



TRANSMISSION WITH INNOVATION

**AMG560 Series  
Industrial Managed Switch with Optional PoE+**

**User Manual**

**Version 1.1**

## **FCC/CE Mark Warning**

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### **FCC Warning**

This Equipment has been tested and found to comply with the limits for a Class-A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. It may cause harmful interference to radio communications if the equipment is not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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## **Before Starting**

### **In Before Starting:**

This section contains introductory information, which includes:

- **Intended Readers**
- **Icons for Note, Caution, and Warning**

## Before Starting

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### Intended Readers

This manual provides information regarding to all the aspects and functions needed to install, configure, use, and maintain the product you've purchased.

This manual is intended for technicians who are familiar with in-depth concepts of networking management and terminologies.

### Icons for Note, Caution, and Warning

To install, configure, use, and maintain this product properly, please pay attention when you see these icons in this manual:



A **Note** icon indicates important information which will guide you to use this product properly.



A **Caution** icon indicates either a potential for hardware damage or data loss, including information that will guide you to avoid these situations.



A **Warning** icon indicates potentials for property damage and personal injury.

# Chapter 1:

## Product Overview

### **In Product Overview:**

This section will give you an overview of this product, including its feature functions and hardware/software specifications.

- **Product Brief Description**
- **Product Specification**
- **Hardware Description**
- **Hardware Installation**

## **1.1. Product Brief Description**

### **Introduction**

This switch is a DIN Rail type industrial Gigabit managed Power over Ethernet Switch is designed with 16 10/100/1000M PoE+ ports and four Gigabit SFP slots for highly critical PoE applications such as real time IP video surveillance, WiMAX systems and Wireless APs. All of the 8 ports of the switch are compliant with both IEEE 802.3af PoE and IEEE 802.3at high power PoE standards and can deliver up to 15.4W and 30W power per port to enable the high-power requiring devices, such as Wireless APs, PTZ and dome network cameras, etc.

### **Ethernet Ring Protection Switching (ERPSv2)**

Ring network topology ensures the reliability of the connections among all the switches in the network. This switch supports ERPSv2 with easy to set up user interface, which allows it to recover from network disconnection in less than 20ms with 250 IGP-8804M2s connected in a ring network topology while transmitting/receiving data at full network speed. Also, it supports multiple ERPS instances, allowing different VLANs have their own ERPS instances.

### **USB Port for Save/Restore Configuration & System Log/Firmware Storage**

This switch comes with a USB port for connecting a USB storage device to the industrial switch. Configuration files, switch system log and firmware can be stored in the USB storage device for the switch to access. When a USB storage device is connected to this switch, it will load the configuration file in the storage device and apply all the settings, saving on-site installation time and effort.

### **Redundant Power Inputs & Embedded Protecting Circuit**

This switch provides two power inputs that can be connected simultaneously to live DC power source. If one of the power input fails, the other live source acts as a backup to automatically support the switch's power needs without compromising network service qualities. Also, it supports automatic protection switching and load balance, while its embedded protecting circuit can protect your system from over input/output voltages and rectifier malfunctions.

#### **Outstanding Management and Enhanced Security**

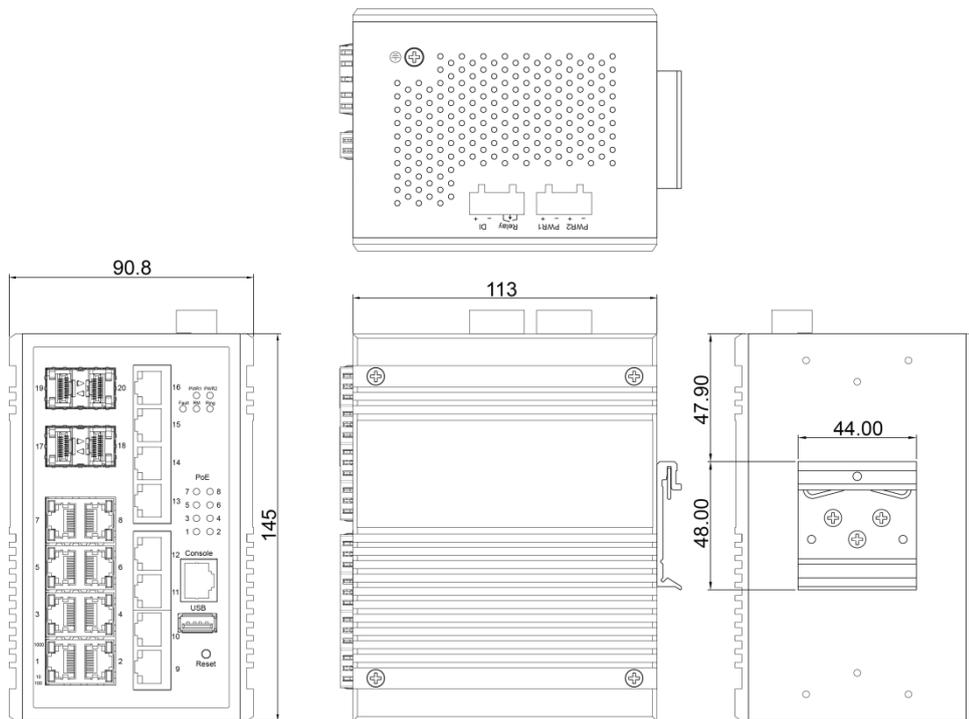
This switch provides various network control and security features to ensure the reliable and secure network connection. To optimize the industrial network environment the switch supports advanced network features, such as Tag VLAN, IGMP Snooping, Quality of Service (QoS), Link Aggregation Control Protocol (LACP), Rate Control, etc. The PoE switch can be smartly configured through Web Browser, SNMP Telnet and RS-232 local console with its command like interface. The failure notifications are sent through e-mail, SNMP trap, Local/Remote system log, multiple event alarm relay.

### 1.3. Hardware Description

This section mainly describes the hardware of this switch and gives a physical and functional overview on the certain switch.

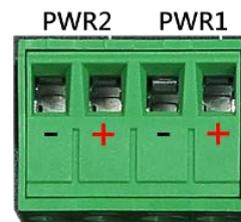
#### Dimension

The dimension of this Switch is 145 mm (H) x 91 mm (W) x 113 mm (D). The figure down below is the drawing of detail mechanical design:



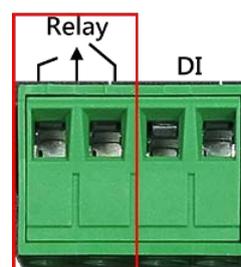
#### Wiring Power Inputs

1. Insert the positive and negative wires into the PWR1 (+,-) and PWR2 (+,-) on the 4-contact terminal block connector.
2. Tighten the screws to prevent the wires from loosening.



#### Wiring Fault Alarm

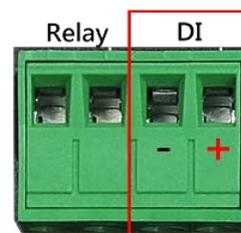
1. Insert the wires into the left two contacts of the 4-contact terminal block (Fault Alarm Relay).
2. Tighten the screws to prevent the wires from loosening.
3. The relay will detect the power and link failure.
4. Users can connect the relay to an alarm and buzzer so that when the relay forms an open circuit, the users will be notified.



#### Wiring Digital Inputs

Insert the positive and negative wires into the right two contacts (+,-) of the 4-contact terminal block (DI).

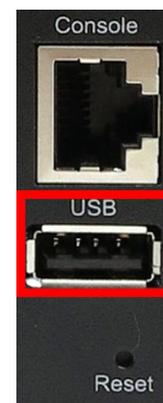
1. Tighten the screws to prevent the wires from loosening.
2. The system will detect the voltage go through the DI.
  - +13 to +30V for state "1"
  - -30 to +3V for state "0"
  - Max. input current: 8mA



#### USB Port

A USB port is available on the switch that is located between the Console port and Reset button. This USB port provides the following features:

- Backup/Restore Configurations
- Auto-Load configuration from USB
- Auto-Backup configuration to USB
- Save system logs to USB



**Double-Secure Power Input Fault Alarm**

The power inputs are designed as a "common negative", which implies that the negative input is connected, but "double-secure" is supported to prevent the un-notified failure of power from one of the negative inputs. If one of the negative power input fails, the system will detect it and the system will trigger the event if the users set the fault alarm or event log for powers.



**LED Status**

LED	Color	Status	Description
PWR1	Green	On	Power is supplied on the power input 1.
		Off	Power is not supplied on the power input 1.
PWR2	Green	On	Power is supplied on the power input 2.
		Off	Power is not supplied on the power input 2.
Fault	Green	On	The system boots up and in normal operation.
		Off	The system is powered off or during booting.
	Red	On	The configured event of failure is triggered.
RM	Green	On	This device has the Ring Master.
		Off	The Ring Master is not on the device.
Ring	Green	On	The Ring protocol is enabled and works normally.
		Flickering	The Ring protocol is enabled, but works abnormally.
		Off	The Ring protocol is disabled.
SFP Slot (1000M)	Green	On	The 1000Mbps link of the fiber port is active.
		Flickering	Data is transmitted on the fiber port at 1000Mbps.
		Off	The 1000Mbps link of the fiber port is inactive.
LAN Port (1000M)	Green	On	The 1000Mbps link of the port is active.
		Flickering	Data is transmitted on the port at 1000Mbps.
		Off	The 1000Mbps link of the port is inactive.
LAN Port (10/100M)	Green	On	The 10/100Mbps link of the port is active.
		Flickering	Data is transmitted on the port at 10/100Mbps.
		Off	The 10/100Mbps link of the port is inactive.
PoE+	Amber	On	An IEEE 802.3at/af powered device is connected.
		Off	No IEEE 802.3at/af powered device is connected.

**Reset Button**

A multifunctional reset button is provided. Use a pointed object such as toothpick or paper clip (straightened) to press the reset button.

Press Time (Sec)	Action
1	Save the running configuration to the USB device named "running-config".
4	Reboot the system.
More than 7	Reset the system to factory default and reboot it.

## 1.4. DIN-Rail Mounting

The DIN-Rail clip is already attached on the rear side of the switch supports EN 50022 standard DIN Rail, in the following diagram includes the dimension of EN 50022 DIN Rail.

Follow the steps below to mount the switch on the DIN-Rail track.

1. Insert the upper end of the DIN-Rail clip into the back of the DIN-Rail track from its upper side
2. Lightly push the bottom of the DIN-Rail clip into the track.
3. Check if the DIN-Rail clip is tightly attached to the track.
4. To remove the switch from the track, reverse the steps above.



## 1.5. Connecting Cable

The port 1~16 is the copper ports, it requests UTP/STP cable.

The port 17 ~ 20 are the SFP slots, purchase the suitable fiber transceiver from your supplier and connect the fiber cable for the link.

### Ethernet cable Request

The wiring cable types for data transmission are as below.

10 Base-T: 2-pair UTP/STP Cat. 3, 4, 5 cable, EIA/TIA-568 100-ohm (Max. 100m)

100 Base-TX: 2-pair UTP/STP Cat. 5 cable, EIA/TIA-568 100-ohm (Max. 100m)

1000 Base-T: 4-pair UTP/STP Cat. 5 cable, EIA/TIA-568 100-ohm (Max. 100m)

The wiring cable types for data transmission and power delivery in any speed are Cat. 5 or above.

### SFP Installation

1. Insert the SFP module. A triangle is available on the switch and SFP module.



2. Push the SFP module down.



## Chapter 2:

# Preparing for Management

### **In Preparing for Management:**

This section will guide your how to manage this product via serial console, management web page, and Telnet/SSH interface.

The switch provides both *out-of-band* and *in-band* managements.

**Out-of-band Management:** You can configure the switch via RS232 console cable without having the switch or your PC connecting to a network. Out-of-band management provides a dedicated and secure way for switch management.

**In-Band Management:** In-band management allows you to manage your switch with a web browser (such as Microsoft IE, Mozilla Firefox, or Google Chrome) as long as your PC and the switch are connected to the same network.

- **Preparation for Serial Console**
- **Preparation for Web Interface**
- **Preparation for Telnet/SSH Interface**

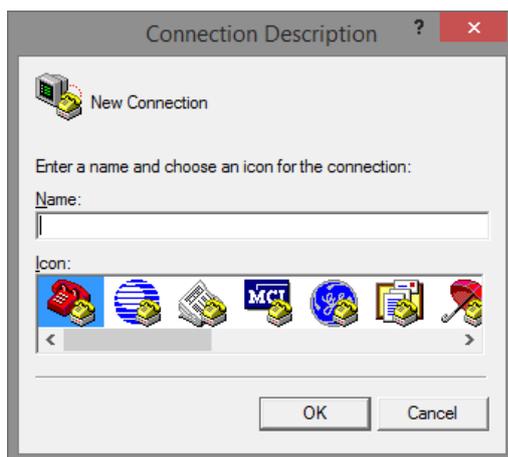
## 2.1. Preparation for Serial Console

Inside the product package, you can find an RS-232 console cable. Before managing your switch via out-of-band management, please attach this cable's RJ45 connector to your switch's console port and its RS-232 female connector to your PC's COM port.

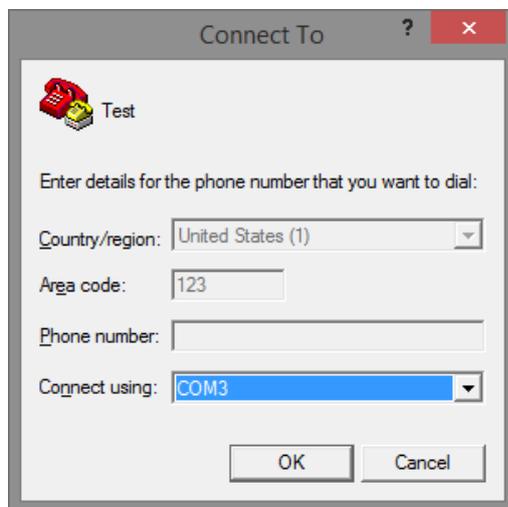
To access this switch's out-of-band management CLI (Command Line Interface), your PC must have terminal emulator software such as HyperTerminal or PuTTY installed. Some operating systems (such as Microsoft Windows XP) have HyperTerminal already installed. If your PC does not have any terminal emulator software installed, please download and install a terminal emulator software on your PC.

The following section will use HyperTerminal as an example.

1. Run HyperTerminal on your PC.
2. Give a name to the new console connection.



3. Choose the COM port that is connected to the switch.

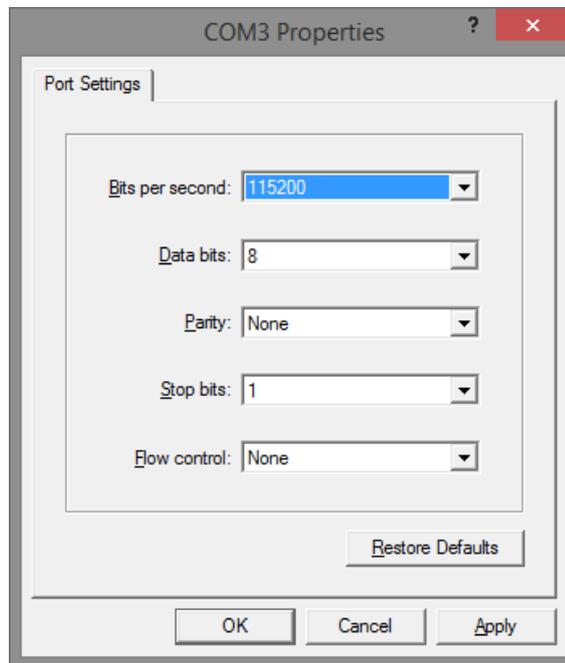


## Chapter 2: Preparing for Management

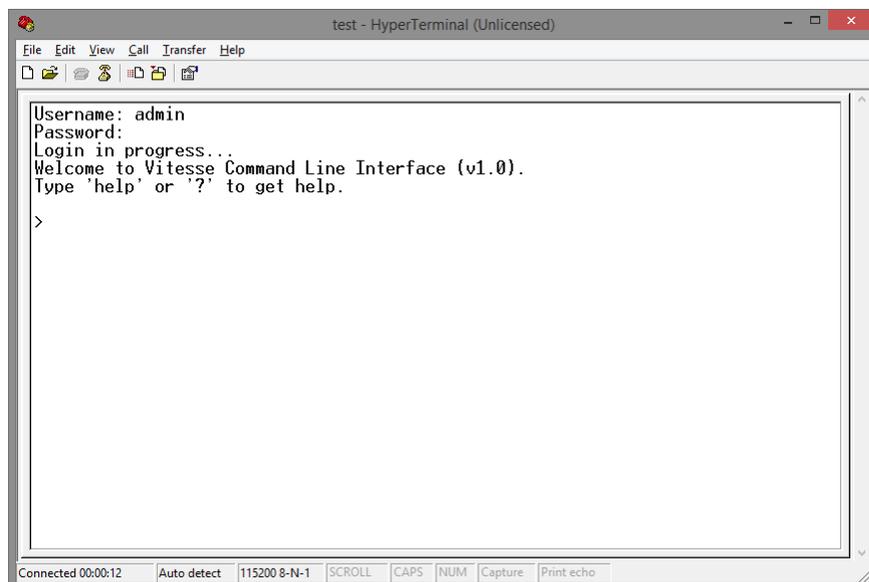
### Preparation for Serial Console

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4. Set the serial port settings as: **Baud Rate: 115200, Data Bit: 8, Parity: None, Stop Bit: 1, Row Control: None.**



5. The system will prompt you to login the out-of-band management CLI. The default username/password is **admin/admin**.

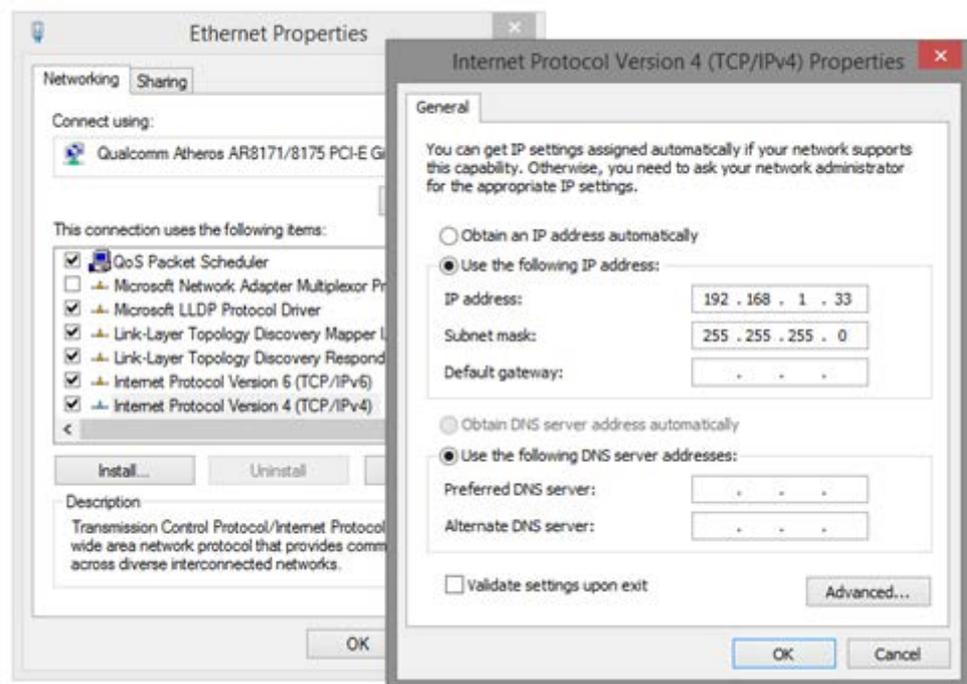


## 2.2. Preparation for Web Interface

The management web page allows you to use a web browser (such as Microsoft IE, Google Chrome, or Mozilla Firefox) to configure and monitor the switch from anywhere on the network.

Before using the web interface to manage your switch, please verify that your switch and your PC are on the same network. Please follow the steps down below to configure your PC properly:

1. Verify that the network interface card (NIC) of your PC is operational and properly installed, and that your operating system supports TCP/IP protocol.
2. Connect your PC with the switch via an RJ45 cable.
3. The default IP address of the switch is **192.168.1.101**. The switch and your PC should locate within the same IP Subnet. Change your PC's IP address to 192.168.1.X, where X can be any number from 2 to 254. Please make sure that the IP address you've assigned to your PC cannot be the same with the switch.



4. Launch the web browser (IE, Firefox, or Chrome) on your PC.
5. Type **192.168.1.101** (or the IP address of the switch) in the web browser's URL field, and press Enter.

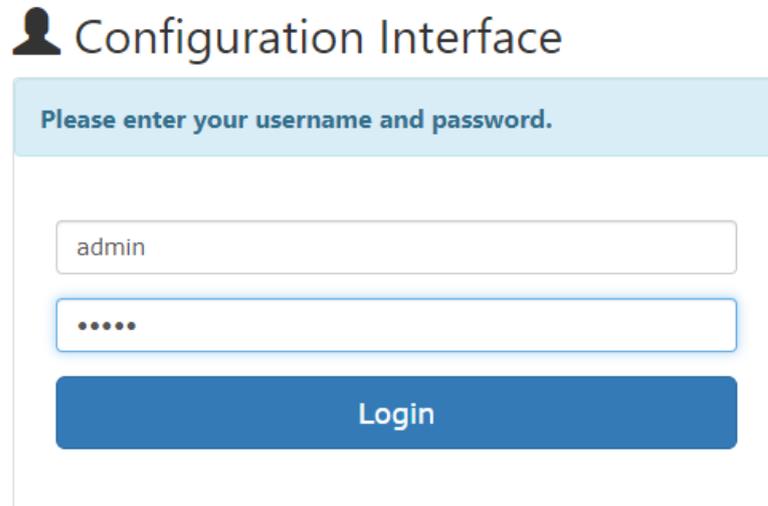


## Chapter 2: Preparing for Management

### Preparation for Web Interface

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- The web browser will prompt you to sign in. The default username/password for the configuration web page is **admin/admin**.



The image shows a web browser window displaying the Configuration Interface login page. At the top left, there is a user icon followed by the text "Configuration Interface". Below this, a light blue banner contains the instruction "Please enter your username and password." Underneath the banner, there are two input fields: the first contains the text "admin", and the second contains five dots representing a password. Below the input fields is a blue button labeled "Login".

For more information, please refer to **Appendix A: IP Configuration for Your PC**.

### 2.3. Preparation for Telnet/SSH Interface

Both telnet and SSH (Secure Shell) are network protocols that provide a text-based command line interface (CLI) for in-band system management. However, only SSH provides a secure channel over an un-secured network, where all transmitted data are encrypted.

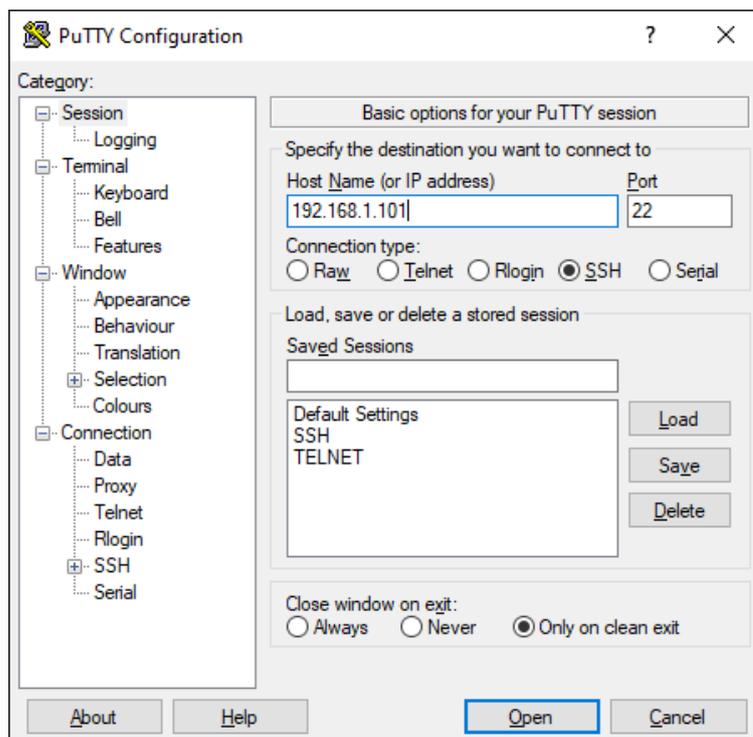
This switch support both telnet and SSH management CLI. In order to access the switch's CLI via telnet or SSH, both your PC and the switch must be in the same network. Before using the switch's telnet/SSH management CLI, please set your PC's network environment according to the previous chapter (**2.2. Preparation for Web Interface**).

Telnet interface can be accessed via Microsoft "CMD" command. However, SSH interface can only be accessed via dedicated SSH terminal simulator. The following section will use *PuTTY* as an example to demonstrate how to connect to the switch's SSH CLI, since both telnet and SSH uses the same way (though using different terminal simulator software) to access in-band management CLI.

#### Access SSH via Putty:

A "PuTTY Configuration" window will pop up after you run PuTTY.

1. Input the IP address of the switch in the "**Host Name (or IP address)**" field. The default IP address of the switch if **192.168.1.101**.
2. Choose "SSH" on the "**Connection type**" section, then press "Enter".



## Chapter 2: Preparing for Management

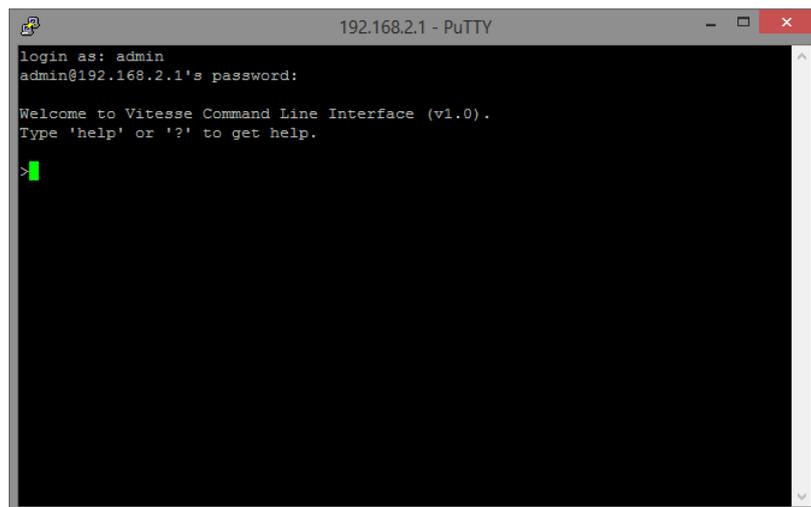
### Preparation for Telnet/SSH Interface

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3. If you're connecting to the switch via SSH for the first time, a **"PuTTY Security Alert"** window will pop up. Please press **"Yes"** to continue. This window won't pop up if you're using telnet to connect to the in-band management CLI.



