PLANET
Networking & Communication

User's Manual

24/48-Port 10/100TX + 4-Port Gigabit Managed Switch

- FGSW-2840 / FGSW-4840S

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Trademarks

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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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

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

Energy Saving Note of the Device

This power required device does not support Standby mode operation. For energy saving, please remove the power cable to disconnect the device from the power circuit. In view of saving the energy and reducing the unnecessary power consumption, it is strongly suggested to remove the power connection for the device if this device is not intended to be active.

WEEE Warning

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

Revision

PLANET 24/48-Port 10/100TX + 4-Port Gigabit Managed Switch User's Manual

FOR MODELS: FGSW-2840(V1) / FGSW-4840S (V3)

REVISION: 1.0 (September 2014)

Part No: EM-FGSW-2840_FGSW-4840S_v1.0

TABLE OF CONTENTS

1. INTRODUCTION

Thank you for purchasing PLANET 24 / 48-Port 10/100TX + 4-Port Gigabit Managed Switch, FGSW-2840/FGSW-4840S. The descriptions of these two models are shown below:

FGSW-2840	24-Port 10/100TX + 4-Port Gigabit with 2 Combo 100/1000X SFP Managed Switch
FGSW-4840S	48-Port 10/100TX + 2-Port Gigabit + 2-Port 1000X SFP Managed Switch

"**Managed Switch**" mentioned in this quick installation guide refers to the FGSW-2840 and FGSW-4840S.

1.1 Package Contents

Open the box of the Managed Switch and carefully unpack it. The box should contain the following items:

- **The FGSW-2840 or FGSW-4840S x 1 (With SFP Dust Cap x 2)**
- **Quick Installation Guide x 1**
- **Power Cord x 1**
- **Rubber Feet x 4**
- **Two 19" Rack-mounting Brackets Kit x 1**

If any of these are missing or damaged, please contact your dealer immediately; if possible, retain the carton including the original packing material, and use them again to repack the product in case there is a need to return it to us for repair.

1.2 Product Description

High-Density, Full-Functioned, Layer 2 Managed Switch for Enterprise and Campus Networking

The FGSW-2840 and FGSW-4840S is a 24/48-Port 10/100Mbps Fast Ethernet Switch with 2/4-Port Gigabit and 2-Port Gigabit SFP interfaces, which comes with a high-performance switch architecture, capable of providing non-blocking 12.8Gbps (FGSW-2840) / 17.6Gbps (FGSW-4840S) switch fabric and wire-speed throughput at 9.5Mpps (FGSW-2840) / 13Mpps (FGSW-4840S). Its four built-in GbE uplink ports also offer incredible extensibility, flexibility and connectivity to the core switch or servers. The powerful features of QoS and network security offered by the FGSW-2840 / FGSW-4840S enable the switch to perform effective data traffic control for ISP and enterprise VoIP, video streaming and multicast applications. It is ideal for the remote access layer of campus or enterprise networks and the aggregation layer of IP metropolitan networks.

Robust Layer 2 Feature

The FGSW-2840 / FGSW-4840S can be programmed for advanced switch management functions such as port mirror, port security, port isolation and loopback detection. It also features the dynamic **port link aggregation** (Static Trunk and LACP), **802.1Q VLAN**, **Rapid Spanning Tree protocol** (RSTP) and **Multiple Spanning Tree protocol** (MSTP), Static / Dynamic / Filtering MAC address, **IGMP Snooping**, Multicast IP and Multicast Filter and DHCP filtering. Via aggregation of supporting ports, the FGSW-2840 / FGSW-4840S allow the operation of a high-speed trunk to combine with multiple ports. It enables a maximum of up to 6 groups of 4 ports for trunk and supports fail-over as well.

Enhanced Security

The FGSW-2840 / FGSW-4840S offer comprehensive **Layer 2 to Layer 4 Access Control List (ACL)** for enforcing security to the edge. It can be used to restrict network access by denying packets based on source and destination IP address.

Efficient Traffic Control

The FGSW-2840 / FGSW-4840S is loaded with robust QoS features and powerful traffic management to enhance services to business-class data, voice, and video solutions. The functionality includes broadcast / multicast / unicast **storm control**, per port **bandwidth control**, 802.1p / CoS / IP DSCP QoS priority and remarking. It guarantees the best performance at VoIP and video stream transmission, and empowers the enterprises to take full advantages of the limited network resources.

Enhanced and Secure Management

For efficient management, the FGSW-2840 / FGSW-4840S are equipped with **Web**, **Telnet** and **SNMP** management interfaces. With the built-in Web-based management interface, the FGSW-2840 / FGSW-4840S offer an easy-to-use, platform-independent management and configuration facility. By supporting the standard Simple Network Management Protocol (SNMP), the switch can be managed via any standard management software. For text-based management, the switch can be accessed via Telnet .

Moreover, the FGSW-2840 / FGSW-4840S offers secure remote management by supporting **HTTPS** and **SNMPv3** connections which encrypt the packet content at each session.

Flexible Extension Solution

The two mini-GBIC slots built in the FGSW-2840 / FGSW-4840S are compatible with the **1000Base-SX/LX** SFP (Small Form-factor Pluggable) fiber transceiver to uplink to the backbone switch and monitoring center in long distance**.** The distance can be extended from 550 meters (multi-mode fiber) to 10/20/30/40/50/60/70/120 kilometers (single-mode fiber or WDM fiber). They are well suited for applications within the enterprise data centers and distributions, the two mini-GBIC slots built in the FGSW-2840 also compatible with 100Base-FX SFP fiber transceiver.

1.3 How to Use This Manual

This User Manual is structured as follows:

Section 2 INSTALLATION

The section explains the functions of the Managed Switch and how to physically install the Managed Switch.

Section 3 SWITCH MANAGEMENT

The section contains the information about the software function of the Managed Switch.

Section 4 WEB CONFIGURATION

The section explains how to manage the Managed Switch by Web interface.

Section 5 COMMAND LINE INTERFACE

The section describes how to use the Command Line interface (CLI).

Section 6 COMMAND LINE MODE

The section explains how to manage the Managed Switch by Command Line interface.

Section 7 SWITCH OPERATION

The chapter explains how to do the switch operation of the Managed Switch.

Section 8 TROUBLESHOOTING

The chapter explains how to troubleshoot the Managed Switch.

Appendix A

The section contains cable information of the Managed Switch.

1.4 Product Features

Physical Port (FGSW-2840)

- **24-port 10/100Base-TX** Fast Ethernet RJ45 copper, auto MDI / MDIX
- **4-port 10/100/1000Base-T** Gigabit Ethernet RJ45 copper, auto MDI / MDIX
- **2 Combo 100/1000Base-X** mini-GBIC/SFP slots (Share with Port 27/28)
- Reset button for system factory default

Physical Port (FGSW-4840S)

- **48-port 10/100Base-TX** Fast Ethernet RJ45 copper, auto MDI / MDIX
- **2-port 10/100/1000Base-T** Gigabit Ethernet RJ45 copper, auto MDI / MDIX
- **2 1000Base-X** mini-GBIC/SFP slots
- Reset button for system factory default

Layer 2 Features

- Prevents packet loss with back pressure (half-duplex) and IEEE 802.3x pause frame flow control (full-duplex)
- High-performance Store and Forward architecture, and runt/CRC filtering eliminates erroneous packets to optimize the network bandwidth
- Supports **VLAN**
  - IEEE 802.1Q tagged VLAN, up to 512VLAN groups, out of 4094 VLAN IDs
  - Management VLAN
- Supports **Spanning Tree Protocol**
  - STP (Spanning Tree Protocol)
  - RSTP (Rapid Spanning Tree Protocol)
  - MSTP (Multiple Spanning Tree Protocol)
  - Loop Guard, Root Guard, TC, BPDU Guard, STP BPDU Guard, BPDU Filtering
- Supports **Link Aggregation**
  - IEEE 802.3ad Link Aggregation Control Protocol (LACP)
  - Cisco ether-channel (Static Trunk)
  - Maximum 6 trunk groups, up to 4 ports per trunk group
- Provides port mirror (many-to-1)

Quality of Service

- Ingress / Egress Rate Limit per port bandwidth control
- Storm Control support
  - Broadcast / Unknown Unicast / Unknown Multicast
- Traffic classification
  - IEEE 802.1p CoS
  - DSCP / ToS priority
- Strict priority, Weighted Round Robin (WRR) and Equal CoS policies
- Voice VLAN

Multicast

- IGMP Snooping v1, v2 and v3
- Multicast IP Table / Static Multicast IP
- Multicast Filter

Security

- L2 / L3 / L4 Access Control List
- MAC Security
  - Static MAC
  - MAC Filtering
- Port Security for Source MAC address entries filtering
- Port Isolation, loopback detection
- DHCP Filtering

Management

- Switch Management Interface
  - Web switch management
  - Telnet Command Line Interface
  - SNMP v1, v2c and v3
  - SSL v2, v3 / SSH v1,v2 secure access
  - IP / MAC / Port-based Web access control
- Static, DHCP and BooTP for IP address assignment
- System Maintenance
  - Firmware upload / download via HTTP
  - Configuration upload / download through HTTP
  - Hardware reset button for system reset to factory default
  - System CPU / Memory status monitor
- System Time Setting
  - Manual Setting
  - Network Time Protocol
  - PC clock synchronization
- Daylight Saving Time Setting
- SNMP trap for interface Link Up and Link Down notification
- System Local Log / remote log / backup log
- Four RMON groups (history, statistics, alarms and events)
- Virtual Cable Test / Loop Back Test

1.5 Product Specifications

Product	FGSW-2840	FGSW-4840S
Hardware Specifications		
Hardware Version	1	3
10/100TX Copper Ports (MDI/MDIX)	24	48
10/100/1000T Copper Ports (MDI/MDIX)	4	2
SFP/mini-GBIC Slots	2 100/1000Base-X SFP interfaces	2 1000Base-X SFP interfaces
Switch Fabric	12.8Gbps / non-blocking	17.6Gbps / non-blocking
Switch Throughput@64 bytes	9.5Mpps @64 bytes	13Mpps @64 bytes
LED	**System:** Power (**Green**) SYS (**Green**) **10/100TX RJ45 Interfaces** (Port 1 to Port 24): 100 LNK / ACT (**Green**) 10 LNK/ACT (**Orange**) **10/100/1000T RJ45 Interfaces** (Port 25 to Port 28): 1000 LNK / ACT (**Green**) 10/100 LNK/ACT (**Orange**) **100/1000Mbps SFP Interfaces** (Share with Port 27 to Port 28): 1000 LNK / ACT (**Green**) 100 LNK/ACT (**Orange**)	**System:** Power (**Green**) SYS (**Green**) **10/100TX RJ45 Interfaces** (Port 1 to Port 48): 100 LNK / ACT (**Green**) 10 LNK/ACT (**Orange**) **10/100/1000T RJ45 Interfaces** (Port 49 to Port 50): 1000 LNK / ACT (**Green**) 10/100 LNK/ACT (**Orange**) **1000Mbps SFP Interfaces** (Port 51 to Port 52): 1000 LNK / ACT (**Green**)
Power Requirements	100~240V AC, 50/60Hz, 0.6A	100~240V AC, 50/60Hz, 0.4A
Power Consumption / Dissipation	Max 12.8 watts / 43 BTU	Max.17.3 watts / 59BTU
Dimensions (W x D x H)	440 x 180 x 44mm (1U height)	440 x 180 x 44mm (1U height)
Weight	1.9kg	2.5kg
Switch Architecture	Store-and-Forward	
MAC Address Table	8K entries	
Flow Control	IEEE 802.3x pause frame for full-duplex Back pressure for half-duplex	
Maximum Transmit Unit	9216bytes	
Reset Button	> 5 sec: Factory default	
Enclosure	Metal	
Layer 2 Functions		
Port Mirroring	TX / RX Many-to-1 monitor	
Port Security	up to 64 MAC Address per port	
Port Isolation	Support	
Loopback Detection	Support	

Link Aggregation	IEEE 802.3ad LACP and static trunk supports 6 groups of 4-port trunk.
VLAN	802.1Q tagged-based VLAN, up to 512 VLAN groups, out of 4094 VLAN IDs Management VLAN
Spanning Tree Protocol	IEEE 802.1D STP IEEE 802.1w RSTP IEEE 802.1s MSTP
Multicast	IGMP (v1/v2/v3) Snooping Multicast IP Multicast Filter
Access Control List	L2 / L3 / L4 Access Control List
QoS	4 Priority Queues Traffic classification: - IEEE 802.1p CoS - DSCP / ToS priority Strict priority, Weighted Round Robin (WRR) and Equal CoS policies Ingress / Egress Rate Limit per port bandwidth control Storm Control support: - Broadcast / Unknown Unicast / Unknown Multicast Voice VLAN
Security	MAC Security: - Static MAC - Dynamic MAC address - MAC Filtering Loop Guard, Root Guard, TC, BPDU Guard, STP BPDU Guard, BPDU Filtering, DHCP Filtering
Virtual Cable Test	Support
Loopback Test	Support
Management Functions	
Basic Management Interfaces	Web browser / Telnet / SNMP v1, v2c, v3 / SSL v2, v3 / SSH v1,v2 Firmware upgrade by HTTP protocol through Ethernet network Configuration Backup / Restore by HTTP protocol through Ethernet network
Secure Management Interfaces	HTTPs, SNMP v3
Web Access Control	IP / MAC / Port-based Web access control
System IP Address Assignment	Static, DHCP and BooTP
System Log	System local log / remote log / backup log
System Time Setting	Manual Setting, Network Time Protocol, PC clock synchronization
Daylight Saving Time	Support
SNMP RMON	RFC 2819 RMON (1, 2, 3, 9)
SNMP Trap	Interface Link Up and Link Down notification
Standards Conformance	

Regulation Compliance	FCC Part 15 Class A, CE
Standards Compliance	IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX / 100Base-FX IEEE 802.3z Gigabit SX/LX IEEE 802.3ab Gigabit 1000Base-T IEEE 802.3x Flow Control and Back pressure IEEE 802.3ad Port Trunk with LACP IEEE 802.1D Spanning Tree protocol IEEE 802.1w Rapid Spanning Tree protocol IEEE 802.1s Multiple Spanning Tree protocol IEEE 802.1p Class of Service IEEE 802.1Q VLAN Tagging RFC 768 UDP RFC 791 IP RFC 792 ICMP RFC 2068 HTTP RFC 1112 IGMP version 1 RFC 2236 IGMP version 2 RFC 3376 IGMP version 3
Environment	
Operating	Temperature: 0 ~ 50 degrees C Relative Humidity: 5 ~ 95% (non-condensing)
Storage	Temperature: -10 ~ 70 degrees C Relative Humidity: 5 ~ 95% (non-condensing)

2. INSTALLATION

This section describes the hardware features and installation of the Managed Switch on the desktop or rack mount. For easier management and control of the Managed Switch, familiarize yourself with its display indicators, and ports. Front panel illustrations in this chapter display the unit LED indicators. Before connecting any network device to the Managed Switch, please read this chapter completely.

2.1 Hardware Description

2.1.1 Switch Front Panel

The front panel provides a simple interface monitoring the Managed Switch. Figure 2-1-1 & 2-1-2 shows the front panel of the Managed Switch.

Front Panel

Figure 2-1-1: FGSW-2840 Front Panel

Front Panel

Figure 2-1-2: FGSW-4840S Front Panel

■ **Fast Ethernet TP Interface**

10/100Base-TX Copper, RJ-45 Twist-Pair: Up to 100 meters.

■ **Gigabit TP Interface**

10/100/1000Base-T Copper, RJ-45 Twist-Pair: Up to 100 meters.

■ **1000Base-X SFP Slots (FGSW-4840S)**

Each of the SFP (Small Form-factor Pluggable) slot supports Dual-speed, 1000Base-SX / LX.

- For 1000Base-SX/LX SFP transceiver module: From 550 meters (Multi-mode fiber), up to 10/20/30/40/50/60/70/120 kilometers (Single-mode fiber).

■ **100/1000Base-X SFP Slots (FGSW-2840)**

Each of the SFP (Small Form-factor Pluggable) slot supports Dual-speed, 1000Base-SX / LX or 100Base-FX.

- For 1000Base-SX/LX SFP transceiver module: From 550 meters (Multi-mode fiber), up to 10/20/30/40/50/60/70/120 kilometers (Single-mode fiber).
- For 100Base-FX SFP transceiver module: From 2 kilometers (Multi-mode fiber), up to 20/40/60 kilometers (Single-mode fiber).

■ **Reset Button**

At front panel of Managed Switch, the reset button is designed for reboot the Managed Switch without turn off and on the power. The following is the summary table of Reset button function:

Reset Button Pressed and Released	Function
> 5 seconds: Factory Default	Reset the Managed Switch to Factory Default configuration. The Managed Switch will then reboot and load the default settings as below: ◦ Default Username: **admin** ◦ Default Password: **admin** ◦ Default IP address: **192.168.0.100** ◦ Subnet mask: **255.255.255.0** ◦ Default Gateway: **192.168.0.254**

2.1.2 LED Indications

The front panel LEDs indicates instant status of port links, data activity, system power and system CPU status; helps monitor and troubleshoot when needed. Figure 2-1-3 & Figure 2-1-4 shows the LED indications of the Managed Switch.

LED Indication

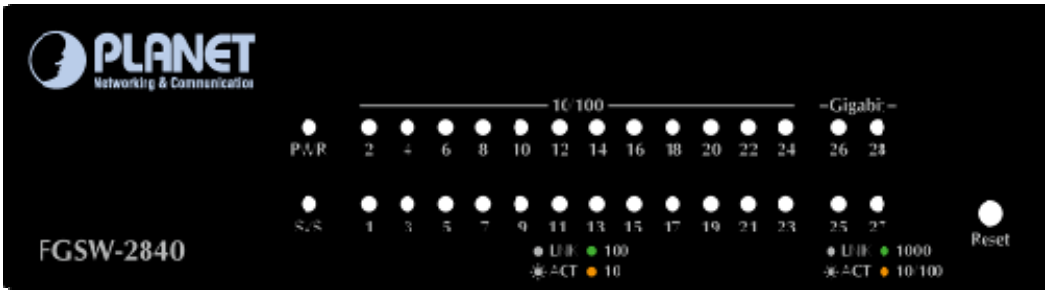


Figure 2-1-3: FGSW-2840 LED Panel

■ **FGSW-2840 LED Definition**

➢ **System**

LED	Color	Function
PWR	**Green**	**Lights** to indicate that the Switch has power.
SYS	**Green**	**Lights** and blinking to indicate the CPU is working.

➢ **10/100Base-TX Interfaces (Port 1 to port 24)**

LED	Color	Function
100 LNK/ACT	**Green**	Lights: To indicate the link through that port is successfully established at 100Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.
10 LNK/ACT	**Orange**	Lights: To indicate the link through that port is successfully established at 10Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.

■ **10/100/1000Base-T Interfaces (Port 25 to port 28)**

LED	Color	Function
1000 LNK/ACT	**Green**	Lights: To indicate the link through that port is successfully established at 1000Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.
10/100 LNK/ACT	**Orange**	Lights: To indicate the link through that port is successfully established at 10Mbps or 100Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.

■ **1000Base-X SFP Interfaces (Share with Port 27 to port 28)**

LED	Color	Function
1000 LNK/ACT	**Green**	Lights: To indicate the link through that port is successfully established at 1000Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.
100 LNK/ACT	**Orange**	Lights: To indicate the link through that port is successfully established at 100Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.

LED Indication

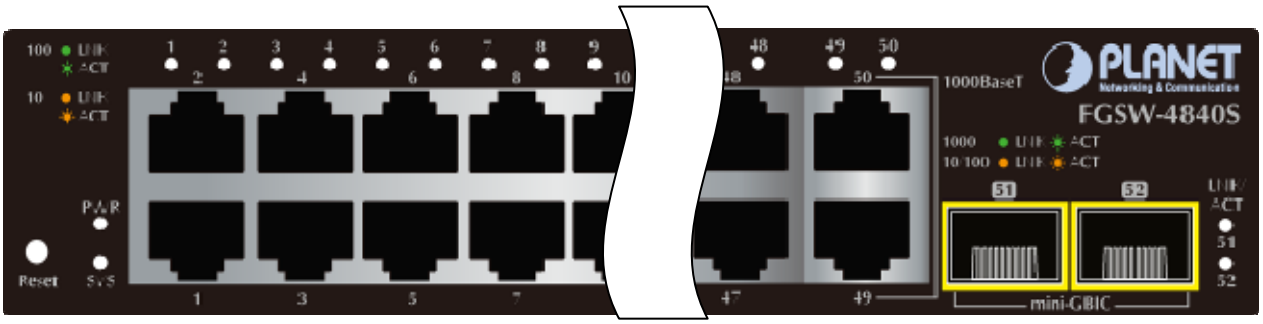


Figure 2-1-4: FGSW-4840S LED Panel

■ **FGSW-4840S LED Definition**

➢ **System**

LED	Color	Function
PWR	**Green**	**Lights** to indicate that the Switch has power.
SYS	**Green**	**Lights** and blinking to indicate the CPU is working.

