KGD-802-B
KGD-802-B-P

Industrial 8-Port Gigabit Ethernet Switches with 2 SFP Slots and 4 PoE PSE Ports & Multiple Redundant Ring Support

Firmware Rev1.064 up

MIB file Rev1.062 up

User's Manual

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IEC 61000-4-6
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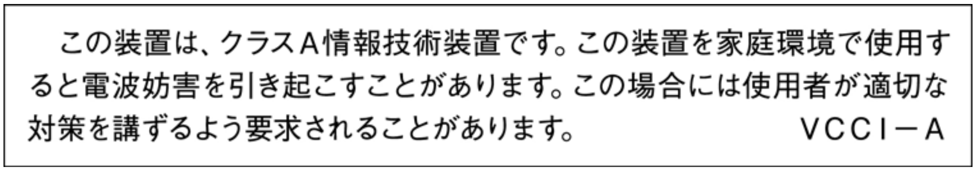

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1. Introduction

The KGD-802 is an industrial managed Gigabit Ethernet switch which is featured with the following switched ports:

- Six 10/100/1000Mbps Gigabit copper ports
- Two combo ports - 10/100/1000Mbps copper & 1000Base-X SFP

and the following advantages in a small footprint box:

Model Definition

KGD-802-P The switch configured with PoE function on Port 1 to Port 4

KGD-802 The switch configured with no PoE function

Plug and Play

The switch is shipped with factory default configuration which behaves like an unmanaged Gigabit switch for workgroup. It provides eight 10/100/1000Mbps copper ports for connections to Ethernet, Fast Ethernet, and Gigabit Ethernet devices. With the featured auto-negotiation function, the switch can detect and configure the connection speed and duplex automatically. The switch also provides auto MDI/MDI-X function, which can detect the connected cable and switch the transmission wire pair and receiving pair automatically. This auto-crossover function can simplify the type of network cables used.

Fiber Connectivity

Two mini-GBIC SFP ports can be installed with an optional SFP optical fiber transceiver to support two 1000Base-X fiber connections when needed.

Power over Ethernet

For PoE applications, four IEEE 802.3af-compliant PoE PSE ports are provided in four copper ports. Each PSE port can deliver +48VDC power to one PoE PD (Powered Device) via the connected Cat.5 cable.

Industrial Features

For industrial environment, the devices are designed with the following enhanced features exceeding that of commercial Ethernet switches:

- High and wide operating Temperature
- Power input interface: Industrial screw terminal block and DC power jack for external commercial power adapter as option
- Screw panel and DIN rail mounting support for industrial enclosure
- Industrial-rated Emission and Immunity performance

Web Management

The switch is embedded with an Http server which provides management functions for advanced network functions including Port Control, Quality of Service, and Virtual LAN functions. The management can be performed via Web browser based interface over TCP/IP network.

Quality of Service

For advanced application, the switch is featured with powerful Quality of Service (QoS) function which can classify the priority for received network frames based on the ingress port and frame contents. Furthermore, many service priority policies can be configured for egress operation in per-port basis.

Virtual LAN (VLAN)

For increasing Tagged VLAN applications, the switch is also featured with powerful VLAN function to fulfill the up-to-date VLAN requirements. The switch supports both port-based VLAN and tagged VLAN in per-port basis.

802.1x Authentication

IEEE 802.1X port-based network access control function provide a means of authenticating and authorizing devices attached to the switched port that has point-to-point connection characteristics, and of preventing access to that port in cases in which the authentication and authorization process fails.

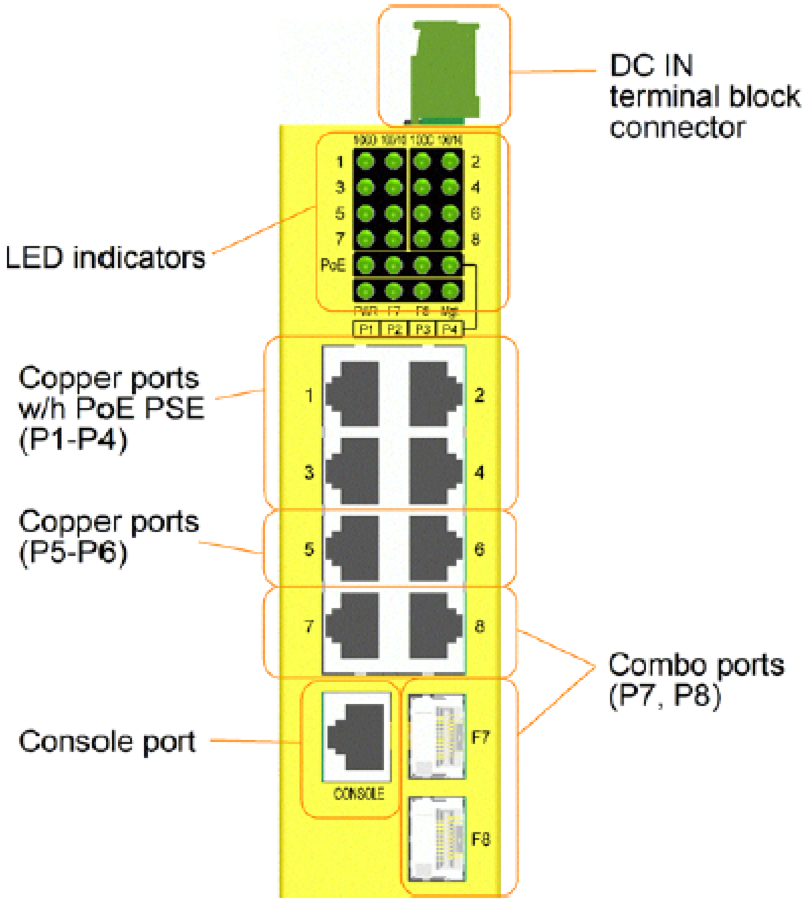
1.1 Features

- Provides 8 10/100/1000Mbps RJ-45 and two 1000M SFPs
- Provides four IEEE 802.3af-compliant PoE PSE ports
- Provides in-band web-based and SNMP management interface

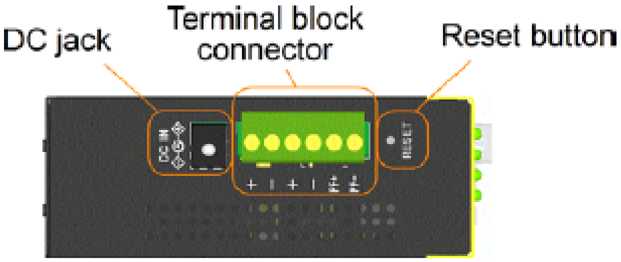
- All copper ports support auto-negotiation and auto-MDI/MDI-X detection
- Provides full wire speed forwarding
- Supports 802.3x flow control for full-duplex and backpressure for half-duplex
- Provides port status, statistic monitoring and control function
- Supports DHCP IP configuration
- Supports port-based and 802.1Q Tag-based VLAN
- Provides QoS function
- Provides link aggregation (port trunking) function with LACP support
- Provides port mirroring function
- Provides 802.1X authentication for port access
- Supports 802.1w RSTP, 802.1D STP
- Provides IGMP snooping
- Supports SFP with Digital Diagnostic Monitoring (DDM)
- Provides packet storm control function
- In-band embedded firmware upgrade function
- Power saving function
- Multiple Redundant ring function
- DDM support over SNMP protocol
- Reboot switch over SNMP protocol
- TFTP for firmware update over SNMP protocol

1.2 Product Panels

The following figure illustrates the front panel and rear panel of the switch:



Front panel



Up panel

1.3 LED Indicators

LED	Function
PWR	Power status
1000	1000M link & activities status (Port 1 - Port 8)

100/10	100M or 10M link & activities status (Port 1 - Port 8)
PoE	PoE power status (Port 1 - Port 4)
F7	Port 7 SFP fiber transceiver in use
F8	Port 8 SFP fiber transceiver in use
Mgt	Management status

1.4 Specifications

10/100/1000 Copper Ports w/h PoE PSE (Port 1 ~ Port 4)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 1000Base-T
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation or software control
Transmission rate	10Mbps, 100Mbps, 1000Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP
Power over Ethernet	IEEE 802.3af-compliant PSE

10/100/1000 Copper Ports (Port 5 ~ Port 6)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 1000Base-T
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation or software control
Transmission rate	10Mbps, 100Mbps, 1000Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP

Combo Ports (Port 7 & Port 8)

10/100/1000 Copper interface

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 1000Base-T
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation or software control
Transmission rate	10Mbps, 100Mbps, 1000Mbps

Duplex support	Full/Half duplex
Network cable	Cat.5 UTP

1000Mbps SFP Fiber interface

Compliance	1000Base-SX/LX/BX (mini-GBIC)
Connectors	SFP for optional SFP type fiber transceivers
Configuration	Auto/Forced, 1000Mbps, Full duplex
Transmission rate	1000Mbps
Network cables	MMF 50/125 60/125, SMF 9/125
Eye safety	IEC 825 compliant

Switch Functions

MAC Addresses Table	8K entries
Forwarding & filtering	Non-blocking, full wire speed
Switching technology	Store and forward
Maximum packet length	1526 bytes (Jumbo frame support disabled)
Jumbo frame support	Up to 9.6K bytes
IP Multicast groups	8192 supported
Flow control	IEEE 802.3x pause frame base for full duplex operation Back pressure for half duplex operation
VLAN function	Port-based VLAN and IEEE 802.1Q Tag-based VLAN
QoS function	Port-based, 802.1p-based, IP DSCP-based
Port control	Port configuration control via software management
Storm control	Broadcast, Multicast storm protection control via software management
Aggregation	Link aggregation (port trunking)
Port Mirroring	Mirror received frames to a sniffer port

Console Port

Interface	RS-232, DTE type
Connector	Shielded RJ-45

Power over Ethernet Function

PSE Pin 4,5	Positive of power voltage (Typical 48VDC)
PSE Pin 7,8	Negative of power voltage (Typical 48VDC)
Discovery PD resistance	15K ~ 33K
PD Classification	Class 0 ~ 4
Power delivery	15.4W max. (per port)

Protection	Under voltage, Over voltage, Over current detection

Terminal Block Connector

DC power input	Screwed terminal block : 2 pairs of +/- contacts
Operating Input Voltages	+6.5 ~ +60VDC (General applications) +44 ~ +54VDC (PoE applications) * Warning: The -48VDC power supply is not supported.
Power consumption	10W max. (Full load with no PoE support) 72W max. (Full load with 4 PoE max. output)
Power dissipation	KGD-802 - 4.2W@30V, 4.5W@48V KGD-802-P - 5.3W@48V
Relay output alarm	2 terminal contacts PF+/PF- (30VDC/1A max. or 120VAC/0.5A max.) Alarm events: power failure, specific port link fault (software configured)

DC Jack

Interfaces	DC Jack (-D 6.3mm / + D 2.0mm)
Operating Input Voltages	+6.5 ~ +60VDC (General applications) +44 ~ +54VDC (PoE applications)

Mechanical

Dimension (base)	140 x 106 x 40 mm (WxDxH)
Housing	Enclosed metal with no fan
Mounting	Din-rail mounting, Panel mounting (optional)

Environmental

Operating Temperature	Typical -20°C ~ +60°C
Storage Temperature	-20°C ~ +85°C
Relative Humidity	10% ~ 90% non-condensing

Electrical Approvals

FCC	Part 15 rule Class A
CE	EMC, CISPR11 Class A
Safety / LVD	IEC 60950-1

2. Installation

2.1 Unpacking

The product package contains:

- The switch unit
- One power adapter (optional accessory)
- One product CD-ROM

2.2 Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the product, observe the following precautions.

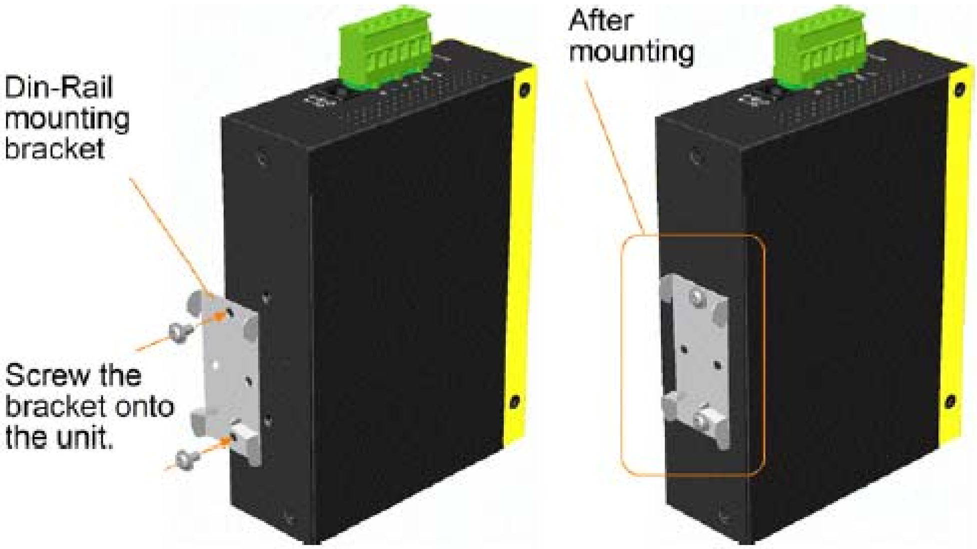
- Do not service any product except as explained in your system documentation.
- Opening or removing covers may expose you to electrical shock.
- Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
    - The power cable, extension cable, or plug is damaged.
    - An object has fallen into the product.
    - The product has been exposed to water.
    - The product has been dropped or damaged.
    - The product does not operate correctly when you follow the operating instructions.
- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.

2.3 DIN-Rail Mounting

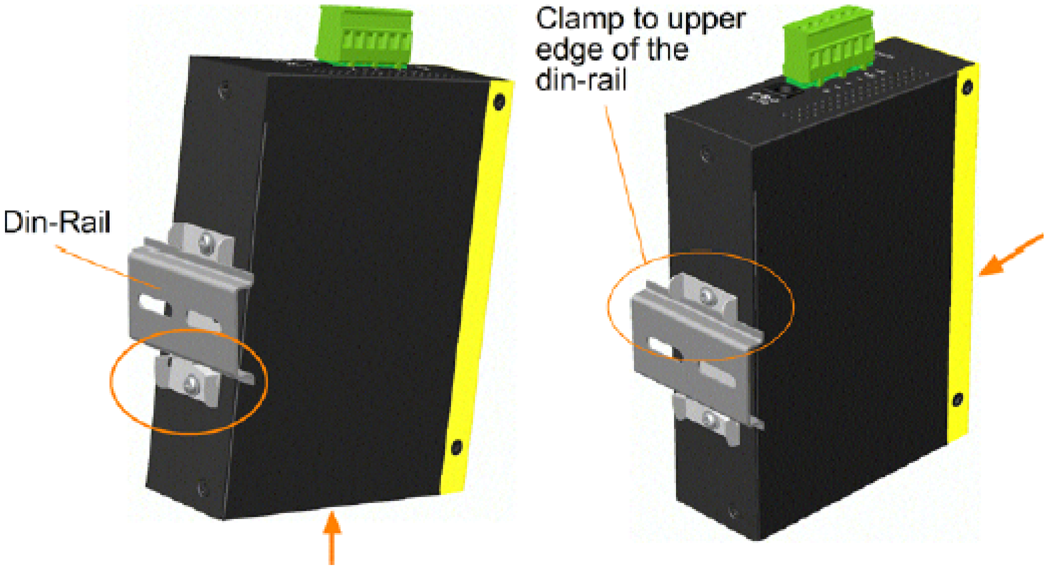
In the product package, a DIN-rail bracket is provided for mounting the switch in a industrial DIN-rail enclosure.

The steps to mount the switch onto a DIN rail are:

1. Install the mounting bracket onto the switch unit as shown below:



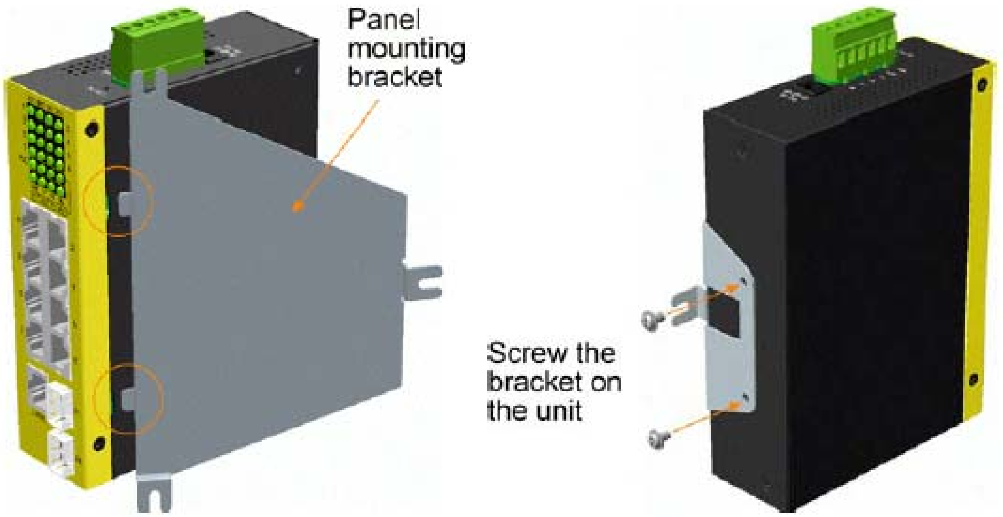
2. Attach bracket to the lower edge of the DIN rail and push the unit upward a little bit until the bracket can clamp on the upper edge of the DIN rail.
3. Clamp the unit to the DIN rail and make sure it is mounted securely.



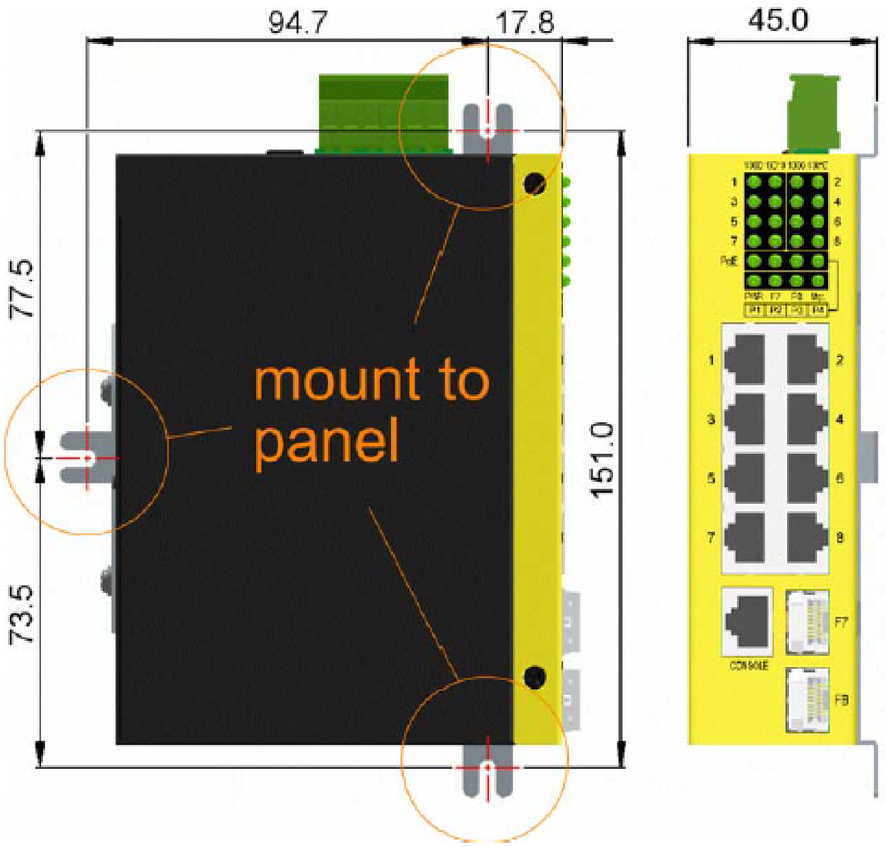
2.4 Panel Mounting

The switches are provided with an optional panel mounting bracket. The bracket supports mounting the switch on a plane surface securely. The mounting steps are:

1. Install the mounting bracket on the switch unit.

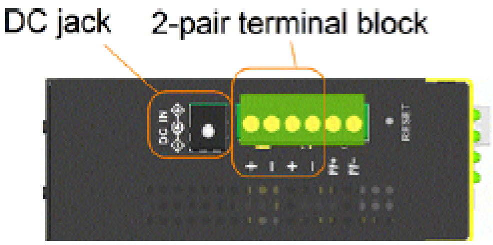


2. Screw the bracket on the switch unit.
3. Screw the switch unit on a panel. Three screw locations are shown below:



2.5 Applying Power

The switch provides two types of power interfaces, terminal block and DC power jack for receiving DC power input from external power supply.



Using Terminal Blocks

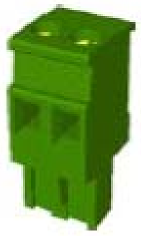
Either DC1 interface or DC2 interface can be used to receive DC power from an external power system. Or, DC2 also can be used to deliver the power received on DC1 to next switch in cascading way.

DC1 +	Vdc Positive (+) terminal
DC1 -	Vdc Negative (-) terminal
DC2 +	Vdc Positive (+) terminal
DC2 -	Vdc Negative (-) terminal

* Working Vdc for general application:	+6.5V ~ +60VDC
* Working Vdc for PoE application:	+44V ~ +54VDC (Typ. 48V)

WARNING: The -48VDC power supply is not supported.

Three 2P terminal plugs are provided together with the switch. Two of the three plugs are used for DC1 and DC2 interfaces respectively. The plug is shown below:



Power wires : 24 ~ 12AWG (IEC 0.5~2.5mm^2)

Install the power source wires with the plug properly. Then, plug in DC1 contacts. If cascading the power to next switch device is needed, install the power wires and plug for another switch. Then, use DC2 contacts.

Note: Only up to four device units can be cascaded to receive power from one main power input source.

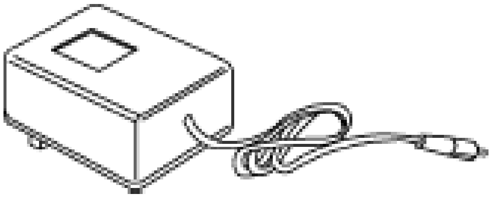
Using DC Power Jack

When an external power system is not available, the switch provides a DC jack to receive power from typical AC-DC power adapter alternatively.

Interfaces: DC Jack (-D 6.3mm / + D 2.0mm)

Operating input voltage range for general applications: +6.5 ~ +60VDC, 10W max. with no PoE support

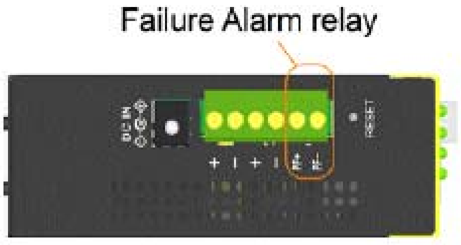
Operating input voltage range for PoE applications: +44 ~ +54VDC, 72W max. with 4 PoE full output



Note: Before you begin the installation, check the AC voltage of your area. The AC power adapter which is used to supply the DC power for the unit should have the AC voltage matching the commercial power voltage in your area.

2.6 Failure Relay Output

The switch provides a relay output to report failure events to a remote alarm monitoring system. The replay output is provided with two contacts in the terminal block next DC2 interface.



Use the provided 2P terminal plug for signal wiring and plug into the PF+/- contacts. The function is designed as:

Alarm Events:

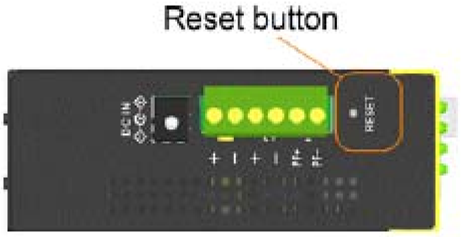
- Input power failure
- Specific port link down (The specific ports can be configured by software.)

Normal: PF+ and PF- shorted
Alarm: PF+ and PF- open

Note: Be sure the voltage applied on PF+/- contacts is within the specification of 30VDC/1A max. or 120VAC/0.5A max.

2.7 Reset Button

The reset button is used to perform a reset to the switch. It is not used in normal cases and can be used for diagnostic purpose. If any network hanging problem is suspected, it is useful to push the button to reset the switch without turning off the power. Check whether the network is recovered.



The button can also be used to restore the software configuration settings to factory default values.

The operations are:

Operation	**Function**
Press the button more than 5 seconds when power up	Restore factory default settings
Press the button and release during switch operation	Reboot the switch

2.8 Making UTP Connections

The 10/100/1000 RJ-45 copper ports supports the following connection types and distances:

Network Cables

10BASE-T:	2-pair UTP Cat. 3,4,5 , EIA/TIA-568B 100-ohm
100BASE-TX:	2-pair UTP Cat. 5, EIA/TIA-568B 100-ohm
1000BASE-T:	4-pair UTP Cat. 5 or higher (Cat.5e is recommended), EIA/TIA-568B 100-ohm
Link distance:	Up to 100 meters

Auto MDI/MDI-X Function

This function allows the port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically. No matter a straight through cable or crossover cable is connected, the ports can sense the receiving pair automatically and configure itself to match the rule for MDI to MDI-X connection. It simplifies the cable installation.

Auto-negotiation Function

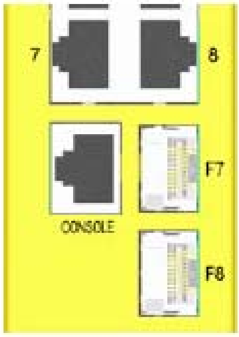
The ports are featured with auto-negotiation function and full capability to support connection to any Ethernet devices. The port performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected device is also auto-negotiation capable, both devices will come out the best configuration after negotiation process. If the connected device is incapable in auto-negotiation, the switch will sense the speed and use half duplex for the connection.

Port Configuration Management

For making proper connection to an auto-negotiation incapable device, it is suggested to use port control function via software management to set forced mode and specify speed and duplex mode which match the configuration used by the connected device.

2.9 Making Fiber Connection

The SFP slots, F7 and F8 must be installed with an SFP fiber transceiver for making fiber connection. Your switch may come with some SFP transceivers pre-installed when it is shipped.



