper layers in the protocol stack, usually Network layer, which is nothing to do with the nature of the LAN. So it can operate over other different LAN technology such as Token Ring, FDDI and so on. Likewise, for the interface to the MAC layer, LLC defines the services with the interface independent of the medium access technology and with some of the nature of the medium itself.

DSAP address	SSAP address	Control	Information
8 bits	8 bits	8 or 16 bits	M*8 bits

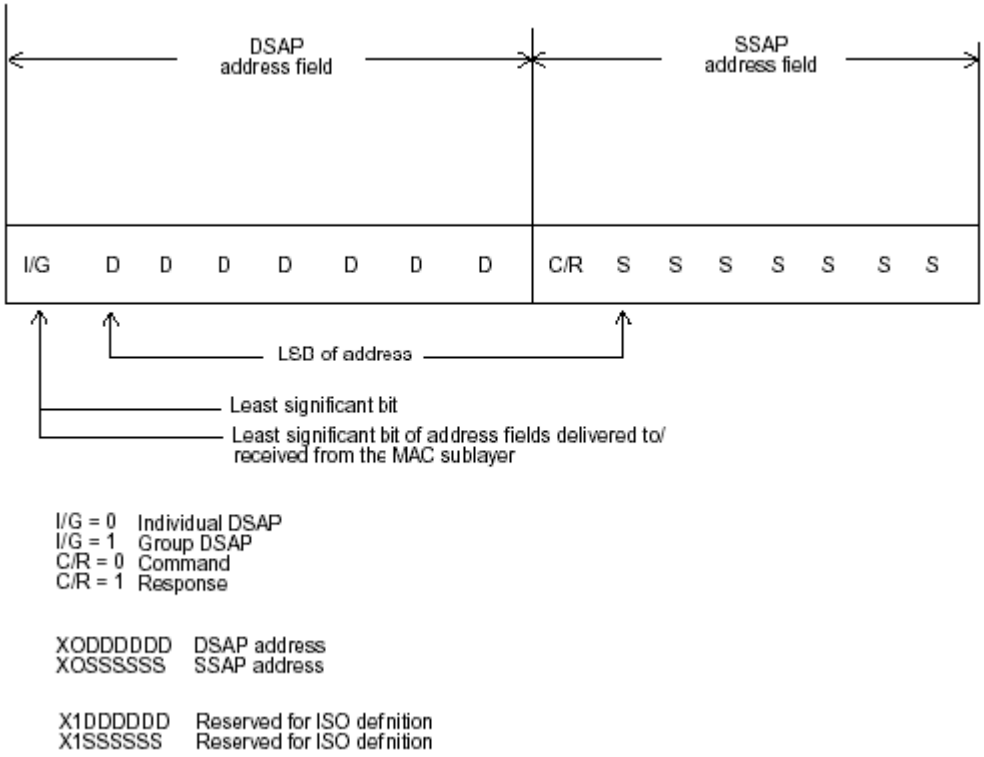
DSAP address	=	Destination service access point address field
SSAP address	=	Source service access point address field
Control	=	Control field [16 bits for formats that include sequence numbering, and 8 bits for formats that do not (see 5.2)]
Information	=	Information field
*	=	Multiplication
M	=	An integer value equal to or greater than 0. (Upper bound of M is a function of the medium access control methodology used.)

The table above is the format of LLC PDU. It comprises four fields, DSAP, SSAP, Control and Information. The DSAP address field identifies the one or more service access points, in which the I/G bit indicates it is individual or group address. If all bit of DSAP is 1s, it's a global address. The SSAP address field identifies the specific services indicated by C/R bit

(command or response). The DSAP and SSAP pair with some reserved values indicates some well-known services listed in the table below.

0xAAAA	SNAP
0xE0E0	Novell IPX
0xF0F0	NetBios
0xFEFE	IOS network layer PDU
0xFFFF	Novell IPX 802.3 RAW packet
0x4242	STP BPDU
0x0606	IP
0x9898	ARP

LLC type 1 connectionless service, LLC type 2 connection-oriented service and LLC type 3 acknowledge connectionless service are three types of LLC frame for all classes of service. In Fig 3-2, it shows the format of Service Access Point (SAP). Please refer to IEEE802.2 for more details.



2.2 Media Access Control (MAC)

MAC Addressing

Because LAN is composed of many nodes, for the data exchanged among these nodes, each node must have its own unique address to identify who should send the data or should receive the data. In OSI model, each layer provides its own mean to identify the unique address in some form, for example, IP address in network layer.

The MAC is belonged to Data Link Layer (Layer 2), the address is defined to be a 48-bit long and locally unique address. Since this type of address is applied only to the Ethernet LAN media access control (MAC), they are referred to as MAC addresses.

The first three bytes are Organizational Unique Identifier (OUI) code assigned by IEEE. The last three bytes are the serial number assigned by the vendor of the network device. All these six bytes are stored in a non-volatile memory in the device. Their format is as the following table and normally written in the form as aa-bb-cc-dd-ee-ff, a 12 hexadecimal digits separated by hyphens, in which the aa-bb-cc is the OUI code and the dd-ee-ff is the serial number assigned by manufacturer.

Bit 47					Bit 0
1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte
	OUI code			Serial number	

The first bit of the first byte in the Destination address (DA) determines the address to be a Unicast (0) or Multicast frame (1), known as I/G bit indicating individual (0) or group (1). So the 48-bit address space is divided into two portions, Unicast and Multicast. The second bit is for global-unique (0) or locally-unique address. The former is assigned by the device manufacturer, and the later is usually assigned by the administrator. In practice, global-unique addresses are always applied.

A unicast address is identified with a single network interface. With this nature of MAC address, a frame transmitted can exactly be received by the target an interface the destination MAC points to.

A multicast address is identified with a group of network devices or network interfaces. In Ethernet, a many-to-many connectivity in the LANs is provided. It provides a mean to send a frame to many network devices at a time. When all bit of DA is 1s, it is a broadcast, which means all network device except the sender itself can receive the frame and response.

Ethernet Frame Format

There are two major forms of Ethernet frame, type encapsulation and length encapsulation, both of which are categorized as four frame formats 802.3/802.2 SNAP, 802.3/802.2, Ethernet II and Netware 802.3 RAW. We will introduce the basic Ethernet frame format defined by the IEEE 802.3 standard required for all MAC implementations. It contains seven fields explained below.

PRE	SFD	DA	SA	Type/Length	Data	Pad bit if any	FCS
7	7	6	6	2		46-1500	4

Preamble (PRE) - The PRE is 7-byte long with alternating pattern of ones and zeros used to tell the receiving node that a frame is coming, and to synchronize the physical receiver with the incoming bit stream. The preamble pattern is:

10101010 10101010 10101010 10101010 10101010 10101010 10101010

Start-of-frame delimiter (SFD) - The SFD is one-byte long with alternating pattern of ones and zeros, ending with two consecutive 1-bits. It immediately follows the preamble and uses the last two consecutive 1s bit to indicate that the next bit is the start of the data packet and the left-most bit in the left-most byte of the destination address. The SFD pattern is 10101011.

Destination address (DA) - The DA field is used to identify which network device(s) should receive the packet. It is a unique address. Please see the section of MAC addressing.

Source addresses (SA) - The SA field indicates the source node. The SA is always an individual address and the left-most bit in the SA field is always 0.

Length/Type - This field indicates either the number of the data bytes contained in the data field of the frame, or the Ethernet type of data. If the value of first two bytes is less than or equal to 1500 in decimal, the number of bytes in the data field is equal to the Length/Type value, i.e. this field acts as Length indicator at this moment. When this field acts as Length, the frame has optional fields for 802.3/802.2 SNAP encapsulation, 802.3/802.2 encapsulation and Netware 802.3 RAW encapsulation. Each of them has different fields following the Length field.

If the Length/Type value is greater than 1500, it means the Length/Type acts as Type. Different type value means the frames with different protocols running over Ethernet being sent or received.

For example,

0x0800	IP datagram
0x0806	ARP
0x0835	RARP
0x8137	IPX datagram
0x86DD	IPv6

Data - Less than or equal to 1500 bytes and greater or equal to 46 bytes. If data is less than 46 bytes, the MAC will automatically extend the padding bits and have the payload be equal to 46 bytes. The length of data field must equal the value of the Length field when the Length/Type acts as Length.

Frame check sequence (FCS) - This field contains a 32-bit cyclic redundancy check (CRC) value, and is a check sum computed with DA, SA, through the end of the data field with the following polynomial.

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$

It is created by the sending MAC and recalculated by the receiving MAC to check if the packet is damaged or not.

How does a MAC work?

The MAC sub-layer has two primary jobs to do:

1. Receiving and transmitting data. When receiving data, it parses frame to detect error; when transmitting data, it performs frame assembly.
2. Performing Media access control. It prepares the initiation jobs for a frame transmission and makes recovery from transmission failure.

Frame transmission

As Ethernet adopted Carrier Sense Multiple Access with Collision Detect (CSMA/CD), it detects if there is any carrier signal from another network device running over the physical medium when a frame is ready for transmission. This is referred to as sensing carrier, also “Listen”. If there is signal on the medium, the MAC defers the traffic to avoid a transmission collision and waits for a random period of time, called backoff time, then sends the traffic again.

After the frame is assembled, when transmitting the frame, the preamble (PRE) bytes are inserted and sent first, then the next, Start of frame Delimiter (SFD), DA, SA and through

the data field and FCS field in turn. The followings summarize what a MAC does before transmitting a frame.

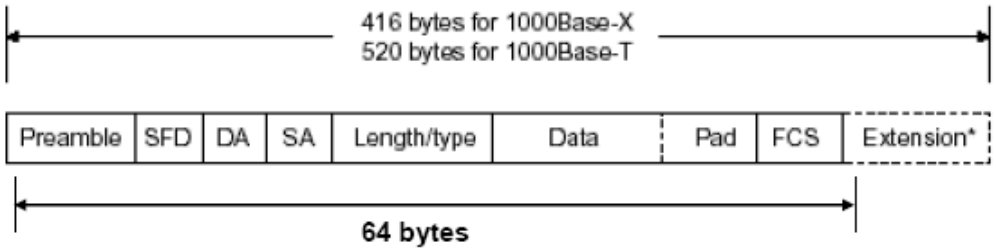
1. MAC will assemble the frame. First, the preamble and Start-of-Frame delimiter will be put in the fields of PRE and SFD, followed DA, SA, tag ID if tagged VLAN is applied, Ethertype or the value of the data length, and payload data field, and finally put the FCS data in order into the responded fields.
2. Listen if there is any traffic running over the medium. If yes, wait.
3. If the medium is quiet, and no longer senses any carrier, the MAC waits for a period of time, i.e. inter-frame gap time to have the MAC ready with enough time and then start transmitting the frame.
4. During the transmission, MAC keeps monitoring the status of the medium. If no collision happens until the end of the frame, it transmits successfully. If there is a collision happened, the MAC will send the patterned jamming bit to guarantee the collision event propagated to all involved network devices, then wait for a random period of time, i.e. backoff time. When backoff time expires, the MAC goes back to the beginning state and attempts to transmit again. After a collision happens, MAC increases the transmission attempts. If the count of the transmission attempt reaches 16 times, the frame in MAC's queue will be discarded.

Ethernet MAC transmits frames in half-duplex and full-duplex ways. In halfduplex operation mode, the MAC can either transmit or receive frame at a moment, but cannot do both jobs at the same time.

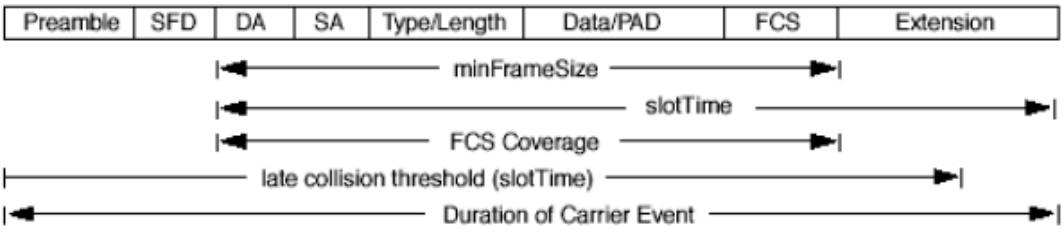
As the transmission of a MAC frame with the half-duplex operation exists only in the same collision domain, the carrier signal needs to spend time to travel to reach the targeted device. For two most-distant devices in the same collision domain, when one sends the frame first, and the second sends the frame, in worstcase, just before the frame from the first device arrives. The collision happens and will be detected by the second device immediately. Because of the medium delay, this corrupted signal needs to spend some time to propagate back to the first device. The maximum time to detect a collision is approximately twice the signal propagation time between the two most-distant devices. This maximum time is traded-off by the collision recovery time and the diameter of the LAN.

In the original 802.3 specification, Ethernet operates in half duplex only. Under this condition, when in 10Mbps LAN, it's 2500 meters, in 100Mbps LAN, it's approximately 200 meters and in 1000Mbps, 200 meters. According to the theory, it should be 20 meters. But it's not practical, so the LAN diameter is kept by using to increase the minimum frame size with a variable-length non-data extension bit field which is removed at the receiving MAC. The following tables are the frame format suitable for 10M, 100M and 1000M Ethernet, and some parameter values that shall be applied to all of these three types of Ethernet.

Actually, the practice Gigabit Ethernet chips do not feature this so far. They all have their chips supported full-duplex mode only, as well as all network vendors' devices. So this criterion should not exist at the present time and in the future. The switch's Gigabit module supports only full-duplex mode.



Parameter value/LAN	10Base	100Base	1000Base
Max. collision domain DTE to DTE	100 meters	100 meters for UTP 412 meters for fiber	100 meters for UTP 316 meters for fiber
Max. collision domain with repeater	2500 meters	205 meters	200 meters
Slot time	512 bit times	512 bit times	512 bit times
Interframe Gap	9.6us	0.96us	0.096us
AttemptLimit	16	16	16
BackoffLimit	10	10	10
JamSize	32 bits	32 bits	32 bits
MaxFrameSize	1518	1518	1518
MinFrameSize	64	64	64
BurstLimit	Not applicable	Not applicable	65536 bits



In full-duplex operation mode, both transmitting and receiving frames are processed simultaneously. This doubles the total bandwidth. Full duplex is much easier than half duplex because it does not involve media contention, collision, retransmission schedule, padding bits for short frame. The rest functions follow the specification of IEEE802.3. For example, it must meet the requirement of minimum inter-frame gap between successive frames and frame format the same as that in the half-duplex operation.

Because no collision will happen in full-duplex operation, for sure, there is no mechanism to tell all the involved devices. What will it be if receiving device is busy and a frame is coming at the same time? Can it use “backpressure” to tell the source device? A function flow control is introduced in the full-duplex operation.

2.3 Flow Control

Flow control is a mechanism to tell the source device stopping sending frame for a specified period of time designated by target device until the PAUSE time expires. This is accomplished by sending a PAUSE frame from target device to source device. When the target is not busy and the PAUSE time is expired, it will send another PAUSE frame with zero time-to-wait to source device. After the source device receives the PAUSE frame, it will again transmit frames immediately. PAUSE frame is identical in the form of the MAC frame with a pause-time value and with a special destination MAC address 01-80-C2-00-00-01. As per the specification, PAUSE operation can not be used to inhibit the transmission of MAC control frame.

Normally, in 10Mbps and 100Mbps Ethernet, only symmetric flow control is supported. However, some switches (e.g. 24-Port GbE Web Smart Switch) support not only symmetric but asymmetric flow controls for the special application. In Gigabit Ethernet, both symmetric flow control and asymmetric flow control are supported. Asymmetric flow control only allows transmitting PAUSE frame in one way from one side, the other side is not but receipt-and-discard the flow control information. Symmetric flow control allows both two ports to transmit PASUE frames each other simultaneously.

Inter-frame Gap time

After the end of a transmission, if a network node is ready to transmit data out and if there is no carrier signal on the medium at that time, the device will wait for a period of time known as an inter-frame gap time to have the medium clear and stabilized as well as to have the jobs ready, such as adjusting buffer counter, updating counter and so on, in the receiver site. Once the inter-frame gap time expires after the de-assertion of carrier sense, the MAC transmits data. In IEEE802.3 specification, this is 96-bit time or more.

Collision

Collision happens only in half-duplex operation. When two or more network nodes transmit frames at approximately the same time, a collision always occurs and interferes with each other. This results the carrier signal distorted and undiscriminated. MAC can afford detecting, through the physical layer, the distortion of the carrier signal. When a collision is detected during a frame transmission, the transmission will not stop immediately but, instead, continues transmitting until the rest bits specified by jamSize are completely transmitted. This guarantees the duration of collision is enough to have all involved devices able to detect the collision. This is referred to as Jamming. After jamming pattern is sent, MAC stops transmitting the rest data queued in the buffer and waits for a random period of time, known as backoff time with the following formula. When backoff time expires, the device goes back to the state of attempting to transmit frame. The backoff time is determined by the formula below. When the times of collision is increased, the backoff time is getting long until the collision times excess 16. If this happens, the frame will be discarded and backoff time will also be reset.

$$0 \le r < 2^k$$

where

$$k = \min(n, 10)$$

Frame Reception

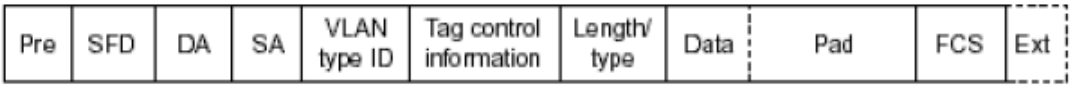
In essence, the frame reception is the same in both operations of half duplex and full duplex, except that full-duplex operation uses two buffers to transmit and receive the frame independently. The receiving node always “listens” if there is traffic running over the medium when it is not receiving a frame. When a frame destined for the target device comes, the receiver of the target device begins receiving the bit stream, and looks for the PRE (Preamble) pattern and Start-of-Frame Delimiter (SFD) that indicates the next bit is the starting point of the MAC frame until all bit of the frame is received.

For a received frame, the MAC will check:

1. If it is less than one slotTime in length, i.e. short packet, and if yes, it will be discarded by MAC because, by definition, the valid frame must be longer than the slotTime. If the length of the frame is less than one slotTime, it means there may be a collision happened somewhere or an interface malfunctioned in the LAN. When detecting the case, the MAC drops the packet and goes back to the ready state.
2. If the DA of the received frame exactly matches the physical address that the receiving MAC owns or the multicast address designated to recognize. If not, discards it and the MAC passes the frame to its client and goes back to the ready state.
3. If the frame is too long. If yes, throws it away and reports frame Too Long.
4. If the FCS of the received frame is valid. If not, for 10M and 100M Ethernet, discards the frame. For Gigabit Ethernet or higher speed Ethernet, MAC has to check one more field, i.e. extra bit field, if FCS is invalid. If there is any extra bits existed, which must meet the specification of IEEE802.3. When both FCS and extra bits are valid, the received frame will be accepted, otherwise discards the received frame and reports frameCheckError if no extra bits appended or alignmentError if extra bits appended.
5. If the length/type is valid. If not, discards the packet and reports lengthError.
6. If all five procedures above are ok, then the MAC treats the frame as good and de-assembles the frame.

What if a VLAN tagging is applied?

VLAN tagging is a 4-byte long data immediately following the MAC source address. When tagged VLAN is applied, the Ethernet frame structure will have a little change shown as follows.



Only two fields, VLAN ID and Tag control information are different in comparison with the basic Ethernet frame. The rest fields are the same.

The first two bytes is VLAN type ID with the value of 0x8100 indicating the received frame is tagged VLAN and the next two bytes are Tag Control Information (TCI) used to provide user priority and VLAN ID, which are explained respectively in the following table.

Bits 15-13	User Priority 7-0, 0 is lowest priority
Bit 12	CFI (Canonical Format Indicator) 1: RIF field is present in the tag header 0: No RIF field is present

Bits 11-0	VID (VLAN Identifier) 0x000: Null VID. No VID is present and only user priority is present. 0x001: Default VID 0xFFF: Reserved

Note: RIF is used in Token Ring network to provide source routing and comprises two fields, Routing Control and Route Descriptor.

When MAC parses the received frame and finds a reserved special value 0x8100 at the location of the Length/Type field of the normal non-VLAN frame, it will interpret the received frame as a tagged VLAN frame. If this happens in a switch, the MAC will forward it, according to its priority and egress rule, to all the ports that is associated with that VID. If it happens in a network interface card, MAC will deprive of the tag header and process it in the same way as a basic normal frame. For a VLAN-enabled LAN, all involved devices must be equipped with VLAN optional function.

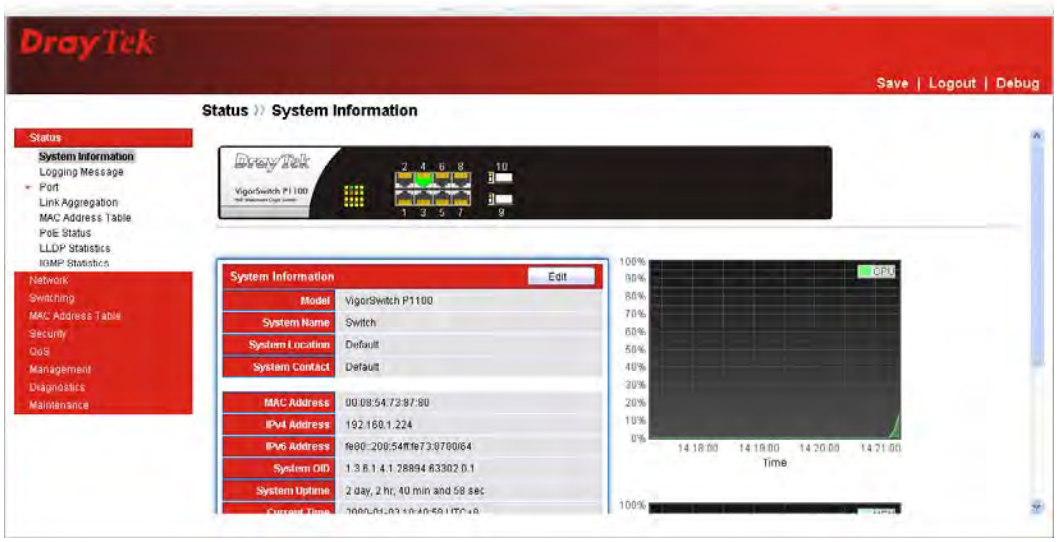
At operating speeds above 100 Mbps, the slotTime employed at slower speeds is inadequate to accommodate network topologies of the desired physical extent. Carrier Extension provides a means by which the slotTime can be increased to a sufficient value for the desired topologies, without increasing the minFrameSize parameter, as this would have deleterious effects. Nondata bits, referred to as extension bits, are appended to frames that are less than slotTime bits in length so that the resulting transmission is at least one slotTime in duration. Carrier Extension can be performed only if the underlying physical layer is capable of sending and receiving symbols that are readily distinguished from data symbols, as is the case in most physical layers that use a block encoding/decoding scheme.

The maximum length of the extension is equal to the quantity (slotTime - minFrameSize). The MAC continues to monitor the medium for collisions while it is transmitting extension bits, and it will treat any collision that occurs after the threshold (slotTime) as a late collision.

Chapter 3: Operation of Web-based Management

This chapter would introduce how to manage your Web Smart Switch and how to configure the 10/100/1000Mbps TP Ports on the switch via web user interfaces. Web Smart Switch provides 24 fixed Gigabit Ethernet TP ports. With this facility, you can easily access and monitor the status like MIBs, port activity, and multicast traffic through any ports on the switch.

The default values of the Switch are listed in the figure below:



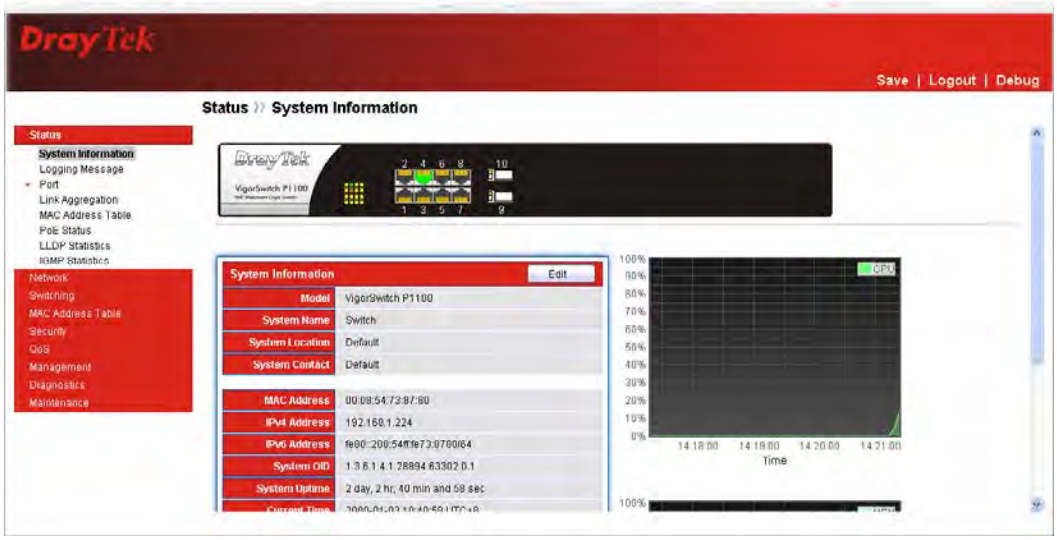
When the configuration of your Web Smart Switch is finished, you can browse it by the IP address you set up. For instance, uncheck the **Enable** box of DHCP Setting first (it is enabled in default). Next, type http://192.168.1. in the address row in a browser, then the following screen would show up and ask for your password input for login and access authentication. The default password is “admin”. For the first time access, please enter the default password, and click <Apply> button. The login process now would be completed.

Web Smart Switch supports a simplified user management function which allows only one administrator to configure the switch at one time.

To optimize the display effect, we recommend Microsoft IE and 1024x768 display resolution.

3.1 Web Management Home Overview

After login, System Information would be displayed as the following illustration. This page lists default values and shows you the basic information of the switch, including “Model”, System Name”, “System Location”, “System Contact”, “MAC Address”, “IPv4 Address”, “IPv6 Address”, “System Uptime”, “Current Time”, “Loader Version”, “Loader Date”, “Firmware Version”, “Firmware Date”, “ Telnet”, “HTTP”, “HTTPS” and “SNMP”. With this information, you will know the software version, MAC address, ports available and so on. It would be helpful while malfunction occurred.



On the top part of the information page, it shows the front panel of the switch. Linked ports will be displayed in green color, and linked-off ones will be in black. For the optional modules, the slots with no module will only show covered plates, the other slots with installed modules would present modules. The images of modules would depend on the ones you insert. Vice versa, if ports are disconnected, they will show just in black.

On the left side, the main menu tree for web is listed in the page. The functions of each folder are described in its corresponded section respectively. As to the function names in normal type are the sub-functions. When clicking it, the function is performed.

3.2 Status

3.2.1 System Information

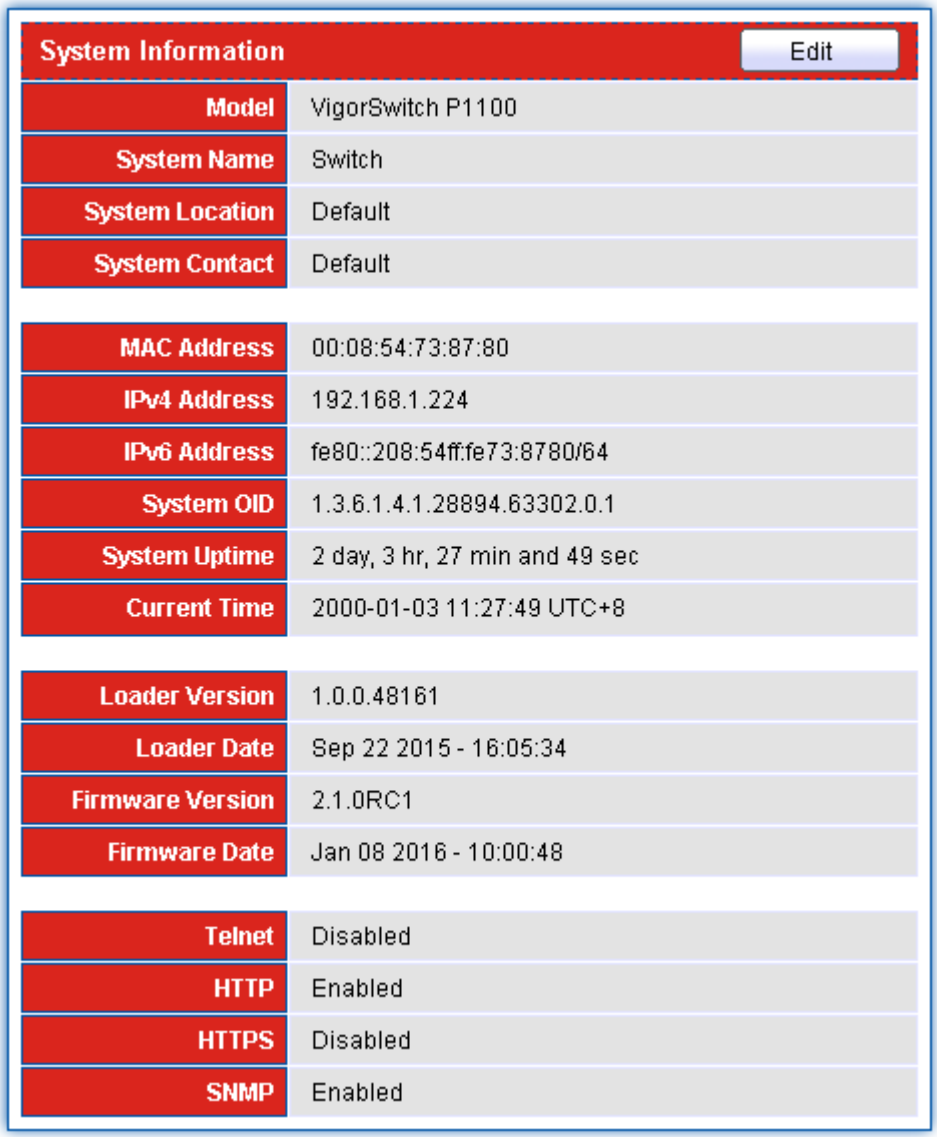
Function name:

Status>>System Information

Function description:

System configuration is one of the most important functions. Without a proper setting, network administrator would not be able to manage the device. The switch supports manual IP address setting.

Show system description, firmware version, hardware version, MAC address, IP address, MAC address, active subnet mask, active gateway, and etc.



Parameter description:	
System Name	System name of the switch. This name will also use as CLI prefix of each line. (“Switch>” or “Switch#”)
System Location	Set the location of the switch where it was located.

System Contact	System contact of the switch. For easily managing and maintaining device, you may write down the contact person and phone here for getting help soon. You can configure this parameter through the device's user interface or SNMP.
MAC address	It is the Ethernet MAC address of the management agent in this switch.
IPv4/IPv6 address	The IPv4/IPv6 address of the switch.
System OID	Display SNMP system object ID.
System Uptime	Display total elapsed time from booting.
Current Time	Display current system time of the switch.
Loader Version	Display the boot loader version in this switch.
Loader Date	Display the date of the loader released.
Firmware Version	Display the firmware version in this switch.
Firmware Date	Display the date of the firmware released.

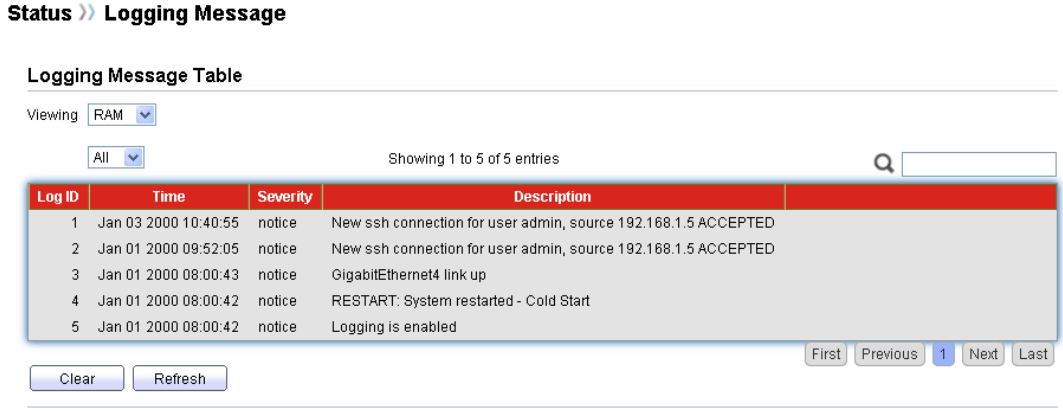
3.2.2 Logging Message

Function name:

Status>>Logging Message

Function description:

Display the switch logs.