➢ **10/100Base-TX Interfaces (Port 1 to port 48)**

LED	Color	Function
100 LNK/ACT	**Green**	Lights: To indicate the link through that port is successfully established at 100Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.
10 LNK/ACT	**Orange**	Lights: To indicate the link through that port is successfully established at 10Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.

■ **10/100/1000Base-T Interfaces (Port 49 to port 50)**

LED	Color	Function
1000 LNK/ACT	**Green**	Lights: To indicate the link through that port is successfully established at 1000Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.
10/100 LNK/ACT	**Orange**	Lights: To indicate the link through that port is successfully established at 10Mbps or 100Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.

■ **1000Base-X SFP Interfaces (Port 51 to port 52)**

LED	Color	Function
LNK/ACT	**Green**	Lights: To indicate the link through that port is successfully established at 1000Mbps. Blink: To indicate that the Switch is actively sending or receiving data over that port.

2.1.3 Switch Rear Panel

The rear panel of the Managed Switch indicates an AC inlet power socket, which accepts input power from 100 to 240V AC, 50-60Hz. Figure 2-1-5 & Figure 2-1-6 shows the rear panel of this Managed Switch.

Rear Panel

Figure 2-1-5: Rear Panel of FGSW-2840

Rear Panel

Figure 2-1-6: Rear Panel of FGSW-4840S

■ **AC Power Receptacle**

For compatibility with electric service in most areas of the world, the Managed Switch's power supply automatically adjusts to line power in the range of 100-240V AC and 50/60Hz.

Plug the female end of the power cord firmly into the receptalbe on the rear panel of the Managed Switch. Plug the other end of the power cord into an electric service outlet and the power will be ready.

Power Notice: The device is a power-required device, which means it will not work till it is powered. If your networks should be active all the time, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network downtime.

Power Notice: In some areas, installing a surge suppression device may also help to protect your Managed Switch from being damaged by unregulated surge or current to the Managed Switch or the power adapter.

2.2 Installing the Switch

This section describes how to install your Managed Switch and make connections to the Managed Switch. Please read the following topics and perform the procedures in the order being presented. To install your Managed Switch on a desktop or shelf, simply complete the following steps.

2.2.1 Desktop Installation

To install the Managed Switch on desktop or shelf, please follow these steps:

Step1: Attach the rubber feet to the recessed areas on the bottom of the Managed Switch.

Step2: Place the Managed Switch on the desktop or the shelf near an AC power source, as shown in Figure 2-1-7.

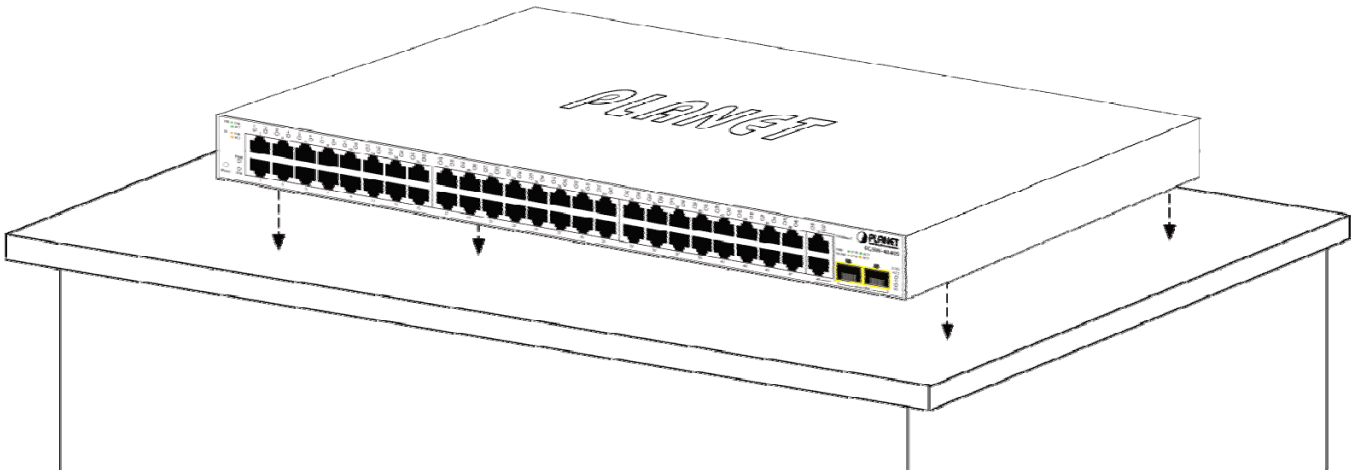


Figure 2-1-7: Place the Managed Switch on the desktop

Step3: Keep enough ventilation space between the Managed Switch and the surrounding objects.

Note: When choosing a location, please keep in mind the environmental restrictions discussed in Chapter 1, Section 4, and specifications.

Step4: Connect the Managed Switch to network devices.

Connect one end of a standard network cable to the RJ-45 ports on the front of the Managed Switch.

Connect the other end of the cable to the network devices such as printer server, workstation or router.

Note: Connection to the Managed Switch requires UTP Category 5 network cabling with RJ-45 tips. For more information, please see the Cabling Specification in Appendix A.

Step5: Supply power to the Managed Switch.

Connect one end of the power cable to the Managed Switch.

Connect the power plug of the power cable to a standard wall outlet.

When the Managed Switch receives power, the Power LED should remain solid Green.

2.2.2 Rack Mounting

To install the Managed Switch in a 19-inch standard rack, please follow the instructions described below.

Step1: Place the Managed Switch on a hard flat surface, with the front panel positioned towards the front side.

Step2: Attach the rack-mount bracket to each side of the Managed Switch with supplied screws attached to the package.

Figure 2-1-8 shows how to attach brackets to one side of the Managed Switch.

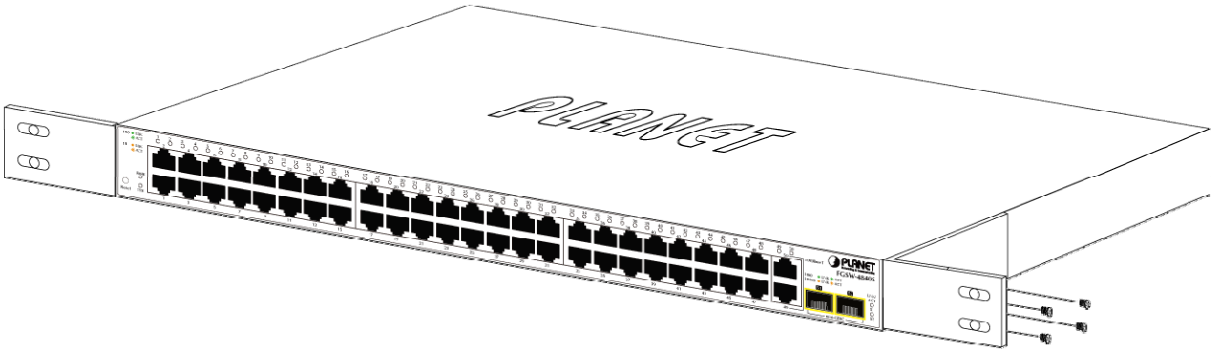


Figure 2-1-8: Attach Brackets to the Managed Switch

You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws would invalidate the warranty.

Step3: Secure the brackets tightly.

Step4: Follow the same steps to attach the second bracket to the opposite side.

Step5: After the brackets are attached to the Managed Switch, use suitable screws to securely attach the brackets to the rack, as shown in Figure 2-1-9.

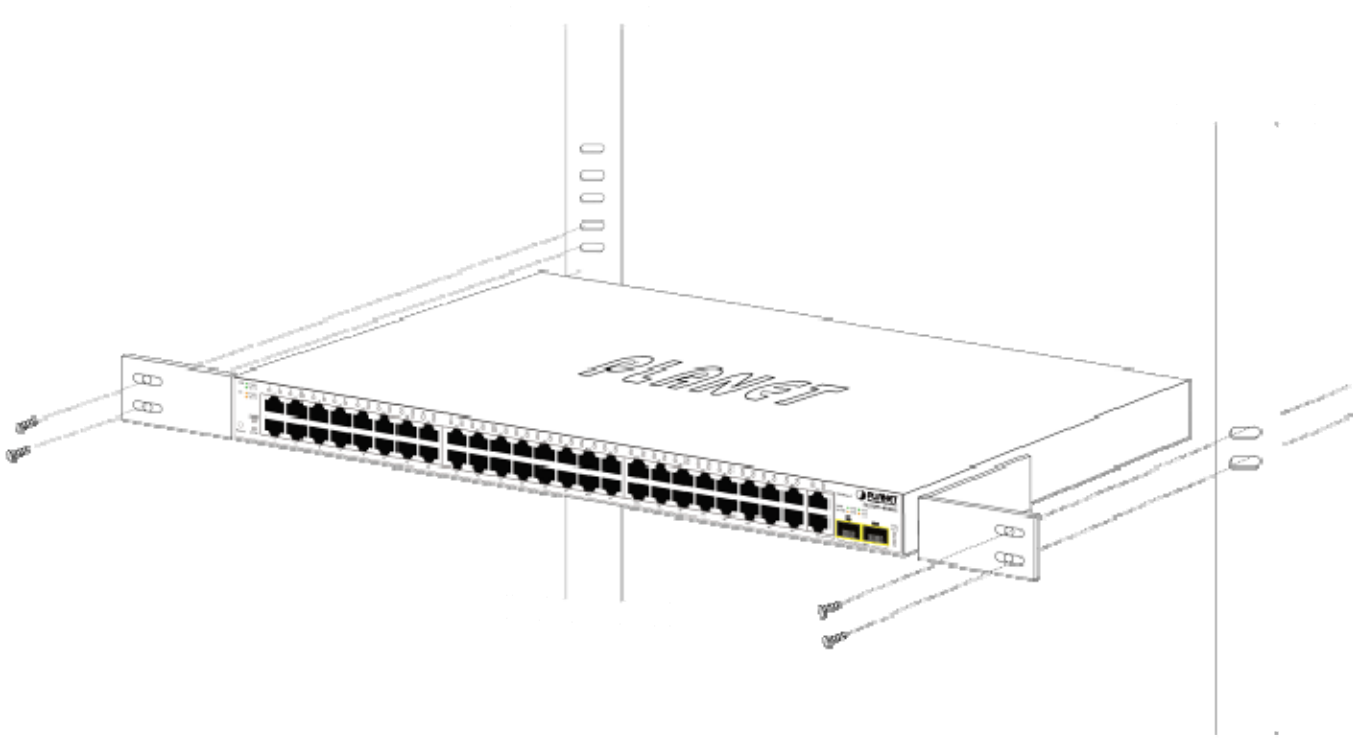


Figure 2-1-9: Mounting Managed Switch in a Rack

Step6: Proceeds with Steps 4 and 5 of session 2.2.1 Desktop Installation to connect the network cabling and supply power to the Managed Switch.

2.2.3 Installing the SFP transceiver

The sections describe how to insert an SFP transceiver into an SFP slot.

The SFP transceivers are hot-pluggable and hot-swappable. You can plug in and out the transceiver to/from any SFP port without having to power down the Managed Switch, as the Figure 2-1-10 shows.

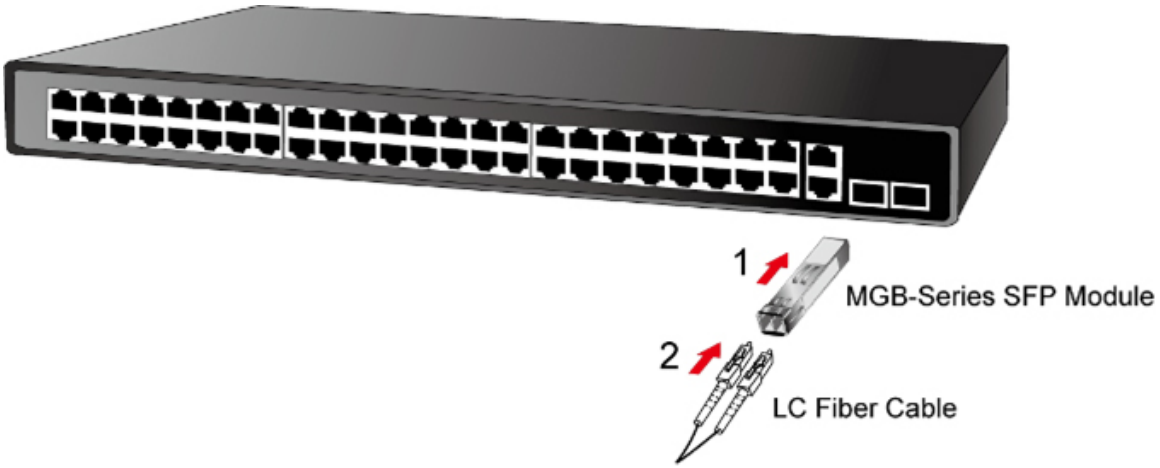


Figure 2-1-10: Plug In the SFP Transceiver

■ Approved PLANET SFP Transceivers

PLANET Managed Switch supports both Single mode and Multi-mode SFP transceiver. The following list of approved PLANET SFP transceivers is correct at the time of publication:

Gigabit SFP Transceiver Modules (FGSW-2840 / FGSW-4840S)

- **MGB-GT** SFP-Port 1000Base-T Module
- **MGB-SX** SFP-Port 1000Base-SX mini-GBIC module
- **MGB-LX** SFP-Port 1000Base-LX mini-GBIC module -10KM
- **MGB-L30** SFP-Port 1000Base-LX mini-GBIC module -30KM
- **MGB-L50** SFP-Port 1000Base-LX mini-GBIC module -50KM
- **MGB-L70** SFP-Port 1000Base-LX mini-GBIC module -70KM
- **MGB-L120** SFP-Port 1000Base-LX mini-GBIC module -120KM
- **MGB-LA10** SFP-Port 1000Base-LX (WDM,TX:1310nm) -10KM
- **MGB-LB10** SFP-Port 1000Base-LX (WDM,TX:1550nm) -10KM
- **MGB-LA20** SFP-Port 1000Base-LX (WDM,TX:1310nm) -20KM
- **MGB-LB20** SFP-Port 1000Base-LX (WDM,TX:1550nm) -20KM
- **MGB-LA40** SFP-Port 1000Base-LX (WDM,TX:1310nm) -40KM
- **MGB-LB40** SFP-Port 1000Base-LX (WDM,TX:1550nm) -40KM

Fast Ethernet SFP Transceiver Modules (FGSW-2840 only)

- **MFB-FX** SFP-Port 100Base-FX Transceiver -2KM
- **MFB-F20** SFP-Port 100Base-FX Transceiver -20KM
- **MFB-F40** SFP-Port 100Base-FX Transceiver -40KM
- **MFB-F60** SFP-Port 100Base-FX Transceiver -60KM
- **MFB-FA20** SFP-Port 100Base-BX Transceiver (WDM,TX:1310nm) -20KM
- **MFB-FB20** SFP-Port 100Base-BX Transceiver (WDM,TX:1550nm) -20KM

It is recommended to use PLANET SFP on the Managed Switch. If you insert an SFP transceiver that is not supported, the Managed Switch will not recognize it.

In the installation steps below, this Manual uses Gigabit SFP transceiver as an example. However, the steps for Fast Ethernet SFP transceiver are similar.

1. Before we connect Managed Switch to the other network device, we have to make sure both sides of the SFP transceivers are with the same media type, for example: 1000Base-SX to 1000Base-SX, 1000Bas-LX to 1000Base-LX.

2. Check whether the fiber-optic cable type matches with the SFP transceiver requirement.
   - To connect to 1000Base-SX SFP transceiver, please use the multi-mode fiber cable with one side being the male duplex LC connector type.
   - To connect to 1000Base-LX SFP transceiver, please use the single-mode fiber cable with one side being the male

duplex LC connector type.

■ Connect the Fiber Cable

1. Insert the duplex LC connector into the SFP transceiver.
2. Connect the other end of the cable to a device with SFP transceiver installed.
3. Check the LNK/ACT LED of the SFP slot on the front of the Managed Switch. Ensure that the SFP transceiver is operating correctly.
4. Check the Link mode of the SFP port if the link fails. To function with some fiber-NICs or Media Converters, user has to set the port Link mode to **"1000 Force"** or **"100 Force"**.

■ Remove the Transceiver Module

1. Make sure there is no network activity anymore.
2. Remove the Fiber-Optic Cable gently.
3. Lift up the lever of the MGB module and turn it to a horizontal position.
4. Pull out the module gently through the lever.

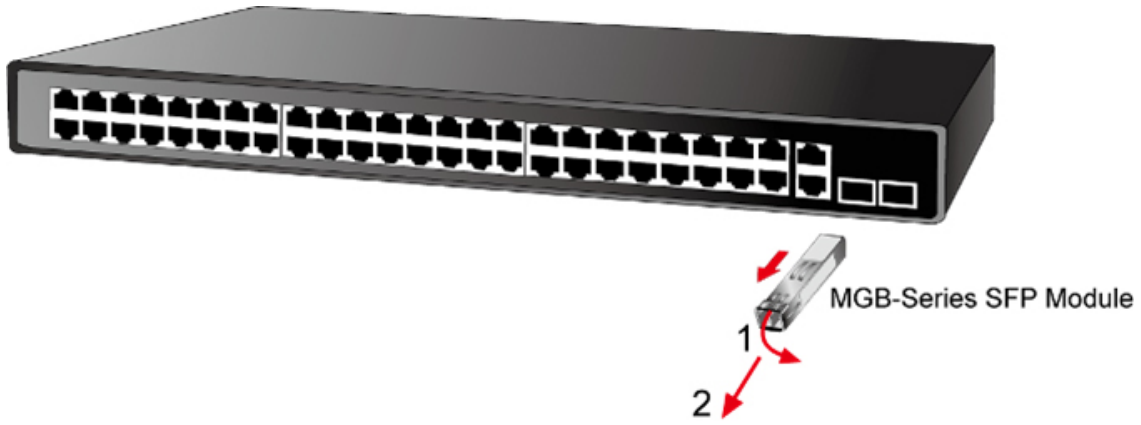


Figure 2-1-11: How to Pull Out the SFP Transceiver

Note

Never pull out the module without lifting up the lever of the module and turning it to a horizontal position. Directly pulling out the module could damage the module and the SFP module slot of the Managed Switch.

3. SWITCH MANAGEMENT

This chapter explains the methods that you can use to configure management access to the Managed Switch. It describes the types of management applications and the communication and management protocols that deliver data between your management device (workstation or personal computer) and the system. It also contains information about port connection options.

This chapter covers the following topics:

- Requirements
- Management Access Overview
- Web Management Access
- SNMP Access

3.1 Requirements

- **Workstations** running Windows 2000/XP, 2003, Vista/7/8, 2008, MAC OS9 or later, Linux, UNIX or other platforms are compatible with **TCP/IP** protocols.
- **Workstation** is installed with **Ethernet NIC** (Network Interface Card)
- **Ethernet Port connection**
  - Network cables -- Use standard network (UTP) cables with RJ45 connectors.
- The above Workstation is installed with **WEB Browser** and **JAVA runtime environment** Plug-in

It is recommended to use Internet Explore 8.0 or above to access the Managed Switch. If the Web interface of the Managed Switch is not accessible, please turn off the anti-virus software or firewall and then try it again.

3.2 Management Access Overview

The Managed Switch gives you the flexibility to access and manage it using any or all of the following methods:

- **Web browser** interface
- An external **SNMP-based network management application**

The administration Web browser interface supports are embedded in the Managed Switch software and are available for immediate use. Each of these management methods has their own advantages. Table 3-1 compares the three management methods.