4. PuTTY will prompt you to login after the telnet/SSH connection is established. The default username/password is **admin/admin**.



# Chapter 3:

## Web Management

### **In Web Management:**

As mentioned in *Chapter 2.2. Preparation for Web Interface*, This switch provides a web-based management interface. You can make all settings and monitor system status with this management web page.

### 3.1. Web Management - Overview

When you log in, the configuration web page will display current system status.

1.  **Hide/Show Model Information**

When a low-resolution environment is used to configure the system via the web console, the "Model Information" field can be hidden to have a better view.

2.  **Save Configuration**

After configuring, click the icon to save the configurations to the "**startup-config**" file. The configurations are retained in the system until a factory reset default is done.

3.  **Restore Factory Default**

Removes the configurations saved in the system. After restoring factory default, all the settings will be set to default values.

4.  **Reboot System**

Reboots the device and restarts the system.

5.  **System Logout**

This option enables you to sign out from the system. Users have to login again if they want to configure the settings.

The system will **auto-logout** after the "timeout" timer expires. The "timeout" timer is configured in the CLI mode by using the "exec-timeout" command.

The maximum value of the timer in the web console is **30** minutes.

#### **A USER-FRIENDLY DATA TABLE**

A user-friendly data table is provided on the "**IPv6 Neighbor Table**", "**IGMP Snooping Table**", "**VLAN Table**", "**LLDP Neighbor Table**", and "**MAC Address Table**". The following section details how to use the data table functions to help the users to observe the information easily.

The following example is "**MAC Address Table**".

## Chapter 3: Web Management

### Web Management - Overview

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VID	MAC Address	Type	Source
VLAN 1	EC:08:6B:06:96:53	Learning	2
VLAN 1	1C:49:7B:6A:F3:41	Learning	5
VLAN 1	1C:1B:0D:66:75:EB	Learning	5
VLAN 1	01:00:5E:7F:FF:FA	Static	2
VLAN 1	40:8D:5C:EA:92:02	Learning	5
VLAN 1	9C:EB:E8:3A:54:E7	Learning	5
VLAN 1	40:8D:5C:EA:8D:C3	Learning	5
VLAN 1	1C:1B:0D:66:F7:F8	Learning	5
VLAN 1	FC:3F:DB:53:19:8E	Learning	5
VLAN 1	A4:02:B9:80:7D:66	Learning	5

Showing 1 to 10 of 10 entries

Auto Refresh  Refresh

Refresh Rate: 5 seconds

- Show  entries

Users will be able to select a value to display the number of entries in one page. The following values can be selected - “10”, “25”, “50”, and “100” selections. By default, “10” is selected.

- Search:

The search option enables you to search a key word in the data. It will search all the columns and identify the data rows that match the search criteria.

- Showing 1 to 10 of 31 entries

It displays the total number of entries and the current entry number.

- and

This option orders the field from **smaller to larger** or from **larger to smaller**.

- 

Changes to “First”, “Previous”, “Next”, or “Last” page.

In addition to the above functions, “Refresh” and “Auto Refresh” function are available for all status page including “IPv6 Neighbor Table”, “RSTP Port Status”, “Port Status”, “IGMP Snooping Table”, “VLAN Table”, “Trunking Status”, “LLDP Neighbor Table”, and “MAC Address Table”.

- Auto Refresh

Selecting this checkbox enablesthe “Auto Refresh” function and deselecting the checkbox disables the “Auto Refresh” function.

## Chapter 3: Web Management

### Web Management - Overview

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- Refresh Rate:  seconds ?

The Refresh Rate option is a **global** configurable variable. When the Auto Refresh option is enabled, the status will refresh automatically based on the Refresh Rate interval.

The range of the Refresh Rate is **from 5 to 300** second(s).

The default Refresh Rate is **5** seconds.

- (Refresh Button)

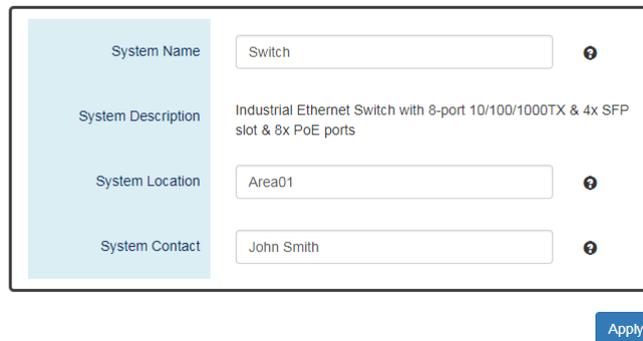
You can click the “**Refresh**” button to manually refresh the status.

## 3.2. Web Management – Basic Settings

### 3.2.1. BASIC SETTINGS - SYSTEM

#### CONFIGURE SYSTEM INFORMATION

##### System Information



System Name	<input type="text" value="Switch"/>	
System Description	Industrial Ethernet Switch with 8-port 10/100/1000TX & 4x SFP slot & 8x PoE ports	
System Location	<input type="text" value="Area01"/>	
System Contact	<input type="text" value="John Smith"/>	

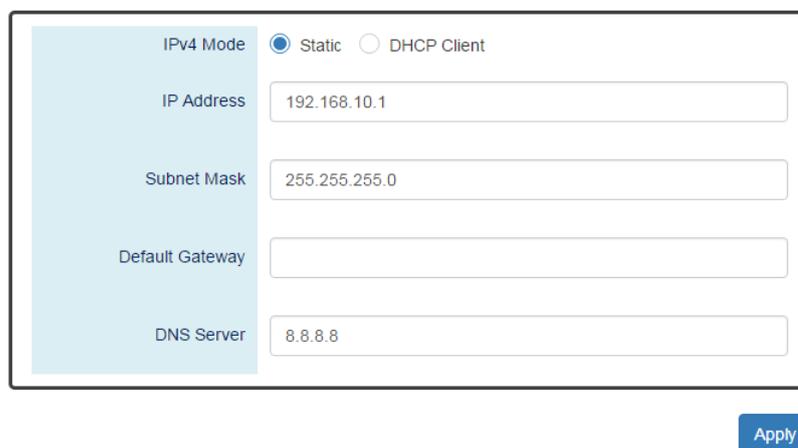
- **Host Name**  
It is useful to identify the difference between the switches, for example: CoreSwitch01.  
The max length for the Host Name is **32** alphanumeric characters.
- **Device Description**  
The Device Description is fixed and defined by the system.  
It contains the copper port number, fiber port number, and PoE information (if supported).
- **Switch Location**  
It is useful to find the location of the switches, for example: Area01.  
The max length for the Switch Location is **32** alphanumeric characters.
- **Contact Information**  
Information of the person responsible for this device and the contact details. Only alphanumeric characters can be used here.
-  (Apply Button)  
After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.2.2. BASIC SETTINGS – IPV4 SETTINGS

**Internet Protocol Version 4 (IPv4)** is the fourth version of the Internet Protocol. It is used on the packet-switched networks and with connectionless communication. IPv4 has four bytes (32 bits) address and the address space is limited to 4,294,967,296 ( $2^{32}$ ) unique addresses. On the local area network (LAN), the “Private Network” is used. It starts from **192.168.0.0** and the address space contains 65,025 ( $2^{16}$ ) IP addresses. The frames can only be sent to the host in the same subnet. For example, the default IP Address of the switch is “192.168.1.101”. When the users want to connect to the web console of the switch, an IP address from “192.168.1.2” to “192.168.1.254” must be assigned to the host.

#### CONFIGURE IPV4 INFORMATION

##### IPv4 Settings



IPv4 Mode	<input checked="" type="radio"/> Static <input type="radio"/> DHCP Client
IP Address	192.168.10.1
Subnet Mask	255.255.255.0
Default Gateway	
DNS Server	8.8.8.8

Apply

- **IPv4 Mode**  
There are 2 ways to configure IPv4 address - one is to configure a **static** IP address manually and another one is to get an IP address by **DHCP**.  
If the IPv4 mode is "**DHCP Client**", IPv4 information fields will be set to "**Disabled**".
- **IP Address**  
Assigns a unique static IP Address in the subnet to access the system.  
The default IP Address is "**192.168.1.101**".
- **Subnet Mask**  
Defines the type of network, to which this device is connected to.  
The default Subnet Mask is "**255.255.255.0**".
- **Default Gateway**  
The IP address of the router used to connect a LAN to a WAN.
- **DNS Server**

## Chapter 3: Web Management

### Basic Settings – IPv4 Settings

---

Specifies the IP address of the DNS Server so that the users can connect to another device based on the **URL** instead of the IP address.

The default DNS Server is "**8.8.8.8**". It is provided by Google.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.2.3. BASIC SETTINGS – IPV6 SETTINGS

**Internet Protocol Version 6 (IPv6)** is a solution to deal with the address space limitation of IPv4 and it is the most recent version of Internet Protocol. It is intended to replace IPv4. IPv6 is a **Layer 3** (Internet Layer) protocol, which is used on the packet-switched networks and with connectionless communication. There are 16 bytes (128 bits) for an IPv6 address and the address space is up to  $2^{128}$  unique addresses. The IPv6 address is usually represented in hexadecimal digits, 8 groups of 4 digits, and each group is separated by a ":" (**colon**). For example, the DNS server address in IPv6 is "2001:4860:4860:0000:0000:0000:0000:8888".

#### CONFIGURE IPV6 INFORMATION

##### IPv6 Settings

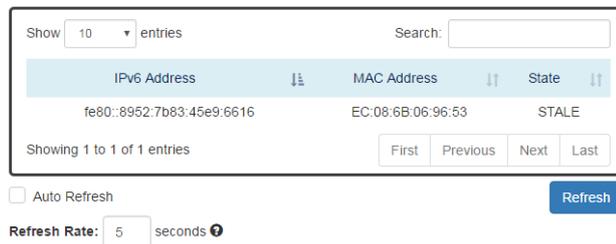


- **IPv6 Mode**  
"Enable" or "Disable" IPv6. When the IPv6 Mode is enabled, other devices can connect to this unit.
- **Default Address**  
This is the Default IPv6 Address for this device. It is a **Link-Local** address and is automatically generated from the **MAC Address** of the device.
- **IPv6 Addresses**  
Enables the users to define other IPv6 addresses for this device.  
The IPv6 address contains 2 sections - **IPv6 address** and **prefix**. The default Prefix is **64-bit**.
  - ➕: Click the **plus icon** to add an IPv6 Address row.
  - ✖: Click the **remove icon** to delete the IPv6 Address row.
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### IPv6 NEIGHBOR TABLE

##### IPv6 Neighbor Table



IPv6 Address	MAC Address	State
fe80::8952:7b83:45e9:6616	EC:08:6B:06:96:53	STALE

Showing 1 to 1 of 1 entries

Auto Refresh

Refresh Rate:  seconds

- **IPv6 Address**  
This field displays the IPv6 address of the neighbor.
- **MAC Address**  
This field displays the MAC address of the neighbor.
- **State**  
The connection state can be “DELAY”, “REACHABLE”, “STALE”, “FAILED”, or “PROBE”.

### 3.2.3. BASIC SETTINGS – SYSTEM TIME

The **System Time** represents the date and time. The system uptime defines the passing time after the system boots up. There is no battery on the switch and hence the system time cannot be saved in the system. Users can configure the time zone and system time manually by synchronizing the time with the browser or by enabling the “**NTP**” service to get the time from a **NTP Server**.

#### NTP

**Network Time Protocol (NTP)** is a clock synchronization protocol, which is used to synchronize the system time with the NTP server. NTP is one of the oldest Internet Protocols in use from 1985 until now. It works based on a client-server model, but it can also be used in peer-to-peer relationships. The NTP application on the switch follows the client-server model and the switch plays a role in the NTP Client.

#### CONFIGURE SYSTEM TIME INFORMATION

##### System Time

###### System Time Information

Current Time	1970/01/01 00:05:52
System Uptime	0 Day 0 Hour 5 Minutes 47 Seconds

###### NTP Settings

NTP Mode	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
NTP Server	<input type="text" value="2.pool.ntp.org"/>

###### Manual Time Settings

Time ZoneEurope	Europe <input type="text" value="London"/>
Date Selector	<input type="text" value="1970/01/01"/>
Time Setting	<input type="text" value="00"/> : <input type="text" value="05"/> : <input type="text" value="47"/>
Sync with Browser	<input type="checkbox"/> 2016/11/9 18:27:47

Apply

- **SYSTEM TIME INFORMATION**
  - Current Time: The current date time of the system.
  - System Uptime: The system boot up duration.
- **NTP Settings**
  - NTP Mode

## Chapter 3: Web Management

### Redundancy – Spanning Tree

---

"Enable" or "Disable" NTP Service. If NTP Mode is enabled, the system will sync time with NTP Server on an hourly basis.

- NTP Server  
This field displays the URL or the IP address of the host that provides the NTP Service.
- **Manual Time Settings**
  - Time Zone  
Select the Time Zone to define the local time offset from GMT.
  - Date Selector  
Select the system date manually. The format is "**year/month/day**".
  - Time Setting  
Define the system time manually. The format is "**hour:minute:second**".
  - Sync with Browser  
Select the checkbox to synchronize the system time with the **browser time**.
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.3. Web Management – Redundancy

#### 3.3.1. REDUNDANCY – SPANNING TREE

The **Spanning-Tree Protocol** is a standard protocol that is defined in **IEEE 802.1D**. It is used to build a **logical loop-free** topology for layer-2 Networks. The basic function of the protocol is to prevent loops and broadcast flooding around the switches. STP allows spare links in the network design to provide **backup paths** when the active link fails and requires a **convergence time of 30-50 seconds** to recover the topology when the topology is changed. This prompted the use of **Rapid Spanning-Tree Protocol** as it provides a faster convergence when the topology is changed.

RSTP was introduced by IEEE as **802.1w**. It can respond within **3 x "Hello Time"** when a topology is changed. The "Hello Time" is a configurable value and it is very important for RSTP. The default RSTP value is **2 seconds** and typically, the convergence time for RSTP is **under 6 seconds**. RSTP is much faster than STP. RSTP should be used instead of STP.

The **Multiple Spanning-Tree Protocol** defined in the **IEEE 802.1s** is an extension to RSTP for Virtual LANs. MSTP provides a better alternate path than STP/RSTP for different VLANs. It can make a group of VLANs more systemized in the topology.

#### CONFIGURE RSTP BASIC INFORMATION

##### RSTP Configuration

##### Bridge Settings

Mode	RSTP	▼
Root Priority	32768	▼
Hello Time	2	?
Forward Delay	15	?
Maximum Age	20	?

- **System Time Information**

RSTP: Enable STP and run "RSTP" for redundancy.

MSTP: Enable STP and run "MSTP" for redundancy.

Disable: Disable STP. Users have to enable another protocol to prevent from loop.

- **Root Priority**

It is used to define the "**Root Bridge**". The bridge with the **lowest Root Priority** is the "Root Bridge". If all the bridges are set to the same Root Priority value, the system will select the Root Bridge based on the **MAC Addresses**.

The range of Root Priority is **from 0 to 61440(multiple of 4096)**.

The default Root Priority is **32768**.

- **Hello Time**

It is very important and used to determine the interval to send BPDU (management frame) to check the RSTP topology and status.

The range of Hello Time is **from 1 to 10** second(s).

The default Hello Time is **2** seconds.

- **Forward Delay**

A delay/timer is used to determine when to change the **Path State** from Learning/Listening to Forwarding.

The range of Forward Delay is **from 4 to 30** seconds.

The default Forward Delay is **15** seconds.

- **Maximum Age**

A timer that is used to wait for the Hello BPDU from the Root Bridge. If this device receives the BPDU before the timer expires, the timer will be reset. Else, the device will send the topology changed BPDU to notify other devices.

The range of Maximum Age is **from 6 to 40** seconds.

The default Maximum Age is **20** seconds.

**Note:** The relationship between "Hello Time", "Forward Delay", and "Maximum Age" is:

$2 \times (\text{Forward Delay} - 1 \text{ sec}) \geq \text{Max Age} \geq 2 \times (\text{Hello Time} + 1 \text{ sec})$

**CONFIGURE RSTP PORT INFORMATION**

**Port Settings**

No.	Path Cost	Port Priority	Admin P2P	Edge	Admin STP
Port1	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port2	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port3	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port4	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port5	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port6	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port7	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port8	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port9	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port10	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port11	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>
Port12	<input type="text" value="0"/>	<input type="text" value="128"/>	<input type="text" value="Shared"/>	<input type="text" value="Auto"/>	<input type="text" value="Enable"/>

Apply

- **No.**  
 Port1 to PortN, where N is based on the total port number.
- **Path Cost**  
 The cost from the current node to another device.  
 The range of Path Cost is **from 0 to 200000000**.  
 The default Path Cost is **0**. This implies that the Path Cost is decided by the system.
- **Port Priority**  
 Used to decide the port to be blocked in the Ring topology.  
 The range of Root Priority is **from 0 to 240** and are in **multiple of 16**.  
 The default Root Priority is **128**.
- **Admin P2P**  
 The Admin P2P is the link-type for each port.  
 P2P: It is a full-duplex link.  
 Shared: It is a half-duplex link.
- **Edge**  
 A port that can connect to a **non-STP device** is called an Edge port. Users can manually fix a port to non-Edge or Edge.  
 Auto: The system **automatically** identifies an Edge or Non-Edge.

Edge: The port is forced to be an Edge port. An edge port will directly be transitioned to the "**Forwarding**" state and is not required to wait for the "Forward Delay". If a port is directly connected to a non-STP device, users can manually set it to "Edge" and enable it to transmit faster.

Non-Edge: The port is forced to be a Non-Edge port. This implies that the port will go through Learning/Listening to Forwarding state even though it is connected to an end device or not.

- **Admin STP**

"Enable" or "Disable" the Spanning-tree protocol that is running on the specific port.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

## RSTP STATUS

### RSTP Status

#### Bridge Information

Bridge ID	8.000.88:88:88:88:88:88
Root Bridge	Yes
Root Priority	32768
Root Port	none
Root Path Cost	0
Hello Time	2
Forward Delay	15
Max Age	20

- **Bridge ID**  
This field shows the **unique** identity of this node when it is part of a network. It contains **8 bytes** - the first 2 bytes are for **Bridge Priority** (configurable) and the remaining 6 bytes are for the **MAC Address** (unique).
- **Root Bridge**  
It is elected from the switches in the STP topology via several **STP messages (BPDU)**. The Root Bridge is the node with the **lowest Root Priority**. If all of the nodes are with the same Root Priority, the Root Bridge will be selected based on their **MAC Addresses**.
- **Root Priority**  
It is used to define the "**Root Bridge**". The bridge with the **lowest Root Priority** is the "Root Bridge". If all bridges are set to the same Root Priority value, the system will select the Root Bridge based on the **MAC Addresses**.
- **Root Port**  
It is the port that is **connected to the Root Bridge** and with the **lowest cost**. If the Root Port shows "**none**", it implies this node is the Root Bridge.
- **Root Path Cost**  
It is the cost from the current node to the Root Bridge.
- **Hello Time**  
It is used to determine the interval to send BPDU (management frame) to check the RSTP topology and status.
- **Forward Delay**  
It is used to determine when to change the **Path State** from Learning/Listening to Forwarding.
- **Max Age**

It is used during waiting for Hello BPDU from the Root Bridge.

#### Port Status

No.	Role	Path State	Port Cost	Port Priority	Oper P2P	Oper Edge
Port1	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port2	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port3	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port4	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port5	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port6	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port7	Designated	Forwarding	20000	128	Shared	Edge
Port8	Designated	Forwarding	20000	128	Shared	Edge
Port9	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port10	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port11	Disabled	Discarding	200000000	128	Shared	Non-Edge
Port12	Disabled	Discarding	200000000	128	Shared	Non-Edge

Auto Refresh

Refresh

- **No.**  
Port 1 to Port N, N is based on the total port number.
- **Role**  
This field shows the role of the STP port.  
Root: This is the root port, which is connected to the Root Bridge with the lowest cost.  
Designated: This is the designated port, which can send the best BPDU on the segment to other connected nodes.  
Alternate: This is the alternate port, which is blocked. This port can still receive useful BPDU **from another bridge**. When it receives a useful BPDU, it will help to forward it on the segment.  
Backup: This is the backup port, which is blocked. It corresponds with “Alternate Port” to the blocking state. This port also receives useful BPDU, but the BPDU is **from the same bridge**. When it receives a useful BPDU, it will help to forward it on the segment.  
Disabled: The port is not linked up.
- **Path State**  
This field shows the path state of this STP port.  
Discarding: The port state can be “Disabled”, “Blocking”, or “Listening”. The incoming frames are dropped and learning MAC addresses are stopped.  
Learning: The port is learning MAC addresses, but the incoming frames are dropped.  
Forwarding: The port in the forwarding state forwards the incoming frames based on the learned MAC address table.

- **Port Cost**

This is the cost from the port to the Root Bridge. Spanning-tree Protocol assumes the path cost is determined by the **access speeds of the links**. The **default RSTP path cost** is shown in the following table:

Speed	RSTP Path Cost	Speed	RSTP Path Cost
4 Mbps	5,000,000	1000 Mbps (1 Gbps)	20,000
10 Mbps	2,000,000	2000 Mbps (2 Gbps)	10,000
16 Mbps	1,250,000	10000 Mbps (10 Gbps)	2,000
100 Mbps	200,000		

- **Port Priority**

The Port Priority is used to determine the Root Port on a non-root bridge. The port with the lowest Port Priority value gets the higher priority.

- **Oper. P2P**

This field shows the link-type of the STP port. P2P means “**point-to-point**” and Shared means “**point-to-multiple**”.

- **Oper. Edge**

This field shows the edge state of this STP port.

#### CONFIGURE MSTI INFORMATION

 MSTI Configuration

 **Basic Settings**

Region Name	<input type="text" value="680235ffff77"/>	
Revision Number	<input type="text" value="0"/>	

 **Instance Settings**

Instance No.	Included VLAN 	Priority
1.	<input type="text"/>	32768 ▼
2.	<input type="text"/>	32768 ▼
3.	<input type="text"/>	32768 ▼
4.	<input type="text"/>	32768 ▼
5.	<input type="text"/>	32768 ▼
6.	<input type="text"/>	32768 ▼
7.	<input type="text"/>	32768 ▼
8.	<input type="text"/>	32768 ▼
9.	<input type="text"/>	32768 ▼
10.	<input type="text"/>	32768 ▼
11.	<input type="text"/>	32768 ▼
12.	<input type="text"/>	32768 ▼
13.	<input type="text"/>	32768 ▼
14.	<input type="text"/>	32768 ▼
15.	<input type="text"/>	32768 ▼

- **Basic Settings**

- Region Name

The Region Name is the name of the MST Region. The switches in the same MST Region must be set to the same Region Name.

The max length for the Region Name is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- Revision Number

The Revision Number is the level of the MST Revision. The switches in the same MST Region must be set to the same Revision Number.

The range of the Revision Number is **from 0 to 65535**.

The default Revision Number is **0**.

- **Instance Settings**

- Instance No.

The Instance No. is from 1 to 15.

- Included VLAN

The configured VLANs are involved in the specific Instance.

The format is: 10, 20, 30.... “Comma” is used to separate VLAN IDs.

- Priority

The priority is used to define the “Root Bridge” that is used to communicate with other MSTI Region.

The range of the Root Priority is **from 0 to 61440(multiple of 4096)**.

The default Root Priority is **32768**.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### CONFIGURE MSTI PORT INFORMATION

#### ⚙️ MSTI Port Settings

Instance 1

Instance 1

No.	Path Cost ⓘ	Port Priority
Port 1	0	128
Port 2	0	128
Port 3	0	128
Port 4	0	128
Port 5	0	128
Port 6	0	128
Port 7	0	128
Port 8	0	128
Port 9	0	128
Port 10	0	128
Port 11	0	128
Port 12	0	128

Apply

- **Instance Selector**

Select the instance to configure the ports. The Instance No. is from 1 to 15.

- **No.**

Port1 to PortN, where N is based on the total port number.

- **Path Cost**

The Path Cost is the cost from the current node to another device.

The range of the Path Cost is **from 0 to 200000000**.

The default Path Cost is **0**. This implies that the Path Cost is decided by the system.

- **Port Priority**

This is used to identify the port to be blocked in the Ring topology.

The range of the Root Priority is **from 0 to 240** and is in **multiples of 16**.

The default Root Priority is **128**.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### 3.3.2. REDUNDANCY – ERPS

**Ethernet Ring Protection Switching (ERPS)** applies the protection switching mechanism for Ethernet traffic in a ring topology. This mechanism is defined in **ITU-T G8032**. You can avoid the possible loops in a network by implementing the ERPS function. This is done by blocking the flow of traffic to the **Ring Protection Link (RPL)** for protecting the entire Ethernet ring.

When an ERPS is implemented in a ring topology, only one switch is allocated as the **owner**. This switch is in charge of blocking the traffic in the RPL to avoid loops. The switch adjacent to the RPL owner is called the **RPL neighbor** node and it is responsible for blocking the end of the RPL during normal condition. The participating switches that are adjacent to the RPL owner or neighbor in a ring are called the members or RPL next-neighbor nodes. The primary function of these switches is to forward the received traffic.

To make sure that a ring is up and loop-free, **Ring Automatic Protection Switching** message is sent regularly as control messages by nodes on the ring. The RPL owner identifies a signal failure (SF) in a ring when the RPL owner misses the poll packets or reads from the fault detection packets. When the fault is identified, the RPL owner unblocks the ring protection link (RPL) and permits the protected VLAN traffic through.

ERPS, similar to STP, provides a **loop-free** network by using polling packets to detect faults. If a fault occurs, ERPS restores itself by sending traffic over a protected reverse path rather than making a calculation to identify the forwarding path. The fault detection mechanism in the ERPS enables the ERPS to join in **less than 50 milliseconds** and recovers quickly to forward traffic.