Parameter description:	
Viewing	Choose RAM or Flash to display related information.
Severity	Display the severity of log messages.
Description	Display the related information about the log.
Clear	Remove current status.
Refresh	Refresh current status page.

3.2.3 Port

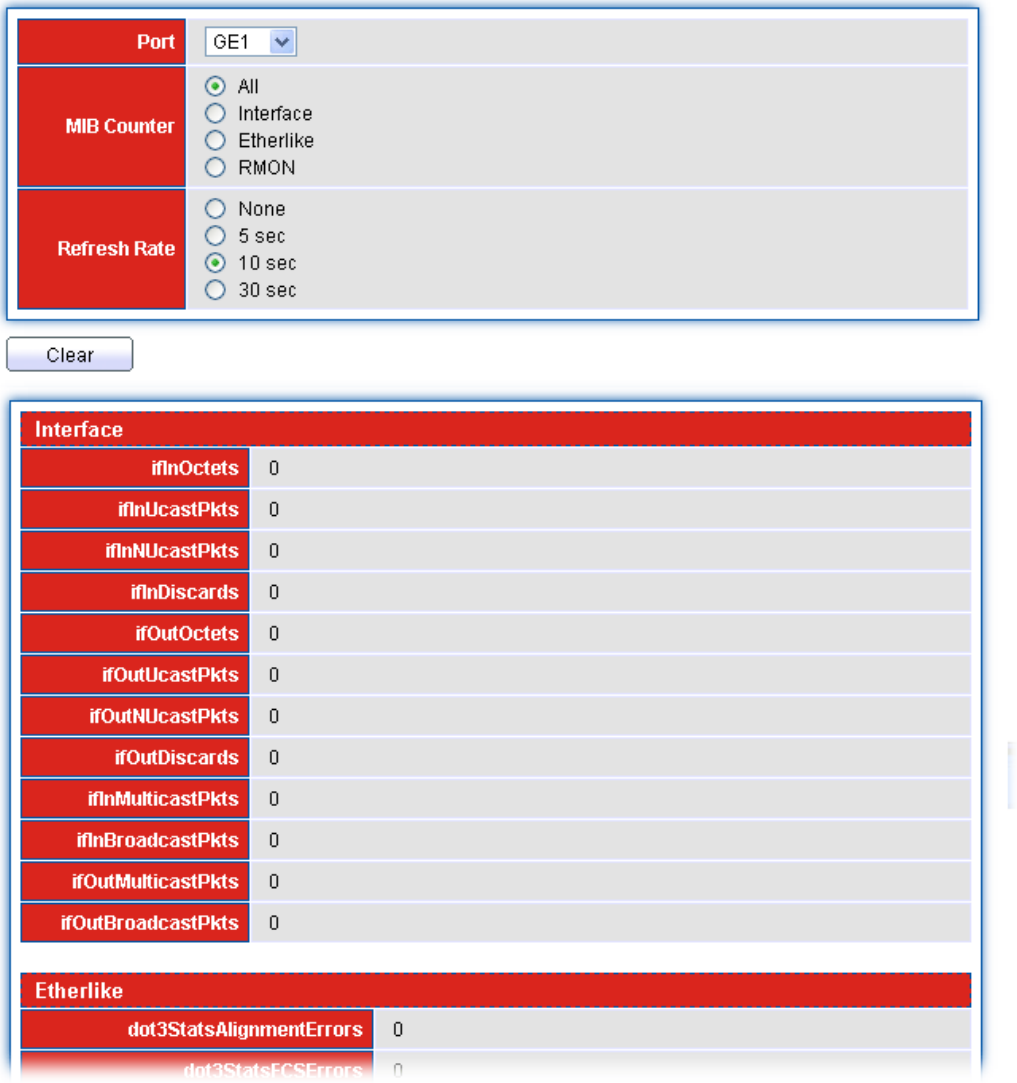
3.2.3.1 Statistics

Function name:

Status>>Port>>Statistics

Function description:

On this page user can get standard counters on network traffic from the interfaces, Ethernet-like and RMON MIB. Interfaces and Ethernet-like counters display errors on the traffic passing through each port. RMON counters provide a total count of different frame types and sizes passing through each port.



Parameter description:	
Port	Select one port to show counter statistics.
MIB Counter	Select the MIB counter to show different count type **All**: All counters. **Interface**: Interface related MIB counters **Etherlike**: Ethernet-like related MIB counters

	RMON: RMON related MIB counters
Refresh Rate	Refresh the web page every period of seconds to get new counter of specified port.

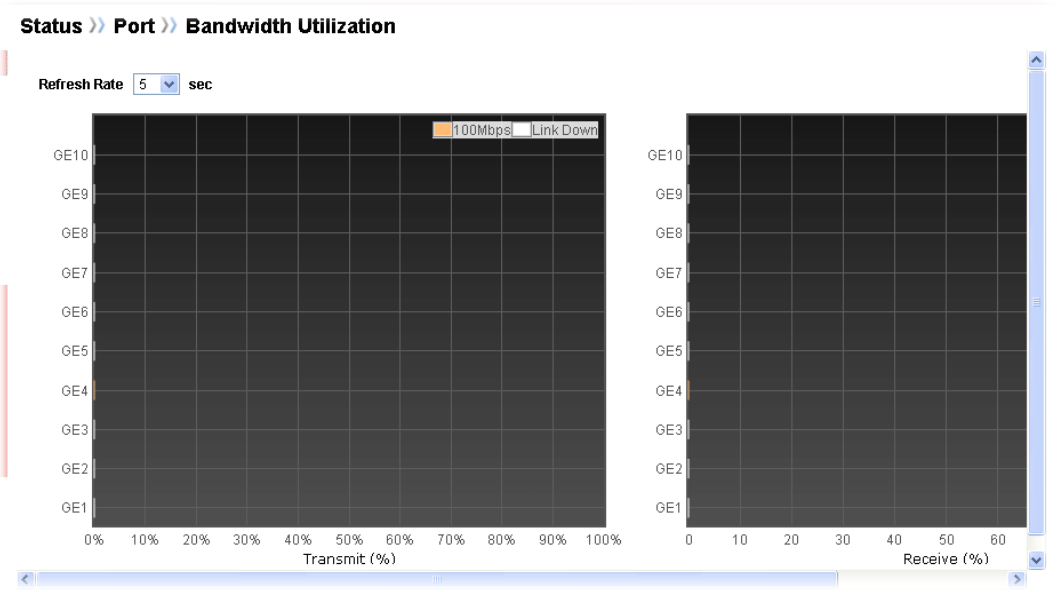
3.2.3.2 Bandwidth Utilization

Function name:

Status>>Port>>Bandwidth Utilization

Function description:

Display the Bandwidth Utilization information.



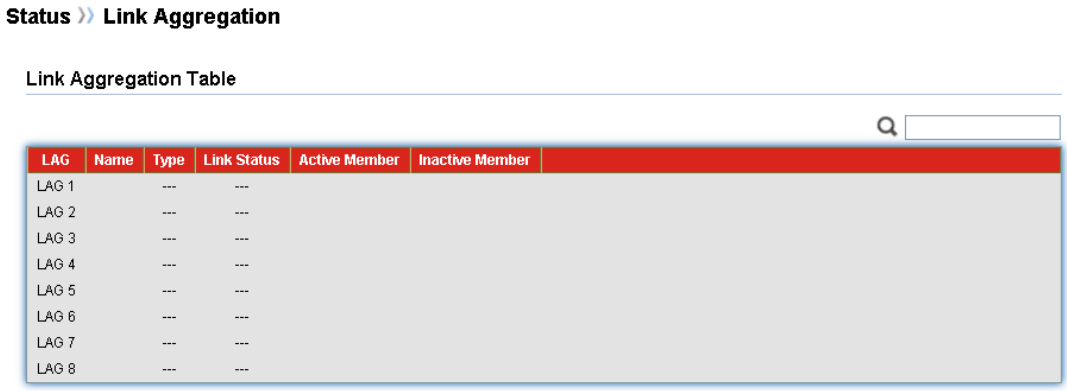
Parameter description:	
Refresh Rate	Refresh the web page every period of seconds.

3.2.4 Link Aggregation

Function name:

Status>>Link Aggregation (LAG)

Function description:



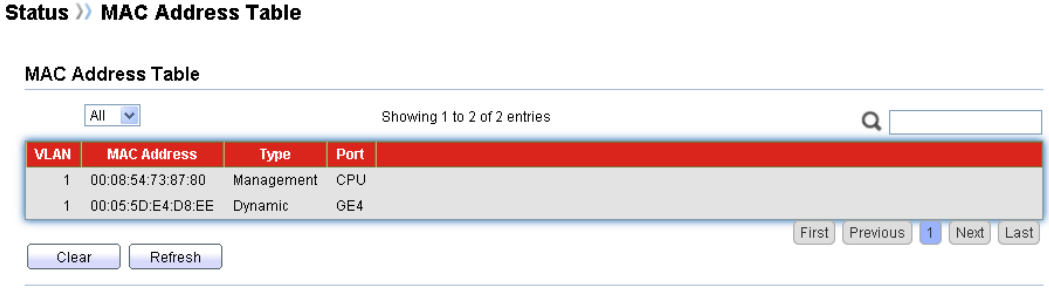
Parameter description:	
LAG Status	
LAG	LAG Name.
Name	LAG port description.
Type	The type of the LAG. ● **Static:** The groups of ports assigned to a static LAG are always active members. ● **LACP:** The groups of ports assigned to dynamic LAG are candidate ports. LACP determines which candidate ports are active member ports.
Link State	LAG port link status.
Active Member	Active member ports of the LAG.
Inactive Member	Inactive or candidate member ports of the LAG.

3.2.5 MAC Address Table

Function name:

Status>>MAC Address Table

Function description:



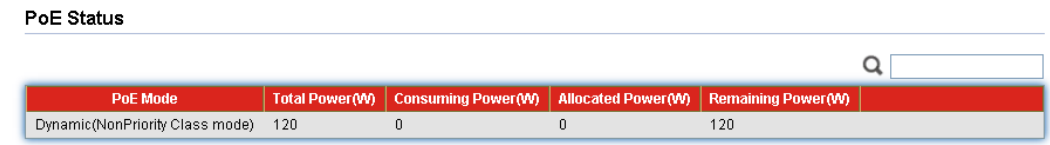
3.2.6 PoE Status

Function name:

Status>>PoE Status

Function description:

The PoE Status page displays PoE working mode and PoE consuming power status.



Parameter description:	
PoE Mode	The type of PoE working mode. **Dynamic(Non Priority Class Mode)**: Dynamic and automatic PoE PD priority and power budget management connection. **Static(Priority Power Base)**: PoE connection base-on manual setting by PD priority and power limit.
Total Power(W)	The system total PoE Power budget.
Consuming Power(W)	Consuming total PoE power.
Allocated Power(W)	Allocated PoE power budget by system.
Remaining Power(W)	Remaining PoE power budget.

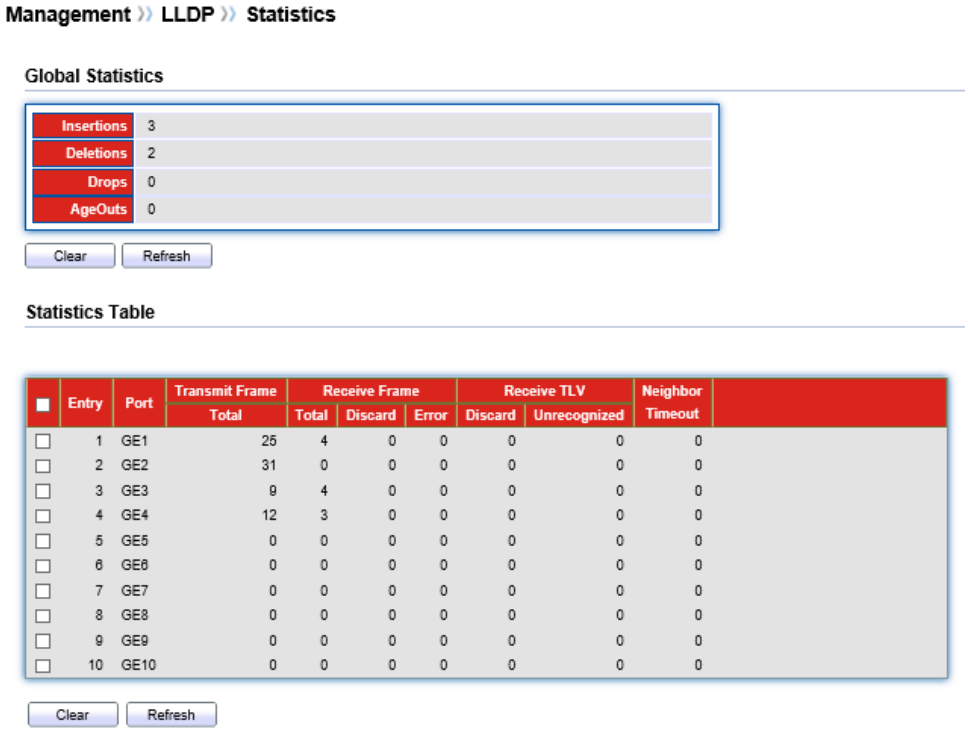
3.2.7 LLDP Statistics

Function name:

Status>>LLDP Statistics

Function description:

The Link Layer Discovery Protocol (LLDP) Statistics page displays summary and per-port information for LLDP frames transmitted and received on the switch.



Parameter description:	
Global Statistics	
Insertions	The number of times the complete set of information advertised by a particular MAC Service Access Point (MSAP) has been inserted into tables associated with the remote systems.
Deletions	The number of times the complete set of information advertised by MSAP has been deleted from tables associated with the remote systems.
Drops	The number of times the complete set of information advertised by MSAP could not be entered into tables associated with the remote systems because of insufficient resources.
Age Outs	The number of times the complete set of information advertised by MSAP has been deleted from tables associated with the remote systems because the information timeliness interval has expired.
Statistics Table	
Port	Interface or port number.

Transmit Frame Total	Number of LLDP frames transmitted on the corresponding port.
Receive Frame Total	Number of LLDP frames received by this LLDP agent on the corresponding port, while the LLDP agent is enabled.
Receive Frame Discarded	Number of LLDP frames discarded for any reason by the LLDP agent on the corresponding port.
Receive Frame Errors	Number of invalid LLDP frames received by the LLDP agent on the corresponding port, while the LLDP agent is enabled.
Receive TLV Discarded	Number of TLVs of LLDP frames discarded for any reason by the LLDP agent on the corresponding port.
Receive TLV Unrecognized	Number of TLVs of LLDP frames that are unrecognized while the LLDP agent is enabled
Neighbor Timeout	Number of age out LLDP frames.

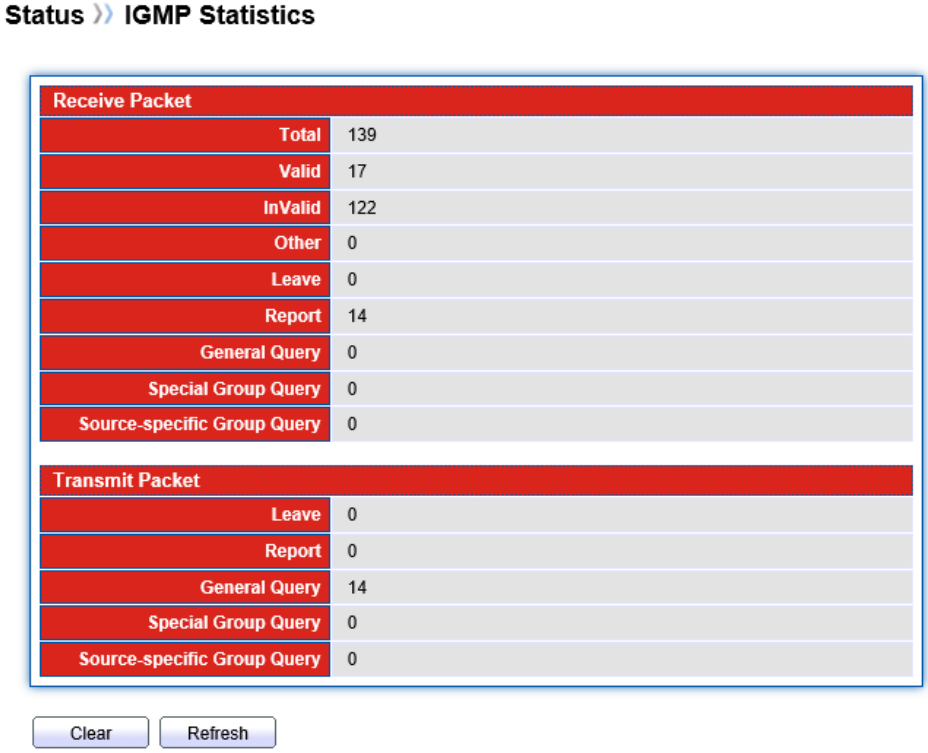
3.2.8 IGMP Statistics

Function name:

Status>>IGMP Statistics

Function description:

IGMP snooping is the process of listening to Internet Group Management Protocol (IGMP) network traffic. The feature allows a network switch to listen in on the IGMP conversation between hosts and routers. By listening to these conversations the switch maintains a map of which links need which IP multicast streams. Multicasts may be filtered from the links which do not need them and thus controls which ports receive specific multicast traffic.



Parameter description:	
Receive Packet	
Total	This field displays the total amount of RX
Valid	This field displays the total amount of valid RX.
Invalid	This field displays the total amount of invalid RX.
Other	This field displays the total amount of other RX.
Leave	This field displays the total amount of leave RX.
Report	This field displays the total amount of report RX.
General Query	This field displays the total amount of general query RX.
Special Group Query	This field displays the total amount of Special Group query RX.
Special-specific Group Query	This field displays the total amount of Special-specific Group Query RX.
Transmit Packet	
Leave	This field displays the total amount of leave TX.
Report	This field displays the total amount of report TX.
General Query	This field displays the total amount of general query TX.
Special Group Query	This field displays the total amount of Special Group query TX.
Special-specific Group Query	This field displays the total amount of Special-specific Group Query TX.

3.3 Network

Configure settings for the switch network interface. Offer how the switch connects to a remote server to get services.

3.3.1 IP Address

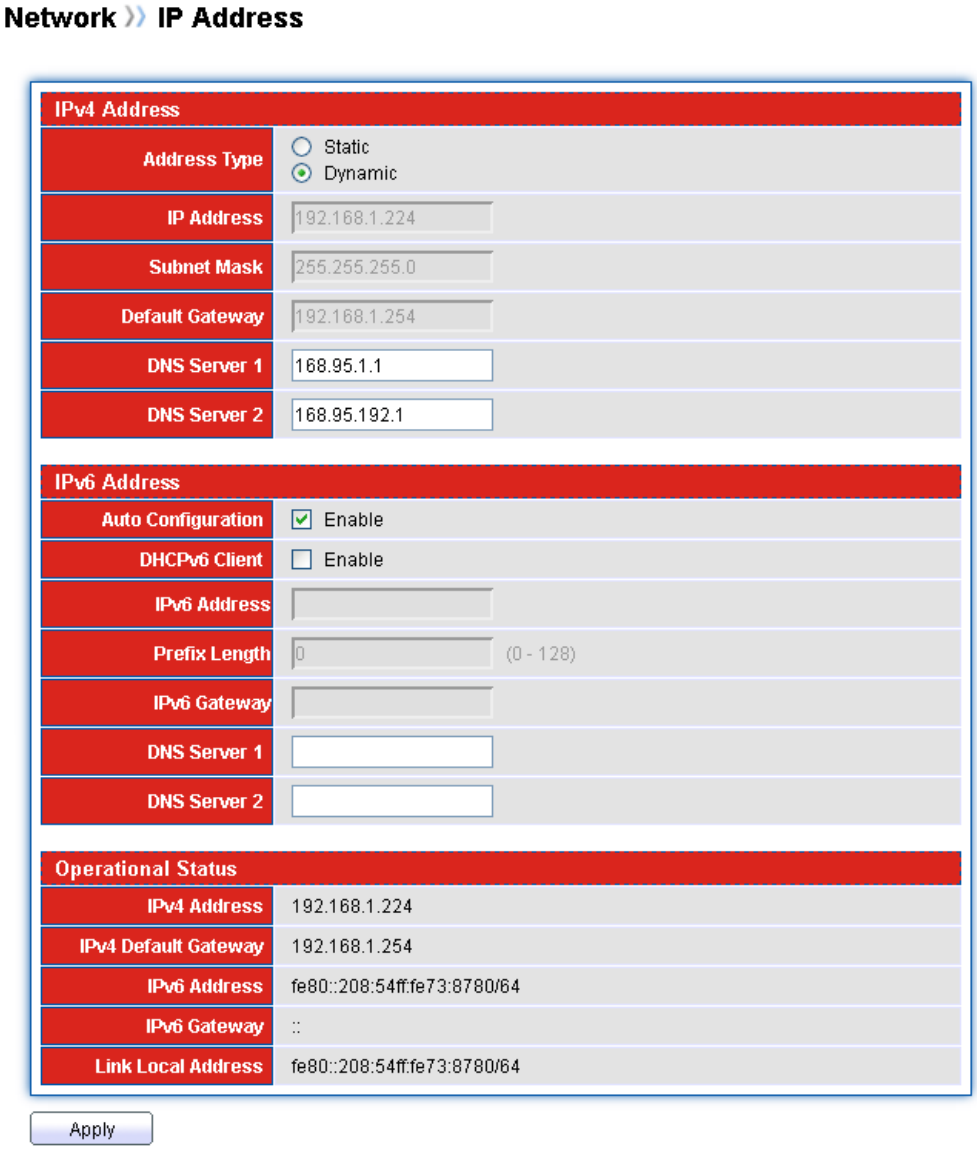
Function name:

Network>> IP Address

Function description:

Use the IP Setting screen to configure the switch IP address and the default gateway device. The gateway field specifies the IP address of the gateway (next hop) for outgoing traffic.

The switch needs an IP address for it to be managed over the network. The factory default IP address is 192.168.1.224. The subnet mask specifies the network number portion of an IP address. The factory default subnet mask is 255.255.255.0.



Parameter description:
IPv4 Address

Address Type	Select the mode of network connection ● **Static**: Enable static IP address. ● **Dynamic**: Enable Dynamic to type IP address.
IP Address	Enter the IP address of your switch in dotted decimal notation for example 192.168.1.224. If static mode is enabled, enter IP address in this field.
Subnet Mask	Enter the IP subnet mask of your switch in dotted decimal notation for example 255.255.255.0. If static mode is enabled, enter subnet mask in this field.
Default Gateway	Enter the IP address of the gateway in dotted decimal notation. If static mode is enabled, enter gateway address in this field.
DNS Server 1	If static mode is enabled, enter primary DNS server address in this field.
DNS Server 2	If static mode is enabled, enter secondary DNS server address in this field.
IPv6 Address	
Auto Configuration	Select **Enable** or **Disable** this function.
DHCPv6 Client	DHCPv6 client state. ● **Enable**: Enable DHCPv6 client function. ● **Disable**: Disable DHCPv6 client function.
IPv6 Address	Enter the IPv6 address of your switch. If auto configuration mode is disabled, enter IPv6 address in this field.
Prefix Length	Specify the prefix for the IPv6 address, when the IPv6 auto configuration and DHCPv6 client are disabled.
IPv6 Gateway	Enter the IP address of the gateway in dotted decimal notation. If auto configuration mode is disabled, enter IPv6gateway address in this field.
DNS Server 1	If static mode is enabled, enter primary DNS server address in this field.
DNS Server 2	If static mode is enabled, enter secondary DNS server address in this field.
Operational Status	
IPv4 Address	Display the optional IPv4 address of the switch..
IPv4 Default Gateway	Display the optional IPv4 gateway of the switch.
IPv6 Address	Display the optional IPv6 address of the switch.
IPv6 Gateway	Display the optional IPv6 gateway of the switch.
Link Local Address	Display the optional IPv6 link local address for the switch.
Apply	Save the settings or changes to the switch.

3.3.2 System Time

Function name:

Network>>System Time

Function description:

Network » System Time

Parameter description:	
Source	**SNTP** - Select the radio button to enable using SNTP server. **From Computer** – Select the radio button to specify the time from PC. **Manual Time** – Select the radio button to specify static time manually.
Time Zone	Select a time zone.
SNTP	
Address Type	Select Hostname or IPv4.

Server Address	Input IP address or hostname of time server.
Server Port	Input time server port number. Default is 123.
Manual Time	
Date	Input the starting date (YYYY-MM-DD).
Time	Input the starting time (HH:MM:SS).
Daylight Saving Time	
Type	Select the mode of daylight saving time. **None** - Disable daylight saving time. **Recurring** - Using recurring mode of daylight saving time. **Non-Recurring** - Using non-recurring mode of daylight saving time. **USA** - Using daylight saving time in the United States that starts on the second Sunday of March and ends on the first Sunday of November **European** - Using daylight saving time in the Europe that starts on the last Sunday
Offset	Specify the adjust offset of daylight saving time.
Recurring	**From** - Specify the starting time of recurring daylight saving time. This field available when selecting "Recurring" mode. **To** - Specify the ending time of recurring daylight saving time. This field available when selecting "Recurring" mode.
Non-recurring	**From** - Specify the starting time of non-recurring daylight saving time. This field available when selecting "Non-Recurring" mode. **To** - Specify the ending time of recurring daylight saving time. This field available when selecting "Non-Recurring" mode.
Operation Status	
Current Time	Display current time the router used.
Apply	Save the settings or changes to the switch.

3.4 Switching

This menu item is used to configure settings for the switch ports, trunk, Layer 2 protocols and other switch features.

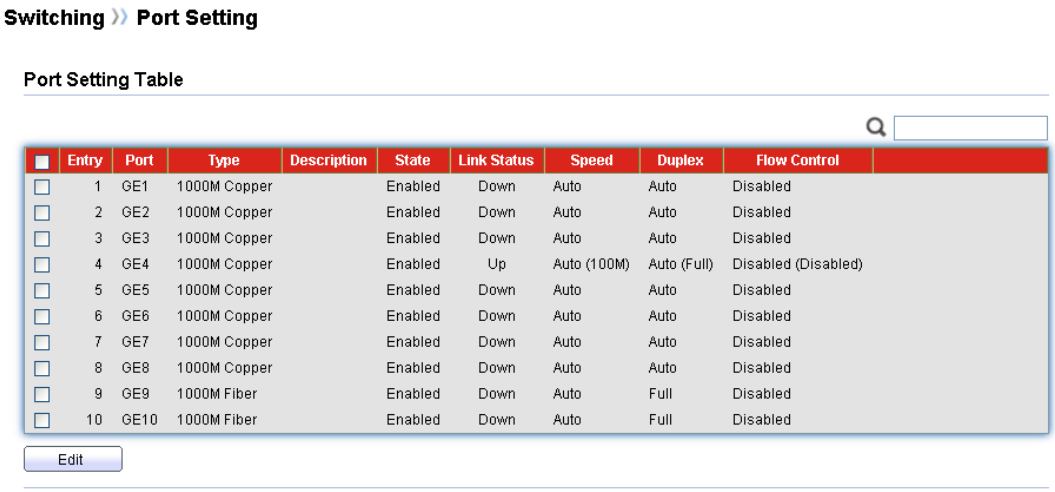
3.4.1 Port Setting

Function name:

Switching>>Port Setting

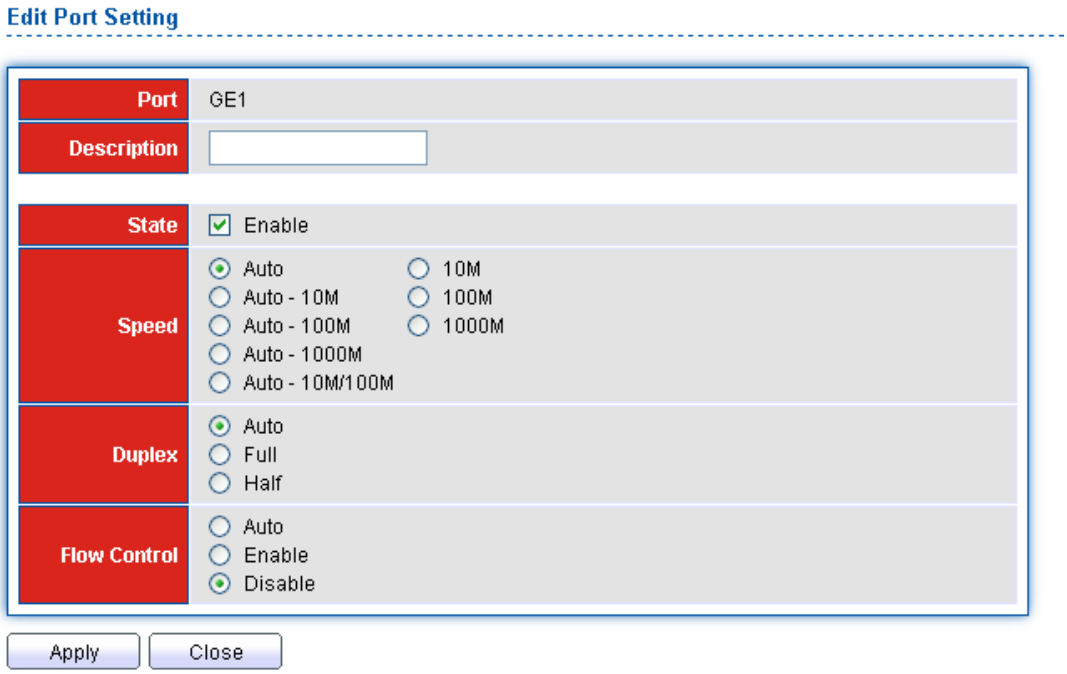
Function description:

It is used to configure switch port settings and show port current status.



Parameter description:	
☐	Check ☐ to enable a port. The factory default for all ports is disabled. A port must be enabled for data transmission to occur.
Edit	Check ☐ for one entry and click **Edit** to modify the setting.

The following shows the configuration page of port setting.



Parameter description:	
Description	Type a brief description for such entry.
State	**Port admin state.** **Enabled:** Check the box to enable the port. **Disabled:** Uncheck the box to disable the port.
Speed	Port speed capabilities: ● **Auto:** Auto speed with all capabilities. ● **Auto-10M:** Auto speed with 10M ability only. ● **Auto-100M:** Auto speed with 100M ability only. ● **Auto-1000M:** Auto speed with 1000M ability only. ● **Auto-10/100M:** Auto speed with 10/100M ability. ● **10M:** Force speed with 10M ability. ● **100M:** Force speed with 100M ability. ● **1000M:** Force speed with 1000M ability. Selecting Auto (auto-negotiation) allows one port to negotiate with a peer port automatically to obtain the connection speed and duplex mode that both ends support. When auto-negotiation is turned on, a port on the switch negotiates with the peer automatically to determine the connection speed and duplex mode. If the peer port does not support auto-negotiation or turns off this feature, the switch determines the connection speed by detecting the signal on the cable and using half duplex mode. When the switch's auto-negotiation is turned off, a port uses the pre-configured speed and duplex mode when making a connection, thus requiring you to make sure that the settings of the peer port are the same in order to connect.

Duplex	Port duplex capabilities: ● **Auto:** Auto duplex with all capabilities. ● **Half:** Auto speed with 10/100M ability only. ● **Full:** Auto speed with 10/100/1000M ability only.
Flow Control	A concentration of traffic on a port decreases port bandwidth and overflows buffer memory causing packet discards and frame losses. Flow Control is used to regulate transmission of signals to match the bandwidth of the receiving port. The switch uses IEEE802.3x flow control in full duplex mode and backpressure flow control in half duplex mode. IEEE802.3x flow control is used in full duplex mode to send a pause signal to the sending port, causing it to temporarily stop sending signals when the receiving port memory buffers fill. Back Pressure flow control is typically used in half duplex mode to send a "collision" signal to the sending port (mimicking a state of packet collision) causing the sending port to temporarily stop sending signals and resend later. Select **"Auto"**/ "**Enable**" to enable it. Or select "**Disable**" to disable it.