Method	Advantages	Disadvantages
Web Browser	• Ideal for configuring the switch remotely • Compatible with all popular browsers • Can be accessed from any location • Most visually appealing	• Security can be compromised (hackers need only know the IP address and subnet mask) • May encounter lag times on poor connections
SNMP Agent	• Communicates with switch functions at the MIB level • Based on open standards	• Requires SNMP manager software • Least visually appealing of all three methods • Some settings require calculations • Security can be compromised (hackers need only know the community name)

Table 3-1: Comparison of Management Methods

3.3 Web Management

The Managed Switch offers management features that allow users to manage the Managed Switch from anywhere on the network through a standard browser such as Microsoft Internet Explorer. After you set up your IP address for the Managed Switch, you can access the Managed Switch's Web interface applications directly in your Web browser by entering the IP address of the Managed Switch.

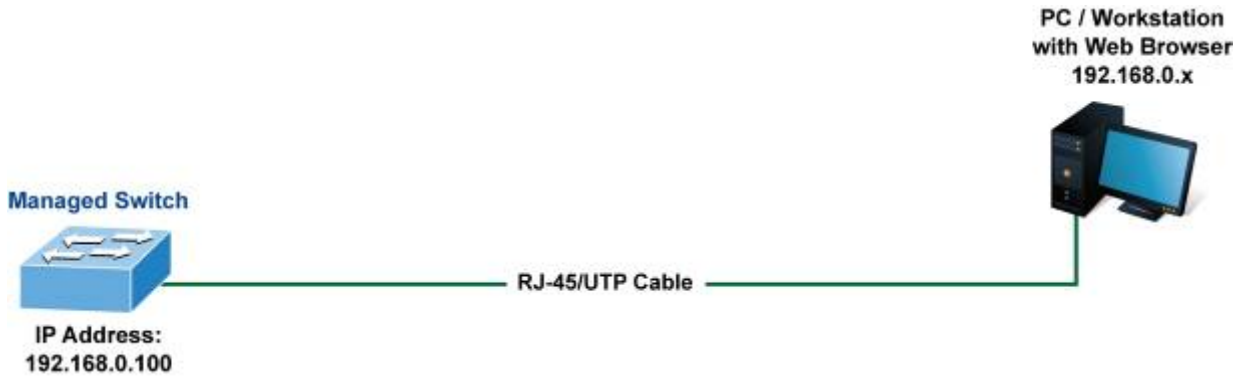


Figure 3-1: Web Management

You can then use your Web browser to list and manage the Managed Switch configuration parameters from one central location; Web Management requires Microsoft **Internet Explorer 8.0** or later, **Google Chrome**, **Safari** or **Mozilla Firefox 1.5** or later.

Note

The following web screen based on FGSW-4840S, for FGSW-2840 the display will be the same to FGSW-4840S.

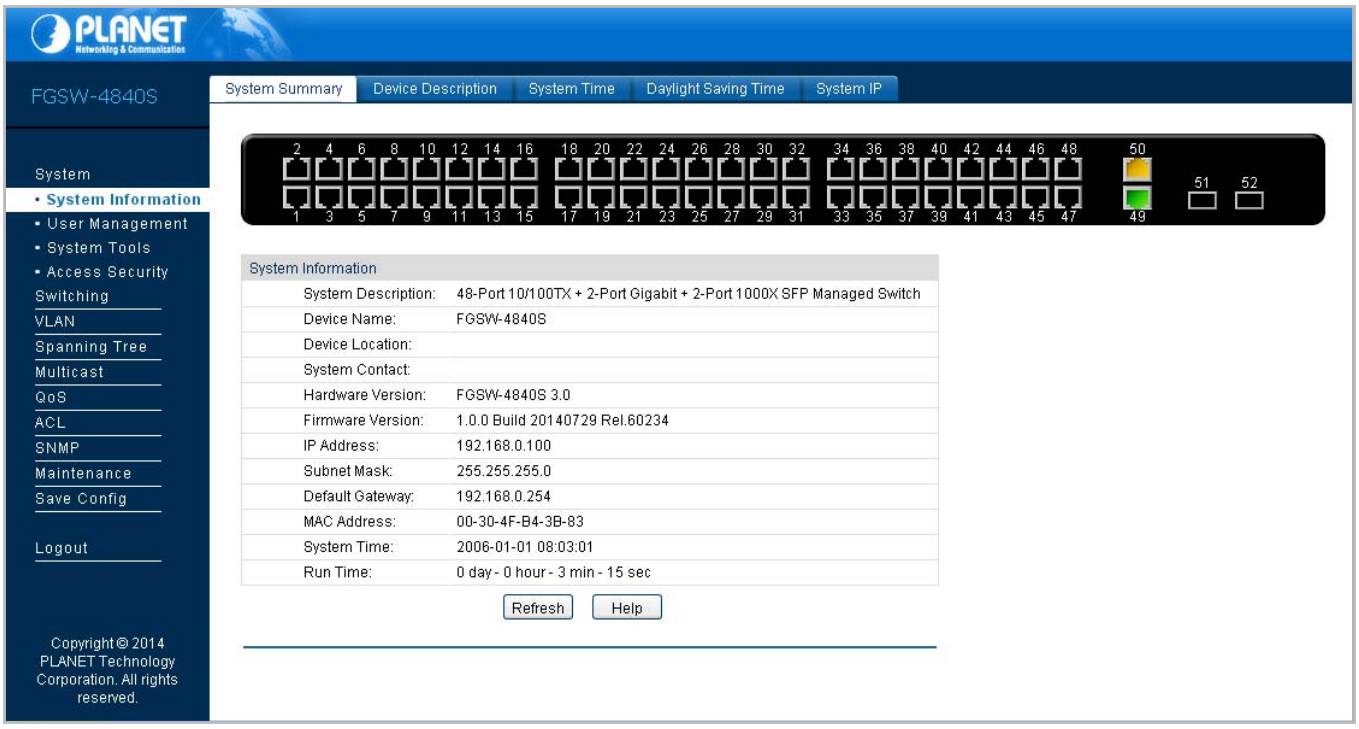


Figure 3-2: Web Main Screen of Managed Switch

3.4 SNMP-Based Network Management

You can use an external SNMP-based application to configure and manage the Managed Switch, such as SNMPc Network Manager, HP Openview Network Node Management (NNM) or What's Up Gold. This management method requires the SNMP agent on the switch and the SNMP Network Management Station to use the **same community string**. This management method, in fact, uses two community strings: the **get community** string and the **set community** string. If the SNMP Network management Station only knows the set community string, it can read and write to the MIBs. However, if it only knows the get community string, it can only read MIBs. The default gets and sets community strings for the Managed Switch are public.

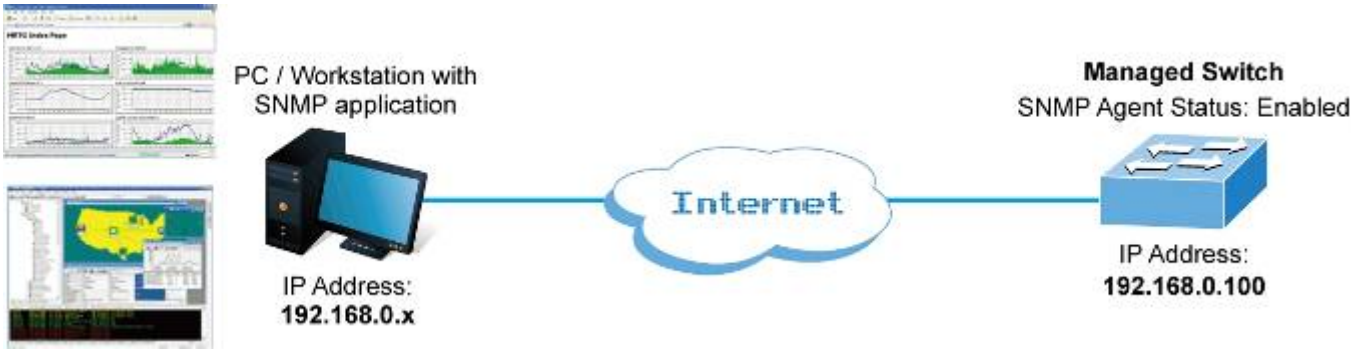


Figure 3-3: SNMP Management

4. WEB CONFIGURATION

This section introduces the configuration and functions of the Web-based management.

About Web-based Management

The Managed Switch offers management features that allow users to manage the Managed Switch from anywhere on the network through a standard browser such as Microsoft Internet Explorer.

The Web-based Management supports Internet Explorer 8.0. It is based on Java Applets with an aim to reduce network bandwidth consumption, enhance access speed and present an easy viewing screen.

Note

By default, IE8.0 or later version does not allow Java Applets to open sockets. The user has to explicitly modify the browser setting to enable Java Applets to use network ports.

Note

The following web screen based on FGSW-4840S, for FGSW-2840 the display will be the same to FGSW-4840S.

The Managed Switch can be configured through an Ethernet connection, making sure the manager PC must be set on the same IP subnet address as the Managed Switch.

For example, the default IP address of the Managed Switch is ***192.168.0.100***, then the manager PC should be set at **192.168.0.x** (where x is a number between 1 and 254, except 100), and the default subnet mask is 255.255.255.0.
If you have changed the default IP address of the Managed Switch to 192.168.1.1 with subnet mask 255.255.255.0 via web, then the manager PC should be set at 192.168.1.x (where x is a number between 2 and 254) to do the relative configuration on manager PC.

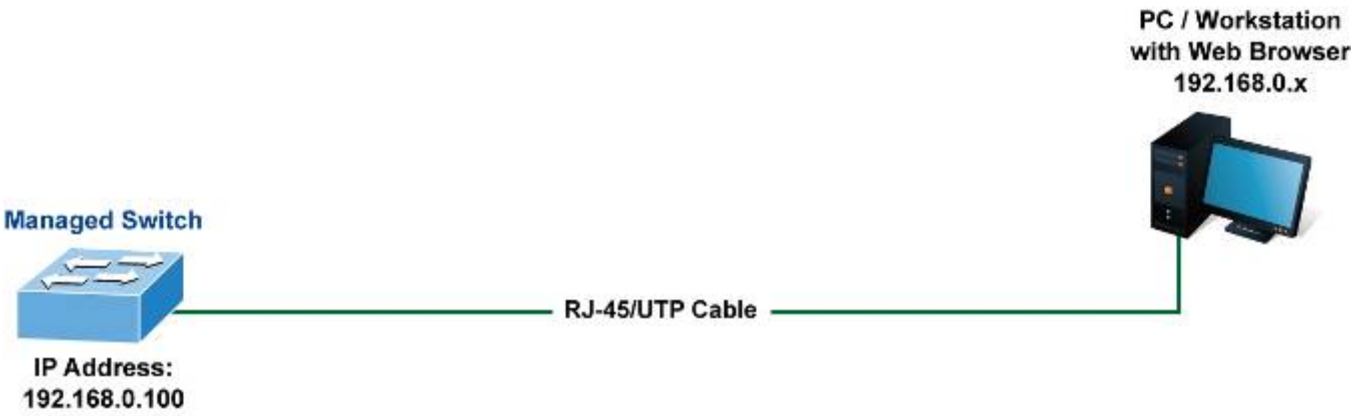


Figure 4-1-1: Web Management

- **Logging on the Managed Switch**

1. Use Internet Explorer 8.0 or above Web browser. Enter the factory-default IP address to access the Web interface. The factory-default IP Address as following:

http://192.168.0.100

2. When the following login screen appears, please enter the default username **"admin"** with password "**admin**" to login the main screen of Managed Switch. The login screen in Figure 4-1-2 appears.

Figure 4-1-2: Login Screen

Default User name: **admin**

Default Password: **admin**

After entering the username and password, the main screen appears as Figure 4-1-3.

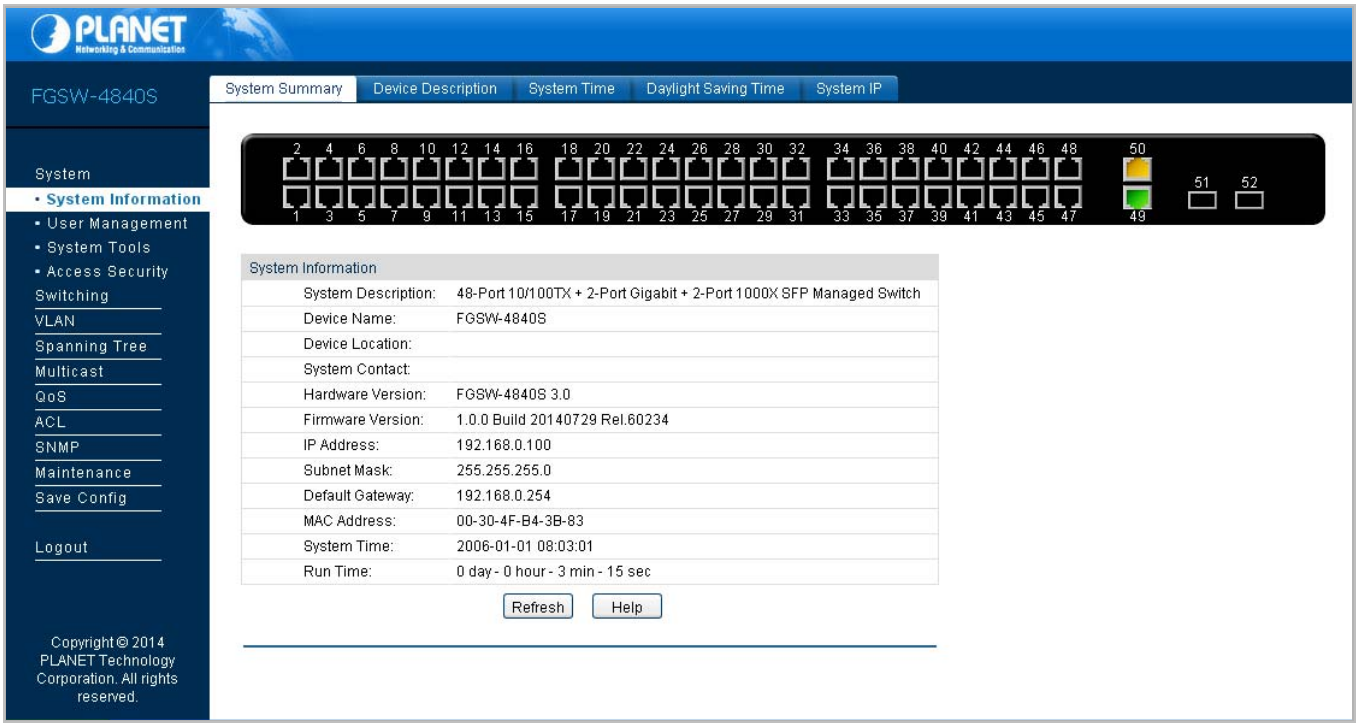


Figure 4-1-3: Web Main Screen of Managed Switch

Now, you can use the Web management interface to continue the switch management or manage the Managed Switch by Web interface. The Switch Menu on the left of the web page let you access all the commands and statistics the Managed Switch provides.

- It is recommended to use Internet Explore 8.0 or above to access Managed Switch.
- The changed IP address takes effect immediately after clicking on the **Apply** button. You need to use the new IP address to access the Web interface.

- For security reason, please change and memorize the new password after this first setup.
- Only accept command in lowercase letter under web interface.

4.1 Main Web Page

The Managed Switch provides a Web-based browser interface for configuring and managing it. This interface allows you to access the Managed Switch using the Web browser of your choice. This chapter describes how to use the Managed Switch's Web browser interface to configure and manage it.

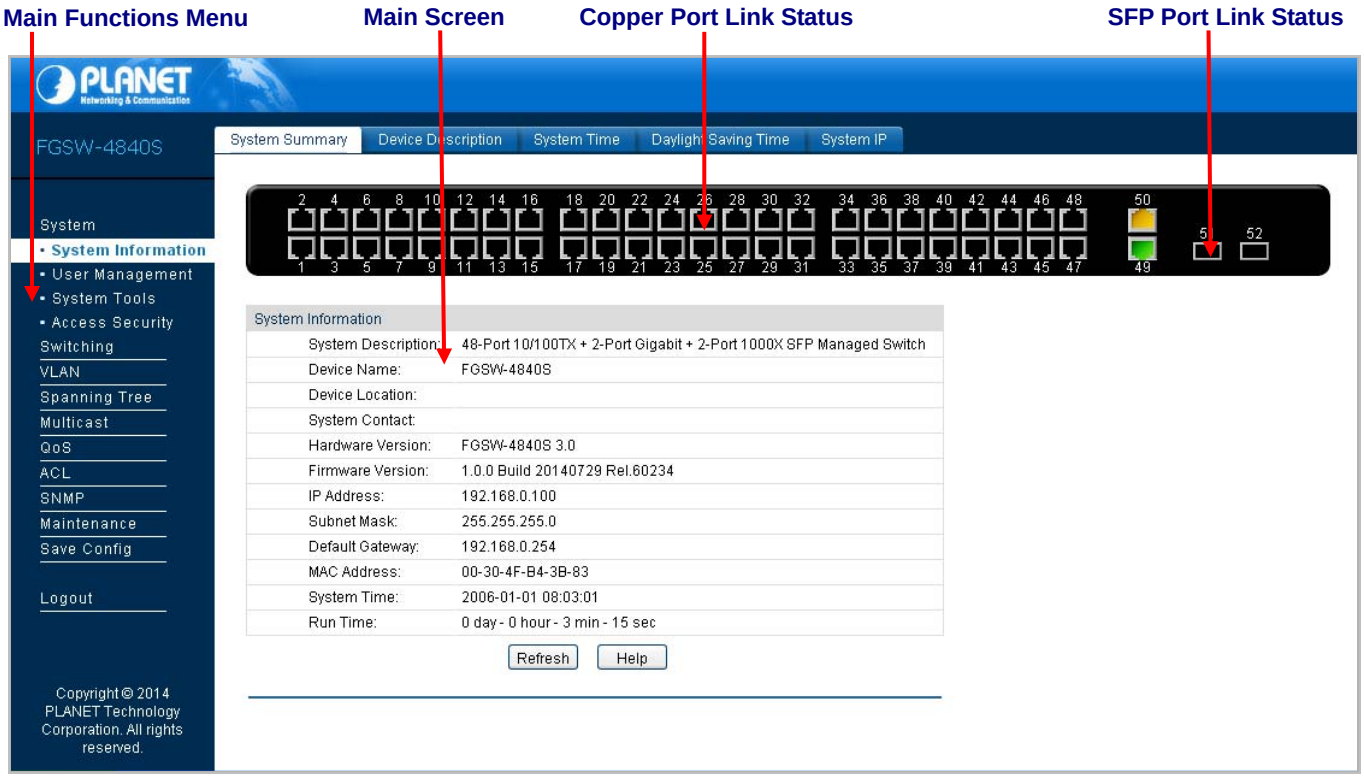


Figure 4-1-4: Web Main Page

Panel Display

The web agent displays an image of the Managed Switch's ports. The Mode can be set to display different information for the ports, including Link up or Link down. Clicking on the image of a port opens the **Port Status** page.

The port states are illustrated as follows:

State	Down	Link at 100M	Link at 10M
10/100TX RJ-45 Ports			

State	Down	Link at 1000M	Link at 10/100M
10/100/1000TRJ-45 Ports			

State	Down	Link at 1000M	Link at 100M (FGSW-2840 only)
SFP Ports			

Main Menu

Using the onboard web agent, you can define system parameters, manage and control the Managed Switch and all its ports, or monitor network conditions. Via the Web-Management, the administrator can set up the Managed Switch by selecting the functions listed in the Main Function. The screen in Figure 4-1-5 appears.

Figure 4-1-5: Managed Switch Main Functions Menu

4.2 System

Use the System menu items to display and configure basic administrative details of the Managed Switch. Under System, the following topics are provided to configure and view the system information. This section has the following items:

- **System Information** The switch system information is provided here.
- **User Management** Configure the switch management interface access authority on this page.
- **System Tools** The system tools provided here to configure related options.
- **Access Security** Configure system access security function on this page.

4.2.1 System Information

The System Info page provides basic properties configuration that can be implemented on **System Summary**, **Device Description**, **System Time**, **Daylight Saving Time** and **System IP** pages. The screen in Figure 4-2-1 appears.