CONFIGURE ERPS INFORMATION

 ERPS Configuration

Ring 1

**Basic Settings**

ERPS Status	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Ring Type	<input checked="" type="radio"/> Major-ring <input type="radio"/> Sub-ring
ERPS Port 0(West)	Port 1 <input type="text"/> None <input type="text"/>
ERPS Port 1(East)	Port 2 <input type="text"/> None <input type="text"/>
ERPS Ring ID	1 <input type="text"/> 
R-APS Channel	1000 <input type="text"/> 
Advanced Settings	<input checked="" type="checkbox"/> Enable

**Advanced Settings**

Major-Ring Virtual Channel	0 <input type="text"/> 
Sub-Ring Virtual Channel	<input type="radio"/> Enable <input checked="" type="radio"/> Disable <small>Support only when Ring Type set to "Sub-ring"</small>
Revertive Mode	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
MEL Value	7 <input type="text"/> 

*For more information, hover the mouse over the  icon in the system.*

- **ERPS Ring**  
There are three rings supported on a device. Using the dropdown select to change the ERPS Rings.
- **Basic Settings**
  - ERPS Status  
“Enable” or “Disable” ERPS protocol running on the switch. By default, the ERPS protocol is **enabled**.
  - Ring Type  
Configure the Ring to be a “Major-ring” or a “Sub-ring”.
  - ERPS Port 0  
The ERPS Port 0 is also called “**West** Port”. Select one of the switch ports to be the Port 0 of ERPS and decide the role of the port.
  - ERPS Port 1  
The ERPS Port 1 is also called “**East** Port”. Select one of the switch ports to be the Port

1 of ERPS and decide the role of the port.

**Note:** Only one of the switch ports can be configured as ERPS Port 0 or ERPS Port 1.

Role	Description
Owner	There is only one “Owner” in the ERPS ring topology. The Owner is responsible for blocking the traffic in RPL and protects one side of the RPL.
Neighbor	There is only one “Neighbor” in the ERPS ring topology. The Neighbor is the port connected with the Owner port and protects another side of the RPL.
Interconnection	The Interconnection port connects a major-ring and a sub-ring. If one of the ports on the switch is set to “Interconnection” role, the other port will be set to “Disabled” automatically.
None	The “None” implies that the port is other than an Owner or a Neighbor.

- ERPS Ring ID

The ID is the identifier of the ring. The members in the same ring must be set to the same ERPS Ring ID.

The range of the ERPS Ring ID is **from 1 to 239**.

The default ERPS Ring ID is **1**.

- R-APS Channel

The R-APS Channel is used to forward ERPS information and is mapped to the VLAN IDs. These VLAN IDs cannot be set as traffic VLANID. The members in the same ring must be set to the same R-APS Channel.

The range of the R-APS Channel is **from 1 to 4094**.

The default R-APS Channel is **1000**.

- **Advanced Settings**

The Advanced Settings field is only displayed when the “Advanced Settings”checkbox is selected in the Basic Settings.

- Major-Ring Virtual Channel

This field is used to configure the specific virtual channel for transmitting the management packets of the sub-ring through the major-ring.

- Sub-Ring Virtual Channel

“Enable” or “Disable” using virtual channel in the sub-ring. When the Sub-Ring Virtual Channel is enabled, ERPS protocol will transmit management packets by the configured virtual channel.

- Revertive Mode

“Enable” or “Disable” the ERPS Revertive Mode. If the Revertive Mode is enabled, the

blocked link will revert to the RPL link after the failed link is recovered.

By default, the ERPS Revertive Mode is **enabled**.

- MEL Value

MEL field is for the compliance with other devices which are running ITU-T G.8031 from third-party. The MEL implies the MEG Level. It is a field in the R-APS PDU. A large MEL value involves more devices. For example, level 7 contains levels 0 to 6.

The range of the MEL Value is **from 0 to 7**.

The default MEL Value is **7**.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

## ERPS STATUS

### ERPS Status

Ring 1

**Basic Information**

Ring Type	Major-ring
ERPS Status	Disable
Ring State	Normal
Node State	Initial
ERPS Ring ID	1
R-APS Channel	1000
Virtual Channel	default
Revertive Mode	Yes
MEL Value	7

**Port Status**

	Interface	Role
Port 0(West)	Lan1	None
Port 1(East)	Lan2	None

Auto Refresh Refresh

Refresh Rate:  seconds 

- **ERPS Ring**  
There are three rings supported on a device. Using the dropdown select to change the ERPS Rings.
- **Basic Information**
  - Ring Type  
The type of the selected ERPS Ring shows “Major-ring”, “Sub-ring with virtual channel”, or “Sub-ring without virtual channel”.
  - ERPS Status  
The status of ERPS is “Enable” or “Disable” in the selected ERPS Ring.
  - Ring State  
There are two states for ERPS Rings: **Normal** and **Abnormal**.

- Node State

There are three states for ERPS Nodes: **Initial**, **Idle**, **Pending**, and **Protection**.

State	Description
Initial	The ERPS protocol is disabled in the selected ring.
Idle	The ERPS protocol is enabled in the selected ring and the ERPS ring is under control by the RPL Owner.
Pending	The ERPS protocol is enabled in the selected ring. The ERPS ring is recovery from Protection state and is waiting for the wtr timer expired.
Protection	The ERPS protocol is enabled in the selected ring but one of the links in the ring is broken. The RPL changes to forward to keep the ring working.

- ERPS Ring ID

The ID is the identity for the selected ERPS Ring.

- R-APS Channel

This field shows the configured R-APS Channel.

- Virtual Channel

This field shows the virtual channel of sub-ring. If the field shows “default” implies the virtual channel follows the R-APS Channel.

- Revertive Mode

Show the Revertive Mode is enabled (Yes) or disabled (No).

- MEL Value

The field is the configured MEL value.

- **Port Status**

- Interface

The configured port presents the ERPS port 0/1 in the ERPS protocol.

- Role

Display the configured role for the configured port.

### 3.4. Web Management – Management

#### 3.4.1. MANAGEMENT – SNMP

**Simple Network Management Protocol (SNMP)** is a standard for collecting and structuring information on the managed devices of the IP network. It can also modify some of the information to change the behavior of the devices. SNMP is usually used in monitoring the network. The users can remotely query the information provided by the devices running SNMP.

The switches support SNMP v1, v2c, and v3. SNMP v1 and v2c authenticates with a community string for “**read-only**” or “**read-write**” permission. The SNMP v3 authentication requires the user to select an authentication level (**MD5** or **SHA**) and also supports data encryption to make the data safer.

For the SNMP version and authentication method relationship, refer to the table below:

Version	Web Setting	Authentication	Encryption	Method
v1 & v2c	Read Only Community	Community String	No	String match for authentication
	Read-Write Community	Community String	No	String match for authentication
v3	Security Level – No Authentication, No Privacy	No	No	Access by an account (admin or user)
	Security Level – Authentication, No Privacy	MD5 / SHA	No	Access by an account (admin or user) and password with more than 8 characters, which is based on MD5 or SHA
	Security Level – Authentication, Privacy	MD5 / SHA	Yes AES / DES	Access by an account (admin or user) and password more than 8 characters, which is based on MD5 or SHA. The data encryption is based on AES or DES and the key requires 8 to 32 characters.

### CONFIGURE SNMP SERVER INFORMATION

#### SNMP Server

##### Basic Settings

SNMP Version	v1, v2c and v3
Read Only Community	public
Read-Write Community	private

##### SNMPv3 Settings

<b>Admin</b>	
Security Level	No Authentication, No Privacy
Authentication Type	<input type="radio"/> MD5 <input checked="" type="radio"/> SHA
Authentication Password	administrator
Encryption Type	<input type="radio"/> AES <input type="radio"/> DES
Encryption Password	administrator
<b>User</b>	
Security Level	No Authentication, No Privacy
Authentication Type	<input type="radio"/> MD5 <input checked="" type="radio"/> SHA
Authentication Password	administrator
Encryption Type	<input type="radio"/> AES <input type="radio"/> DES
Encryption Password	administrator

Apply

- **Basic Settings**

- SNMP Version

The system enables the SNMP “v1, v2c and v3” authentication by default. The users can enable the SNMP server on only “v1 and v2c” or “v3”. “None” refers to disabling the SNMP server.

- Read Only Community

The community used to access the SNMP server with the “read-only” privilege.

The max length for the Read Only Community is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- Read-Write Community

The community used to access the SNMP server with the “read-write” privilege.

The **max.length** for the Read-Write Community is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- **SNMPv3 Settings**

This section is displayed only when the **SNMP Version** is set to “v3” or “v1, v2c and v3”.

Two accounts are provided – Admin and User to access the SNMP agent. The users can set different levels for the 2 accounts.

- Security Level

**No Authentication, No Privacy:** Access by an account “admin” or “user”.

**Authentication, No Privacy:** Access by an account “admin” or “user” with password.

**Authentication, Privacy:** Access by an account “admin” or “user” with password and the data will be encrypted.

- Authentication Type

Two algorithms are provided - **MD5** and **SHA** for authentication password.

- Authentication Password

A string/key is used to authenticate the SNMP Server and obtain the access permission. It will be hashed by MD5 or SHA before authentication.

The min length for the Read-Write Community is 8 characters.

The max length for the Read-Write Community is 32 characters.

**Note:** #, \, ', ", ? are **invalid** characters.

- Encryption Type

Two algorithms are provided - **AES** and **DES** for data encryption.

- Encryption Password

A string/key is used to encrypt the data that is sent to the SNMP server.

The min length for the Read-Write Community is 8 characters.

The max length for the Read-Write Community is 32 characters.

**Note:** #, \, ', ", ? are **invalid** characters.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE SNMP TRAP INFORMATION

#### SNMP Trap

##### Basic Settings

Trap Mode	<input type="text" value="v3 Trap"/>	
Inform Retry	<input type="text" value="5"/>	
Inform Timeout	<input type="text" value="1"/>	
Trap Receiver IP	<input type="text"/>	
Community	<input type="text" value="public"/>	

##### SNMPv3 Trap Settings

Username	<input type="text"/>	
Engine ID	<input type="text" value="0x80001f88807a9ff25ad3000000"/>	
Security Level	<input type="text" value="No Authentication, No Privacy"/>	
Authentication Type	<input checked="" type="radio"/> MD5 <input type="radio"/> SHA	
Authentication Password	<input type="text"/>	
Encryption Type	<input checked="" type="radio"/> AES <input type="radio"/> DES	
Encryption Password	<input type="text"/>	

- **Basic Settings**

- Trap Mode

The system enables the SNMP “v1, v2c and v3” authentication by default. Users can enable the SNMP server only on “v1 and v2c” or “v3”. “None” indicates disabling the SNMP server.

- Inform Retry

The SNMP trap will send “Retry” times when the trap set to “v2 Inform” or “v3 Inform” mode.

The range of the Inform Retry is **from 1 to 100**.

The default Inform Retry is **5**.

- Inform Timeout

The interval is used to send trap when the trap set to “v2 Inform” or “v3 Inform” mode.

The range of the Inform Retry is **from 1 to 300** second(s).

The default Inform Retry is **1** second.

- Trap Receiver IP  
The IP address is the IP address of the trap server to receive the trap information.
- Community  
The string in the SNMP trap is the identity of the device.  
  
The max length for the Community is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- **SNMPv3 Trap/Inform Settings**

This section is displayed only when **Trap Mode** are set to “v3 Trap” or “v3 Inform”.

- Username  
Specify the username for authentication with the SNMP trap server.
- Engine ID  
The Engine ID is the identifier for the given SNMP application.
- Security Level  
**No Authentication, No Privacy:** Access using the username assigned to the users.  
  
**Authentication, No Privacy:** Access using the username assigned to the users with password.  
  
**Authentication, Privacy:** Access using the username assigned to the users with password and the data will be encrypted.
- Authentication Type  
Two algorithms are provided - **MD5** and **SHA** for authentication password.
- Authentication Password  
A string/key is used to authenticate the SNMP trap server and obtain the permission. It will be hashed by MD5 or SHA before authentication.  
  
The min length for the Read-Write Community is 8 characters.  
  
The max length for the Read-Write Community is 32 characters.  
  
**Note:** #, \, ', ", ? are **invalid** characters.
- Encryption Type  
Two algorithms are provided - **AES** and **DES** for data encryption.
- Encryption Password

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A string/key is used to encrypt the data sent to the SNMP trap server.

The min length for the Read-Write Community is 8 characters.

The max length for the Read-Write Community is 32 characters.

**Note:** #, \, ', ", ? are **invalid** characters.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### 3.4.2. MANAGEMENT – DHCP

##### DHCP SERVER/CLIENT

DHCP, **Dynamic Host Configuration Protocol**, is a standardized protocol used in the IP networks. The DHCP Server holds an **IP address pool** and when a DHCP Client request for an IP address, the DHCP Server picks an IP address from the pool and assigns it to the client. DHCP Server also manages other IP information such as **Default Gateway** and **DNS Server**. DHCP is very useful to configure the IP information for a number of devices. Only the administrator can enable the DHCP Client for each device and setup the DHCP Server. The clients will then obtain a unique IP address and other IP settings to connect to the network.

##### DHCP SERVER BINDING

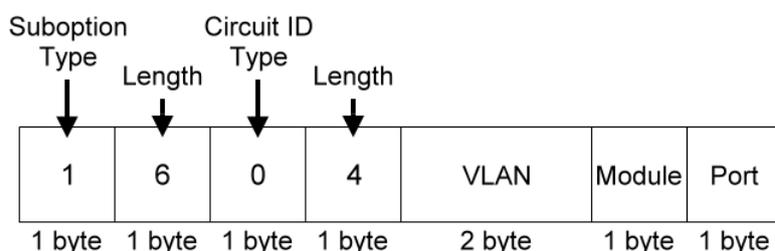
Apart from dynamically allocating an IP address to a DHCP Client, the DHCP Server also provides a function to manually assign a **static IP address** to the device with a specific MAC Address. This is called as DHCP Server Binding.

##### DHCP RELAY/OPTION82

In a large network, there might be several subnets existed and the DHCP Client is not able to serve by DHCP Servers directly. In this case, we need a relay agent to help to transmit the request frames to the DHCP Servers. When a relay agent receives the broadcast request frame from a DHCP Client, the relay agent will transmit the frame to the DHCP Servers, which are in the same subnet by unicast.

Option 82 is an information option to identify the clients by **Circuit ID** and **Remote ID**. The **Circuit ID** is an identity containing the **interface** name and/or **VLAN** information, and the **Remote ID** is to identify the **remote host** (the relay agent). The DHCP Server can distribute an IP address to the DHCP Client according to Option 82 information and make the IP addresses more controllable.

The frame format for the **Circuit ID** is as below:



- **VLAN**

The VLAN field is for the **management VLAN ID**, which is natively set to 1.

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### Management – DHCP

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- **Module**

The stack number for the device sending the DHCP request is on. For industrial switches, this byte is always filled as 0.

- **Port**

The port number identifies the incoming DHCP request frame/DHCP Client.

The frame format for the **Remote ID** is as below:



- **MAC Address**

By default, the MAC address is set to the MAC address of DHCP relay agent.

CONFIGURE DHCP CLIENT

⚙️ IPv4 Settings

IPv4 Mode	<input checked="" type="radio"/> Static <input type="radio"/> DHCP Client
IP Address	192.168.10.1
Subnet Mask	255.255.255.0
Default Gateway	
DNS Server	8.8.8.8

Apply

- **IPv4 Mode**

Set the **IPv4 Mode** to “**DHCP Client**” to enable the DHCP Client. The system sends a **discovery frame** to the network and tries to obtain an IP address from the DHCP Server.

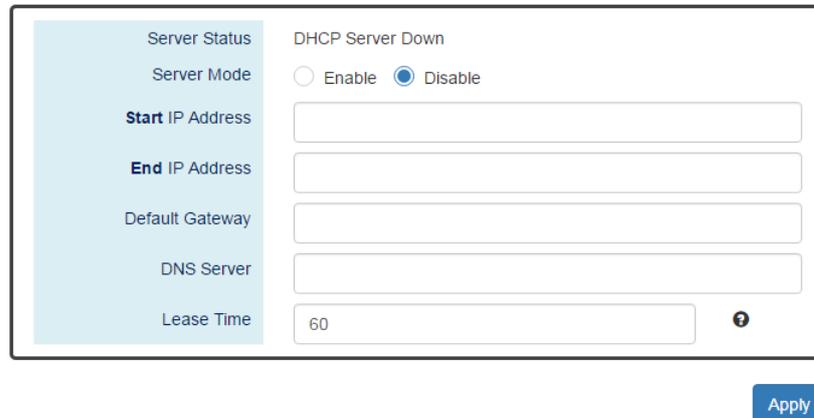
After enabling the DHCP Client, users need to connect to the **Console Port** to get the IP address by using “**show ip address**” on the CLI.

-  (Apply Button)

After configuring above fields, click “**Apply**” button to make the changes effective.

#### CONFIGURE DHCP SERVER INFORMATION

#### DHCP Server



Server Status	DHCP Server Down
Server Mode	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Start IP Address	<input type="text"/>
End IP Address	<input type="text"/>
Default Gateway	<input type="text"/>
DNS Server	<input type="text"/>
Lease Time	<input type="text" value="60"/> 

Apply

- **Server Status**  
Shows the status of the DHCP server: **Down** or **Up**.
- **Server Mode**  
“Enable” or “Disable” the DHCP Server function.
- **Start IP Address**  
Set the range of the IP pool. The “Start IP Address” is the starting.  
“Start IP Address” must be in the **same subnet** as that of the switch itself.
- **End IP Address**  
Set the range of IP pool. The “End IP Address” is the end.  
“End IP Address” must be in the **same subnet** as that of the switch itself.
- **Default Gateway**  
Set the Default Gateway for the DHCP Clients to make them connect to the WAN.  
“Default Gateway” must be in the **same subnet** as that of the switch itself.
- **DNS Server**  
Set the DNS Server for the DHCP Clients to make them connect to another device based on the **URL** instead of IP address.

- **Lease Time**

DHCP Server leases an IP address to a device for a **period of time**. When the lease time expires, the DHCP server may assign a different IP address in the pool to the device.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE DHCP SERVER BINDING INFORMATION

#### DHCP Server Binding

Binding ID 	MAC Address	Binding IP Address	+
<input type="text"/>	<input type="text"/>	<input type="text"/>	×

- **Binding ID**  
An ID used to identify the binding.  
  
The range of the Binding ID is **from 1 to 32**.
  - **MAC Address**  
The device with the specified MAC Address will be assigned to the static Binding IP Address.
  - **Binding IP Address**  
A static IP Address will be assigned to the specified MAC Address.
  - **+**: Click the **plus icon** to add a DHCP Binding row.
  - **×**: Click the **remove icon** to delete the DHCP Binding row.
  -  (Apply Button)
- After configuring above fields, click "**Apply**" button to make the changes effective.

### CONFIGURE DHCP RELAY INFORMATION

#### DHCP Relay

##### Relay Basic Settings

Relay Mode	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Relay Option82	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Helper Address 1	<input type="text"/>
Helper Address 2	<input type="text"/>
Helper Address 3	<input type="text"/>
Helper Address 4	<input type="text"/>

##### Relay Untrust

No.	Untrust Status 
Port 1	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 2	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 3	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 4	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 5	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 6	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 7	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 8	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 9	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 10	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 11	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 12	<input type="radio"/> Enable <input checked="" type="radio"/> Disable

Apply

- **Relay Basic Settings**

- Relay Mode  
“Enable” or “Disable” the DHCP Relay function.
- Relay Option82  
“Enable” or “Disable” the DHCP Relay with Option82 tag.

## Chapter 3: Web Management Management – DHCP

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- Helper Address 1 - 4

The **IP Addresses** of the **DHCP Servers** provide IP addresses to the DHCP Clients. A backup of Four Helper Addresses are available during breakdown.

- **Relay Untrust**

- No.

Port1 to PortN, where N is based on the total port number.

- Untrust Status

“Enable” or “Disable” to untrust the specific port. If the untrusted status is enabled on a port, the system will **drop** the DHCP management frames on the port.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### 3.4.3. MANAGEMENT – PoE

The **PoE**, or **Power over Ethernet**, allows switches to provide electric power along with data on the twisted pair Ethernet cables. The Power over Ethernet defined in **IEEE 802.3af** provides up to 15.4 W and **IEEE 802.3at** provides up to 25.5 W. It requires category 5 cables or better to support high power levels. **PoE** is helpful when the AC power is not available or is available with high cost. It is usually used in surveillance IP cameras, I/O sensors, wireless access points, and IP telephones.

#### CONFIGURE POWER OVER ETHERNET (PoE)

##### PoE Configuration

No.	Mode	Force	Status	Class	Voltage	Power
Port 1	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	On	3	48.1V	3.6W
Port 2	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	Off	0	-	-
Port 3	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	Off	0	-	-
Port 4	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	On	3	48.1V	2.8W
Port 5	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	Off	0	-	-
Port 6	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	Off	0	-	-
Port 7	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	Off	0	-	-
Port 8	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> On <input checked="" type="radio"/> Off	Off	0	-	-

Apply

- **No.**  
Port 1 to Port N, where N is based on the total PoE port number.
- **Mode**  
“Enable” or “Disable” PoE function on the specific port.
- **Force**  
Turn on or turn off the function to provide power forcedly on the specific port. When the forced mode is turned on, the system will provide power to that port even there is no device connected to this port.
- **Status**  
The field shows the PoE status of the specific port.  
  
On: PoE is enabled on the port and power is delivered on the port.  
  
Off: PoE is enabled on the port but no Powered Device (PD) is connected.

Disabled: PoE is disabled on the port.

- **Class**

The field shows the class followed by the PD. The acceptable power of the class is defined in the IEEE 802.3af/at.

- **Voltage**

This field shows the output voltage that PSE provided. The power output of the boost switch will be boosted to 53V.

- **Power**

The Consumption field contains provided power in watts. The PSE can provide up to 30Watts and the PDs can receive up to 25.5Watts.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE POE KEEP ALIVE

##### PoE Keep Alive

No.	Detect	IP Address 	Ping Interval 	Hold Time 
Port 1	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 2	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 3	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 4	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 5	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 6	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 7	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>
Port 8	<input type="checkbox"/> Enable	<input type="text"/>	<input type="text" value="30"/>	<input type="text" value="60"/>

- **No.**  
Port1 to PortN, where N is based on the total PoE port number.
- **Detect**  
“Enable” or “Disable” to detect the Powered Device (PD) on the specific port. When the detection is enabled, the system pings the configured IP Address on every Ping Interval.
- **IP Address**  
The field is the IP Address of the Powered Device (PD).
- **Ping Interval**  
The Ping Interval is the duration to ping the Powered Device (PD).  
  
The range of the Ping Interval is **from 1 to 65535** seconds.  
  
The default Ping Interval is **30**seconds.
- **Hold Time**  
The Hold Time is used when the ping fails. The system will wait for the Hold Time to expire and then try to ping the PD again.  
  
The range of the Hold Time is **from 1 to 65535** seconds.  
  
The default Hold Time is **60**seconds.
- (Apply Button)  
  
After configuring above fields, click "**Apply**" button to make the changes effective.

### CONFIGURE POE SCHEDULE

#### PoE Schedule

Port 1

Schedule Mode  Enable  Disable

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
00	<input type="checkbox"/>						
01	<input type="checkbox"/>						
02	<input type="checkbox"/>						
03	<input type="checkbox"/>						
04	<input type="checkbox"/>						
05	<input type="checkbox"/>						
06	<input type="checkbox"/>						
07	<input type="checkbox"/>						
08	<input type="checkbox"/>						
09	<input type="checkbox"/>						
10	<input type="checkbox"/>						
11	<input type="checkbox"/>						
12	<input type="checkbox"/>						
13	<input type="checkbox"/>						
14	<input type="checkbox"/>						
15	<input type="checkbox"/>						
16	<input type="checkbox"/>						
17	<input type="checkbox"/>						
18	<input type="checkbox"/>						
19	<input type="checkbox"/>						
20	<input type="checkbox"/>						
21	<input type="checkbox"/>						
22	<input type="checkbox"/>						
23	<input type="checkbox"/>						

Apply

- **Port Selector**  
Select the port number to configure the PoE Schedule.  
  
Port1 to PortN, where N is based on the total PoE port number.
- **Schedule Mode**  
“Enable” or “Disable” to provide power by the schedule on the specific port.
- **Enable** (for each day)  
The week is from Sunday to Saturday.
- **Week** (The x-ray of the table)  
The week is from Sunday to Saturday.

- **Hour** (The y-ray of the table)  
The hour is from 00 (00:00) to 23 (23:00).

Users can select the checkbox with the Week and Hour in the table to enable the PoE Schedule on the specific time. For example, if the user wants the PoE to be enabled only on Monday from 6:00 to 7:00 and on Wednesday from 13:00 to 15:00, the following checkboxes must be selected—“Mon-06”, “Mon-07”, “Wed-13”, “Wed-14”, and “Wed-15”.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### CONFIGURE POE PRIORITY

 PoE Priority

 Basic Settings

Priority Mode	Actual
Power Budget	1600

 Power Settings

No.	Priority	Limit
Port 1	Low	35
Port 2	Low	35
Port 3	Low	35
Port 4	Low	35
Port 5	Low	35
Port 6	Low	35
Port 7	Low	35
Port 8	Low	35



- **Basic Setting**

- Priority Mode

Configure the priority mode to provide the power to PDs. There are three modes: Actual, Class, and Static.

Actual: Provide the power according to the requirement from the PD.

Class: Follow the IEEE 802.3at/af classes to provide power. For example, the PD follows class 4 so the PSE will provide 30 Watt to it.

Static: Provide the fixed power that configured in the “Limit” fields by the user to the PDs.

- Power Budget

This field defines the **maximum power** that can provide to all the connected PDs.

The range of Power Budget is **from 0 to 5000** Watt.

The default Power Budget is **1600** Watt.

- **Power Settings**

- No.

Port1 to PortN, where N is based on the total PoE port number.

- Priority

Assign the PoE priority to **high**, **middle**, or **low** for the specific port.

- Limit

Set the power limitation for the specific port. The system will provide the limited watts to the PD without detecting how many watts the PD needs. This field only works when the priority mode is set to “Static”.

The range of Limit is **from 4 to 35** Watt.

The default Limit is **35** Watt.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### **3.4.4. MANAGEMENT – INDUSTRIAL PROTOCOL**

There are two industrial protocols provided in the switch – **EtherNet/IP** and **Modbus/TCP**.

**EtherNet/IP** is an **industrial network protocol** that linked up the Common Industrial Protocol (CIP) with standard Ethernet. EtherNet/IP takes advantage of both of the **Internet Protocol suite** and **IEEE 802 standard**, which are the most widely deployed collections of Ethernet standards, to define the features and functions for its transportation, networking, data link and physical layers. CIP makes use of **object-oriented design** to provide EtherNet/IP with the services and device profiles needed for real-time control applications. The object-oriented design of the CIP is also used to promote consistent implementation of automation functions into a diverse ecosystem of products. EtherNet/IP defines how to organize the data in a TCP/UDP packet and transfers the packet in the application layer.