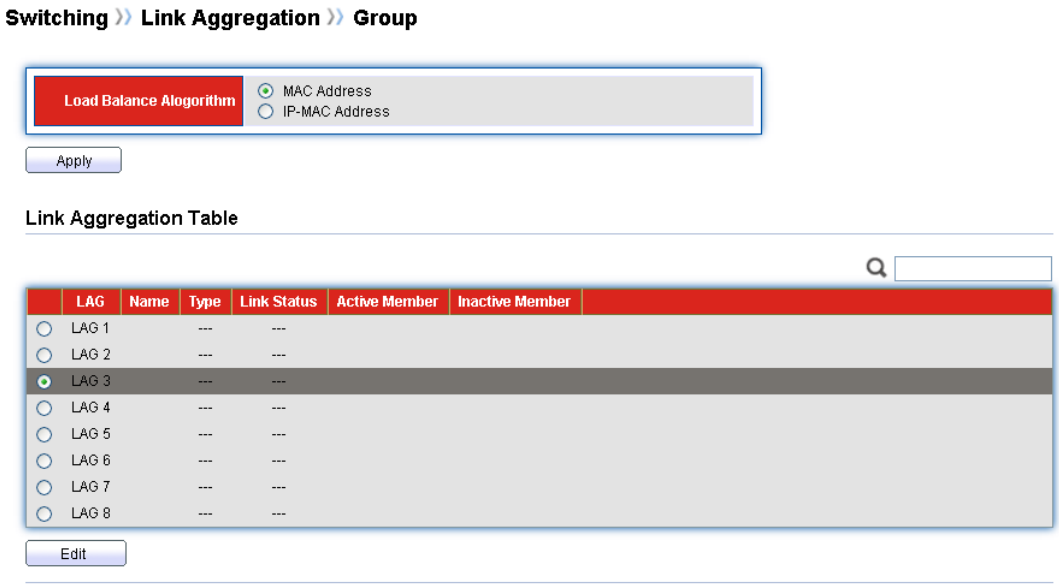
3.4.2 Link Aggregation

3.4.2.1 Group

Function name:

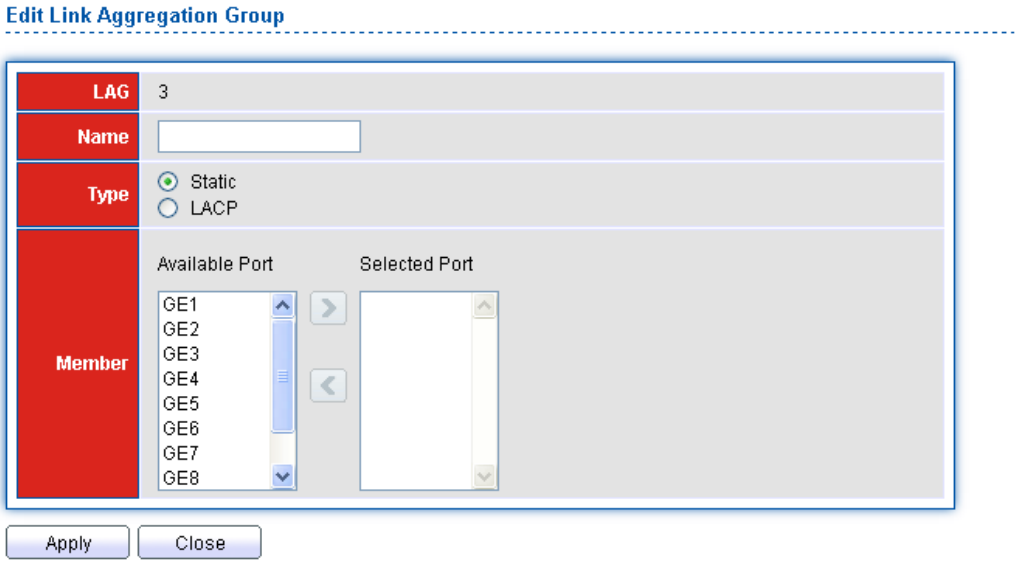
Switching>>Link Aggregation>>Group

Function description:



Parameter description:	
Load Balance Algorithm	Select the LAG load balance distribution algorithm ● **MAC Address**: Based on source and destination MAC address for all packets ● **IP/MAC Address**: Based on source and destination IP addresses for IP packet, and source and destination MAC address for non-IP packets.
Apply	Save the settings or changes to the switch.
Link Aggregation Table	
	Check to choose a entry.
Edit	Check for one entry and click **Edit** to modify the setting.

The following shows the configuration page of Link Aggregation Group.



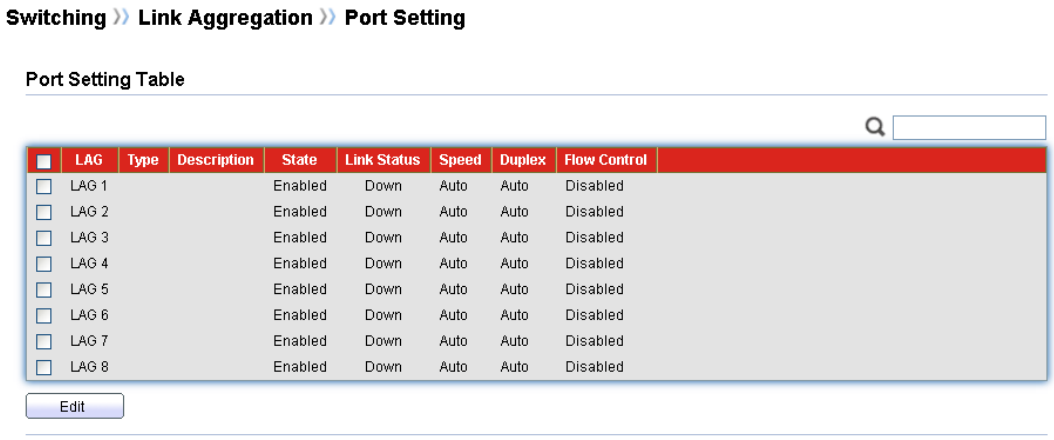
Parameter description:	
LAG	Display LAG Name.
Name	Type LAG port description.
Type	Select the type of the LAG. ● **Static**: The group of ports assigned to a static LAG will be always active members. ● **LACP**: The group of ports assigned to dynamic LAG will be candidate ports. LACP determines which candidate ports are active member ports.
Member	**Available Port** - Inactive or candidate member ports of the LAG. **Selected Port** - Active member ports of the LAG.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.4.2.2 Port Setting

Function name:

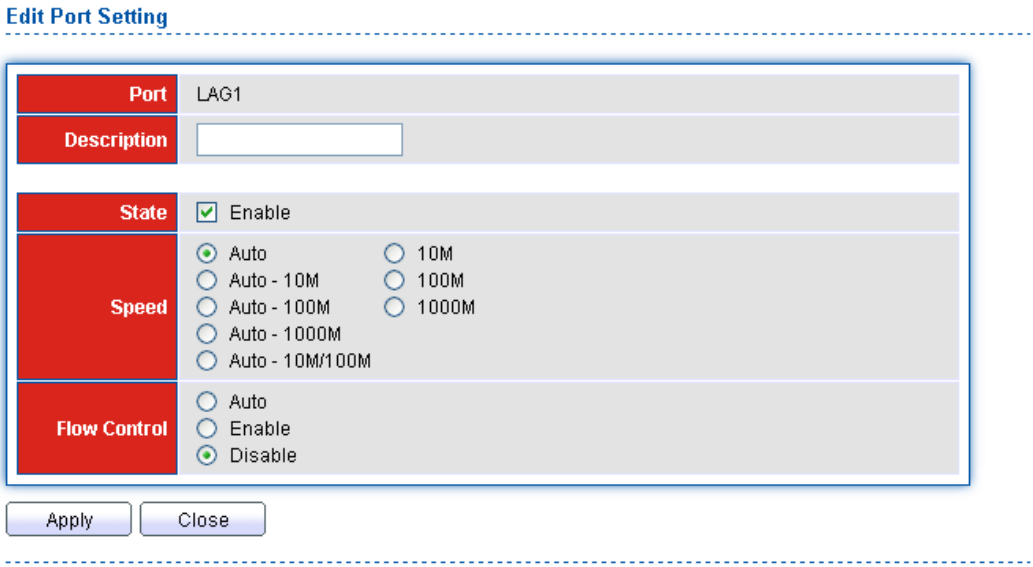
Switching>>Link Aggregation>>Port Setting

Function description:



Parameter description:	
☐	Check ☐ to enable a port. The factory default for all ports is disabled. A port must be enabled for data transmission to occur.
Edit	Check ☐ for one entry and click **Edit** to modify the setting.
LAG	LAG Port Name.
Type	LAG Port media type.
Description	LAG port description.
State	Display LAG port admin state. Enabled : Enable the port Disabled : Disable the port
Link Status	Current LAG port link status. Up: Port is link up. Down: Port is link down.
Speed	Current LAG port speed configuration and link speed status.
Duplex	Current LAG port duplex configuration and link duplex status.
Flow Control	Current LAG port flow control configuration and link flow control status.

The following shows the configuration page of port setting.



Parameter description:	
Description	Type a brief description for such entry.
State	Display LAG port admin state. Enabled: Check the box to enable the port. Disabled: Uncheck the box to disable the port.
Speed	Port speed capabilities: ● **Auto:** Auto speed with all capabilities. ● **Auto-10M:** Auto speed with 10M ability only. ● **Auto-100M:** Auto speed with 100M ability only. ● **Auto-1000M:** Auto speed with 1000M ability only. ● **Auto-10/100M:** Auto speed with 10/100M ability. ● **10M:** Force speed with 10M ability. ● **100M:** Force speed with 100M ability. ● **1000M:** Force speed with 1000M ability. Selecting Auto (auto-negotiation) allows one port to negotiate with a peer port automatically to obtain the connection speed and duplex mode that both ends support. When auto-negotiation is turned on, a port on the switch negotiates with the peer automatically to determine the connection speed and duplex mode. If the peer port does not support auto-negotiation or turns off this feature, the switch determines the connection speed by detecting the signal on the cable and using half duplex mode. When the switch's auto-negotiation is turned off, a port uses the pre-configured speed and duplex mode when making a connection, thus requiring you to make sure that the settings of the peer port are the same in order to connect.
Flow Control	A concentration of traffic on a port decreases port bandwidth and overflows buffer memory causing packet

	discards and frame losses. Flow Control is used to regulate transmission of signals to match the bandwidth of the receiving port. The switch uses IEEE802.3x flow control in full duplex mode and backpressure flow control in half duplex mode. IEEE802.3x flow control is used in full duplex mode to send a pause signal to the sending port, causing it to temporarily stop sending signals when the receiving port memory buffers fill. Back Pressure flow control is typically used in half duplex mode to send a "collision" signal to the sending port (mimicking a state of packet collision) causing the sending port to temporarily stop sending signals and resend later. Select **"Auto"**/ "**Enable**" to enable it. Or select "**Disable**" to disable it.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

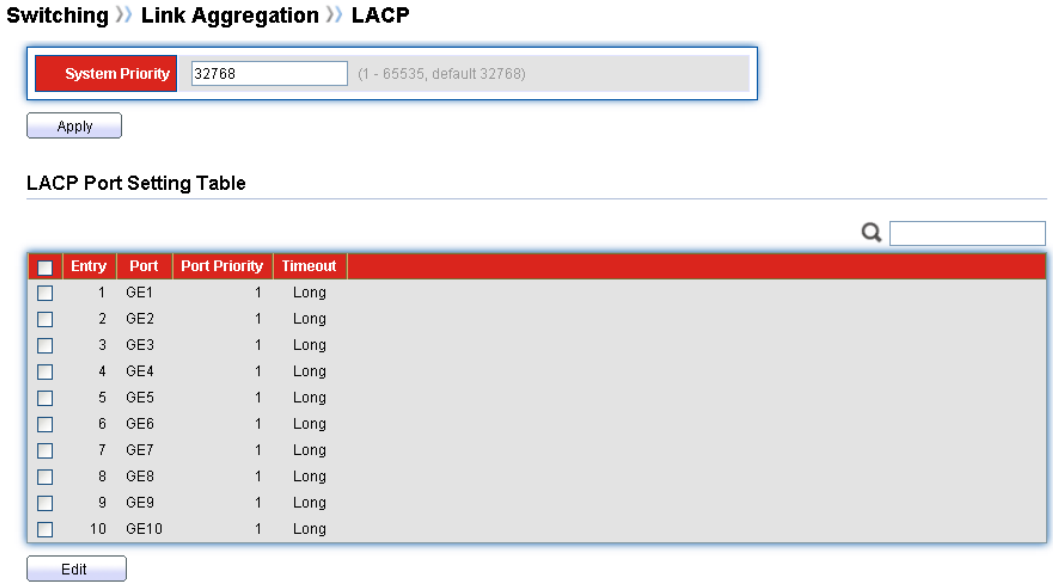
3.4.2.3 LACP Setting

Function name:

Switching>>Link Aggregation>>LACP Setting

Function description:

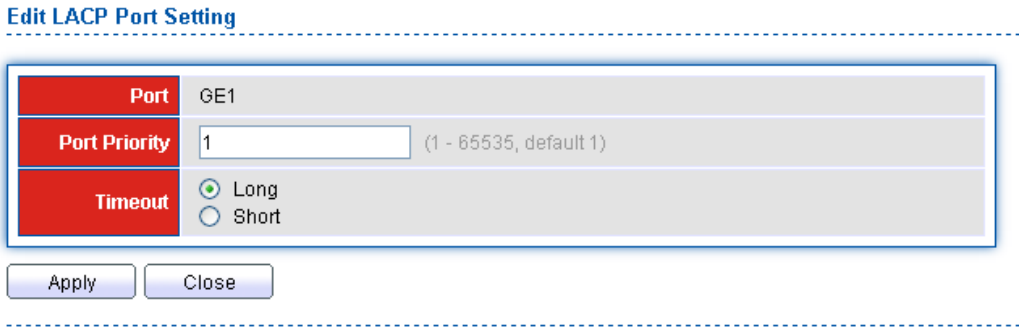
It is a Trunk mechanism can aggregate several physical ports to a logical port for higher bandwidth. The device provides at most 8 groups of trunk configuration. Each trunk group can aggregate at most 8 ports. For trunk ports traffic balancing, a hash function is applied and the hash parameters can be configured by user. There are 2 sets of hash algorithm configurations, each trunk group can bind to a set of configuration. The device also provide traffic separation mechanism to choose the link maximum id member port dedicated for known multicast traffic or flooding traffic.



Parameter description:	
LACP Setting	
System Priority	Configure the system priority of LACP. This decides the system priority field in LACP PDU.
Apply	Save the settings or changes to the switch.
Port	Port Name.
Port Priority	LACP priority value of the port.
Timeout	The periodic transmissions type of LACP PDUs. Long: Transmit LACP PDU with slow periodic (30s). Short: Transmit LACP PDU with fast periodic (1s).
☐	Check ☐ to enable a port. The factory default for all ports is disabled. A port must be enabled for data transmission to occur.
Edit	Check ☐ for one entry and click **Edit** to modify the setting.

The following shows the configuration page of LACP port setting. Port id could be physical port id or logical port id (trunk id). Mirror, ingress and egress bandwidth control

module base on physical port not logic port, however, almost all of the other modules, such as storm filter, VLAN, L2 table and so on, port id means logical port.



Parameter description:	
Port Priority	Enter the LACP priority value of the port.
Timeout	Select the periodic transmissions of LACP PDUs. **Long**: Transmit LACP PDU with slow periodic (30s). **Short**: Transmit LACPP DU with fast periodic (1s).
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

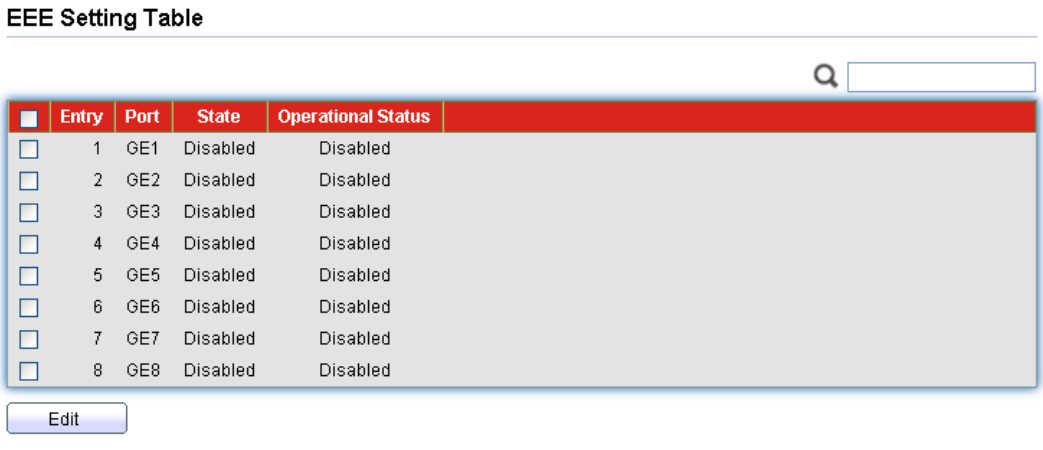
3.4.3 EEE

Function name:

Switching>>EEE

Function description:

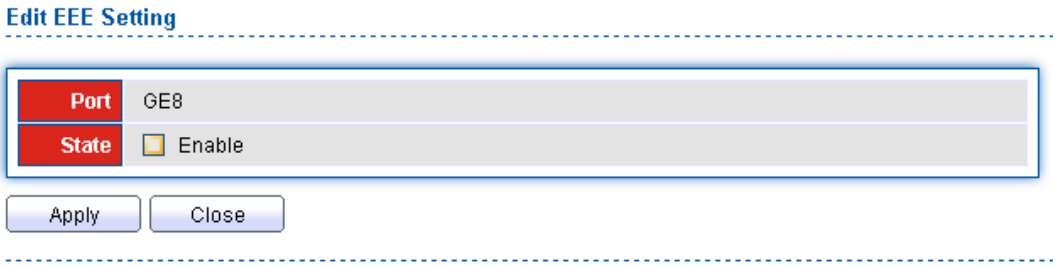
This page allows user to enable or disable port EEE (Energy Efficient Ethernet) function.



Parameter description:	
Port	Select one or multiple ports to configure
State	Port EEE function. ● **Enabled**: Enable EEE function.

	● **Disabled**: Disable EEE function.
Operational Status	Display Port EEE operational status. Enabled: EEE is operating. Disabled: EEE is no operating.
☐	Check ☐ to enable a port. The factory default for all ports is disabled. A port must be enabled for data transmission to occur.
Edit	Check ☐ for one entry and click **Edit** to modify the setting.

The following shows the configuration page of EEE setting.



Parameter description:	
Port	Select one or multiple ports to configure.
State	Port EEE admin state. Enable: Check the box to enable port EEE. Disable: Uncheck the box to disable port EEE.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

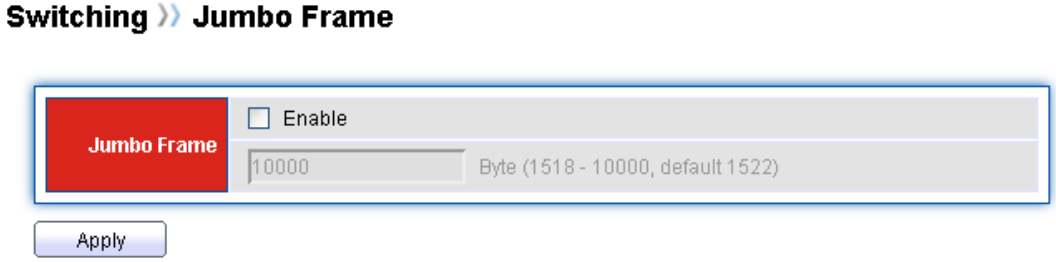
3.4.4 Jumbo Frame

Function name:

Switching>>Jumbo Frame

Function description:

This page allows user to configure switch port jumbo frame settings.



Parameter description:	
Jumbo Frame	Check **Enable** to activate such feature. Type Jumbo frame size. The valid range is 1526 bytes – 9216 bytes.
Apply	Save the settings or changes to the switch.

3.4.5 PoE

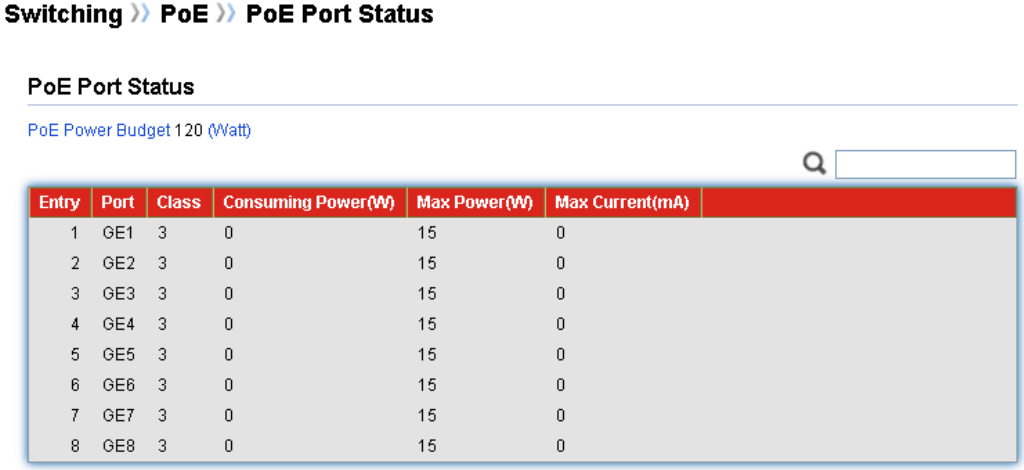
3.4.5.1 PoE Port Status

Function name:

Switching>>PoE>>PoE Port Status

Function description:

This page shows PoE port current status.



Parameter description:	
Port	Display the name of the port.
Class	Displays PoE power classification level status.(Dynamic mode only). 0 : Default (Class 3 : 12.95W) 1 : 0.44W~3.84W (Very Low Power) 2 : 3.84W~6.49W (Low Power) 3 : 6.49W~12.95W (Mid Power) 4 : 12.95W~25.5W (High Power)
Consuming Power(W)	Displays current PoE power consumption.
Max Power(W)	Displays PSE maximum power. Class 0 : 16.2W Class 1 : 4.2W Class 2 : 7.4W Class 3 : 16.2W Class 4 : 31.2W
Max Current(mA)	Displays current PoE power current.

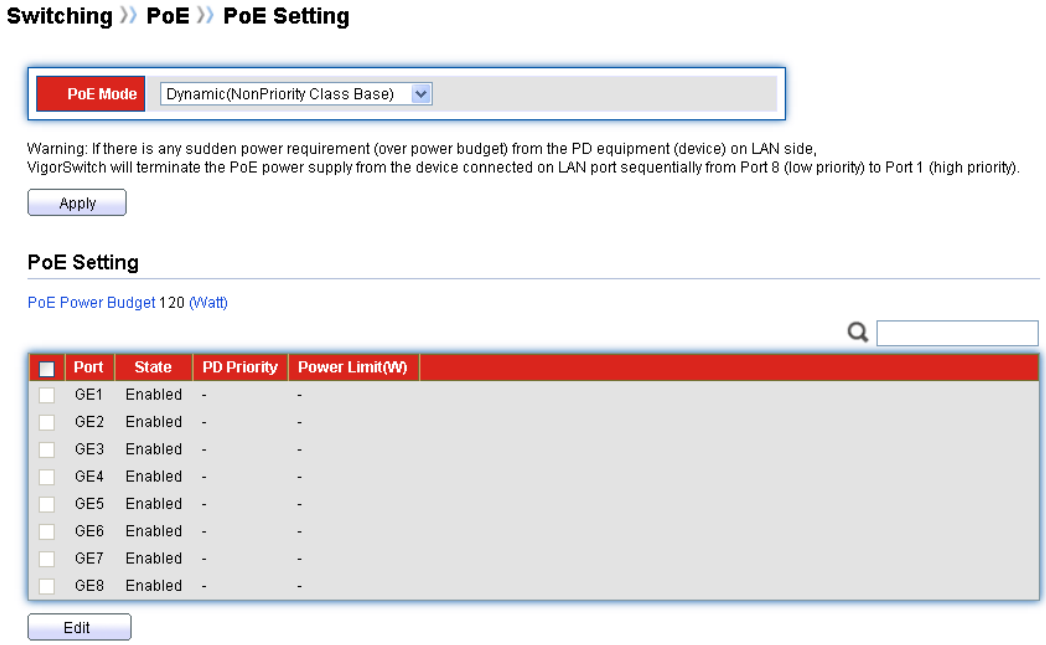
3.4.5.2 PoE Setting

Function name:

Switching>>PoE>>PoE Setting

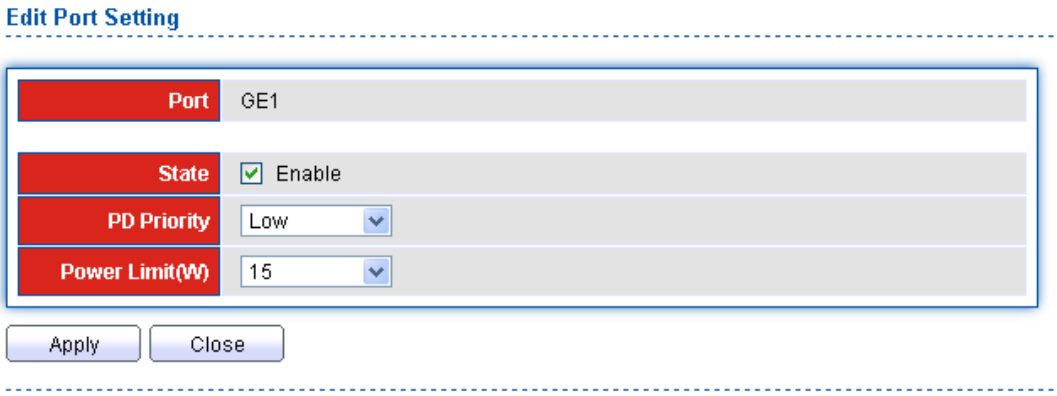
Function description:

This page allows user to configure PoE working type and per port status.



Parameter description:	
PoE Mode	**Static (Priority Power Base) –** The PoE Static mode is manual configure per port on/off, power budget and PD priority. **Dynamic (NonPriority Class Base) –** The PoE Dynamic mode is automatic negotiation PD device by classification level of power, and power budget management by port PD priority. The default device power connection priority is port1(high priority)>port2>…>port8(low priority).
Apply	Click it to enable **PoE Mode** and activate the PoE Setting.
☐	Check ☐ to enable a port. The factory default for all ports is disabled.
Edit	Check ☐ for one entry and click **Edit** to modify the setting.
Port	Display Port Name.
PD Priority	Display PD Priority.

The following shows the configuration page of PoE setting.



Parameter description:	
Port	Display the port name.
State	Check ☐ to PoE function.
PD Priority	Select PD Priority. **Low:** PD device set to low priority connection. **Medium:** PD device set to middle priority connection. **High:** PD device set to high priority connection. **Critical:** PD device set to highest priority connection.
Power Limit(W)	Selected the power delivery of watts. **15W:** PoE port limit set to 15W (802.3af). **30W:** PoE port limit set to 30W (802.3at).
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.4.6 VLAN Management

A virtual local area network, virtual LAN or VLAN, is a group of hosts with a common set of requirements that communicate as if they were attached to the same broadcast domain, regardless of their physical location. A VLAN has the same attributes as a physical local area network (LAN), but it allows for end stations to be grouped together even if they are not located on the same network switch. VLAN membership can be configured through software instead of physically relocating devices or connections.

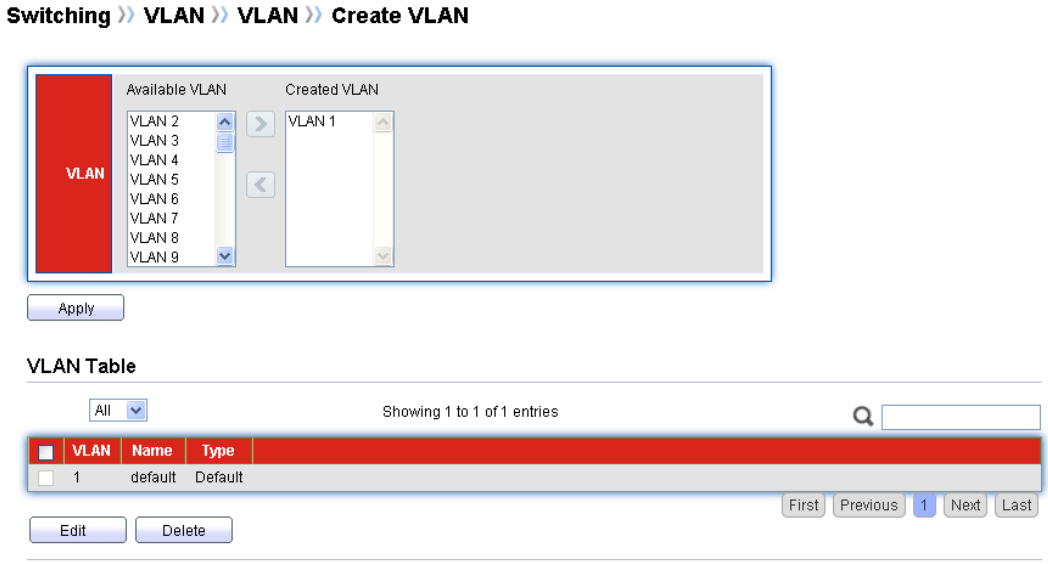
3.4.6.1 Create VLAN

Function name:

Switching>>VLAN>>VLAN>>Create VLAN

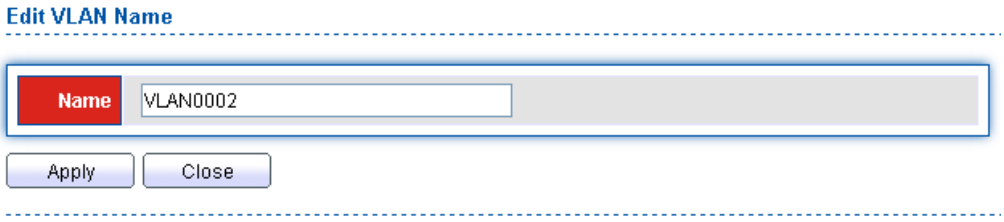
Function description:

It allows a user to add, edit or delete VLAN settings.



Parameter description:	
Apply	Click it to add one VLAN from available VLAN area to created VLAN area; and activate VLAN table.
☐	Check ☐ to enable the selected VLAN entry.
Edit	Check ☐ for one entry and click **Edit** to modify VLAN.
Delete	Check ☐ for one entry and click **Delete** to remove VLAN.

The following shows the modification page of VLAN name.



Parameter description:	
Name	Type a name for such VLAN profile.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.4.6.2 VLAN Configuration

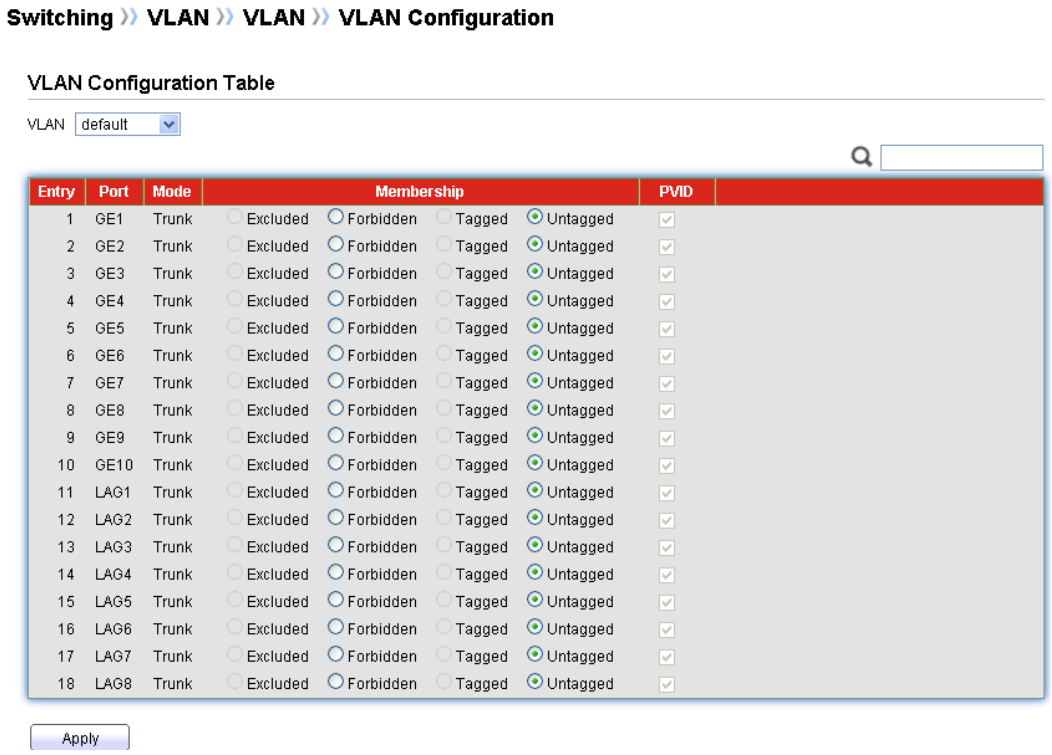
Function name:

Switching>>VLAN>>VLAN>>VLAN Configuration

Function description:

This page allows a user to configure VLAN Interface related settings.