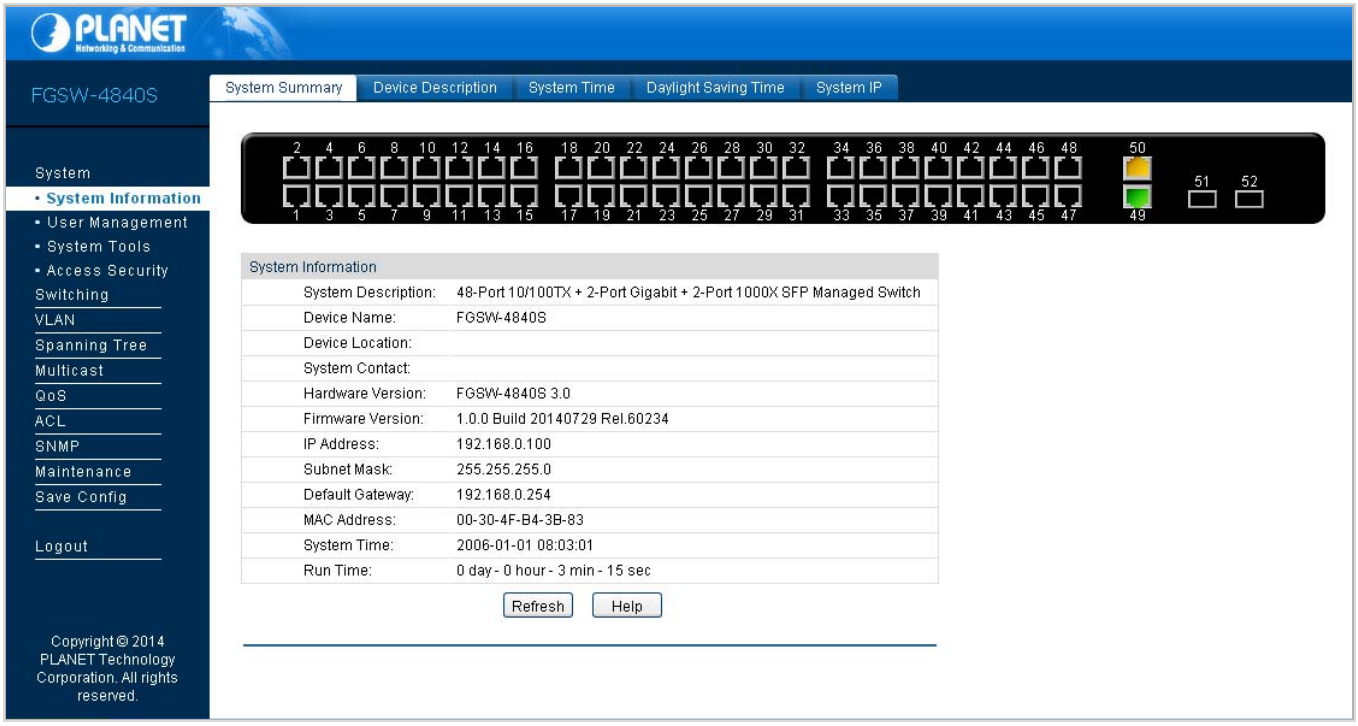


Figure 4-2-1: System Information Page Screenshot

The page includes the following fields:

Object	Description
• **System Summary**	View the port connection status and the system information on this page.
• **Device Description**	Configure the description of the switch, including device name, device location and system contact on this page.
• **System Time**	Configure the system time and the settings here will be used for other time-based functions on this page.
• **Daylight Saving Time**	Configure the Daylight Saving Time of the switch on this page.
• **System IP**	Configure the system IP of the switch on this page.

4.2.1.1 System Summary

The port status diagram shows the working status of 10/100Mbps RJ45 ports, 10/100/1000Mbps RJ45 ports and 2 SFP ports of the Managed Switch, the System Summary includes the Managed Switch system information and the screen in Figure 4-2-2 appears.

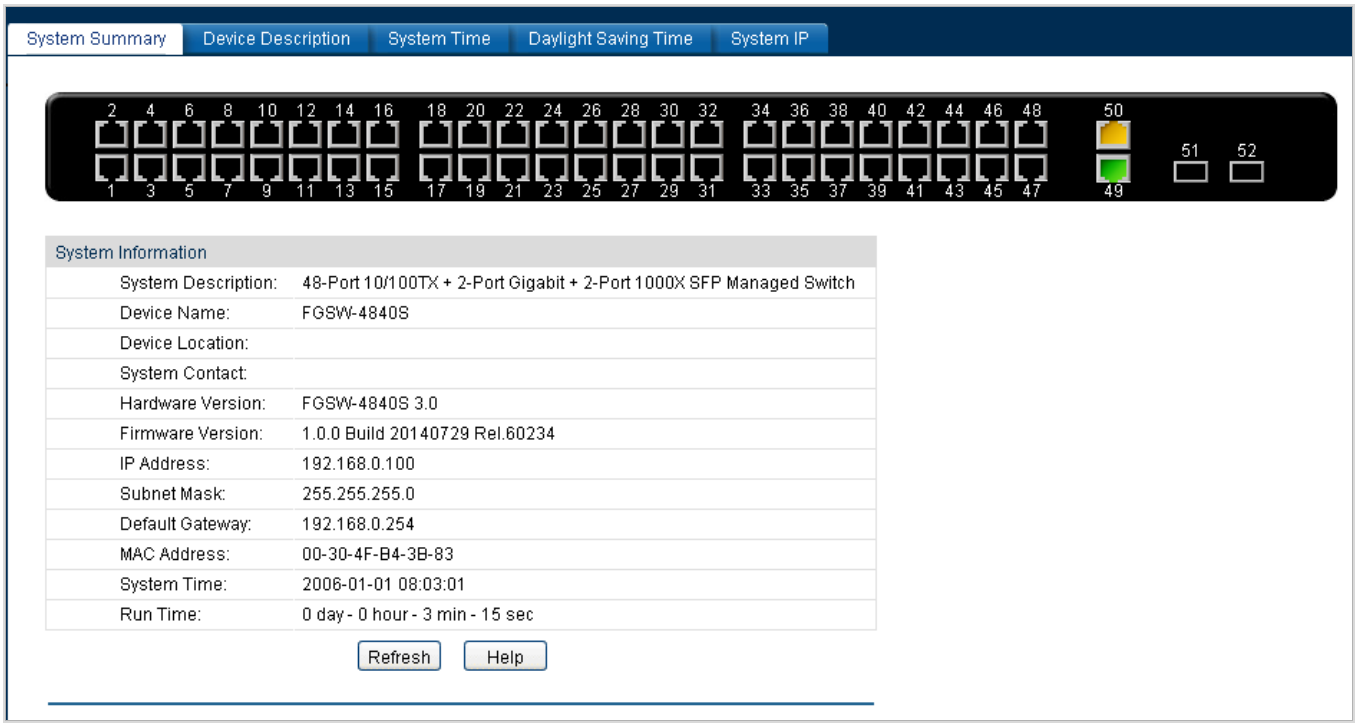


Figure 4-2-2: System Summary Page Screenshot

The page includes the following fields:

Object	Description
• **System Description**	Displays the current system description information.
• **Device Name**	Displays the current system name information.
• **Device Location**	Displays the current device location information.
• **System Contact**	Displays the current system contact information.
• **Hardware Version**	Displays the current hardware version information.
• **Firmware Version**	Displays the current firmware version information.
• **IP Address**	Displays the current IP address information.
• **Subnet Mask**	Displays the current IP subnet mask address information.
• **Default Gateway**	Displays the current IP default gateway information.
• **MAC Address**	Displays the current MAC address information.
• **System Time**	Displays the current system time information.
• **Run Time**	Displays the current system operation time information.

Buttons

Refresh: Click to refresh the current web page.

Help: Click to display the help web page.

4.2.1.2 Device Description

This page allows configuring the description of the Managed Switch, including device name, device location and system contact. After setup is completed, please press "**Apply**" button to take effect, and the screen in Figure 4-2-3 appears.

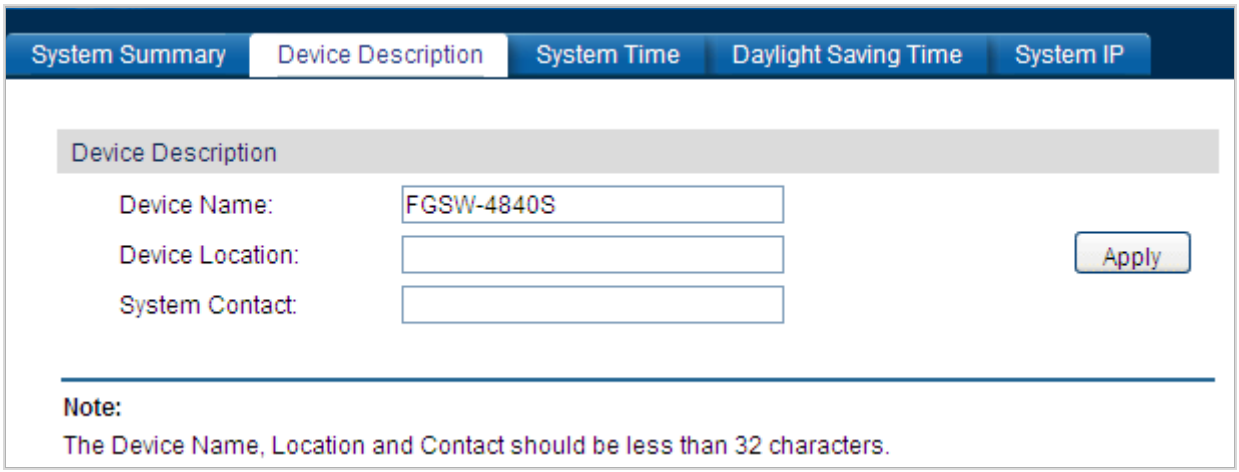


Figure 4-2-3: Device Description Page Screenshot

The page includes the following fields:

Object	Description
• **Device Name**	The name identifying the Managed Switch. Maximum length: **32** characters.
• **Device Location**	The device location information of the Managed Switch. Maximum length: **32** characters.
• **System Contact**	The system contact information of the Managed Switch. Maximum length: **32** characters.

Button

Apply: Click to apply changes.

4.2.1.3 System Time

This page allows configuring system time and the settings here will be used for other time-based functions. After setup is completed, please press "**Apply**" button to take effect, and the screen in Figure 4-2-4 appears.

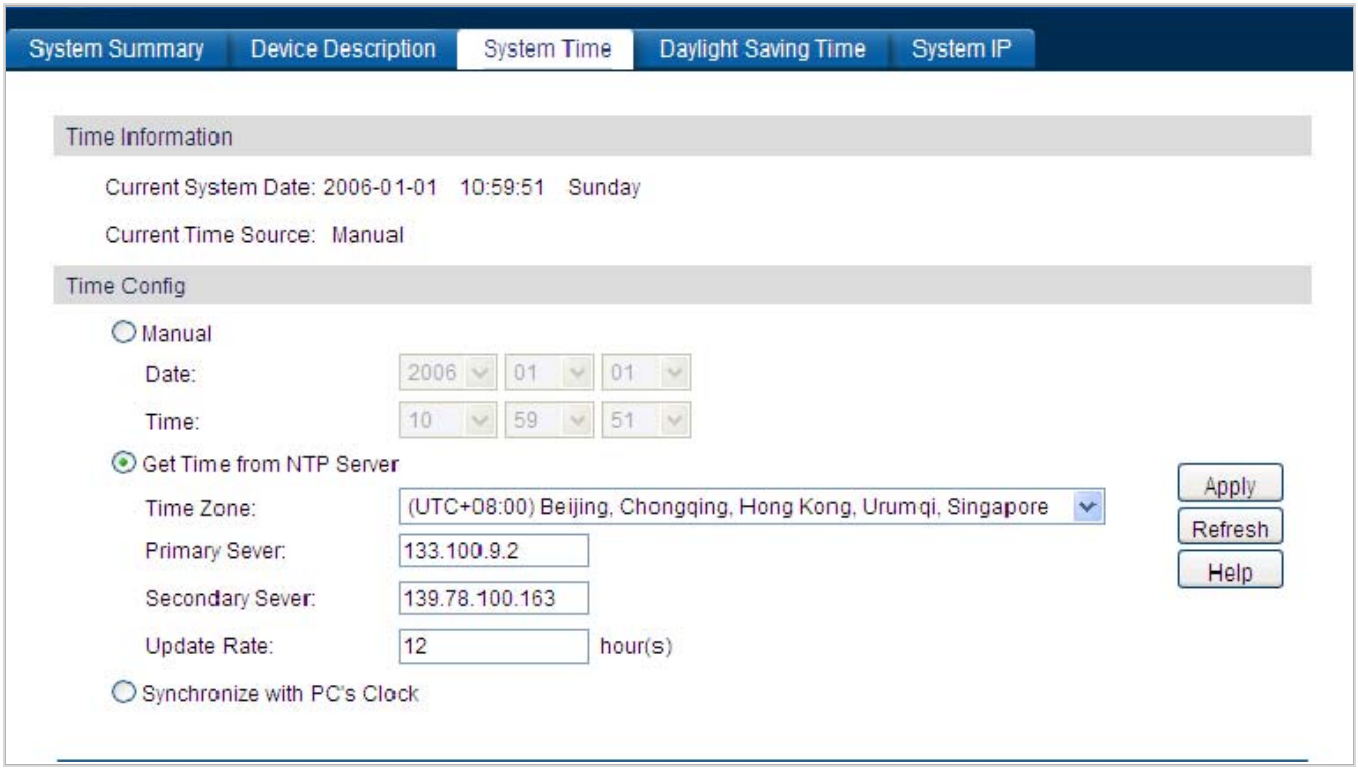


Figure 4-2-4: System Time Page Screenshot

The page includes the following fields:

Object	Description
• **Time Information**	**Current System Date:** Displays the current date and time of the Managed Switch. **Current Time Source:** Displays the current time source of the Managed Switch.
• **Time Config**	To set time from the following methods. • **Manual** - When this option is selected, you can set the date and time manually. • **Get Time from NTP Server** - When this option is selected, you can configure the time zone and the IP Address for the NTP Server. The Managed Switch will get time automatically if it is connected to a NTP Server. ◦ **Time Zone:** Select your local time. ◦ **Primary/Secondary NTP Server:** Enter the IP Address for the NTP Server. ◦ **Update Rate:** Specify the rate of fetching time from NTP server. • **Synchronize with PC Clock** - When this option is selected, the administrator PC clock is utilized.

Note

- The system time will be restored to the default when the Managed Switch is restarted and you need to reconfigure the system of the Managed Switch.
- When Get Time from NTP Server is selected and no time server is configured, the Managed Switch will get time from the time server of the Internet if it has connected to the Internet.

Buttons

Apply: Click to apply changes.

Refresh: Click to refresh current web page.

Help: Click to display help web page.

4.2.1.4 Daylight Saving Time

The Daylight Saving Time Configuration screenin Figure 4-2-5 appears.

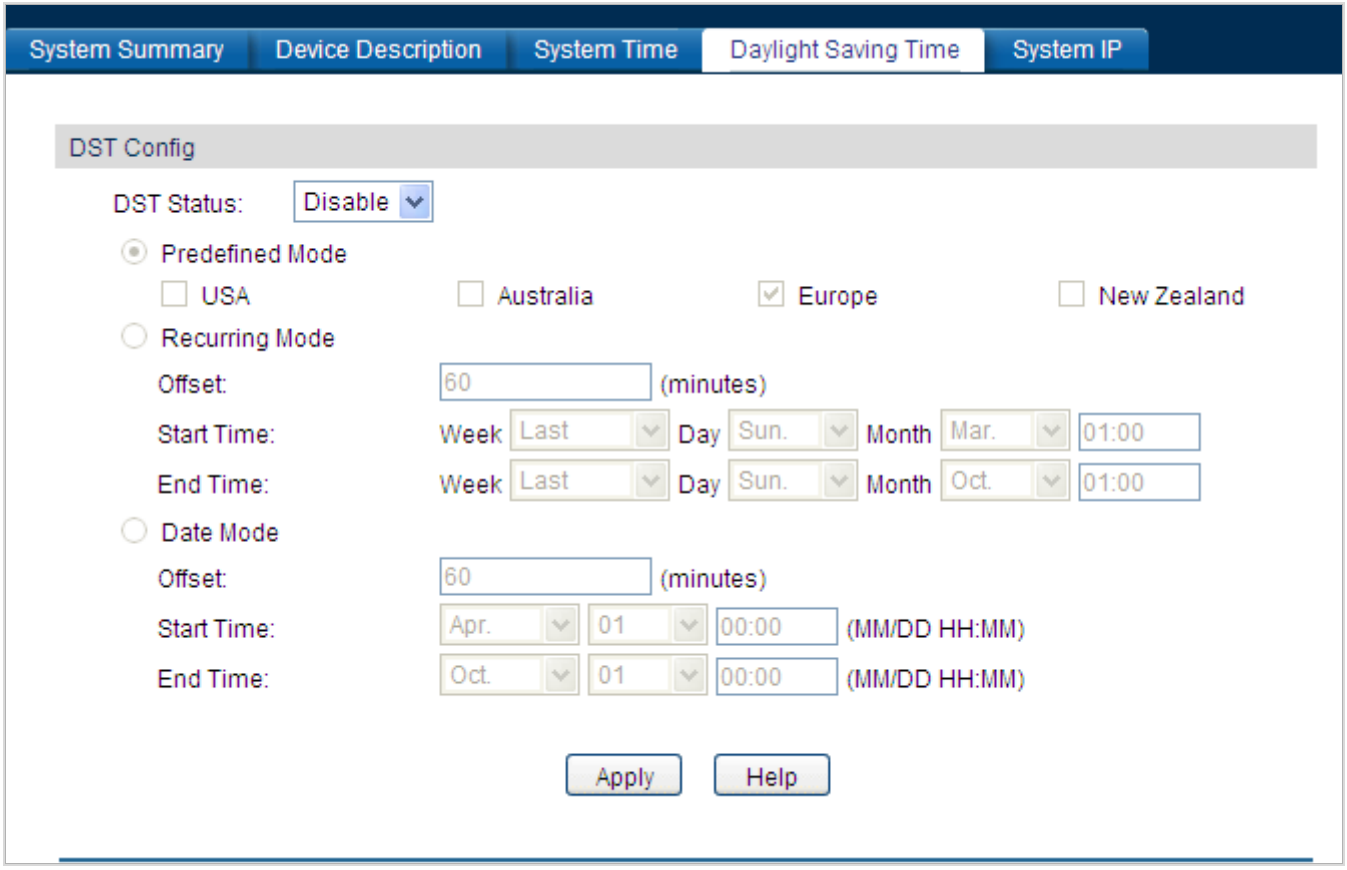


Figure 4-2-5: Daylight Saving Time Page Screenshot

The page includes the following fields:

Object	Description
• **DST Status**	Enable or disable the DST.
• **Predefined Mode**	Select a predefined DST configuration. ● **USA:** Second Sunday in March, 02:00 ~ First Sunday in November, 02:00. ● **Australia:** First Sunday in October, 02:00 ~ First Sunday in April, 03:00.

	● **Europe:** Last Sunday in March, 01:00 ~ Last Sunday in October, 01:00. ● **New Zealand:** Last Sunday in September, 02:00 ~ First Sunday in April, 03:00.
• **Recurring Mode**	Specify the DST configuration in recurring mode. This configuration is recurring in use. ● **Offset:** Specify the time adding in minutes when Daylight Saving Time comes. ● **Start/End Time:** Select starting time and ending time of Daylight Saving Time.
• **Date Mode**	Specify the DST configuration in Date mode. This configuration is recurring in use. ● **Offset:** Specify the time adding in minutes when Daylight Saving Time comes. ● **Start/End Time:** Select starting time and ending time of Daylight Saving Time.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.2.1.5 System IP

This page provides three modes to obtain an IP address: Static IP, DHCP and BOOTP. The IP address obtained using a new mode will replace the original IP address. On this page you can configure the system IP of the Managed Switch. After setup is completed, please press "**Apply**" button to take effect, and the screen in Figure 4-2-6 appears.