**Modbus** is a popular communication protocol used for the **industrial serial devices**. It is usually working as “**master-slave**” architecture and working with **programmable logic controllers** which are also called **PLCs**. The Modbus/TCP implies to provide Modbus Messaging service on the TCP/IP, so that the devices which are running Modbus can communicate with each other with Modbus messages. The Modbus messages are encapsulated with an Ethernet TCP/IP wrapper on the basis of the standard. During the transmission, the switches can only acquire the encapsulated information when the Modbus/TCP is enabled. If users would like to understand the real content of Modbus message, users have to install other utilities such as “ModScan”. Our switches implements the Modbus/TCP registers including system information, firmware information, port information, and packet information. The details refer to the “Modbus Data MAPPING INFORMATION” section”.

#### **MODBUS DATA FORMAT AND FUNCTION CODE**

The primary four types of Modbus/TCP data format are as following:

<b>Data Access Type</b>		<b>Function Code</b>	<b>Function Name</b>
Bit Access	Physical Discrete Inputs	2	Read Discrete Inputs
	Internal Bits or Physical Coils	1	Read Coils
Word Access (16-bit Access)	Physical Input Registers	4	Read Input Registers
	Physical Output Registers	3	Read Holding Registers

**Modbus Data Mapping Information**

In the following tables, we assume the total port number is **8**.

The following table is for **Function Code 3 (Holding Registers) / Function Code 6**.

Address Offset	Data Type	Interpretation	Description
<b>System Information</b>			
0x0000 to 0x0008	1 word	HEX	Port 1 to Port 8 Status 0x0000: Disable 0x0001: Enable
			Port 1 to Port 8 Status Configuration 0x0000: Disable 0x0001: Enable

The following table is for **Function Code 4 (Input Registers)**. The data map addresses in the following table starts from **Modbus address 30001**. For example, the address offset 0x0000H equals Modbus address 30001, and the address offset 0x0030H equals Modbus address 30049. All the information read from our switches is in the **HEX mode** and users can refer to the ASCII table for the translation (e.g. 0x4B='K', 0x74='t').

Address Offset	Data Type	Interpretation	Description
<b>System Information</b>			
0x0030	20 words	ASCII	Product Name = "SWITCH" Word 0 Hi byte = 'S' Word 0 Lo byte = 'W' Word 1 Hi byte = 'I' Word 1 Lo byte = 'T' Word 2 Hi byte = 'C' Word 2 Lo byte = 'H'
0x0050	1 word		Product Serial Number
0x0051	2 words	HEX	Firmware Version For example: Word 0 = 0x0103 Word 1 = 0x0200 Firmware version is 1.3.2
0x0053	2 words	HEX	Firmware Release Date For example: Word 0 = 0x1719 Word 1 = 0x1506 Firmware was released on 2015-06-17 at 19 o'clock
0x0055	3 words	HEX	Ethernet MAC Address Ex: MAC = 01:02:03:0A:0B:0C Word 0 Hi byte = 0x01 Word 0 Lo byte = 0x02 Word 1 Hi byte = 0x03 Word 1 Lo byte = 0x0A Word 2 Hi byte = 0x0B Word 2 Lo byte = 0x0C
0x0058	1 word	HEX	Power 1 0x0000: Off 0x0001: On

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0x0059	1 word	HEX	Power 2 0x0000: Off 0x0001: On
0x005A	1 word	HEX	Fault LED Status 0x0000: Boot error 0x0001: Normal 0x0002: Fault
0x0082	1 word	HEX	DO1 0x0000: Off 0x0001: On
<b>Port Information</b>			
0x1000 to 0x1008	1 word	HEX	Port 1 to Port 8 Status 0x0000: Link down 0x0001: Link up 0x0002: Disable 0xFFFF: No port
0x1100 to 0x1108	1 word	HEX	Port 1 to Port 8 Speed 0x0000: 10M-Half 0x0001: 10M-Full 0x0002: 100M-Half 0x0003: 100M-Full 0xFFFF: No port
0x1200 to 0x1208	1 word	HEX	Port 1 to Port 8 Flow Ctrl 0x0000: Off 0x0001: On 0xFFFF: No port
0x1300 to 0x1313 (Port 1)  0x1314 to 0x1327 (Port 2) ...  0x138C to 0x139F (Port 8)	20 words	ASCII	Port 1 to Port 8 Description Port Description = "100Tx,RJ45." Word 0 Hi byte = '1' Word 0 Lo byte = '0' Word 1 Hi byte = '0' Word 1 Lo byte = 'T' ... Word 4 Hi byte = '4' Word 4 Lo byte = '5' Word 5 Hi byte = '.' Word 5 Lo byte = '\0'
<b>Packet Information</b>			
0x2000 to 0x200F	2 words	HEX	Port 1 to Port 8 Tx Packets Ex: port 1 Tx Packet Amount = 13248635 Received Modbus response: 0x13248635 Word 0 = 1324 Word 1 = 8635
0x2080 to 0x208F	2 words	HEX	Port 1 to Port 8 Tx Bytes Ex: port 1 Tx Bbytes Amount = 13248635 Received Modbus response: 0x13248635 Word 0 = 1324 Word 1 = 8635
0x2100 to 0x21(YY*2-1)	2 words	HEX	Port 1 to YY Rx Packets Ex: port 1 Rx Packet Amount = 13248635 Received Modbus response: 0x13248635 Word 0 = 1324 Word 1 = 8635

## Chapter 3: Web Management

### Management – Industrial Protocol

---

0x2180 to 0x218F	2 words	HEX	Port 1 to Port 8 Rx Bytes Ex: port 1 Rx Bbytes Amount = 13248635 Received Modbus response: 0x13248635 Word 0 = 1324 Word 1 = 8635
---------------------	---------	-----	--

#### Configure Industrial Protocols Information

#### Industrial Protocols

##### Modbus/TCP

Modbus Mode <input type="radio"/> Enable <input checked="" type="radio"/> Disable
---

##### Ethernet/IP

Ethernet/IP Mode <input type="radio"/> Enable <input checked="" type="radio"/> Disable
--

Apply

- **Modbus Mode**  
“Enable” or “Disable” the Modbus/TCP function.
- **Ethernet/IP Mode**  
“Enable” or “Disable” the Ethernet/IP function.
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### 3.4.5. MANAGEMENT – UPnP

UPnP is **Universal Plug and Play**, a set of networking protocols that permit the network devices to seamlessly discover each other in the networks. It is promoted by the UPnP Forum, but since 2016, all UPnP efforts are managed by the Open Connectivity Foundation.

UPnP extends “**plug and play**” to connect to a network device without configuration. When an UPnP device such as printer, Wi-Fi AP, or mobile device connects to a network, it will automatically establish the working configurations with other devices.

#### CONFIGURE UPnP INFORMATION

A screenshot of a web configuration interface for UPnP. It features a light blue header with a gear icon and the text "UPnP". Below this, there are two main sections: "UPnP Mode" with radio buttons for "Enable" and "Disable" (where "Disable" is selected), and "Advertisement Interval" with a text input field containing the value "1800" and a help icon. At the bottom right of the form is a blue "Apply" button.

- **UPnP Mode**

“Enable” or “Disable” the UPnP function.

- **Advertisement Interval**

A time period used to send the UPnP advertisement frame.

The range of the Advertisement Interval is **from 300 to 86400** seconds.

The default Advertisement Interval is **1800**seconds.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.5. Web Management – L2 Switching

#### 3.5.1. L2 SWITCHING – PORT MANAGEMENT

Port Management contains a “Description” field that is used to describe the port, “Enable” or “Disable” option to turn on or turn off a specific port, configure the speed-duplex for the port, and Flow Control on the port. In the Port Status page, the users can obtain information such as Link Status, Speed, Duplex, Flow Control, Tx and Rx in Bytes, and PoE status. These are very helpful for the administrator to manage the interfaces on the switch.

#### Configure Port Information

#### Port Settings

No.	Description 	Link Status	Admin Status	Speed	Flow Control
Port 1	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 2	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 3	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 4	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 5	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 6	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 7	<input type="text"/>	Up	Enable ▼	Auto ▼	Off ▼
Port 8	<input type="text"/>	Up	Enable ▼	Auto ▼	Off ▼
Port 9	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 10	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 11	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼
Port 12	<input type="text"/>	Down	Enable ▼	Auto ▼	Off ▼

Apply

- **No.**  
Port 1 to Port N, where N is based on the total port number.
- **Description**  
The description for the port is helpful for the administrator to identify the difference between the ports.

The max length for the Description is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- **Link Status**

Link Status shows “Up”, “Down”, or “Disable” to reflect the link status of the port.

- **Admin Status**

“Enable” or “Disable” the Admin Status of the port to restrict the transmission on the port.

**Note:** Administrator can **turn off the un-used port** to **secure** the network with unexpected device.

- **Speed**

The users are able to manually fix the speed and duplex or automatically run auto-negotiation to determine the speed and duplex.

- Auto: The port follows IEEE 802.3u protocol to auto-negotiate with connected device.
- 100M-Full: The port transmits frames with **100Mbps** per second speed and **full duplex**.
- 100M-Half: The port transmits frames with **100Mbps** per second speed and **half duplex**.
- 10M-Full: The port transmits frames with **10Mbps** per second speed and **full duplex**.
- 10M-Half: The port transmits frames with **10Mbps** per second speed and **half duplex**.

- **Flow Control**

“Enable” or “Disable” the Flow Control when the speed is set to “Auto”. Enabling Flow Control helps to prevent the traffic from losing when the network is in congestion.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### SFP DDM STATUS



- **SFP Port Selector**

Select the SFP port number to display SFP DDM information.

- **Transceiver Info**

If there is no SFP module inserted or the information cannot be read, the field will show “-”.

If a SFP module is plugged into the SFP slot, the following information will be shown:

- **Vendor Name**

This field shows the **brand or vendor name** of the SFP module.

- **Part Number**

This field shows the **model name (part number)** of the SFP module.

- **Transceiver Type**

This field shows the **transceiver type** of the SFP module including transmitting **speed** and the **type of fiber**. If there is no SFP module inserted or the transceiver type cannot be read, the field will show “**Unknown**”.

- **Laser Wavelength**

This field shows the **laser operating wavelength** of the SFP module.

- **Link Length**

This field shows the **maximum link length** of the SFP module.

**DDM Module**

Real-Time Value	
Temperature	57.000deg
Voltage	0.0mV
Current	0.000mA
Tx Power	0.0000mW
Rx Power	0.0000mW

Alarm Warning				
	HI ALARM	HI WARNING	LOW WARNING	LOW ALARM
TEMP	57.000deg	0.000deg	0.000deg	0.000deg
VOLT	1459.2mV	0.0mV	0.0mV	0.0mV
CURR	29.184mA	0.000mA	0.000mA	0.000mA
TX PW	1.4592mW	0.0000mW	0.0000mW	0.0000mW
RX PW	1.4592mW	0.0000mW	0.0000mW	0.0000mW

- **DDM Module**

This section only shows when the **SFP DDM** is supported on the inserted SFP module.

- **Real Time Value**

The current operating information including **temperature, voltage, current, Tx power,** and **Rx power**.

- **Alarm Warning**

The default configured threshold for triggering the alarm and system warning. There are 5 types of information (**temperature, voltage, current, Tx power, and Rx power**) and 4 levels of alarm and warning (**high alarm/warning, low alarm/warning**).

#### Detailed Port Status

There are two methods to link to **detailed port status (RMON)**. One is from **menu** and the other is from the **front panel** picture. Users can directly click the port on the front panel and then the page will redirect to the detailed port status page of the specific port. The RMON is a set of standard Simple Network Management Protocol (SNMP) and it is useful to monitor and manage the incoming and outgoing traffic.

#### Detailed Port Status

Port 1

→ Received Packets

Rx Octets	210214768
Rx Unicast	0
Rx Multicast	431649
Rx Broadcast	1391
Rx Pause	0

→ Received Size Counter

Rx 64 Bytes	512514
Rx 65-127 Bytes	9572
Rx 128-255 Bytes	35690
Rx 256-511 Bytes	433090
Rx 512-1023 Bytes	19
Rx 1024-1518 Bytes	57136

→ Received Error Counter

Rx Collision	0
Rx CRC/Alignment	0
Rx Drop	0
Rx Fragment	0
Rx Jabber	0
Rx Oversize	0
Rx Undersize	0

← Transmitted Packets

Tx Octets	108301443
Tx Unicast	17
Tx Multicast	531719
Tx Broadcast	83245
Tx Pause	0

← Transmitted Error Counter

Tx Discard	0
Tx Error	0

- Port Selector

Select the port number to monitor the RMON information.

Port 1 to N, where N is based on the total port number.

- **Received Packets**
  - Rx Octets: the total received traffic in bytes
  - Rx Unicast: the number of received unicast packets
  - Rx Multicast: the number of received multicast packets
  - Rx Broadcast: the number of received broadcast packets
  - Rx Pause: the number of MAC Control packets received on the specific interface with an opcode indicating the PAUSE operation.
- **Received Size Counter**
  - Rx 64 Bytes: the number of received packets that were 64 octets
  - Rx 65-127 Bytes: the number of received packets that were from 65 to 127 octets
  - Rx 128-255 Bytes: the number of received packets that were from 128 to 255 octets
  - Rx 256-511 Bytes: the number of received packets that were from 256 to 511 octets
  - Rx 512-1023 Bytes: the number of received packets that were from 512 to 1023 octets
  - Rx 1024-1518 Bytes: the number of received packets that were from 1024 to 1518 octets
- **Received Error Counter**
  - Rx Collision: the total number of collisions on the Ethernet segment.
  - Rx CRC/Alignment: the total number of received packets that have either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
  - Rx Drop: the total number of dropped packets due to lack of resources.
  - Rx Fragment: the total number of received packets that are less than 64 octets and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
  - Rx Jabber: the total number of received packets that are longer than 1518 octets and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
  - Rx Oversize: the total number of received packets that are longer than 1518 octets.
  - Rx Undersize: the total number of received packets that are less than 64 octets.
- **Transmitted Packets**
  - Tx Octets: the total transmitted traffic in bytes.
  - Tx Unicast: the number of transmitted unicast packets
  - Tx Multicast: the number of transmitted multicast packets

## Chapter 3: Web Management

### L2 Switching – Port Management

- Tx Broadcast: the number of transmitted broadcast packets
- Tx Pause: the number of MAC Control packets transmitted on the specific interface with an opcode indicating the PAUSE operation.
- **Transmitted Error Counter**
  - Tx Discard: the number of outbound packets which are chosen to be discarded even though no errors had been detected. One possible reason for discarding such a packet could be to free up buffer space.
  - Tx Error: the number of outbound packets that could not be transmitted because of errors.

#### PORT STATUS

### Port Status

Port	Link Status	Speed	Duplex	Flow Control	Rx Byte	Tx Byte	PoE	Clear Rx/Tx
1	Up	1000	Full	Off	1704675	33021829	No_PD	<input type="checkbox"/>
2	Up	100	Full	Off	17960092	13197836	Delivery	<input type="checkbox"/>
3	Down	-	-	Off	0	0	No_PD	<input type="checkbox"/>
4	Up	100	Full	Off	5927919	25182558	Delivery	<input type="checkbox"/>
5	Up	1000	Full	Off	1175481	31105465	No_PD	<input type="checkbox"/>
6	Down	-	-	Off	0	0	No_PD	<input type="checkbox"/>
7	Up	1000	Full	Off	3192398	28409537	No_PD	<input type="checkbox"/>
8	Down	-	-	Off	0	0	No_PD	<input type="checkbox"/>
9	Down	-	-	Off	0	0	None	<input type="checkbox"/>
10	Down	-	-	Off	0	0	None	<input type="checkbox"/>
11	Down	-	-	Off	0	0	None	<input type="checkbox"/>
12	Down	-	-	Off	0	0	None	<input type="checkbox"/>

Auto Refresh

Refresh Rate:  seconds 

- **Port**  
Port 1 to N, where N is based on the total port number.
- **Link Status**  
Link Status displays the link state (“Up” or “Down”) of the port. If the port is disabled, it displays “Disabled”.

- **Speed**  
Speed displays the access speed in bit per second of the port. If the port is linked down, it displays“-“.
- **Duplex**  
Duplex displays the link-type (Full or Half) of the port. If the port is linked down, it displays“-“.
- **Flow Control**  
It is the state (On or Off) of the Flow Control.
- **Rx Byte**  
This is the total **received** frames formatted in byte.
- **Tx Byte**  
This is the total **transmitted** frames formatted in byte.
- **PoE**  
PoE displays the PoE state (Delivery, No PD, Disabled, None) of the port. If the port does not support PoE function, it displays “None”.

**Note:** This information is displayed on the system that supports the PoE function.

- **Clear Rx/Tx**  
Select the specific ports and click the “**Click Selected**” button to clear the Tx/Rx Byte information or click “**Click All**” button to clear all ports’ Tx/Rx Byte information.

### 3.5.2. L2 SWITCHING – IGMP SNOOPING

**Internet Group Management Protocol (IGMP)** is used in communicating among hosts and establishing a multicast group membership on the IPv4 networks (Layer 3). IGMP provides the ability to prune **multicast traffic** to those who need this kind of traffic and reduce the amount of traffic on the network. However, switches work on the MAC Layer (Layer 2) and are unable to obtain IGMP information. **IGMP Snooping** allows the switch to listen to the IGMP communication between hosts and routers, and maintains a table of multicast IPs and group members. **IGMP Snooping** can prevent the hosts on the LAN from receiving traffic from a non-joined multicast group and save bandwidth of the network.

#### Configure IGMP Snooping Information

##### IGMP Snooping Settings

###### Basic Settings

Mode	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Last-Member Count	<input type="text" value="2"/>
Last-Member Interval	<input type="text" value="1"/>

###### Fast-Leave Settings

No.	Fast-Leave Mode
Port 1	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 2	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 3	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 4	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 5	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 6	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 7	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 8	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 9	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 10	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 11	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Port 12	<input type="radio"/> Enable <input checked="" type="radio"/> Disable

Apply

- **Basic Setting**

- Mode

“Enable” or “Disable” the IGMP Snooping function.

- Last-Member Count

The count is the number of times that the router sends IGMP query messages to receive the leave message.

The range of the Last-Member Count is **from 2 to 10**.

The default Last-Member Count Interval is **2**.

- Last-Member Interval

The interval is the period to send IGMP query messages.

The range of the Last-Member Interval is **from 1 to 25** seconds.

The default Last-Member Interval is **1** second.

- **Fast-Leave Setting**

- No.

Port 1 to N, where N is based on the total port number.

- Fast-Leave Mode

“Enable” or “Disable” the fast-leave function on the specific port. If the fast-leave mode is enabled on the port, the switch will close the multicast stream when receiving a leave message on this port without further action.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### CONFIGURE IGMP SNOOPING QUERIER INFORMATION

#### IGMP Snooping Querier

##### Basic Settings

Mode	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Query Interval	<input type="text" value="125"/>
Max Response Time	<input type="text" value="10"/>

##### Query Version Settings

VLAN ID	State	Version	
<input type="text" value="1"/>	<input type="text" value="Enable"/>	<input type="text" value="v2"/>	<input type="text" value=""/>

Apply

- **Basic Settings**

- Mode

- “Enable” or “Disable” the IGMP Snooping Querier function. If it is enabled, the system sends IGMP snooping **version 1 and 2** queries.

- Querier Interval

- This period is the interval to send the IGMP snooping queries.

- The range of the Querier Interval is **from 1 to 3600** seconds.

- The default Querier Interval is **125** seconds.

- Query Max Response Time

- This is a timer to wait for the member response of the IGMP groups. It is used in **removing** the information of the IGMP groups if no member responds to the query.

- **Query Version Settings**

- The Query Version Settings is configured for per-VLAN query.

- VLAN ID

- The field is to fill in the VLAN ID to configure the IGMP Snooping query version.

- State

- “Enable” or “Disable” the IGMP Snooping query on the configured VLAN ID.

- Version

- Set the IGMP Snooping version (v1, v2c, v3) on the specific VLAN.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### Configure Unknown Multicast Information

#### Unknown Multicast

##### Action Setting

Unknown-Multicast	Flooding
-------------------	----------

##### Router Port Settings

No.	Router Port	Status
Port 1	<input type="checkbox"/>	-
Port 2	<input type="checkbox"/>	-
Port 3	<input type="checkbox"/>	-
Port 4	<input type="checkbox"/>	-
Port 5	<input type="checkbox"/>	-
Port 6	<input type="checkbox"/>	-
Port 7	<input type="checkbox"/>	-
Port 8	<input type="checkbox"/>	-
Port 9	<input type="checkbox"/>	-
Port 10	<input type="checkbox"/>	-
Port 11	<input type="checkbox"/>	-
Port 12	<input type="checkbox"/>	-



- **Action Settings**

- Unknown-Multicast

Configure the action when the system receives an unknown-multicast packet.

Flooding: flood the unknown-multicast packet to all other ports.

Discarding: discard the unknown-multicast packet.

Router: forward the unknown-multicast packet to the router port.

- **Router Port Settings**

- No.

Port 1 to N, where N is based on the total port number.

- Router Port

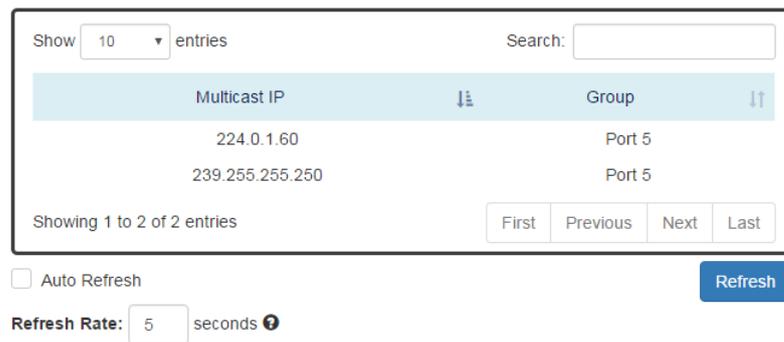
Set the specific port to router port or not.

- Status

The status field shows the port's status which “-“ implies not a router port and “static” implies set to router port.

#### IGMP SNOOPING TABLE

##### IGMP Snooping Table



Multicast IP	Group
224.0.1.60	Port 5
239.255.255.250	Port 5

Showing 1 to 2 of 2 entries

Auto Refresh

Refresh Rate:  seconds

- **Multicast IP**

The Multicast IP is the IP address of the multicast group.

- **Group**

The group shows the port number, which joined the group.

### **3.5.3. L2 SWITCHING – 802.1Q VLAN**

#### **802.1Q VLAN**

**Virtual Local Area Network (VLAN)** is a structure that can ease Network planning. The devices in a VLAN can be located anywhere without the restriction of physical connections, but work like they are on the same physical segment.

IEEE 802.1Q defines **VLAN tagging** conception for the Ethernet frames. VLAN tagging supports frames in the different VLAN groups transmitting on a link (called **VLAN trunk**). The maximum number of VLANs on the Ethernet network is 4096. The VLAN 0 and VLAN 4095 are for specific use and hence the usable VLAN number is **4094**.

#### **VLAN Q-in-Q**

**VLAN Q-in-Q**, also called **Stacked VLAN**, is an extension for 802.1Q VLAN. It supports a maximum of 4096\*4096 VLAN groups. VLAN Q-in-Q can apply a port to a provider, customer, or tunnel for different applications. The header of the stacked VLAN frame contains two 802.1Q Headers with different Ethertype (TPID). The TPID “0x88A8” is the outer tag by default and the TPID “0x8100” is the inner tag for 802.1Q VLAN. Customized ethertype called **Specific Provider Ethertype** are supported if one or more ports are set to “**Specific Provider**”.

### Configure 802.1Q VLAN Information

#### ⚙️ 802.1Q VLAN Settings

##### 📍 Management VLAN

VLAN ID	<input type="text" value="1"/>	?
---------	--------------------------------	---

##### 📍 VLAN Member Settings

VLAN ID ?	Name ?	Untagged Ports	Tagged Ports	+
<input type="text" value="1"/>	<input type="text"/>	12 items selected ▾	Nothing selected ▾	×

- **Management VLAN**

- VLAN ID

The VLAN ID is for the native VLAN. Only the ports in the same VLAN as Management VLAN can **access the switch** configuration console via **Ethernet**.

The range of the VLAN ID is **from 1 to 4094**.

The default Management VLAN ID is **1**.

- **VLAN Member Settings**

- VLAN ID

Assigns a unique VLAN ID to this VLAN group.

The range of the VLAN ID is **from 1 to 4094**.

- Name

Assigns a name to this VLAN group to identify the different VLANs.

The **max.length** for the Name is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- Untagged Ports

Sets the untagged ports for this VLAN group. The system **removes the VLAN tag** before transmitting from the port that is set to **“untagged”**. Usually, this port is connected to the end device that belongs to this VLAN.

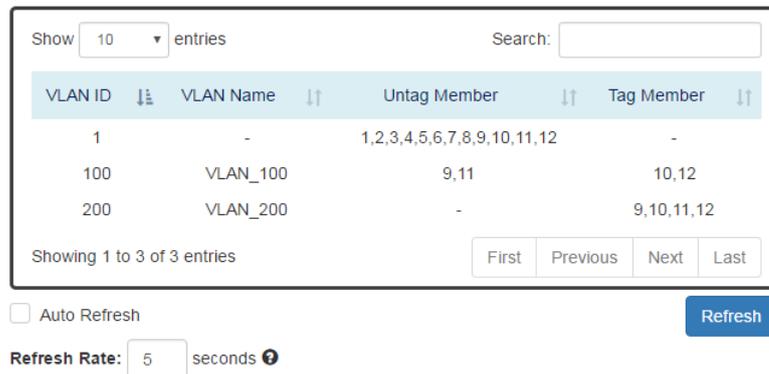
- Tagged Ports

Sets the tagged ports for this VLAN group. The system **keeps the VLAN tag** when transmitting from the port that is set to **“tagged”**. Usually this port is connected to another switch and uses the VLAN tag to transfer the VLAN information.

- **+**: Click the **plus icon** to add a VLAN Member row.
- **X**: Click the **remove icon** to delete the VLAN Member row.

### 802.1Q VLAN TABLE

#### VLAN Table



VLAN ID	VLAN Name	Untag Member	Tag Member
1	-	1,2,3,4,5,6,7,8,9,10,11,12	-
100	VLAN_100	9,11	10,12
200	VLAN_200	-	9,10,11,12

Showing 1 to 3 of 3 entries

Auto Refresh

Refresh Rate:  seconds

- **VLAN ID**  
This is the assigned unique **VLAN ID** for this VLAN group.
- **VLAN Name**  
This is the assigned **VLAN Name** for this VLAN group.
- **Untag Member**  
These ports are assigned as VLAN untagged ports.
- **Tag Member**  
These ports are assigned as VLAN tagged ports.