A PVID (Port VLAN ID) is a tag that adds to incoming untagged frames received on a port so that the frames are forwarded to the VLAN group that the tag defines.



Parameter description:	
VLAN	Select specified VLAN ID to configure Port to VLAN Settings.
Membership	Select the membership for this port with the specified VLAN ID. ● **Excluded**: Specify the port is excluded in the VLAN. ● **Forbidden**: Specify the port is forbidden in the VLAN. ● **Tagged**: Specify the port is tagged in the VLAN. ● **Untagged**: Specify the port is untagged in the VLAN.
PVID	It will be enabled/disabled according to the membership

	selected.
Apply	Save the settings or changes to the switch.

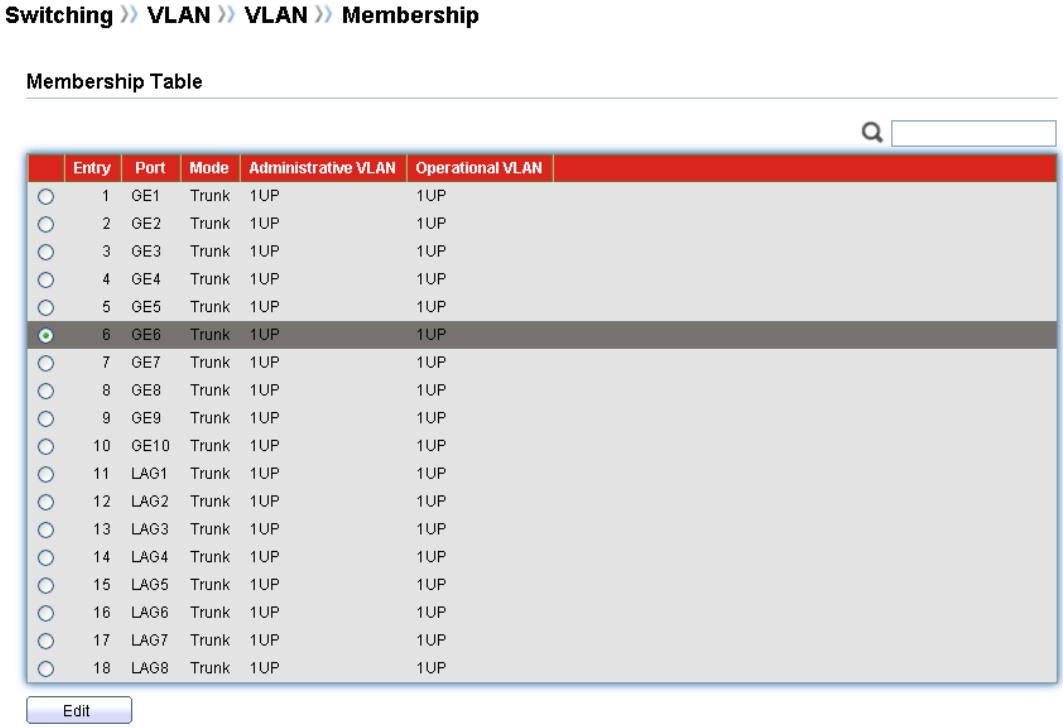
3.4.6.3 Membership

Function name:

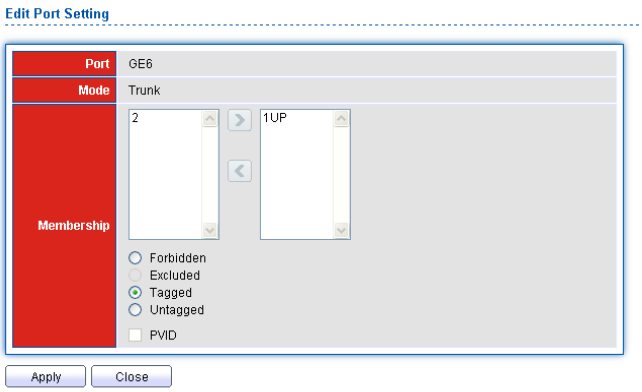
Switching>>VLAN>>VLAN>>Membership

Function description:

This page shows a table of VLAN Membership setting.



Parameter description:	
Port	Display the interface of this port entry.
Mode	Display the interface VLAN mode of this port.
Administrative VLAN	Display the administrative VLAN list of this port.
Operational VLAN	Display the operational VLAN list of this port.
Edit	Click the Edit button to edit the VLAN membership of this port.



Select the membership for this port with the specified VLAN ID.

- **Excluded**: Specify the port is excluded in the VLAN.
- **Forbidden**: Specify the port is forbidden in the VLAN.
- **Tagged**: Specify the port is tagged in the VLAN.
- **Untagged**: Specify the port is untagged in the VLAN.

PVID-Check this checkbox to select the VLAN ID to be the port-based VLAN ID for this port.

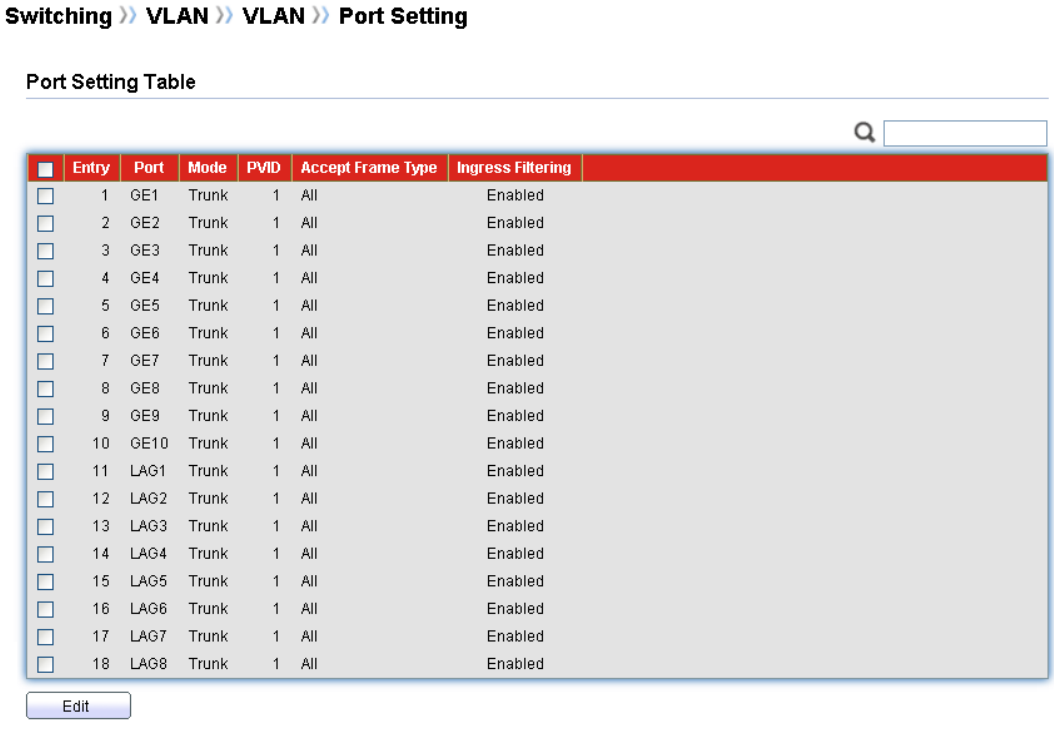
3.4.6.4 Port Setting

Function name:

Switching>>VLAN>>VLAN>>Port Setting

Function description:

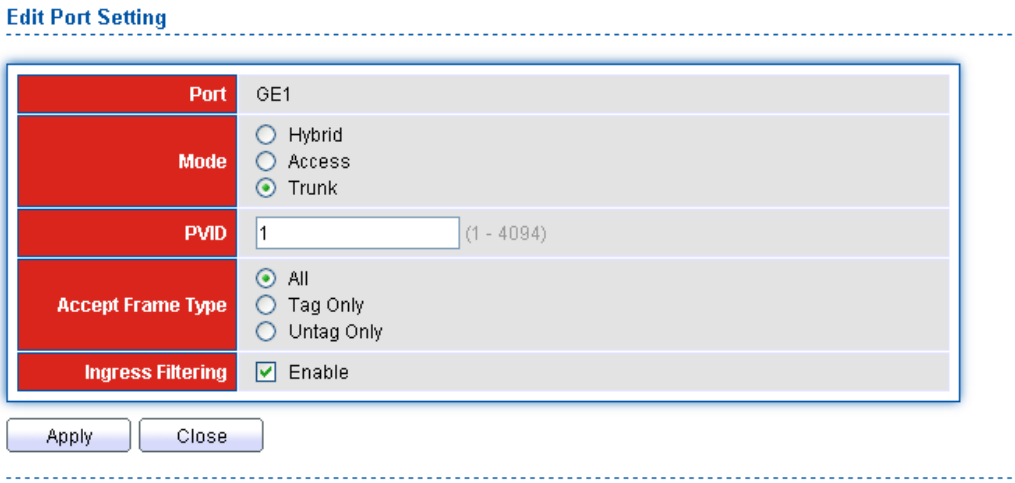
This page allow user to configure port VLAN settings such as VLAN port mode, PVID etc… The attributes depend on different VLAN port mode.



Parameter description:	
☐	Check ☐ to enable the selected VLAN port entry.
Edit	Check ☐ for one entry and click **Edit** to modify VLAN port.
Port	Display the interface.
Mode	Display the VLAN mode of port.
PVID	Display the Port-based VLAN ID of port.
Accept Frame Type	Display accepted frame type of port.
Ingress Filtering	Display ingress filter status of port.

The following shows the modification page of VLAN port setting.

Switching ›› **VLAN** ›› **VLAN** ›› **Port Setting**



Parameter description:	
Port	Display the interface of the port entry.
Mode	Select the VLAN mode of the interface. **Hybrid**: Support all functions as defined in IEEE 802.1Qspecification. **Access**: Accepts only untagged frames and join an untagged VLAN. **Trunk**: An untagged member of one VLAN at most, and is a tagged member of zero or more VLANs.
PVID	Specify the port-based VLAN ID (1~4094). It's only available with hybrid and Trunk mode.
Accept Frame Type	Specify the acceptable-frame-type of the specified interfaces. It's only available with Hybrid mode.
Ingress Filtering	Specify the status of ingress filtering. It's only available with Hybrid mode.

Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

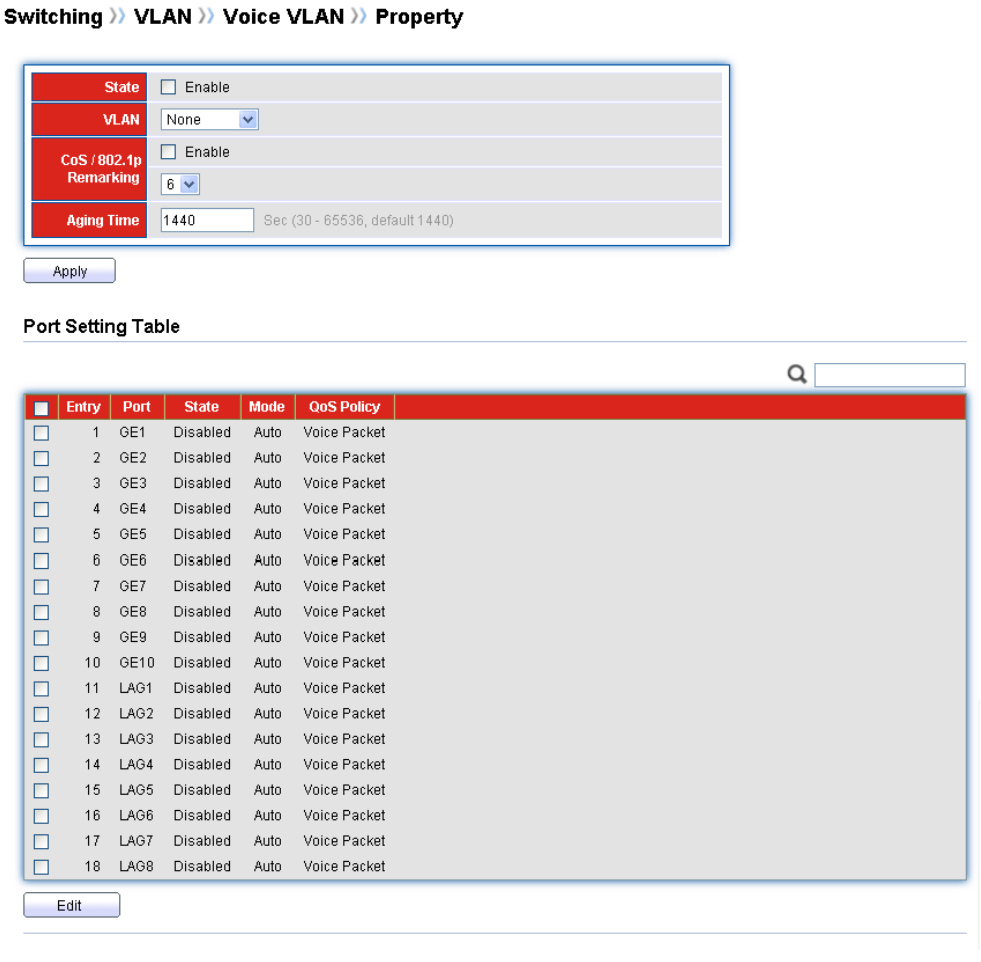
3.4.6.5 Voice VLAN Property

Function name:

Switching>>VLAN>>VLAN>>Voice VLAN >>Property

Function description:

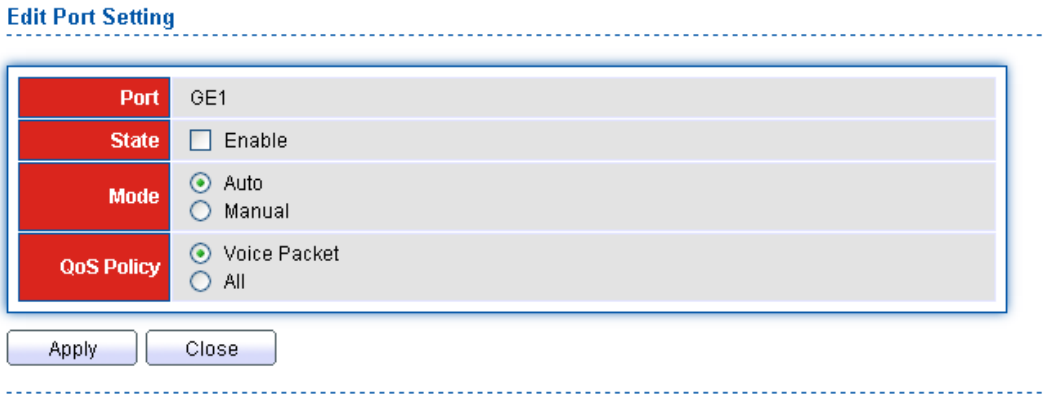
This page allow user to configure global and per interface setting of voice VLAN.



Parameter description:	
State	Check Enable to enable Voice VLAN.
VLAN	Select Voice VLAN ID profile
Cos/802.1p Remarking	Set checkbox to enable or disable 1p remarking. If enabled, qualified packets will be remark by this value. Check Enable to enable such function. Select a value that will be advertised by LLDP-MED.
Aging Time	Select value of aging time (30~65536 min). Default is 1440 minutes. A voice VLAN entry will be age out after this time if without any packet pass through.

Apply	Save the settings or changes to the switch.
☐	Check ☐ to enable the selected port setting entry.
Edit	Check ☐ for one entry and click **Edit** to modify port setting for voice VLAN.
Entry	Display port entry.
State	Display enable/disable status of interface.
Mode	Display voice VLAN mode.
QoS Policy	Display voice VLAN remark will effect which kind of packet.

The following shows the modification page of voice VLAN port setting.



Parameter description:	
State	Set checkbox to enable/disable voice VLAN function of interface.
Mode	Select port voice VLAN mode. **Auto**: Voice VLAN auto detect packets that match OUI table and add received port into voice VLAN ID tagged member. **Manual**: User need add interface to VLAN ID tagged member manually.
QoS Policy	Select port QoS Policy mode. **Voice Packet**: QoS attributes are applied to packets with OUIs in the source MAC address. **All**: QoS attributes are applied to packets that are classified to the Voice VLAN.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

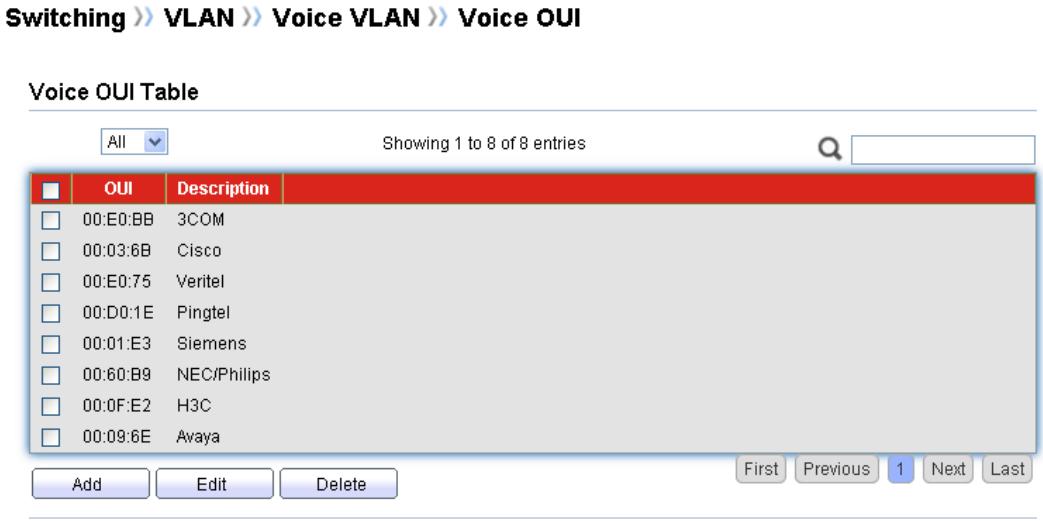
3.4.6.6 Voice VLAN Voice OUI

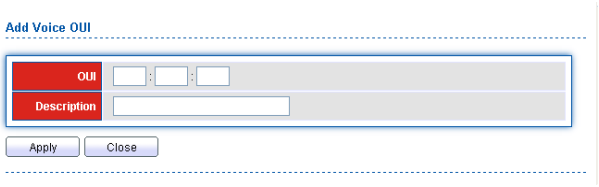
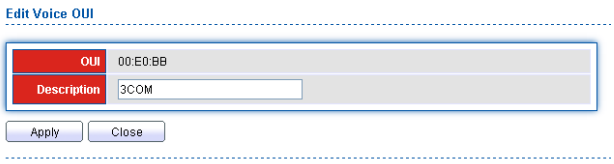
Function name:

Switching>>VLAN>>VLAN>>Voice VLAN >>Voice OUI

Function description:

This page allow user to add, edit or delete OUI MAC addresses. Default has 8 pre-defined OUI MAC.



Parameter description:	
OUI	Display OUI address.
Description	Description of the specified MAC address to the voice VLAN OUI table.
☐	Check ☐ to enable the selected port setting entry.
Add	Click it to create a new voice OUI.  **OUI**: Input OUI MAC address. It can't be edited in edit dialog. **Description**: Input description of the specified MAC address to the voice VLAN OUI table.
Edit	Check ☐ for one entry and click **Edit** to modify OUI setting for voice VLAN. 
Delete	Click it to remove the selected voice VLAN entry.

3.4.7 Multicast

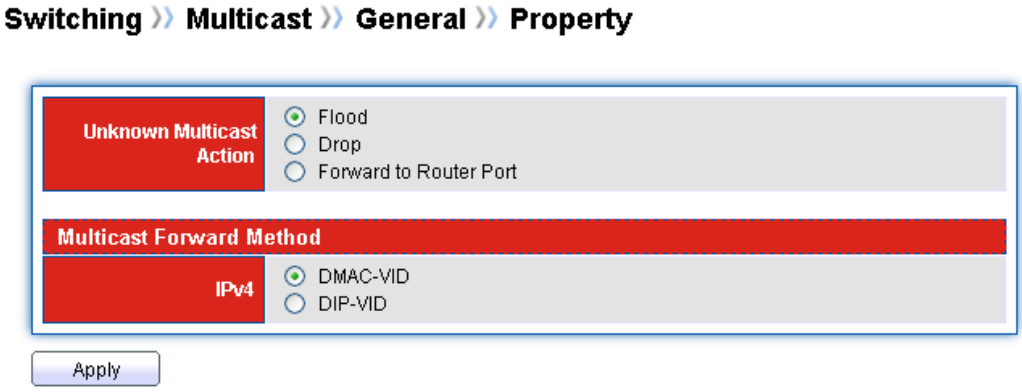
In computer networking, multicast (one-to-many or many-to-many distribution) Is group communication where information is addressed to a group of destination computers simultaneously.

3.4.7.1 General Property

Function name:

Switching>>Multicast>>General>>Properties

Function description:



Parameter description:	
Unknown Multicast Action	Set the unknown multicast action ● **Drop**: drop the unknown multicast data. ● **Flood**: flood the unknown multicast data. ● **Forward to Router port**: forward the unknown multicast data to router port.
IPv4	Set the ipv4 multicast forward method. ● **DMAC-VID**: forward method dmac+vid. ● **DIP-VID**: forward method dip+sip.
Apply	Save the settings or changes to the switch.

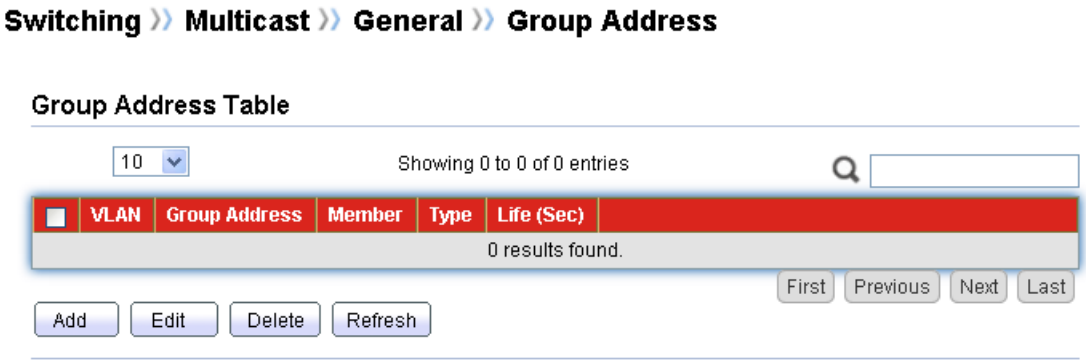
3.4.7.2 General Group Address

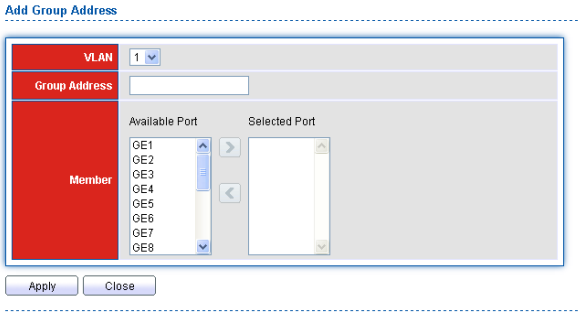
Function name:

Switching>>Multicast>>General>>Group Address

Function description:

To display Multicast General Group web page. This page allow user to browse all multicast groups that dynamic learned or statically added.



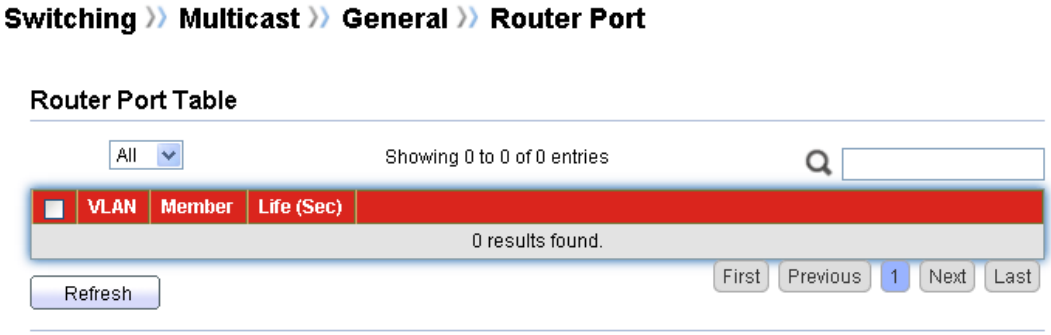
Parameter description:	
Add	Click it to create a new group address profile for multicast.  **VLAN** – Specify one VLAN ID. **Group Address** – Type the group IP address. Member – Display the member ports of group. **Available Port** - Inactive or candidate member ports. **Selected Port** - Active member ports. **Apply** – Save the settings.
☐	Check ☐ to select group address profile.
Edit	Check ☐ of a group address profile and click **Edit** to modify settings.
Delete	Click it to remove the selected group address profile.
Refresh	Click it to renew current page.

3.4.7.3 General Router Port

Function name:

Switching>>Multicast>>General>>Router Port

Function description:



Parameter description:	
VLAN	The VLAN ID router entry.
Member	Router Port member.
Life (Sec)	The expiry time of the router entry.
Refresh	Click it to renew current page.

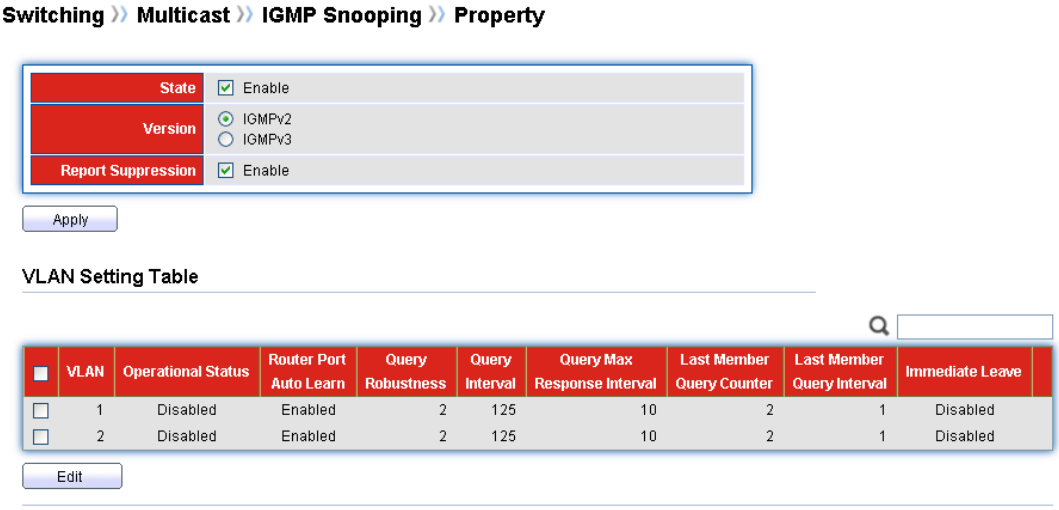
3.4.7.4 IGMP Snooping Property

Function name:

Switching>>Multicast>>IGMP Snooping>>Property

Function description:

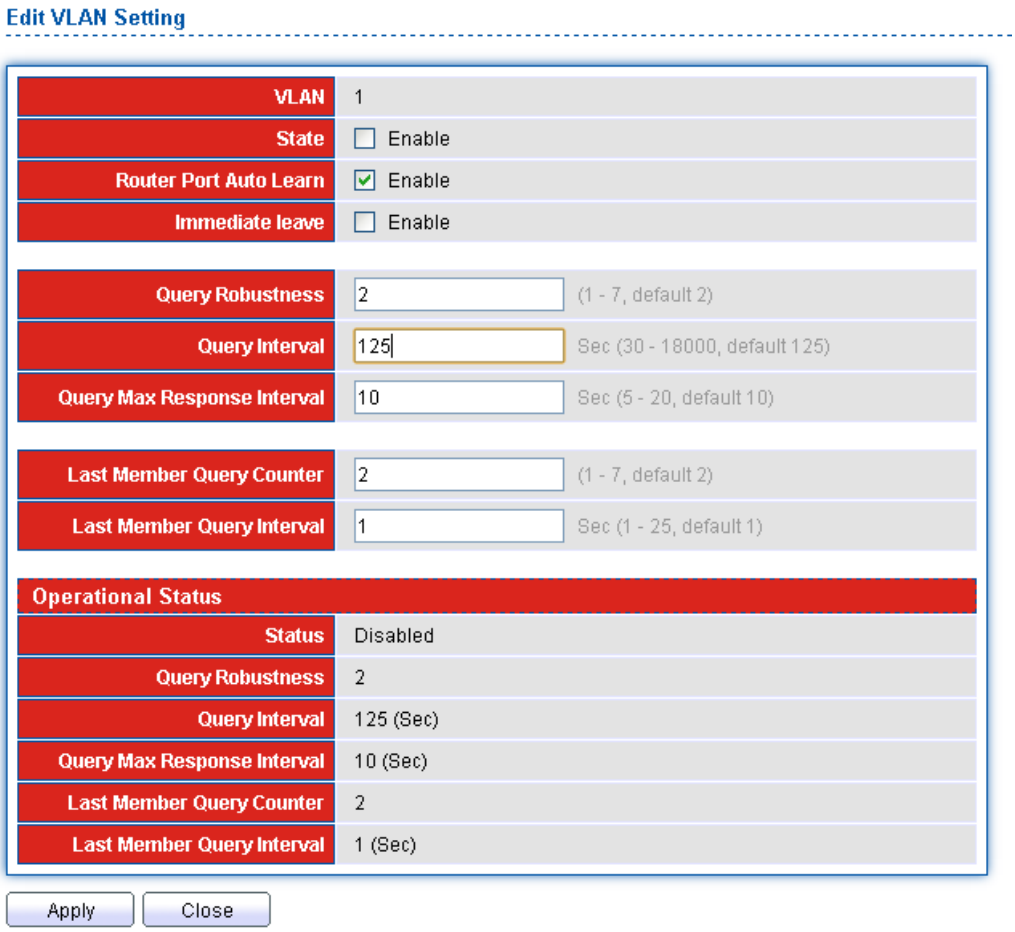
IGMP snooping is the process of listening to Internet Group Management Protocol (IGMP) network traffic. The feature allows a network switch to listen in on the IGMP conversation between hosts and routers. By listening to these conversations the switch maintains a map of which links need which IP multicast streams. Multicasts may be filtered from the links which do not need them and thus controls which ports receive specific multicast traffic.



Parameter description:	
State	Check **Enable** to set the enabling status of IGMP functionality.
Version	Set the IGMP snooping version. **IGMPv2**: Only support process IGMP v2 packet.

	IGMPv3: Support v3 basic and v2.
Report Suppression	Check **Enable** to set the enabling status of IGMP v2 report suppression.
Apply	Save the settings or changes to the switch.
VLAN Setting Table	
VLAN ID	The IGMP entry VLAN ID.
Operation Status	The enable status of IGMP VLAN functionality. ● **Enabled**: when IGMP Snooping enable and IGMP VLAN enable and multicast filtering enable. ● **Disabled**: when IGMP Snooping disable or IGMP VLAN disable or multicast filtering disable.
Router Port Auto Learn	Set the enabling status of IGMP router port learning. ● **Enable**: Enable learning router port by query and PIM, DVRMP. ● **Disable**: Disable learning dynamic router port.
Query Robustness	The Robustness Variable allows tuning for the expected packet loss on a subnet.
Query Interval	The interval of queries send general query.
Query Max Response Interval	In Membership Query Messages, it specifies the maximum allowed time before sending a responding report in units of 1/10 second.
Last Member Query count	The count that Query-switch sends Group-Specific Queries when it receives a Leave Group message for a group.
Last Member Query Interval	The interval that Query-switch sends Group-Specific Queries when it receives a Leave Group message for a group.
Immediate leave	Leave the group when receive IGMP Leave message. ● **Enable**: Enable Fastleave. ● **Disable**: Disable Fastleave.
Edit	Click **Edit** to edit the IGMP Snooping Table.
☐	Check ☐ to select VLAN profile for IGMP.
Edit	Check ☐ of a VLAN profile and click **Edit** to modify settings.