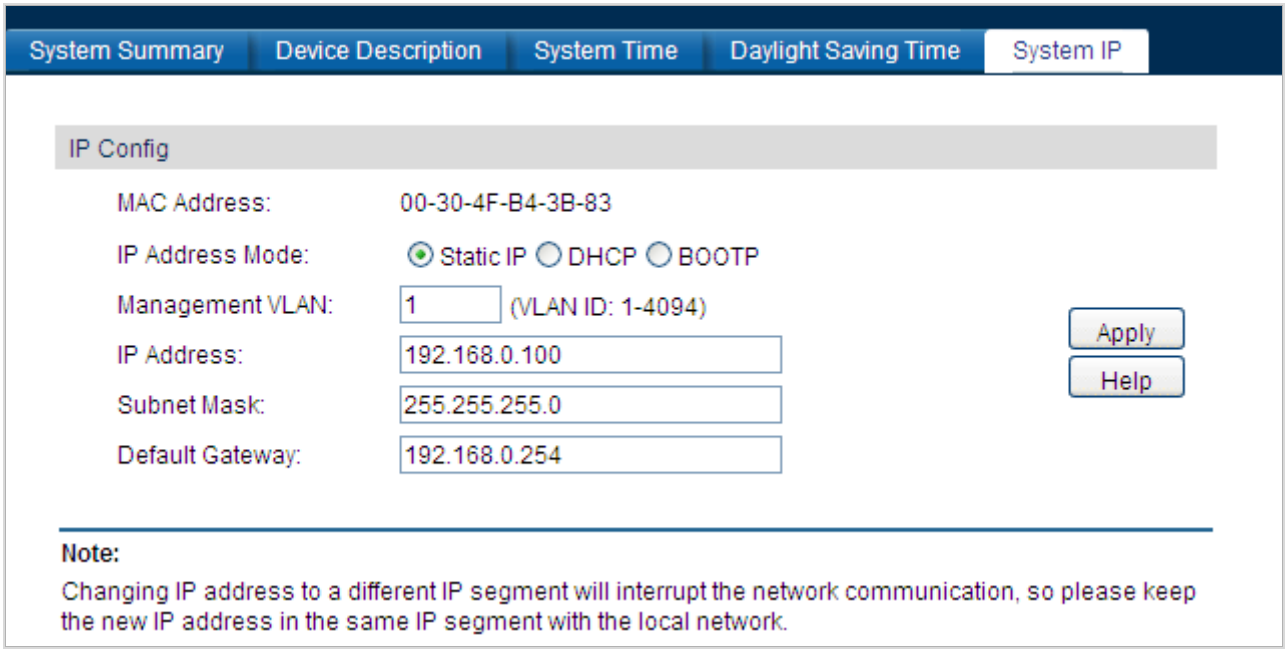


Figure 4-2-6: System IP Page Screenshot

The page includes the following fields:

Object	Description
• **MAC Address**	Displays MAC Address of the Managed Switch.
• **IP Address Mode**	Select the mode to obtain IP Address for the Managed Switch. ● **Static IP**: When this option is selected, you should enter IP Address, Subnet Mask and Default Gateway manually. ● **DHCP**: When this option is selected, the Managed Switch will obtain network parameters from the DHCP Server. ● **BOOTP**: When this option is selected, the Managed Switch will obtain network parameters from the BOOTP Server.
• **Management VLAN**	Enter the ID of management VLAN, the only VLAN through which you can get access to the Managed Switch. By default VLAN1 owning all the ports is the Management VLAN and you can access the Managed Switch via any port on the Managed Switch. However, if another VLAN is created and set to be the Management VLAN, you may have to reconnect the management station to a port that is a member of the Management VLAN.
• **IP Address**	Enter the system IP of the Managed Switch. The default system IP is **192.168.0.100**.
• **Subnet Mask**	Enter the subnet mask of the Managed Switch. The default subnet mask is **255.255.255.0**.
• **Gateway**	Enter the default gateway of the Managed Switch. The default gateway is **192.168.0.254**.

Note

- Changing the IP address to a different IP segment will interrupt the network communication; please keep the new IP address in the same IP segment with the local network.
- The Managed Switch only possesses an IP address; the IP address configured will replace the original IP address.

Note

- If the Managed Switch gets the IP address from DHCP server, you can see the configuration of the Managed Switch in the DHCP server; if DHCP option is selected but no DHCP server exists in the network, a few minutes later, the Managed Switch will restore the setting to the default.
- If DHCP or BOOTP option is selected, the Managed Switch will get network parameters dynamically from the Internet, which means that its IP address, subnet mask and default gateway cannot be configured.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.2.2 User Management

The User Management functions to configure the user name and password for users to log on to the Web management page with a certain access level so as to protect the settings of the Managed Switch from being randomly changed; the screen in Figure 4-2-7 appears.

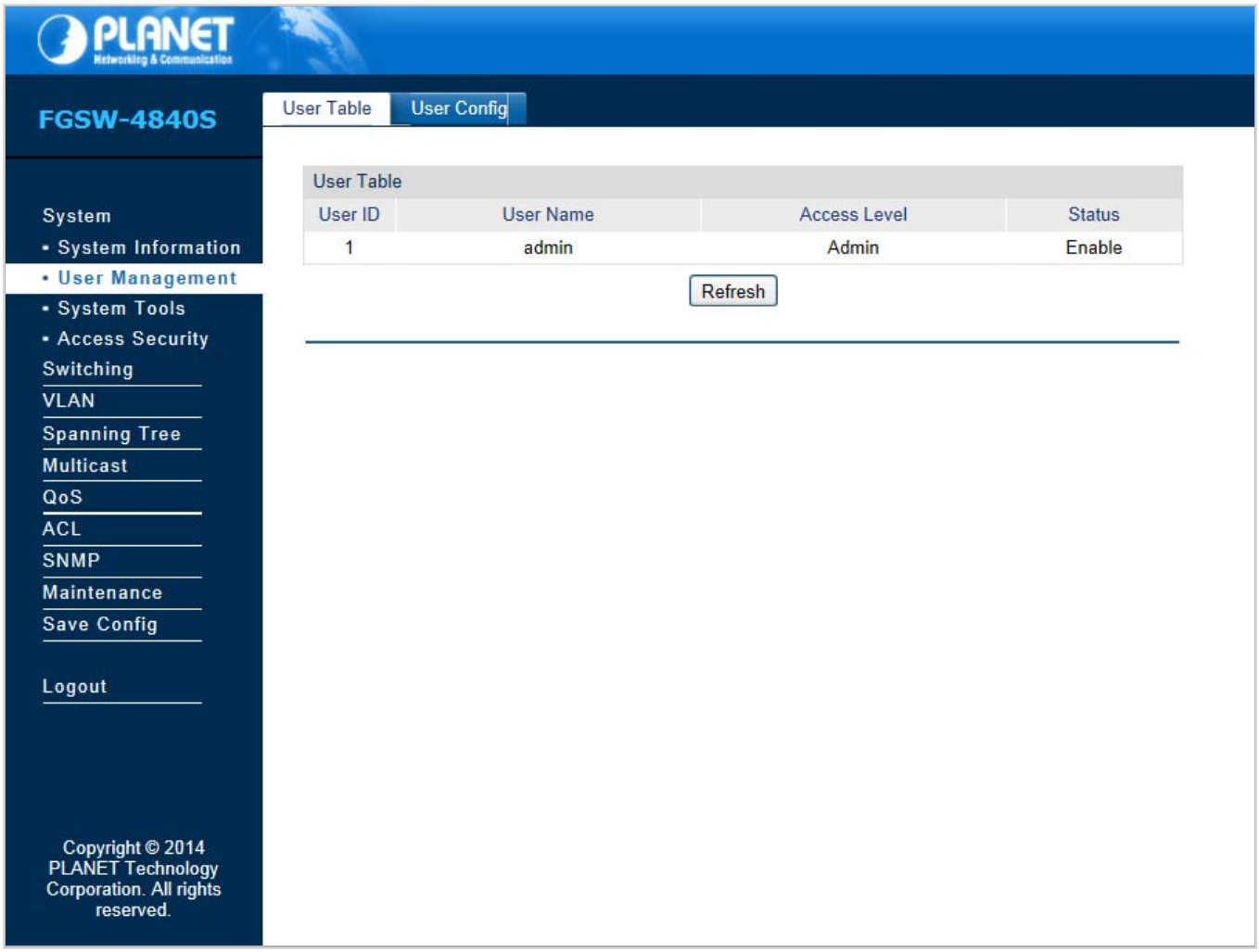


Figure 4-2-7: User Management Page Screenshot

The page includes the following fields:

Object	Description
• **User Table**	View the information about the current users of the Managed Switch on this page.
• **User Config**	Configure the access level of the user to log on to the Web management page on this page.

4.2.2.1 User Table

This page provides view the information about the current users of the Managed Switch; the screen in Figure 4-2-8 appears.

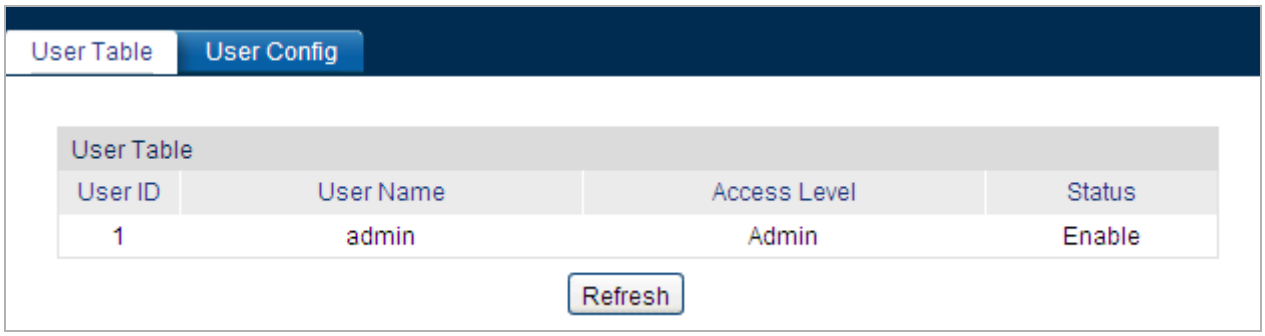


Figure 4-2-8: User Table Page Screenshot

4.2.2.2 User Config

This page allows configuring the access level of the user to log on to the Web management page of Managed Switch.The Managed Switch provides two access levels: Guest and Admin.

Object	Description
• **Guest**	The guest only can view the settings without the right to configure the Managed Switch.
• **Admin**	The admin can configure all the functions of the Managed Switch.

The Web management pages contained in this guide are subject to the admin's login without any explanation; the screen in Figure 4-2-9 appears.

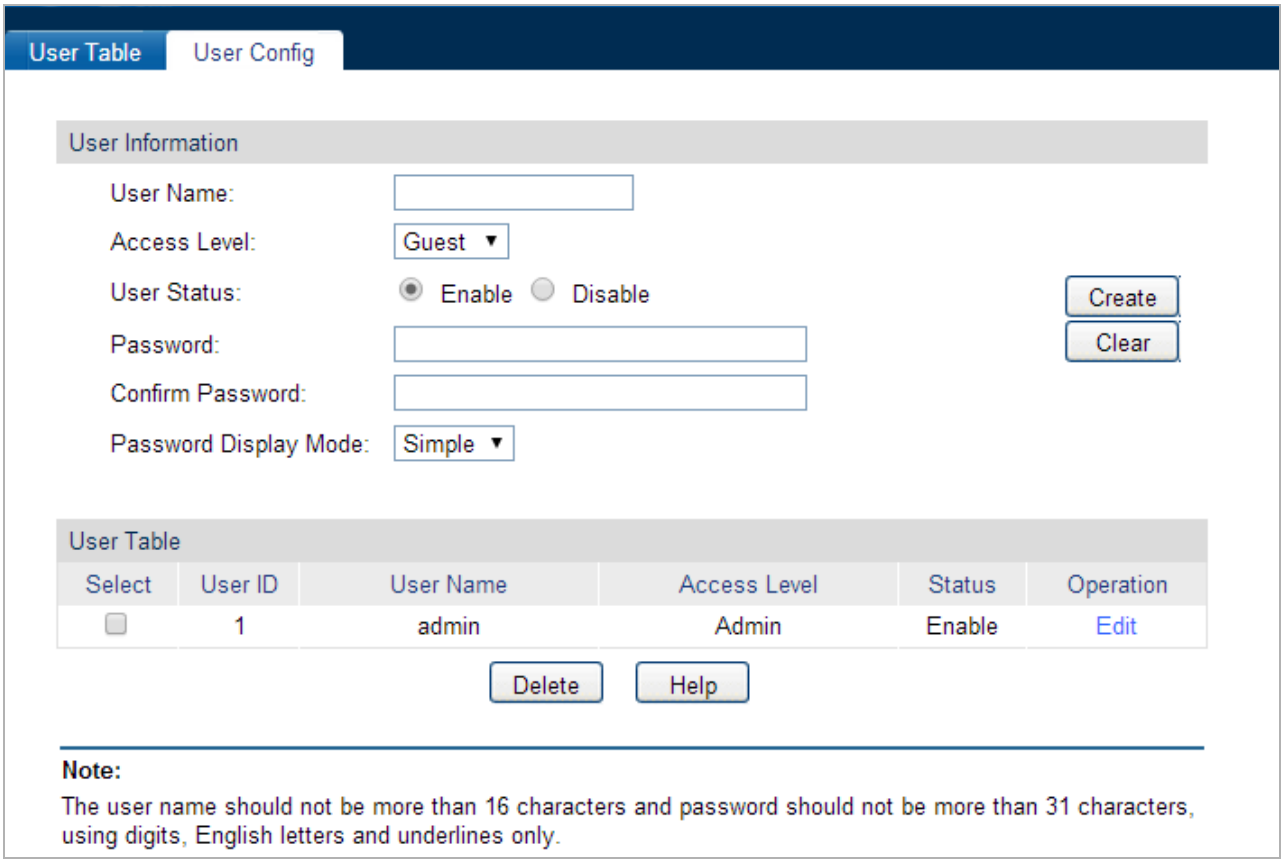


Figure 4-2-9: User Config Page Screenshot

The page includes the following fields:

Object	Description
User Information	
• **User Name**	Create a name for users' login.
• **Access Level**	Select the access level to login. ● **Admin:** allow edit, modify and view all the settings of different functions. ● **Guest:** only can view the settings without the right to edit and modify.
• **User Status**	Select Enable/Disable the user configuration.
• **Password**	Type a password for users' login.
• **Confirm Password**	Retype the password.
• **Password Display Mode**	Select password display mode. ● **Simple:** displays the password in plain text in configure file. ● **Cipher:** displays the password in cipher text in configure file.
User Table	
• **Select**	Select the desired entry to delete the corresponding user information. It is multi-optional The current user information can't be deleted.
• **User ID**	Displays the current user ID, user name, access level and user status.
• **User Name**	Displays the user name.
• **Access Level**	Displays the access level information.
• **Status**	Displays the current user config status.
• **Operation**	Click the **Edit** button of the desired entry, and edit the corresponding user information. After modifying the settings, please click the **Modify** button to make the modification effective. Access level and user status of the current user information can't be modified

Buttons

Create: Click to add a new user.

Clear: Click to clear the current input information.

Delete: Click to delete the current user.

Help: Click to display help web page.

4.2.3 System Tools

The System Tools function, allowing to manage the configuration file of the Managed Switch, can be implemented on the **Config Restore**, **Config Backup**, **Firmware Upgrade**, **System Reboot** and **System Reset** pages; the screen in Figure 4-2-10 appears.

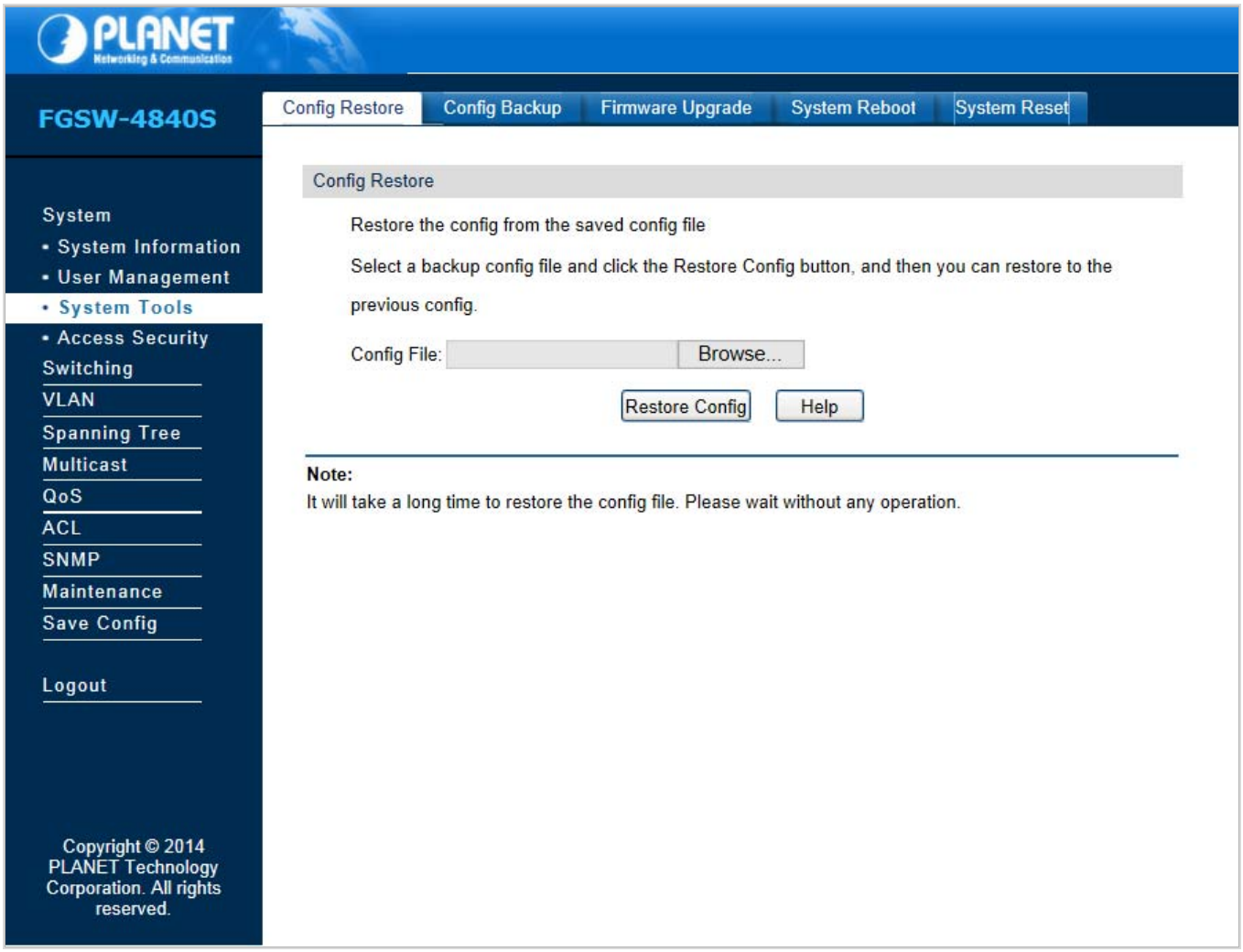


Figure 4-2-10: System Tools Page Screenshot

The page includes the following fields:

Object	Description
• **Configure Restore**	Allows uploading a backup configuration file to restore Managed Switch to the previous configuration.
• **Configure Backup**	Allows downloading the current configuration and saving it as a file to your computer for future configuration restore.
• **Firmware Upgrade**	Provides firmware upgrade function of Managed Switch.
• **System Reboot**	Provides system reboot function of Managed Switch.
• **System Reset**	Provides system reset to default function of Managed Switch.

4.2.3.1 Config Restore

This page provides uploading a backup configuration file to restore Managed Switch to the previous configuration; the screen in Figure 4-2-11 appears.