### Configure 802.1Q VLAN PVID & Accept Type

**VLAN PVID**

No.	PVID
Port 1	<input type="text" value="1"/>
Port 2	<input type="text" value="1"/>
Port 3	<input type="text" value="1"/>
Port 4	<input type="text" value="1"/>
Port 5	<input type="text" value="1"/>
Port 6	<input type="text" value="1"/>
Port 7	<input type="text" value="1"/>
Port 8	<input type="text" value="1"/>
Port 9	<input type="text" value="1"/>
Port 10	<input type="text" value="1"/>
Port 11	<input type="text" value="1"/>
Port 12	<input type="text" value="1"/>

**Accept Type**

No.	Filter
Port 1	<input type="text" value="All"/>
Port 2	<input type="text" value="All"/>
Port 3	<input type="text" value="All"/>
Port 4	<input type="text" value="All"/>
Port 5	<input type="text" value="All"/>
Port 6	<input type="text" value="All"/>
Port 7	<input type="text" value="All"/>
Port 8	<input type="text" value="All"/>
Port 9	<input type="text" value="All"/>
Port 10	<input type="text" value="All"/>
Port 11	<input type="text" value="All"/>
Port 12	<input type="text" value="All"/>

- **VLAN PVID**
  - No.  
Port1 to PortN, where N is based on the total port number.
  - PVID  
Assign a VLAN ID to the frames without a VLAN tag that come into the specific port.
  
- **Accept Type**
  - No.  
Port1 to PortN, where N is based on the total port number.
  - Filter  
Three types of filters are provided: All, Tagged Only, Untagged Only.  
**All:** Accept both tagged and untagged frames that come into the port.  
**Tagged Only:** Accept only tagged frames that come into the port.  
**UNTAGGED ONLY: ACCEPT ONLY UNTAGGED FRAMES THAT COME INTO THE PORT.**
  
- (Apply Button)  
After configuring the above fields, click "**Apply**" button to make it effective.

CONFIGURE VLAN Q-IN-Q

 VLAN Q-in-Q Settings

 Specific Provider Ethertype

Ethertype	0x88A8	
-----------	--------	---

- **Specific Provider Ethertype**

This is a global configuration and an Ethertype is assigned for all ports, which are configured as “**Specific Provider**”. This field is locked (disabled) until at least one port is configured to the “**Specific Provider**” in the “**Q-in-Q Port Settings**” section.

The range of the Provider Ethertype is **from 0x0000 to 0xFFFF**, but **0x8100** is **invalid**.

The default Provider Ethertype is **0x88A8**.

 Q-in-Q Port Settings

No.	Mode
Port 1	Customer
Port 2	Customer
Port 3	Customer
Port 4	Customer
Port 5	Customer
Port 6	Customer
Port 7	Customer
Port 8	Customer
Port 9	Customer
Port 10	Customer
Port 11	Customer
Port 12	Customer

Apply

- **Q-in-Q Port Settings**

- No.  
Port1 to PortN, where N is based on the total port number.
- Mode  
Set the port to one of the Q-in-Q mode.

The Egress is dependent on the connected device and hence the egress action is skipped.

<b>Mode</b>	<b>Ingress</b>
Q-in-Q Tunnel	Untagged Frames: Add TPID: 0x88A8 tag and forward. Tagged Frames: TPID: 0x8100: Add TPID: 0x88A8 tag and forward. TPID: 0x88A8: Forward the frames.
<b>Mode</b>	<b>Ingress</b>
Customer	A port set to "Customer" runs typically 802.1Q VLAN. Untagged Frames: Add TPID: 0x8100 tag and forward. Tagged Frames: TPID:0x8100: Same VLAN ID: Forward the frames. Different VLAN ID: Discard the frames. TPID:0x88A8: Discard the frames.
Provider	Untagged Frames: Add TPID: 0x88A8 tag and forward. Tagged Frames: TPID: 0x8100: Discard the frames. TPID:0x88A8: Same VLAN ID: Forward the frames. Different VLAN ID: Discard the frames.
Specific Provider	Users define the Ethertype for the Provider service. Untagged Frames: Add the user-defined TPID tag and forward. Tagged Frames: TPID: 0x8100: Discard the frames. TPID: 0x88A8: Discard the frames. TPID:[user-defined]: Same VLAN ID: Forward the frames. Different VLAN ID: Discard the frames.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.5.4. L2 SWITCHING – QUALITY OF SERVICE

**Quality of Service** which known as **QoS** provides a stable and predictable transmitting service. It is useful to manage the bandwidth more efficiently based on the requirement of applications. Users are able to set **different priorities** for different traffics to satisfy the services which need a fixed bandwidth and have more sensitive of delay. **Quality of Service** can also optimize the restrict bandwidth resource and control the network traffic of the switches.

#### Configure QoS Information

#### Quality of Service (QoS)

##### Queue Scheduling

Scheduling Mode	WRR (Weighted) ▼
-----------------	------------------

##### Queue Weight

Queue	Weight		Queue	Weight	
0	<input type="text" value="1"/>		4	<input type="text" value="5"/>	
1	<input type="text" value="2"/>		5	<input type="text" value="6"/>	
2	<input type="text" value="3"/>		6	<input type="text" value="7"/>	
3	<input type="text" value="4"/>		7	<input type="text" value="8"/>	

- **Queue Scheduling**

- Scheduling Mode

Select the scheduling mode for the Quality of Service.

WRR: **Weighted Round Robin**. WRR ensures that every queue takes turns to transmit the traffic by its weight.

Strict: **Strict Priority Queue**. The traffic is transmitted based on the priority, which is from highest to lowest.

- **Queue Weight**

- Queue

Eight queues from queue 0 to queue 7 are supported.

- Weight

Enables you to configure a specific weight for the port.

## Chapter 3: Web Management

### L2 Switching – Quality of Service

The range of the Weight is **from 1 to 100**. There is no need to sum all queues to 100.

The default Weight for each queue is displayed in the table:

<b>Queue</b>	0	1	2	3	4	5	6	7
<b>Weight</b>	1	2	3	4	5	6	7	8

#### Configure QoS Trust Mode and Default CoS

**Trust Mode**

No.	Mode
Port 3	CoS
Port 4	CoS
Port 5	CoS
Port 6	CoS
Port 7	CoS
Port 8	CoS
Port 9	CoS
Port 10	CoS
Port 11	CoS
Port 12	CoS

**Default CoS**

No.	Class
Port 3	0
Port 4	0
Port 5	0
Port 6	0
Port 7	0
Port 8	0
Port 9	0
Port 10	0
Port 11	0
Port 12	0

- **Trust Mode**

- No.

Port1 to PortN, where N is based on the total port number.

- Mode

CoS: Class of Service. Use the 3-bit “PRI” field in the VLAN tag. It enables you to assign traffic to 8 different classes **from 0 to 7**.

DSCP: Use 6-bit field “DSCP” in the Type of Service (ToS) tag. It enables you to assign traffic to 64 different types **from 0 to 63**.

- **Default CoS**

- No.

Port1 to PortN, where N is based on the total port number.

## Chapter 3: Web Management

### L2 Switching – Quality of Service

---

- **Class**

You can assign a default class to the port. The system follows the assigned CoS classes to transmit frames if there is **no VLAN tag** in the frame header.

The default Class for each port is **0**.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE CoS MAPPING

##### CoS Mapping

Class / Priority	Queue
0	1
1	0(Lowest)
2	2
3	3
4	4
5	5
6	6
7	7(Highest)



- **Class / Priority**

There are **3 bits** for the “Class of Service” field called “**PRI**” in the VLAN tag and there are **8 classes from 0 to 7**.

- **Queue**

The chipset supports **8 queues from queue 0 to queue 7**. The queue 0 is the lowest priority queue and the queue 7 is the highest priority queue.

The default Queue for each class is displayed in the table:

<b>Class</b>	0	1	2	3	4	5	6	7
<b>Queue</b>	1	0	2	3	4	5	6	7

**CONFIGURE TOS MAPPING**

 **DSCP Mapping**

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

**Apply**

- DSCP**  
 There are **6 bits** for the “**DSCP**” in ToS tag and hence there are 64 classes **from 0 to 63**.
- Queue**  
 The chipset supports **8 queues from queue 0 to queue 7**. The queue 0 is the least priority queue and the queue 7 is the highest priority queue.

The default Queue for each type is displayed in the table:

Type	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
<b>Queue</b>	0	1	2	3	4	5	6	7

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.5.5. L2 SWITCHING – PORT TRUNK

**Port Trunk** is also known as **Link Aggregation**, and it is a protocol to group links to a trunk. A total of **8** trunk groups are provided. It is a good method to reach load balance and link backup. For example, when port 1 to port 4 are combined to trunk 1 and all ports support 100Tx and set to full-duplex, the bandwidth of the trunk will be 800Mbps. The traffic transmitting on the trunk is distributed to one of the link by the source **MAC address** to reach the load balance. When the trunk mode is set to LACP and when one of the link is broken, the traffic will transmit on another link on the group.

#### Configure Port Trunk Information

##### Trunking Settings

Group	Trunking Mode	Member Ports
Trunk 1	LACP	Nothing selected
Trunk 2	LACP	Nothing selected
Trunk 3	LACP	Nothing selected
Trunk 4	LACP	Nothing selected
Trunk 5	LACP	Nothing selected
Trunk 6	LACP	Nothing selected
Trunk 7	LACP	Nothing selected
Trunk 8	LACP	Nothing selected

[Apply](#)

- **Group**  
Eight trunk groups from **Trunk 1** to **Trunk 8** are supported.
- **Trunking Mode**  
Two trunking modes are available: “LACP” and “Static”.

**Static:** The traffic is transmitted on one of the links in the group. The link is determined by the MAC Address in the frame header. If the link is broken, the traffic cannot transmit on the other links in the group.

**LACP:** It is also known as “Dynamic” trunking. If the current transmitting link is broken, the traffic can be transmitted on another link in the group.

- **Member Ports**

Select member ports to be joined in the specified Trunk group. A port can only be in one of the Trunk group. Each Trunk group supports maximum 8 member ports.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### PORT TRUNK STATUS

##### Trunking Status

Group	Type	Ports	Link Status
Trunk 1	-	-	-
Trunk 2	-	-	-
Trunk 3	Static	9	Down
		10	Down
		11	Down
Trunk 4	-	12	Down
		-	-
Trunk 5	LACP	7	Down
Trunk 6	-	8	Down
Trunk 7	-	-	-
Trunk 8	-	-	-

Auto Refresh



Refresh Rate:  seconds 

- **Group**

The supported trunk groups are from **Trunk 1** to **Trunk 8**.

- **Type**

The trunk mode set for this group maybe "**LACP**" or "**Static**". This field displays "-" if no members are in the group.

- **Ports**

The selected member ports in the group will be displayed in this column.

- **Link Status**

This field displays the link state (Up or Down) for the specific port.

### 3.6. Web Management – Security

#### 3.6.1. SECURITY – STORM CONTROL

A traffic storm happens when there is excessive packets **flood** to the LAN and decreases the performance. The **Storm Control** function is used to prevent the system from breaking down by the broadcast, multicast, or unknown unicast traffic storm. When the **Storm Control** is enabled on the specific traffic type, the system will monitor the incoming traffic. If the traffic is more than the configured level, the traffic will be dropped to avoid the storm.

#### Configure Storm Control Information

##### Storm Control

Traffic Type	Mode	Level
Broadcast	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	High (2500fps) ▼
Multicast	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	High (2500fps) ▼
Unknown Unicast	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	High (2500fps) ▼

**Apply**

- **Traffic Type**

Three types of traffics are supported in the Storm Control: **Broadcast**, **Multicast**, and **Unknown Unicast**.

- **Mode**

“Enable” or “Disable” Storm Control function in the specific traffic type.

- **Level**

Three frame levels are available: **High**, **Middle**, and **Low**. If the frames of specific traffic type are more than the set level, the system will drop the type of frames to prevent the system from breaking down.

- **HIGH: MORE THAN 2500 FRAME PER SECOND.**
- **MID: MORE THAN 1000 FRAME PER SECOND.**
- **LOW: MORE THAN 500 FRAME PER SECOND.**

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.6.2. SECURITY – 802.1X

802.1X is an **IEEE** standard defined **Port-based Network Access Control**. It provides a more secured authentication mechanism for the devices, which would like to connect to a LAN or a WAN. The **Port-based** Network Access Control protocol is a convenient method for the users because the authentication is per-port and once the port passes the authentication, it is not required to authenticate again when changing to another device, i.e., without security. Therefore, **MAC-based** access control is provided. It is a more secure, but less convenient method for authentication. Only the device with the MAC Address that has passed the authentication can be added to the networks. These two methods are optional on each port and the users can select one of them on different ports.

#### CONFIGURE 802.1X BASIC INFORMATION

##### 802.1X Settings

###### Basic Settings

802.1X Mode	<input type="radio"/> Enable	<input checked="" type="radio"/> Disable
Server Type	<input type="radio"/> Local Database	<input checked="" type="radio"/> RADIUS Server

- **Basic Settings**

- 802.1X Mode

“Enable” or “Disable” 802.1X function on the switch.

- Server Type

Select the 802.1X server type to “Local Database” or “RADIUS Server”.

**Local Database:** The database is maintained in a table stored in the switch. The client has to send the username and password to authenticate with the switch’s database.

**RADIUS Server:** The database is maintained in other devices running RADIUS service. The authentication follows the RADIUS protocol including communication and encryption.

### Configure 802.1X Port Information

#### Port Settings

No.	Enable	Mode	Re-Auth	Re-Auth Period
Port 1	No	Mac-based	Yes	3600
Port 2	No	Mac-based	Yes	3600
Port 3	No	Mac-based	Yes	3600
Port 4	No	Mac-based	Yes	3600
Port 5	No	Mac-based	Yes	3600
Port 6	No	Mac-based	Yes	3600
Port 7	No	Mac-based	Yes	3600
Port 8	No	Mac-based	Yes	3600
Port 9	No	Mac-based	Yes	3600
Port 10	No	Mac-based	Yes	3600
Port 11	No	Mac-based	Yes	3600
Port 12	No	Mac-based	Yes	3600

Apply

- **Port Settings**

- No.

Port 1 to Port N, where N is based on the total port number.

- Enable

“Enable” or “Disable” 802.1X function on the port. “Yes” means 802.1X is enabled on the port and the port is locked until it passes the authentication.

- Mode

Select the 802.1X mode to “Mac-based” or “Port-based”.

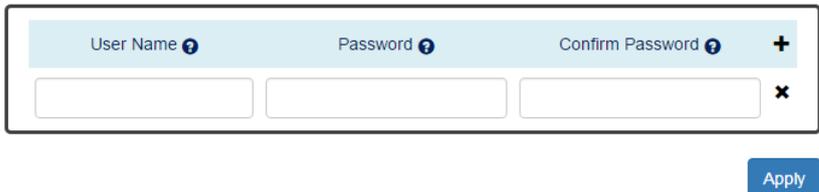
Mac-based: Only the MAC Address, which passed the authentication can connect to the networks.

Port-based: If the port had passed the authentication, every device connected to the port can connect to the networks.

- Re-Auth  
“Enable” or “Disable” re-authentication on the port. “Yes” means re-authentication is enabled on the port and the port has to re-authenticate with the server every re-auth period.
- Re-Auth Period  
This is a time interval, which is used in re-authenticating the server.
-  (Apply Button)  
After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE LOCAL DATABASE INFORMATION

##### 802.1X Local Database



User Name ?	Password ?	Confirm Password ?	+
<input type="text"/>	<input type="text"/>	<input type="text"/>	×



- **User Name**  
The User Name is used in authentication.  
  
The max length for the User Name is **32 characters**.  
  
**Note:** #, \, ', ", ? are **invalid** characters.
- **Password**  
The Password is used in authentication.  
  
The max length for the Password is **20 characters**.  
  
**Note:** #, \, ', ", ? are **invalid** characters.
- **Confirm Password**  
The Confirm Password field must be the same as Password field.
- **+**: Click the **plus icon** to add a Username/Password row.
- **×**: Click the **remove icon** to delete the Username/Password row.
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### Configure RADIUS Server Information

#### 802.1X RADIUS Server

##### RADIUS Server 1

Server IP	<input type="text"/>
Service Port	<input type="text" value="1812"/> 
Shared Key	<input type="text"/> 

##### RADIUS Server 2

Server IP	<input type="text"/>
Service Port	<input type="text" value="1812"/> 
Shared Key	<input type="text"/> 



- **Server IP**  
The Server IP is the IP address of the server.
- **Service Port**  
The Service Port is the listening port on the RADIUS server.
- **Shared Key**  
The key is used in establishing the connection between the server and the authenticator before authentication.
-  (Apply Button)  
After configuring above fields, click "**Apply**" button to make the changes effective.

#### 3.6.3. SECURITY – SERVICE CONTROL

We provide 4 types of interface which are **HTTP**, **HTTPS**, **SSH**, and **Telnet** to access the management interface of the switch. Users can configure the authority for each type of service to be enabled or disabled. All services are enabled by default and users can disable unused service to make the system more secure.

#### CONFIGURE SERVICE CONTROL INFORMATION

##### Service Control

HTTP	<input checked="" type="radio"/> Enable	<input type="radio"/> Disable
HTTPS	<input checked="" type="radio"/> Enable	<input type="radio"/> Disable
SSH	<input checked="" type="radio"/> Enable	<input type="radio"/> Disable
Telnet	<input checked="" type="radio"/> Enable	<input type="radio"/> Disable

- **HTTP**  
Enable or Disable to access management interface by **HTTP** which is the foundation of data communication for the **World Wide Web (WWW)**.
- **HTTPS**  
Enable or Disable to access management interface by **HTTPS** which is an adaptation of HTTP for security. The communication will be **encrypted** in HTTPS.
- **SSH**  
Enable or Disable to access management interface by **SSH** which is a **cryptographic network** protocol. SSH provides a **secure channel** over an unsecured network in the client-server architecture. The switch plays the role of SSH server and hosts plays the role of SSH client.
- **Telnet**  
Enable or Disable to access management interface by **Telnet** which is a **text-oriented** virtual terminal connection. It's less secure than SSH because it doesn't encrypt any data even password when the data is transmitting.
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

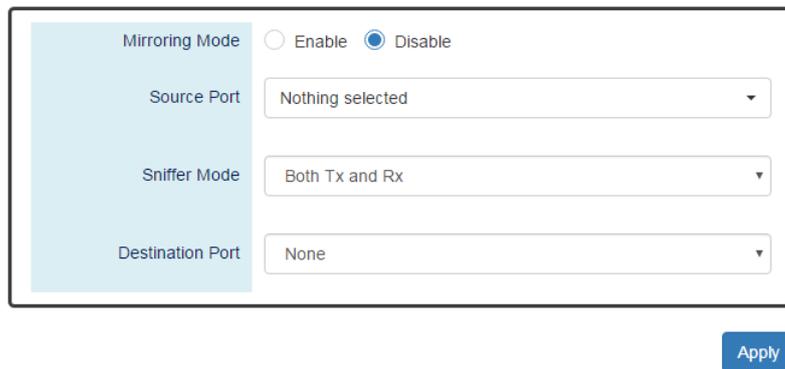
### 3.7. Web Management – Diagnostics

#### 3.7.1. DIAGNOSTICS – PORT MIRRORING

**Port Mirroring** is a feature that copies the incoming or outgoing packets on one or more ports to another destination port. It is very useful to monitor the network traffic and analyze the copied traffic. **Port Mirroring** helps network management to keep a close eye on the network and debug when some issues arise.

#### Configure Port Mirroring Information

##### Port Mirroring



Mirroring Mode	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Source Port	Nothing selected
Sniffer Mode	Both Tx and Rx
Destination Port	None

Apply

- **Mirroring Mode**

“Enable” or “Disable” the Port Mirroring function. If the user enables Port Mirroring function, the system will transmit the traffic of the specific “Sniffer Mode” from “Source Port” to “Destination Port”.

- **Source Port**

The traffic on the Source Ports will be sniffed to the Destination Port.

- **Sniffer Mode**

Both Tx and Rx: Sniffs both transmitting and receiving traffics.

Tx Only: Sniffs only the transmitting traffic.

Rx Only: Sniffs only the receiving traffic.

- **Destination Port**

The traffic will sniff to the Destination Port. This port is usually connected to a host running the software to observe the packets.

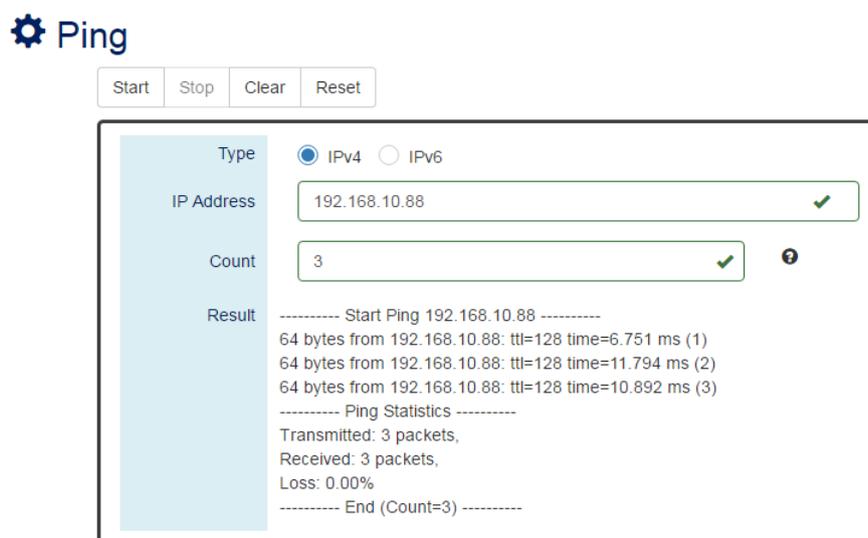
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### 3.7.2. DIAGNOSTICS – PING

**Ping** is a tool used to test the reachability of a device on the IP network. Ping is enabled by sending **Internet Control Message Protocol (ICMP)** request to the target device and waits for the response packet from the target device to check the connection.

#### Ping Another Device with IPv4/IPv6



- **Type**  
Ping a connected device with “**IPv4**” or “**IPv6**” protocol.
- **IP Address**  
The IP address of the connected device is verified based on the type.
- **Count**  
Sets the count times. The system will send “Count” number ICMP packets to the specific IP address and wait for the response.  
  
The range of the Count is **from 3 to 50**.  
  
The default Count is **3**.
- **Result**  
The result of the ping shows the response from the specific IP address. If the specific IP address does not respond, “No Response” will be displayed.

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### Diagnostics – Ping

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- **“Start” Button**  
Click the “Start” Button to start the ping to the IP address.
- **“Stop” Button**  
Click the “Stop” Button to stop the ping to the IP address before the count is completed.
- **“Clear” Button**  
Click the “Clear” Button to clear the “Result”.
- **“Reset” Button**  
Click the “Reset” Button to clear the “Result” and reset the “IP Address” and “Count” number.

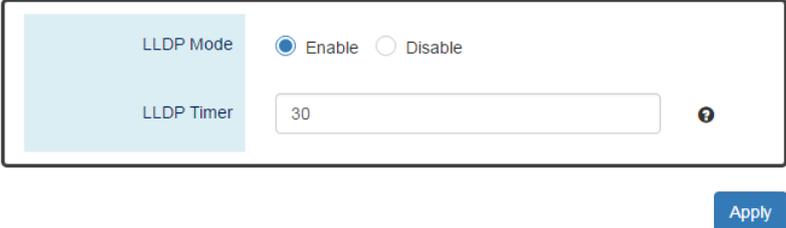
## 3.8. Web Management – Monitoring

### 3.8.1. MONITORING – LLDP

**LLDP** is **Link Layer Discovery Protocol** and it is a vendor-neutral layer 2 protocol that is defined by **IEEE 802.1AB**. **LLDP** is used in advertising identity of the devices, capabilities and neighbors on the LAN. The information from the neighbors enables the switch to quickly identify the devices and interoperate with each other more smoothly and efficiently. The neighbor table shows the information about the device that is next to the port. The LLDP can only get information from the device that is close to it. If the users want to know the topology of the LAN, they can collect all information from the device and analysis the neighbor table.

#### Configure LLDP Information

##### LLDP Settings



The screenshot shows a configuration panel for LLDP. It has a light blue header bar with a gear icon and the text "LLDP Settings". Below the header, there are two main sections: "LLDP Mode" and "LLDP Timer". The "LLDP Mode" section has two radio buttons: "Enable" (which is selected) and "Disable". The "LLDP Timer" section has a text input field containing the number "30" and a small question mark icon to its right. At the bottom right of the panel is a blue "Apply" button.

- **LLDP Mode**  
“Enable” or “Disable” the LLDP function.
- **LLDP Timer**  
The LLDP Timer is a time interval to send LLDP messages.  
  
The range of the LLDP Timer is **from 5 to 32767** seconds.  
  
The default LLDP Timer is **30** seconds.
-  (Apply Button)  
After configuring above fields, click "**Apply**" button to make the changes effective.

## LLDP NEIGHBOR TABLE

### LLDP Neighbor

Show  entries Search:

Local Port	Remote System Name	Chassis ID	Remote Port	Port ID	Address
3	MT-0804G	00:AA:BB:CC:11:02	lan8	local 8	192.168.10.11
6	L2GigaBitEthern...	00:03:CE:11:22:33	Sid #2, Po...	local 1017	192.168.10.90

Showing 1 to 2 of 2 entries

Auto Refresh

Refresh Rate:  seconds 

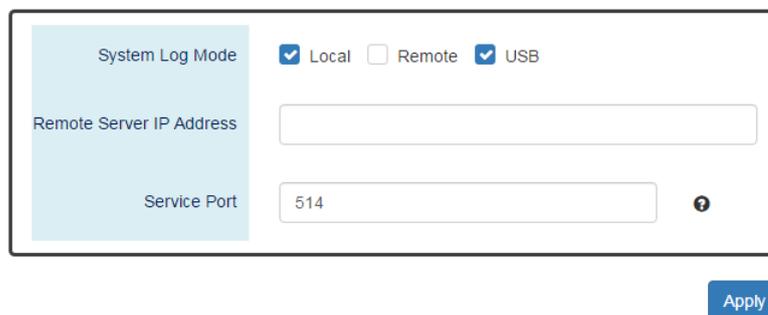
- **Local Port**  
The port connected to the LLDP neighbor on the local switch.
- **Remote System Name**  
This is the system name of the LLDP neighbor. This value is set and provided by the remote device.
- **Chassis ID**  
The Chassis ID defines the **MAC Address** of the LLDP neighbor.
- **Remote Port**  
This field displays the **port information** received from the LLDP neighbor.
- **Port ID**  
The Port ID displays the **port identity** of the connected port on the LLDP neighbor.
- **Address**  
The Address displays the **IP address** of the LLDP neighbor.