The following shows the modification page of IGMP Snooping VLAN port setting.



Parameter description:	
State	Check **Enable** to set the enabling status of IGMP functionality.
Router Ports Auto Learn	Check **Enable** to enable learning router port by query and PIM, DVRMP.
Immediate leave	Check **Enable** to leave the group when receive IGMP Leave message.
Query Robustness	The Robustness Variable allows tuning for the expected packet loss on a subnet.
Query Interval	The admin query interval.
Query Max Response Interval	The admin query max response interval.
Last Member Query count	The admin last member query count.
Last Member Query Interval	The admin last member query interval.
Operational Status	A brief table for the above settings.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

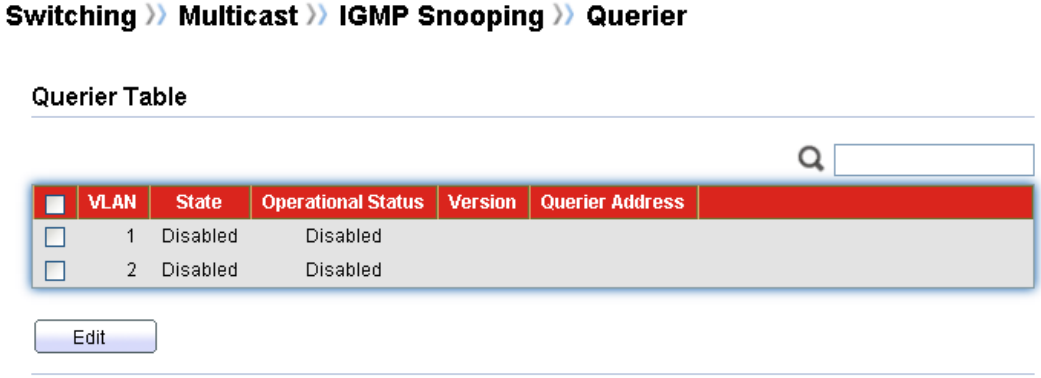
3.4.7.5 IGMP Snooping Querier

Function name:

Switching>>Multicast>>IGMP Snooping>>Querier

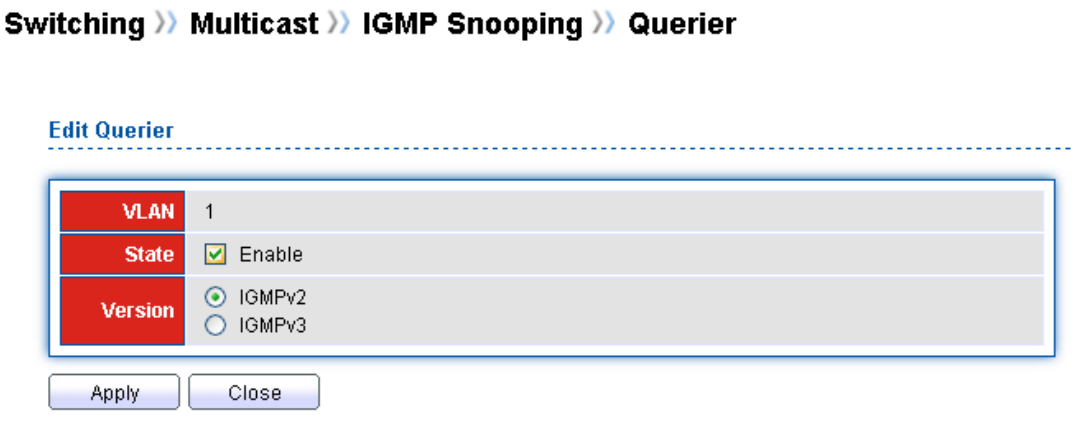
Function description:

This page allows user to configure querier settings on specific VLAN of IGMP Snooping.



Parameter description:	
☐	Check ☐ to select VLAN profile for querier.
Edit	Check ☐ of a VLAN profile and click **Edit** to modify settings.
VLAN	IGMP Snooping querier entry VLAN ID.
State	The IGMP Snooping querier Admin State.
Operational Status	The IGMP Snooping querier operational status.
Version	The IGMP Snooping querier operational version.
Querier Address	The operational querier IP address on the VLAN.

The following shows the modification page for VLAN IGMP Snooping querier settings.



Parameter description:	
VLAN ID	Display the VLAN ID.
State	Check **Enable** to set the enabling status of IGMP Querier Election on the chosen VLAN.

Version	Set the query version of IGMP Querier Election on the choseVLANs. **IGMPv2**: Querier version 2. **IGMPv3**: Querier version 3.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.4.7.6 IGMP Snooping Statistics

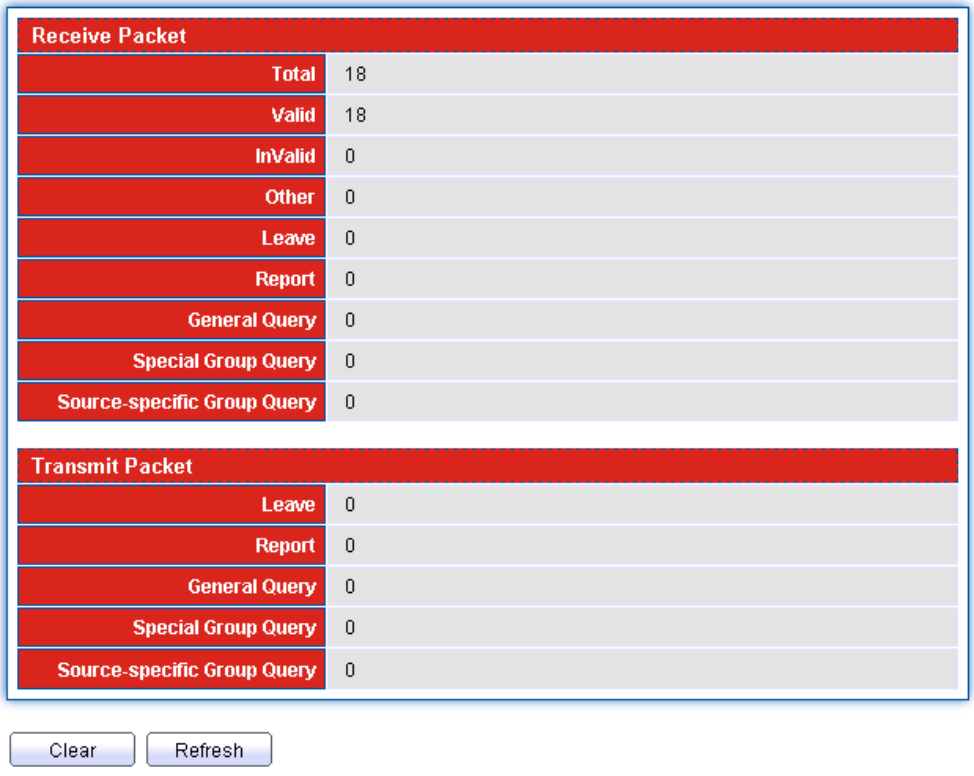
Function name:

Switching>>Multicast>>IGMP Snooping>>Statistics

Function description:

This page allow user to display IGMP Snooping Statistics and clear IGMP Snooping statistics.

Switching » Multicast » IGMP Snooping » Statistics



Parameter description:	
Receive Packet	**Total -** Total RX IGMP packet, include IPv4 multicast data to CPU. **Valid -** The valid IGMP Snooping process packet. **InValid -** The invalid IGMP Snooping process packet. **Other -** The ICMP protocol is not 2, and is not IPv4 multicast data packet. **Leave -** IGMP leave packet.

	Report - IGMP join and report packet. **General Query -** IGMP general query packet. **Special Group Query -** IGMP special group general query packet. **Source -** IGMP special source and group general query packet.
Transmit Packet	**Leave -** IGMP leave packet. **Report -** IGMP join and report packet. **General Query -** IGMP general query packet includes querier transmit general query packet. **Special Group Query -** IGMP special group query packet include querier transmit special group query packet. **Source -** IGMP special source and group general query packet.

3.4.8 Spanning Tree

The Spanning Tree Protocol (STP) is a network protocol that ensures a loop-free topology for any bridged Ethernet local area network.

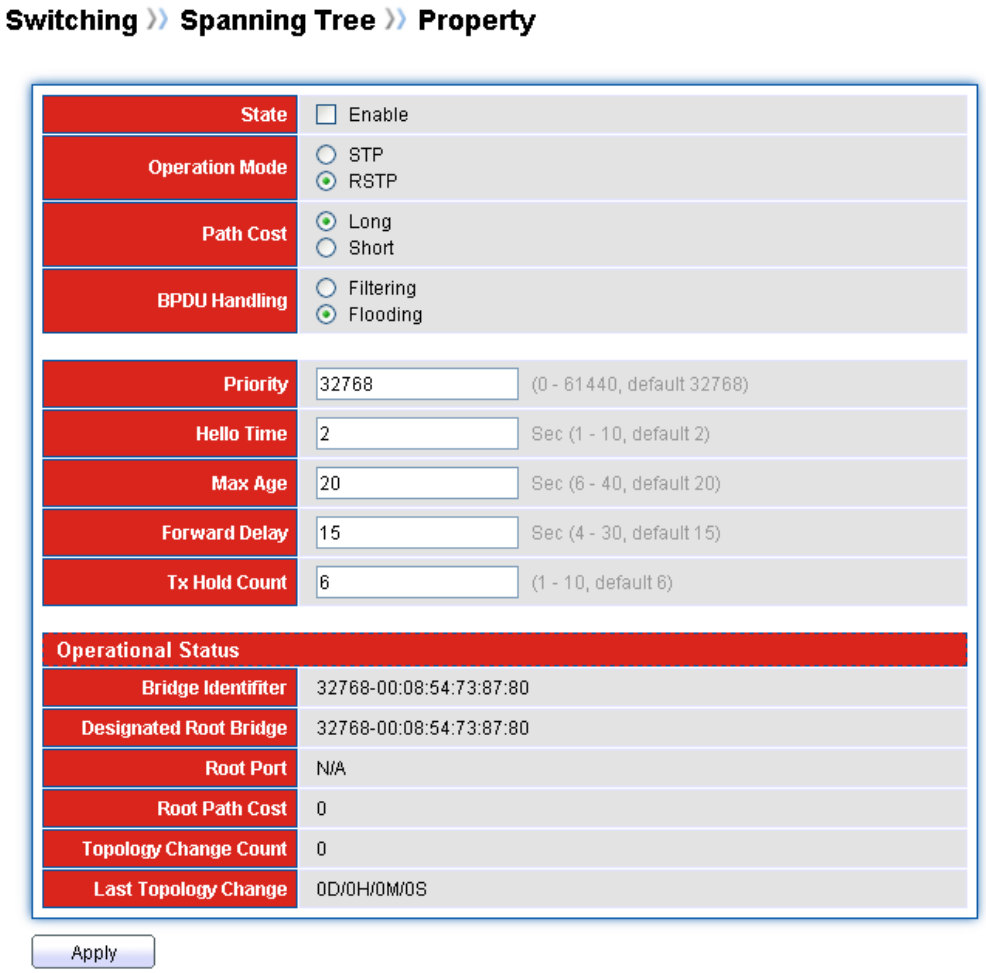
3.4.8.1 Property

Function name:

Switching>>Spanning Tree>>Properties

Function description:

Configure and display STP property configuration.



Parameter description:	
State	Check Enable to activate the settings in this page.
Operation Mode	Set the operating mode of STP: **STP**: Enable the Spanning Tree (STP) operation. **RSTP**: Enable the Rapid Spanning Tree (RSTP) operation
Path Cost	**Specify the path cost method.** **Long:** Specifies that the default port path costs are within the range: 1~200,000,000. **Short:** Specifies that the default port path costs are within

	the range: 1~65,535.
BPDU Handling	Specify the BPDU forward method when the STP is disabled. **Filtering:** Filter the BPDU when STP is disabled. **Flooding:** Flood the BPDU when STP is disabled.
Priority	Specify the bridge priority. The valid range is from 0 to 61440, and the value should be the multiple of 4096. It ensures the probability that the switch is selected as the root bridge, and the lower value has the higher priority for the switch to be selected as the root bridge of the topology.
Hello Time	Specify the STP hello time in second to broadcast its hello message to other bridge by Designated Ports. Its valid range is from 1 to 10 seconds.
Max Age	Specify the time interval in seconds for a switch to wait the configuration messages, without attempting to redefine its own configuration.
Forward Delay	Specify the STP forward delay time, which is the amount of time that a port remains in the Listening and Learning states before it enters the Forwarding state. Its valid range is from 4 to 10 seconds.
Tx Hold Count	Specify the tx-hold-count used to limit the maximum numbers of packets transmission per second. The valid range is from 1 to 10.
Operational Status	
Bridge Identifier	Bridge identifier of the switch.
Designated Root Identifier	Bridge identifier of the designated root bridge.
Root Port	Operational root port of the switch.
Root Path Cost	Operational root path cost.
Topology Change Count	Numbers of the topology changes.
Last Topology Change	The last time for the topology change.
Apply	Save the settings or changes to the switch.

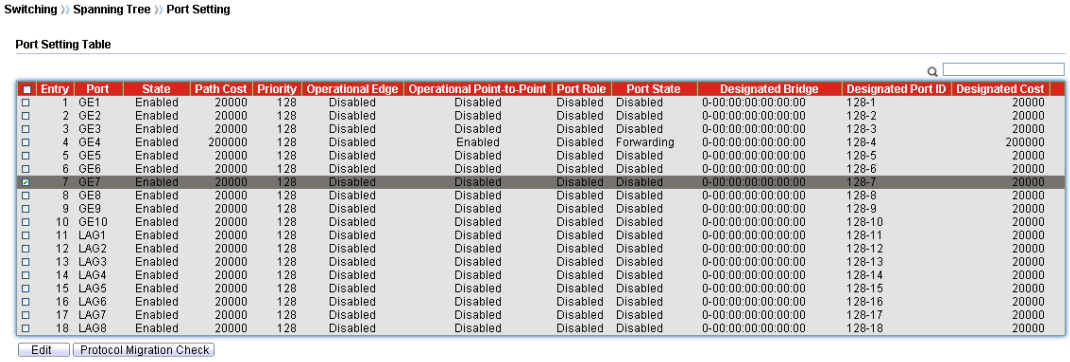
3.4.8.2 Port Setting

Function name:

Switching>>Spanning Tree>>Port Setting

Function description:

Configure and display STP port settings.

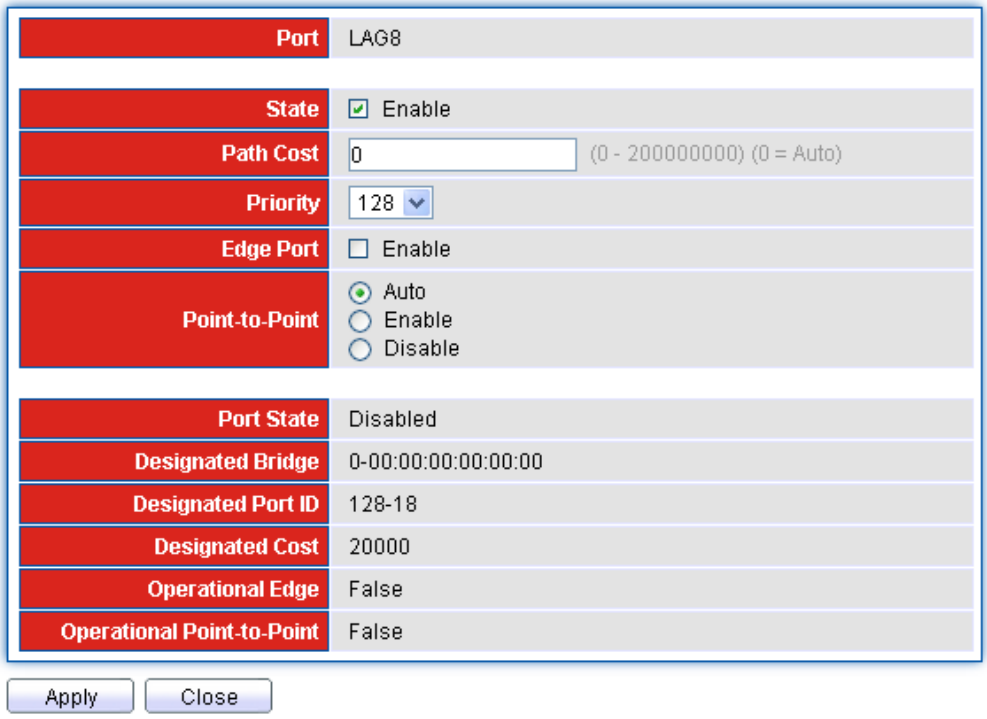


Parameter description:	
☐	Check ☐ to select a profile for querier.
Edit	Check ☐ of a profile and click **Edit** to modify settings.
Protocol Migration Check	Restart the Spanning Tree Protocol (STP) migration process (re-negotiate with its neighborhood) on the specific interface.
Port	Specify the interface ID or the list of interface IDs.
State	The operational state on the specified port.
Path Cost	STP path cost on the specified port.
Priority	STP priority on the specified port.
Operation Edge	The operational edge port on the specified port.
Operational Point-to-Point	The operational edge point-to-point status on the specified port.
Port Role	The current port role on the specified port. The possible values are: “Disabled”, “Root”, “Designated”, “Alternative”, and “Backup”.
Port State	The current port state on the specified port. The possible values are: “Disabled”, “Discarding”, “Learning”, and “Forwarding”.
Designated Bridge	The bridge ID of the designated bridge.
Designated Port ID	The designated port ID on the switch.
Designated Cost	The path cost of the designated port on the switch.

The following shows the modification page of port setting for spanning tree.

Switching ›› Spanning Tree ›› Port Setting

Edit Port Setting



Parameter description:	
State	Enable/Disable the STP on the specified port
Path Cost	Path cost is the cost of transmitting a frame on to a LAN through that port. It is recommended to assign this value according to the speed of the bridge. The slower the media, the higher the cost. Entering 0 means the switch will automatically assign a value.
Priority	Specify the STP priority on the specified port.
Edge Port	Set the edge port configuration: **Enable:** Check the box to force to true state (as link to a host) **Disable:** Uncheck the box to force to false state (as link to a host). In the edge mode, the interface would be put into the Forwarding state immediately upon link up. If the edge mode is enabled for the interface and there are BPDUs received on the interface, the loop might be occurred in the short time before the STP state change.
Point-to-Point	Specify the Point-to-Point port configuration: **Auto:** The state is depended on the duplex setting of the port. **Enable:** Click it to force to true state**.** **Disable:** Click it to force to false state.

Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.4.8.3 Statistics

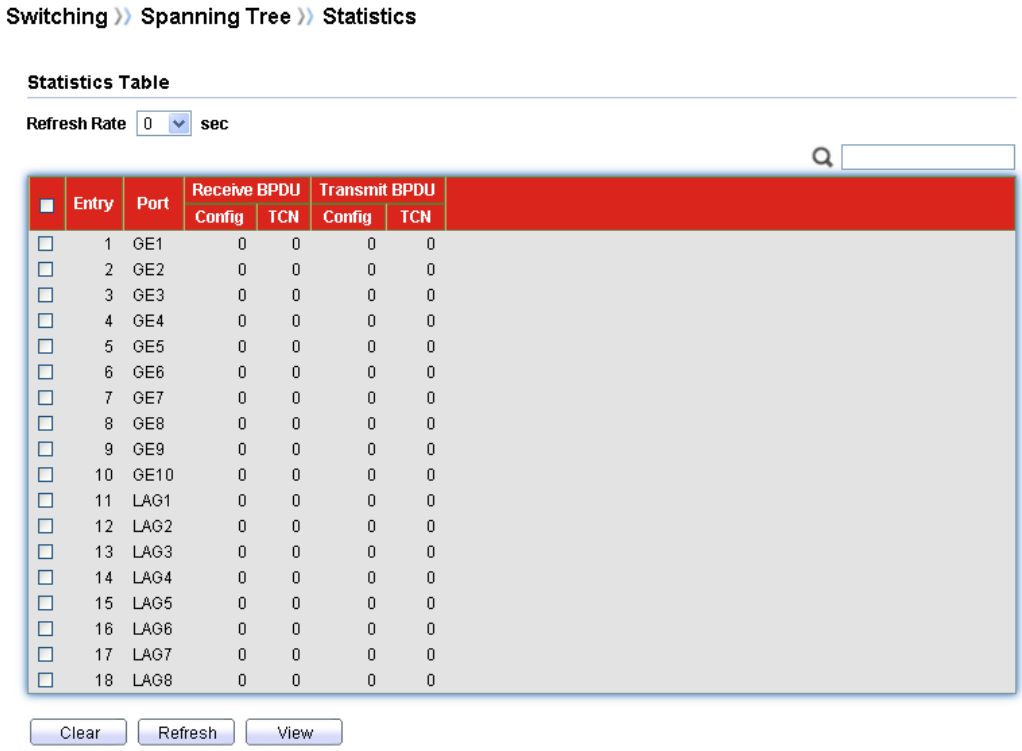
Function name:

Switching>>Spanning Tree>> Statistics

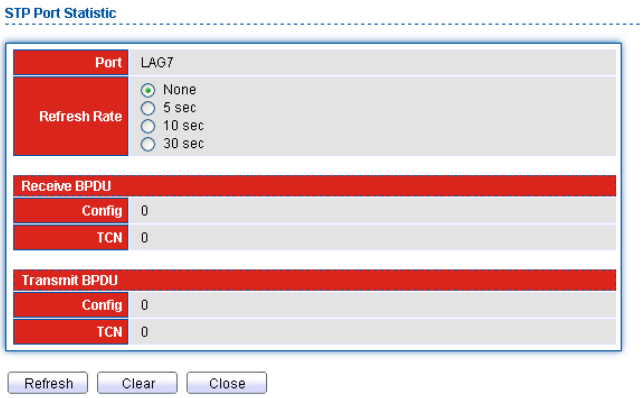
Function description:

To display STP statistics.

Bridge Protocol Data Units (BPDUs) are frames that contain information about the Spanning tree protocol (STP). Switches send BPDUs using a unique MAC address from its origin port and a multicast address as destination MAC (01:80:C2:00:00:00, or 01:00:0C:CC:CC:CD for Per VLAN Spanning Tree). For STP algorithms to function, the switches need to share information about themselves and their connections. What they share are bridge protocol data units (BPDUs). BPDUs are sent out as multicast frames to which only other layer 2 switches or bridges are listening. If any loops (multiple possible paths between switches) are found in the network topology, the switches will co-operate to disable a port or ports to ensure that there are no loops; that is, from one device to any other device in the layer 2 network, only one path can be taken.



Parameter description:	
Refresh Rate	The option to refresh the statistics automatically.
☐	Check ☐ to select VLAN profile for querier.
Port	It displays the port number.
Receive BPDU(Config)	The counts of the received CONFIG BPDU.

Receive BPDU(TCN)	The counts of the received TCN BPDU.
Transmit BPDU(Config)	The counts of the transmitted CONFIG BPDU.
Transmit BPDU(TCN)	The counts of the transmitted TCN BPDU
Clear	Remove the value displayed on this page.
Refresh	Refresh the page.
View	Display a pop up window with configurable rate page. 

3.5 MAC Address Table

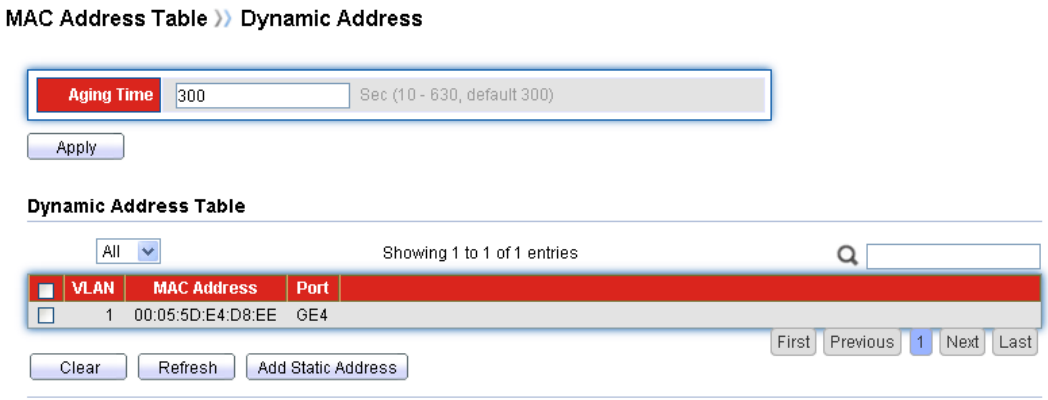
MAC Address Table is used to show dynamic MAC table and configure settings for static MAC entries.

3.5.1 Dynamic Address

Function name:

MAC Address Table>>Dynamic Address

Function description:



Parameter description:	
Aging Time	<10-630> The Dynamic MAC address aging out value.
Apply	Save the settings or changes to the switch.
Dynamic Address Table	
☐	Check ☐ to select VLAN profile for querier.

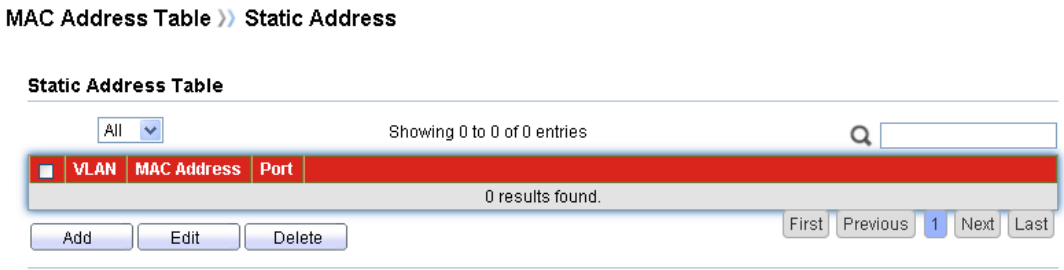
VLAN	This is the VLAN group to which the MAC address belongs. Select the VLAN to show or clear dynamic MAC entries. If not select any port, VLAN and MAC address, the whole dynamic MAC table will be displayed or cleared.
MAC Address	This field displays the MAC address that will be forwarded. Select the MAC address to show or clear dynamic MAC entries. If not select any port, VLAN and MAC address, the whole dynamic MAC table will be displayed or cleared.
Port	This field displays the port where the MAC address will be forwarded.
Clear	Click this button to remove any dynamically learned MAC address forwarding entries.
Refresh	Refresh the page.
Add Static Address	Click this button to add any port into the static MAC table.

3.5.2 Static Address

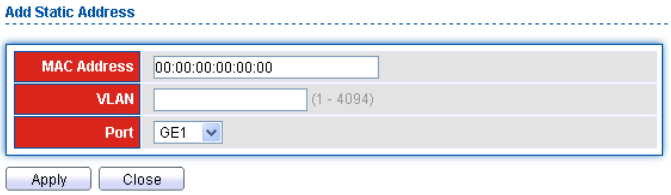
Function name:

MAC Address Table>>Static Address

Function description:



Parameter description:	
VLAN	This is the VLAN group to which the MAC address belongs. Select the VLAN to show or clear static MAC entries. If not select any port, VLAN and MAC address, the whole static MAC table will be displayed or cleared.
MAC Address	This field displays the MAC address that will be forwarded. Select the MAC address to show or clear static MAC entries. If not select any port, VLAN and MAC address, the whole static MAC table will be displayed or cleared.
Port	This field displays the port number defined for such VLAN.
Add	Click it to create a new profile.

	
Edit	Check ☐ to select VLAN profile and click this button to modify the settings.
Delete	Check ☐ to select VLAN profile and click this button to delete the profile.

3.6 Security

Security pages are used to configure settings for the switch security features.

3.6.1 Access Control

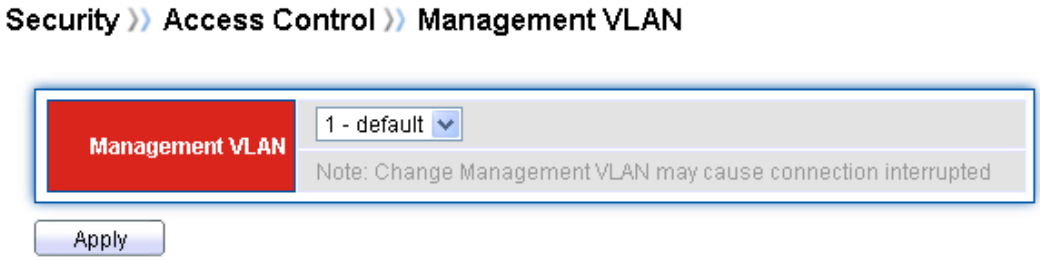
3.6.1.1 Access Control Management VLAN

Function name:

Security>>Access Control>>Management VLAN

Function description:

This page allow user to change Management VLAN connection.



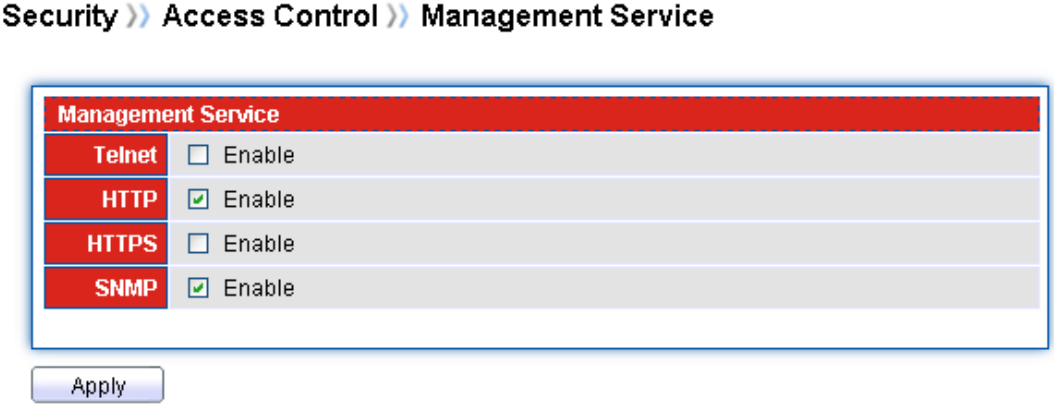
Parameter description:	
Management VLAN	Select management VLAN in option list. Management connection, such as http, https, SNMP etc.., has the same VLAN of management VLAN are allow connecting to device. Others will be dropped.
Apply	Save the settings or changes to the switch.

3.6.1.2 Access Control Management Service

Function name:

Security>>Access Control>>Management Service

Function description:



Parameter description:

Telnet	Telnet is the TCP/IP standard protocol for remote terminal service. TELNET allows a user at one site to interact with a remote timesharing system at another site as if the user's keyboard and display connected directly to the remote machine. Check **Enable** to access telnet service or uncheck not to access telnet service.
HTTP	HTTP is the acronym of HyperText Transfer Protocol. Check **Enable** to Enable HTTP service.
HTTPS	HTTPS is the acronym of Hypertext Transfer Protocol over Secure Socket Layer. Check **Enable** to Enable HTTPS service.
SNMP	Manage switch through SNMP**.** Check **Enable** to Enable SNMP service.
Apply	Save the settings or changes to the switch.

3.6.2 Protected Port

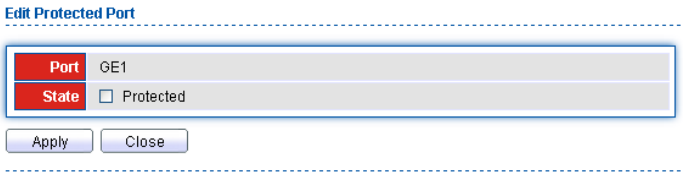
Function name:

Security>>Protected Port

Function description:

This page allows user to configure protected port setting to prevent the selected ports from communicate with each other.

Parameter description:	
Port List	Select the port to be protected.
State	Configure port protect type: ● **Unprotected:** Unprotected port can communicate with all ports. ● **Protected:** Prevent protected ports from communicate with each other.
☐	Check ☐ to select port profile.