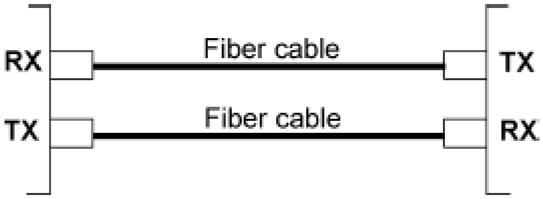
Installing SFP Fiber Transceiver

To install an SFP fiber transceiver into SFP slot, the steps are:

1. Turn off the power to the switch.
2. Insert the SFP fiber transceiver into the SFP slot. Normally, a bail is provided for every SFP transceiver. Hold the bail and make insertion.
3. Until the SFP transceiver is seated securely in the slot, place the bail in lock position.

Connecting Fiber Cables

LC connectors are commonly equipped on most SFP transceiver modules. Identify TX and RX connector before making cable connection. The following figure illustrates a connection example between two fiber ports:



Make sure the Rx-to-Tx connection rule is followed on the both ends of the fiber cable.

Network Cables

Multimode (MMF) - 50/125, 62.5/125

Single mode (SMF) - 9/125

Fiber Port Configuration

For 1000M fiber application on Port 7, 8 just leave the default port configuration *Auto* for fiber connection.

2.10 Making PoE Connections

This section describes how to make a connection between a PSE port and a PoE PD device. Port 1, Port 2, Port 3 and Port 4 are equipped with PoE PSE function. The ports are enabled to deliver power together with network signal to a connected powered device via Cat.5 cable.

To make a PoE connection, the following check points should be noted:

1. For safety reason, the connected PoE PD (Powered Device) must be a IEEE 802.3af-compliant device. Incompliant devices are not supported by the PoE switch model.
2. The Cat.5 cables used for the connections must be 4-pair cables. The power is sent over the spare pairs (4,5) (7,8) of the cable. The maximum distance supported is 100 meters.
3. The DC IN power voltage supplied to the switch must be within the following range to make PoE function working.

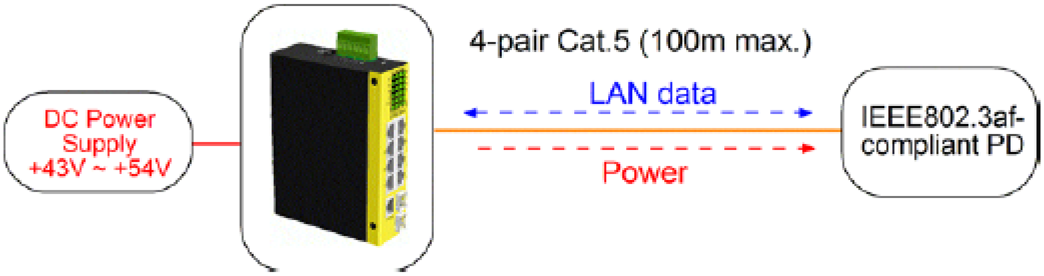
   DC IN voltage range for PoE applications : +44V ~ +54V
4. The DC IN power supplied to the switch must meet the following calculation:

   DC IN power = Sum of all connected PD power required + 10 watts

The PSE ports are equipped with the following capabilities:

1. Detection for an IEEE 802.3af compliant PD.
2. No power is supplied to a device which is classified non-IEEE 802.3af complaint PD.
3. No power is supplied when no connection exists on the port.
4. The power is cut off immediately from powering condition when a disconnection occurs.
5. The power is cut off immediately from powering condition when overload occurs.
6. The power is cut off immediately from powering condition when overcurrent occurs.
7. The power is cut off immediately from powering condition when short circuit condition occurs.

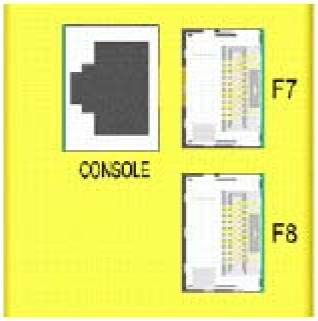
The figure below illustrates a connection example:



2.11 LED Indication

LED	Function	State	Interpretation
PWR	Power status	ON	The power is supplied to the switch.
		OFF	The power is not supplied to the switch.
1000	1000Mbps link status	ON	A 1000M link is established on the port. (No traffic)
		BLINK	Port 1000Mbps link is up and there is traffic.
		OFF	Port link is down.
10/100	1000Mbps link status	ON	A 10M or 100M link is established on the port.
		BLINK	Port link is up and there is traffic.
		OFF	Port link is down.
PoE	PoE power status	ON	PoE power is delivered on the port.
		OFF	PoE power is off.
F7	Port 7 SFP status	ON	Port 7 SFP fiber is in use.
		OFF	Port 7 RJ-45 is in use.
F8	Port 8 SFP status	ON	Port 8 SFP fiber is in use.
		OFF	Port 8 RJ-45 is in use.
Mgt	Management status	ON	System diagnostics & initialization finished
		OFF	System diagnostics & initialization in process

2.12 Making Console Connection



The connector designed for the console port is RJ-45 and has the pin-assignments as follows:

Pin	RS-232 signals	IN/OUT
1,2,7,8	NC	
3	RxD	IN
6	TxD	OUT

4,5	GND

Baud Rate information:

Baud rate - 115200
Data bits - 8
Parity - None
Stop bit - 1
Flow control – None

2.12.1 Console Commands

Three command sets are provided as follows:

System commands

```
>System↵
System>Info↵                          ; display system information
    Name:                             ; System name of this switch unit
    S/W Version: x.xx                 ; Software version
    H/W Version: x.xx                 ; Hardware version
    MAC address: xx-xx-xx-xx-xx-xx    ; MAC address of this switch unit
System>Restore default↵               ; Restore factory default configuration
System>Restore default keepIP↵        ; Restore defaults, but keep IP no changed
System>Name [<name>]↵                 ; Assign a system name to the switch unit
System>Reboot↵                        ; Reboot the switch unit
```

Console commands

```
>Console↵
Console>Info↵                         ; console information
    Password:                         ; password for entering into management interface
    Timeout:                          ; timeout for console connection without user action
    Prompt:                           ; current command prompt used
Console>Password [<password>]↵        ; change password
Console>Timeout [<timeout>]↵          ; change timeout value
Console>Prompt [<string>]↵            ; change prompt string
```

IP commands

```
>IP↵
IP>Info↵                                                      ; IP information
```

```
    Address: xxx.xxx.xxx.xxx                            ; IP address
    Subnet Mask: xxx.xxx.xxx.xxx                        ; Subnet mask
    Gateway: xxx.xxx.xxx.xxx                            ; Gateway IP address
    Dhcp: disabled                                      ; Gateway IP address
IP>Setup [<ipaddress>[<ipmask>[<ipgateway>]]]↵          ; Setup new IP
IP>Status↵                                              ; DHCP status when enabled
    Dynamic Address: xxx.xxx.xxx.xxx    Subnet Mask: xxx.xxx.xxx.xxx
    Gateway: xxx.xxx.xxx.xxx    dhcp Address: xxx.xxx.xxx.xxx
IP>Dhcp [enable / disable]↵                             ; Use DHCP mode or not
```

2.13 Configuring IP Address and Password for the Switch

The switch is shipped with the following factory default settings for software management :

Default IP address of the switch : ***192.168.0.2 / 255.255.255.0***

The IP Address is an identification of the switch in a TCP/IP network. Each switch should be designated a new and unique IP address in the network. Two methods to configure the IP address are:

1. Use console port

   The console command sequence to set a fixed IP for the switch is:

   ```
   >IP↵
   IP>Setup [<ipaddress>[<ipmask>[<ipgateway>]]]↵
   ```

   The console command sequence to use DHCP mode for IP is:

   ```
   >IP↵
   IP>Dhcp enable↵
   IP>
   ```

2. Use Web management

   Refer to Web management interface for System Configuration. The switch is shipped with factory default password ***123*** for software management. The password is used for authentication in accessing to the switch via Http web-based interface. For security reason, it is recommended to change the default settings for the switch before deploying it to your network. Refer to Web management interface for System Configuration.

3. Advanced Functions

To help a better understanding about the software management interfaces, this chapter describes some advanced functions provided by the switch.

3.1 Abbreviation

Ingress Port: Ingress port is the input port on which a packet is received.

Egress Port: Egress port is the output port from which a packet is sent out.

IEEE 802.1Q Packets: A packet which is embedded with a VLAN Tag field

VLAN Tag: In IEEE 802.1Q packet format, 4-byte tag field is inserted in the original Ethernet frame between the Source Address and Type/Length fields. The tag is composed of:

#of bits	**16**	**3**	**1**	**12**
Frame field	TPID	User priority	CFI	VID

TPID: 16-bit field is set to 0x8100 to identify a frame as an IEEE 802.1Q tagged packet

User Priority: 3-bit field refer to the 802.1p priority

CFI: The Canonical Format Indicator for the MAC address is a 1 bit field.

VID: VLAN identifier, 12-bit field identifies the VLAN to which the frame belongs to.

Untagged packet: A standard Ethernet frame with no VLAN Tag field

Priority-tagged packet: An IEEE 802.1Q packet which VID filed value is zero (VID=0)

VLAN-Tagged packet: An IEEE 802.1Q packet which VID filed value is not zero (VID<>0)

PVID (Port VID)

PVID is the default VID of an ingress port. It is often used in VLAN classification for untagged packets. It is also often used for egress tagging operation.

DSCP: Differentiated Service Code Point, 6-bit value field in an IP packet

VLAN Table lookup: The process of searching VLAN table to find a VLAN which matches the given VID index

MAC address table lookup: The process of searching MAC address table to find a MAC entry which matches the given destination MAC address and the port where the MAC address is located

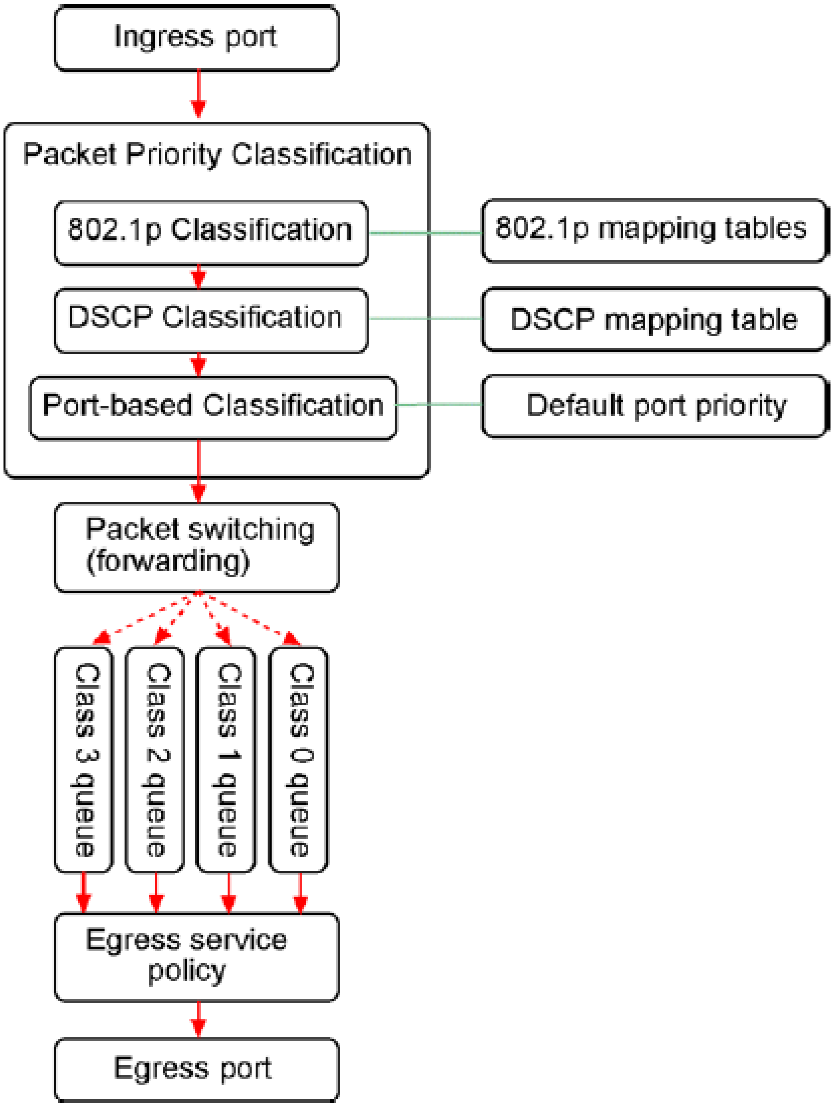
Packet forwarding: also known as packet switching in a network switch based on MAC address table and VLAN table information

VLAN forwarding: the operation that a packet is forwarded to an egress destination port based on VLAN table information

VLAN group: configuration information about a VLAN which can be recognized in the switch. The information includes a VID associated to the VLAN, member ports, and some special settings.

3.2 QoS Function

The switch provides a powerful Quality of Service (QoS) function to guide the packet forwarding in four priority classes. The versatile classification methods can meet most of the application needs. The following figure illustrates the QoS operation flow when a packet received on the ingress port until it is transmitted out from the egress port:



3.2.1 Packet Priority Classification

Each received packet is examined and classified into one of four priority classes, Class 3, Class 2, Class 1 and Class 0 upon reception. The switch provides the following classification methods:

802.1p classification: use User Priority tag value in the received IEEE 802.1Q packet to map to one priority class

DSCP classification: use DSCP value in the received IP packet to map to one priority class

Port-based classification: used when 802.1p and DSCP are disabled or fail to be applied

They all can be configured to be activated or not. More than one classification methods can be enabled at the same time. However, 802.1p classification is superior than DSCP classification.

802.1p mapping tables: Each ingress port has its own mapping table for 802.1p classification.
DSCP mapping table: All ingress ports share one DSCP mapping table for DSCP classification.
Default port priority: A port default priority class is used when port-based classification is applied

All configuration settings are in per port basis except that DSCP mapping table is global to all ports. A received packet is classified into one of four priority class before it is forwarded to an egress port.

3.2.2 Priority Class Queues

Each egress port in the switch is equipped with four priority class egress queues to store the packets for transmission. A packet is stored into the class queue which is associated to the classified priority class. For example, a packet is stored into Class 3 egress queue if it is classified as priority Class 3.

3.2.3 Egress Service Policy

Each port can be configured with an egress service policy to determine the transmission priority among four class queues. By default, higher class number has higher priority than the lower class numbers.

Four policies are provided for selection as follows:

- **Strict priority** : Packets in high priority class queue are sent first until the queue is empty
- **Weighted ratio priority Class 3:2:1:0 = 4:3:2:1** : four queues are served in 4:3:2:1 ratio
- **Weighted ratio priority Class 3:2:1:0 = 5:3:1:1** : four queues are served in 5:3:1:1 ratio
- **Weighted ratio priority Class 3:2:1:0 = 1:1:1:1** : four queues are served equally

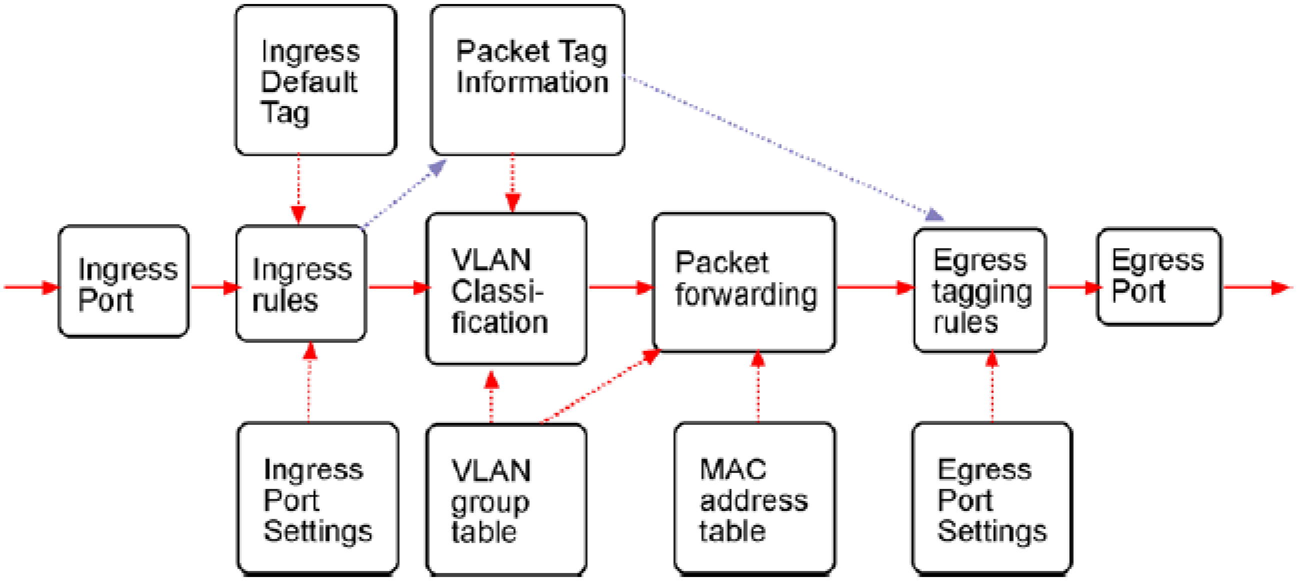
Strict priority policy lets high priority class queue is served first until it is empty. Lower priority queue may not get any service (or egress bandwidth) when higher priority traffic is heavy for long time. Three weighted ratio policies are provided to resolve such problem. Four class queues are served in weighted round robin basis. Every priority class can get a guaranteed ratio for the egress bandwidth.

3.3 VLAN Function

The switch supports port-based VLAN, 802.1Q Tag VLAN and eight VLAN groups.

3.3.1 VLAN Operation

The following figure illustrates the basic VLAN operation flow beginning from a packet received on an ingress port until it is transmitted from an egress port.



The following sections describe the VLAN processes and **Advanced VLAN mode** settings provided by the switch. A global setting means the setting is applied to all ports of the switch. A per port setting means each port can be configured for the setting respectively.

3.3.2 Ingress Rules

When a packet is received on an ingress port, the ingress rules are applied for packet filtering and packet tag removal. The related Ingress port settings are:

3.3.2.1 802.1Q Tag Aware Per port setting

Tag-aware **-** 802.1Q Tag Aware mode is used. The switch examines the tag content of every received packets. For a VLAN tagged packet, the packet VLAN tag data is retrieved as packet tag information for VLAN classification and egress tagging operation. For untagged packet and priority-tagged packet, port-based mode is used.

Tag-ignore **-** Port-based mode is used. The switch ignores the tag content of every received packets. Ingress Port Default Tag is always used as packet tag information for VLAN classification.

3.3.2.2 Keep Tag Per port setting

Enable **-** The VLAN tag in the received VLAN tagged packet will be kept as it is and is not stripped in whole forwarding operation.

Disable **-** The VLAN tag data in the received VLAN tagged packet is stripped (removed).

3.3.2.3 Drop Untag Per Port Setting

Enable **-** All untagged packets and priority-tagged packets are dropped. A priority-tagged packet is treated as an untagged packet in this switch. Only VLAN-tagged packets are admitted.

Disable **-** Disable untagged packet filtering

3.3.2.4 Drop Tag Per Port Setting

Enable - All VLAN-tagged packets are dropped. A priority-tagged packet is treated as an untagged packet in this switch. Only untagged packets are admitted.

Disable **-** Disable VLAN-tagged packet filtering

3.3.3 Ingress Default Tag Per Port Setting

Each port can be configured with one Ingress Default Tag. This ingress port default tag is used when ingress port is in *Tag-ignore* mode or for the received untagged packets in *Tag-aware* mode. The Ingress Default Tag includes **PVID**, **CFI** and **User Priority** configuration.

When Ingress port default tag is used, it is copied as packet associated Packet Tag Information for VLAN classification. The PVID is used as index to one VLAN group in VLAN group table.

3.3.4 Packet Tag Information

Under VLAN process, every packet is associated with one Packet Tag information in packet forwarding operation. The tag information includes VID, CFI and User Priority data and is used for two purposes:

- The VID in tag is used as index for VLAN classification.
- The tag is used for egress tag insertion if egress tagging is enabled.

The following table lists how the Packet Tag information is generated:

Tag Aware setting	Received Packet Type	Packet Tag information source
Tag-ignore	Untagged packet	Ingress Port Default Tag
Tag-ignore	Priority-tagged packet	Ingress Port Default Tag
Tag-ignore	VLAN-tagged packet	Ingress Port Default Tag

Tag-aware	Untagged packet	Ingress Port Default Tag
Tag-aware	Priority-tagged packet	Ingress Port Default Tag
Tag-aware	VLAN-tagged packet	Received packet VLAN Tag

3.3.5 VLAN Group Table Configuration

The switch provides a table of eight VLAN groups to support up to eight VLANs at the same time. Each VLAN group is associated to one unique VLAN. The table is referred for VLAN classification.

A VLAN group contains the following configuration settings:

VID: 12-bit VLAN Identifier index to the VLAN to which the group is associated
Member Ports: the admitted egress ports for packets belonging to this VLAN
Source Port Check: the ingress port of the packet must also be the member port of this VLAN. Otherwise, the packet is discarded.

3.3.6 VLAN Classification

VLAN classification is a process to classify a VLAN group to which a received packet belongs. The VID of the generated Packet Tag information associated to the received packet is used as an index for VLAN group table lookup. The VID matched VLAN group will be used for packet forwarding. If no matched VLAN group is found in table lookup, the packet is dropped.

Refer to section 3.2.4 for details about how the Packet Tag information is generated.

The member ports specified in the matched VLAN group are the admitted egress port range for the packet. The packet will never be forwarded to other ports which are not in the member ports.

The Source Port Check setting of the matched VLAN group is also referred. If it is enabled, the ingress port will be checked whether it is a member port of this group.

3.3.7 Packet Forwarding

The forwarding is a process to forward the received packet to one or more egress ports. The process uses the following information as forwarding decision:

- Member ports of the matched VLAN group : the egress port range for forwarding
- Source Port Check setting of the matched VLAN group : check ingress port membership

- The packet destination MAC address : for MAC address table loop up
- The switch MAC address table : to find the associated port where a MAC address is learned

If the MAC address table lookup is matched and the learned port is the VLAN member port, the packet is forwarded to the port (egress port). If the lookup failed, the switch will broadcast the packet to all member ports.

3.3.8 Egress Tagging Rules

Egress Tagging rules are used to make change to the packet before it is stored into egress queue of an egress port. Three egress settings are provided for each port and are described as follows:

3.3.8.1 Egress Settings

Insert Tag (per port setting)

***Enable* -** Insert the Tag data of the associated Packet Tag information into the packet

Disable - No tagging is performed.

Untagging Specific VID (per port setting)

***Enable* -** No tag insertion if the VID data of the associated Packet Tag information matches the Untagged VID configured in next setting even [Insert Tag] is enabled.

***Disable* -** This rule is not applied.

3.3.9 Summary of VLAN Function

VLAN Modes

Port-based VLAN Mode: Simple port-based 2-VLAN-groups mode

Port-based VLAN ISP Mode: Simple port-based 7-VLAN-groups mode

Simplified ed VLAN Mode: Simple configuration for Tag-based VLAN

Advanced VLAN Mode: Full VLAN configuration for port-based and Tag-based VLAN

Advanced VLAN Mode

Egress Settings (per port): [Tag Aware], [Keep Tag], [Drop Untag], [Drop Tag]

Ingress Default Tag (per port): [PVID], [CFI], [User Priority]

VLAN Groups (global): 8 VLAN groups

VLAN Group Settings (per group): [VID], [Member Ports], [Source Port Check]

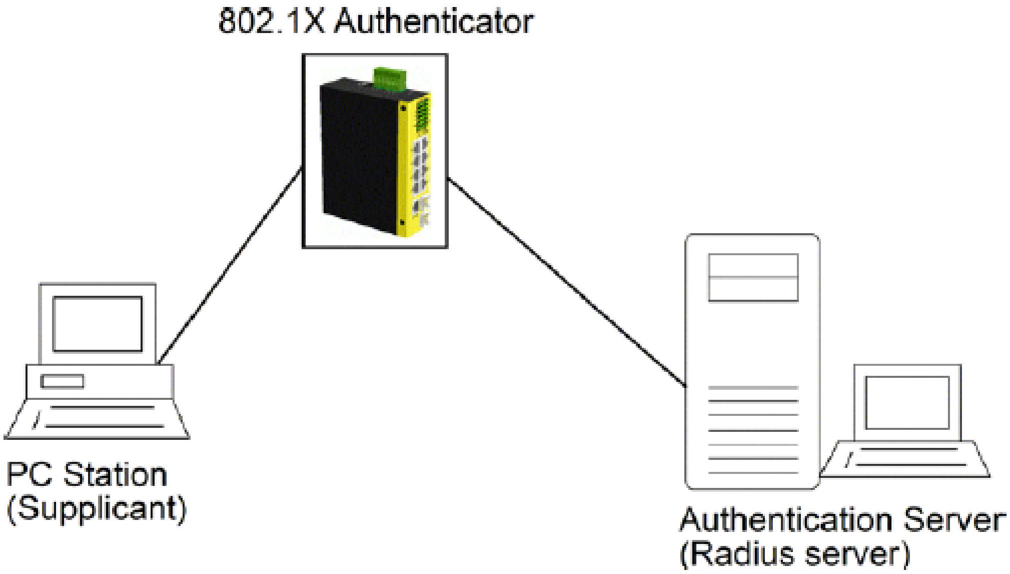
Egress Settings: [Insert Tag], [Untagging Specific VID], [Untagged VID]

VLAN range supported: 1 ~ 4095 (eight VLANs at the same time)

[PVID] [VID] [Untagged VID] value range: 1 ~ 4095

3.4 802.1X Authentication

For some IEEE 802 LAN environments, it is desirable to restrict access to the services offered by the LAN to those users and devices that are permitted to make use of those services. IEEE 802.1X Port-based network access control function provide a means of authenticating and authorizing devices attached to a LAN port that has point-to-point connection characteristics, and of preventing access to that port in cases in which the authentication and authorization process fails. The 802.1X standard relies on the client to provide credentials in order to gain access to the network. The credentials are not based on a hardware address. Instead, they can be either a username/password combination or a certificate. The credentials are not verified by the switch but are sent to a Remote Authentication Dial-In User Service (RADIUS) server, which maintains a database of authentication information. 802.1X consists of three components for authentication exchange, which are as follows:



- An 802.1X authenticator: This is the port on the switch that has services to offer to an end device, provided the device supplies the proper credentials.
- An 802.1X supplicant: This is the end device; for example, a PC that connects to a switch that is requesting to use the services (port) of the device. The 802.1X supplicant must be able to respond to communicate.
- An 802.1X authentication server: This is a RADIUS server that examines the credentials provided to the authenticator from the supplicant and provides the authentication service. The authentication server is responsible for letting the authenticator know if services should be granted.