### 3.8.2. MONITORING – SYSTEM WARNING

**System Warning** contains “System Event Log”, “SMTP Settings”, and “Event Selection” for different types of services such as “Fault Alarm”, “System Log”, “SMTP”, and “SNMP Trap”. These logs are very useful for the administrator to manage and debug the system. When the system is powered off or when someone tries to login the system or the system reboots abnormally, or when some of the interfaces are linked down, the system sends log messages to notify specific users and record the events on the server or assigned platform. Users can also connect an alarm buzzer to the relay alarm pins. When the configured “Fault Alarm” events are triggered, the alarm buzzer will ring to notify the users.

#### Configure System Warning Information

##### System Log Settings



- **System Log Mode**  
The port connected to the LLDP neighbor on the local switch.
- **Remote Server IP Address**  
The field contains the IP Address of the remote server. If the “**Remote**” mode is enabled, users have to assign this IP Address to receive the system logs.
- **Service Port**  
The port is used to listen to the system log packets on the remote server.  
  
The range of the Service Port is **from 1 to 65535**.  
  
The default Service Port is **514**.
-  (Apply Button)  
After configuring above fields, click "**Apply**" button to make the changes effective.

#### SYSTEM EVENT LOG

#### System Event Log

```
Jan 1 18:36:15 Switch user.info emonitor: [EVENT] Port 3: LINK-UP
Jan 1 18:36:15 Switch user.info emonitor: [EVENT] Port 8: LINK-UP
Jan 1 18:36:22 Switch user.warn emonitor: [EVENT] Port 3: LINK-DOWN
Jan 1 18:36:22 Switch user.warn emonitor: [EVENT] Port 8: LINK-DOWN
Jan 1 18:36:32 Switch user.info emonitor: [EVENT] Port 1: LINK-UP
Jan 1 18:36:32 Switch user.info emonitor: [EVENT] Port 7: LINK-UP
Jan 1 18:36:37 Switch user.warn emonitor: [EVENT] Port 1: LINK-DOWN
Jan 1 18:36:37 Switch user.warn emonitor: [EVENT] Port 7: LINK-DOWN
```



- **Log Text Area**

The system event information displays if the “**Local**” system log mode is enabled and the configured events are triggered.

-  (Clear Button)

Click the “Clear” button to clear the system event log in the text area.

-  (Refresh Button)

Click the “Refresh” button to refresh the system event log in the text area.

### Configure SMTP Information

#### SMTP Settings

##### Server Settings

SMTP Status	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Server Address	<input type="text"/>
Server Port	<input type="text" value="25"/> 
Sender E-mail	<input type="text"/>
Mail Subject	<input type="text" value="Switch Notification"/> 
SMTP Authentication	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
User Name	<input type="text"/> 
Password	<input type="text"/> 

##### Recipient Settings

E-mail Address 1	<input type="text"/>
E-mail Address 2	<input type="text"/>
E-mail Address 3	<input type="text"/>
E-mail Address 4	<input type="text"/>

Apply

- **Server Settings**

- SMTP Status

“Enable” or “Disable” the SMTP function.

- Server Address

This is the **IP address** or **URL** of the SMTP Server. For example, the SMTP server address provided by Google is “smtp.gmail.com”.

- Server Port

This field is the port listening on the server for the SMTP request. For security, we suggest users configure the server port to **465** for **SSL** or **587** for **TLS**.

The range of the Service Port is **from 1 to 65535**.

The default Service Port is **25**. Port 25 is the default port for e-mail server.

- Sender E-mail

The Sender E-mail is the e-mail address used to send the notifications to Recipients.

- Mail Subject

The Mail Subject is a string that is displayed in the E-mail title.

**Note:** #, \, ', ", ? are **invalid** characters.

- SMTP Authentication

“Enable” or “Disable” to authenticate the SMTP server with the configured username and password.

- User Name

The username is used in authentication with the SMTP server.

The max length for the User Name is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- Password

The password is used in authentication with the SMTP server.

The max length for the Password is **32 characters**.

**Note:** #, \, ', ", ? are **invalid** characters.

- **Recipient Settings**

- E-mail Address 1-4

The configured e-mail address will receive the notifications if the SMTP is enabled and the events set on “Event Selection” are triggered.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

CONFIGURE SYSTEM EVENT SELECTION

 System Event Selection

Event	Fault Alarm	System Log	SMTP	SNMP Trap
Authentication Failure	-	Disable ▾	Disable ▾	Disable ▾
ERPS Change	-	Disable ▾	Disable ▾	Disable ▾
Power 1	Disable ▾	Disable ▾	Disable ▾	Disable ▾
Power 2	Disable ▾	Disable ▾	Disable ▾	Disable ▾
Cold Start	-	Disable ▾	Disable ▾	Disable ▾
Warm Start	-	Disable ▾	Disable ▾	Disable ▾
Digital Input	Disable ▾	Disable ▾	Disable ▾	Disable ▾

Apply

- **Event**

There are 5 events on the System Events.

Authentication Failure: Login failed on the web console or CLI. It may be caused due to incorrect username or password.

ERPS Change: The ERPS function is working and the topology is changed.

Power 1 or 2: The power 1 or 2 is powered off.

Cold Start: The system reboots due to interruption of power supply.

Warm Start: The system reboots by issuing “reboot” command on CLI or clicking the “reboot icon” on the web console.

Digital Input: The signal from the digital input is changed from high to low or low to high.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### Configure Interface Event Selection

#### Interface Events

Event	Fault Alarm	System Log	SMTP	SNMP Trap
All Ports Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 1 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 2 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 3 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 4 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 5 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 6 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 7 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 8 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 9 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 10 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 11 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down
Port 12 Link	<input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down	<input type="checkbox"/> Up <input type="checkbox"/> Down

Apply

- Event**

The events on the “Interface Events” display the **link status** for each port. Fault Alarm is triggered only during link down and other system log types support both link up and link down.
- Fault Alarm**

The **Fault LED** will turn on **red** and relay will turn ON, if the configured events are triggered. By default, the Fault LED is **green** and relay is turned OFF in the normal situation.
- System Log**

When the configured events are triggered, the logs will be displayed in the “System Event Log” page, remote server, or saved to a USB file named “**message**”. This is based on the settings of the “**System Log Mode**” in the “**System Log Settings**” page.
- SMTP**

If the SMTP is enabled and the configured events are triggered, the system will send an e-mail notification to the e-mail addresses of the assigned recipient set in the “**SNMP Settings**” page.
- SNMP Trap**

If the SNMP Trap is enabled and the configured events are triggered, the system will send event information to the assigned “**Trap Receiver IP**”, which is set in the “**SNMP Trap**”

page.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE SFP DDM EVENT SELECTION

 SFP DDM Event Selections

Port 9 ▼

Event	Fault Alarm	System Log	SMTP	SNMP Trap
Current	Disable ▼	Disable ▼	Disable ▼	Disable ▼
Rx Power	Disable ▼	Disable ▼	Disable ▼	Disable ▼
Tx Power	Disable ▼	Disable ▼	Disable ▼	Disable ▼
Temperature	Disable ▼	Disable ▼	Disable ▼	Disable ▼
Voltage	Disable ▼	Disable ▼	Disable ▼	Disable ▼



- **Event**

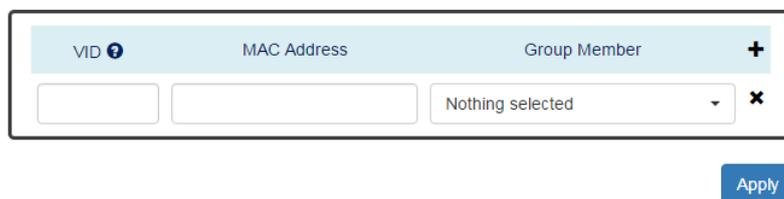
There are 5 events on the “SFP DDM Events”: **Current**, **Rx Power**, **Tx Power**, **Temperature**, and **Voltage**. Enable or Disable the event fault alarm or system warning when the value is higher than the high alarm/warning threshold or the value is lower than the low alarm/warning threshold.

### 3.9. Web Management – MAC Table

MAC address is **Media Access Control** address, which is used in layer 2 switching. **AMAC Address table** is maintained by the switch to transmit frames more efficiently. When the switch receives a frame, the system will check the MAC table and forward the frame to the corresponding port. The MAC Address table is built dynamically by the received frames and when the system receives a frame with an unknown MAC address, it **floods** the frame to all LAN ports in the same VLAN. When the destination device replies the system identifies the MAC Address and the target port.

#### Configure Static MAC Address Information

##### Static MAC Address Settings



VID ⓘ	MAC Address	Group Member	+
<input type="text"/>	<input type="text"/>	Nothing selected	✕

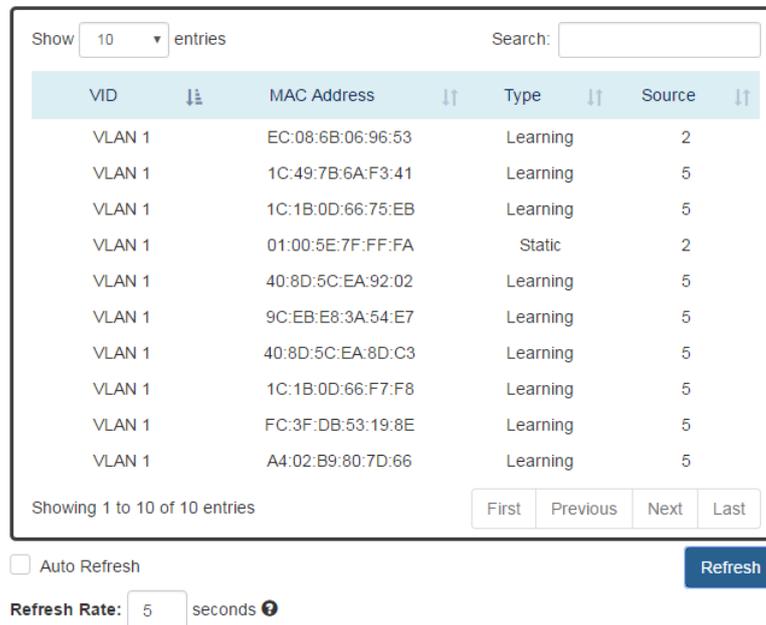
Apply

- **VID**  
The VID is the VLAN group ID, which contains the configured MAC Address.  
The range of the VID is **from 1 to 4094**.
- **MAC Address**  
This field is the static MAC Address of the configured member ports in the VLAN group.
- **Group Member**  
The Group Member is the port(s) in the VLAN group, to which the configured MAC Address belongs.
- **+**: Click the **plus icon** to add a static MAC Address row.
- **✕**: Click the **remove icon** to delete the static MAC Address row.
-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### MAC ADDRESS TABLE

#### MAC Address Table



VID	MAC Address	Type	Source
VLAN 1	EC:08:6B:06:96:53	Learning	2
VLAN 1	1C:49:7B:6A:F3:41	Learning	5
VLAN 1	1C:1B:0D:66:75:EB	Learning	5
VLAN 1	01:00:5E:7F:FF:FA	Static	2
VLAN 1	40:8D:5C:EA:92:02	Learning	5
VLAN 1	9C:EB:E8:3A:54:E7	Learning	5
VLAN 1	40:8D:5C:EA:8D:C3	Learning	5
VLAN 1	1C:1B:0D:66:F7:F8	Learning	5
VLAN 1	FC:3F:DB:53:19:8E	Learning	5
VLAN 1	A4:02:B9:80:7D:66	Learning	5

Showing 1 to 10 of 10 entries

Auto Refresh  Refresh Rate: 5 seconds 

Refresh

- **VID**  
The VID is the VLAN group ID, which contains the configured MAC Address.
- **MAC Address**  
The MAC Address column displays the learnt or configured MAC Addresses.
- **Type**  
The Type column displays the type (Learning or Static) of the MAC Address.  
  
Learning: The MAC address is learnt from the transmitting frames.  
  
Static: The MAC Address is configured by the users or the system.
- **Source**  
The Source column displays the port(s) to which the MAC Address belongs.

### 3.10. Web Management – Maintenance

#### 3.10.1. MAINTENANCE – AUTHORIZATION

The "Username" and "Password" are very important information both in the "Command Line Interface" or "Web Console". Users have to login into the system before doing any configuration. We strongly suggest the users to change at least the password for **security** when they are going to use this device.

We also provide authentication with **RADIUS/TACACS+** server from software **version 1.0.3**. Users can maintain the login information in their own RADIUS/TACACS+ database and allow several usernames/passwords to login the system.

#### CONFIGURE LOGIN INFORMATION

The screenshot shows a web interface titled "Update Authorization" with a gear icon. Below the title is a "Basic Settings" section. It contains a table with the following fields:

Mode	Local	
Username	admin	?
Password	.....	?
Confirm Password		?

Below the table, there is a green progress bar labeled "Great" and an "Apply" button.

- **Mode**

There are three modes for login authentication.

Local: The username and password are defined in the system.

Radius: The username and password are defined in the **RADIUS server** and when users login the system, the system will authenticate with the RADIUS server to get the login permission. The password will be encrypted during the transmitting.

Tacacs+: The username and password are defined in the **TACACS+ server** and when users login the system, the system will authenticate with the TACACS+ server to get the login permission. The whole payload and password will be encrypted during the transmitting.

- **Username**

The account used to login to the system.

The maximum length of the Username is **20** characters

Only **alphabet** (A-Z, a-z) and **numbers** (0-9) are allowed.

The default Username is **admin**.

- **Password**

The password used to login to the system. We provide **password strength** bar for reference. There are 3 levels - **Weak**, **OK**, and **Great**. We strongly recommend users configuring the password to "**Great**" level for security.

The maximum length of the Password is **20** characters.

Only **alphabet** (A-Z, a-z) and **numbers** (0-9) are allowed.

The default Password is **admin**.

- **Confirm Password**

It is used to confirm the value specified by the users in the "Password" field. The value of the field must be the same as "Password".

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### Configure RADIUS Server Information

This section only display when the mode in the Basic Settings is set to “Radius”.

**RADIUS Server**

Server IP	<input type="text"/>
Server Port	<input type="text" value="1812"/> ⓘ
Shared Key	<input type="text"/> ⓘ
Retransmit Times	<input type="text"/> ⓘ
Timeout	<input type="text" value="5"/> ⓘ

- **Server IP**  
The IP address of the RADIUS server must in the same subnet as the IP address of the switch.
- **Server Port**  
The port is listening to the RADIUS service on the RADIUS server.  
  
The range of the Server Port is **from 1 to 65535**.  
  
The default Server Port is **1812**.
- **Shared Key**  
The Shared Key is a string that used to build the connection with the RADIUS server. It must be the same as the string/secret set in the RADIUS server.  
  
The maximum length of the Shared Key is **32** characters.
- **Retransmit Times**  
The password used to login to the system.  
  
The range of the Retransmit Times is **from 1 to 1000**.
- **Timeout**  
The time interval is used to waiting for the response from the RADIUS server.  
  
The range of the Timeout is **from 1 to 1000** seconds.  
  
The default Timeout is **5** seconds.

-  (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

#### CONFIGURE TACACS+ SERVER INFORMATION

This section only display when the mode in the Basic Settings is set to “Tacacs+”.

**TACACS+ Server**

Server IP	<input type="text"/>
Server Port	<input type="text" value="49"/> ?
Shared Key	<input type="text"/> ?
Timeout	<input type="text" value="30"/> ?

- **Server IP**

The IP address of the TACACS+ server must in the same subnet as the IP address of the switch.

- **Server Port**

The port is listening to the TACACS+ service on the TACACS+ server.

The range of the Server Port is **from 1 to 65535**.

The default Server Port is **49**.

- **Shared Key**

The Shared Key is a string that used to build the connection with the TACACS+ server. It must be the same as the string/secret set in the TACACS+ server.

The maximum length of the Shared Key is **32** characters.

- **Timeout**

The time interval is used to waiting for the response from the TACACS+ server.

The range of the Timeout is **from 1 to 1000** seconds.

The default Timeout is **30** seconds.

- (Apply Button)

After configuring above fields, click "**Apply**" button to make the changes effective.

### 3.10.2. MAINTENANCE – FIRMWARE UPGRADE

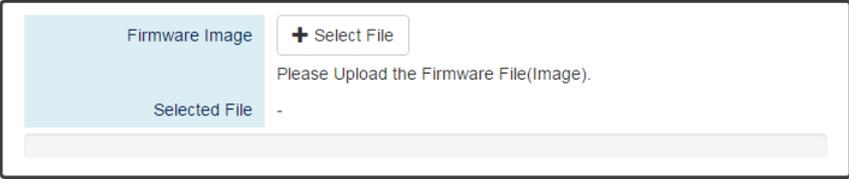
For a better performance and wider industrial applications, we constantly develop new features and revise the issues from the users. We suggest the users to upgrade the system to the newest firmware version to have a better user experience.

We provide 2 ways to upgrade the firmware from the Web Console, - one is saving the firmware file in the USB stick and another one is save the firmware file on the PC. If the firmware file is on the PC, the users will have to only **select the file** and click **Apply** button, for the system to upgrade it automatically.

#### Upgrade Firmware Version - Upload Firmware File

##### Firmware Upgrade

##### Upload Firmware File



Upload

- **Firmware Image**

Click the "**Select File**" button to select the firmware image.

The **Firmware Version** displayed on the system can be customized by the **file name**. For example, if you want the version to be called as 1.2.3, you only need to modify the file name to **XXX-v1.2.3** (XXX is the original file name).

- **Selected File**

After selecting a firmware image to be uploaded, the **selected file name** will be displayed in this field.

-  (Upload Button)

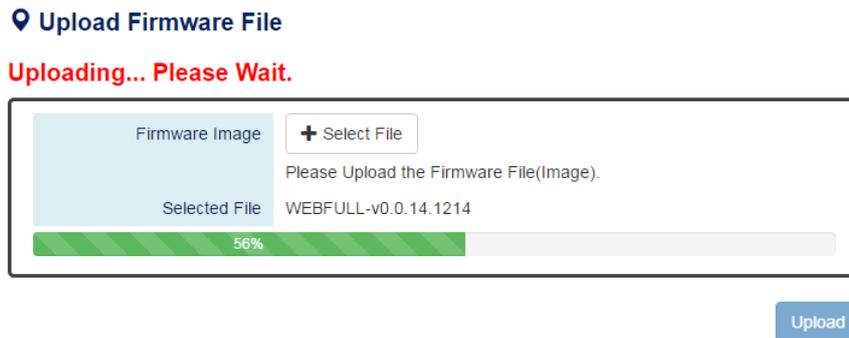
After selecting the firmware image, click "Upload" button to upload it.

#### UPGRADE FIRMWARE PROCESS - UPLOADING FIRMWARE FILE

The following steps are performed when the system starts to upgrade after the "Apply" button is clicked:

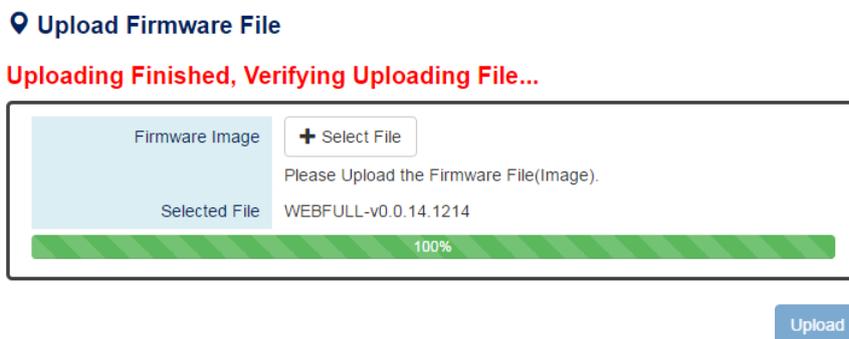
1. **Uploading** the firmware image

The progress bar displays the uploading percentage.



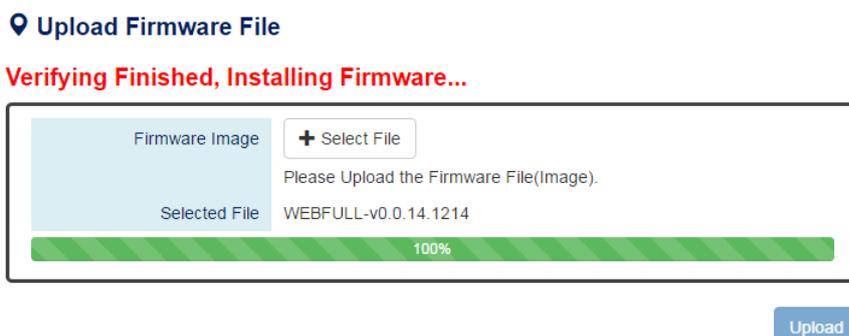
2. **Verifying** the uploaded file

When the file is **100%** uploaded, the system starts to **verify** the uploaded file to make sure it is **valid**. By default, the firmware image is encrypted to prevent the attack on man-in-the-middle. Optionally, higher encryption methodology is also provided.



3. **Installing** the uploaded firmware image

The new firmware will install after the system validates it.



4. **Rebooting** the system

The system will reboot automatically if the firmware is upgraded without any issue.

The progress bar displays the rebooting progress.

Device Rebooting... Please Wait...

The Web Page Will Refresh Automatically.



### Upgrade Firmware Version - Copy Firmware File from USB

📍 Copy Firmware File from USB

Image File Name

Please Enter the File(Image) Name Which is Saved in the USB.

Upload

- **Image File Name**

Enter the name of the firmware image in the USB. The system will try to identify the file with specified file name to upload it to the system.

- **Upload** (Upload Button)

After entering the firmware image name, click "Upload" button to copy it from the USB to the system.

### UPGRADE FIRMWARE PROCESS - COPY FIRMWARE FILE FROM USB

1. **Copying** the firmware image from USB to switch

The system will also check if the USB is inserted and file exists.

📍 Copy Firmware File from USB

🌀 Copying Image to System...

Image File Name

Please Enter the File(Image) Name Which is Saved in the USB.

Upload

2. **Verifying** the uploaded file

After copying the firmware file to switch, the system starts to **verify** the uploaded file to make sure it is **valid**. By default, the firmware image is encrypted to prevent the attack on man-in-the-middle. Optionally, higher encryption methodology is also provided.

📍 Copy Firmware File from USB

🌀 Copying File Finished, Verifying Uploading File...

Image File Name

Please Enter the File(Image) Name Which is Saved in the USB.

Upload

3. **Installing** the uploaded firmware image

The new firmware will install after the system makes sure it is valid.

#### 📍 Copy Firmware File from USB

⚙️ **Verifying Finished, Installing Firmware...**

Image File Name	WEBFULL-v0.0.14.1214 ✓
Please Enter the File(Image) Name Which is Saved in the USB.	

Upload

#### 4. **Rebooting** the system

The system will reboot automatically if the firmware is upgraded without any issue.

The progress bar displays the rebooting progress.

**Device Rebooting... Please Wait...**

**The Web Page Will Refresh Automatically.**



#### 3.10.3. MAINTENANCE – CONFIG BACKUP

In the normal application, there are several switches in the Network and they might be configured to the same features. To facilitate this, the users can configure one of the switches and save the configuration file to local host (for example: users' PC) or USB sticks and then restore the configurations on another switch via "**Config Restore**" function. Configuration file in the USB can also have a way to fast replace the device when it is damage.

#### Backup Configuration File

##### Config Backup

###### Backup to Localhost

File Name	<input type="text"/>	<input type="button" value="Save"/>
-----------	----------------------	-------------------------------------

###### Backup to USB

Backup <b>Running-config</b> File	<input type="text"/>	<input type="button" value="Save"/>
Backup <b>Startup-config</b> File	<input type="text"/>	<input type="button" value="Save"/>

- **Backup to Local host**

- File Name

Specify the File Name for the **Startup-config** file, which will be saved to the local host.

- **Backup to USB**

Ensure there is a **USB stick** inserted into the USB port.

- Backup **Running-config** File

Specify the File Name for the saved **Running-config** file, which will be saved to the USB.

- Backup **Startup-config** File

Specify the File Name for the saved **Startup-config** file, which will be saved to the USB.

-  (Save Button)

Click the "Save" button to save the configuration file to the **Local host** or **USB**.

**NOTE:** If the **File Name** filed is empty, the system assigns the default name as ***config-[datetime].cfg***

### 3.10.4. MAINTENANCE – CONFIG RESTORE

We suggest users to save/backup the configurations after a series of settings. If another device needs the same configurations, users can use the **Config Restore** function to restore it.

#### RESTORE CONFIGURATION FILE

⚙️ Config Restore

📍 Restore from Localhost

File Name    + Select File    Restore

📍 Restore from USB

File Name in USB    [ ]    ?    Restore

- **Restore from Localhost**
  - File Name  
Select the configuration file, which is saved in the Localhost.
- **Restore from USB**

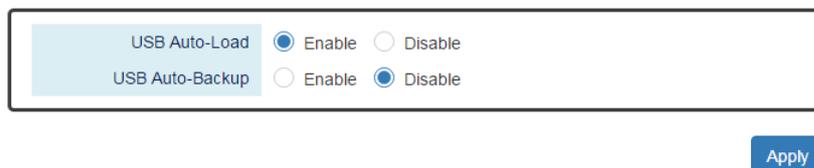
Please ensure there is a **USB stick** inserted into the USB port.

  - File Name in USB  
The File Name of the saved configuration file, which is saved to the USB. If the configuration file is saved in the directory, please specify the **full path**.
-  (Restore Button)  
Click the "Restore" button to restore the configurations from the **Localhost** or **USB**.