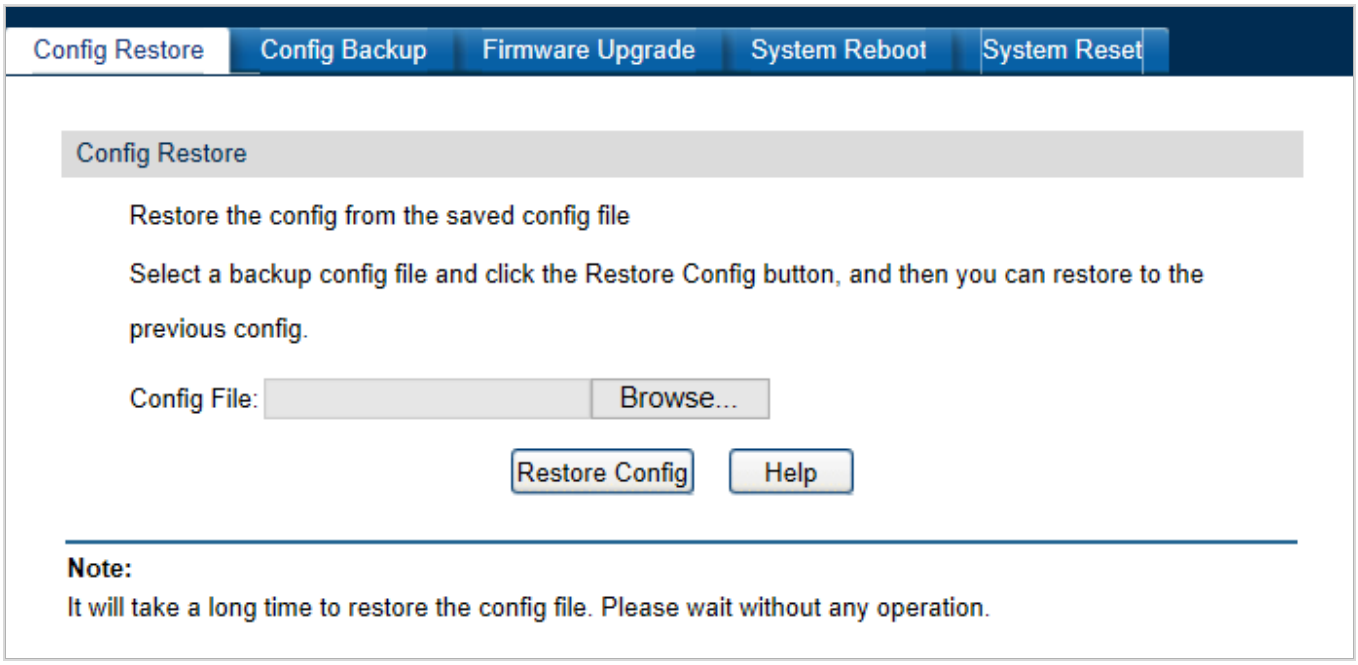


Figure 4-2-11: Config Restore Page Screenshot

The page includes the following fields:

Object	Description
• **Restore Config**	Click the **Restore Config** button to restore the backup configuration file. It will take effect after the Managed Switch automatically reboots.

Button

Help: Click to display help web page.

- It will take a few minutes to restore the configuration. Please wait without any operation.
- To avoid any damage, please don't power down the Managed Switch during the configuration restore process.
- After being restored, the current settings of the Managed Switch will be lost. Wrong uploaded configuration file may cause the Managed Switch to unmanage.

4.2.3.2 Config Backup

This page provides downloading the current configuration and saving it as a file to your computer for future configuration restore; the screen in Figure 4-2-12 appears.

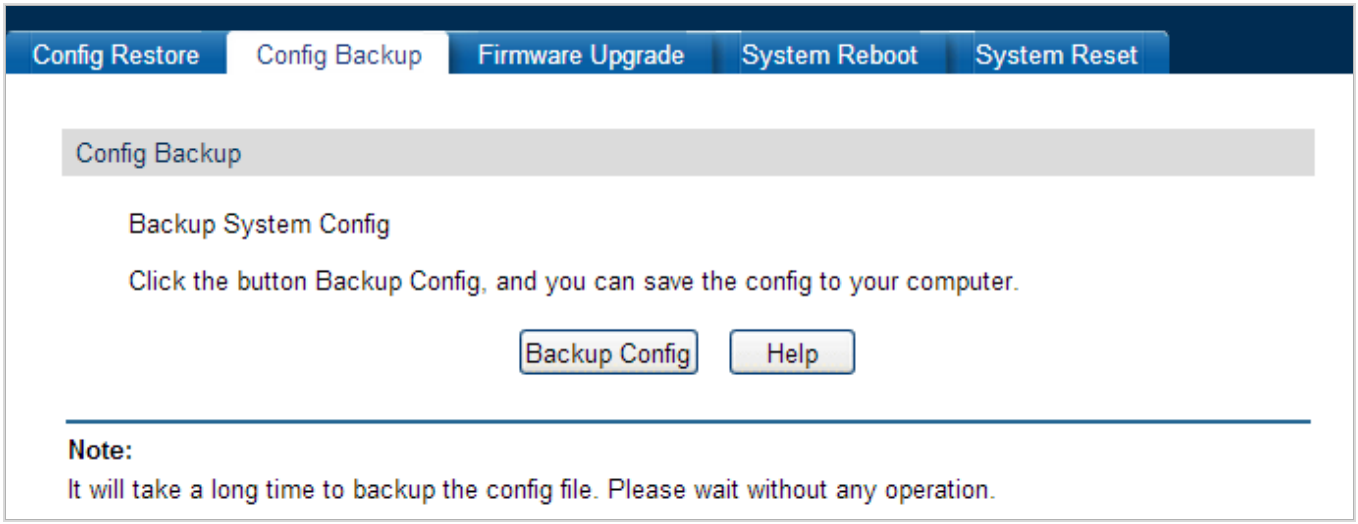


Figure 4-2-12: Config Backup Page Screenshot

The page includes the following fields:

Object	Description
• **Config Backup**	Click the **Backup Config** button to save the current configuration as a file to your computer. You are suggested to take this measure before upgrading.

Button

Help: Click to display help web page.

Note

■ It will take a few minutes to back up the configuration. Please wait without any operation.

4.2.3.3 Firmware Upgrade

This page provides firmware upgrade function of Managed Switch; the screen in Figure 4-2-13 appears.

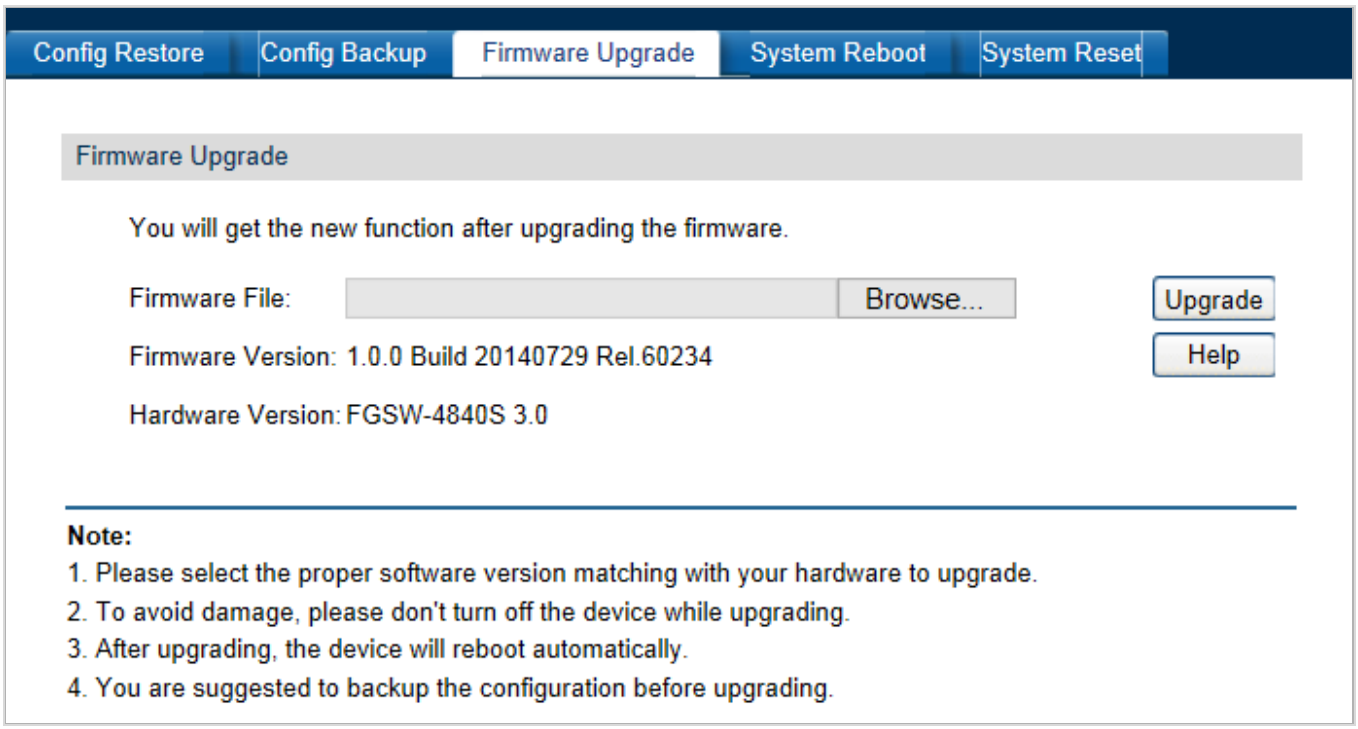


Figure 4-2-13: Firmware Upgrade Page Screenshot

The page includes the following fields:

Object	Description
• **Upgrade**	Click the **Upgrade** button to start firmware upgrade process.

Button

Help: Click to display help web page.

Note

- Please don't interrupt the upgrade.
- Please select the proper software version matching with your hardware to upgrade.
- To avoid damage, please don't power off the Managed Switch while upgrading.
- After upgrading, the Managed Switch will reboot automatically.
- Please back up the current configuration before starting the firmware upgrade process.

4.2.3.4 System Reboot

This page provides system reboot function of Managed Switch; the screen in Figure 4-2-14 appears.

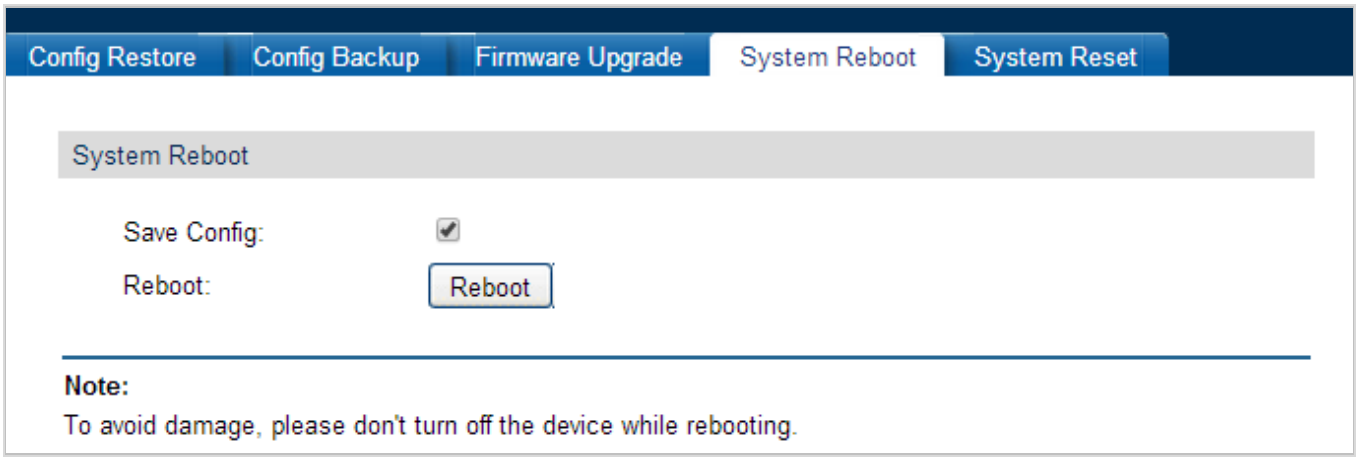


Figure 4-2-14: System Reboot Page Screenshot

The page includes the following fields:

Object	Description
• **Save Config**	Choose to save the current config of Managed Switch.
• **Reboot**	Click the **Upgrade** button to start the reboot process.

Note

■ To avoid damage, please don't power off the Managed Switch while rebooting.

4.2.3.5 System Reset

This page provide resetting the Managed Switch to the default and all the settings will be cleared after the Managed Switch is reset; the screen in Figure 4-2-15 appears.

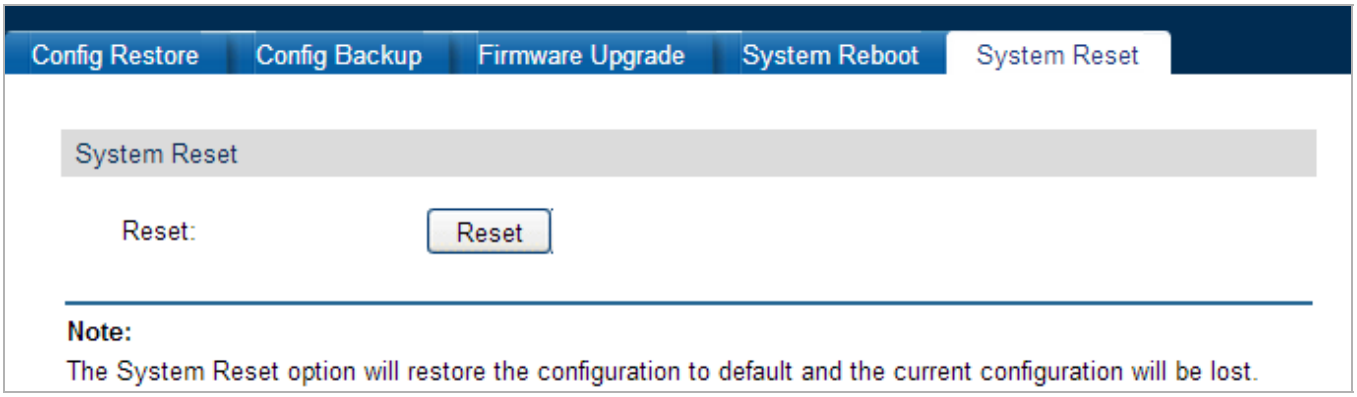


Figure 4-2-15: System Reset Page Screenshot

The page includes the following fields:

Object	Description
• **Reset**	Click the **Reset** button to start the system factory default process.

Note

- After the Managed Switch is reset, the Managed Switch will be reset to the default and all the settings will be cleared.

4.2.4 Access Security

Access Security provides different security measures for the remote login so as to enhance the configuration management security. It can be implemented on the **Access Control**, **SSL Config** and **SSH Config** pages; the screen in Figure 4-2-16 appears.

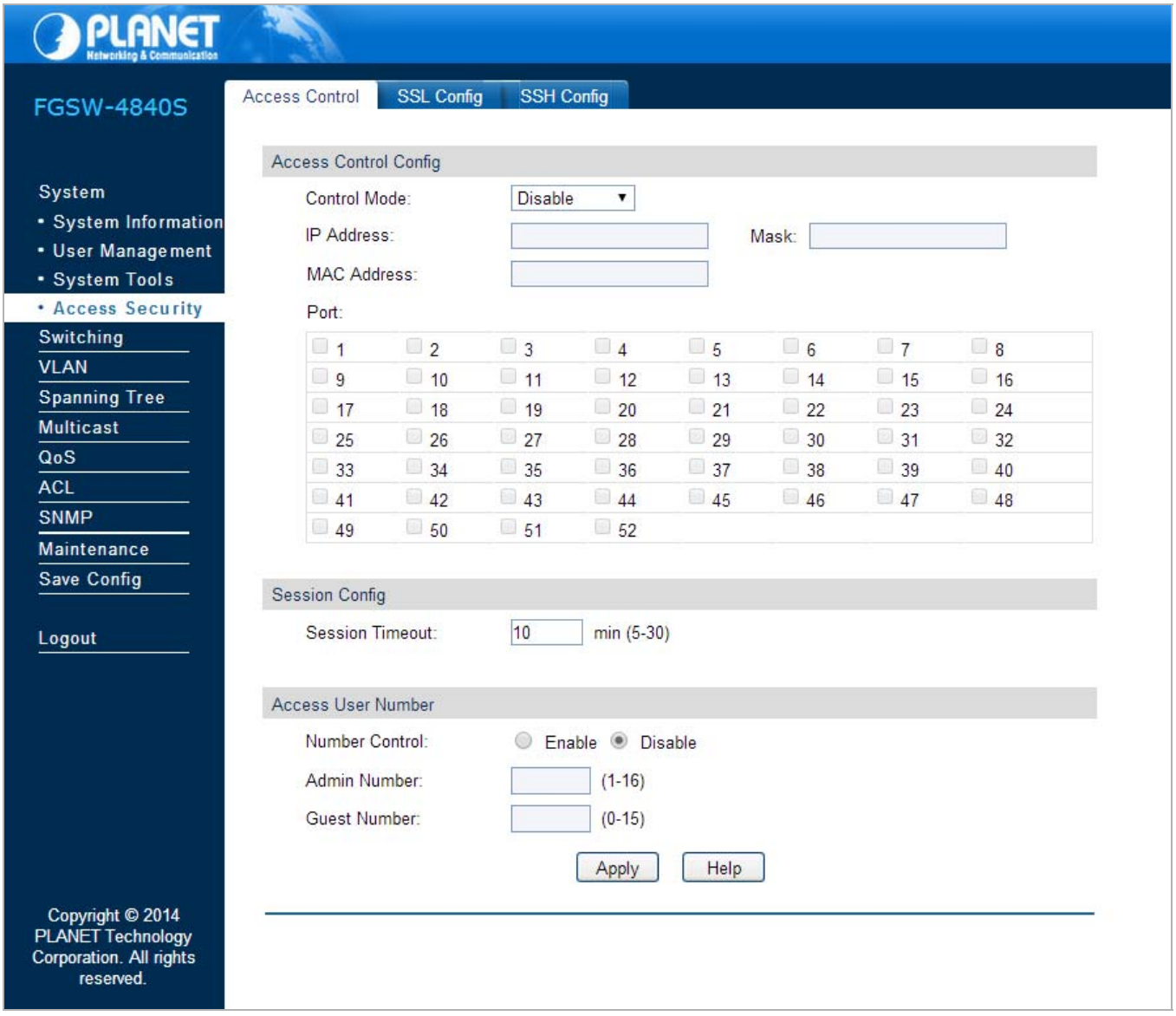


Figure 4-2-16: Access Security Page Screenshot

The page includes the following fields:

Object	Description
• **Access Control**	Allows controlling the users logging on to the Web management page to enhance the configuration management security of Managed Switch.
• **SSL Config**	Allows downloading the current configuration and saving it as a file to your computer for future configuration restore.
• **SSH Config**	Provides firmware upgrade function of Managed Switch.

4.2.4.1 Access Control

This page provides controlling the users logging on to the Web management page to enhance the configuration management security. The definitions of Admin and Guest can be referred to Chapter 4.2.2 under User Management; the screen in Figure 4-2-17 appears.