The 802.1X authenticator operates as a go-between with the supplicant and the authentication server to provide services to the network. When a switch is configured as an authenticator, the ports of the switch must then be configured for authorization. In an authenticator-initiated port authorization, a client is powered up or plugs into the port, and the authenticator port sends an Extensible Authentication Protocol (EAP) PDU to the supplicant requesting the identification of the supplicant. At this point in the process, the port on the switch is connected from a physical standpoint; however, the 802.1X process has not authorized the port and no frames are passed from the port on the supplicant into the switching engine. If the PC attached to the switch did not understand the EAP PDU that it was receiving from the switch, it would not be able to send an ID and the port would remain unauthorized. In this state, the port would never pass any user traffic and would be as good as disabled. If the client PC is running the 802.1X EAP, it would respond to the request with its configured ID. (This could be a username/password combination or a certificate.)

After the switch, the authenticator receives the ID from the PC (the supplicant). The switch then passes the ID information to an authentication server (RADIUS server) that can verify the identification information. The RADIUS server responds to the switch with either a success or failure message. If the response is a success, the port will be authorized and user traffic will be allowed to pass through the port like any switch port connected to an access device. If the response is a failure, the port will remain unauthorized and, therefore, unused. If there is no response from the server, the port will also remain unauthorized and will not pass any traffic.

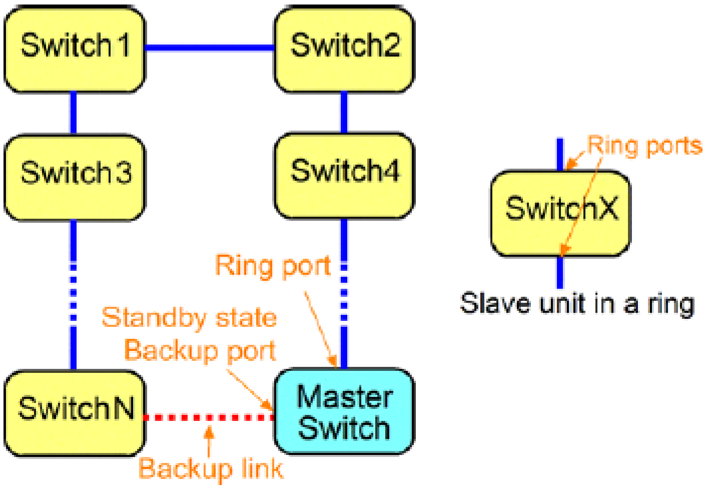
3.5 Redundant Ring Support

For industrial applications, multiple switches are often connected like a cascaded chain due to topology limitation. In such configuration, a backup (redundant) mechanism with fast response is often required to keep the network operating when any cable fault or even device fault occur.

The switch is featured with Auto Multi-Ring Technology to support redundant ring connections. Basically, the following functions are provides with AMR technology:

1. Up to four redundant rings can be supported concurrently.
2. The ring master switch monitors ring status continuously and controls a backup link.
3. As any fault detected, the ring master switch activates the backup link to operate with the fast response time and make ring continue operation automatically.
4. The master switch continuously monitors ring health until faults are repaired. The backup link is set back to standby state automatically when the ring is recovered from any faults and back to normal.

3.5.1 Configuration Definition



Slave Units: All switch units except the master switch in a ring configuration.

Master Unit: The switch unit which monitors the ring configuration and controls the backup link in a ring. One ring port and one backup port are configured. In a multiple ring configuration, a switch could be a master of one ring and slave unit of another ring.

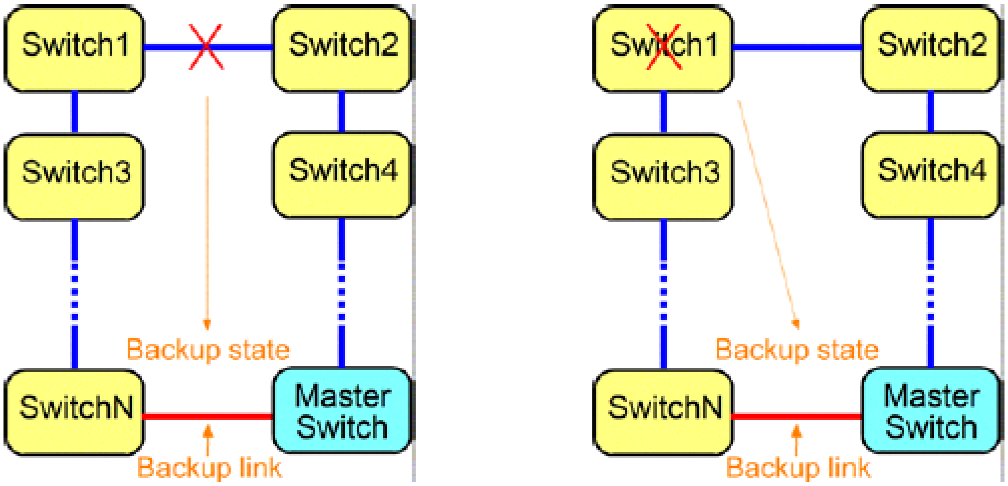
Ring Ports: The ports used for connecting switches in a ring.

Backup Port: The port specified in the master unit which is connected to a physical cable but is disabled in operation in standby state. It is enabled immediately by the master unit when a fault is detected in a ring configuration.

Ring Group ID: Each ring configuration must have a unique ID for identification when multiple rings are configured in a network. A switch can support multiple rings concurrently.

3.5.2 Fault Monitoring & Activating Backup Link

The ring master monitors the network continuously. As any fault is reported, the master activates (enable) the backup link in standby state immediately to recover the communication channel and keep the network operating. The fault may be ring cable disconnection as shown in the left figure below:



From standby state, the backup link enters into backup state. Other possible faults could be a switch failed due to function failure or power problem as shown in the above right figure.

The redundant ring function can support not only one fault case but also multiple faults cases at the same time and give much faster response time than typical Spanning Tree Protocol. Other faults happening outside this scope is beyond the capability of the switch.

3.5.3 Repairing the Network & Standby Recovery

When the backup link is activated to support continuous network operation, the failed section in the ring is blocked and isolated for physical examination and repairing by network administration people. After the failure is repaired, the ring master monitors the health of the ring until all elements and whole network are verified to recover back to normal condition. The ring can enter into standby state (on guard) again.

The switch provides a user friendly management interface to configure the ring network. It also provides a helpful function to examine the status of all configured rings.

3.5.4 Important Notes for Applications

One switch can support up to four AMR rings.

1. A switched port can not belong to more than one AMR ring.
2. A switched port can not be configured as AMR ring port and RSTP port at the same time.
3. One switch can support both AMR and RSTP concurrently via different ports.

4. The AMR function is not compatible with other similar functions available in different brands of switches.
5. The faults to be monitored are cable connections between ring ports and the switch members in a ring. Other faults beyond these are not supported.
6. The cabling of the backup link should be protected securely and has NO RISK for any failure.
7. When the backup link is activated, the faults should be investigated and repaired immediately.

3.5.4.1 Configuration Rules for Tagged VLAN Application

Since the Ring protocol frames communicated among the switches in a ring are untagged, the following rules must be followed:

1. Designate one VLAN among the ring switches to include all ring ports. The factory default VLAN group 1 (VID=1) can be used directly since it includes all ports as members.
2. Configure the designated VLAN as the PVID for all ring ports.
3. Set “Drop Untag” setting disabled for all ring ports.

4. Web Management

The switch features an http server which can serve the management requests coming from any web browser software over TCP/IP network.

Web Browser

Compatible web browser software with JAVA script support
Microsoft Internet Explorer 4.0 or later
Netscape Communicator 4.x or later

Set IP Address for the System Unit

Before the switch can be managed from a web browser software, make sure a unique IP address is configured for the switch.

4.1 Start Browser Software and Making Connection

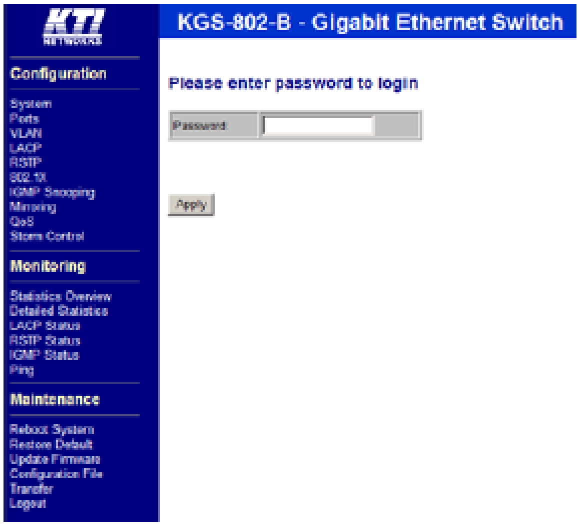
Start your browser software and enter the IP address of the switch unit to which you want to connect. The IP address is used as URL for the browser software to search the device.

```
URL: http://xxx.xxx.xxx.xxx/
```

Factory default IP address: 192.168.0.2

4.2 Login to the Switch Unit

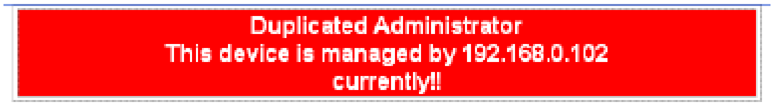
When browser software connects to the switch unit successfully, a Login screen is provided for you to login to the device as the left is played below:



KGS-802-B - Gigabit Ethernet Switch

Please enter password to login

Password



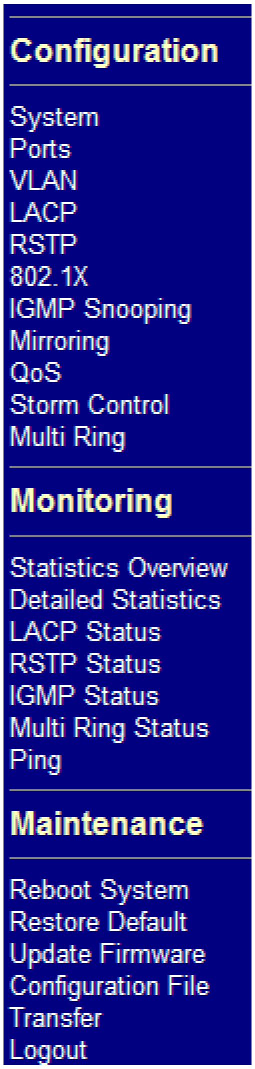
Duplicated Administrator
This device is managed by 192.168.0.102
currently!!

The switch will accept only one successful management connection at the same time. The other connection attempts will be prompted with a warning message as the right is played above.

A new connection will be accepted when the current user logout successfully or auto logout by the switch due to no access for time out of 3 minutes.

System Configuration is displayed after a successful login.

4.3 Main Management Menu



Configuration

System	Switch information, system and IP related settings
Ports	Port link status, port operation mode configuration
VLAN	VLAN related configuration
LACP	LACP confguration for port link aggregation
RSTP	RSTP (Rapid spanning tree protocol) related configuration
802.1X	802.1X authentication related configuration
IGMP Snooping	IGMP snooping related configuration
Mirroring	Port mirroring related configuration
QoS	Quality of Service related configuration
Storm Control	Packet Storm protection control configuration
Multi Ring	Multiple redundant rings configuration

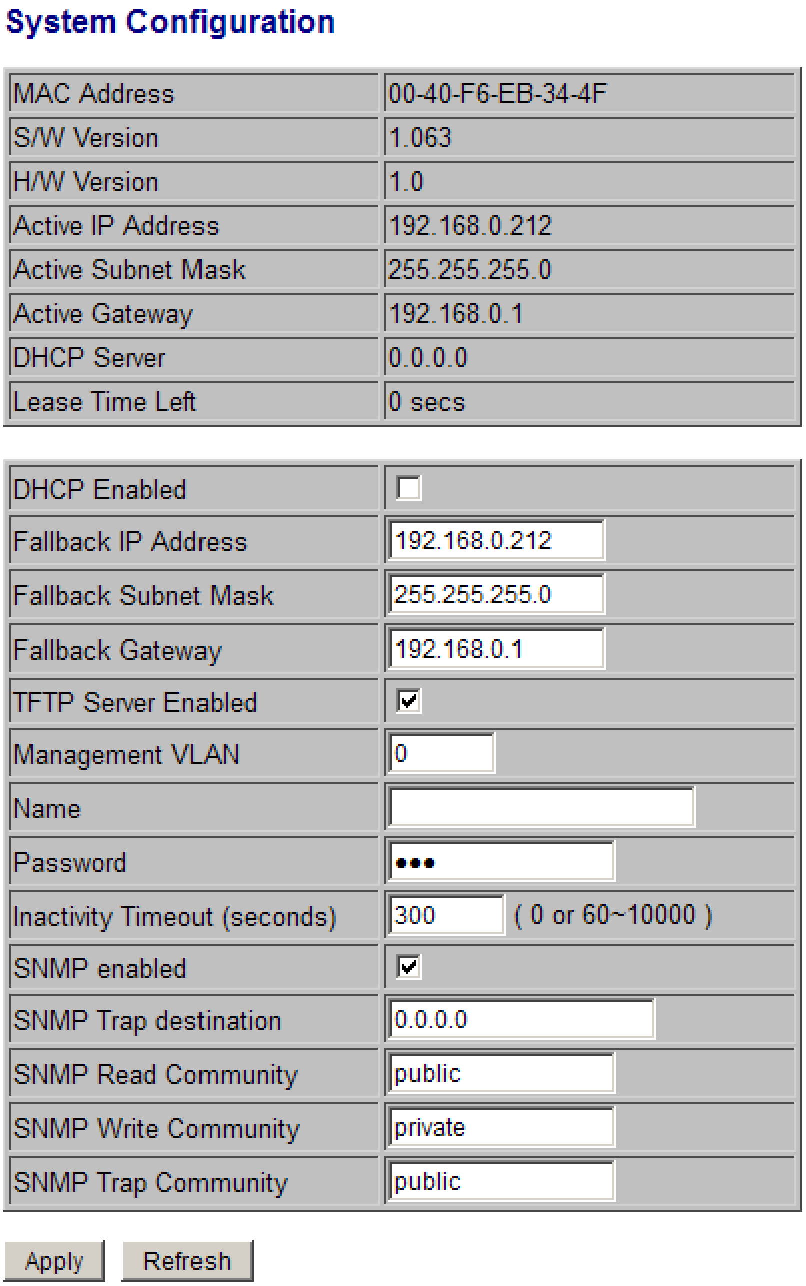
Monitoring

Statistics Overview	List simple statistics for all ports
Detailed Statistics	List detailed statistics for all ports
LACP Status	LACP port status
RSTP Status	RSTP protocol status
IGMP Status	IGMP snooping status
Multi Ring Status	Multi redundant ring status
Ping	Ping command from the switch to other IP devices

Maintenance

Reboot System	Command to reboot the switch
Restore Default	Command to restore the switch with factory default settings
Update Firmware	Command to update the switch firmware
Configuration File Transfer	Command to transfer (upload/download) configuration file
Logout	Command to logout from the switch management

4.4 System



System Configuration

MAC Address	00-40-F6-EB-34-4F
S/W Version	1.063
H/W Version	1.0
Active IP Address	192.168.0.212
Active Subnet Mask	255.255.255.0
Active Gateway	192.168.0.1
DHCP Server	0.0.0.0
Lease Time Left	0 secs

DHCP Enabled	□
Fallback IP Address	192.168.0.212
Fallback Subnet Mask	255.255.255.0
Fallback Gateway	192.168.0.1
TFTP Server Enabled	☑
Management VLAN	0
Name	
Password	●●●
Inactivity Timeout (seconds)	300 (0 or 60~10000)
SNMP enabled	☑
SNMP Trap destination	0.0.0.0
SNMP Read Community	public
SNMP Write Community	private
SNMP Trap Community	public

Configuration	Description
MAC Address	The MAC address factory configured for the switch It can not be changed in any cases.
S/W Version	The firmware version currently running
H/W Version	The hardware version currently operating
Active IP Address	Currently used IP address for the switch management
Active Subnet Mask	Currently used subnet mask for IP address for the switch management

Active Gateway	Currently used gateway IP address for the switch management
DHCP Server	Current IP address of the DHCP server
Lease Time Left	The time left for the lease IP address currently used
DHCP Enabled *[2]	Use DHCP to get dynamic IP address configuration for the switch
Fallback IP Address	IP address used when DHCP mode is not enabled
Fallback Subnet Mask	Subnet mask for IP address used when DHCP mode is not enabled
Fallback Gateway	Default gateway IP address used when DHCP mode is not enabled
TFTP Server Enabled	Enable TFTP for firmware update over SNMP protocol
Management VLAN	Set management VLAN ID
Name *[1]	Set the system name for this switch unit
Password	Set new password
SNMP enabled	Enable SNMP agent
SNMP Trap destination	The IP address of the SNMP trap manager
SNMP Read community	The community allowed for the SNMP [get] message
SNMP Write community	The community allowed for the SNMP [set] message
SNMP Trap community	The community used for the SNMP trap messages sent by the switch
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

Note:

1. *It is suggested to give each switch unit a system name as an alternative unique identification beside IP address.*
2. *Setting change of DHCP mode takes effective in next boot-up.*
3. *SNMP traps are sent to Management VLAN group members only.*

4.4.1 Management VLAN

Management VLAN settings allow administrator to access the switch and perform the switch management over a dedicated VLAN.

The following rules are applied with the Management VLAN:

1. If [Management VLAN] setting is zero, no VLAN limitation is applied in accessing the switch web management interface.
2. If [Management VLAN] setting is not zero, the switch web (http) server only replies to the management hosts located in the matched VLAN group. That means the egress port will be limited in the member ports of the matched VLAN group.
3. The switch web (http) server can accept untagged or tagged management accessing packets. Reply to the web access host based on the following rule:

   [Management VLAN] = 0

Incoming web access packets	**Reply packets (Outgoing to the management host)**
Untagged packets	Untagged packets
Tagged packets	Packets tagged with received packet’s tag (Untagged for exceptional case: Ingress port Tag Aware = Ignore, Keep Tag = disabled)

   [Management VLAN] > 0

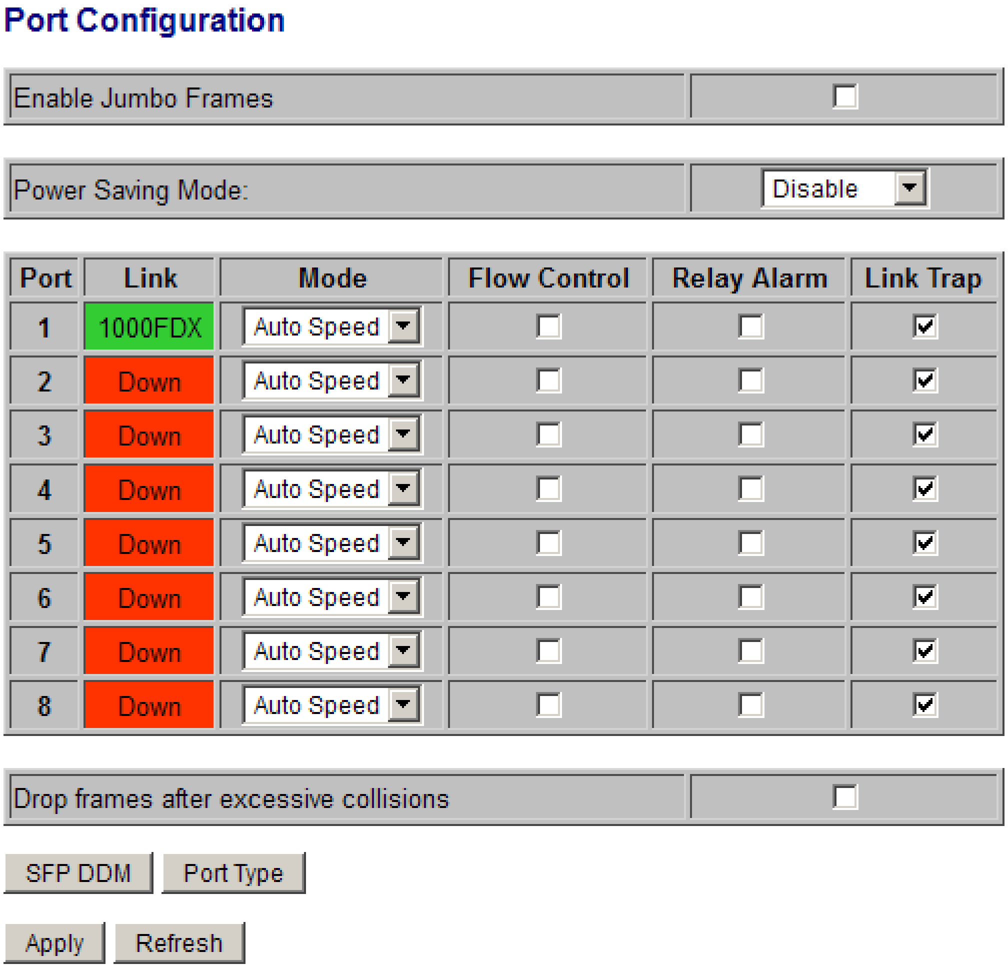
Incoming web access packets	**Reply packets (Outgoing to the management host)**
Untagged packets	Untagged packets
Tagged packets	Packets tagged with configured management VLAN ID

4. The system will cross-check VLAN group table and reject un-existing VLAN setting during configuring Management VLAN value.
5. If VLAN group configuration causes a result that no VLAN group matches the management VLAN setting, the management VLAN setting will be reset to zero by the system automatically.

Notes:

1. *To apply management VLAN function, be sure to configure a VLAN group that matches the management VLAN first.*
2. *No matter how management VLAN is configured, login password authentication is still required.*

4.5 Ports



Port Configuration

Enable Jumbo Frames	□

Power Saving Mode:	Disable

Port	Link	Mode	Flow Control	Relay Alarm	Link Trap
1	1000FDX	Auto Speed	□	□	☑
2	Down	Auto Speed	□	□	☑
3	Down	Auto Speed	□	□	☑
4	Down	Auto Speed	□	□	☑
5	Down	Auto Speed	□	□	☑
6	Down	Auto Speed	□	□	☑
7	Down	Auto Speed	□	□	☑
8	Down	Auto Speed	□	□	☑

Drop frames after excessive collisions	□

Configuration	Function
Enable Jumbo Frames	Select to enable jumbo frame support
Power Saving Mode	*Full* - all the time
	Link-up - power saving only when link up
	Link-down - power saving only when link down
	Disable - disable port power saving
Port	The port number
	Ex.
	7 *Indicates Port 7 type - RJ-45*
	7(SFP) *Indicates Port 7 type - SFP*
	8 *Indicates Port 8 type - RJ-45*
	8(SFP) *Indicates Port 8 type - SFP*
Link	*Speed and duplex status with green background* - port is link on

Down with red background - port is link down

Mode

Select port operating mode

Disabled - disable the port operation

Mode	*Auto-negotiation*	*Speed capability*	*Duplex capability*
Auto	*Enable*	*10, 100, 1000M*	*Full, Half*
10 Half	*Disable*	*10M*	*Half*
10 Full	*Disable*	*10M*	*Full*
100 Half	*Disable*	*100M*	*Half*
100 Full	*Disable*	*100M*	*Full*
1000 Full	*Enable*	*1000M*	*Full*
Auto 1000 Full	*Enable*	*1000M*	*Full*
Force 1000 Full	*Disable*	*1000M*	*Full*

Flow Control

Set port flow control function

v - set to enable 802.3x pause flow control for ingress and egress

Relay Alarm

Set port link down alarm

v - set to enable port link down monitoring for failure relay output

(Refer to section 2.6 for Failure Relay Output function.)

PoE Enable

Set port PoE function (Only valid for Port 1 ~ Port 4 on PoE model)

v - set to enable PoE function

Link Trap

Set SNMP port link trap

v - set to enable SNMP port link trap

Drop frame after excessive collision

Check to enable the function

[SFP DDM]

Click to display DDM information and status of the SFP transceivers

[Port Type]

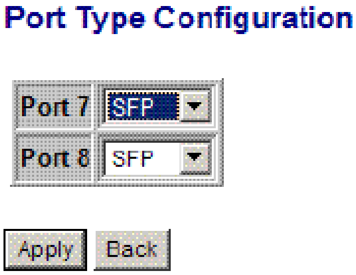
Click to set port type, <Auto>, <RJ-45> or <SFP> for Port 7 and Port 8

[Apply]

Click to apply the configuration change

4.5.1 Port Type

Port 7 and Port 8 supports two media types, RJ-45 and SFP. Use this button to select the port type.