### 3.10.5. MAINTENANCE – USB AUTO-LOAD & AUTO-BACKUP

#### Configure USB Auto-Load and Auto-Backup

#### USB Auto-Load & Auto-Backup



USB Auto-Load	<input checked="" type="radio"/> Enable	<input type="radio"/> Disable
USB Auto-Backup	<input type="radio"/> Enable	<input checked="" type="radio"/> Disable

Apply

- **USB Auto-Load**  
“Enable” or “Disable” the USB Auto-Load function. If “USB Auto-Load” is **enabled**, the system will search the configuration file named “**startup-config**” in the USB and load it when rebooting.
- **USB Auto-Backup**  
“Enable” or “Disable” USB Auto-Backup function. If “USB-Auto-Backup” is **enabled**, the system will save the configurations to a file named “**running-config**” in the USB when users modify the configurations.
-  (Apply Button)

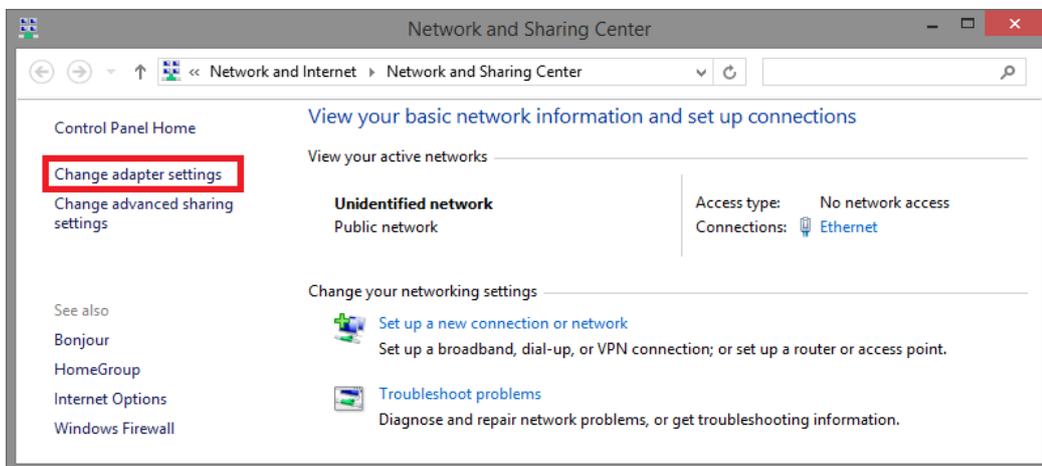
After configuring above fields, click "**Apply**" button to make the changes effective.

## Appendix A: IP Configuration for Your PC

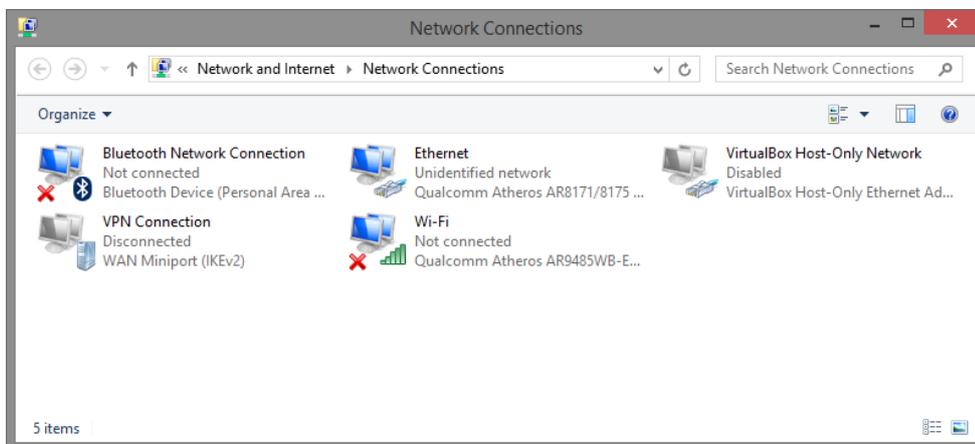
This appendix describes how to set the IP address of your PC so you can connect to product configuration webpage. The configuration webpage allows you to set system variables or monitor system status.

The following section will guide you to set the IP address properly in a Microsoft Windows 8 environment. Setting IP address in other Microsoft operating system (such as Windows Vista or Windows 7) is quite the same and can be related.

1. Open **Network and Sharing Center** in **Control Panel**, and click on **Change adapter settings** as shown in the figure down below.



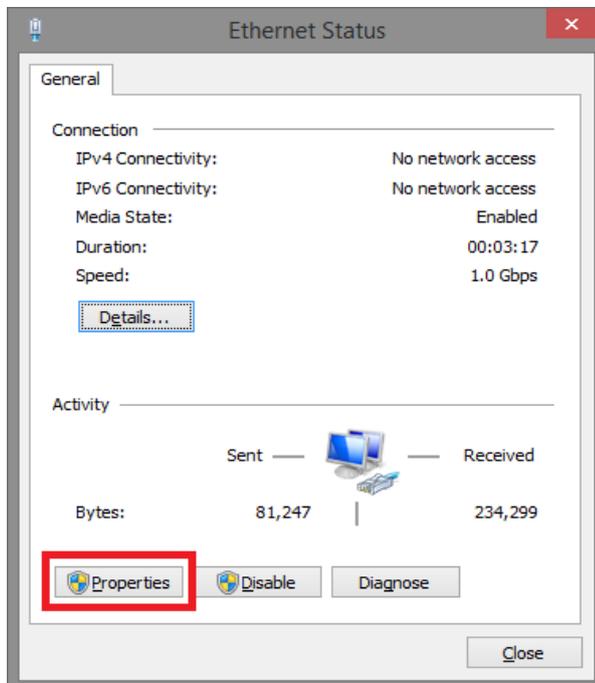
2. A **Network Connections** window will pop up, **showing** all the network connections available on your PC. Please double-click on the network connection you are using to connect the device.



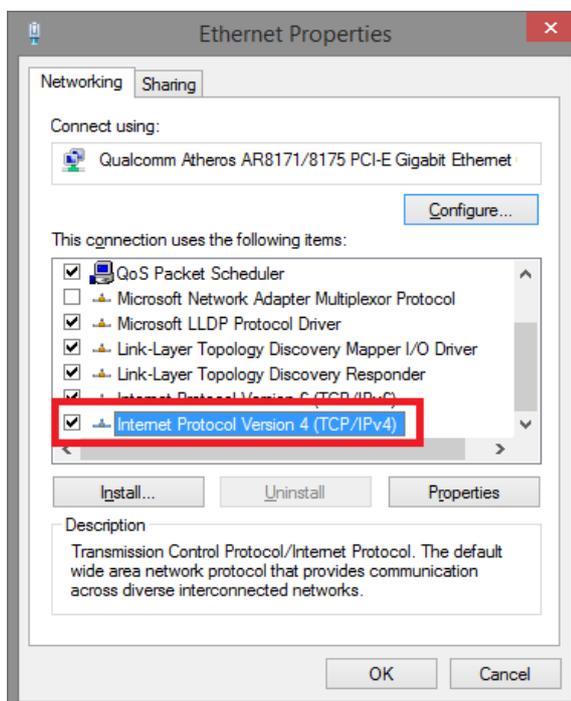
## Appendix A: IP Configuration for Your PC

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3. An **Ethernet Status** window will pop up. Please click on the **Properties** button as shown in the figure down below.



4. An **Ethernet Properties** window will pop up. Please double click on the **Internet Protocol Version 4 (TCP/IPv4)**.



5. An **Internet Protocol Version 4 (TCP/IPv4) Properties** window will pop up. Please

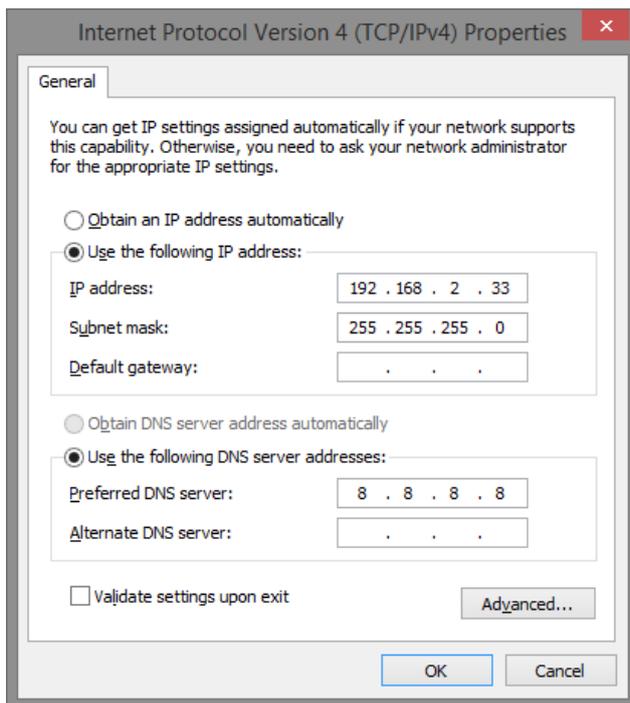
## Appendix A: IP Configuration for Your PC

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set your PC's IP address and subnet mask as shown in the figure down below.

By default, your product's IP address should be **192.168.1.101**. You can set any IP address as long as it's not the same with your product's IP address and is in the same network segment with your product's IP address.

Press **OK** to apply the TCP/IPv4 settings you just made. Now you can connect to your product using a web browser (i.e. Internet Explorer, Chrome, or Firefox).



## Appendix B: CLI Command Reference

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### Appendix B: CLI Command Reference

The following are the commands that the users can use in the CLI mode. Please check if the mode is correct before issuing the command.

#### AUTHENTICATION GROUP

Command	Explanation	Mode
login authentication [tacacs+   radius]	Set login authentication method	Configure
logout	Disconnect	Configure
radius-server host [IP_ADDR]	Set IP address of RADIUS server	Configure
radius-server key [SHARED_KEY]	Set specific characters for authentication verification	Configure
radius-server port [1-65535]	Set communication port of RADIUS server	Configure
radius-server retransmit [1-1000]	Set the number of times a request re-sending to RADIUS server	Configure
radius-server timeout [1-1000]	Set the timeout period to wait for RADIUS server response	Configure
tacacs-server host [IP_ADDR]	Set IP address of TACASC+ server	Configure
tacacs-server key [SHARED_KEY]	Set specific characters for authentication verification	Configure
tacacs-server port [1-65535]	Set communication port of TACASC+ server	Configure
tacacs-server timeout [1-1000]	Set the timeout period to wait for TACASC+ server response	Configure
username [USER_ID] [PASSWORD]	Configure username and password	Configure
show login authentication	Display login authentication method	Configure
show radius-server host	Display IP address of RADIUS server	Configure
showradius-server key	Display specific characters for authentication verification	Configure
showradius-server port	Display communication port of RADIUS server	Configure
showradius-server retransmit	Display the number of times a request is resent	Configure
showradius-server timeout	Display the timeout period to wait for RADIUS server response	Configure
showtacacs-server host	Display IP address of the server	
showtacacs-server key	Display specific characters for authentication verification	
showtacacs-server port	Display communication port of the server	
showtacacs-server timeout	Display the timeout period to wait for the server response	
show username	Display admin ID	Configure
no login authentication	Default Login authentication method	Configure
no radius-server host	Default IP address of the server	Configure
no radius-server key	Default specific characters for authentication verification	Configure
no radius-server port	Default communication port of the server	Configure
no radius-server retransmit	Default the number of times a request is resent	Configure
no radius-server timeout	Default the timeout period to wait for the server response	Configure
no tacacs-server host	Default IP address of TACACS+ server	Configure
no tacacs-server key	Default specific characters for authentication verification	Configure
no tacacs-server port	Default communication port of TACACS+ server	Configure
no tacacs-server timeout	Default the timeout period to wait for TACACS+ server response	Configure
no username	Default username and password	Configure

## Appendix B: CLI Command Reference

### SYSTEM GROUP

Command	Explanation	Mode
erase startup-config	Reset to factory default and reboot	Configure
exec-timeout [MINUTE] [SECOND]	Set idle timeout [MINUTE] [SECOND]	Configure
hostname [HOSTNAME]	Set Switch Host Name	Configure
reboot	Reboot the switch	Configure
system contact [CONTACT]	Set system contact	Configure
system location [LOCATION]	Set device location	Configure
username [USER_ID] [PASSWORD]	Configure username and password	Configure
show exec-timeout	Display idle timeout	Configure
show hostname	Display Switch Host Name	Configure
show environment power [1 2]	Display power 1/2 status	Configure
show event status relay	Display relay status	Configure
show system contact	Display system contact	Configure
show system description	Display system description	Configure
show system location	Display system location	Configure
show system mac	Display system MAC address	Configure
show system uptime	Display system uptime	Configure
show system version firmware	Display system version	Configure
show transceiver ddm	Display transceiver DDM information	Interface
show transceiver info	Display transceiver information	Interface
show transceiver raw	Display transceiver raw data	Interface
show username	Display admin ID	Configure
no exec-timeout	Default idle timeout	Configure
no hostname	Default Switch Host Name	Configure
no system contact	Clear system contact	Configure
no system location	Clear device location	Configure
no username	Default username and password	Configure

### SERVICE CONTROL GROUP

Command	Explanation	Mode
service [http   https   ssh   telnet] enable	Enable service http, https, ssh, or telnet	Configure
show service [http   https   ssh   telnet]	Display service http, https, ssh, or telnet state	Configure
no service [http   https   ssh   telnet]	Disable service http, https, ssh, or telnet	Configure

### IPv4 GROUP

Command	Explanation	Mode
ip address [IP_ADDR] [MASK]	Set IPv4 address and netmask	Configure
ip default-gateway [DEFAULT_GATEWAY_ADDR]	Set default gateway address	Configure
ip name-server [NAME_SERVER_IP]	Set Domain Name-Server	Configure
ip ping [IPV4_ADDR] [<size PKG_SIZ>   <repeat PKG_CNT>]	Issue an IPv4 ping command	Configure
show ip address	Display Host address of IPv4	Configure
show ip default-gateway	Display default gateway address	Configure
show ip mode	Display IP mode (Static or Dynamic)	Configure
show ip name-server	Display Domain Name-Server	Configure
no ip address	Delete IPv4 address	Configure
no ip default-gateway	Clear the default gateway address	Configure
no ip name-server	Clear the domain name-server	Configure

## Appendix B: CLI Command Reference

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### IPv6 GROUP

Command	Explanation	Mode
ipv6 address add [IPV6_ADDR</PREFIX_LEN>]	Add an address and netmask of IPv6	Configure
ipv6 enable	Enable IPv6 protocol	Configure
ipv6 neighbor flush	Issue a neighbor flush command of IPv6	Configure
ipv6 ping [IPV6_ADDR] [<size PKG_SIZ>   <repeat PKG_CNT>]	Issue an IPv6 ping command	Configure
show ipv6	Display IPv6 protocol state	Configure
show ipv6 address	Display IPv6 addresses	Configure
show ipv6 default address	Display default IPv6 address	Configure
show ipv6 neighbor	Display neighbor cache of IPv6	Configure
no ipv6	Disable IPv6 protocol	Configure
no ipv6 address add [IPV6_ADDR/PREFIX_LEN]	Delete IPv6 address	Configure

### TIME GROUP

Command	Explanation	Mode
clock time [hh:mm:ss] [day] [month] [year]	Configure time	Configure
clock timezone [AREA] [CITY]	Configure time zone	Configure
ntp client sync [minute   hour   day   month   year] [NUMBER]	Configure NTP client sync	Configure
ntp client timeserver [SERVER_IP/URL]	Configure NTP client time server	Configure
ntp time update	Configure NTP time update	Configure
show clock time	Show time	Configure
show clock timezone	Show timezone	Configure
show ntp client sync	Show sync time	Configure
show ntp client timeserver	Show NTP server configuration	Configure
no clock timezone	Remove timezone	Configure
no ntp client sync	Remove NTP sync time	Configure
no ntp client timeserver	Remove NTP time server configuration	Configure

## Appendix B: CLI Command Reference

### STP GROUP

Command	Explanation	Mode
spanning-tree forward-time [4-30]	Set STP forward time	Configure
spanning-tree hello-time [1-10]	Set STP hello time	Configure
spanning-tree max-age [6-40]	Set max age	Configure
spanning-tree mode [rstp]	Set STP mode as [RSTP]	Configure
spanning-tree mst instance [1-15] vlan [VLAN_LIST]	Set vlan group for specific MSTP instance	Configure
spanning-tree mst name [NAME]	Set MSTP name	Configure
spanning-tree mst revision [0-65535]	Set MSTP revision	Configure
spanning-tree mst [1-15] priority[0-61440]	Set priority for specific MSTP instance	Configure
spanning-tree priority [0-61440]	Set STP priority	Configure
spanning-tree cost [0-200000000]	Configure STP cost	Interface
spanning-tree edge [admin-edge]admin-non-edge]	Configure STP edge	Interface
spanning-tree link-type [point-to-multiple]point-to-point]	Configure STP link type on port	Interface
spanning-tree mst [1-15] cost [0-200000000]	Configure port cost for specific MSTP instance	Interface
spanning-tree mst [1-15]port-priority [0-200000000]	Configure port priority for specific MSTP instance	Interface
spanning-tree port-priority [0-240]	Configure STP port priority	Interface
spanning-tree stp disable	Disable Spanning Tree Protocol (STP) on port	Interface
show spanning-tree forward-time	Show STP forward time	Configure
show spanning-tree hello-time	Show STP hello time	Configure
show spanning-tree max-age	Show STP max age	Configure
show spanning-tree mode	Show Spanning Tree mode (RSTP or disable)	Configure
show spanning-tree mst instance [1-15] vlan	Show vlan group for specific MSTP instance	Configure
show spanning-tree mst name	Show MSTP name	Configure
show spanning-tree mst revision	Show MSTP revision	Configure
show spanning-tree mst [1-15] priority	Show priority for specific MSTP instance	Configure
show spanning-tree mst [1-15] status	Show bridge status for specific MSTP instance	Configure
show spanning-tree priority	Show STP priority	Configure
show spanning-tree rstp-status	Show Spanning Tree rstp status	Configure
show spanning-tree cost	Show STP cost	Interface
show spanning-tree edge	Show STP auto edge	Interface
show spanning-tree link-type	Show STP link type	Interface
show spanning-tree mst [1-15] cost	Show port cost for specific MSTP instance	Interface
show spanning-tree mst [1-15] port-priority	Show port priority for specific MSTP instance	Interface
show spanning-tree port-priority	Show STP port priority	Interface
show spanning-tree stp	Show STP activated status on port	Interface
no spanning-tree forward-time	Remove STP forward time configuration	Configure
no spanning-tree hello-time	Remove STP hello time configuration	Configure
no spanning-tree max-age	Remove STP max age configuration	Configure
no spanning-tree priority	Disable STP configuration	Configure
no spanning-tree cost	Remove STP priority configuration	Configure
no spanning-tree edge	Remove STP cost configuration	Interface
no spanning-tree link-type	Remove auto edge configuration	Interface
no spanning-tree mst [1-15] cost	Remove link type configuration	Interface
nospanning-tree mst [1-15] port-priority	Remove port cost for specific MSTP instance	Interface
no spanning-tree mst [1-15] port-priority	Remove port priority for specific MSTP instance	Interface
no spanning-tree port-priority	Remove STP port priority configuration	Interface
no spanning-tree stp	Enable STP on port	Interface

## Appendix B: CLI Command Reference

### ERPS GROUP

Command	Explanation	Mode
ethernet redundancy erps-ring [ 1   2   3 ]	Ethernet Ring Protection Switching(ERPS) mode	Configure
aps-channel [1 - 4094]	Set APS channel	ERPS
disable	Disable ERPS function	ERPS
enable	Enable ERPS function	ERPS
erps-ring [ 1   2   3 ]	Change to Other ERPS Ring	ERPS
ext-command clear	Extended ERPS command - Clear	ERPS
ext-command fs	Extended ERPS command– Forced Switch	ERPS
ext-command ms	Extended ERPS command– Manual Switch	ERPS
id [1 - 239]	Set Ring ID	ERPS
mel [0 - 7]	ERPS mel	ERPS
revertive	Set as revertive mode	ERPS
ring-port 0 [1(lan1) - N(lanN)]	Mapping ERPS ring port0 to switch port	ERPS
ring-port 1 [1(lan1) - N(lanN)]	Mapping ERPS ring port1 to switch port	ERPS
role port0 [o(owner)   n(neigh)   i(interconn)]	Set role on ring port0	ERPS
role port1 [o(owner)   n(neigh)   i(interconn)]	Set role on ring port1	ERPS
timer guard [10 - 2000]	Set guard timer interval	ERPS
timerhold-off [0 - 10000]	Set hold-off timer interval	ERPS
timer wtr [1 - 12]	Set WTR timer interval	ERPS
type [m(major-ring)   s(sub-ring)]	Set type as Major-Ring or Sub-Ring	ERPS
virtaul-channel major-ring channel-id [1-4094]	Set virtual channel for ERPS Ring	ERPS
virtaul-channel sub-ring set	Set virtual channel for ERPS Sub-ring	ERPS
show config	Displays ERPS configuration	ERPS
show port status	Displays ERPS ring port status	ERPS
show status	Displays ERPS status	ERPS
no aps-channel	Default ERPS aps-channel	ERPS
no id	Default Ring ID as default	ERPS
no revertive	Default mode non-revertive	ERPS
no ring-port 0	Default ring port0 as lan1	ERPS
no ring-port 1	Default ring port1 as lan2	ERPS
no role port0	Default role of ring port0 as none	ERPS
no role port1	Default role of ring port1 as none	ERPS
no timer guard	Default guard timer	ERPS
no timerhold-off	Default hold-off timer	ERPS
no timer wtr	Default wtr timer	ERPS
no type	Default ring type as Major-Ring	ERPS
no virtaul-channel major-ring channel-id	Default virtual channel as ERPS Major Ring's aps-channell	ERPS
no virtaul-channel sub-ring set	Default virtual channel for ERPS Sub-ring as None	ERPS

## Appendix B: CLI Command Reference

### SNMP GROUP

Command	Explanation	Mode
snmp server community ro [COMMUNITY]	Set v1, v2c snmp server read-only community	Configure
snmp server community rw [COMMUNITY]	Set v1, v2c snmp server read-write community	Configure
snmp server enable	Enable snmp server	Configure
snmp server enable v1-v2c-only	Enable snmp v1 and v2c	Configure
snmp server enable v3-only	Enable snmp v3 command only	Configure
snmp server v3 auth admin [md5  sha] [PASSWORD]	Set SNMPv3 admin authentication type	Configure
snmp server v3 auth user [md5  sha] [PASSWORD]	Set SNMPv3 user authentication type	Configure
snmp server v3 encryption admin [des  aes] [PASSWORD]	Set SNMPv3 admin encryption type	Configure
snmp server v3 encryption user [des  aes] [PASSWORD]	Set SNMPv3 user encryption type	Configure
snmp server v3 level admin [auth  noauth  priv]	Set SNMPv3 admin security level	Configure
snmp server v3 level user [auth  noauth  priv]	Set SNMPv3 user security level	Configure
snmp trap community [COMMUNITY]	Set v1, v2c snmp trap community	Configure
snmp trap host [TRAP_HOST_IP]	Set snmp trap host IP address	Configure
snmp trap inform retry [1-100]	Set snmp inform retry times	Configure
snmp trap inform timeout [1-300]	Set snmp inform timeout	Configure
snmp trap v3 auth [sha  md5] [PASSWORD]	Set SNMPv3 authentication type: md5 or sha	Configure
snmp trap v3 encryption [des  aes] [PASSWORD]	Set SNMPv3 encryption type: des or aes	Configure
snmp trap v3 engine-ID [ENGINE_ID]	Set snmp trap engine ID	Configure
snmp trap v3 level [auth  noauth  priv]	Set SNMPv3 trap security level	Configure
snmp trap v3 user [USER_ID]	Set SNMPv3 trap user	Configure
snmp trap version [1  2c trap  2c inform  3 trap  3 inform]	Set snmp trap version and type	Configure
show snmp server	Display snmp server status	Configure
show snmp server community ro	Display snmp server read only community	Configure
show snmp server community rw	Display snmp server writable community	Configure
show snmp server v3 auth admin	Display SNMPv3 admin authentication type and passphrase	Configure
show snmp server v3 auth user	Display SNMPv3 user authentication type and passphrase	Configure
show snmp server v3 encryption admin	Display SNMPv3 admin encryption type and passphrase	Configure
show snmp server v3 encryption user	Display SNMPv3 user encryption type and passphrase	Configure
show snmp server v3 level admin	Display SNMPv3 admin security level	Configure
show snmp server v3 level user	Display SNMPv3 user security level	Configure
show snmp trap community	Display snmp trap community	Configure
show snmp trap host	Display snmp trap host	Configure
show snmp trap inform retry	Display snmp inform retry times	Configure
show snmp trap inform timeout	Display snmp inform timeout	Configure
show snmp trap v3 auth	Display SNMPv3 authentication type and passphrase	Configure
show snmp trap v3 encryption	Display SNMPv3 encryption type and passphrase	Configure
show snmp trap v3 engine-ID	Display snmp trap engine ID	Configure
show snmp trap v3 level	Display SNMPv3 trap security level	Configure
show snmp trap v3 user	Display SNMPv3 trap user	Configure
show snmp trap version	Display snmp trap version and type	Configure
no snmp server	Disable snmp server	Configure

## Appendix B: CLI Command Reference

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no snmp server community ro	Default ro-community name	Configure
no snmp server community rw	Default rw-community name	Configure
no snmp server v3 auth admin	Default SNMPv3 admin authentication type	Configure
no snmp server v3 auth user	Default SNMPv3 user authentication type	Configure
no snmp server v3 encryption admin	Default SNMPv3 admin encryption type	Configure
no snmp server v3 encryption user	Default SNMPv3 user encryption type	Configure
no snmp server v3 level admin	Default SNMPv3 admin security level	Configure
no snmp server v3 level user	Default SNMPv3 user security level	Configure
no snmp trap community	Default snmp trap community	Configure
no snmp trap host	Default snmp trap host	Configure
no snmp trap inform retry	Default snmp inform retry times	Configure
no snmp trap inform timeout	Default snmp inform timeout	Configure
no snmp trap v3 auth	Default SNMPv3 authentication type and passphrase	Configure
no snmp trap v3 encryption	Default SNMPv3 encryption type and passphrase	Configure
no snmp trap v3 engine-ID	Default snmp trap engine ID	Configure
no snmp trap v3 level	Default SNMPv3 trap security level	Configure
no snmp trap v3 user	Default SNMPv3 trap user	Configure
no snmp trap version	Default snmp trap version	Configure