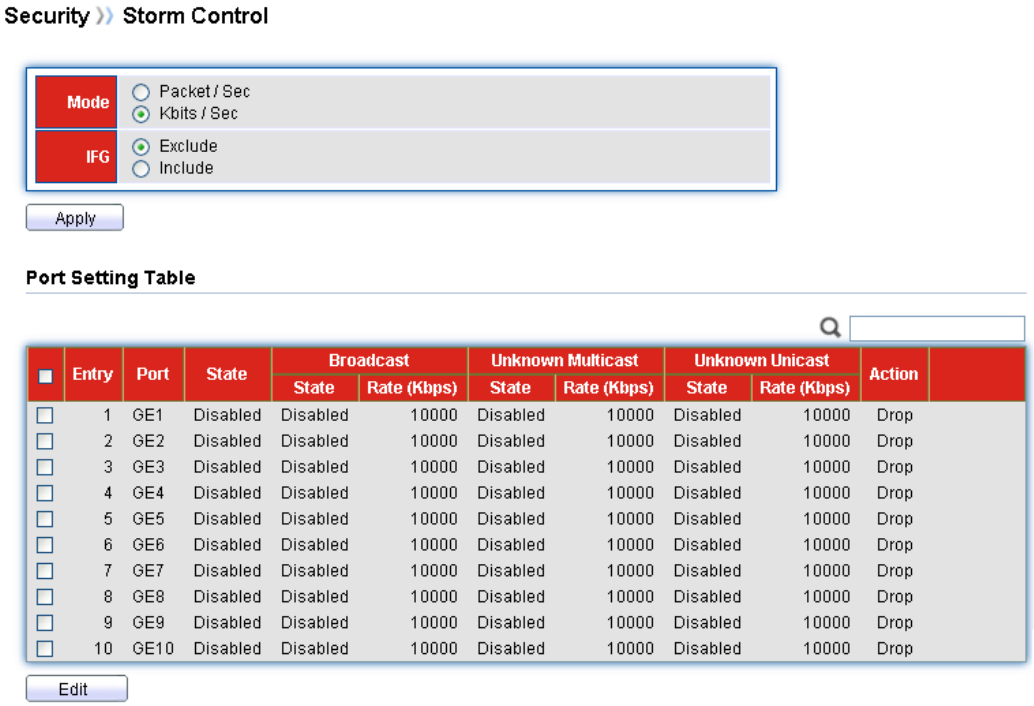
Edit	Check ☐ of a port profile and click **Edit** to modify settings. 

3.6.3 Storm Control

Function name:

Security>>Storm Control

Function description:



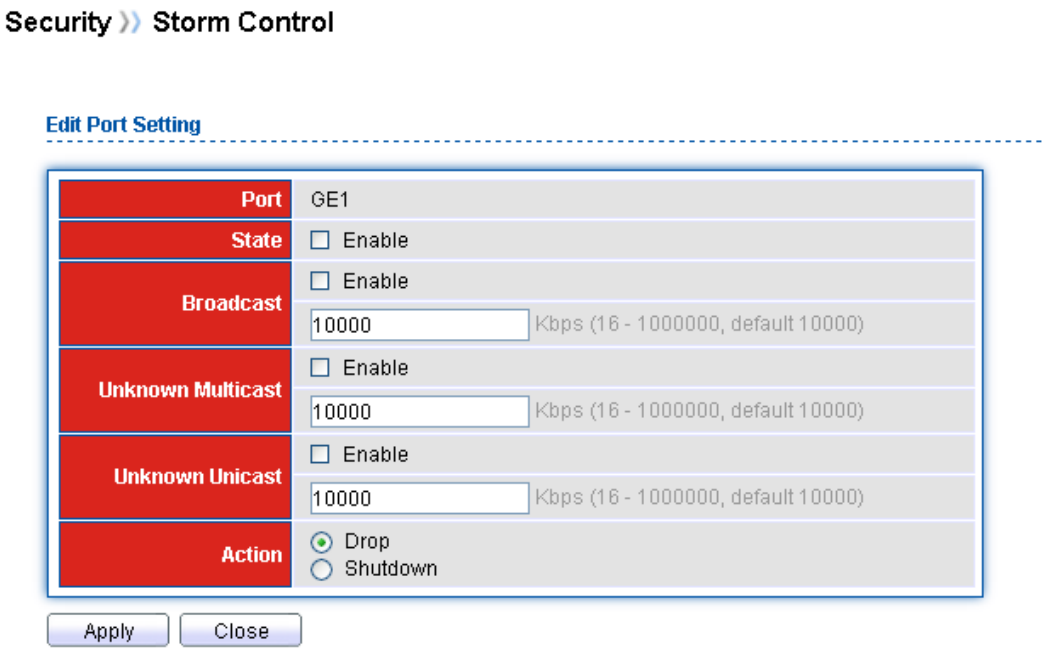
Entry	Port	State	Broadcast		Unknown Multicast		Unknown Unicast		Action
			State	Rate (Kbps)	State	Rate (Kbps)	State	Rate (Kbps)	
1	GE1	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
2	GE2	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
3	GE3	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
4	GE4	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
5	GE5	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
6	GE6	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
7	GE7	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
8	GE8	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
9	GE9	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
10	GE10	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop

Edit

Parameter description:	
Mode	Select the mode of storm control ● Packet/Sec: storm control rate calculates by packet-based. ● Kbits/Sec: storm control rate calculates by octet-based.
IFG	Select the rate calculates w/o preamble & IFG (20 bytes) ● Exclude: exclude preamble & IFG (20 bytes) when count ingress storm control rate. ● Include: include preamble & IFG (20 bytes) when count ingress storm control rate.
Apply	Save the settings or changes to the switch.
Port Setting Table	

☐	Check ☐ to select port profile.
Port	This field displays the port number.
State	Display the port setting profile enabled or disabled.
Broadcast	**State** – Display the storm control function enabled/disabled. **Rate(Kbps)** - Display the storm control rate for Broadcast packet.
Unknown Multicast	**State** – Display the storm control function enabled/disabled. **Rate(Kbps)** - Display the storm control rate for unknown multicast packet.
Unknown Unicast	**State** – Display the storm control function enabled/disabled. **Rate(Kbps)** - Display the storm control rate for unknown unicast packet.
Edit	Check ☐ of a port profile and click **Edit** to modify settings.

The following shows the modification page of port setting for storm control.



Parameter description:	
Port	This field displays the port number of physical port.
State	Determine the state of setting. **Enable**: Check the box to enable the storm control function for the selected Port. Uncheck the box to disable the storm control function for the selected Port.

Broadcast	Specify the storm control rate for Broadcast packet. Value of storm control rate, Unit: Kbps (Kbits per-second). The range is from 0 to 1000000.
Unknown Multicast	Specify the storm control rate for unknown multicast packet. Value of storm control rate, Unit: Kbps (Kbits per-second). The range is from 0 to 1000000.
Unknown Unicast	Specify the storm control rate for unknown unicast packet. Value of storm control rate, Unit: Kbps (Kbits per-second). The range is from 0 to 1000000.
Action	Select the state of setting. **Drop**: Packets exceed storm control rate will be dropped. **Shutdown**: Port exceeds storm control rate will be shutdown.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.6.4 DoS

A Denial of Service (DoS) attack is a hacker attempt to make a device unavailable to its users. DoS attacks saturate the device with external communication requests, so that it cannot respond to legitimate traffic. These attacks usually lead to a device CPU overload.

The DoS protection feature is a set of predefined rules that protect the network from malicious attacks. The DoS Security Suite Setting enables activating the security suite.

3.6.4.1 Property

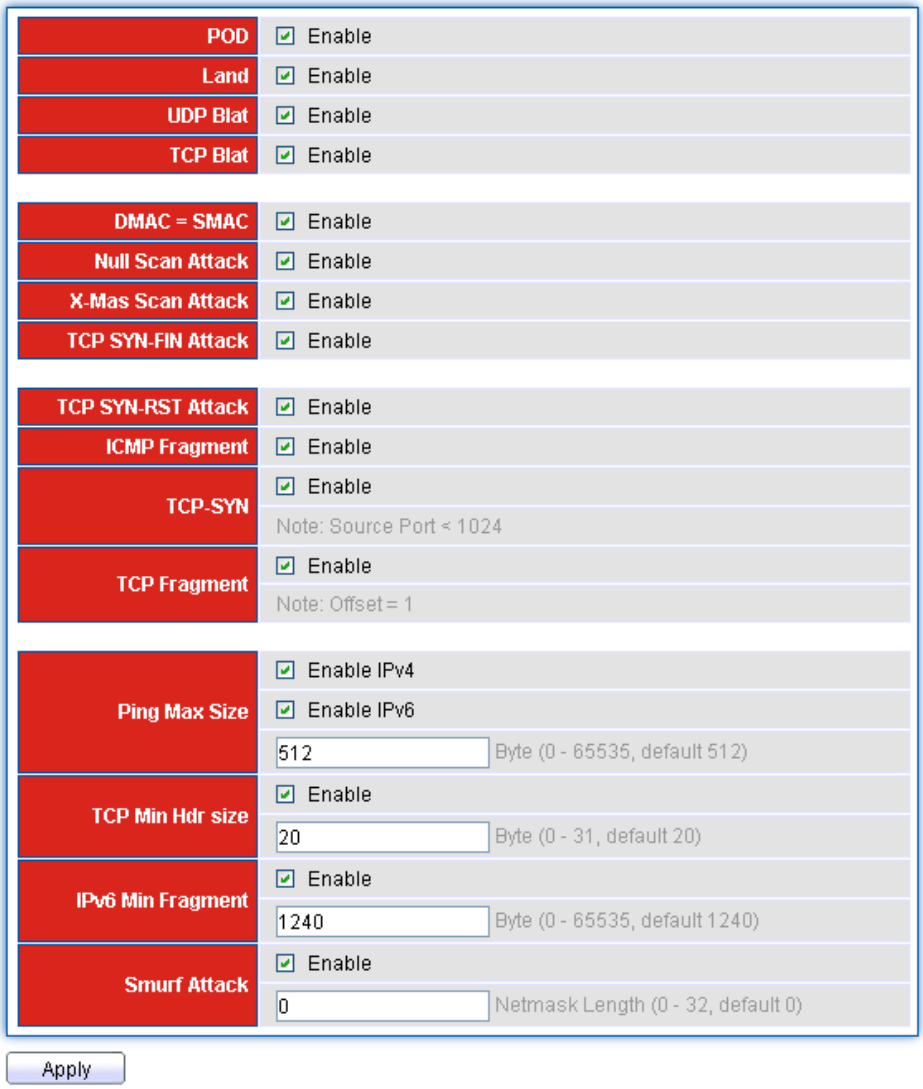
Function name:

Security>>DoS>>Property

Function description:

This page allows user to configure DoS setting to enable/disable DoS function for Global Setting.

Security ›› DoS ›› Property



Parameter description:	
POD	Avoids ping of death attack. Ping packets that length are larger than 65535 bytes. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
Land	Drops the packets if the source IP address is equal to the destination IP address. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
UDP Blat	Drops the packets if the UDP source port equals to the UDP destination port. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.

TCP Blat	Drops the packages if the TCP source port is equal to the TCP destination port. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
DMAC = SMAC	Drops the packets if the destination MAC address is equal to the source MAC address. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
Null Scan Attack	Drops the packets with NULL scan. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
X-Mas Scan Attack	Drops the packets if the sequence number is zero, and the FIN, URG and PSH bits are set. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
TCP SYN-FIN Attack	Drops the packets with SYN and FIN bits set. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
TCP SYN-RST Attack	Drops the packets with SYN and RST bits set. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
ICMP Fragments	Drops the fragmented ICMP packets. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
TCP-SYN	Drops SYN packets with sport less than 1024. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
TCP Fragments	Drops the TCP fragment packets with offset equals to one.
Ping Max Size	Determine the IPv4/IPv6 PING packet with the length. Specify the maximum size of the ICMPv4/ICMPv6 ping packets. The valid range is from 0 to 65535 bytes, and the default value is 512 bytes. **Enable IPv4**: Check the box to enable the item DoS setting for IPv4; uncheck the box to disable the item DoS setting. **Enable IPv6**: Check the box to enable the item DoS setting for IPv6; uncheck the box to disable the item DoS

	setting.
TCP Min Hdr Size	Checks the minimum TCP header and drops the TCP packets with the header smaller than the minimum size. The length range is from 0 to 31 bytes, and default length is 20 bytes. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
IPv6 Min Fragment	Checks the minimum size of IPv6 fragments, and drops the packets smaller than the minimum size. The valid range is from 0 to 65535 bytes, and default value is 1240 bytes. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
Smurf Attack	Avoid smurf attack. The length range of the netmask is from 0 to 323 bytes, and default length is 0 byte. **Enable**: Check the box to enable the item DoS setting; uncheck the box to disable the item DoS setting.
Apply	Save the settings or changes to the switch.

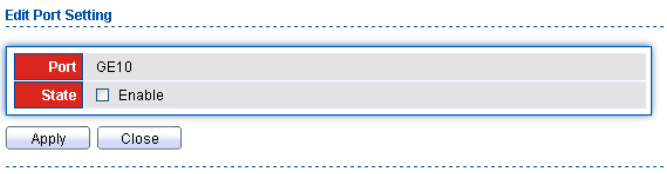
3.6.4.2 Port Setting

Function name:

Security>>DoS>>Port Setting

Function description:

To configure and display the state of DoS protection for interfaces.

Parameter description:	
☐	Check ☐ to select port profile.
Port	This field displays the port number.
State	Display the port setting is enabled or disabled.
Edit	Check ☐ of a port profile and click **Edit** to modify settings. 

3.7 QoS

QoS (Quality of Service) functions to provide different quality of service for various network applications and requirements and optimize the bandwidth resource distribution so as to provide a network service experience of a better quality.

3.7.1 General

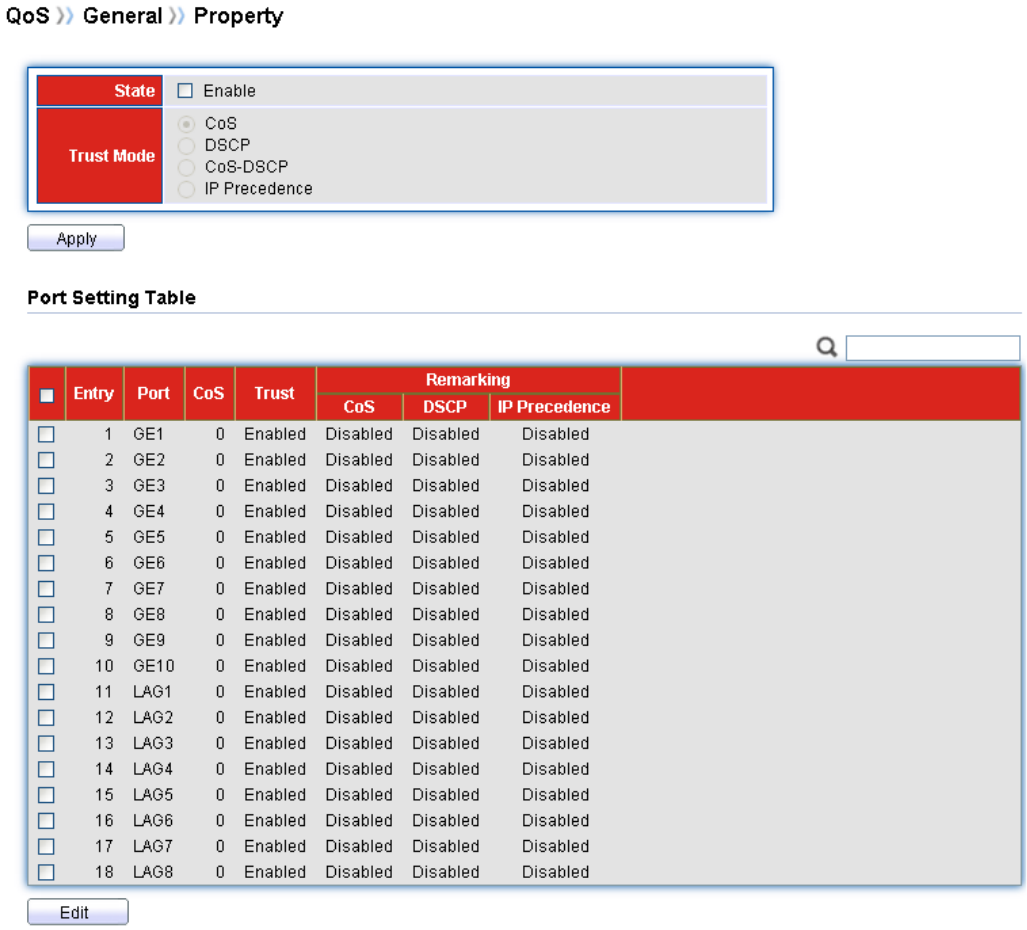
3.7.1.1 QoS Properties

Function name:

QoS>>General>>Property

Function description:

It is used to configure settings for both basic and advanced modes.

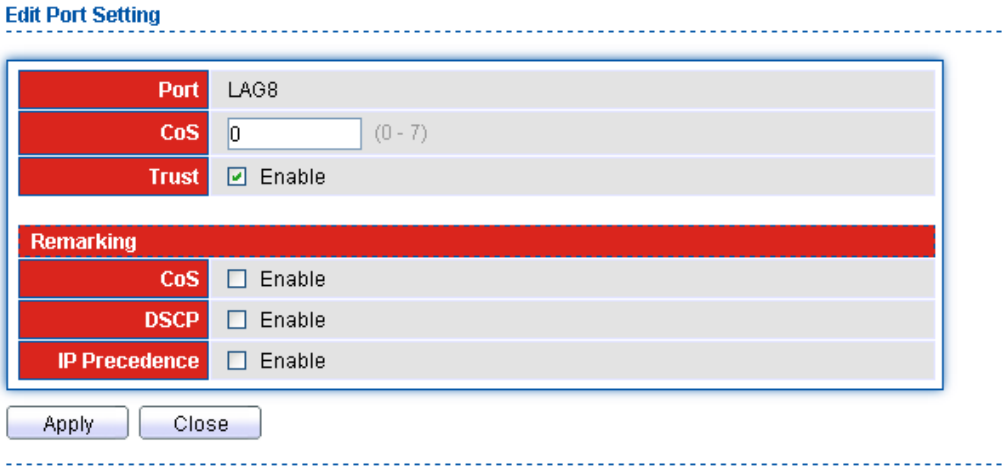


Parameter description:	
State	Check it to enable such function.
Trust Mode	Select the QoS operation mode. ● **CoS**: Traffic is mapped to queues based on the CoS field in the VLAN tag, or based on the per-port default CoS value if there is no VLAN tag on the incoming packet. ● **DSCP**: All IP traffic is mapped to queues based on the DSCP field in the IP header. If traffic is not IP traffic,

	it is mapped to the lowest priority queue. ● **CoS-DSCP**: All IP traffic is mapped to queues based on the DSCP field in the IP header. If traffic is not IP but has VLAN tag, mapped to queues based on the CoS value in the VLAN tag. ● **IP Precedence**: All IP traffic is mapped to queues based on the IP Precedence field in the IP header. If traffic is not IP traffic, it is mapped to the lowest priority queue.
Apply	Save the settings or changes to the switch.
Port Setting Table	
☐	Check ☐ to select port profile.
Edit	Check ☐ of a port profile and click **Edit** to modify settings.
Port	Display the name of the port.
CoS	Port default CoS priority value for the selected ports.
Trust	Port trust state. **Enable**: Traffic will follow trust mode in global setting. **Disable**: Traffic will always use best efforts.
Remarking (CoS)	Port CoS remarking admin state. **Enable**: CoS remarking is enabled. **Disable**: CoS remarking is disabled.
Remarking (DSCP)	Port DSCP remarking admin state. **Enable**: DSCP remarking is enabled. **Disable:** DSCP remarking is disabled.
Remarking (IP Precedence)	Port IP Precedence remarking admin state. **Enable**: IP Precedence remarking is enabled. **Disable**: IP Precedence remarking is disabled.

The following shows the modification page of port setting for storm control.

QoS ›› General ›› Property



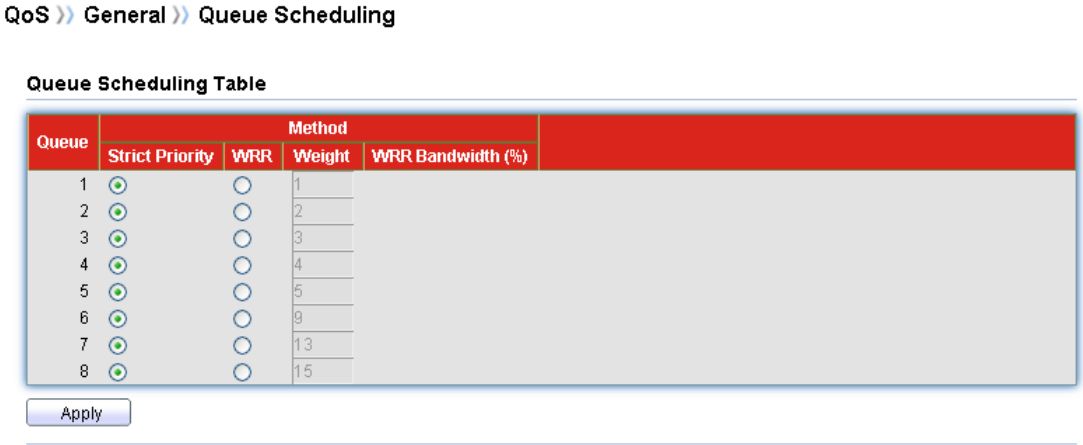
Parameter description:	
Port	Display the port number.
CoS	Set default CoS/802.1p priority value for the selected ports.
Trust Mode	Select the QoS operation mode. ● **CoS/802.1p**: Traffic is mapped to queues based on the CoS field in the VLAN tag, or based on the per-port default CoS value if there is no VLAN tag on the incoming packet. ● **DSCP**: All IP traffic is mapped to queues based on the DSCP field in the IP header. If traffic is not IP traffic, it is mapped to the lowest priority queue. ● **CoS/802.1p-DSCP**: All IP traffic is mapped to queues based on the DSCP field in the IP header. If traffic is not IP but has VLAN tag, mapped to queues based on the CoS value in the VLAN tag. ● **IP Precedence**: All IP traffic is mapped to queues based on the IP Precedence field in the IP header. If traffic is not IP traffic, it is mapped to the lowest priority queue. ● **None**: All traffic is mapped to the lowest priority queue.
Remarking	
CoS	Check Enable to enable CoS remark.
DSCP	Check Enable to enable DSCP remark.
IP Precedence	Check Enable to enable IP Precedence remark.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.7.1.2 Queue Scheduling

Function name:

QoS>>General>>Queue Scheduling

Function description:



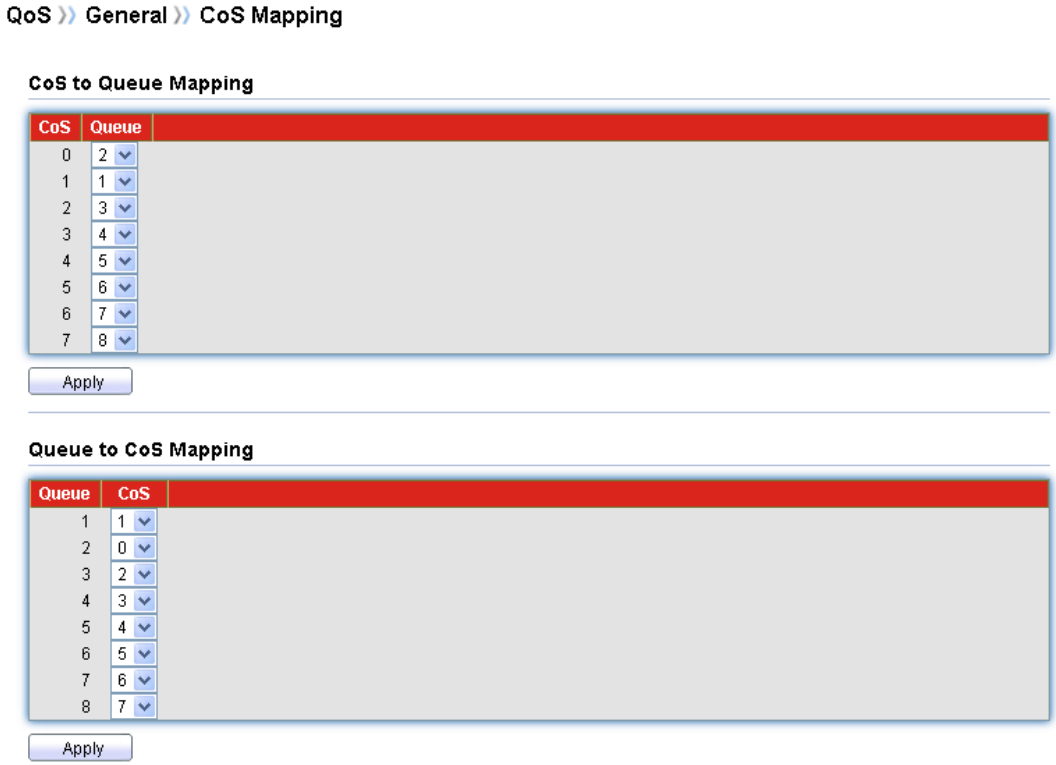
Parameter description:	
Queue	Queue ID to configure.
Strict Priority	Click it to set queue to strict priority type.
WRR	Click it to set queue to Weight round robin type.
Weight	If the queue type is WRR, set the queue weight for the queue.
Apply	Save the settings or changes to the switch.

3.7.1.3 CoS Mapping

Function name:

QoS>>General>>CoS Mapping

Function description:



Parameter description:	
CoS to Queue Mapping	
Class of service	Class of service value.
Queue	Select queue ID for the CoS value.
Queue of CoS Mapping	
Queue	Queue ID.
Class of service	Select CoS Value for the Queue ID.
Apply	Save the settings or changes to the switch.

3.7.1.4 DSCP Mapping

Function name:

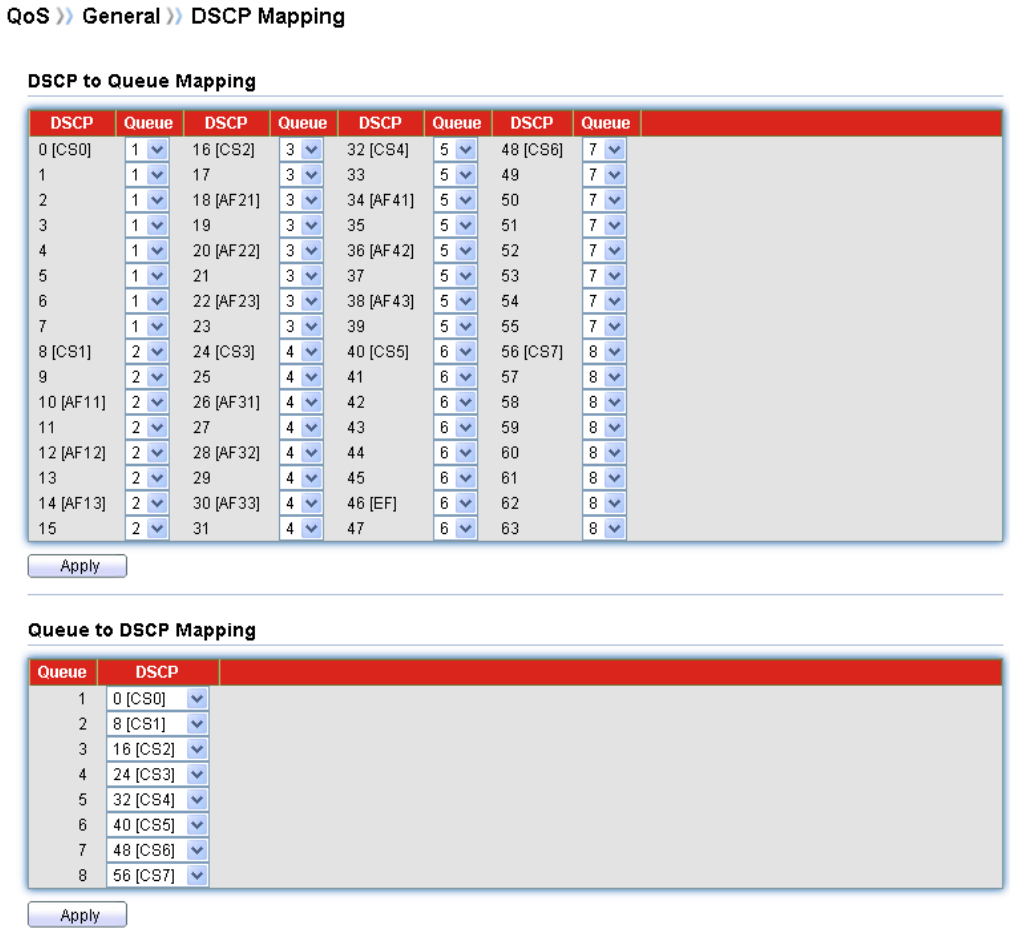
QoS>>General>>DSCP Mapping

Function description:

To display DSCP Mapping web page.

The DSCP to Queue table determines the egress queues of the incoming IP packets based on their DSCP values. The original VLAN Priority Tag (VPT) of the packet is unchanged.

Use the Queues to DSCP page to remark DSCP value for egress traffic from each queue.



Parameter description:	
DSCP to Queue Mapping	
DSCP	Select the DSCP value to mapping to the priority and drop precedence. The DSCP range is 0 to 63.
Queue	Select queue ID for the DSCP value.
Queue to DSCP Mapping	
Queue	Queue ID.
DSCP	Select DSCP Value for the Queue ID.
Apply	Save the settings or changes to the switch.

3.7.1.5 IP Precedence Mapping

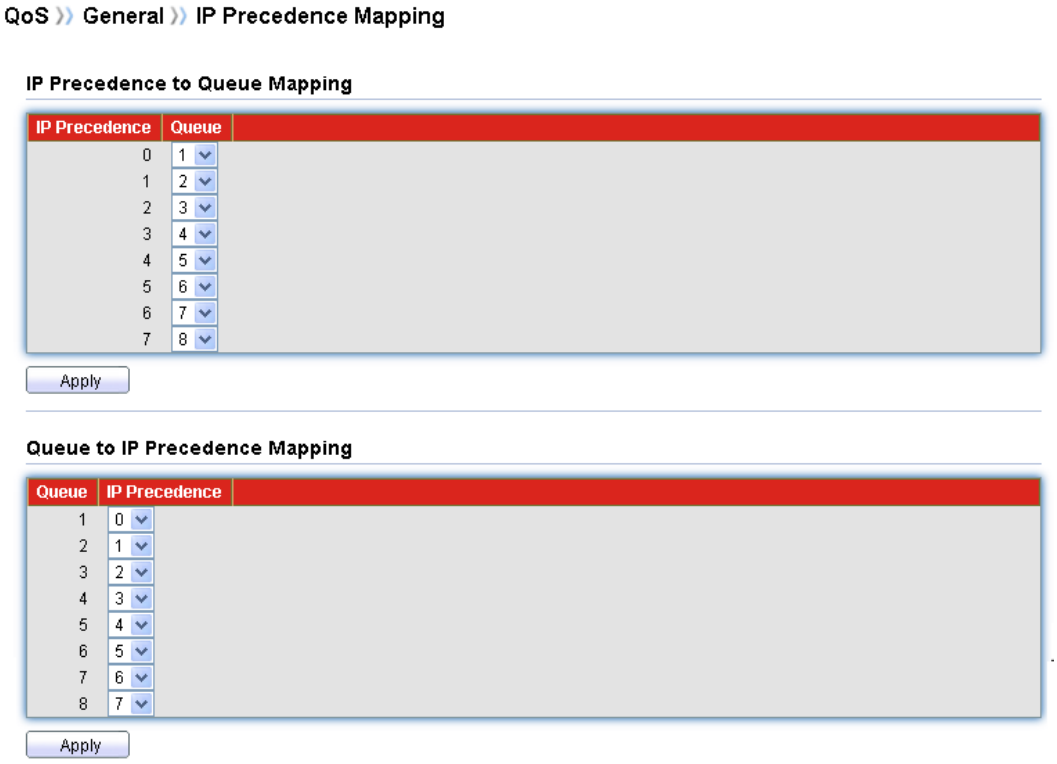
Function name:

QoS>>General>>IP Precedence Mapping

Function description:

To display IP Precedence Mapping web page.

This page allow user to configure IP Precedence to Queue Mapping and Queue to IP Precedence Mapping.



Parameter description:	
IP Precedence to Queue Mapping	
IP Precedence	IP Precedence value.
Queue	Select queue ID for the IP Precedence value.
Queue to IP Precedence Mapping	
Queue	Queue ID.
IP Precedence	Select IP Precedence value for the queue ID.
Apply	Save the settings or changes to the switch.

3.7.2 Rate Limit

Use the Rate Limit pages to define values that determine how much traffic the switch can receive and send on specific port or queue.