Port Type Configuration

Port 7	SFP
Port 8	SFP

Information	Function	
Port #	Port number (Port 7 & Port 8)	
Type	*Auto*	*Use SFP if SFP transceiver is inserted in slot and detected by the swich*
	RJ-45	*Use RJ-45.*
	SFP	*Use SFP.*

Notes:

The available mode options for RJ-45 port type on Port 7 and Port 8 are:

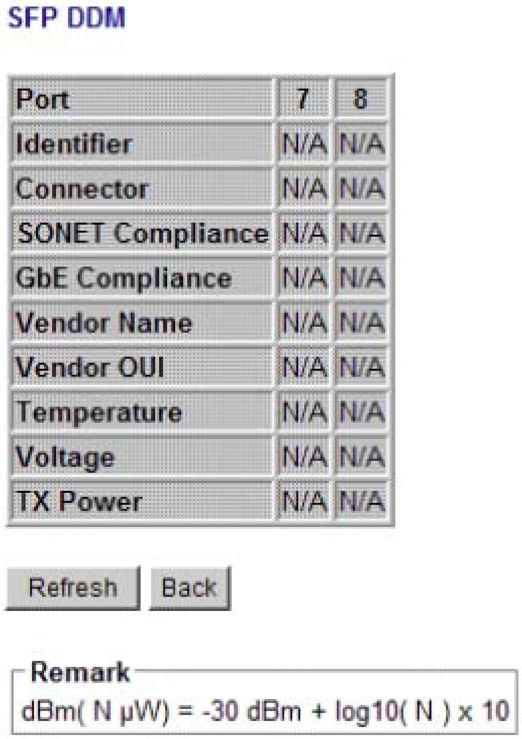
Mode	*Auto-negotiation*	*Speed capability*	*Duplex capability*
Auto	*Enable*	*10, 100, 1000M*	*Full, Half*
10 Half	*Disable*	*10M*	*Half*
10 Full	*Disable*	*10M*	*Full*
100 Half	*Disable*	*100M*	*Half*
100 Full	*Disable*	*100M*	*Full*
1000 Full	*Enable*	*1000M*	*Full*

The available mode options for SFP port type on Port 7 and Port 8 are:

Mode	*Auto-negotiation*	*Speed capability*	*Duplex capability*
Auto 1000 Full	*Enable*	*1000M*	*Full*
Force 1000 Full	*Disable*	*1000M*	*Full*

4.5.2 SFP DDM Status

DDM (Digital Diagnostic Monitoring) information and status are provided in some SFP transceivers. Part of the information are retrieved and listed as follows:



SFP DDM

Port	7	8
Identifier	N/A	N/A
Connector	N/A	N/A
SONET Compliance	N/A	N/A
GbE Compliance	N/A	N/A
Vendor Name	N/A	N/A
Vendor OUI	N/A	N/A
Temperature	N/A	N/A
Voltage	N/A	N/A
TX Power	N/A	N/A

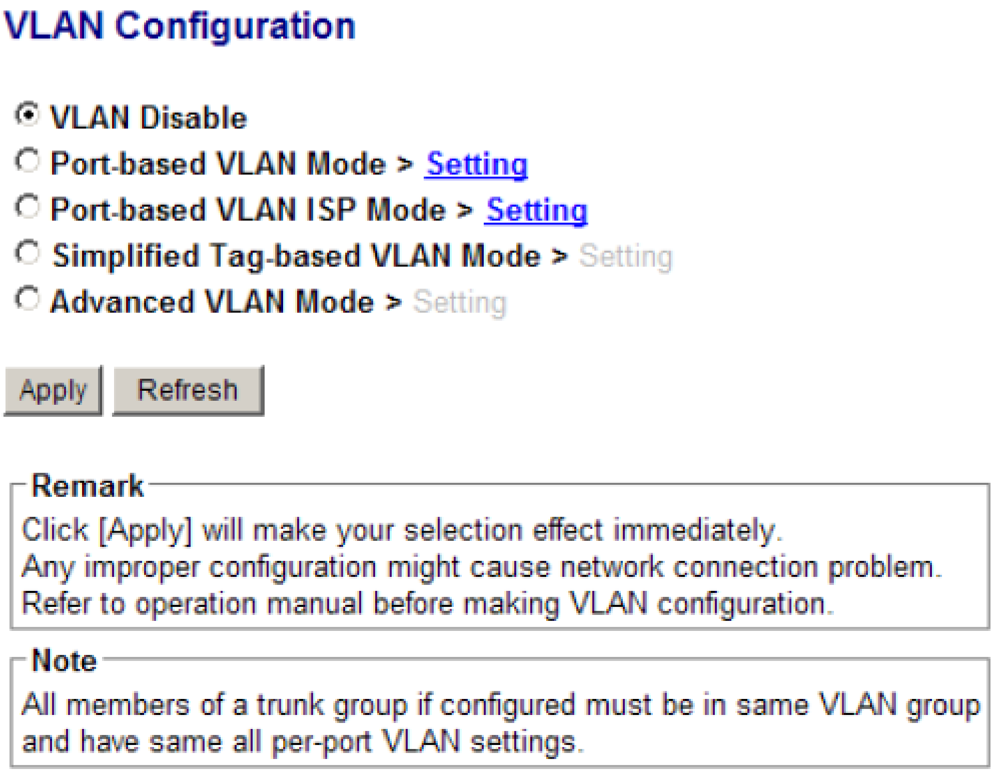
Remark
dBm(N μW) = -30 dBm + log10(N) x 10

Information	Function
Port	Port number which has SFP slot (Port 4, Port 5, Port 6 come with SFP.)
Identifier	The identifier information of the transceiver
Connector	The connector type used on the transceiver
SONET Compliance	SONET compliance information of the transceiver
GbE Compliance	Gigabit Ethernet compliance information of the transceiver
Vendor Name	The vendor name of the transceiver
Vendor OUI	The vendor OUI of the transceiver
Temperature	The current temperature sensed inside the transceiver
Voltage	The working voltage sensed inside the transceiver
TX Power	The transmission optical power sensed
[Refresh]	Click to refresh current configuration
[Back]	Click to back to previous page

Note:

1. *TX power data is displayed with unit of mW. It can be converted to dBm as remark.*
2. *N/A: the information is not available*

4.6 VLANs



VLAN Configuration

● VLAN Disable
○ Port-based VLAN Mode > Setting
○ Port-based VLAN ISP Mode > Setting
○ Simplified Tag-based VLAN Mode > Setting
○ Advanced VLAN Mode > Setting

Remark

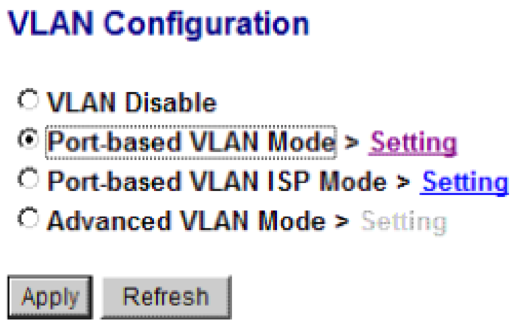
Click [Apply] will make your selection effect immediately.
Any improper configuration might cause network connection problem.
Refer to operation manual before making VLAN configuration.

Note

All members of a trunk group if configured must be in same VLAN group and have same all per-port VLAN settings.

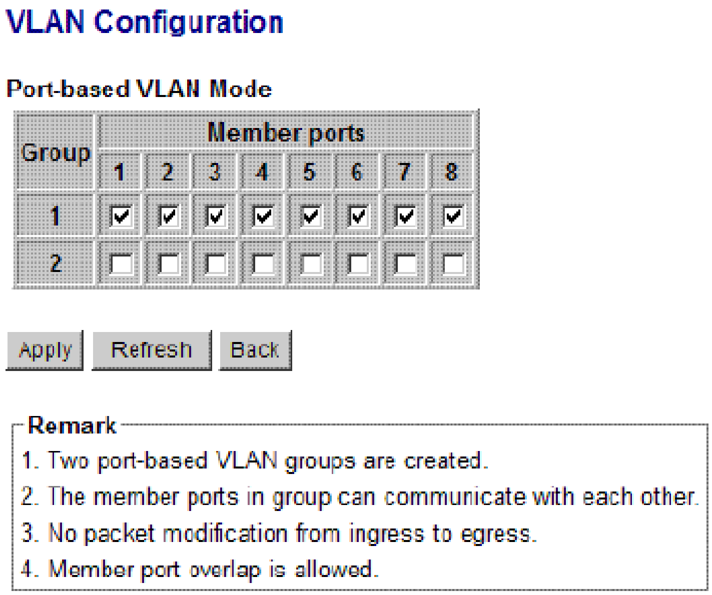
VLAN Configuration	**Description**
VLAN Disable	Select to disable VLAN function All ports are allowed to communicate with each others freely with no VLAN limitation.
Port-based VLAN Mode	Simple configuration for 2 port-based VLAN groups
Port-based VLAN ISP Mode	Simple configuration for 7 port-based VLAN groups (also called metro-mode sometimes)
Simplified Tag-based VLAN Mode	Simple configuration for Tag-based VLAN (Less optional settings)
Advance VLAN Mode	Full VLAN configuration for port-based and Tag-based VLAN
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

4.6.1 Port-based VLAN Mode



VLAN Configuration

○ VLAN Disable
● Port-based VLAN Mode > Setting
○ Port-based VLAN ISP Mode > Setting
○ Advanced VLAN Mode > Setting



VLAN Configuration

Port-based VLAN Mode

Group	Member ports							
	1	2	3	4	5	6	7	8
1	☑	☑	☑	☑	☑	☑	☑	☑
2	☐	☐	☐	☐	☐	☐	☐	☐

Remark

1. Two port-based VLAN groups are created.
2. The member ports in group can communicate with each other.
3. No packet modification from ingress to egress.
4. Member port overlap is allowed.

Configuration	Description
Group 1, 2	Port-based VLAN group number
Member ports	Select member ports for the group
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

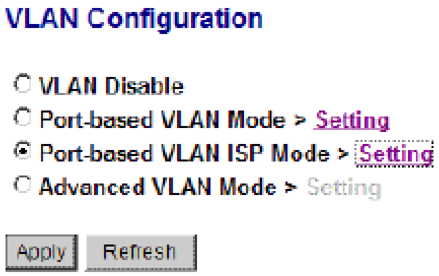
Operation in this mode:

1. The member ports of two groups are allowed to overlap.
2. The member ports in same group can communicate with other members only.
3. No packet tag is examined.
4. A received packet will not be modified (i.e. tagging or untagging) through VLAN operation till it is transmitted.

Note:

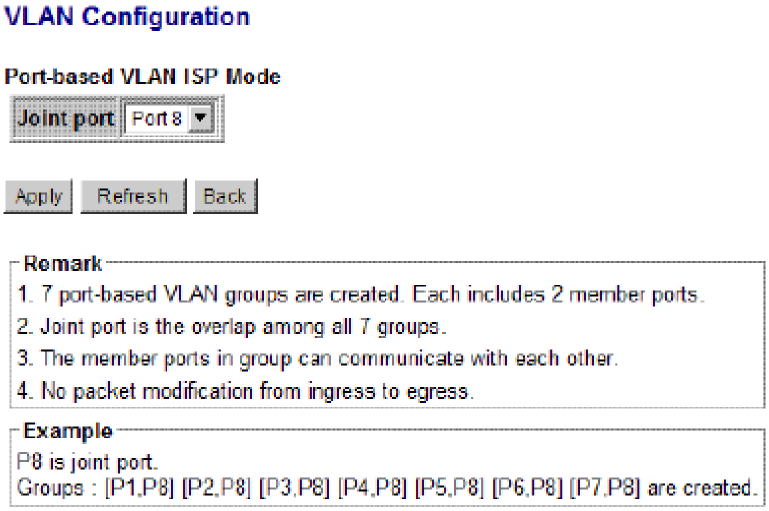
VLAN group 1 is configured with VID (VLAN ID) 1 and group 2 is configured with VID 2 by the system automatically.

4.6.2 Port-based VLAN ISP Mode



VLAN Configuration

○ VLAN Disable
○ Port-based VLAN Mode > Setting
● Port-based VLAN ISP Mode > Setting
○ Advanced VLAN Mode > Setting



VLAN Configuration

Port-based VLAN ISP Mode

Joint port: Port 8

Remark

1. 7 port-based VLAN groups are created. Each includes 2 member ports.
2. Joint port is the overlap among all 7 groups.
3. The member ports in group can communicate with each other.
4. No packet modification from ingress to egress.

Example

P8 is joint port.
Groups : [P1,P8] [P2,P8] [P3,P8] [P4,P8] [P5,P8] [P6,P8] [P7,P8] are created.

Configuration	Description
Joint port	Select a port as the joint port for all 7 port-based VLAN groups
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

Example:

If Port 8 is selected as the joint port, the 7 port-based VLAN groups are configured as follows automatically:

Group 1 - member [Port 1, Port 8], Group 2 - member [Port 2, Port 8]
Group 3 - member [Port 3, Port 8], Group 4 - member [Port 4, Port 8]
Group 5 - member [Port 5, Port 8], Group 6 - member [Port 6, Port 8]
Group 7 - member [Port 7, Port 8]

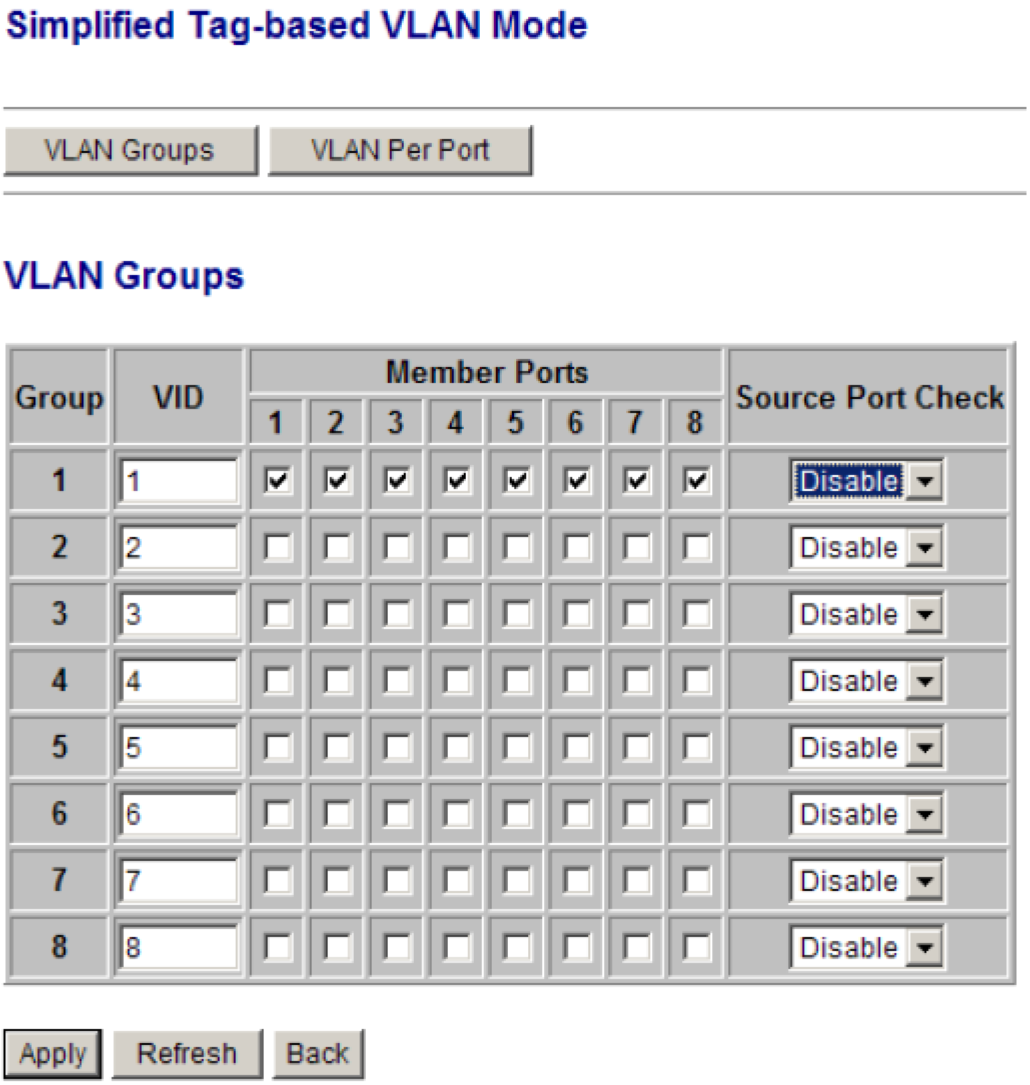
Mode Operation:

1. The joint port is the shared member port for all groups.
2. Two member ports are configured in each group.
3. The member ports in same group can communicate with other only.
4. No packet tag is examined.
5. A received packet will not be modified (i.e. tagging or untagging) through VLAN operation till it is transmitted.

Note:

The seven groups are configured with associated VID 1 ~ 7 respectively by the system.

4.6.3 Simplified Tag-based VLAN Mode



Simplified Tag-based VLAN Mode

VLAN Groups

Group	VID	Member Ports								Source Port Check
		1	2	3	4	5	6	7	8	
1	1	☑	☑	☑	☑	☑	☑	☑	☑	Disable
2	2	□	□	□	□	□	□	□	□	Disable
3	3	□	□	□	□	□	□	□	□	Disable
4	4	□	□	□	□	□	□	□	□	Disable
5	5	□	□	□	□	□	□	□	□	Disable
6	6	□	□	□	□	□	□	□	□	Disable
7	7	□	□	□	□	□	□	□	□	Disable
8	8	□	□	□	□	□	□	□	□	Disable

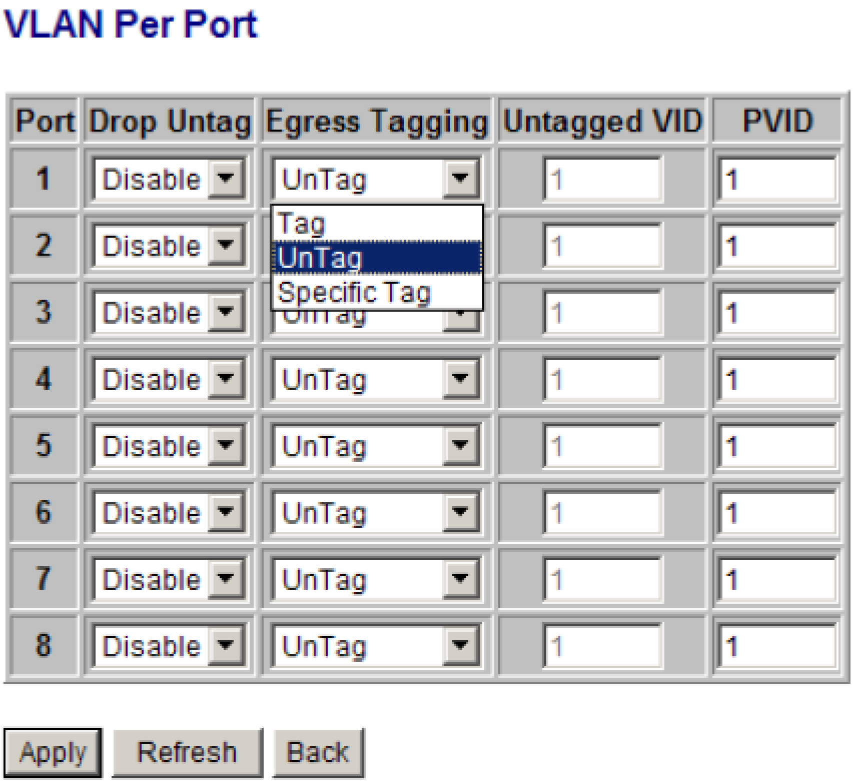
Configuration	Description
[VLAN Groups]	Click to configure VLAN groups first
[VLAN Per Port]	Click to configure per port simplified VLAN settings

4.6.3.1 VLAN Groups

Configuration	**Description**
Group	Group number
VID	VID of the VLAN to which this group is associated *1 ~ 4095* - decimal 12-bit VID value
Member Ports	Select the admitted egress ports for the packets belong to the VLAN *Port 1 ~ 8* - click to select
Source Port Check	Check whether the ingress port is the member port of the VLAN *Enable* - set to enable this check, the packet is dropped if ingress port is not member port of the VLAN. *Disable* - set to disable this check
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

Note: This VLAN group configuration is also applied to Advanced VLAN configuration

4.6.3.2 Per Port Settings



VLAN Per Port

Port	Drop Untag	Egress Tagging	Untagged VID	PVID
1	Disable	UnTag	1	1
2	Disable		1	1
3	Disable	UnTag	1	1
4	Disable	UnTag	1	1
5	Disable	UnTag	1	1
6	Disable	UnTag	1	1
7	Disable	UnTag	1	1
8	Disable	UnTag	1	1

Configuration	Description
Port	Port number
Drop Untag	Drop all untagged packets and priority-tagged packets (ingress)
	Enable - drop untagged packets and priority-tagged packets
	Disable - admit untagged packets and priority-tagged packets
Egress Tagging	Tagging rule for egress operation
	Tag - Tagging all egress packets
	Untag - No tagging for all egress packets
	Specific *Tag* - Tagging egress packets except those matched [Untagged VID]
Untagged VID	VID for *Specific Tag* in [Egress Tagging] setting
	1 ~ *4095* - decimal 12-bit VID value
PVID	Port VID, VID of Ingress Default Tag (See section 4.6.4.1)
	1 ~ *4095* - decimal 12-bit VID value
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

4.6.3.3 Simplified Tag-based VLAN Operation

Ingress filtering setting [Drop Untag] = *Enable*

Ingress Packets	**Rule**
Untagged packets	Dropped
Priority packets	Dropped
Tagged packets	Admitted to get into forwarding operation

Ingress filtering setting [Drop Untag] = *Disable*

Ingress Packets	**Rule**
Untagged packets	Admitted to get into forwarding operation
Priority packets	Admitted to get into forwarding operation
Tagged packets	Admitted to get into forwarding operation

Ingress filtering setting [Drop Untag] = *Disable*

Egress rule setting [Egress Tagging] = *Tag*

Ingress Packets	**Egress rule**
Untagged packets	Tagging with *Ingress Default Tag** (Tagging)
Priority packets	Tagging with *Ingress Default Tag** (Tagging)
Tagged packets	Egress with no packet modification

** Ingress Default Tag = Ingress port PVID + CFI (0) + User priority (0)*

Ingress filtering setting [Drop Untag] = *Disable*

Egress rule setting [Egress Tagging] = *Untag*

Ingress Packets	**Egress rule**
Untagged packets	Egress with no packet modification (untagged)
Priority packets	Egress with no packet modification (untagged)
Tagged packets	Tag is removed (Untagging)

** Ingress Default Tag = Ingress port PVID + CFI (0) + User priority (0)*

Ingress filtering setting [Drop Untag] = *Disable*

Egress rule setting [Egress Tagging] = *Specific Tag*

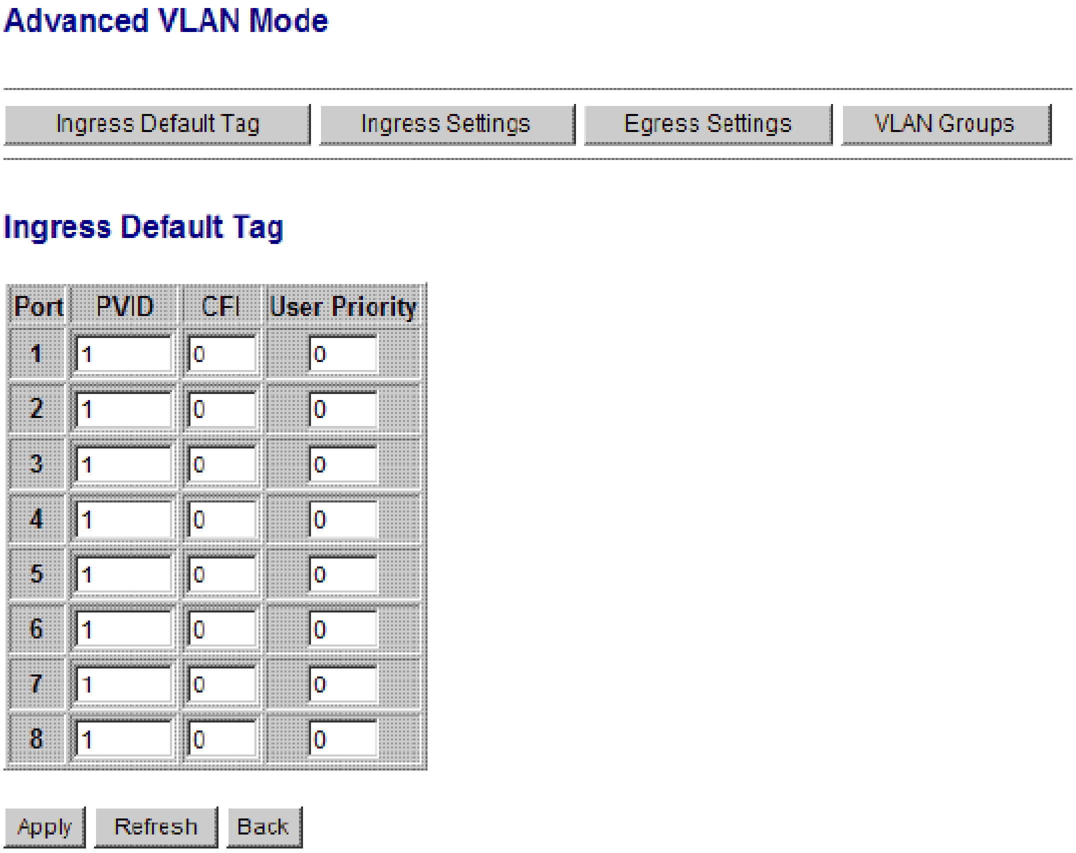
Ingress Packets	**Egress rule**
Untagged packets	Tagging with *Ingress Default Tag** (Tagging)
Priority packets	Tagging with *Ingress Default Tag** (Tagging)
Tagged packets	Egress with no packet modification except the packets with VID equal to [Untagged VID] setting*

* *Ingress Default Tag = Ingress port PVID + CFI (0) + User priority (0)*
& not equal to [Untagged VID] setting

* *The packets with VID equal to [Untagged VID] setting are removed the tag.*

For more information about Ingress Default Tag, refer to section 3.3.3 and 4.6.4.1.