## Appendix B: CLI Command Reference

### DHCP GROUP

Command	Explanation	Mode
boot host dhcp	Directs the system to get an IP address	Configure
dhcp relay information option	Set DHCP-relay option	Configure
dhcp relay server [server_number: 1-4] [server_IP]	Set DHCP-relay server [1-4] IP	Configure
dhcp relay untrust	Set DHCP-relay untrusted port	Interface
dhcp server binding [bind_ID: 1 - 32] [MAC] [IP_TO_BIND]	Set binding IP and MAC of DHCP	Configure
dhcp server default-gateway [IP_ADDR]	Set default-gateway IP for DHCP client	Configure
dhcp server included-address [START_OF_IP] [END_OF_IP]	Set IP range for its client	Configure
dhcp server lease [60-2592000]	Set DHCP server lease time	Configure
dhcp server name-server [IP_ADDR]	Set name-server address for DHCP client	Configure
dhcp service relay enable	Enable DHCP relay	Configure
dhcp service server enable	Enable DHCP server	Configure
show boot host dhcp	Display DHCP client state	Configure
show dhcp relay information option	Display DHCP relay option	Configure
show dhcp relay server [server_number: 1-4]	Display DHCP relay address	Configure
show dhcp relay untrust	Display DHCP untrusted port status	Interface
show dhcp server binding	Display all DHCP bounding entries	Configure
show dhcp server default-gateway	Display DHCP default-gateway IP	Configure
show dhcp server included-address	Display DHCP included IP range	Configure
show dhcp server lease	Display DHCP server lease time	Configure
show dhcp server name-server	Display DHCP name-server	Configure
show dhcp server status	Display DHCP server status	Configure
show dhcp service relay	Display DHCP relay agent status	Configure
show dhcp service server	Display DHCP server status	Configure
no boot host dhcp	Disable DHCP client	Configure
no dhcp relay information option	Disable DHCP relay option	Configure
no dhcp relay server [server_number: 1-4]	Remove DHCP relay server [1-4] IP	Configure
no dhcp relay untrust	Default port as trusted	Interface
no dhcp server binding [bind_ID: 1-32]	Remove DHCP bounding IP and MAC	Configure
no dhcp server default-gateway	Remove DHCP default-gateway IP	Configure
no dhcp server included-address	Remove DHCP included IP range	Configure
no dhcp server lease	Remove DHCP lease time	Configure
no dhcp server name-server	Remove DHCP name-server	Configure
no dhcp service relay	Disable DHCP relay	Configure
no dhcp service server	Disable DHCP server	Configure

### INDUSTRIAL PROTOCOLS GROUP

Command	Explanation	Mode
ethernet-ip enable	Enable EtherNet/IP Protocol	Configure
modbus tcp enable	Enable Modbus/TCP Protocol	Configure
show ethernet-ip	Show EtherNet/IP status	Configure
show modbus tcp	Show Modbus/TCP status	Configure
no ethernet-ip	Disable EtherNet/IP Protocol	Configure
no modbus tcp	Disable Modbus/TCP Protocol	Configure

## Appendix B: CLI Command Reference

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### UPNP GROUP

Command	Explanation	Mode
upnp advertisement interval [300-86400]	Set UPnP advertisement interval	Configure
upnp enable	Enable Universal Plug and Play (UPnP)	Configure
show upnp	Display Universal Plug and Play (UPnP) state	Configure
show upnp advertisement interval	Display UPnP advertisement interval	Configure
no upnp	Disable Universal Plug and Play (UPnP)	Configure
no upnp advertisement interval	Default UPnP advertisement interval	Configure

### PORT GROUP

Command	Explanation	Mode
flowcontrol [on   off]	Configure port's flow-control to response a pause frame	Interface
name [PORT_NAME]	Set interface name	Interface
shutdown	Disable port	Interface
speed_duplex [10   100] [full   half]	Configure port's speed and duplex	Interface
show interface all link summary	To display interface link status globally	Configure
show administrate	To display port's admin state	Interface
show flowcontrol	Display port's flow-control state	Interface
show link duplex	To display port's duplex	Interface
show link rx	To display port's Rx_Bytes	Interface
show link speed	To display port's speed	Interface
show link state	To display port's link state	Interface
show link summary	To display port's link summary	Interface
show link tx	To display port's Tx_Bytes	Interface
show name	To display port's name	Interface
show speed_duplex	To display port's speed and duplex	Interface
show transceiver	Transceiver information	Interface
no flowcontrol	Default flow-control as Auto mode	Interface
no name	Remove port's name	Interface
no shutdown	Enable port	Interface
no speed_duplex	Default port speed-duplex as Auto mode	Interface

## Appendix B: CLI Command Reference

### PoE GROUP

Command	Explanation	Mode
power inline budget[0-5000]	Power PoE budget	Configure
power inline mode [actual   class   static]	PoE priority mode selection	Configure
power inline force	Force PoE powered on port	Interface
power inline limit [4-35]	Set PoE port power limit on port	Interface
power inline never	Disable PoE on port	Interface
power inline priority [1-3]	Set PoE port priority on port; 1:high, 2:middle, 3:low	Interface
keepalive enable	Enable PoE keepalive	Interface
keepalive hold-time	Configure PoE keepalive power cycle hold-time	Interface
keepalive ip	Configure IP for PoE keepalive	Interface
keepalive time	Configure PoE keepalive cycle time	Interface
schedule enable	Enable one port PoE schedule	Interface
schedule [Sunday-Saturday] open-time [time]	Configure PoE schedule open time on one day	Interface
show power inline budget	Display PoE power budget	Configure
show power inline mode	Display PoE priority mode selection	Configure
show power inline operation	Display All PoE ports operation status	Configure
show power inline status	Display All PoE ports detail status	Configure
show power inline status	Display PoE status for specific port	Interface
show keepalive table	Display All PoE keepalive info	Configure
show power inline status	Display PoE status	Interface
show keepalive	Show PoE keepalive status	Interface
show keepalive hold-time	Show PoE keepalive hold-time	Interface
show keepalive ip	Show IP for PoE keepalive	Interface
show keepalive time	Show PoE keepalive cycle time	Interface
show schedule	Disable Universal Plug and Play (UPnP)	Interface
show schedule [Sunday-Saturday] open-time	Show open time of POE schedule on one day	Interface
show schedule table	Show one port PoE schedule table	Interface
no power inline budget	Default PoE power budget	Configure
no power inline mode	Default PoE priority mode	Configure
no power inline force	Disable force PoE powered on port	Interface
no power inline limit	Disable PoE port power limit on port	Interface
no power inline never	Enable PoE on port	Interface
no power inline priority	Disable PoE port priority on port	Interface
no keepalive	Disable PoE keepalive	Interface
no keepalive hold-time	Default PoE keepalive power cycle hold-time	Interface
no keepalive ip	Remove IP for PoE keepalive	Interface
no keepalive time	Remove PoE keepalive cycle time	Interface
no schedule	Remove one port PoE schedule	Interface
no schedule [Sunday-Saturday] open-time	Remove PoE schedule on one day	Interface

## Appendix B: CLI Command Reference

### IGMP SNOOPING GROUP

Command	Explanation	Mode
igmp snooping enable	Enable IGMP snooping	Configure
igmp snooping last-member count [2-10]	Set IGMP last-member-count	Configure
igmp snooping last-member interval [1-25]	Set IGMP last-member-interval	Configure
igmp snooping querier enable	Enable IGMP snooping querier	Configure
igmp snooping query interval [1-3600]	Set IGMP query interval	Configure
igmp snooping query max-respond-time [1-12]	Set IGMP max-query-respond time	Configure
igmp snooping query version [VLAN_ID] [STATE:0 1] [VERSION:1 2 3]	Add IGMP query version entry by VLAN ID. STATE 0: disable; STATE 1: enable	Configure
igmp snooping router-port [PORT_LIST]	Set router port list for multicast	Configure
igmp snooping unknown-multicast [f d r]	Set unknown-multicast action	Configure
show igmp snooping all	Display IGMP settings (summary)	Configure
show igmp snooping mdb	Display IGMP multicast database	Configure
show igmp snooping query-version	Display IGMP Query version by VLAN ID	Configure
show igmp snooping router-port	Display IGMP router port list	Configure
show igmp snooping unknown-multicast	Display unknown-multicast action	Configure
no igmp snooping	Disable IGMP snooping	Configure
no igmp snooping last-member count	Default IGMP Last-Member-Count	Configure
no igmp snooping last-member interval	Default IGMP Last-Member-Interval	Configure
no igmp snooping querier	Disable IGMP querier	Configure
no igmp snooping query interval	Default IGMP query interval	Configure
no igmp snooping query max-respond-time	Default IGMP max-respond-time	Configure
no igmp snooping router-port	Default IGMP router port	Configure
no igmp snooping unknown-multicast	Default unknown-multicast action	Configure

### VLAN GROUP

Command	Explanation	Mode
management-vlan [VLAN_ID: 1-4094]	Configure management vlan ID	Configure
provider ethertype [VALUE_IN_HEX (i.e., 0x88A8)]	Setup EtherType in S-TAG for provider port	Configure
member [untag PORT_LIST] [tag PORT_LIST]	Set VLAN member	VLAN
name [VLAN_NAME]	Set VLAN Name	VLAN
switchport accept [tagged   untagged]	Set VLAN acceptance of frame	Interface
switchport mode [d(dot1q-tunnel)  c(customer)  p(provider)  s(specific-provider)]	Configure port type as dot1q-tunnel, Customer, or Service Provider	Interface
switchport pvid [PVID: 1-4094]	Set port VLAN-Id	Interface
show management-vlan	Display management vlan ID	Configure
show provider ethertype	Display Service Provider EtherType	Configure
show vlan global	Display VLAN Global information	Configure
show member	Display port VLAN member	VLAN
show name	Display VLAN name	VLAN
show switchport accept	Display acceptance of VLAN frame	Interface
show switchport mode	Display VLAN interface port type	Interface
show switchport pvid	Display port VLAN-Id	Interface
no management-vlan	Set management vlan to default	Configure
no provider ethertype	Default EtherType as 0x88A8 in S-TAG for provider port	Configure
no member	Default VLAN member	VLAN
no name	Default VLAN name	VLAN
no switchport accept	Default acceptance of VLAN frame	Interface
no switchport mode	Default port type as Customer	Interface
no switchport pvid	Default port VLAN-Id	Interface

## Appendix B: CLI Command Reference

### QoS GROUP

Command	Explanation	Mode
qos fair-queue weight [W0] [W1] [W2] [W3] [W4] [W5] [W6] [W7]	Set WRR Queue Weight	Configure
qos map cos [priority:0-7] to tx-queue [0-7]	Set Cos queue mapping of priority [0-7]	Configure
qos map dscp [0-63] to tx-queue [0-7]	Set DSCP mapping queue	Configure
qos queue-schedule [strict   wrr]	Set QoS scheduling type	Configure
qos default cos [0-7]	Set Default Class of Service (COS) value	Interface
qos trust [cos   dscp]	Set trust of cos or dscp	Interface
show qos fair-queue weight	Display WRR Queue Weight	Configure
show qos map cos	Display global QoS queue mapping status	Configure
show qos map cos [0-7]	Display QoS queue mapping status of Priority [0-7]	Configure
show qos map dscp	Display global DSCP queue mapping status	Configure
show qos map dscp [0-63]	Display DSCP queue mapping status of class [0-63]	Configure
show qos queue-schedule	Display queue scheduling type	Configure
show qos default cos	Display CoS default value	Interface
show qos trust	Display QoS trust	Interface
no qos fair-queue weight	Default WRR Queue Weight	Configure
no qos map cos [0-7]	Reset Cos queue mapping of priority [0-7]	Configure
no qos map dscp [0-63]	Reset DSCP mapping queue to default	Configure
no qos queue-schedule	Default scheduling type as WRR	Configure
no qos default cos	Reset default CoS to initial value	Interface
no qos trust	Default trust as CoS	Interface

### PORT TRUNK GROUP

Command	Explanation	Mode
trunk group [1-8] [static   lacp] INTERFACES_LIST	Configure port aggregation group	Configure
show trunk group	Show all trunk groups	Configure
show trunk group [1-8]	Show trunk group [1-8]	Configure
no trunk group [1-8]	Remove trunk group [1-8]	Configure

## Appendix B: CLI Command Reference

### STORM CONTROL GROUP

Command	Explanation	Mode
storm-control broadcast enable	Enable the broadcast storm control	Configure
storm-control broadcast level [low   mid   high]	Set the broadcast storm control level	Configure
storm-control multicast enable	Enable the multicast storm control	Configure
storm-control multicast level [low   mid   high]	Set the multicast storm control level	Configure
storm-control unknown-unicast enable	Enable the unknown-unicast storm control	Configure
storm-control unknown-unicast level [low   mid   high]	Set the unknown-unicast storm control level	Configure
show storm-control broadcast	Display the broadcast storm control status	Configure
show storm-control broadcast level	Display the broadcast storm control level	Configure
show storm-control multicast	Display the multicast storm control status	Configure
show storm-control multicast level	Display the multicast storm control level	Configure
show storm-control unknown-unicast	Display the unknown-unicast storm control status	Configure
show storm-control unknown-unicast level	Display the unknown-unicast storm control level	Configure
no storm-control broadcast	Disable the broadcast storm control	Configure
no storm-control broadcast level	Default the broadcast storm control to level high	Configure
no storm-control multicast	Disable the multicast storm control	Configure
no storm-control multicast level	Default the multicast storm control to level high	Configure
no storm-control unknown-unicast	Disable the unknown-unicast storm control	Configure
no storm-control unknown-unicast level	Default the unknown-unicast storm control to level high	Configure

### 802.1X GROUP

Command	Explanation	Mode
dot1x authentication server [1 2] ip [IP]	Set 802.1X authentication server 1 or 2 address	Configure
dot1x authentication server [1 2] port [PORT]	Set 802.1X authentication server 1 or 2 port	Configure
dot1x authentication server [1 2] share-key [KEY]	Set 802.1X authentication server 1 or 2 share-key	Configure
dot1x authentication server type [local radius]	Set 802.1X authentication server type	Configure
dot1x enable	Enable 802.1X protocol	Configure
dot1x local-db [USER] [PASSWORD]	Set 802.1X local user database	Configure
dot1x authenticator enable	Set 802.1X authenticator	Interface
dot1x mode [mac-based   port-based]	Set 802.1X mode as 1. MAC-based, 2. Port-based	Interface
dot1x reauthentication enable	Set 802.1X reauthentication	Interface
dot1x reauthentication period [60-65535]	Set 802.1X reauthentication period	Interface
show dot1x	Display 802.1X protocol state	Configure
show dot1x authentication server [1 2] ip	Display 802.1X authentication server 1 or 2 address	Configure
show dot1x authentication server [1 2] port	Display 802.1X authentication server 1 or 2 port	Configure
show dot1x authentication server [1 2] share-key	Display 802.1X authentication server 1 or 2 key	Configure
show dot1x authentication server type	Display 802.1X authentication server type	Configure
show dot1x brief	Display 802.1X information	Configure
show dot1x local-db	Display 802.1X users and password in database	Configure
show dot1x server brief	Display 802.1X RADIUS server	Configure
show dot1x authenticator	Display 802.1X authenticator state	Interface
show dot1x mode	Display 802.1X mode config	Interface
show dot1x reauthentication	Display 802.1X reauthentication state	Interface
show dot1x reauthentication period	Display 802.1X reauthentication period(in	Interface

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	sec.)	
no dot1x	Disable 802.1X protocol	Configure
no dot1x authentication server [1 2] ip	Default 802.1X authentication server 1 or 2 address	Configure
no dot1x authentication server [1 2] port	Default 802.1X authentication server 1 or 2 port	Configure
no dot1x authentication server [1 2] share-key	Default 802.1X authentication server 1 or 2 share-key	Configure
no dot1x authentication server type	Default 802.1X authentication server type	Configure
no dot1x local-db [USER]	Remove an entry in 802.1X local database	Configure
no dot1x authenticator	Disable 802.1X authenticator	Interface
no dot1x mode	Default 802.1X mode as MAC-based	Interface
no dot1x reauthentication	Disable 802.1X reauthentication	Interface
no dot1x reauthentication period	Default 802.1X reauthentication period	Interface

### PORT MIRROR GROUP

Command	Explanation	Mode
mirror destination [DEST_PORT]	Set mirror interface of destination	Configure
mirror enable	Enable port mirror	Configure
mirror source [rx   tx   both] [PORT_LIST]	Set mirror interface of source	Configure
show mirror	Show port mirror enable/disable state	Configure
show mirror destination	Show port mirror destination configuration	Configure
show mirror source	Show port mirror source configuration	Configure
no mirror	Disable port mirror	Configure
no mirror destination	Delete port mirror Destination configuration	Configure
no mirror source	Delete port mirror Source configuration	Configure

### LLDP GROUP

Command	Explanation	Mode
lldp enable	Enable LLDP protocol	Configure
lldp timer [5-32767]	Set LLDP timer	Configure
show lldp neighbor	Display LLDP neighbor	Configure
show lldp neighbor detail	Display LLDP neighbors in detail	Configure
show lldp state	Display LLDP status	Configure
show lldp timer	Display LLDP timer	Configure
no lldp	Disable LLDP protocol	Configure
no lldp timer	Default LLDP timer	Configure

### SYSLOG GROUP

Command	Explanation	Mode
syslog local enable	Enable logging to local	Configure
syslog log clear	Clear syslog log	Configure
syslog remote enable	Enable logging to remote	Configure
syslog remote port [PORT]	Set syslog remote server port	Configure
syslog remote server [ADDRESS]	Set syslog remote server address	Configure
syslog usb enable	Enable log to USB device	Configure
show syslog local	Display local logging state	Configure
show syslog log	Display syslog messages	Configure
show syslog remote	Display remote logging state	Configure
show syslog remote port	Display remote server port	Configure
show syslog remote server	Display remote server IP	Configure
show syslog usb	Display USB logging state	Configure
no syslog local	Disable logging to local	Configure
no syslog remote	Disable logging to remote	Configure
no syslog remote port	Default syslog remote server port	Configure
no syslog remote server	Clear syslog remote server address	Configure
no syslog usb	Disable logging to USB	Configure

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### SMTP GROUP

Command	Explanation	Mode
smtp authentication enable	Enable SMTP authentication	Configure
smtp authentication password [PASSWORD]	Set SMTP password	Configure
smtp authentication username [USER_NAME]	Set SMTP username	Configure
smtp enable	Enable SMTP	Configure
smtp receive [1-4] [RECEIVER_ADDRESS]	Set SMTP receiver [1-4] address	Configure
smtp sender [SMTP_SENDER_ADDRESS]	Set SMTP sender	Configure
smtp server address [SMTP_SERVER_ADDRESS]	Set SMTP server address	Configure
smtp server port [SMTP_SERVER_PORT]	Set SMTP server port	Configure
smtp subject [SUBJECT]	Set SMTP subject	Configure
show smtp authentication state	Display SMTP authentication status	Configure
show smtp authentication username	Display SMTP user name	Configure
show smtp receive [1-4]	Display SMTP receiver [1-4]	Configure
show smtp sender	Display SMTP sender	Configure
show smtp server address	Display SMTP server address	Configure
show smtp server port	Display SMTP server port	Configure
show smtp state	Display SMTP service	Configure
show smtp subject	Display SMTP subject	Configure
no smtp authentication	Disable SMTP authentication	Configure
no smtp authentication password	Clear SMTP password	Configure
no smtp authentication username	Clear SMTP user name	Configure
no smtp	Disable SMTP	Configure
no smtp receive [1-4]	Clear SMTP receiver [1-4]	Configure
no smtp sender	Clear SMTP sender	Configure
no smtp server address	Clear SMTP server	Configure
no smtp server port	Clear SMTP server port	Configure
no smtp subject	Clear SMTP subject	Configure

### EVENT GROUP

Command	Explanation	Mode
event alarm ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Register a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure
event alarm digital-input [high   low]	Register an event of digital-input	Configure
event alarm interface [lan1-lanN] down	Register an event of Interface DOWN	Configure
event alarm [power1 power2]	Register an event of power 1 or 2 failure	Configure
event smtp auth-failure	Register an event of authentication failure	Configure
event smtp cold-start	Register an event of cold-start	Configure
event smtp ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Register a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure
event smtpdigital-input [high   low]	Register an event of digital-input	Configure
event smtp interface [lan1-lanN] down	Register an event of Interface DOWN	Configure
event smtp interface [lan1-lanN] up	Register an event of Interface UP	Configure
event smtp [power1 power2]	Register an event of power 1 or 2 failure	Configure
event smtp warm-start	Register an event of warm-start	Configure
event snmptrap auth-failure	Register an event of authentication failure	Configure
event snmptrap cold-start	Register an event of cold-start	Configure
event snmptrap ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Register a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure
event snmptrapdigital-input [high   low]	Register an event of digital-input	Configure
event snmptrap interface [lan1-lanN] down	Register an event of Interface DOWN	Configure
event snmptrap interface [lan1-lanN] up	Register an event of Interface UP	Configure
event snmptrap [power1 power2]	Register an event of power 1 or 2 failure	Configure
event snmptrap warm-start	Register an event of warm-start	Configure
event syslog auth-failure	Register an event of authentication failure	Configure
event syslog cold-start	Register an event of cold-start	Configure
event syslog ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Register a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure

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event syslog digital-input [high   low]	Register an event of digital-input	Configure
event syslog interface [lan1-lanN] down	Register an event of Interface DOWN	Configure
event syslog interface [lan1-lanN] up	Register an event of Interface UP	Configure
event syslog [power1 power2]	Register an event of power 1 or 2 failure	Configure
event syslog warm-start	Register an event of warm-start	Configure
show event alarm ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Display current, Rx power, temperature, Tx power, or voltage event registration	Configure
show event alarm digital-input	Display digital-input event registration	Configure
show event alarm interface [lan1-lanN] down	Display interface DOWN event registration	Configure
show event alarm [power1 power2]	Display power 1 or 2 event registration	Configure
show event smtp auth-failure	Display authentication failure event registration	Configure
show event smtp cold-start	Display cold-start event registration	Configure
show event smtp ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Display current, Rx power, temperature, Tx power, or voltage event registration	Configure
show event smtp digital-input	Display digital-input event registration	Configure
show event smtp interface [lan1-lanN] down	Display interface DOWN event registration	Configure
show event smtp interface [lan1-lanN] up	Display interface UP event registration	Configure
show event smtp [power1 power2]	Display power 1 or 2 event registration	Configure
show event smtp warm-start	Display warm-start event registration	Configure
show event snmptrap auth-failure	Display authentication failure event registration	Configure
show event snmptrap cold-start	Display cold-start event registration	Configure
show event snmptrap ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Display current, Rx power, temperature, Tx power, or voltage event registration	Configure
show event snmptrap digital-input	Display digital-input event registration	Configure
show event snmptrap interface [lan1-lanN] down	Display interface DOWN event registration	Configure
show event snmptrap interface [lan1-lanN] up	Display interface UP event registration	Configure
show event snmptrap [power1 power2]	Display power 1 or 2 event registration	Configure
show event snmptrap warm-start	Display warm-start event registration	Configure
show event syslog auth-failure	Display authentication failure event registration	Configure
show event syslog cold-start	Display cold-start event registration	Configure
show event syslog ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Display current, Rx power, temperature, Tx power, or voltage event registration	Configure
show event syslog digital-input	Display digital-input event registration	Configure
show event syslog interface [lan1-lanN] down	Display interface DOWN event registration	Configure
show event syslog interface [lan1-lanN] up	Display interface UP event registration	Configure
show event syslog [power1 power2]	Display power 1 or 2 event registration	Configure
show event syslog warm-start	Display warm-start event registration	Configure
no event alarm ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Unregister a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure
no event alarmdigital-input	Unregister an event of digital-input	Configure
no event alarm interface [lan1-lanN] down	Unregister an event of Interface DOWN	Configure
no event alarm [power1 power2]	Unregister an event of power 1 or 2 failure	Configure
no event smtp auth-failure	Unregister an event of authentication failure	Configure
no event smtp cold-start	Unregister an event of cold-start	Configure
no event smtp ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Unregister a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure
no event smtp digital-input	Unregister an event of digital-input	Configure
no event smtp interface [lan1-lanN] down	Unregister an event of Interface DOWN	Configure
no event smtp interface [lan1-lanN] up	Unregister an event of Interface UP	Configure
no event smtp [power1 power2]	Unregister an event of power 1 or 2 failure	Configure
no event smtp warm-start	Unregister an event of warm-start	Configure
no event snmptrap auth-failure	Unregister an event of authentication failure	Configure
no event snmptrap cold-start	Unregister an event of cold-start	Configure
no event snmptrap ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Unregister a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure

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no event snmptrap digital-input	Unregister an event of digital-input	Configure
no event snmptrap interface [lan1-lanN] down	Unregister an event of Interface DOWN	Configure
no event snmptrap interface [lan1-lanN] up	Unregister an event of Interface UP	Configure
no event snmptrap [power1 power2]	Unregister an event of power 1 or 2 failure	Configure
no event snmptrap warm-start	Unregister an event of warm-start	Configure
no event syslog auth-failure	Unregister an event of authentication failure	Configure
no event syslog cold-start	Unregister an event of cold-start	Configure
no event syslog ddm [lanX-lanY] [current   rx_power   temperature   tx_power   voltage]	Unregister a DDM event of current, Rx power, temperature, Tx power, or voltage	Configure
no event syslog digital-input	Unregister an event of digital-input	Configure
no event syslog interface [lan1-lanN] down	Unregister an event of Interface DOWN	Configure
no event syslog interface [lan1-lanN] up	Unregister an event of Interface UP	Configure
no event syslog [power1 power2]	Unregister an event of power 1 or 2 failure	Configure
no event syslog warm-start	Unregister an event of warm-start	Configure

### MAC ADDRESS TABLE GROUP

Command	Explanation	Mode
clear mac address-table dynamic	Flush dynamic MAC addresses in MAC table	Configure
mac address add [VID: 1-4094] [MAC_ADDR] [PORT]	Set a MAC address to MAC table	Configure
show mac address	Display MAC table	Configure
no mac address [VID: 1-4094] [MAC_ADDR]	Remove a MAC address from FDB	Configure

### USB GROUP

Command	Explanation	Mode
usb auto-backup	Auto save to USB if running config is changed	Configure
usb auto-load	Auto load config from USB to switch	Configure
show usb auto-backup	Display USB auto backup activated status	Configure
show usb auto-load	Display USB auto load activated status	Configure
no usb auto-backup	Disable auto save	Configure
no usb auto-load	Disable auto load	Configure

### FILE GROUP

Command	Explanation	Mode
copy running-config startup-config	Save running-config to startup-config	Configure
copy running-config usb [file]	Save running-config to USB	Configure
copy startup-config running-config	Restore from startup-config	Configure
copy usb firmware [file]	Upgrade firmware from USB	Configure
copy startup-config usb [file]	Save startup-config to USB	Configure
copy usb startup-config [file]	Restore startup-config from USB	Configure
upload file name [FILE_NAME]	Set uploading file name	Configure
upload server ip [SERVER_IP]	Set uploading server IP	Configure
upload tftp	Upload and update firmware via TFTP (slower)	Configure
upload wget	Upload and update firmware via HTTP (faster)	Configure
show upload file name	Display uploading file name	Configure
show upload server ip	Display uploading server IP	Configure
no upload file name	Default uploading file name	Configure
no upload server ip	Clear uploading server IP	Configure

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### Revision History

Version	Date	Remark
Ver 1.0	2017/06/26	1. First version
Ver 1.1	2018/09/12	1. Adding power wiring section 2. Adding SFP DDM & MSTP section