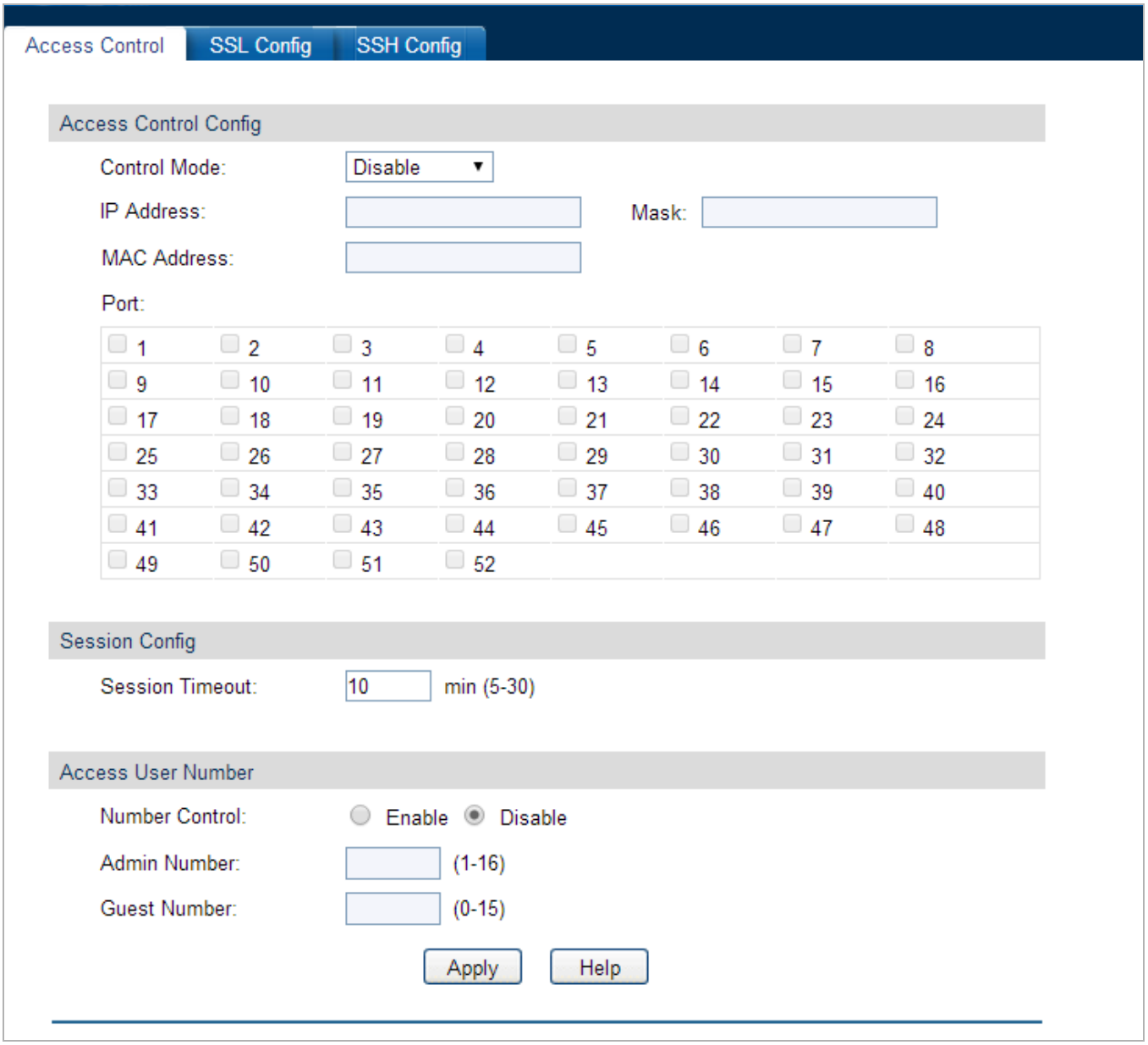


Figure 4-2-17: Access Control Page Screenshot

The page includes the following fields:

Object	Description
Access Control Config	
• **Control Mode**	Select the control mode for users to log on to the Web management page. ● **Disable**：Disable the access control function. ● **IP-based:** Select this option to limit the IP-range of the users for login. ● **MAC-based:** Select this option to limit the MAC address of the users for login. ● **Port-based:** Select this option to limit the ports for login.

• **IP Address & MASK**	These fields can be available for configuration only when IP-based mode is selected. Only the users within the IP-range you set here are allowed for login.
• **MAC Address**	The field can be available for configuration only when MAC-based mode is selected. Only the users with this MAC Address you set here are allowed for login.
• **Port**	The field can be available for configuration only when Port-based mode is selected. Only the users connected to these ports you set here are allowed for login.
Session Config	
• **Session Timeout**	If you do nothing with the Web management page within the timeout time, the system will log out automatically. If you want to reconfigure, please login again.
Access User Number	
• **Number Control**	Select Enable/Disable the Number Control function.
• **Admin Number**	Enter the maximum number of the users logging on to the Web management page as Admin.
• **Guest Number**	Enter the maximum number of the users logging on to the Web management page as Guest.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.2.4.2 SSL Config

SSL (Secure Sockets Layer), a security protocol, is to provide a secure connection for the application layer protocol (e.g. HTTP) communication based on TCP. SSL is widely used to secure the data transmission between the Web browser and servers. It is mainly applied through ecommerce and online banking.

SSL mainly provides the following services:

1. Authenticate the users and the servers based on the certificates to ensure the data are transmitted to the correct users and servers;
2. Encrypt the data transmission to prevent the data being intercepted;
3. Maintain the integrality of the data to prevent the data being altered in the transmission.

Adopting asymmetrical encryption technology, SSL uses key pair to encrypt/decrypt information. A key pair refers to a public key (contained in the certificate) and its corresponding private key. By default the Managed Switch has a certificate (self-signed certificate) and a corresponding private key. The Certificate/Key Download function enables the user to replace the default key pair. After SSL is effective, you can log on to the Web management page via https://192.168.0.100. For the first time you use HTTPS connection to log into the Managed Switch with the default certificate. You will be prompted that "The security certificate presented by this website was not issued by a trusted certificate authority" or "Certificate Errors". Please add this certificate to trusted certificates or continue to this website. The screen in Figure 4-2-18 appears.

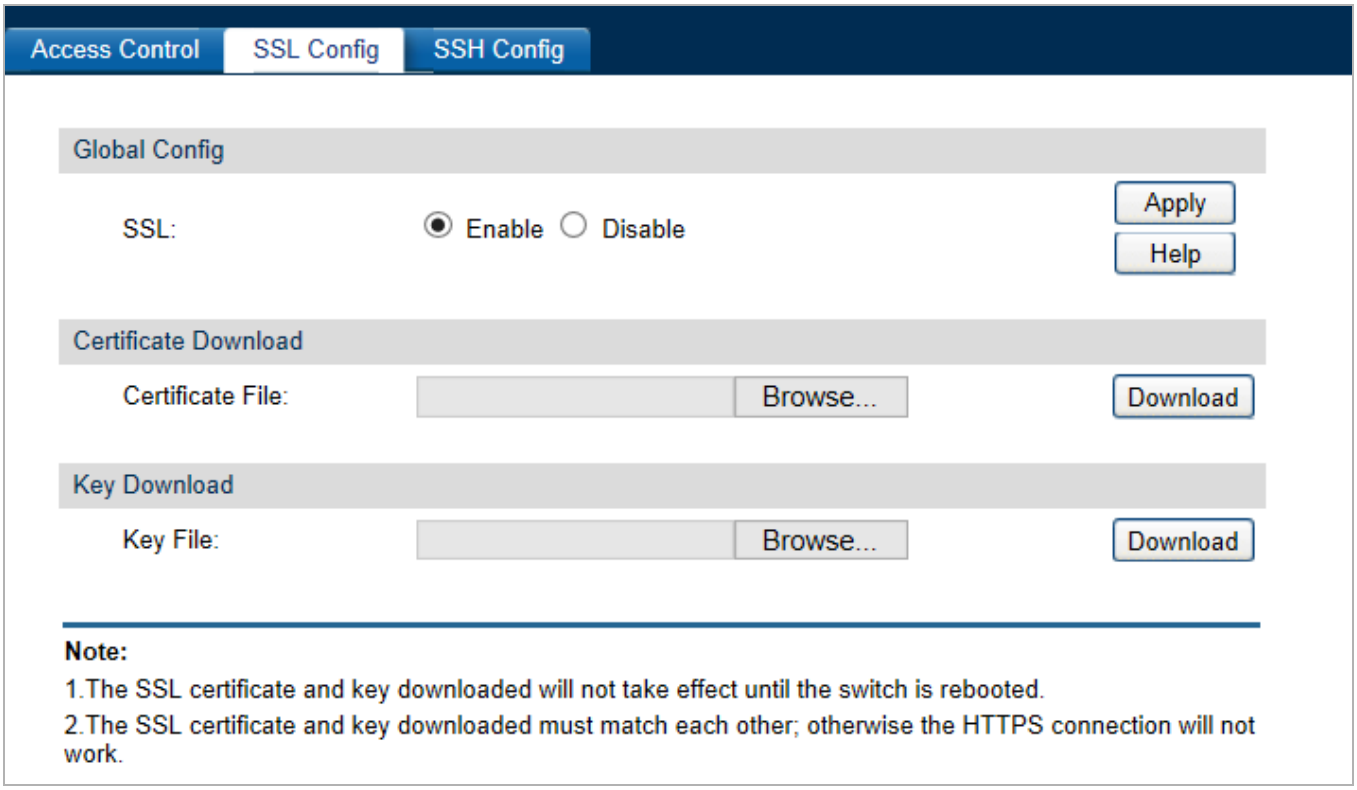


Figure 4-2-18: SSL Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **SSL**	Select Enable/Disable the SSL function on the Managed Switch.
Certification Download	
• **Certification File**	Select the desired certificate to download to the Managed Switch. The certificate must be BASE64 encoded.
Key Download	
• **Key File**	Select the desired SSL key to download to the Managed Switch. The key must be BASE64 encoded.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

Download: Click to download the files.

Note

- The SSL certificate and key downloaded must match each other; otherwise the HTTPS connection will not work.
- The SSL certificate and key downloaded will not take effect until the Managed Switch is rebooted.
- To establish a secured connection using https, please enter https: // into the URL field of the browser.
- It may take more time for https connection than that for http connection, because https connection involves authentication, encryption and decryption, etc.

4.2.4.3 SSH Config

As stipulated by IFTF (Internet Engineering Task Force), SSH (Secure Shell) is a security protocol established on application and transport layers. SSH-encrypted-connection is similar to a Telnet connection, but essentially the old Telnet remote management method is not safe, because the password and data transmitted with plain text can be easily intercepted. SSH can provide information security and powerful authentication when you log on to the Managed Switch remotely through an insecure network environment. It can encrypt all the transmission data and prevent the information in a remote management being leaked. Comprising server and client, SSH has two versions, V1 and V2, which are not compatible with each other. In the communication, SSH server and client can auto-negotiate the SSH version and the encryption algorithm. After getting a successful negotiation, the client sends authentication request to the server for login, and then the two can communicate with each other after successful authentication.

This Managed Switch supports SSH server and you can log on to the switch via SSH connection using SSH client software. SSH key can be downloaded into the Managed Switch. If the key is successfully downloaded, the certificate authentication will be preferred for SSH access to the Managed Switch.The screen in Figure 4-2-19 appears.

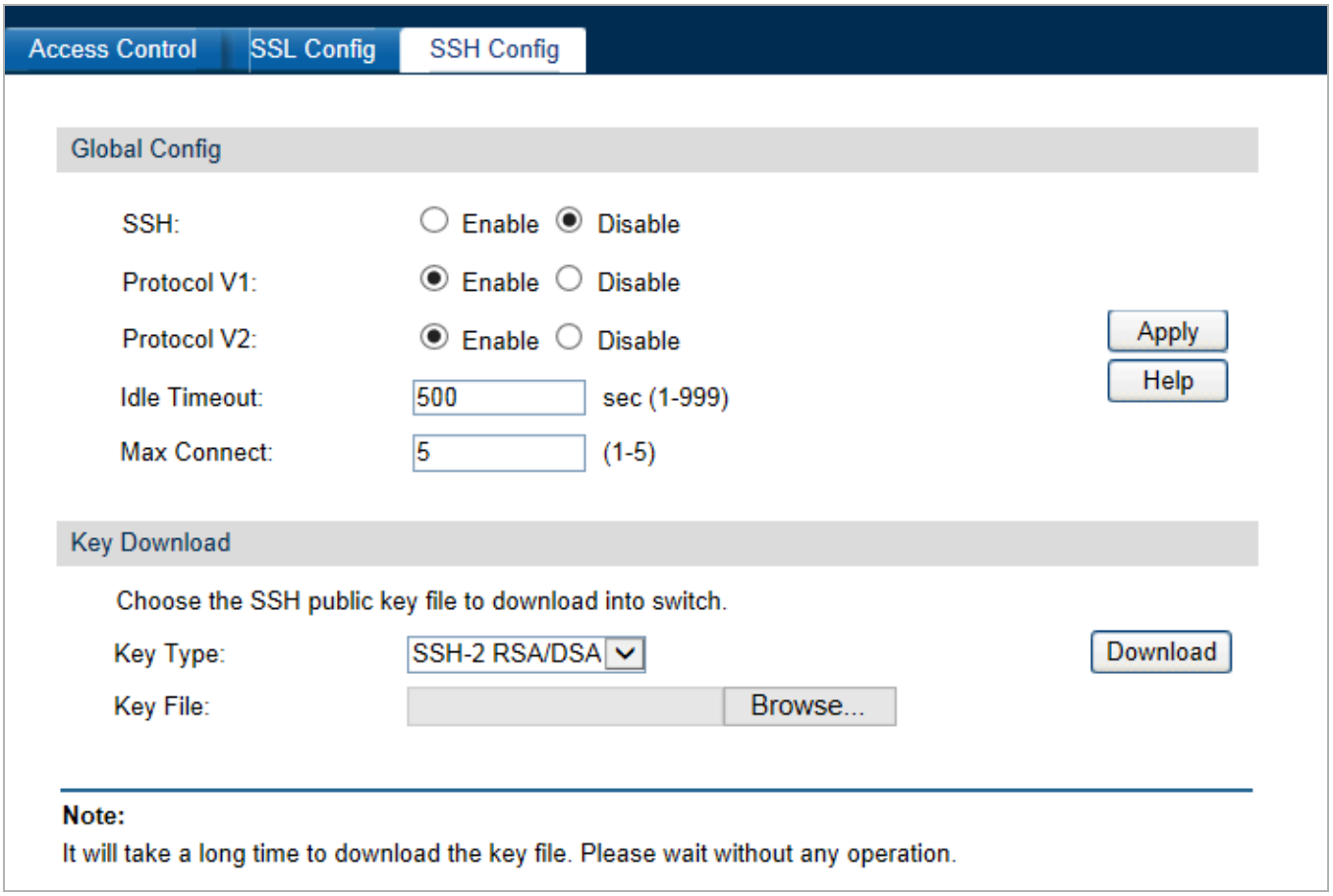


Figure 4-2-19: SSH Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **SSH**	Select Enable/Disable the SSH function on the Managed Switch.
• **Protocol V1**	Select Enable/Disable SSH V1 to be the supported protocol.
• **Protocol V2**	Select Enable/Disable SSH V2 to be the supported protocol.
• **Idle Timeout**	Specify the idle timeout time. The system will automatically release the connection when the time is up. The default time is 120 seconds.
• **Max.Connect**	Specify the maximum number of the connections to the SSH server. No new connection will be established when the number of the connections reaches the maximum number you set. The default value is 5.
Key Download	
• **Certification File**	Select the type of SSH key to download. The Managed Switch supports three types: SSH-1 RSA, SSH-2 RSA and SSH-2 DSA.
Key Download	
• **Key Type**	Select the desired key file to download.
• **Key File**	Click the **Download** button to download the desired key file to the Managed Switch.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

Download : Click to download the files.

Note

- Please ensure the key length of the downloaded file is in the range of 256 to 3072 bits.
- After the key file is downloaded, the user's original key of the same type will be replaced. The wrong uploaded file will result in the SSH access to the Managed Switch via Password authentication.

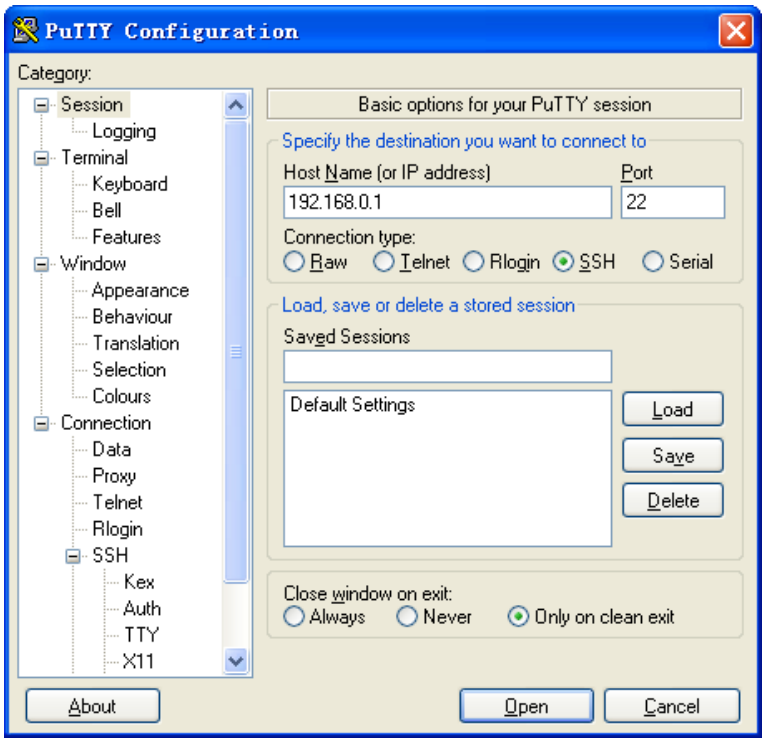
Application Example 1 for SSH:

➢ **Network Requirements**

1. Log on to the Managed Switch via password authentication using SSH and the SSH function is enabled on the Managed Switch.
2. PuTTY client software is recommended.

➢ **Configuration Procedure**

1. Open the software to log on to the interface of PuTTY. Enter the IP address of the Managed Switch into **Host Name** field; keep the default value 22 in the **Port** field; select SSH as the Connection type.



2. Click the **Open** button in the above figure to log on to the Managed Switch. Enter the login user name and password, and then you can continue to configure the Managed Switch.

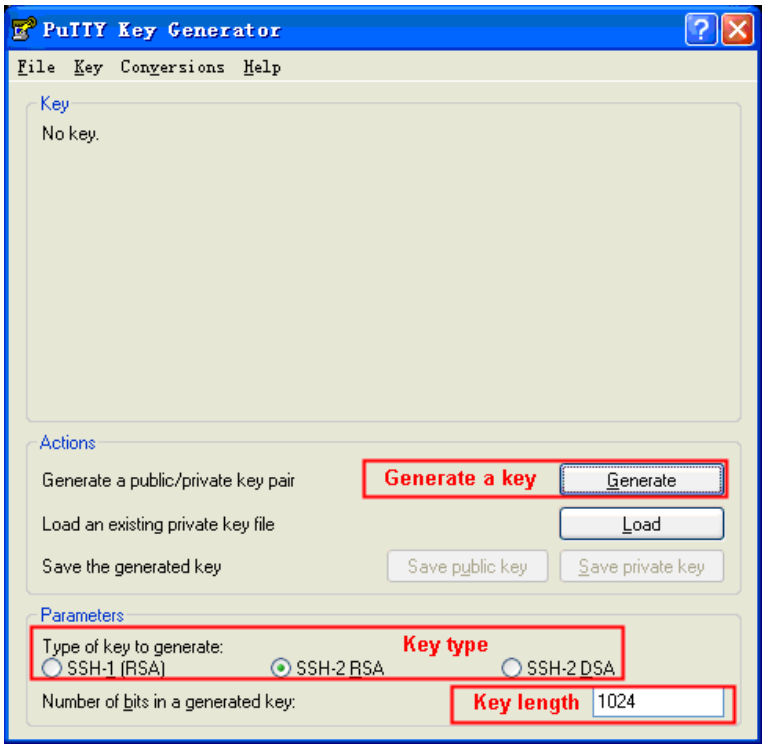
Application Example 2 for SSH:

➢ **Network Requirements**

1. Log on to the Managed Switch via key authentication using SSH and the SSH function is enabled on the Managed Switch.
2. PuTTY client software is recommended.

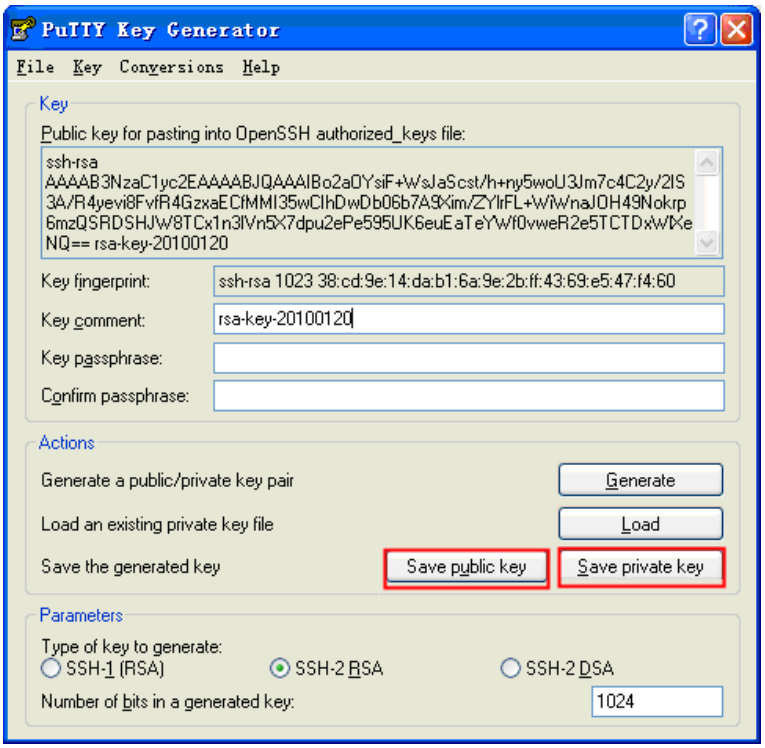
➢ **Configuration Procedure**

1. Select the key type and key length, and generate SSH key.

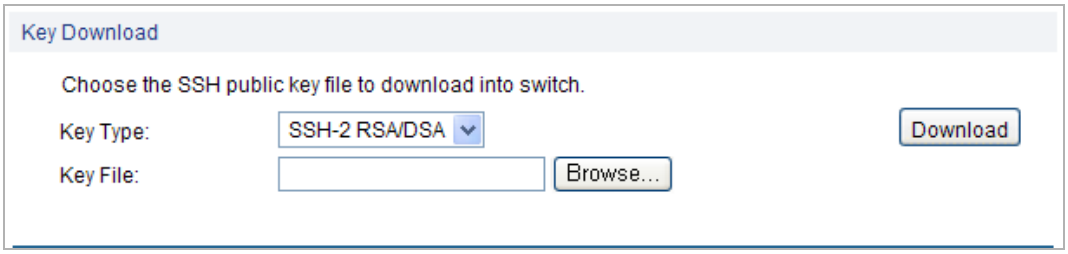


Note

- The key length is in the range of 256 to 3072 bits.
- During the key generation, randomly moving the mouse quickly can accelerate the key generation.
- After the key is successfully generated, please save the public key and private key to the computer.