3.7.2.1 Ingress / Egress Port

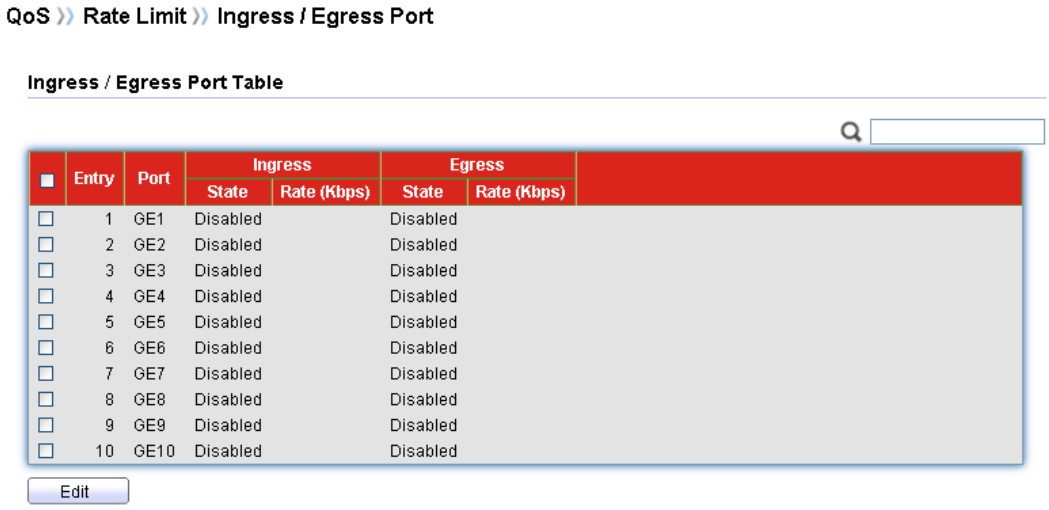
Function name:

QoS>>Rate Limit>>Ingress / Egress Port

Function description:

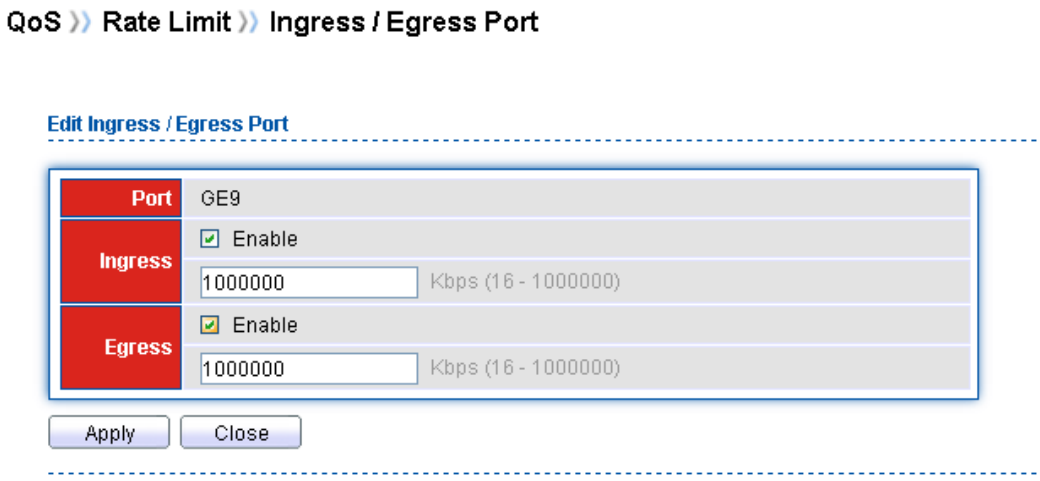
To display Ingress/Egress Port web page.

This page allow user to configure ingress port rate limit and egress port rate limit. The ingress rate limit is the number of bits per second that can be received from the ingress interface. Excess bandwidth above this limit is discarded.



Parameter description:	
☐	Check ☐ to select port profile.
Port	Display the port number.
Ingress	**State** – Display current status (enabled/disabled) of Ingress port setting. **Rate** – Display the value for Ingress port.
Egress	**State** – Display current status (enabled/disabled) of Egress port setting. **Rate** – Display the value for Egress port.
Edit	Check ☐ of a port profile and click **Edit** to modify settings.

The following shows the modification page of port setting for ingress/egress port.



Parameter description:	
Port	Display the port number.
Ingress	**Enable** - Enable ingress bandwidth control. Type the rate value,<0-1000000>,unit:16 Kbps.
Egress	**Enable** - Enable egress bandwidth control. Type the rate value,<0-1000000>,unit:16 Kbps.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.7.2.2 Egress Queue

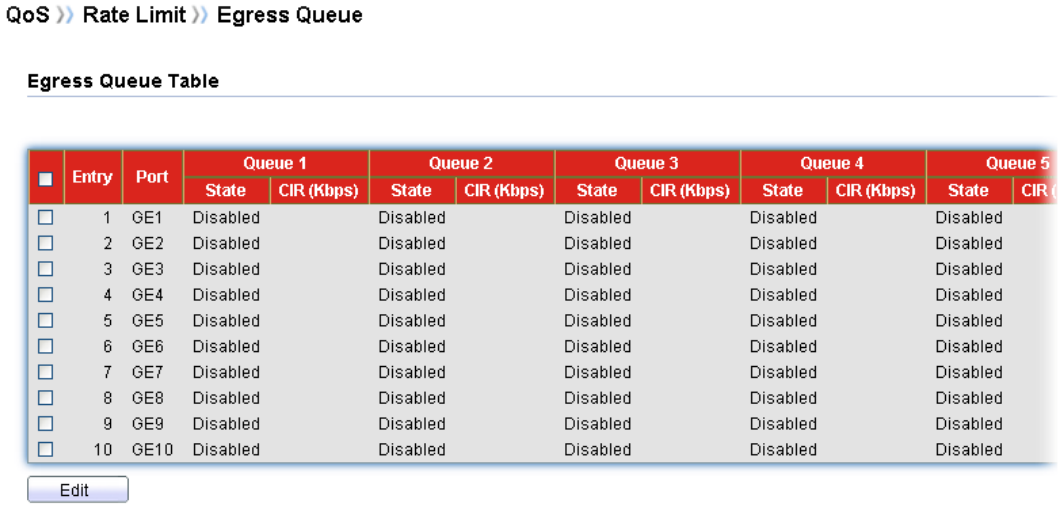
Function name:

QoS>>Rate Limit>>Egress Queue

Function description:

To display Egress Queue web page.

Egress rate limiting is performed by shaping the output load.



Parameter description:	
☐	Check ☐ to select port profile.
Queue 1 ~ 8	**State** – Display the egress bandwidth control is enabled/disabled. **CIR(Kbps)** – Display the Rate value.
Edit	Check ☐ of a port profile and click **Edit** to modify settings.

The following shows the modification page of port setting for egress queue.

Parameter description:	
Port	Display the port number.
Queue 1 ~ 8	**Enable** – Click it to enable egress bandwidth control. Type the Rate value,<0-1000000>,unit:16 Kbps.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.8 Management

3.8.1 LLDP

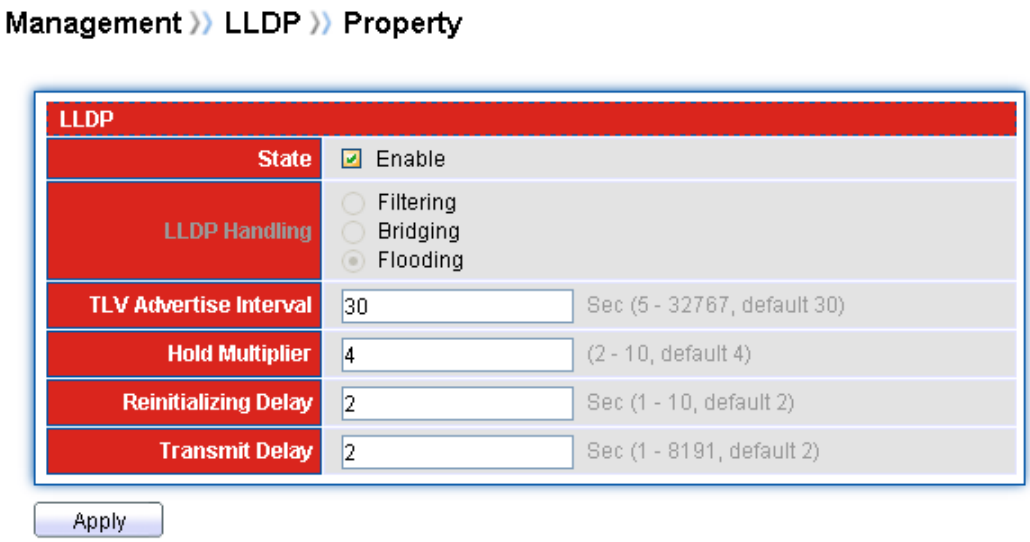
LLDP is a one-way protocol; there are no request/response sequences. Information is advertised by stations implementing the transmit function, and is received and processed by stations implementing the receive function. The LLDP category contains LLDP and LLDP-MED pages.

3.8.1.1 Property

Function name:

Management>>LLDP>>Property

Function description:



Parameter description:	
State	Check it to enable LLDP protocol on this switch.
LLDP Handling	It is enabled when State is unchecked. Select LLDP PDU handling action to be filtered, bridging or flooded when LLDP is globally disabled.
TLV Advertise Interval	Select the interval at which frames are transmitted. The default is 30 seconds, and the valid range is 5–32768seconds.
Hold Multiplier	Select the multiplier on the transmit interval to assign to TTL (range 2–10, default = 4).
Reinitializing Delay	Select the delay before a re-initialization (range 1–10 seconds, default = 2).
Transmit Delay	Select the delay after an LLDP frame is sent (range 1–8192 seconds, default = 3).
Apply	Save the settings or changes to the switch.

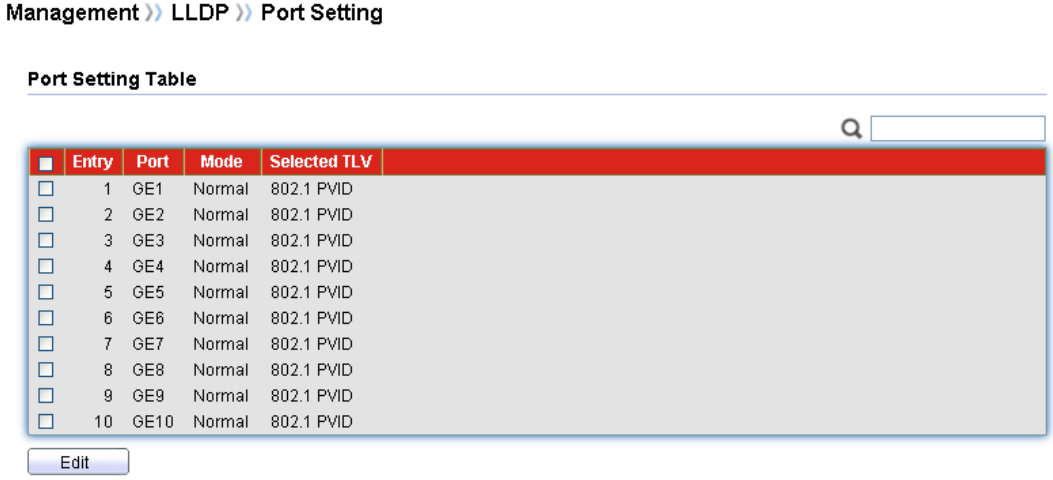
3.8.1.2 LLDP Port Setting

Function name:

Management>>LLDP>>Port Setting

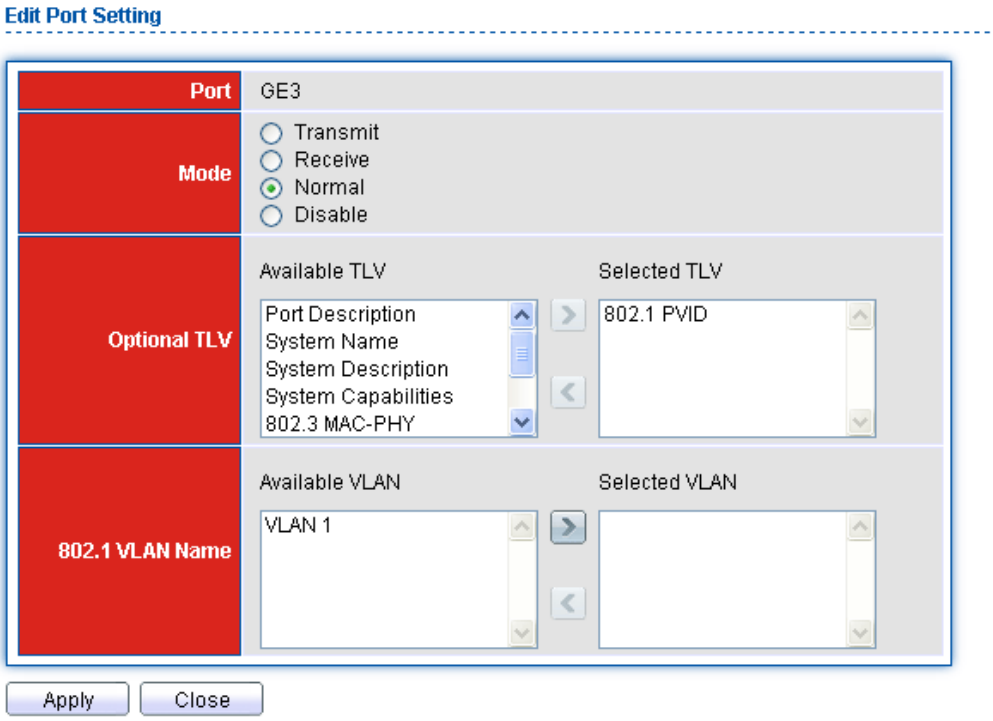
Function description:

Select specified port or all ports to configure LLDP state.



Parameter description:	
☐	Check ☐ to select port profile.
Edit	Check ☐ of a port profile and click **Edit** to modify settings.
Port	Select specified port or all ports to configure LLDP state.
Mode	Select the transmission state of LLDP port interface. **Disable**: Disable the transmission of LLDP PDUs. **RX Only**: Receive LLDP PDUs only. **TX Only**: Transmit LLDP PDUs only. **Normal**: Transmit and receive LLDP PDUs both.

The following shows the modification page of port setting for LLDP.



Parameter description:	
Port	Display the number of the port.
Mode	Select the transmission state of LLDP port interface. Transmit –Transmit LLDP PDUs only. Receive – Receive LLDP PDUs only. Normal – Transmit and receive LLDP PDUs both. Disable - Disable the transmission of LLDP PDUs.
Optional TLV	Within data communication protocols, optional information may be encoded as a type-length-value or TLV element inside a protocol. TLV is also known as tag-length value. The type and length are fixed in size (typically 1-4 bytes), and the value field is of variable size. Select the LLDP optional TLVs to be carried (multiple selection is allowed). ● Port Description ● System Name ● System Description ● System Capability ● 802.3 MAC-PHY ● 802.3 Link Aggregation ● 802.3 Maximum Frame Size

	● Management IP Address ● 802.1 PVID
802.1 VLAN Name	Select the VLAN Name ID to be carried (multiple selection is allowed).
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

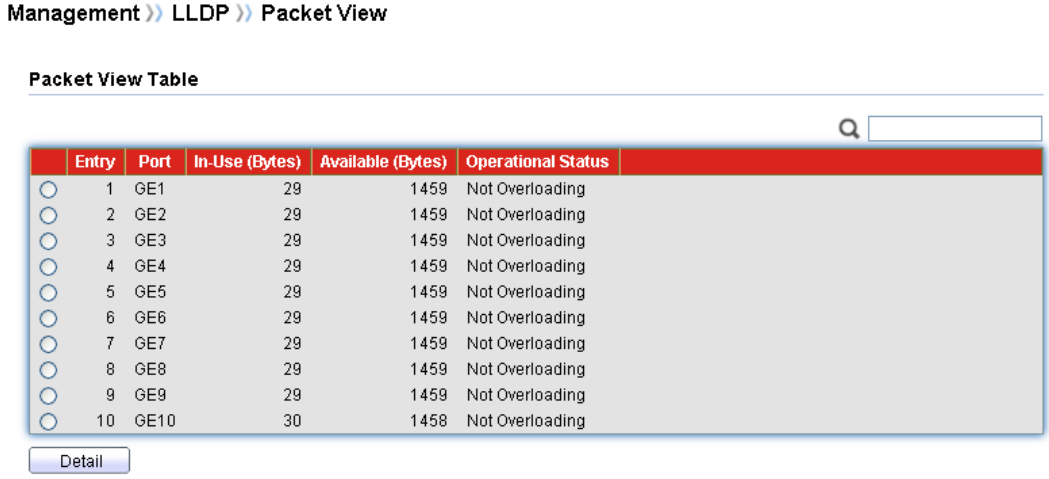
3.8.1.3 Packet View

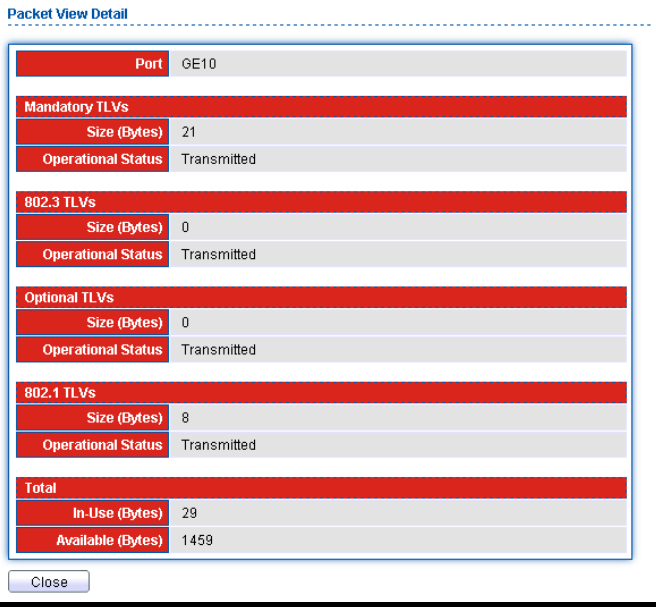
Function name:

Management>>LLDP>>Packet View

Function description:

To display LLDP Overloading.



Parameter description:	
◯	Click it to select port profile.
Port	Port Name.
In-Use (Bytes)	Total number of bytes of LLDP information in each packet.
Available (Bytes)	Total number of available bytes left for additional LLDP information in each packet.
Operational Status	Overloading or not.
Detail	Click ◯ of a port profile and click “Detail” to view selected port detailed information. 

	Mandatory TLVs -This field displays how many bytes used by mandatory TLVs. **802.3 TLVs** - This field displays how many bytes used by 802.3 TLVs. **Optional TLVs** - This field displays how many bytes used by optional TLVs. **802.1 TLVs** - This field displays how many bytes used by 802.1 TLVs. **Total** - This field displays the total in bytes.

3.8.1.4 Local Information

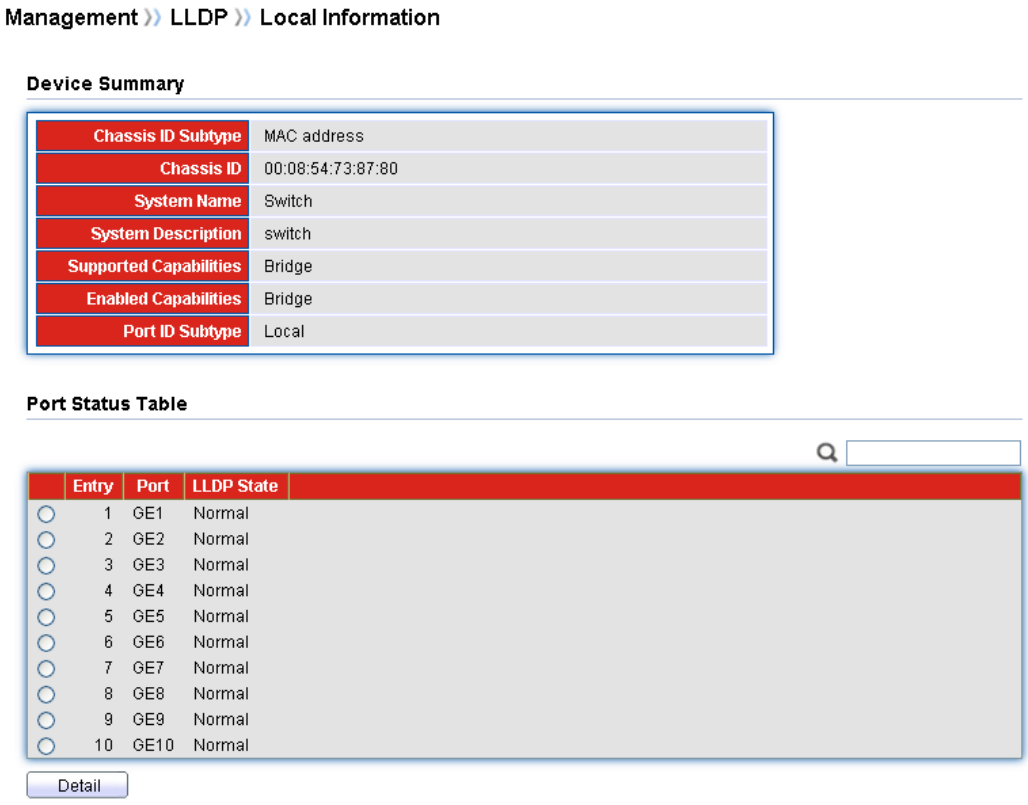
Function name:

Management>>LLDP>>Local Information

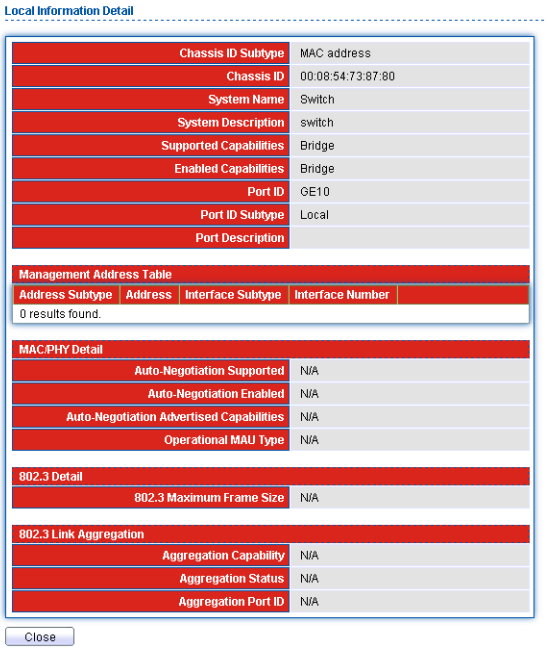
Function description:

To display LLDP Local Device.

Use the LLDP Local Information to view LLDP local device information.



Parameter description:	
Chassis ID Subtype	Display the type of chassis ID, such as the MAC address.
Chassis ID	Display Identifier of chassis. Where the chassis ID subtype is a MAC address, the MAC address of the switch is displayed.
System Name	Display name of switch.

System Description	Display description of switch.
Supported Capabilities	Primary functions of the device, such as Bridge, WLAN AP, or Router.
Enabled Capabilities	Primary enabled functions of the device.
Port ID Subtype	Display the type of the port identifier that is shown.
LLDP Status	Display LLDP Tx and Rx abilities.
○	Check it to select port profile.
Detail	Check ○ of a port profile and click “Detail” to view selected port detailed information of the selected port. 

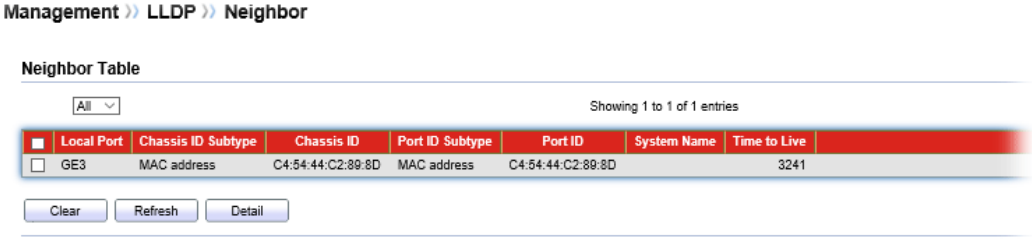
3.8.1.5 Neighbor

Function name:

Management>>LLDP>>Neighbor

Function description:

This page is used to view LLDP neighbor’s information.



Parameter description:	
☐	Check ☐ to select port profile.
Local Port	Number of the local port to which the neighbor is

	connected.
Chassis ID Subtype	Type of chassis ID (for example, MAC address).
Chassis ID	Identifier of the 802 LAN neighboring device's chassis.
Port ID Subtype	Type of the port identifier that is shown.
Port ID	Identifier of port.
System Name	Published name of the switch.
Time to Live	Time interval in seconds after which the information for this neighbor is deleted.
Clear	Click this button to remove information of the selected port.
Refresh	Refresh this page.
Detail	Click "Detail" to view selected neighbor detailed information.

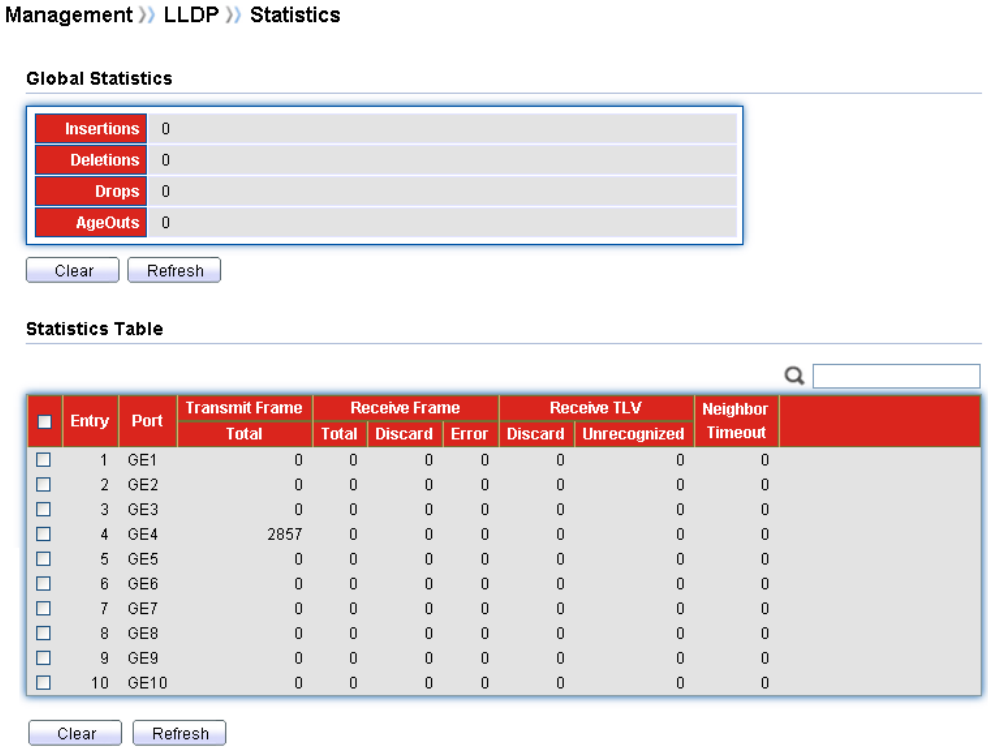
3.8.1.6 Statistics

Function name:

Management>>LLDP>>Statistics

Function description:

The Link Layer Discovery Protocol (LLDP) Statistics page displays summary and per-port information for LLDP frames transmitted and received on the switch.



Parameter description:	
Insertions	The number of times the complete set of information advertised by a particular MAC Service Access Point

	(MSAP) has been inserted into tables associated with the remote systems.
Deletions	The number of times the complete set of information advertised by MSAP has been deleted from tables associated with the remote systems.
Drops	The number of times the complete set of information advertised by MSAP could not be entered into tables associated with the remote systems because of insufficient resources.
AgeOuts	The number of times the complete set of information advertised by MSAP has been deleted from tables associated with the remote system because the information timeliness interval has expired.
Statistics Table	
Port	Interface or port number.
Transmit Frame Total	Number of LLDP frames transmitted on the corresponding port.
Receive Frame Total	Number of LLDP frames received by this LLDP agent on the corresponding port, while the LLDP agent is enabled.
Receive Frame Discard	Number of LLDP frames discarded for any reason by the LLDP agent on the corresponding port.
Receive Frame Error	Number of invalid LLDP frames received by the LLDP agent on the corresponding port, while the LLDP agent is enabled.
Receive TLV Discard	Number of TLVs of LLDP frames discarded for any reason by the LLDP agent on the corresponding port.
Receive TLV Unrecognized	Number of TLVs of LLDP frames that are unrecognized while the LLDP agent is enabled.
Neighbor Timeout	Number of age out LLDP frames.
☐	Check ☐ to select port profile.
Clear	Click this button to remove information of the selected port.
Refresh	Refresh the page.

3.8.2 SNMP

Simple Network Management Protocol (SNMP) is an "Internet-standard protocol for managing devices on IP networks". Devices that typically support SNMP include routers, switches, servers, workstations, printers, modem racks and more.

SNMP is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

SNMP is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF). It consists of a set of standards for network management, including an application layer protocol, a database schema, and a set of data objects.

An SNMP-managed network consists of three key components:

- Managed device
- Agent - software which runs on managed devices
- Network management station (NMS) - software which runs on the manager

A managed device is a network node that implements an SNMP interface that allows unidirectional (read-only) or bidirectional (read and write) access to node-specific information. Managed devices exchange node-specific information with the NMSs. Sometimes called network elements, the managed devices can be any type of device, including, but not limited to, routers, access servers, switches, bridges, hubs, IP telephones, IP video cameras, computer hosts, and printers.

An agent is a network-management software module that resides on a managed device. An agent has local knowledge of management information and translates that information to or from an SNMP-specific form.

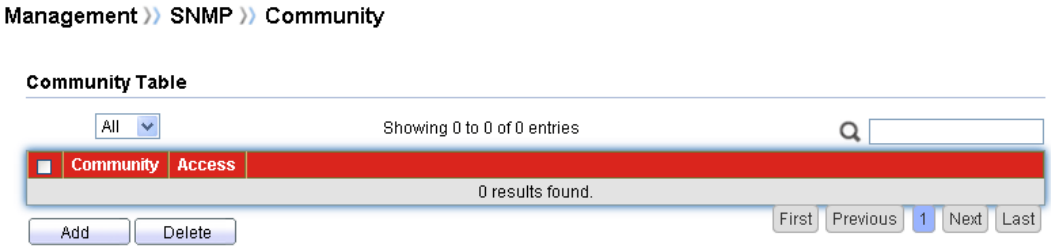
A network management station (NMS) executes applications that monitor and control managed devices. NMSs provide the bulk of the processing and memory resources required for network management. One or more NMSs may exist on any managed network.

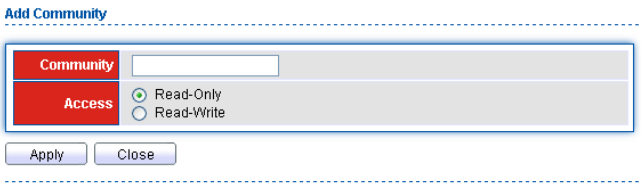
3.8.2.1 Community

Function name:

Management>>SNMP>>Community

Function description:



Parameter description:	
☐	Check ☐ to select community profile.
Community Name	Display the community string.
Access	Display the SNMP community type (Read-Only or Read-Write).
Add	Click **Add** to add any other community.  **Apply** - Save the settings or changes to the switch. **Close** - Close the page and return to previous page.
Delete	Click **Delete** to remove any selected community strings.

3.8.2.2 Trap Event

Function name:

Management>>SNMP>>Trap Event

Function description:

This page allow user to add or delete SNMP trap receiver IP address and community name.