4.6.4 Advanced VLAN Mode



Port	PVID	CFI	User Priority
1	1	0	0
2	1	0	0
3	1	0	0
4	1	0	0
5	1	0	0
6	1	0	0
7	1	0	0
8	1	0	0

Configuration	**Description**
Ingress Default Tag	Click to configure per port Ingress Default Tag settings
Ingress Settings	Click to configure per port ingress settings
Egress Settings	Click to configure per port egress settings
VLAN Groups	Click to configure VLAN group table

4.6.4.1 Ingress Default Tag

Configuration	Description
Port	Port number
PVID	Port VID, VID for Ingress Default Tag *1 ~ 4095* - decimal 12-bit VID value
CFI	CFI for Ingress Default Tag *0, 1* - 1-bit CFI value
User Priority	User priority for Ingress Default Tag *0 ~ 7* - decimal 3-bit value
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

PVID is used as index for VLAN classification (VLAN group table lookup) in one of the following conditions:

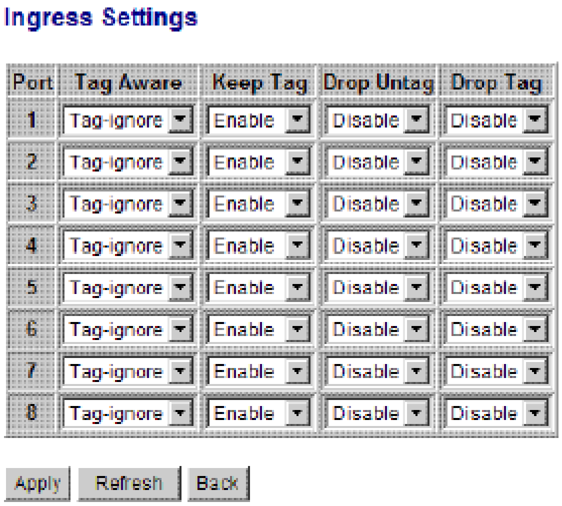
1. Ingress port [Tag Aware] setting = *Tag-ignore*
2. Ingress port [Tag Aware] setting = *Tag-aware*
   and the received packet is untagged or priority-tagged

[PVID+CFI+User Priority] = Ingress Default Tag for the ingress port

It is used as the tag for insertion in egress tagging operation in one of the following conditions:

1. Ingress port [Tag Aware] setting = *Tag-ignore*, Egress port [Insert Tag] = *Enable*
2. Ingress port [Tag Aware] setting = *Tag-aware*, Egress port [Insert Tag] = *Enable*
   and the received packet is untagged or priority-tagged

4.6.4.2 Ingress Settings



Ingress Settings

Port	Tag Aware	Keep Tag	Drop Untag	Drop Tag
1	Tag-ignore	Enable	Disable	Disable
2	Tag-ignore	Enable	Disable	Disable
3	Tag-ignore	Enable	Disable	Disable
4	Tag-ignore	Enable	Disable	Disable
5	Tag-ignore	Enable	Disable	Disable
6	Tag-ignore	Enable	Disable	Disable
7	Tag-ignore	Enable	Disable	Disable
8	Tag-ignore	Enable	Disable	Disable

Configuration	**Description**
Port	Port number
Tag Aware	Check tag data for every received packet *Tag-aware* - set to activate Tag-based mode *Tag-ignore* - set to use port-based mode and ignore any tag in packet
Keep Tag	Tag is removed from the received packet if exists *Enable* - set to activate tag removal for VLAN-tagged packets *Disable* - set to disable tag removal function
Drop Untag	Drop all untagged packets and priority-tagged packets *Enable* - drop untagged packets and priority-tagged packets *Disable* - admit untagged packets and priority-tagged packets
Drop Tag	Drop all VLAN-tagged packets *Enable* - drop VLAN-tagged packets *Disable* - admit VLAN-tagged packets
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

Note:

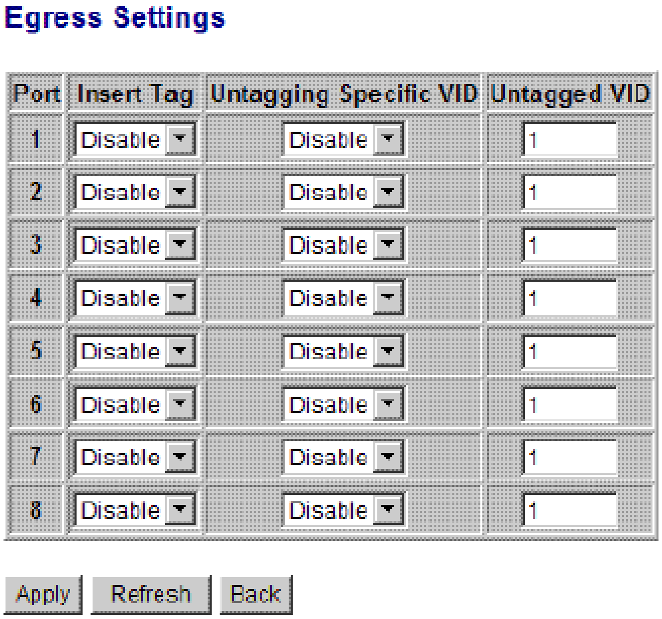
1. *Priority-tagged packet (VID=0) is treated as untagged packet in the switch.*
2. *[Tag Aware] setting affects the index used for VLAN classification (VLAN table lookup). The following table lists the index used:*

Ingress [Tag Aware] setting

Received packet type	***Tag-ignore***	***Tag-aware***
Untagged	PVID	PVID
Priority-tagged (VID=0)	PVID	PVID
VLAN-tagged (VID>0)	PVID	Packet tag VID

3. *Both [Drop Untag] and [Drop Tag] are set to Disable to admit all packets.*

4.6.4.3 Egress Settings



Egress Settings

Port	Insert Tag	Untagging Specific VID	Untagged VID
1	Disable	Disable	1
2	Disable	Disable	1
3	Disable	Disable	1
4	Disable	Disable	1
5	Disable	Disable	1
6	Disable	Disable	1
7	Disable	Disable	1
8	Disable	Disable	1

Configuration	**Description**
Port	Port number
Insert Tag	Activate tagging (Insert a tag to the packet) *Enable* - set to activate tagging *Disable* - set to disable tagging function
Untagging Specific VID	No tag insertion if packet tag information matches [Untagged VID] *Enable* - set to enable this function *Disable* - set to disable this function
Untagged VID	VID for [Untagging Specific VID] setting *1 ~ 4095* - decimal 12-bit VID value
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

The inserted tag sources when [Insert Tag] = *Enable* are listed as follows:

Received packet type	**[Tag Aware]=*Tag-ignore***	**[Tag Aware]=*Tag-aware***
Untagged	Ingress Default Tag	Ingress Default Tag
Priority-tagged (VID=0)	Ingress Default Tag	Ingress Default Tag
VLAN-tagged (VID>0)	Ingress Default Tag	Packet own tag

4.6.4.4 VLAN Groups

Configuration	**Description**
Group	Group number
VID	VID of the VLAN to which this group is associated *1 ~ 4095* - decimal 12-bit VID value
Member Ports	Select the admitted egress ports for the packets belong to the VLAN *Port 1 ~ 8* - click to select
Source Port Check	Check whether the ingress port is the member port of the VLAN *Enable* - set to enable this check, the packet is dropped if ingress port is not member port of the VLAN. *Disable* - set to disable this check
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

Note: This VLAN groups configuration is also applied to Advanced VLAN configuration.

4.6.5 Simplified Tag-based VLAN vs. Advanced VLAN

Simplified Tag-based mode comes from "Advanced" mode actually. Some optional settings in "Advanced" mode are pre-configured and hidden for no change under Simplified mode. The following table lists the setting relations between Simplified mode and Advanced:

Hidden Advanced settings & pre-configured value in Simplified Mode

Setting	Value
[CFI]	*0*
[User Priority]	*0*
[Tag Aware]	*enable*
[Keep Tag]	*disable*
[Drop Tag]	*disable*

Simplified Mode [Egress Tagging] is equal to combination of Advanced Mode [Insert Tag] & [Untagging Specific VID]. The setting options are:

Simplified Mode	**Advanced Mode**	
[Egress Tagging]	**[Insert Tag]**	**[Untagging Specific VID]**
Tag	*Enable*	*Disable*
Untag	*Disable*	*Disable*
Specific Tag	*Enable*	*Enable*

4.6.6 Important Notes for VLAN Configuration

Some considerations should be checked in configuring VLAN settings:

1. **Switch VLAN Mode selection**

   It is suggested to evaluate your VLAN application first and plan your VLAN configuration carefully before applying it. Any incorrect setting might cause network problem.

2. **Aggregation/Trunking configuration**

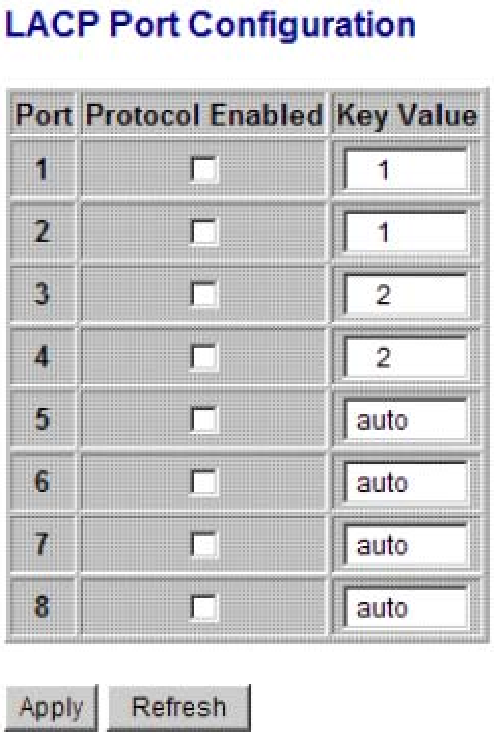
   Make sure the members of a link aggregation (trunk) group are configured with same VLAN configuration and are in same VLAN group.

3. **Double Tagged in Advanced VLAN Mode**

   For a received packet, Ingress port [Keep Tag] setting and Egress port [Insert Tag] setting are enabled at the same time. It will cause the packet double-tagged when egress. Although, it is often applied in Q-in-Q provider bridging application. However, such condition should be avoided in normal VLAN configuration. See table below:

Ingress port	**Egress port**		
[Keep Tag]	**[Insert Tag]**	**Received Packet**	**Packet Transmitted**
Enable	*Enable*	Priority-tagged	Double-tagged
Enable	*Enable*	VLAN-tagged	Double-tagged

4.7 LACP



LACP Port Configuration

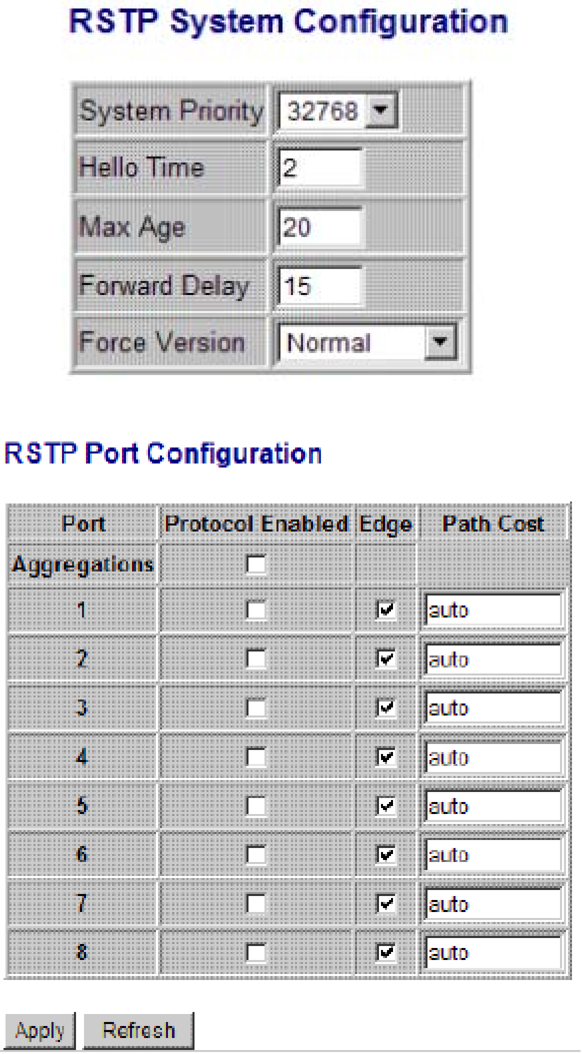
Port	Protocol Enabled	Key Value
1	□	1
2	□	1
3	□	2
4	□	2
5	□	auto
6	□	auto
7	□	auto
8	□	auto

Configuration	**Description**
Port	Port number
Protocol Enabled	Enable LACP support for the port
Key Value	An integer value assigned to the port that determines which ports are aggregated into an LACP link aggregate. Set same value to the ports in same LACP link aggregate. Value: 1 ~ 255. *Auto* - key value is assigned by the system
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

Notes:

1. *This configuration is used to configure LACP aggregate groups.*
2. *The ports with same key value are in same LACP aggregate group.*
3. *The ports with Auto key are in same LACP aggregate group.*
4. *The ports configured in non-LACP aggregation are not available in this configuration.*

4.8 RSTP



RSTP System Configuration

System Priority	32768 ▾
Hello Time	2
Max Age	20
Forward Delay	15
Force Version	Normal ▾

RSTP Port Configuration

Port	Protocol Enabled	Edge	Path Cost
Aggregations	☐		
1	☐	☑	auto
2	☐	☑	auto
3	☐	☑	auto
4	☐	☑	auto
5	☐	☑	auto
6	☐	☑	auto
7	☐	☑	auto
8	☐	☑	auto

Configuration	Description
System Priority	The lower the bridge priority is the higher priority it has. Usually, the bridge with the highest bridge priority is the root. Value: 0 ~ 61440
Hello Time	Hello Time is used to determine the periodic time to send normal BPDU from designated ports among bridges. It decides how long a bridge should send this message to other bridge to tell I am alive. Value: 1 ~ 10
Max Age	When the switch is the root bridge, the whole LAN will apply this setting as their maximum age time. Value: 6 ~ 40
Forward Delay	This figure is set by Root Bridge only. The forward delay time is defined as the time spent from Listening state moved to Learning state and also from Learning state moved to Forwarding state of a port in bridge. Value: 4 ~ 30

Force Version — Two options are offered for choosing STP algorithm.
Compatible - STP (IEEE 802.1D)
Normal - RSTP (IEEE 802.1w)

Aggregations — Enabled to support port trunking in STP. It means a link aggregate is treated as a physical port in RSTP/STP operation.

Port Protocol Enabled — Port is enabled to support RSTP/STP.

Port Edge — An Edge Port is a port connected to a device that knows nothing about STP or RSTP. Usually, the connected device is an end station. Edge Ports will immediately transit to forwarding state and skip the listening and learning state because the edge ports cannot create bridging loops in the network.

Port Path Cost — Specifies the path cost of the port that switch uses to determine which port are the forwarding ports the lowest number is forwarding ports, the rage is 1 ~ 200,000,000 and *Auto*. *Auto* means a default cost is automatically calculated in RSTP operation based on the port link speed.

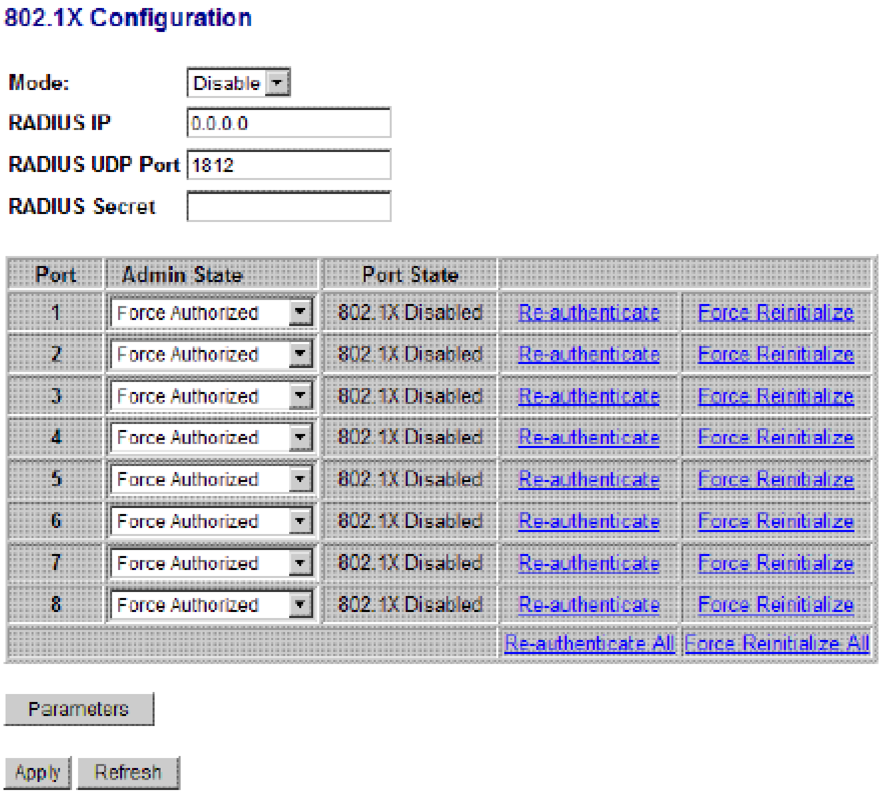
The default costs are :

Link Speed	Auto Default Cost
10Mbps	2000000
100Mbps	200000
1000Mbps	20000

[Apply] — Click to apply the configuration change

[Refresh] — Click to refresh current configuration

4.9 802.1X Configuration



802.1X Configuration

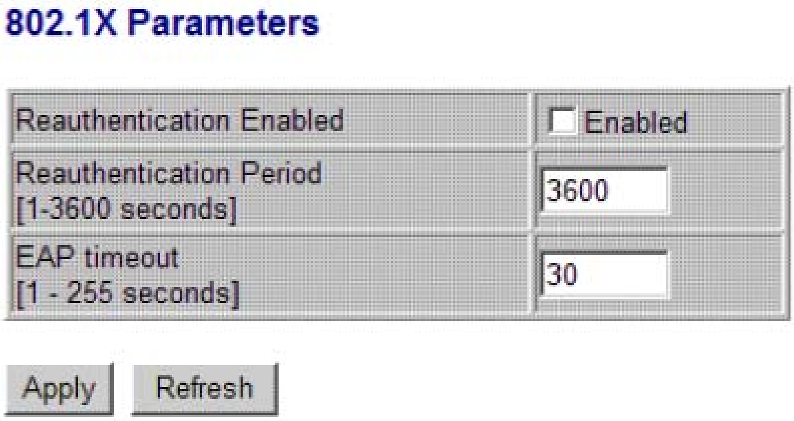
Mode:	Disable
RADIUS IP	0.0.0.0
RADIUS UDP Port	1812
RADIUS Secret	

Port	Admin State	Port State		
1	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
2	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
3	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
4	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
5	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
6	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
7	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
8	Force Authorized	802.1X Disabled	Re-authenticate	Force Reinitialize
			Re-authenticate All	Force Reinitialize All

Configuration	Description
Mode	*Disabled* - disable 802.1X function *Enabled* - enable 802.1X function
RADIUS IP	IP address of the Radius server
RADIUS UDP Port	The UDP port for authentication requests to the specified Radius server
RADIUS Secret	The encryption key for use during authentication sessions with the Radius server. It must match the key used on the Radius server.
Port	Port number
Admin State	Port 802.1X control *Auto* - set to the Authorized or Unauthorized state in accordance with the outcome of an authentication exchange between the Supplicant and the Authentication Server. *Force Authorized* - the port is forced to be in authorized state. *Force Unauthorized* - the port is forced to be in unauthorized state.
Port State	Port 802.1X state *802.1X Disabled* - the port is in 802.1X disabled state *Link Down* - the port is in link down state *Authorized* (green color) - the port is in 802.1X authorized state

	Unauthorized (red color) - the port is in 802.1X unauthorized state
[Re-authenticate]	Click to perform a manual authentication for the port
[Force Reinitialize]	Click to perform an 802.1X initialization for the port
[Re-authenticate All]	Click to perform manual authentication for all ports
[Force Reinitialize All]	Click to perform 802.1X initialization for all ports
[Parameters]	Click to configure Re-authentication parameters
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

4.9.1 802.1X Re-authentication Parameters

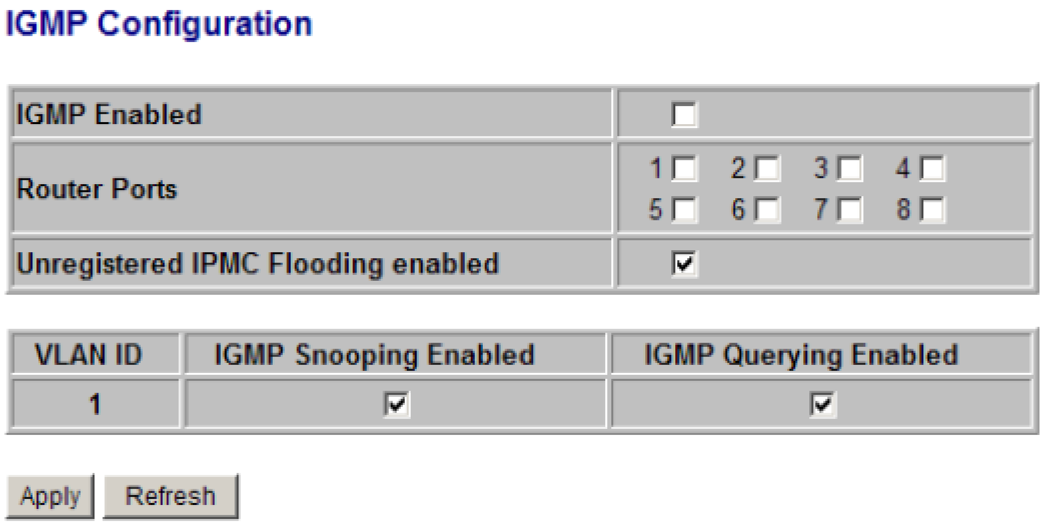


802.1X Parameters

Reauthentication Enabled	□ Enabled
Reauthentication Period [1-3600 seconds]	3600
EAP timeout [1 - 255 seconds]	30

Configuration	Description
Reauthentication Enabled	Check to enable periodical re-authentication for all ports
Reauthentication Period	The period of time after which the connected radius clients must be re-authenticated (unit: second), Value: 1- 3600
EAP timeout	The period of time the switch waits for a supplicant response to an EAP request (unit: second), Value: 1 - 255
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

4.10 IGMP Snooping



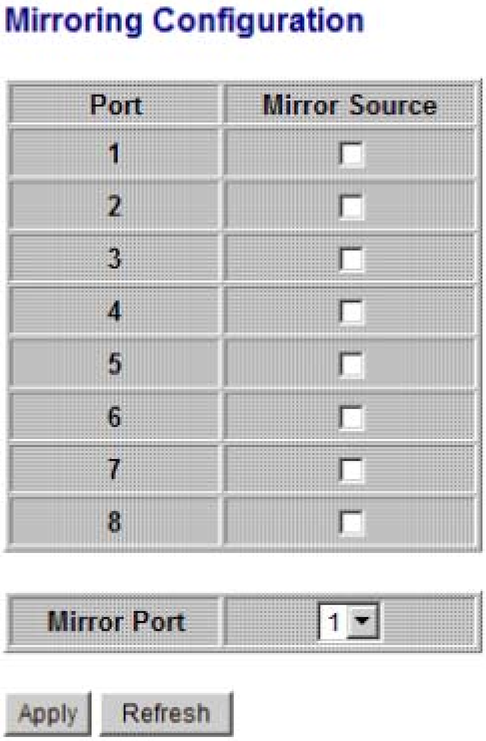
IGMP Configuration

IGMP Enabled	□
Router Ports	1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □
Unregistered IPMC Flooding enabled	☑

VLAN ID	IGMP Snooping Enabled	IGMP Querying Enabled
1	☑	☑

Configuration	Description
IGMP Enabled	Check to enable global IGMP snooping.
Router Ports	Specify which ports have multicast router connected and require being forwarding IPMC packets unconditionally.
VLAN ID	List of current existing VLANs
IGMP Snooping Enabled	Check to enable IGMP snooping on the associated VLAN.
IGMP Querying Enabled	Check to enable IGMP querying on the associated VLAN.
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

4.11 Mirroring

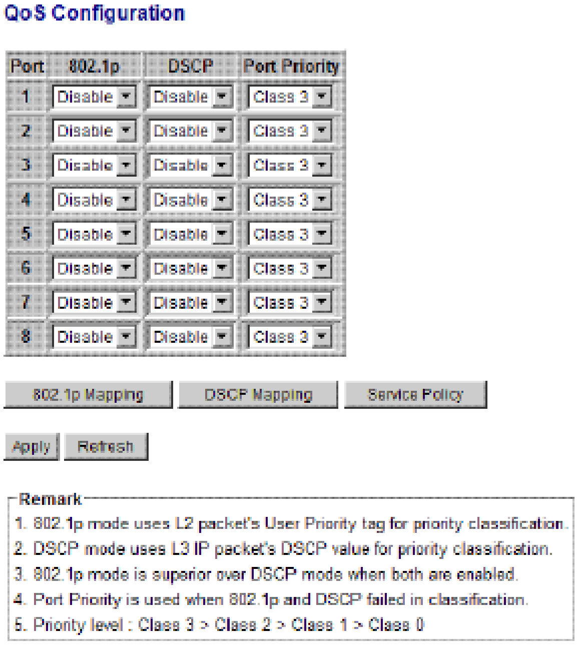

Mirroring Configuration

Port	Mirror Source
1	□
2	□
3	□
4	□
5	□
6	□
7	□
8	□

Mirror Port: 1

Configuration	Description
Mirror Port	The port is forwarded all packets received on the mirrored ports
Mirror Source	Select the ports which will be mirrored all received packets to the mirror port.
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

4.12 Quality of Service



QoS Configuration

Port	802.1p	DSCP	Port Priority
1	Disable	Disable	Class 3
2	Disable	Disable	Class 3
3	Disable	Disable	Class 3
4	Disable	Disable	Class 3
5	Disable	Disable	Class 3
6	Disable	Disable	Class 3
7	Disable	Disable	Class 3
8	Disable	Disable	Class 3

Remark

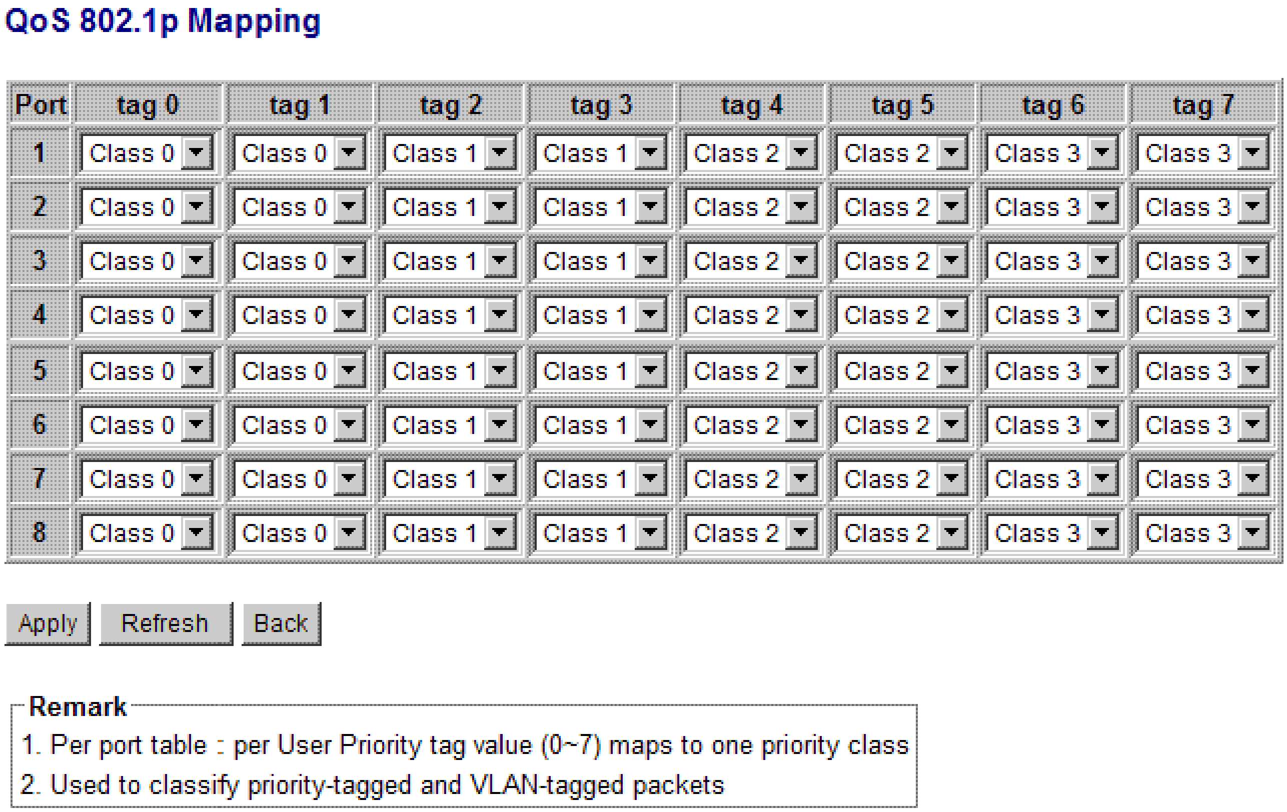
1. 802.1p mode uses L2 packet's User Priority tag for priority classification.
2. DSCP mode uses L3 IP packet's DSCP value for priority classification.
3. 802.1p mode is superior over DSCP mode when both are enabled.
4. Port Priority is used when 802.1p and DSCP failed in classification.
5. Priority level : Class 3 > Class 2 > Class 1 > Class 0

QoS Configuration	**Description**
Port	Port number
802.1p	802.1p priority classification *Enable* - set to enable this classification to the port for priority-tagged and VLAN-tagged packets *Disable* - 802.1p classification is not applied to the port
DSCP	DSCP classification *Enable* - set to enable DSCP classification to the port for IP packets *Disable* - DSCP classification is not applied to the port
Port Priority	Port default priority class, it is used as a port-based QoS mode when 802.1p and DSCP classifications are disabled. It is also used as default priority class for the received packet when both 802.1p and DSCP classification failed in classification. *Class 3* ~ *Class 0* - priority class
[802.1p Mapping]	Click to configure 802.1p mapping tables.
[DSCP Mapping]	Click to configure DSCP mapping table.
[Service Policy]	Click to configure per port egress service policy mode.
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

Note:

802.1p classification is superior over DSCP classification if both are enabled. That means if a received packet is classified successfully in 802.1p classification, the classified priority class is used directly for the packet and the result of DSCP classification is ignored.

4.12.1 802.1p Mapping



QoS 802.1p Mapping

Port	tag 0	tag 1	tag 2	tag 3	tag 4	tag 5	tag 6	tag 7
1	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
2	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
3	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
4	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
5	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
6	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
7	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3
8	Class 0	Class 0	Class 1	Class 1	Class 2	Class 2	Class 3	Class 3

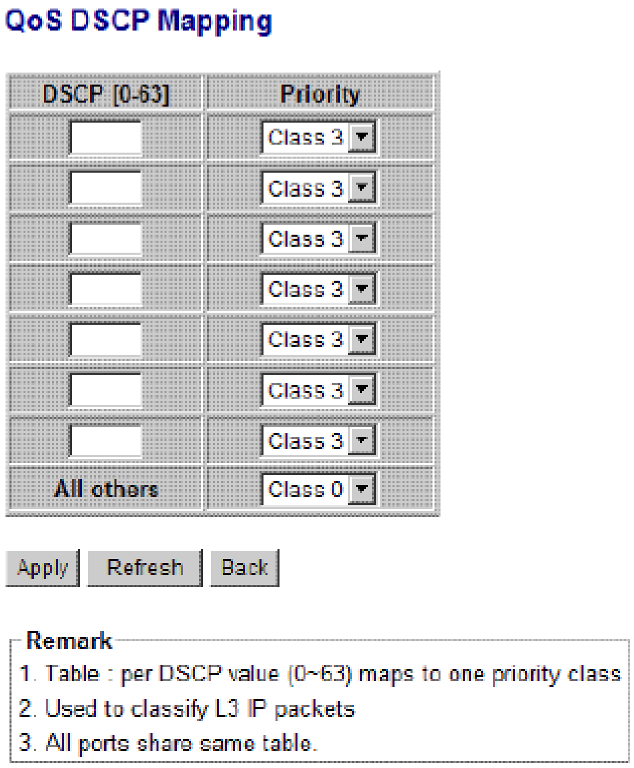
Remark

1. Per port table : per User Priority tag value (0~7) maps to one priority class
2. Used to classify priority-tagged and VLAN-tagged packets

Configuration	Description
Port n	Port number n
tag m	3-bit User priority tag value m (range : 0 ~ 7)
Priority class	Mapped priority class for tag m on Port n *Class 3 ~ Class 0*
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

Every ingress port has its own 802.1p mapping table. The table is referred in 802.1p priority classification for the received packet.

4.12.2 DSCP Mapping



QoS DSCP Mapping

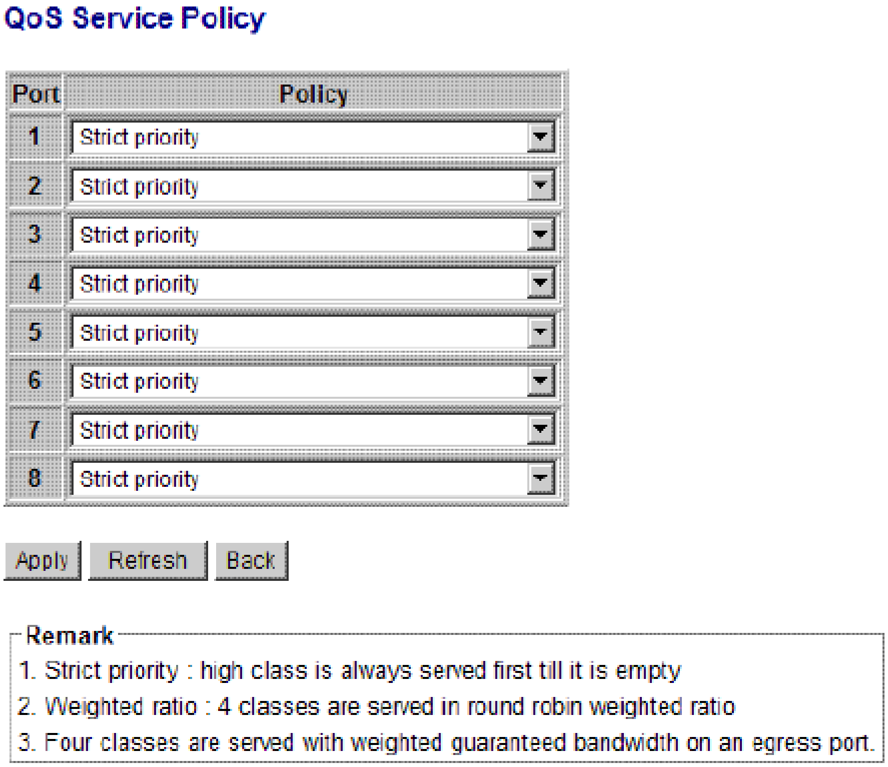
DSCP [0-63]	Priority
	Class 3
	Class 3
	Class 3
	Class 3
	Class 3
	Class 3
	Class 3
All others	Class 0

Remark
1. Table : per DSCP value (0~63) maps to one priority class
2. Used to classify L3 IP packets
3. All ports share same table.

Configuration	Description
DSCP [0-63]	Seven user-defined DSCP values which are configured with a priority class *0 ~ 63* - 6-bit DSCP value in decimal
Priority	The priority class configured for the user-defined DSCP value *Class 3 ~ Class 0*
All others	The other DSCP values not in the seven user-defined values are assigned a default priority class *Class 3 ~ Class 0*
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

Only one DSCP mapping table is configured and applied to all ports. The table is referred in DSCP priority classification.

4.12.3 QoS Service Policy



QoS Service Policy

Port	Policy
1	Strict priority
2	Strict priority
3	Strict priority
4	Strict priority
5	Strict priority
6	Strict priority
7	Strict priority
8	Strict priority

Remark

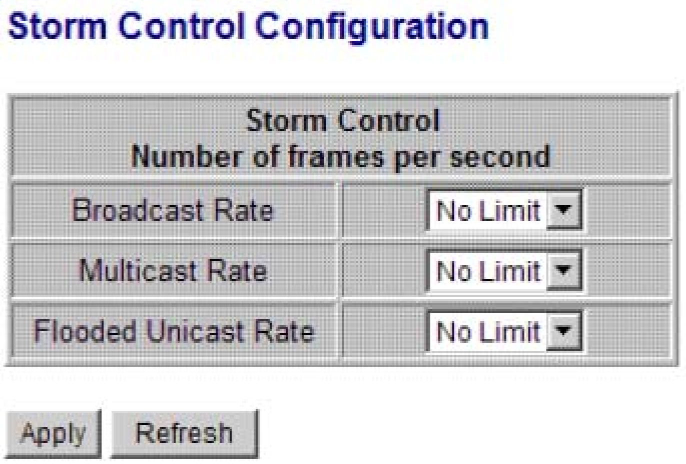
1. Strict priority : high class is always served first till it is empty
2. Weighted ratio : 4 classes are served in round robin weighted ratio
3. Four classes are served with weighted guaranteed bandwidth on an egress port.

Configuration	Description
Port	Port number
Policy	Service policy for egress priority among four egress class queues *Strict priority* - high class queue is served first always till it is empty *Weighted ratio priority Class 3:2:1:0 = 4:3:2:1* - weighted ratio 4:3:2:1 *Weighted ratio priority Class 3:2:1:0 = 5:3:1:1* - weighted ratio 5:3:1:1 *Weighted ratio priority Class 3:2:1:0 = 1:1:1:1* - weighted ratio 1:1:1:1
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration
[Back]	Click to go back to upper menu

Notes:

1. *Queue with higher class number has higher priority than queue with lower class number. That means Class 3 > Class 2 > Class 1 > Class 0 by default.*
2. *In weighted ratio policies, a weighted fairness round robin service is guaranteed normally. However, when excess bandwidth exists higher class queue will take advantage on bandwidth allocation.*

4.13 Storm Control



Storm Control Configuration

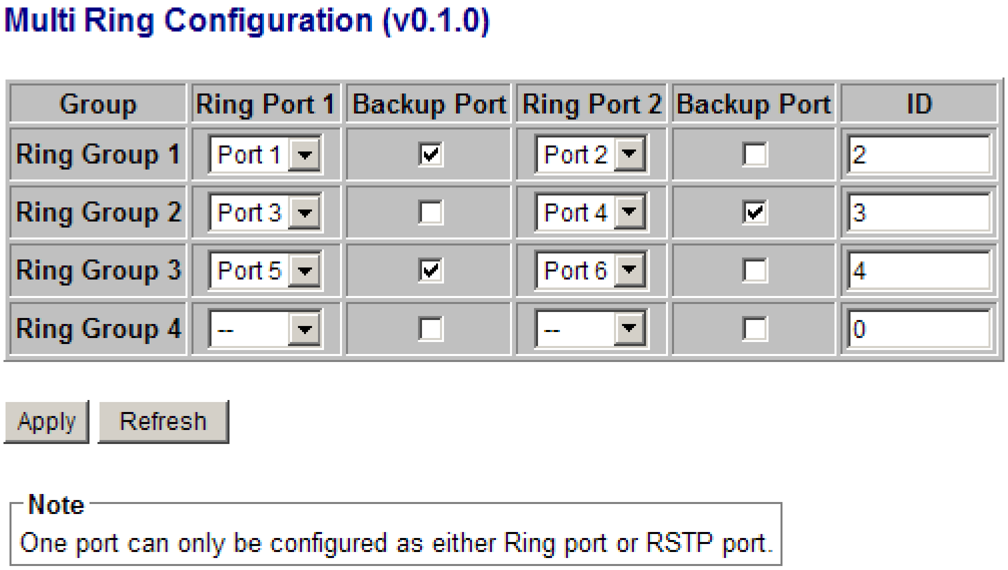
Storm Control Number of frames per second	
Broadcast Rate	No Limit
Multicast Rate	No Limit
Flooded Unicast Rate	No Limit

Configuration	Description
Broadcast Rate	The rate limit of the broadcast packets transmitted on a port.
Broadcast Rate	The rate limit of the Multicast packets transmitted on a port.
Flooded Unicast Rate	The rate limit of the flooded unicast packets transmitted on a port. The flooded unicast packets are those unicast packets whose destination address is not learned in the MAC address table.
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

Notes:

1. *The unit of the rates is pps (packets per second).*
2. *No Limit - no protection control*

4.14 Multi Ring


Multi Ring Configuration (v0.1.0)

Group	Ring Port 1	Backup Port	Ring Port 2	Backup Port	ID
Ring Group 1	Port 1	☑	Port 2	□	2
Ring Group 2	Port 3	□	Port 4	☑	3
Ring Group 3	Port 5	☑	Port 6	□	4
Ring Group 4	--	□	--	□	0

Note

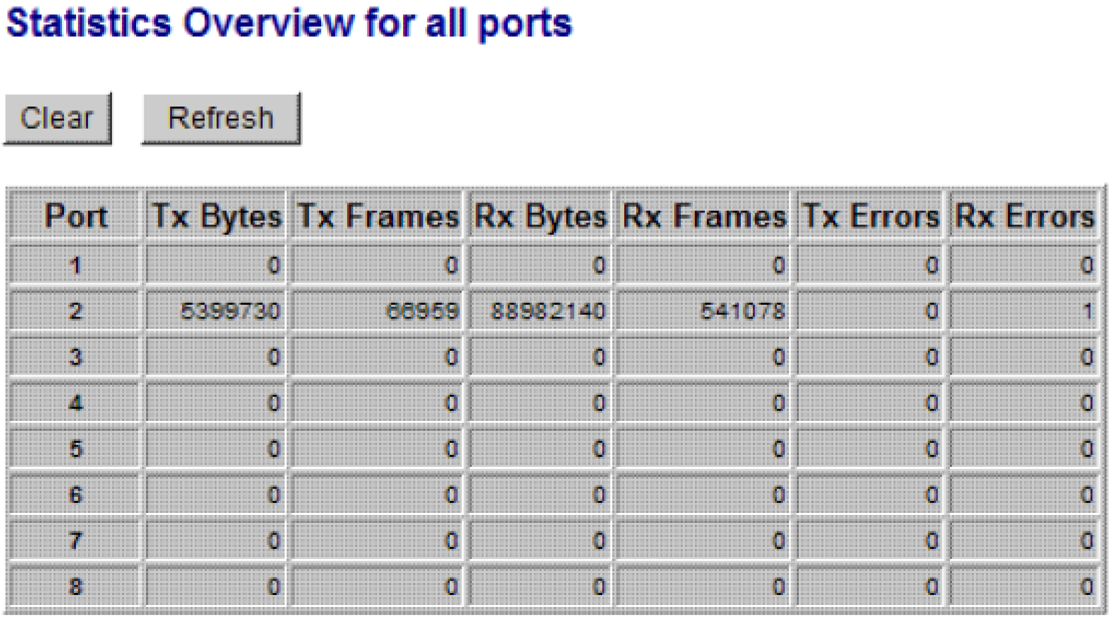
One port can only be configured as either Ring port or RSTP port.

Configuration	Description
Ring Group 1 -4	Up to four redundant rings supported in one switch
Ring Port 1, 2	Two ring ports are needed to support one redundant ring.
Backup Port	Check to specify the ring port as a backup port.
Ring Group ID	One unique ID is assigned for the associated ring group. Value range: 0 ~ 65535. The ring group ID should be same for all switch members in the associated ring.
[Apply]	Click to apply the configuration change
[Refresh]	Click to refresh current configuration

Notes:

1. *One switch provides two ports to support one redundant ring. As a slave switch, both ports are configured* ***<Ring Port>.*** *To be a master of a ring, one port must be set to* ***<Backup Port>****.*
2. *Only one backup port is configured among the member switches in a redundant ring.*
3. *One switched port can only be configured either Multi Ring enabled or RSTP enabled.*

4.15 Statistics Overview

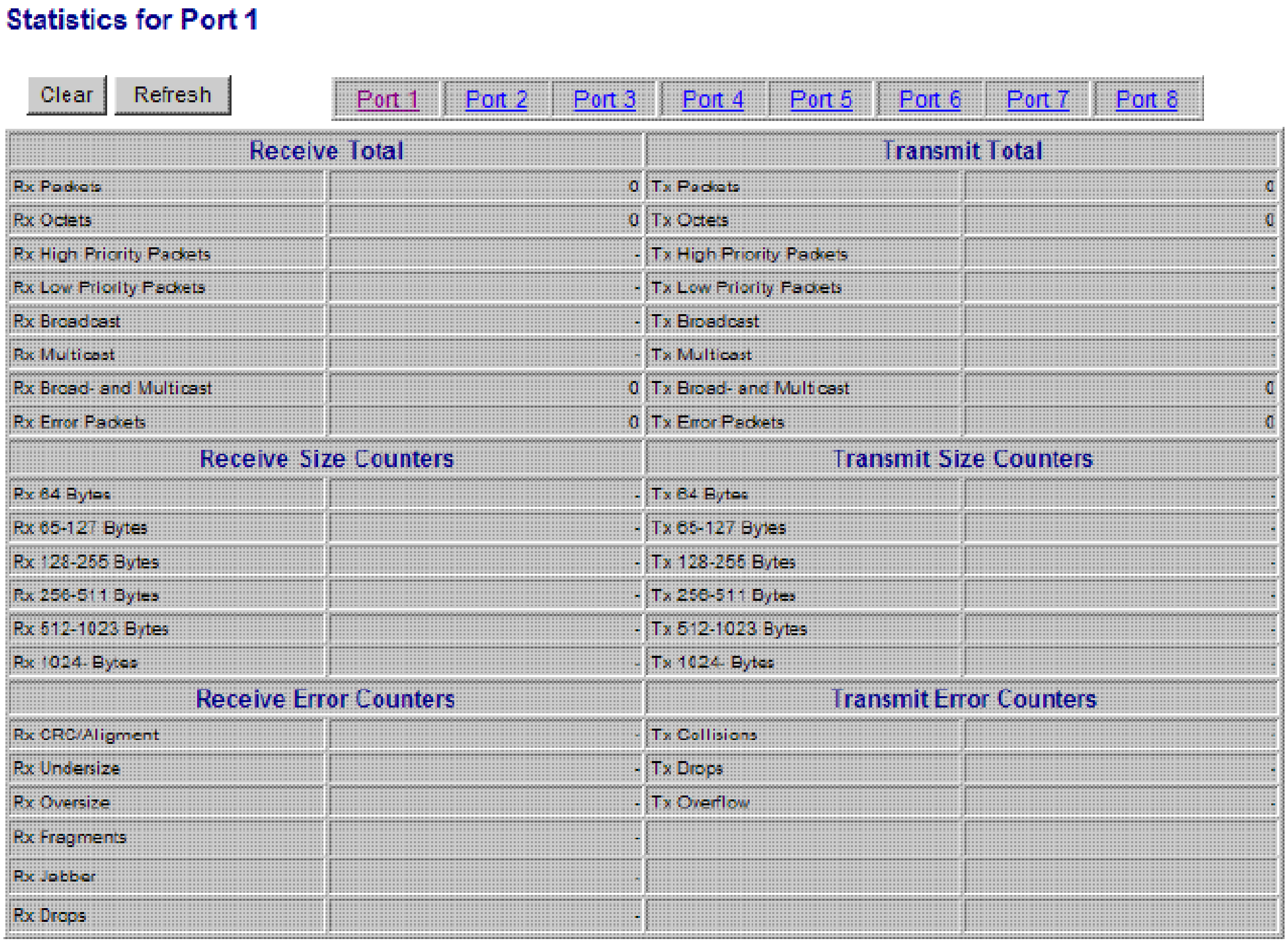


Statistics Overview for all ports

Port	Tx Bytes	Tx Frames	Rx Bytes	Rx Frames	Tx Errors	Rx Errors
1	0	0	0	0	0	0
2	5399730	66959	88982140	541078	0	1
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0

Statistics	Description
Port	Port number
Tx Bytes	Total of bytes transmitted on the port
Tx Frames	Total of packet frames transmitted on the port
Rx Bytes	Total of bytes received on the port
Rx Frames	Total of packet frames received on the port
Tx Errors	Total of error packet frames transmitted on the port
Rx Errors	Total of error packet frames received on the port
[Clear]	Click to reset all statistic counters
[Refresh]	Click to refresh all statistic counters

4.16 Detailed Statistics

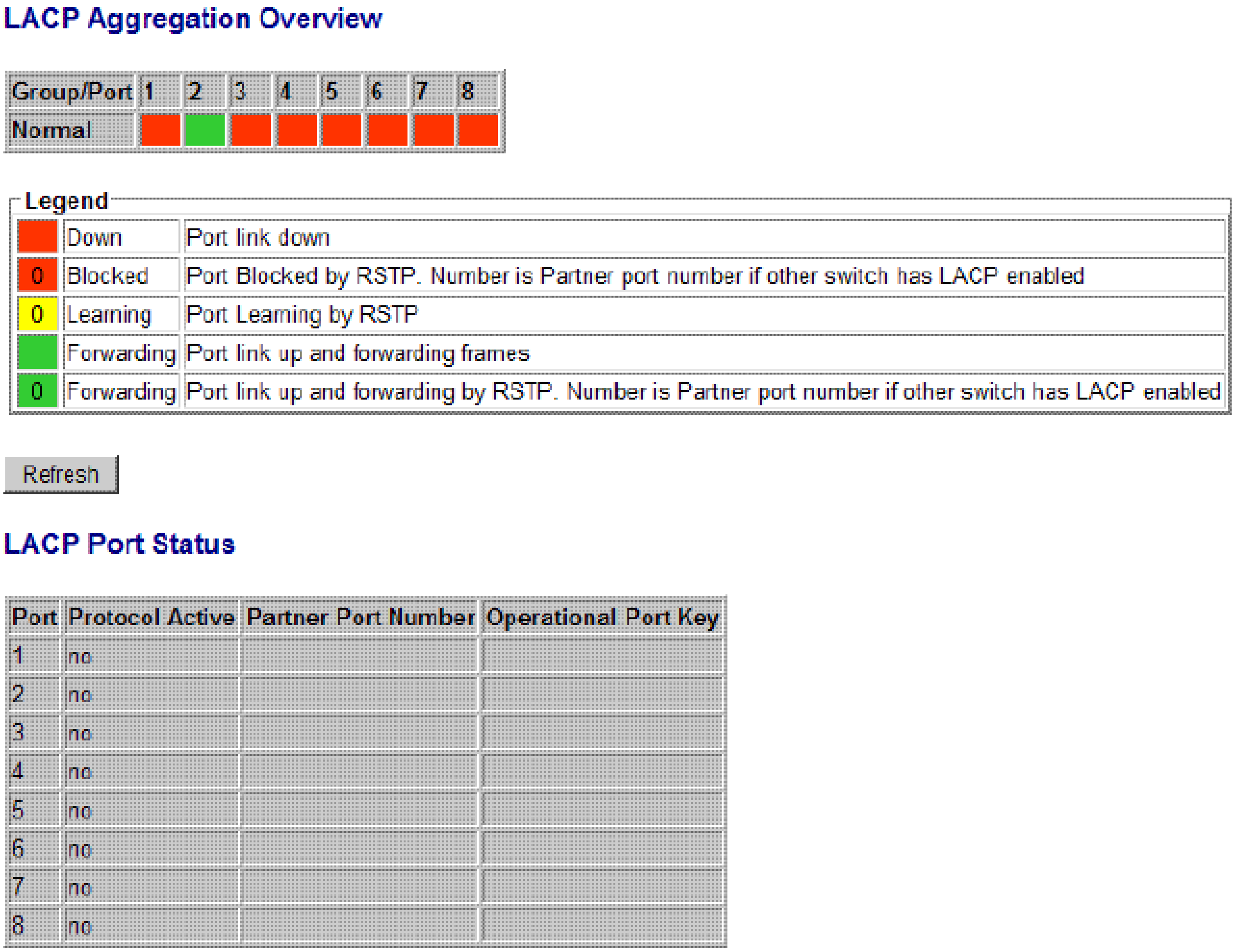


Statistics for Port 1

Receive Total		Transmit Total	
Rx Packets	0	Tx Packets	0
Rx Octets	0	Tx Octets	0
Rx High Priority Packets	-	Tx High Priority Packets	-
Rx Low Priority Packets	-	Tx Low Priority Packets	-
Rx Broadcast	-	Tx Broadcast	-
Rx Multicast	-	Tx Multicast	-
Rx Broad- and Multicast	0	Tx Broad- and Multicast	0
Rx Error Packets	0	Tx Error Packets	0
Receive Size Counters		**Transmit Size Counters**	
Rx 64 Bytes	-	Tx 64 Bytes	-
Rx 65-127 Bytes	-	Tx 65-127 Bytes	-
Rx 128-255 Bytes	-	Tx 128-255 Bytes	-
Rx 256-511 Bytes	-	Tx 256-511 Bytes	-
Rx 512-1023 Bytes	-	Tx 512-1023 Bytes	-
Rx 1024- Bytes	-	Tx 1024- Bytes	-
Receive Error Counters		**Transmit Error Counters**	
Rx CRC/Aligment	-	Tx Collisions	-
Rx Undersize	-	Tx Drops	-
Rx Oversize	-	Tx Overflow	-
Rx Fragments	-		
Rx Jabber	-		
Rx Drops	-		

Button	Description
[Port #]	Click to display the detailed statistics of Port #.
[Clear]	Click to reset all statistic counters
[Refresh]	Click to refresh the displayed statistic counters

4.17 LACP Status



LACP Aggregation Overview

Group/Port	1	2	3	4	5	6	7	8
Normal	🟥	🟩	🟥	🟥	🟥	🟥	🟥	🟥

Legend

🟥	Down	Port link down
0 🟥	Blocked	Port Blocked by RSTP. Number is Partner port number if other switch has LACP enabled
0 🟨	Learning	Port Learning by RSTP
🟩	Forwarding	Port link up and forwarding frames
0 🟩	Forwarding	Port link up and forwarding by RSTP. Number is Partner port number if other switch has LACP enabled

Refresh

LACP Port Status

Port	Protocol Active	Partner Port Number	Operational Port Key
1	no		
2	no		
3	no		
4	no		
5	no		
6	no		
7	no		
8	no		

Status	**Description**
Port	The port number
Normal	Display the ports not LACP enabled.
Group #	The LACP group
Status	The LACP port status presented with color and a number *<Down>* - the port is link down *<Blocked & #>* - the port is blocked by RSTP and the # is the port number of LACP link partner *<Learning>* - the port is learning by RSTP *<Forwarding>* - the port is link up and forwarding frames *<Forwarding & #>* - the port is link up and forwarding frames and the # is the port number of LACP link partner
Partner MAC address	The MAC address of the link partner at the other end of the LACP aggregate

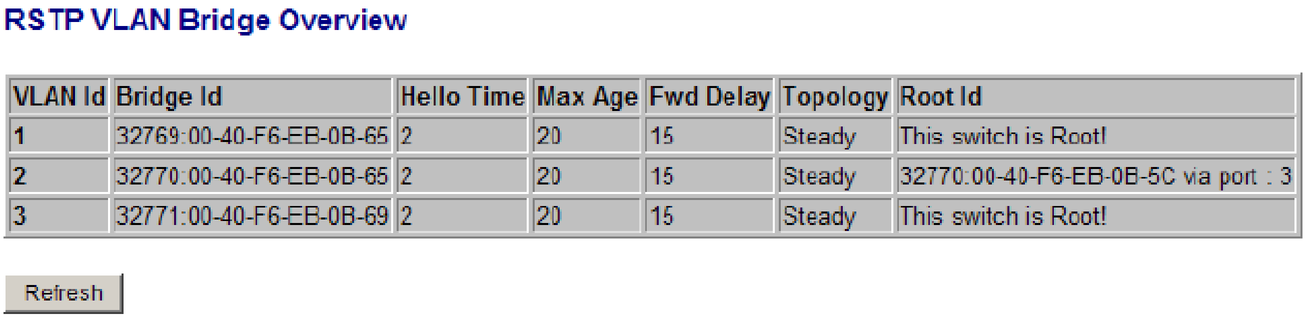
Local Port Aggregated	The ports at local end which are aggregated in same LACP group
[Refresh]	Click to refresh the status

Note: the figure shows an example that two LACP link aggregates are configured.