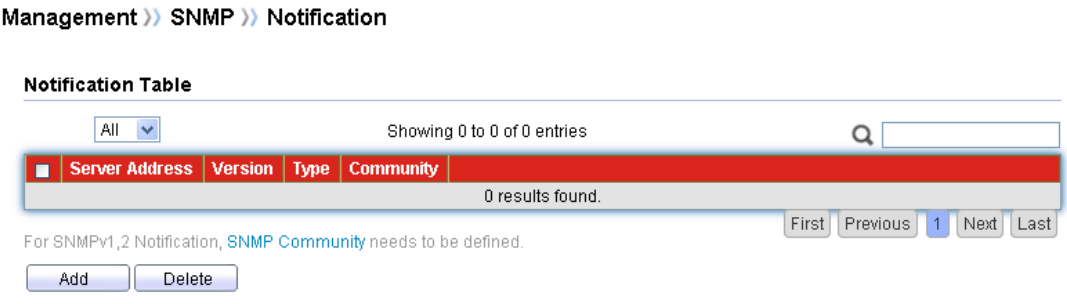
Parameter description:	
Authentication Failure	SNMP authentication failure trap, when community not match or user authentication password not match.
Link Up / Down	Port link up or down trap.
Cold Start	Device reboot configure by user trap.
Warm Start	Device reboot by power down trap.
Apply	Save the settings or changes to the switch.

3.8.2.3 Notification

Function name:

Management>>SNMP>> Notification

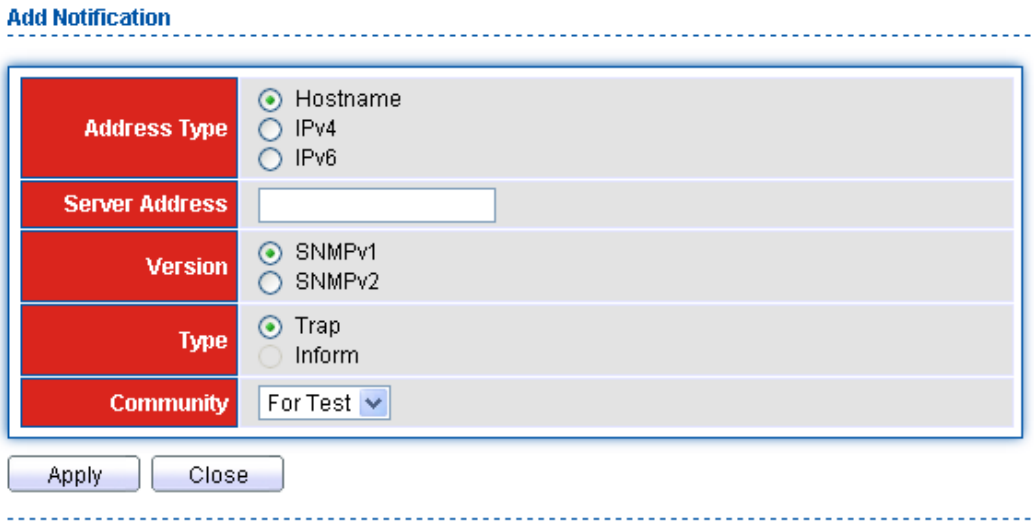
Function description:



Parameter description:	
☐	Check ☐ to select community profile.
Server Address	Display the IP address of SNMP server.
Version	Display the SNMP version (SNMPv1 or SNMPv2).
Type	Display the type (Trap or Inform) selected for the server.
Community	SNMP community name for notification.

Add	Click **Add** to add any other notification.
Delete	Click **Delete** to remove any selected community strings.

The following shows the setting page by clicking **Add**.



Parameter description:	
Address Type	Choose IPv4/IPv6/Hostname to specify IP address or the hostname of the SNMP trap recipients.
Server Address	Type the IP address of SNMP server based on the address type selected above.
Version	Specify SNMP notification version. **SNMPv1:** SNMP Version 1 notification. **SNMPv2:** SNMP Version 2 notification.
Type	Specify Notification Type. **Trap:** Send SNMP traps to the host. **Inform:** Send SNMP informs to the host.
Community	Choose one of the community profiles (created by Management>>SNMP>>Community).
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.9 Diagnostics

Use the Diagnostics pages to configure settings for the switch diagnostics feature or operating diagnostic utilities.

3.9.1 Logging

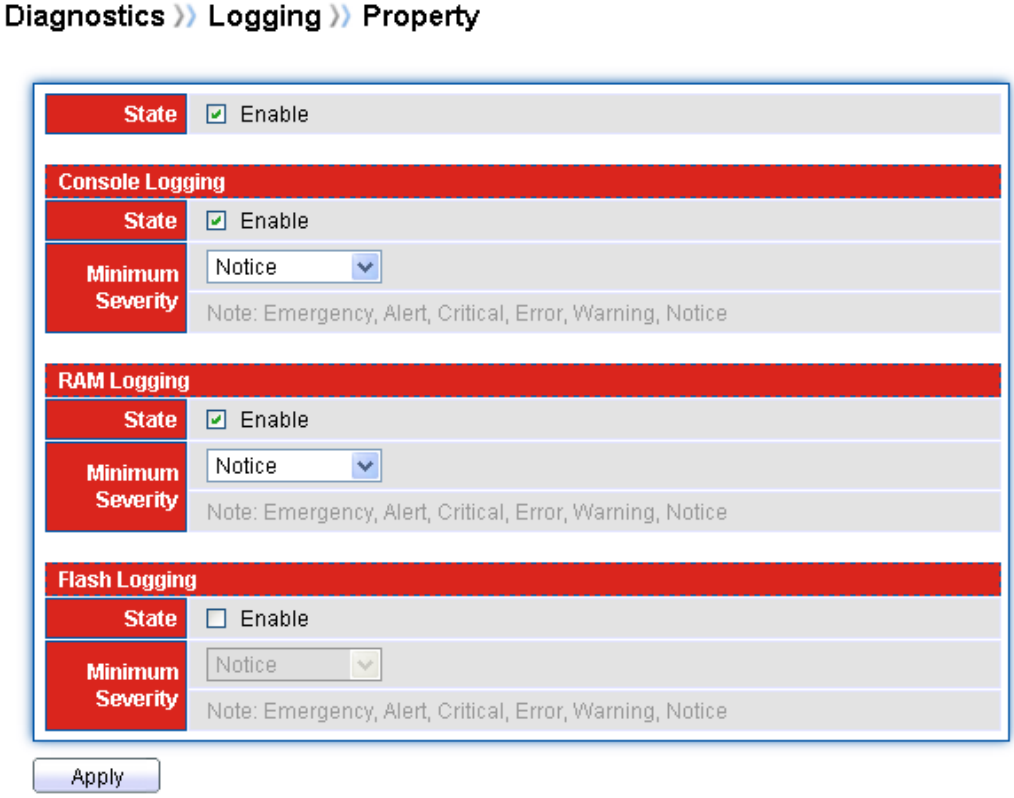
3.9.1.1 Property

Function name:

Diagnostics>>Logging>>Property

Function description:

To display the Logging Service web page.



Parameter description:	
State	Enable/Disable the global logging services. When the logging service is enabled, logging configuration of each destination rule can be individually configured. If the logging service is disabled, no messages will be sent to these destinations.
Minimum Severity	Select severity of log messages which will be stored.
Apply	Save the settings or changes to the switch.

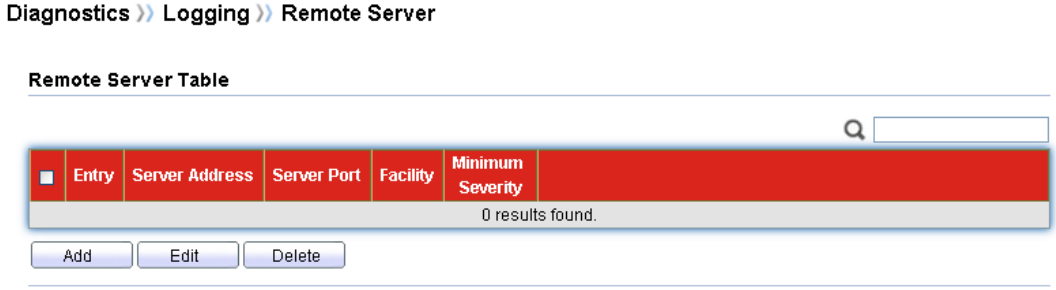
3.9.1.2 Remote Server

Function name:

Diagnostics>>Logging>>Remote Server

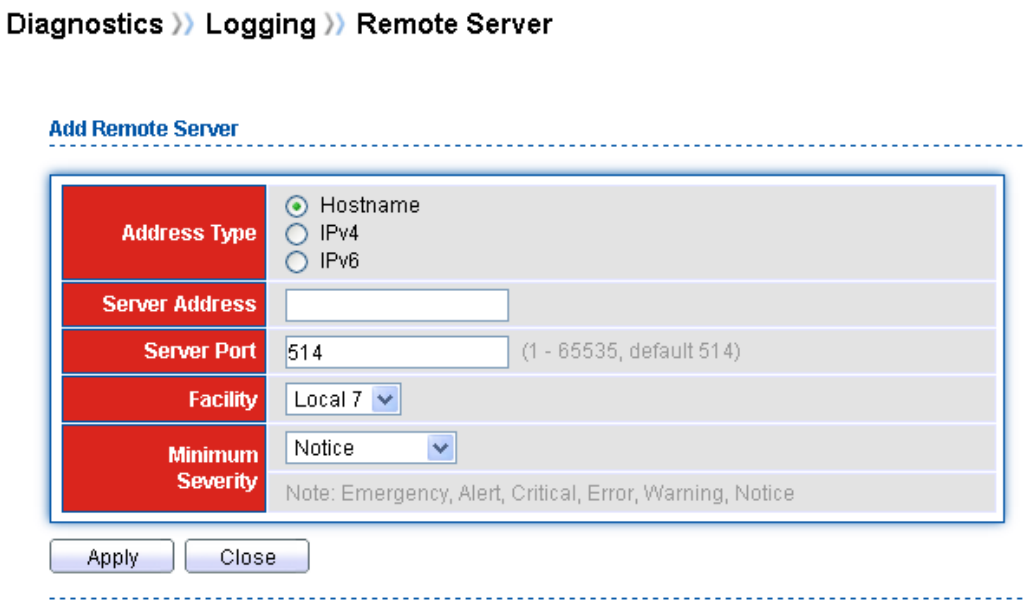
Function description:

This page allows user to configure remote logging server information. The configured result will be displayed on Remote Logging Setting Status table.



Parameter description:	
☐	Check ☐ to select community profile.
Server Address	Display the IP address of remote log server.
Server Port	Display the number of server port.
Facility	Display the facility of log messages which will be sent.
Minimum Severity	Display the severity of log messages which will be sent.
Apply	Save the settings or changes to the switch.
Add	Create a new server profile.
Edit	Check ☐ of a server profile and click **Edit** to modify settings.
Delete	Click **Delete** to remove any selected remote server.

The following shows the setting page by clicking **Add**.



Parameter description:

Address Type	Choose IPv4/IPv6/Hostname to specify IP address or the hostname of the SNMP trap recipients.
Server Address	Type the IP address of SNMP server based on the address type selected above.
Server Address	Type the IP address of remote log server.
Server Port	Enter a number between 1 and 65535 as the server port.
Facility	Select facility of log messages which will be sent. It can be one of the following values: local0, local1, local2, local3, local4, local5, local6, and local7.
Minimum Severity	Select severity of log messages which will be sent. Emergence: System is not usable. Alert: Immediate action is needed. Critical: System is in the critical condition. Error: System is in error condition. Warning: System warning has occurred. Notice: System is functioning properly, but a system notice has occurred. Informational: Device information. Debug: Provides detailed information about an event.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

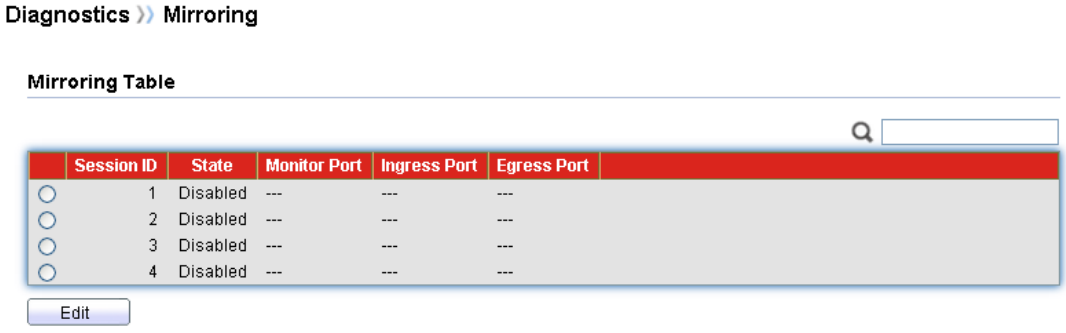
3.9.2 Mirroring

Function name:

Diagnostics >> Mirroring

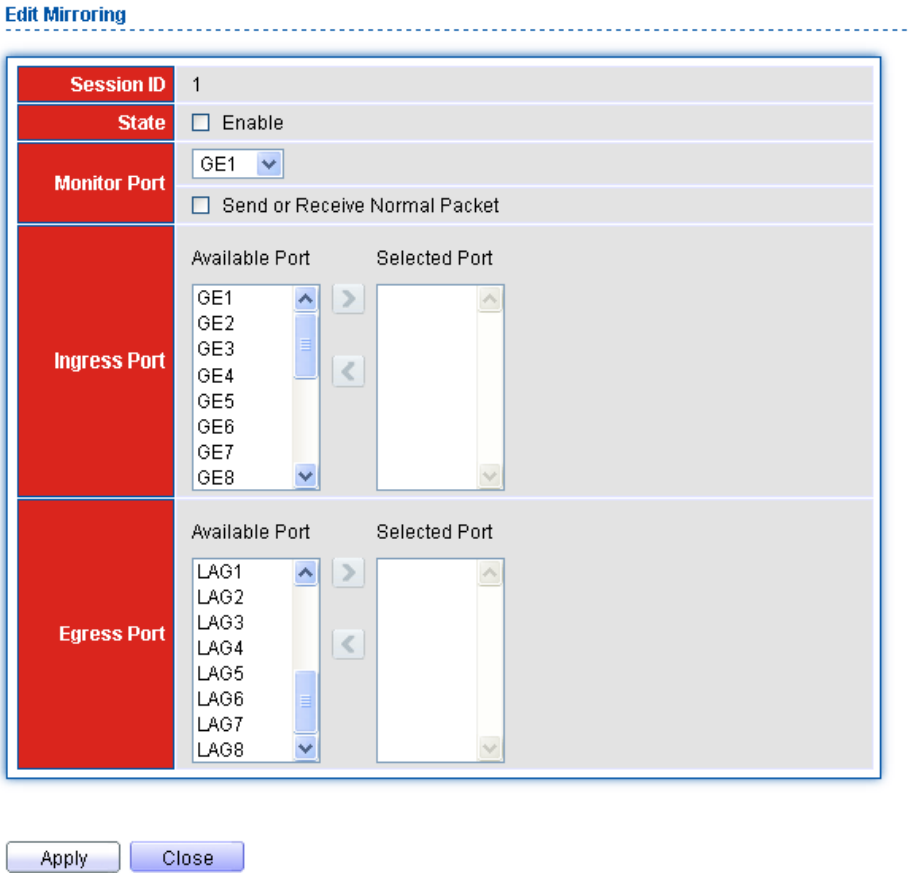
Function description:

To display the Port Mirroring web page.



Parameter description:	
◯	Click it to select port profile.
Session ID	Display mirror session ID.
State	Select mirror session state: port-base mirror or disable. **Enabled**: Enable port based mirror.

	Disabled: Disable mirror.
Monitor Port	Display mirror session monitor port.
Ingress Port	Display mirror session source RX ports.
Egress Port	Display mirror session source TX ports.
Edit	Click ○ of a port profile and click “Edit” to view selected port detailed information.



Parameter description:	
Session ID	Select mirror session ID.
State	Select mirror session state: port-base mirror or disable. **Enabled**: Enable port based mirror. **Disabled**: Disable mirror.
Monitor Port	Select mirror session monitor port, and select. Whether normal packet could be sent or received by monitor port.
Ingress Port	Select mirror session source RX ports.
Egress Port	Select mirror session source TX ports.

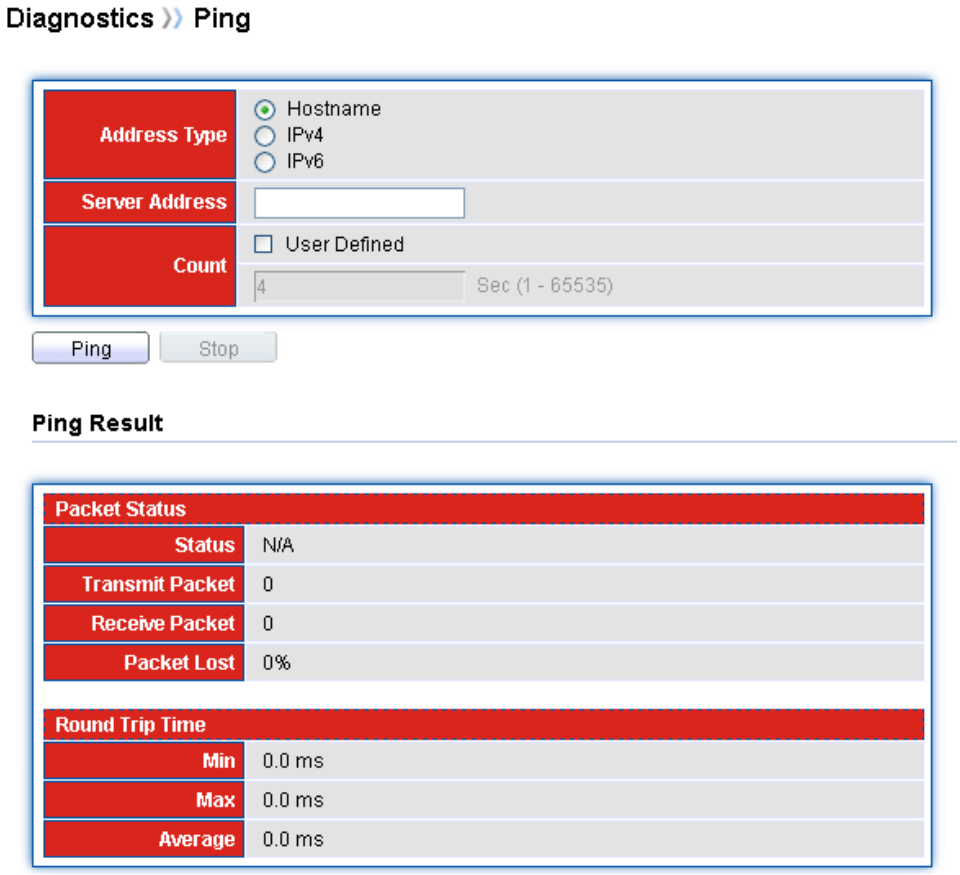
3.9.3 Ping

Function name:

Diagnostics >>Ping

Function description:

To display the Diagnostic Ping functionality web page.



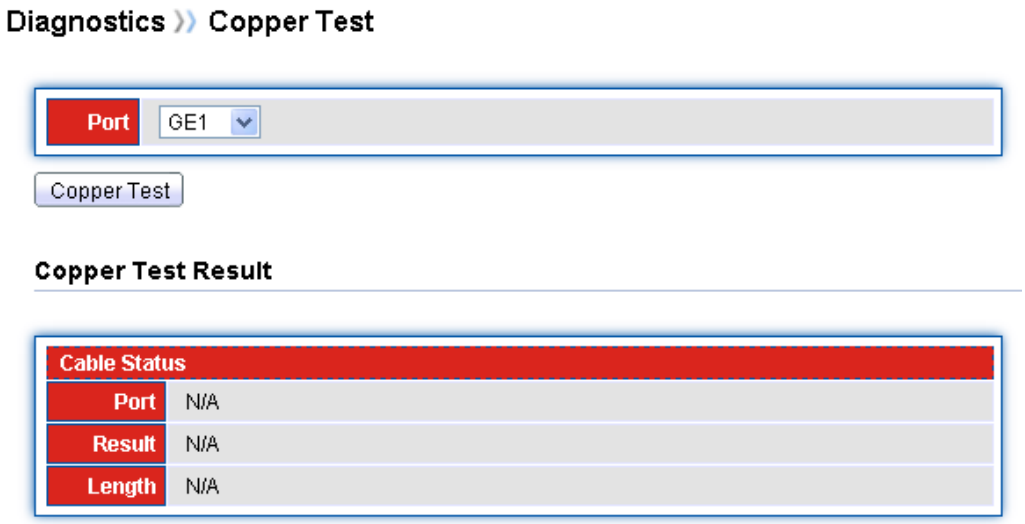
Parameter description:	
Address Type	Choose IPv4/IPv6/Hostname to specify IP address or the hostname of the SNMP trap recipients.
Server Address	Type the IP address of SNMP server based on the address type selected above.
Count	It means how many times to send ping request packet. Enter a number between 1 and 5 as the count and the default configuration is 4.
Ping	Perform ping action.
Stop	Terminate ping action.
Ping Result	After ping finished, results will be shown in this field.

3.9.4 Copper Test

Function name:

Diagnostics >>Copper Test

Function description:



Parameter description:	
Port	The Selected Port ID.
Copper Test	Click it to start the test.

3.10 Maintenance

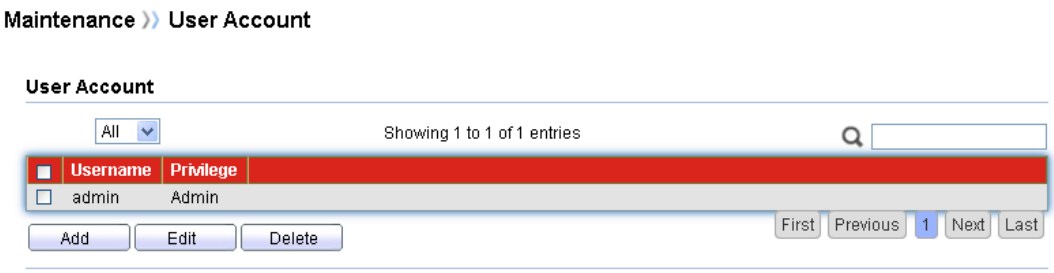
3.10.1 User Account

Function name:

Maintenance >>User Account

Function description:

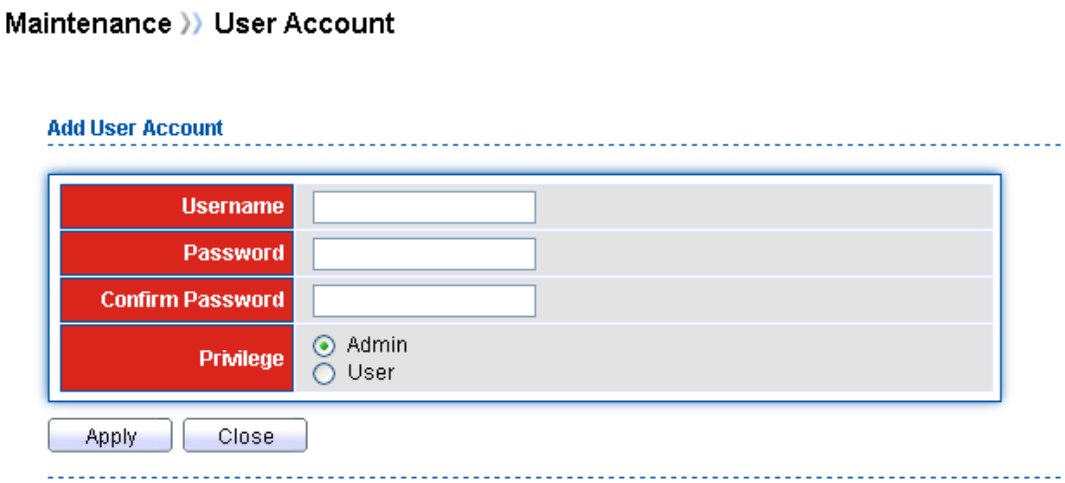
This page allows user to add or delete local user on switch database for authentication. The default user is “admin”.



Parameter description:	
☐	Check ☐ to select community profile.
Username	Display the username for new account.

Privilege	Display the privilege level for new account.
Add	Create a new user account profile.
Edit	Check ☐ of a user account profile and click **Edit** to modify settings.
Delete	Click **Delete** to remove any selected user account.

The following shows the setting page by clicking **Add**.



Parameter description:	
Username	Enter your username for new account.
Password	Enter the password for new account.
Confirm Password	Retype password to make sure the password is exactly you typed before in “Password” field.
Privilege	Select privilege level for new account. ● **Admin:** Allow to change switch settings. ● **User:** See switch settings only. Not allow to change it.
Apply	Save the settings or changes to the switch.
Close	Close the page and return to previous page.

3.10.2 Firmware Upgrade/Backup

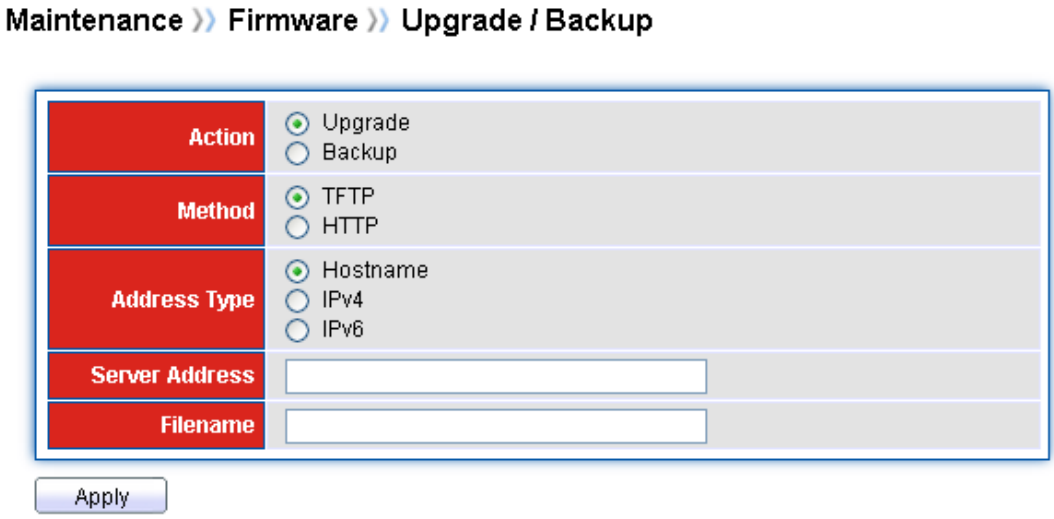
Function name:

Maintenance >>Firmware>>Upgrade/Backup

Function description:

This page allows user to upgrade / backup the firmware image or configuration file on the switch to remote TFTP server or host file system through HTTP protocol.

Upgrade/Backup files with TFTP Page



Upgrade/Backup files with HTTP Page

Parameter description:	
Action	Firmware operations **Upgrade**: Upgrade firmware from remote host to DUT. **Backup**: Backup firmware image from DUT to remote host.
Method	Select Upgrade/Backup method: **TFTP:** Using TFTP to upgrade/backup firmware. **HTTP:** Using WEB browser to upgrade/backup firmware.
Address Type	Specify TFTP server address type **Hostname**: Use domain name as server address. **IPv4**: Use IPv4 as server address **IPv6**: Use IPv6 as server address
Server Address	Type IP address of the TFTP server. If the TFTP upgrade method is selected, the IP address of the TFTP server must be assigned.
Filename	Firmware image or configuration file name on remote TFTP server. If the TFTP upgrade method is selected, the file name must be specified.

Apply	Save the settings or changes to the switch.

3.10.3 Configuration

3.10.3.1 Upgrade/Backup

Function name:

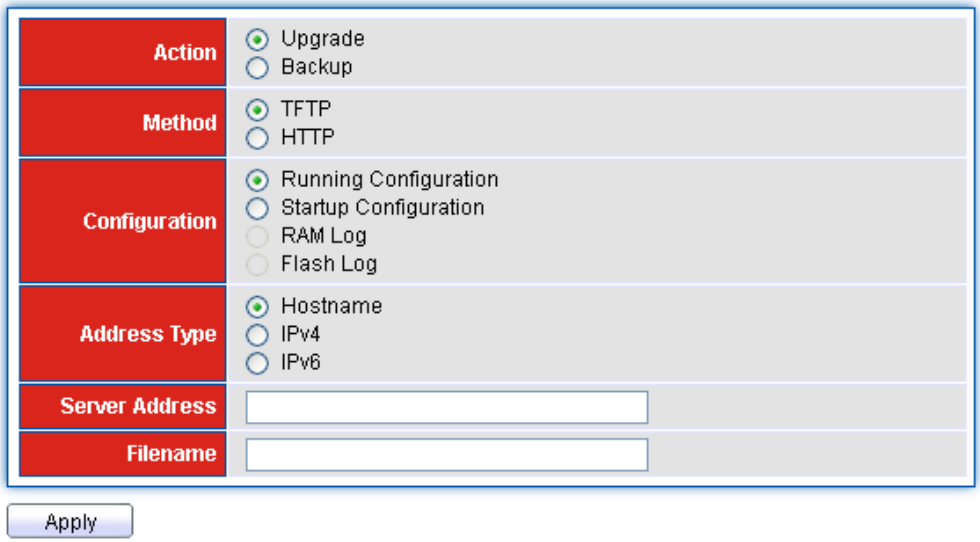
Maintenance >> Configuration >>Upgrade/Backup

Function description:

This page allows user to save either the running configuration or the startup configuration to the existing configuration file as the startup configuration.

Upgrade/Backup files through TFTP Page

Maintenance ›› Configuration ›› Upgrade / Backup



Upgrade/Backup files through HTTP Page

Maintenance ›› Configuration ›› Upgrade / Backup

Parameter description:	
Action	Configuration operations

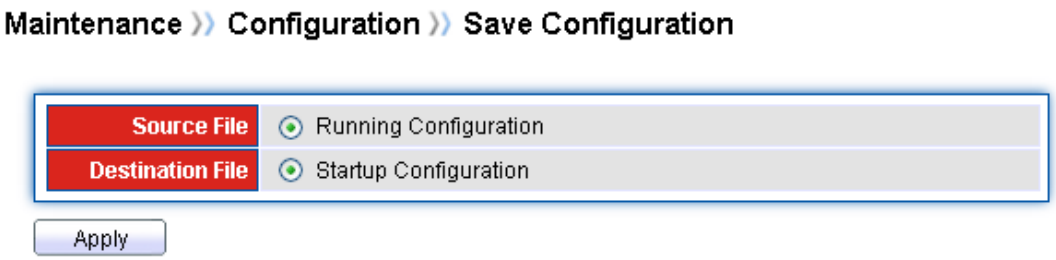
	Upgrade: Upgrade Configuration from remote host to DUT. **Backup**: Backup Configuration image from DUT to remote host.
Method	Select Upgrade/Backup method: **TFTP**: Using TFTP to upgrade/backup Configuration. **HTTP**: Using WEB browser to upgrade/backup Configuration.
Configuration	Select upgrade type: **Running Configuration**: Merge to current running configuration file. **Startup Configuration:** Replace startup configuration file. **RAM Log:** Backup log file stored in RAM. **Flash Log:** Backup log files store in Flash.
Address Type	Specify TFTP server address type **Hostname**: Use domain name as server address. **IPv4**: Use IPv4 as server address **IPv6**: Use IPv6 as server address
Server Address	IP address of the TFTP server. If the TFTP upgrade method is selected, the IP address of the TFTP server must be assigned.
Filename	Firmware image or configuration file name on remote TFTP server. If the TFTP upgrade method is selected, the file name must be specified. If the HTTP upgrade method is selected, the field allows you to select any file on host operating system.
Apply	Save the settings or changes to the switch.

3.10.3.2 Save Configuration

Function name:

Maintenance >> Configuration >>Save Configuration

Function description:



Parameter description:	
Source File	Select upgrade method.

	● **Running configuration**: Running configuration file.
Destination File	Select upgrade type. ● **Startup Configuration**: Startup configuration file
Apply	Click **Apply** to save the running or the startup configuration to the startup configuration file.

3.10.4 Factory Default / System Reboot

Function name:

Maintenance>>Factory Default

Maintenance>>System Reboot

Function description:

Click **Restore Factory Default** to return to factory default settings for Vigor switch or click **Reboot** to reboot Vigor router with current settings.

This page is left blank.

Chapter 4: Trouble Shooting

4.1 Resolving No Link Condition

The possible causes for a no link LED status are as follows:

- The attached device is not powered on
- The cable may not be the correct type or is faulty
- The installed building premise cable is faulty
- The port may be faulty

4.2 Q & A

Q1.How to configure the switch to support loop detection:

Answer:

Vigor switch support loop detection in default. If you want to disable loop detection, you can simply set STP --> STP Global Setting --> Global Setting --> BPDU Forward --> flooding to filter.

Q2. Where is Rapid Spanning Tree, Where can I find it?

Answer:

RSTP equals to Rapid Spanning Tree. Please follow the following direction to choose it: STP --> STP Global Setting --> Global Setting --> Force Version --> RSTP.