LACP Port Status	**Description**
Port	The port number
Protocol Active	*yes* - the port is link up and in LACP operation *no* - the port is link down or not in LACP operation
Partner Port Number	The port number of the remote link partner
Operation Port Key	The operation key generated by the system

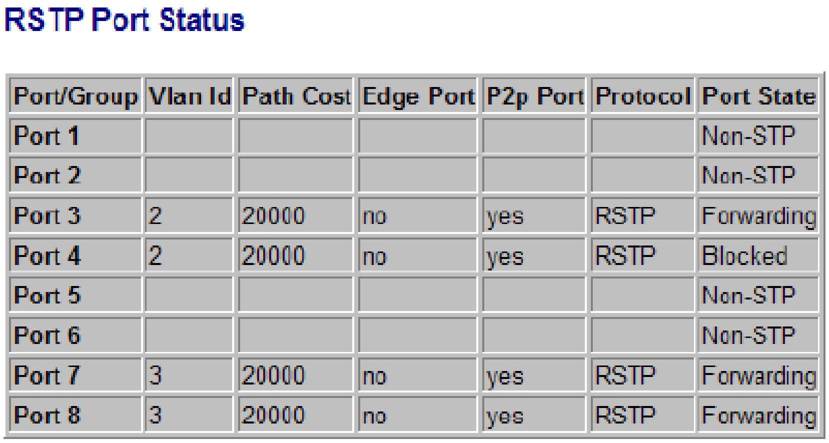
4.18 RSTP Status

The following example shows three RSTP topologies operate in three VLANs configured in a switch.



RSTP VLAN Bridge Overview

VLAN Id	Bridge Id	Hello Time	Max Age	Fwd Delay	Topology	Root Id
1	32769:00-40-F6-EB-0B-65	2	20	15	Steady	This switch is Root!
2	32770:00-40-F6-EB-0B-65	2	20	15	Steady	32770:00-40-F6-EB-0B-5C via port : 3
3	32771:00-40-F6-EB-0B-69	2	20	15	Steady	This switch is Root!



RSTP Port Status

Port/Group	Vlan Id	Path Cost	Edge Port	P2p Port	Protocol	Port State
Port 1						Non-STP
Port 2						Non-STP
Port 3	2	20000	no	yes	RSTP	Forwarding
Port 4	2	20000	no	yes	RSTP	Blocked
Port 5						Non-STP
Port 6						Non-STP
Port 7	3	20000	no	yes	RSTP	Forwarding
Port 8	3	20000	no	yes	RSTP	Forwarding

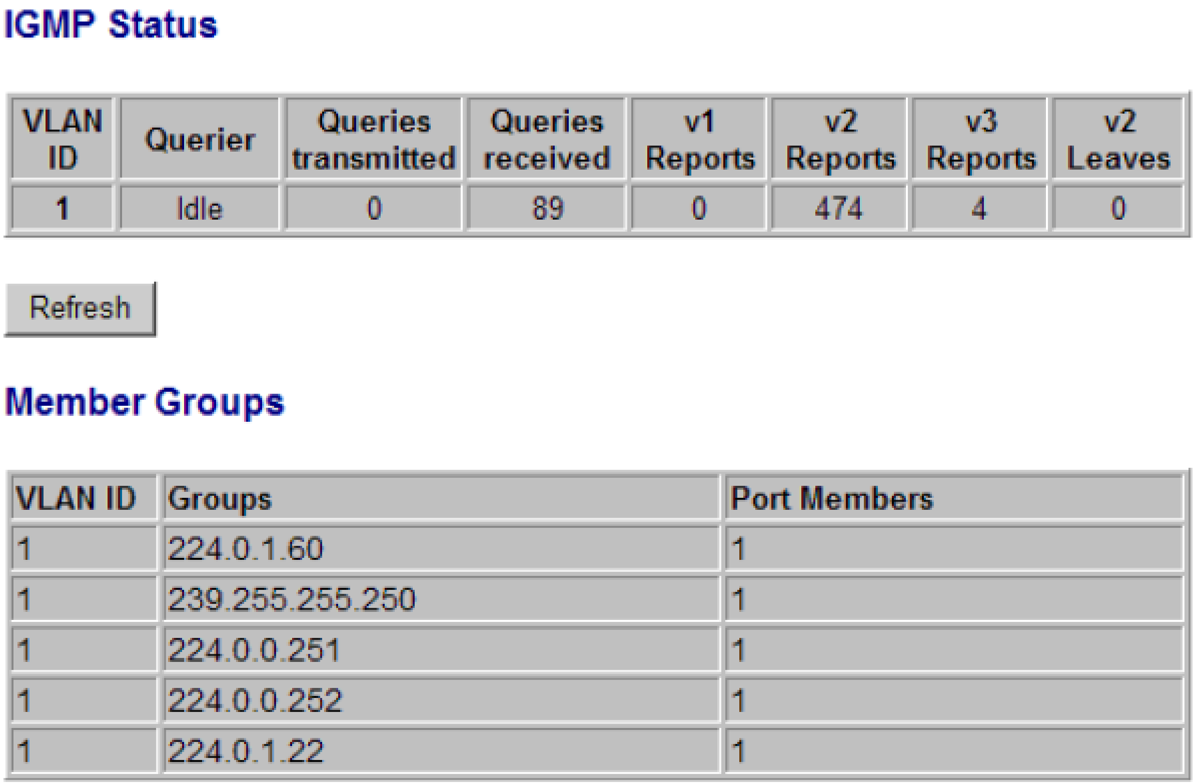
RSTP Status	**Description**
VLAN Id	The VLAN which has STP enabled ports
Bridge Id	STP bridge ID [Priority:MAC address] detected in the associated VLAN
Hello Time	Hello Time is used to determine the periodic time to send normal BPDU from designated ports among bridges. It decides how long a bridge should send this message to other bridge to tell I am alive. *1 ~ 10* seconds
Max. Age	When the switch is root bridge, the whole LAN uses this setting as the maximum age time. *6 ~ 40* seconds
Fwd Delay	This figure is set at Root Bridge only.
Topology	*Steady* - The STP topology is steady. *Changing* - The STP topology is changing.
Root Id	The MAC address of current STP root If the switch is STP root, a message of [The switch is Root.] is displayed.
[Refresh]	Click to refresh the status

RSTP Port Status	**Description**
Port/Group	Port number
VLAN Id	The associated VLAN to which the RSTP port belongs (PVID)
Path Cost	The path cost of the RSTP port
Edge Port	Is the port an edge port?
P2p Port	*Yes* - The port operates in full duplex.
Protocol	The protocol version configured for the port - *RSTP* or *STP*
Port State	*Forwarding* - A port receiving and sending data, normal operation. STP still monitors incoming BPDUs that would indicate it should return to the blocking state to prevent a loop. *Blocking* - A port that would cause a switching loop, no user data is sent or received but it may go into forwarding mode if the other links in use were to fail and the spanning tree algorithm determines the port may transition to the forwarding state. BPDU data is still received in blocking state. *Listening* - The switch processes BPDUs and awaits possible new information that would cause it to return to the blocking state. *Learning* - While the port does not yet forward frames (packets) it does learn source addresses from frames received and adds them to the filtering database (switching database) *Non-STP* - RSTP is disabled.

The above status example shows three STP operate in three different VLANs as follows:
VLAN 1 members: P1, P2, P3, P4, P5, P6, P7, P8
VLAN 2 members: P3, P4
VLAN 3 members: P7, P8
P3 PVID = VLAN 2
P4 PVID = VLAN 2
P7 PVID = VLAN 3
P8 PVID = VLAN 3
P3 and P4 connect to same switch as an STP redundant link associated to VLAN 2.
P7 and P8 connect to another switch as an STP redundant link associated to VLAN 3.

The switch supports STP over multiple VLANs. Each VLAN has individual STP mechanism operating independently.

4.19 IGMP Status



IGMP Status

VLAN ID	Querier	Queries transmitted	Queries received	v1 Reports	v2 Reports	v3 Reports	v2 Leaves
1	Idle	0	89	0	474	4	0

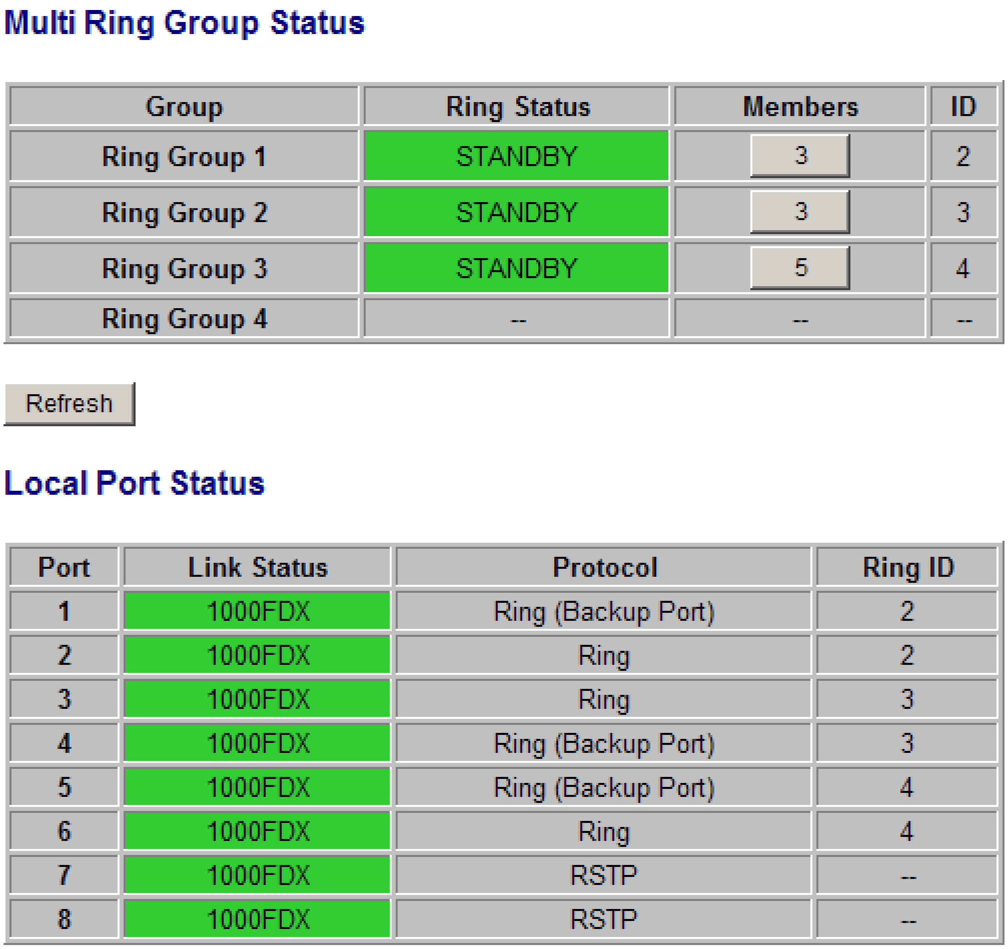
Member Groups

VLAN ID	Groups	Port Members
1	224.0.1.60	1
1	239.255.255.250	1
1	224.0.0.251	1
1	224.0.0.252	1
1	224.0.1.22	1

Status	**Description**
VLAN ID	The VLAN ID of the entry.
Querier Status	Show the Querier status is “Active” or “Idle”.
Queries transmitted	The number of Transmitted Queries.
Queries Received	The number of Received Queries.
V1 Reports	The number of Received V1 Reports.
V2 Reports	The number of Received V2 Reports.
V3 Reports	The number of Received V3 Reports.
V2 Leave	The number of Received V2 Leave.
[Refresh]	Click to refresh the page.

Group Member Status	**Description**
VLAN ID	The VLAN where the groups found
Groups	IPMC group (IP) found on the VLAN
Port Members	Port members found of the group

4.20 Multi Ring Status



Multi Ring Group Status

Group	Ring Status	Members	ID
Ring Group 1	STANDBY	3	2
Ring Group 2	STANDBY	3	3
Ring Group 3	STANDBY	5	4
Ring Group 4	--	--	--

Local Port Status

Port	Link Status	Protocol	Ring ID
1	1000FDX	Ring (Backup Port)	2
2	1000FDX	Ring	2
3	1000FDX	Ring	3
4	1000FDX	Ring (Backup Port)	3
5	1000FDX	Ring (Backup Port)	4
6	1000FDX	Ring	4
7	1000FDX	RSTP	--
8	1000FDX	RSTP	--

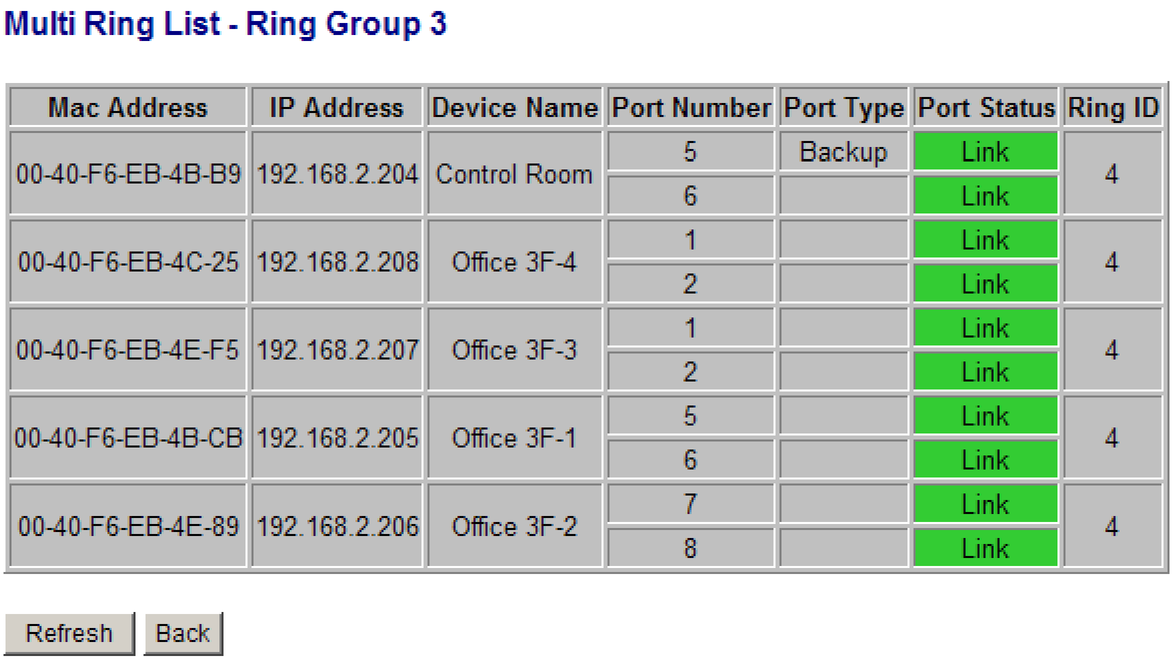
This figure shows an example that three redundant rings are configured and local Port 1/2, Port 3/4 and Port 5/6 connect Ring 2, Ring 3, and Ring 4 respectively. Port 7 and Port 8 connect RSTP network independently.

Status	**Description**
Group #	Ring entities
Ring Status	Status: [*STANDBY*]– The ring is normal and with no failure. The backup link is under standby and not activated. [*BACKUP*] – Failure occurred somewhere on the ring and the master has activated the backup link to support continuous operation of the ring. The ring failure should be repaired immediately by the persons who are in charge. [*Master Failed*] – Possible failure occurred on the master unit itself. No backup support is available. This is a critical situation and should be repaired immediately. [*Backup Port Failed*] – Possible failure occurred on the backup link. No backup

	support is available. This is a critical situation and should be repaired immediately.
Members	The number of the switch members in the ring. Click to browse the ring member information and status. This is a helpful tool for diagnosing where the ring failure is located.
Ring ID	The ring group ID assigned to the ring
[Refresh]	Click to refresh the page.

Local Port Status	Description
Port #	Port number of this switch
Link Status	Port link status (Refer to the section of Port Configuration.)
Protocol	The protocol and role served by the port - *Ring* – normal ring port of the associated redundant ring (Ring ID) *Ring (Backup Port)* - Backup port of the associated redundant ring (Ring ID) *RSTP* – the port is serving RSTP instead of Multi-Ring protocol.
Ring ID	Ring Group ID the port connected

Ring Member Information and Status



Multi Ring List - Ring Group 3

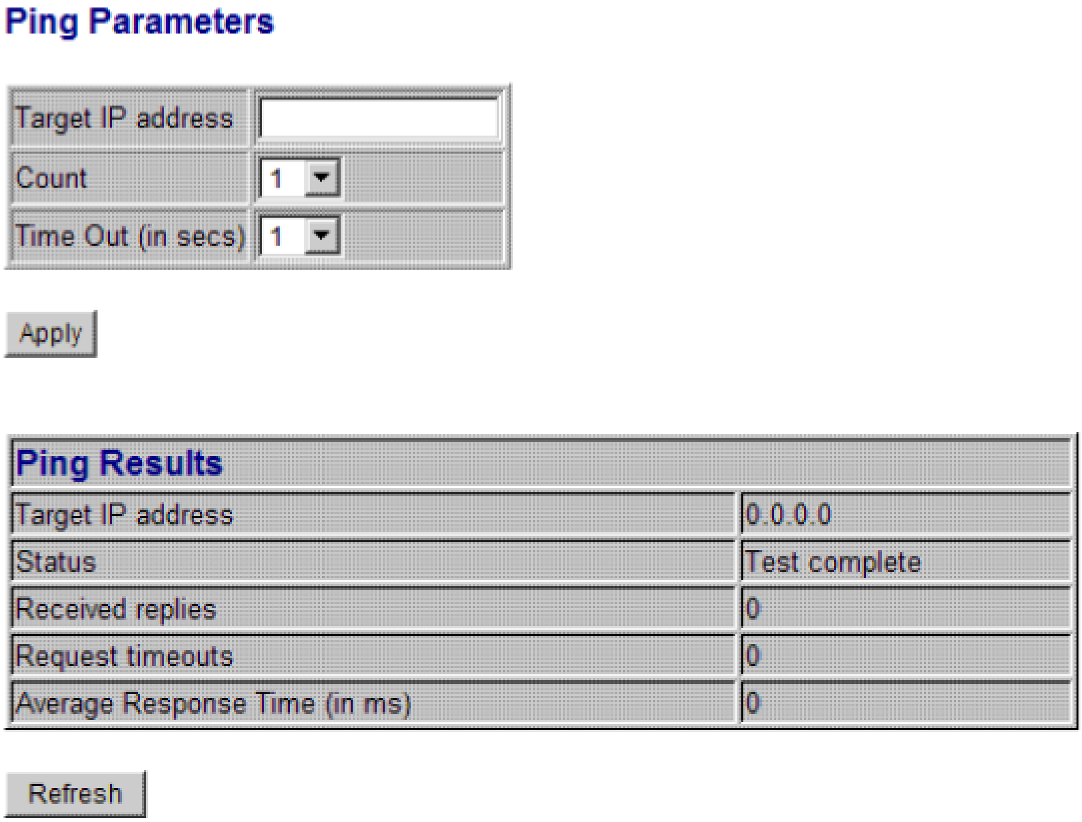
Mac Address	IP Address	Device Name	Port Number	Port Type	Port Status	Ring ID
00-40-F6-EB-4B-B9	192.168.2.204	Control Room	5	Backup	Link	4
			6		Link	
00-40-F6-EB-4C-25	192.168.2.208	Office 3F-4	1		Link	4
			2		Link	
00-40-F6-EB-4E-F5	192.168.2.207	Office 3F-3	1		Link	4
			2		Link	
00-40-F6-EB-4B-CB	192.168.2.205	Office 3F-1	5		Link	4
			6		Link	
00-40-F6-EB-4E-89	192.168.2.206	Office 3F-2	7		Link	4
			8		Link	

This example shows switch member information and status of Ring group 3.

Status	Description

Mac Address	MAC address of each member switch
IP Address	IP address configured of each member switch (See System Configuration.)
Device Name	The name configured for each member switch (See System Configuration.)
Port Number	The ring port pair of each member switch connected on this ring group
Port Type	Whether the ring port is backup port or not
Port Status	Current link status of the ring ports connected on this ring group
Ring ID	Ring group ID of this ring group

4.21 Ping



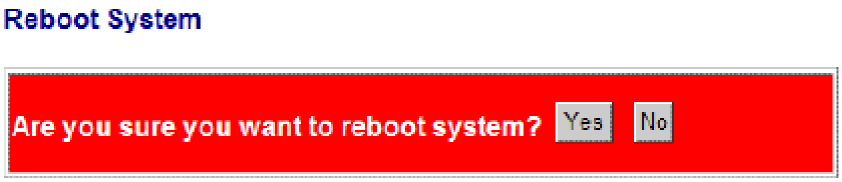
Ping Parameters

Target IP address	
Count	1
Time Out (in secs)	1

Ping Results	
Target IP address	0.0.0.0
Status	Test complete
Received replies	0
Request timeouts	0
Average Response Time (in ms)	0

Ping	**Description**
Target IP Address	The target IP address to which the ping command issues
Count	The number of ping commands generated
Time Out (in secs)	The time out for a reply (in seconds)
[Apply]	Start the ping command
Status	The command status
Received replies	The number of replies received by the system
Request time-outs	The number of requests time out
Average Response Time	The average response time of a ping request (in mini-seconds)

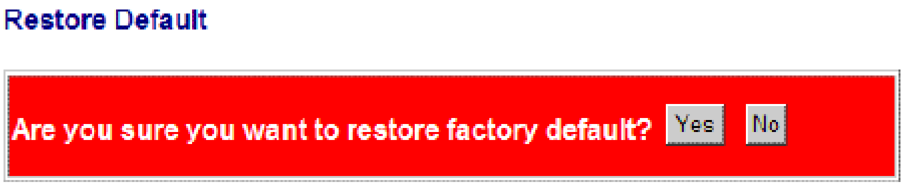
4.22 Reboot System


Reboot System

Are you sure you want to reboot system?

This menu is used to reboot the switch unit remotely with current configuration. Starting this menu will make your current http connection lost. You must rebuild the connection to perform any management operation to the unit.

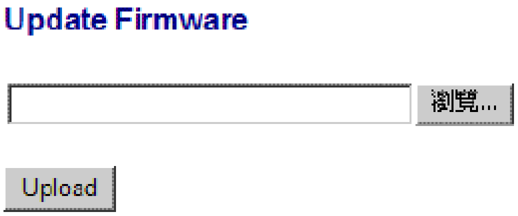
4.23 Restore Default


Restore Default

Are you sure you want to restore factory default?

This menu is used to restore all settings of the switch unit with factory default values. Note that this menu might change the current IP address of the switch and make your current http connection lost.

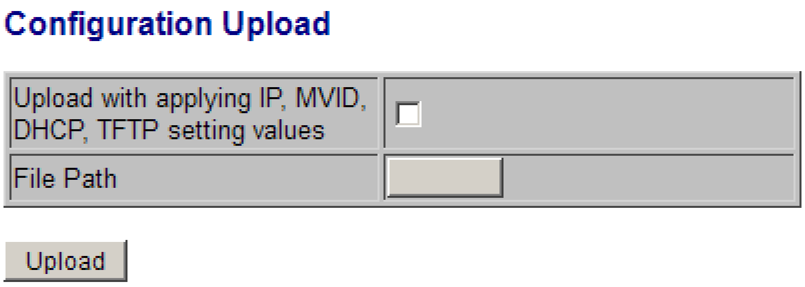
4.24 Update Firmware


Update Firmware

This menu is used to perform in-band firmware (switch software) upgrade. Enter the path and file name of new firmware image file for uploading.

Configuration	**Description**
Filename	Path and filename (warp format)
[Browse]	Click to browse your computer file system for the firmware image file
[Upload]	Click to start upload

4.25 Configuration File Transfer


Configuration Upload

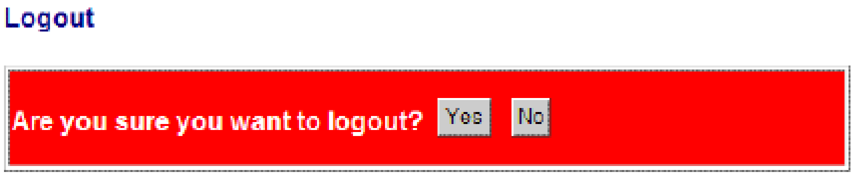
Upload with applying IP, MVID, DHCP, TFTP setting values	□
File Path	

Configuration Download

This [download] command can be used to backup current switch configuration and download it to the connected management PC using default filename, “switch.cfg”.

Configuration	Description
Upload with applying IP, MVID, DHCP, TFTP setting values	Check to apply the IP, MVID, DHCP, TFTP values contained in the configuration file. Otherwise, factory default values are applied.
File Path	Path and filename of a backup configuration file to be uploaded
[Browse]	Click to browse your computer file system for the configuration file
[Upload]	Click to start upload operation from the connected PC to the switch
[Download]	Click to start download operation from the switch to the connected PC

4.26 Logout


Logout

Are you sure you want to logout?

This menu is used to perform a logout from the switch management. If current user does not perform any management operation over 3 minutes, the switch will execute an auto logout and abort the current connection.

5. SNMP Support

SNMP version support	Snmp v1, v2c management	
Managed Objects	MIB-II	
	system	OBJECT IDENTIFIER ::= { mib-2 1 }
	interfaces	OBJECT IDENTIFIER ::= { mib-2 2 }
	ip	OBJECT IDENTIFIER ::= { mib-2 4 }
	snmp	OBJECT IDENTIFIER ::= { mib-2 11 }
	dot1dBridge	OBJECT IDENTIFIER ::= { mib-2 17 }
	ifMIB	OBJECT IDENTIFIER ::= { mib-2 31 }
Private Objects	enterprise.device.sys_obj	
	DDM_Table	OBJECT IDENTIFIER ::= { sys_obj 1 } [*1]
	Reboot	OBJECT IDENTIFIER ::= { sys_obj 2 } [*2]
	tftpUpload	OBJECT IDENTIFIER ::= { sys_obj 3 } [*3]
RFC	RFC 3418 - Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	
	RFC 1907 - Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)	
	RFC 1213 - Management Information Base for Network Management of TCP/IP-based internets:MIB-II	
	RFC 1158 - Management Information Base for network management of TCP/IP-based internets: MIB-II	
	RFC 1493 - Definitions of Managed Objects for Bridges	
	RFC 2863 - The Interfaces Group MIB	
	RFC 1573 - Evolution of the Interfaces Group of MIB-II	
SNMP Trap Support	TRAP_COLDSTART - the device boot up trap	
	TRAP_LINKUP - the port link recovery trap	
	TRAP_LINKDOWN - port link down trap	

**1: DDM_Table provides the information and status detected on the ports featured with DDM function. The information table is displayed and indexed by port number.*

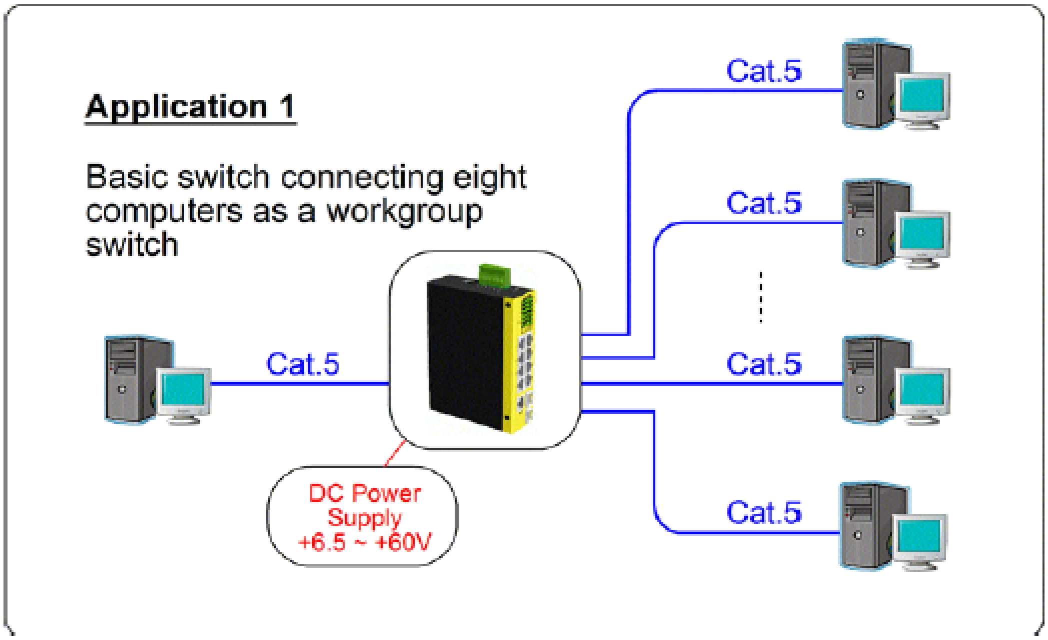
**2: Reboot mib allows rebooting the switch over SNMP protocl.*

**3: tftpUpload mib allows performing firmware update from tftp server over SNMP protocol.*

6. Applications

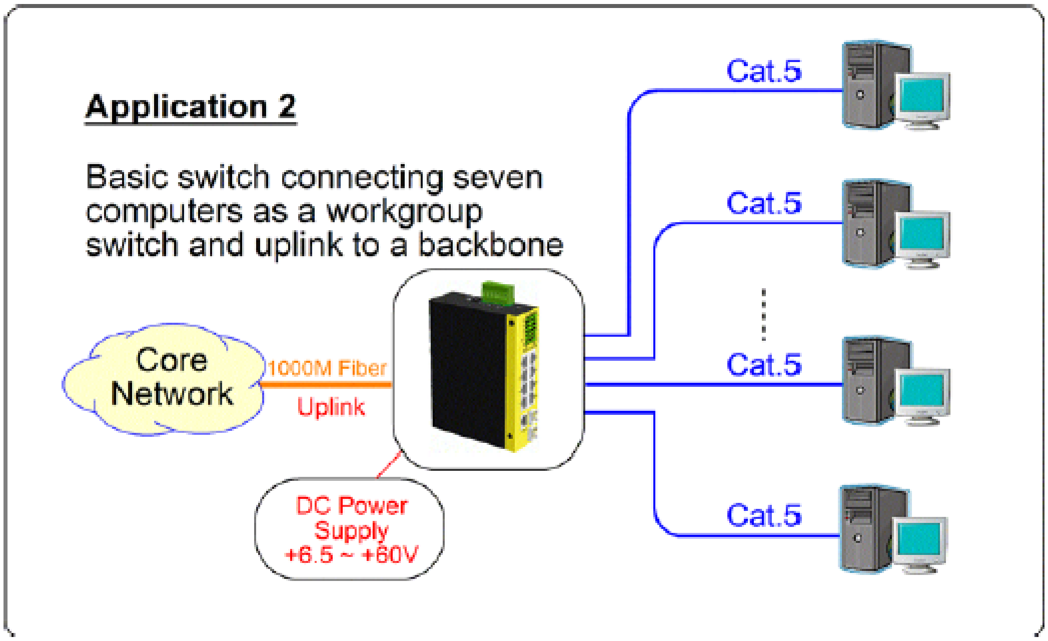
6.1 Applications with No PoE

The following figure illustrates a basic switch connects eight computers via Cat.5 cables.



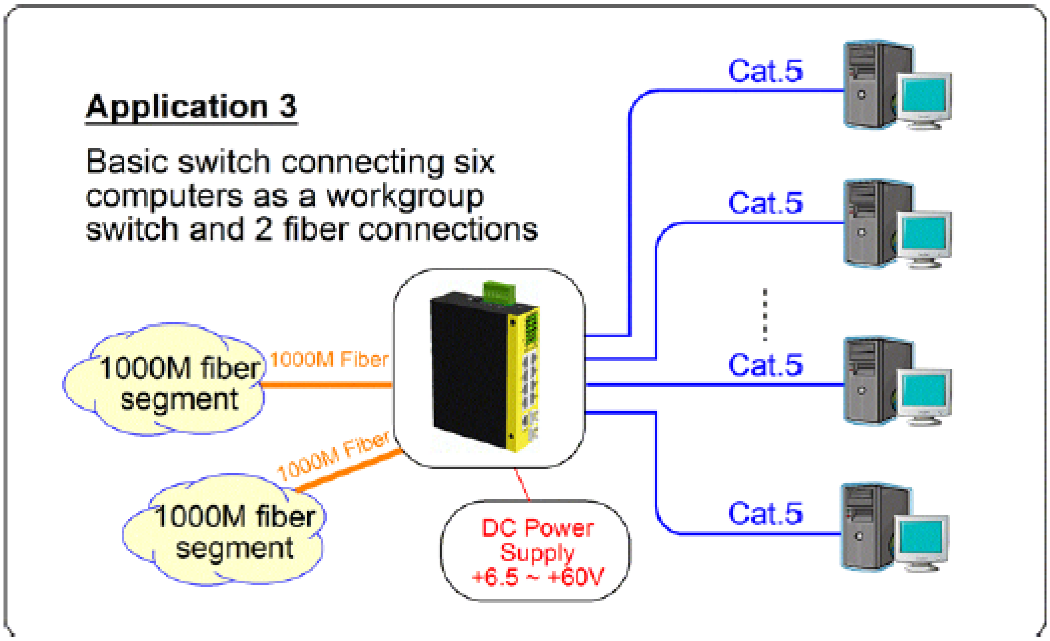
Application 1
Basic switch connecting eight computers as a workgroup switch
Cat.5
Cat.5
Cat.5
Cat.5
Cat.5
DC Power Supply +6.5 ~ +60V

The following figure illustrates the switch connects seven computers via Cat.5 and uplinks to a fiber backbone.



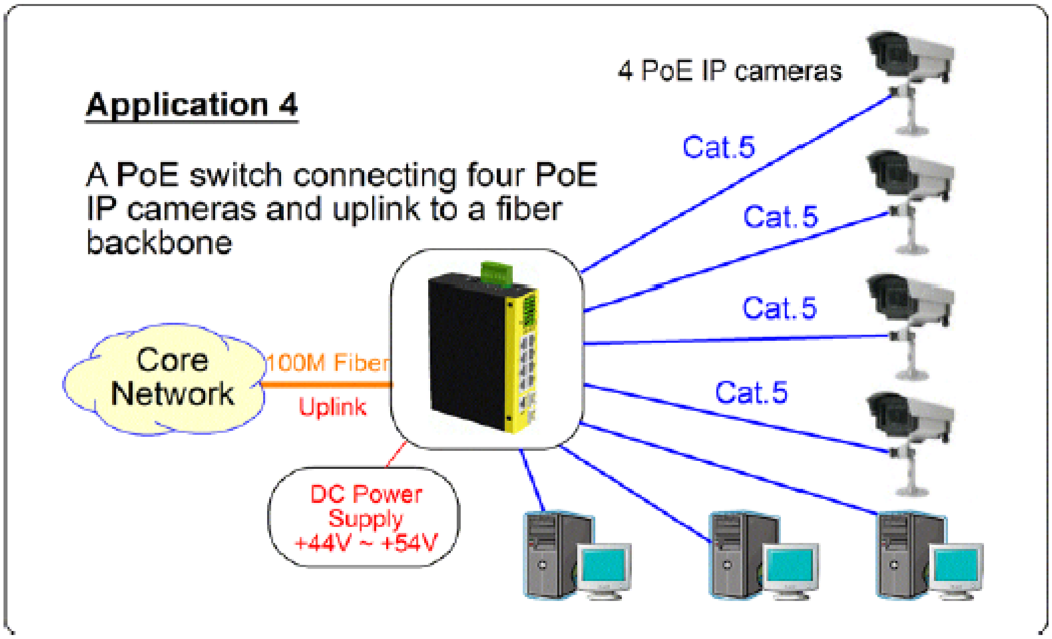
Application 2
Basic switch connecting seven computers as a workgroup switch and uplink to a backbone
Core Network
1000M Fiber
Uplink
Cat.5
Cat.5
Cat.5
Cat.5
DC Power Supply +6.5 ~ +60V

The following figure illustrates the switch connects six computers via Cat.5 and two fiber segments.

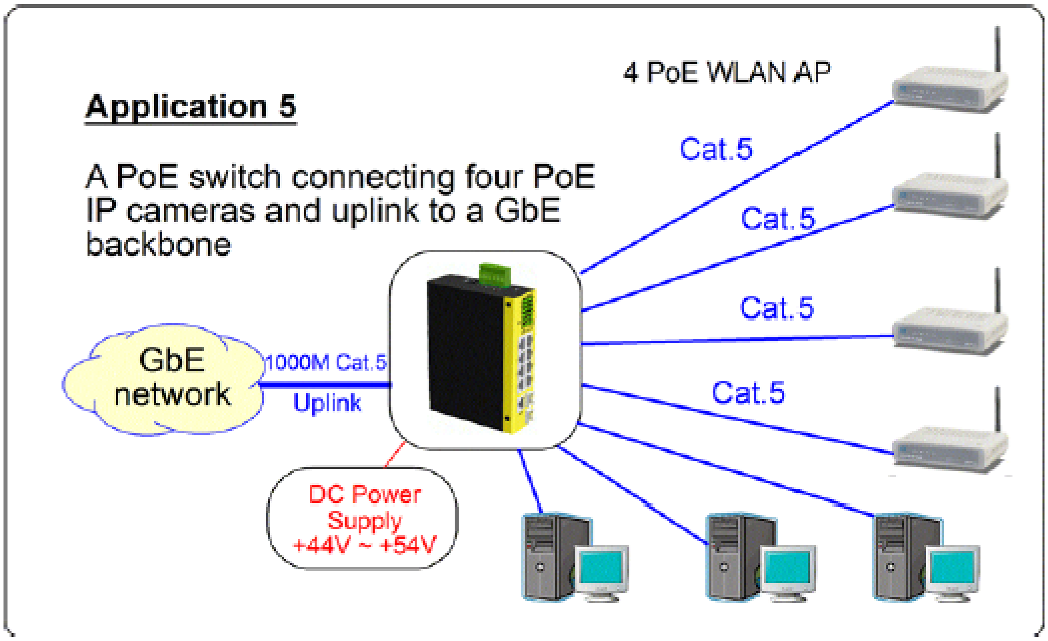

Application 3
Basic switch connecting six computers as a workgroup switch and 2 fiber connections
1000M fiber segment
1000M Fiber
1000M Fiber
1000M fiber segment
DC Power Supply +6.5 ~ +60V
Cat.5
Cat.5
Cat.5
Cat.5

6.2 Applications with PoE

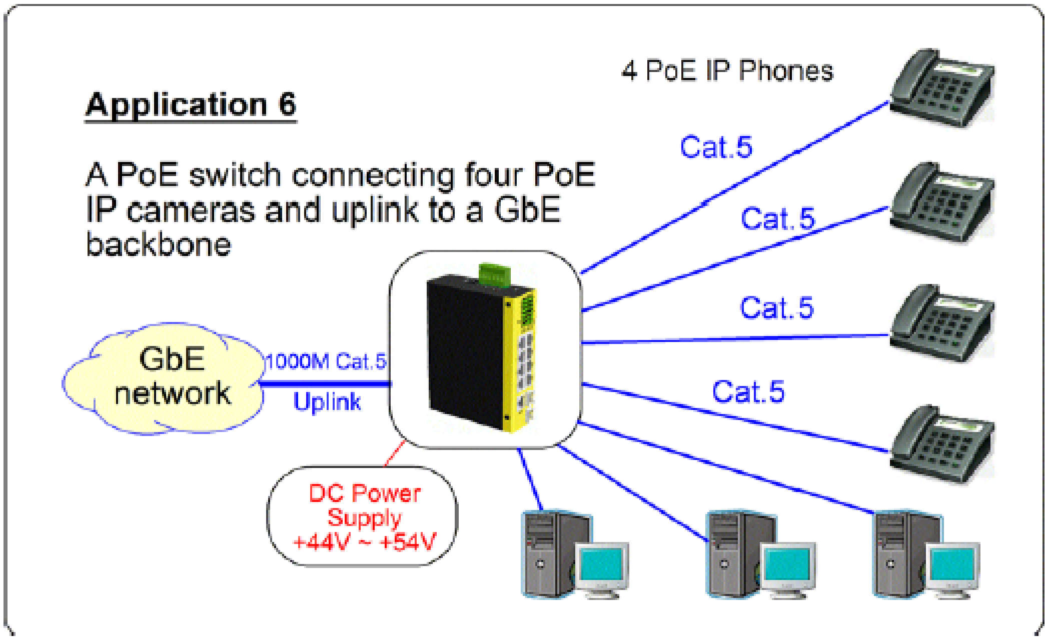
The following figure illustrates the switch connects four PoE IP cameras, three computers via Cat.5 cables and uplinks to a fiber backbone.


Application 4
A PoE switch connecting four PoE IP cameras and uplink to a fiber backbone
4 PoE IP cameras
Cat.5
Cat.5
Cat.5
Cat.5
Core Network
100M Fiber
Uplink
DC Power Supply +44V ~ +54V

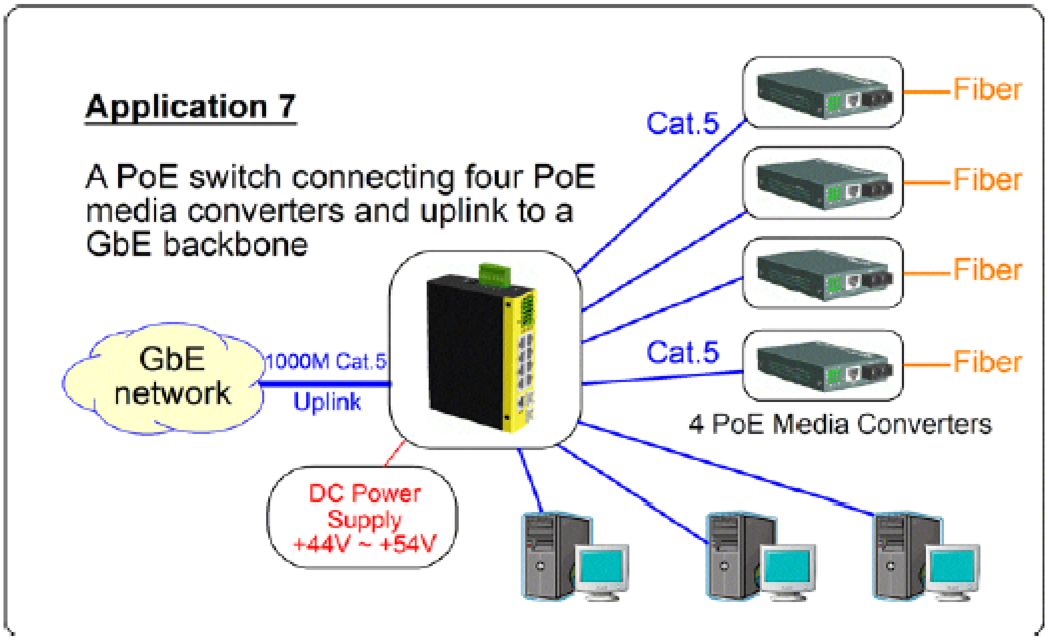
The following figure illustrates the switch connects four PoE WLAN access points, three computers via Cat.5 cables and one uplink.


Application 5
A PoE switch connecting four PoE IP cameras and uplink to a GbE backbone
4 PoE WLAN AP
Cat.5
Cat.5
Cat.5
Cat.5
GbE network
1000M Cat.5
Uplink
DC Power Supply +44V ~ +54V

The following figure illustrates the switch connects four PoE IP phones, three computers via Cat.5 cables and one uplink.


Application 6
A PoE switch connecting four PoE IP cameras and uplink to a GbE backbone
4 PoE IP Phones
Cat.5
Cat.5
Cat.5
Cat.5
GbE network
1000M Cat.5
Uplink
DC Power Supply +44V ~ +54V

The following figure illustrates the switch connects four media converters, three computers via Cat.5 cables and one uplink.

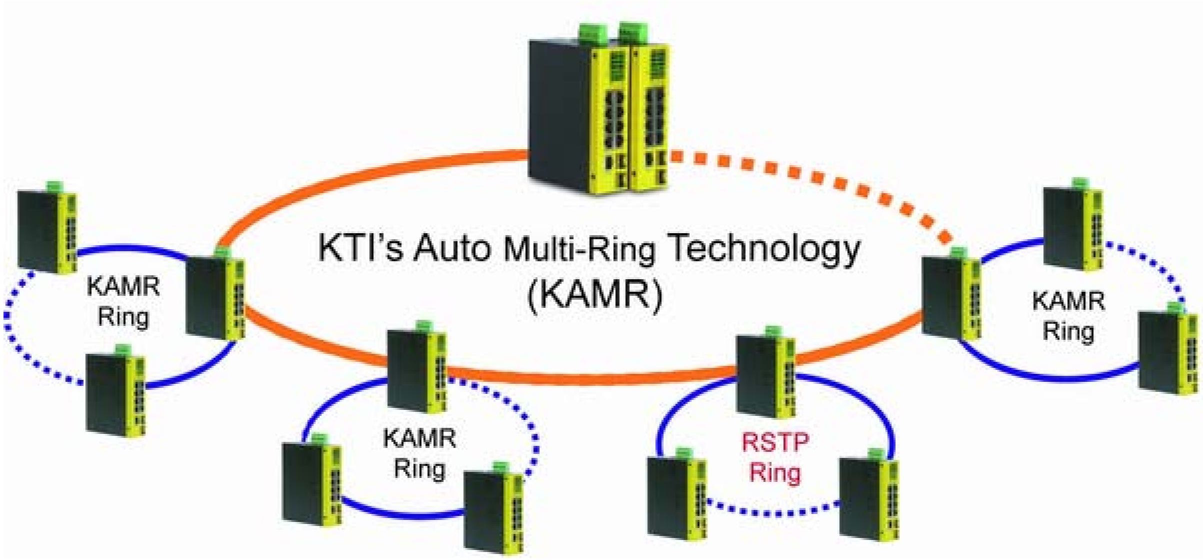

Application 7
A PoE switch connecting four PoE media converters and uplink to a GbE backbone
GbE network
1000M Cat.5
Uplink
DC Power Supply +44V ~ +54V
Cat.5
Cat.5
Fiber
Fiber
Fiber
Fiber
4 PoE Media Converters

6.3 Redundant Ring Applications with Auto Multi-Ring Technology

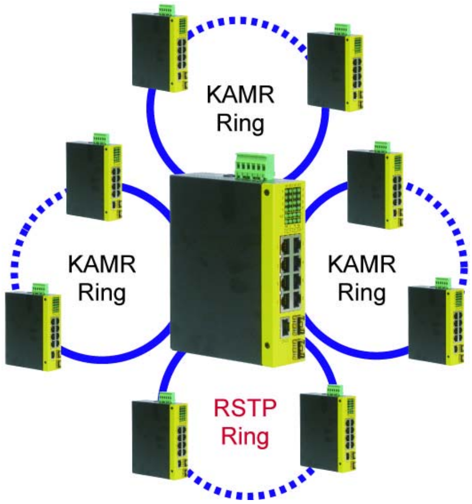
Auto Multi-Ring Technology was developed especially for switches connected in ring topology which needs redundant support when any failure occurs in ring. For large network, more than one ring connections are very common. Auto Multi-Ring Technology implementation can support more than one ring connection within a switch. It is also able to work with RSTP support concurrently in the switch. Some basic information is:

- Supports up to four rings in one switch
- The number of switches supported in one ring can be up to 250 theoretically.
- Supports web monitoring for up to 50 member switches in one ring
- Provides fast response time than RSTP protocol
- Works with RSTP protocol concurrently in one switch

The following figure illustrates a configuration that three redundant rings and one RSTP ring hook on a main redundant ring. Some switches support two redundant rings concurrently.

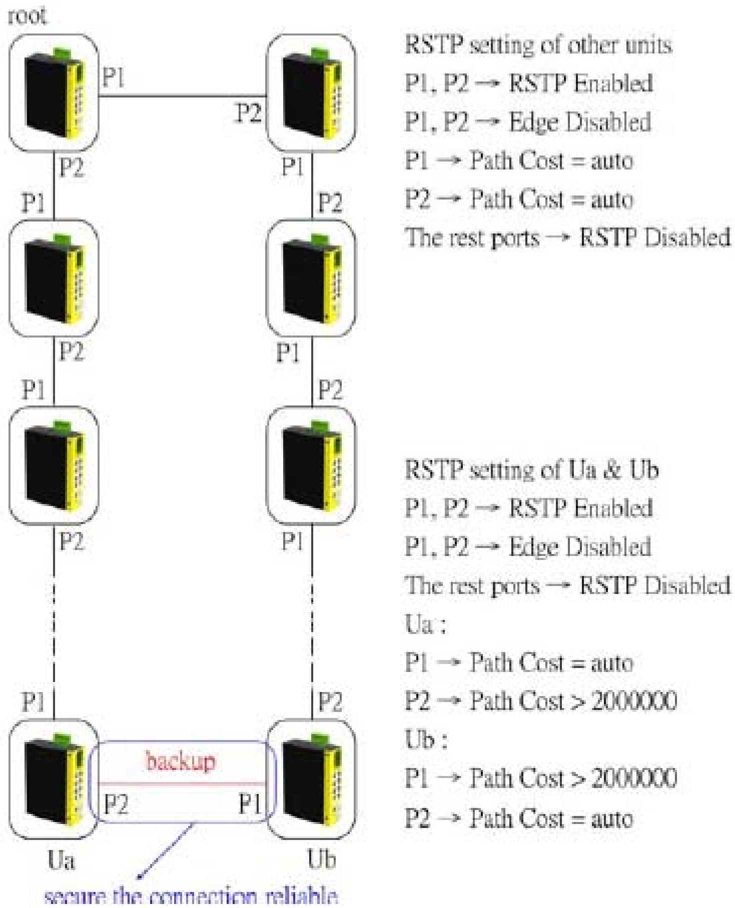


The following figure shows one switch is configured to support three redundant rings and one RSTP ring at the same time.



6.4 Redundant Ring Applications with industrial standard RSTP protocol

The following figure illustrates the configuration for a ring connection using RSTP function to establish a backup path. In case that any link failure occurs, the backup path can link up immediately to recover the network operation.



RSTP setting of other units
P1, P2 → RSTP Enabled
P1, P2 → Edge Disabled
P1 → Path Cost = auto
P2 → Path Cost = auto
The rest ports → RSTP Disabled

RSTP setting of Ua & Ub
P1, P2 → RSTP Enabled
P1, P2 → Edge Disabled
The rest ports → RSTP Disabled
Ua :
P1 → Path Cost = auto
P2 → Path Cost > 2000000
Ub :
P1 → Path Cost > 2000000
P2 → Path Cost = auto