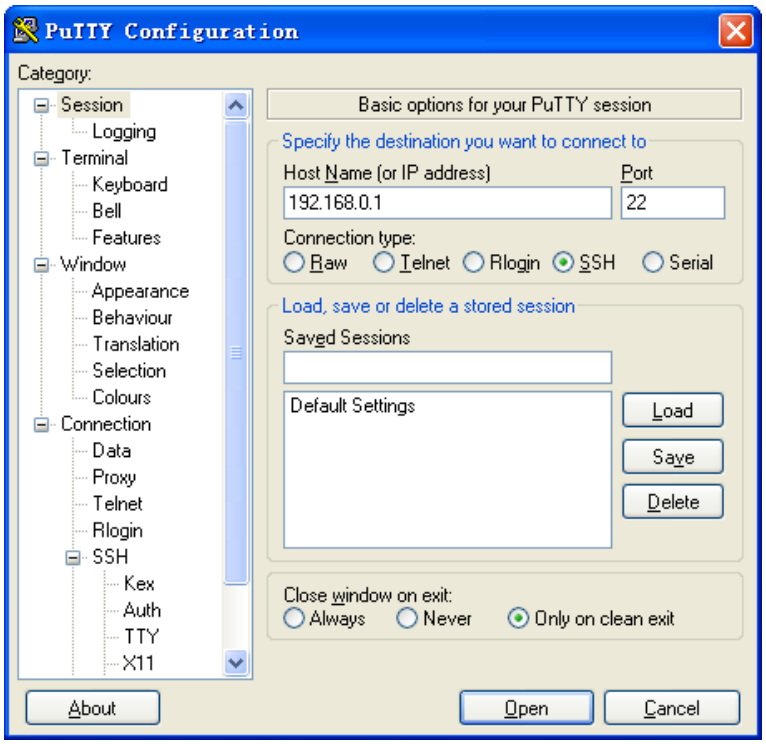


2. On the Web management page of the Managed Switch, download the public key file saved in the computer to the Managed Switch.

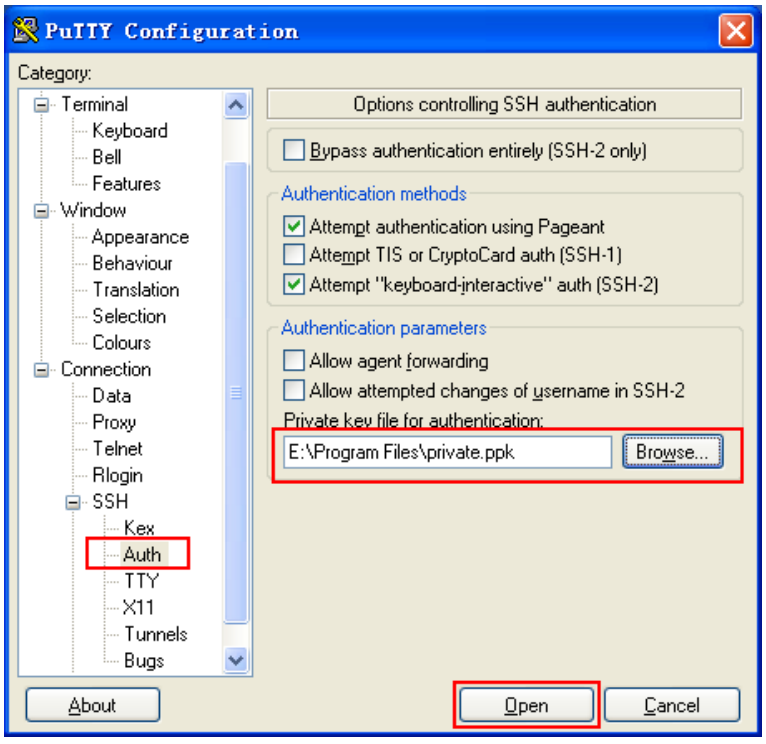


Note

- The key type should accord with the type of the key file.
- Downloading of the SSH key cannot be interrupted.
- After the public key is downloaded, please log on to the interface of PuTTY and enter the IP address for login.



3. Click **Browse** to download the private key file to SSH client software and click **Open**.



After successful authentication, please enter the login user name. If you log on to the Managed Switch without entering password, it indicates that the key has been successfully loaded.

4.3 Switching

Use the System menu items to display and configure basic administrative details of the Managed Switch. Under System the following topics are provided to configure and view the system information:

The Switching function is used to configure the basic functions of the Managed Switch; the screen in Figure 4-3-1 appears.

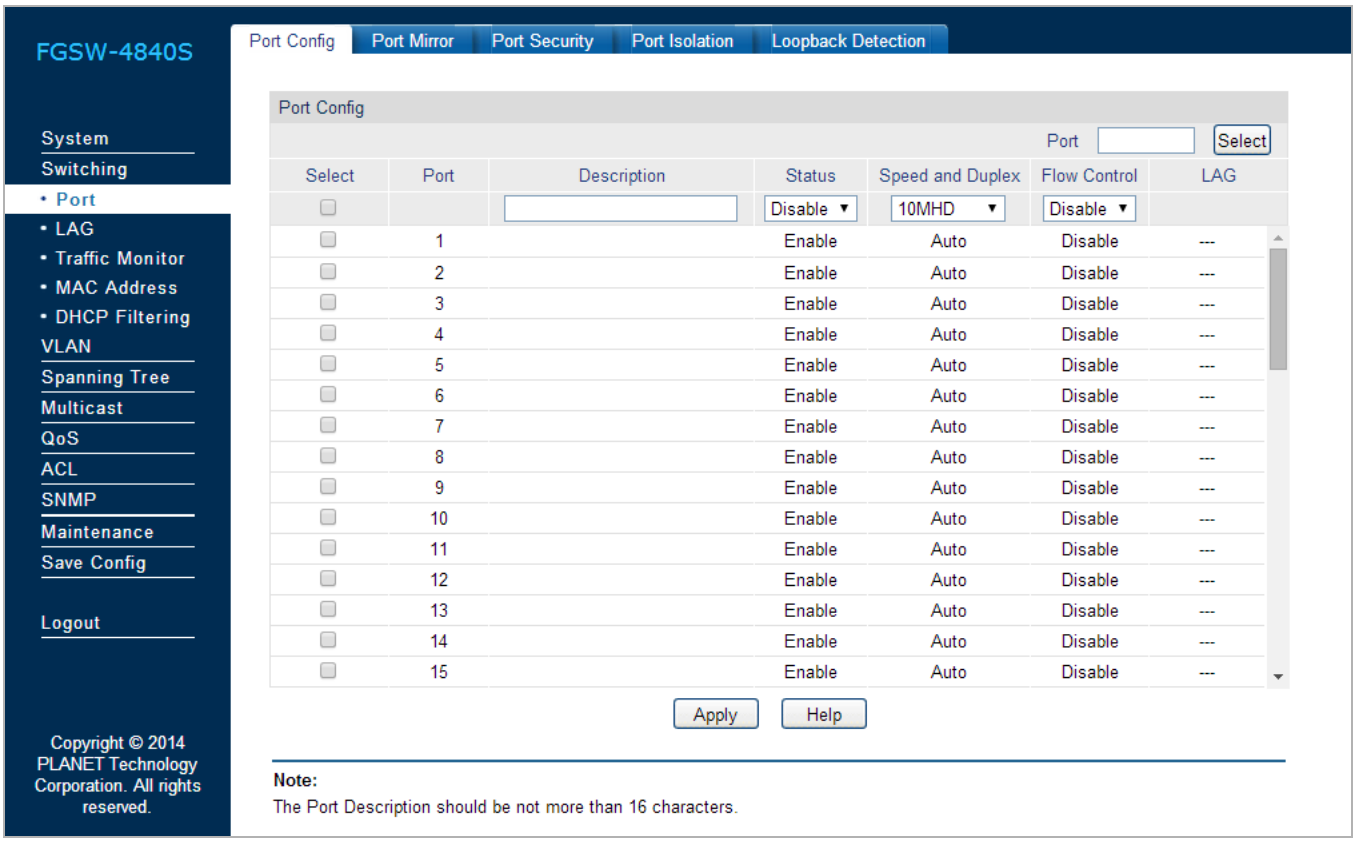


Figure 4-3-1: Port Page Screenshot

This section has the following items:

Port	Configure per port basic features of Managed Switch.
LAG	Configure static trunk or LACP on this page.
Traffic Monitor	The Managed Switch per port Ethernet Traffic statistics monitor.
MAC Addrrss	Configure MAC Address related function on this page.
DHCP Filtering	Configure DHCP Filtering function on this page.

4.3.1 Port

The Port function, allowing you to configure the basic features for the port, is implemented on the **Port Config**, **Port Mirror**, **Port Security**, **Port Isolation** and **Loopback Detection** pages. The screen in Figure 4-3-2 appears.

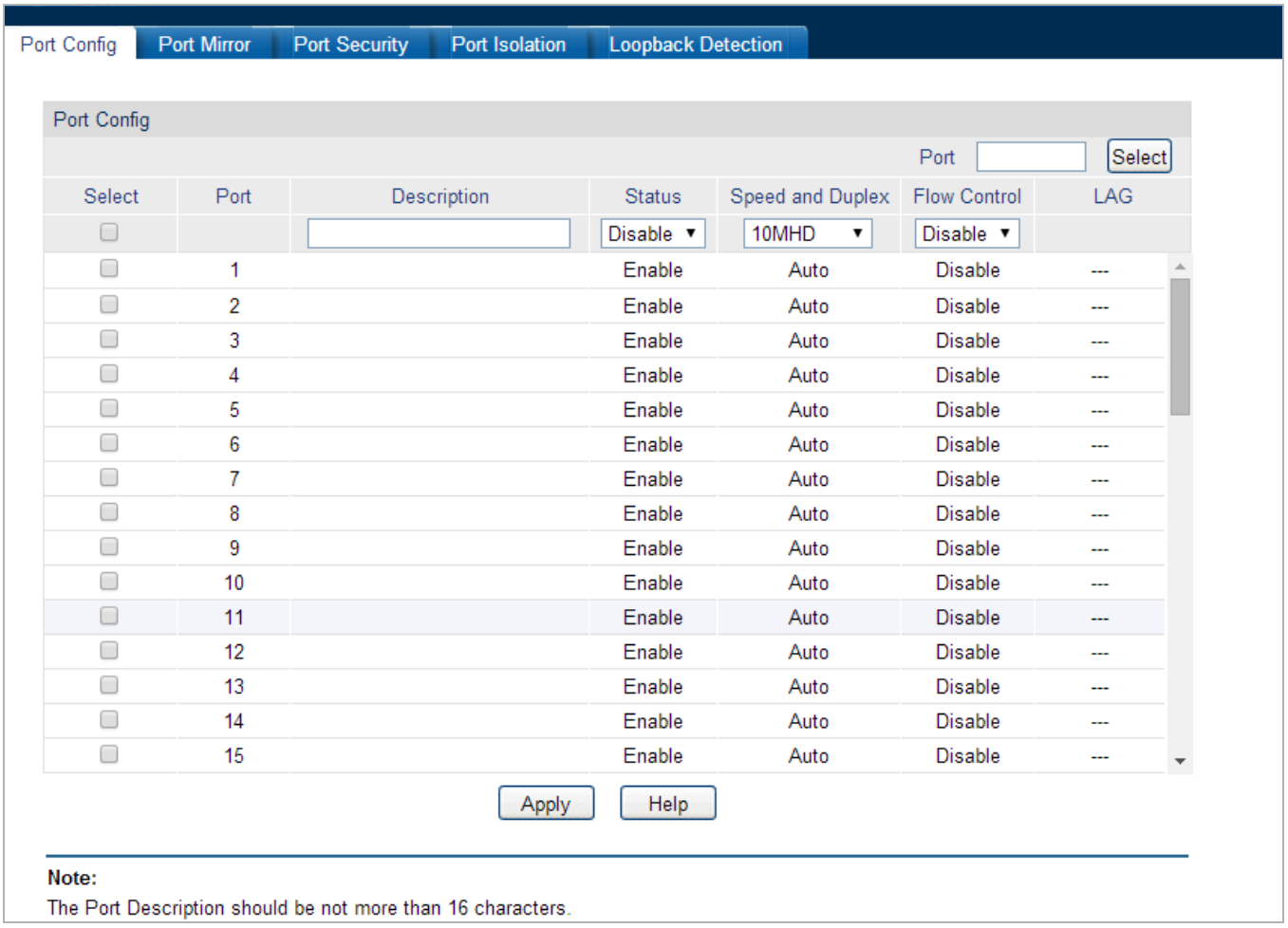


Figure 4-3-2: Port Page Screenshot

The page includes the following fields:

Object	Description
• **Port Config**	View the port connection status and the system information on this page.
• **Port Mirror**	Configure the description of the Managed Switch, including device name, device location and system contact on this page.
• **Port Security**	Configure the system time and the settings here will be used for other time-based functions on this page.
• **Port Isolation**	Configure the Daylight Saving Time of the Managed Switch on this page.
• **Loopback Detection**	Configure the system IP of the Managed Switch on this page.

4.3.1.1 Port Config

This page provides configuring the basic parameters for the ports of Managed Switch. When the port is disabled, the packets on the port will be discarded. Disabling the port which is vacant for a long time can reduce the power consumption effectively and it can enable the port when it is in need; the screen in Figure 4-3-3 appears.

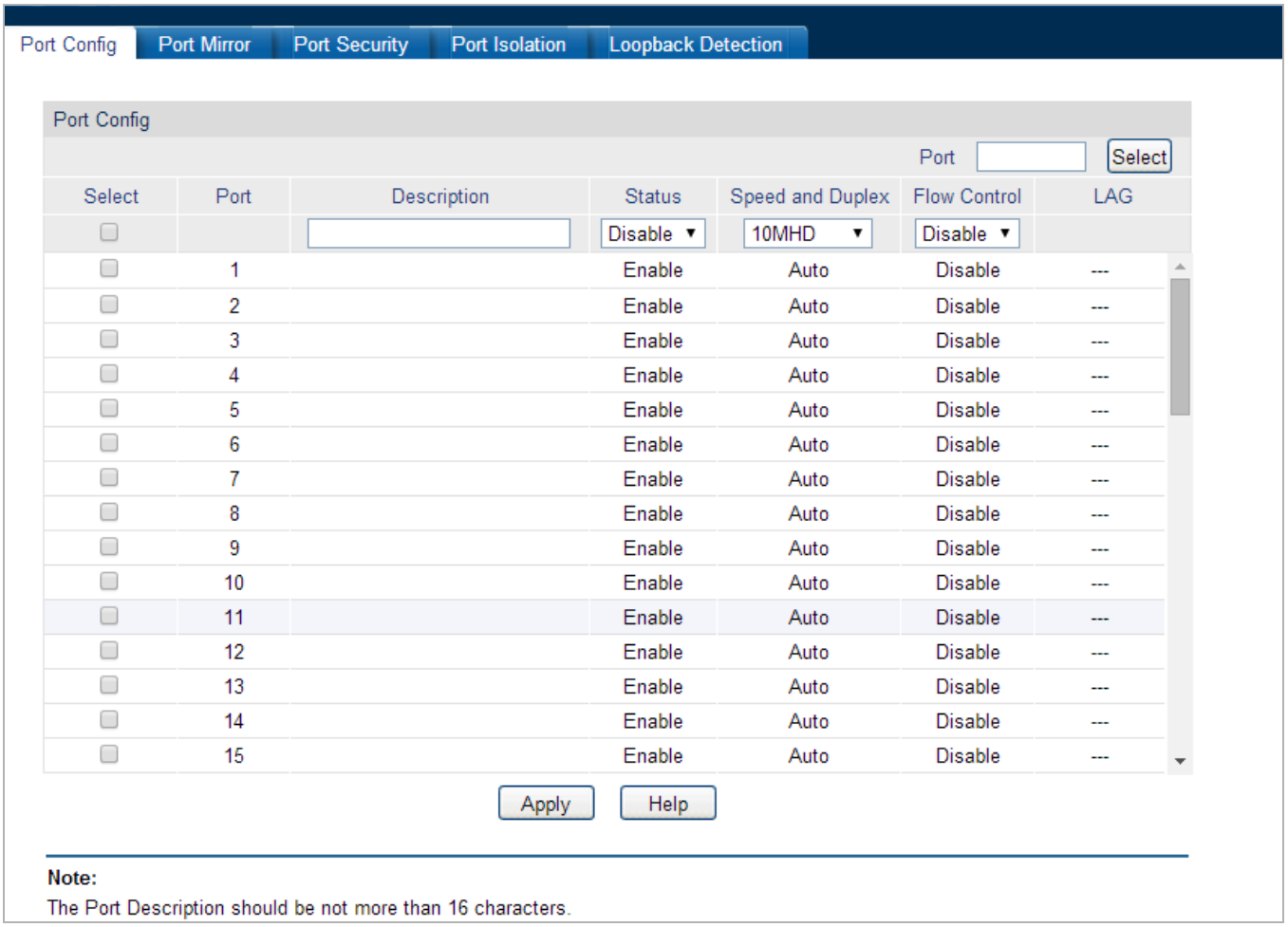


Figure 4-3-3: Port Config Page Screenshot

The page includes the following fields:

Object	Description
Port Config	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port number that entered.
• **Select**	Select the desired port for configuration. It is multi-optional.
• **Port**	Displays the port number.
• **Description**	Give a description to the port for identification.
• **Status**	Allows you to enable/disable the port. When Enable is selected, the port can forward the packets normally.
• **Speed and Duplex**	Select the Speed and Duplex mode for the port. The device connected to the

	Managed Switch should be in the same Speed and Duplex mode with the Managed Switch. When "**Auto"** is selected, the Speed and Duplex mode will be determined by auto-negotiation. For the SFP port, this Managed Switch does not support auto-negotiation.
• **Flow Control**	Allows you to enable/disable the Flow Control feature. When Flow Control is enabled, the Managed Switch can synchronize the speed with its peer to avoid the packet loss caused by congestion.
• **LAG**	Displays the LAG number which the port belongs to.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

Note

- The port description can accept 16 characters only.
- The Managed Switch cannot be managed through the disabled port. Please enable the port which is used to manage the Managed Switch.
- The parameters of the port members in a LAG should be set as the same.

Note

- When using the SFP port with a 100M module or a gigabit module, it needs to configure its corresponding **Speed and Duplex** mode.
- For 100M module, please select **100MFD** while selecting **1000MFD** for gigabit module. By default, the **Speed and Duplex** mode of SFP port is 1000MFD. (For FGSW-2840 only)

4.3.1.2 Port Mirror

Port Mirror, the packets obtaining technology, functions to forward copies of packets from one/multiple ports (mirrored port) to a specific port (mirroring port). Usually, the mirroring port is connected to a data diagnose device, which is used to analyze the mirrored packets for monitoring and troubleshooting the network. The screen in Figure 4-3-4 appears.

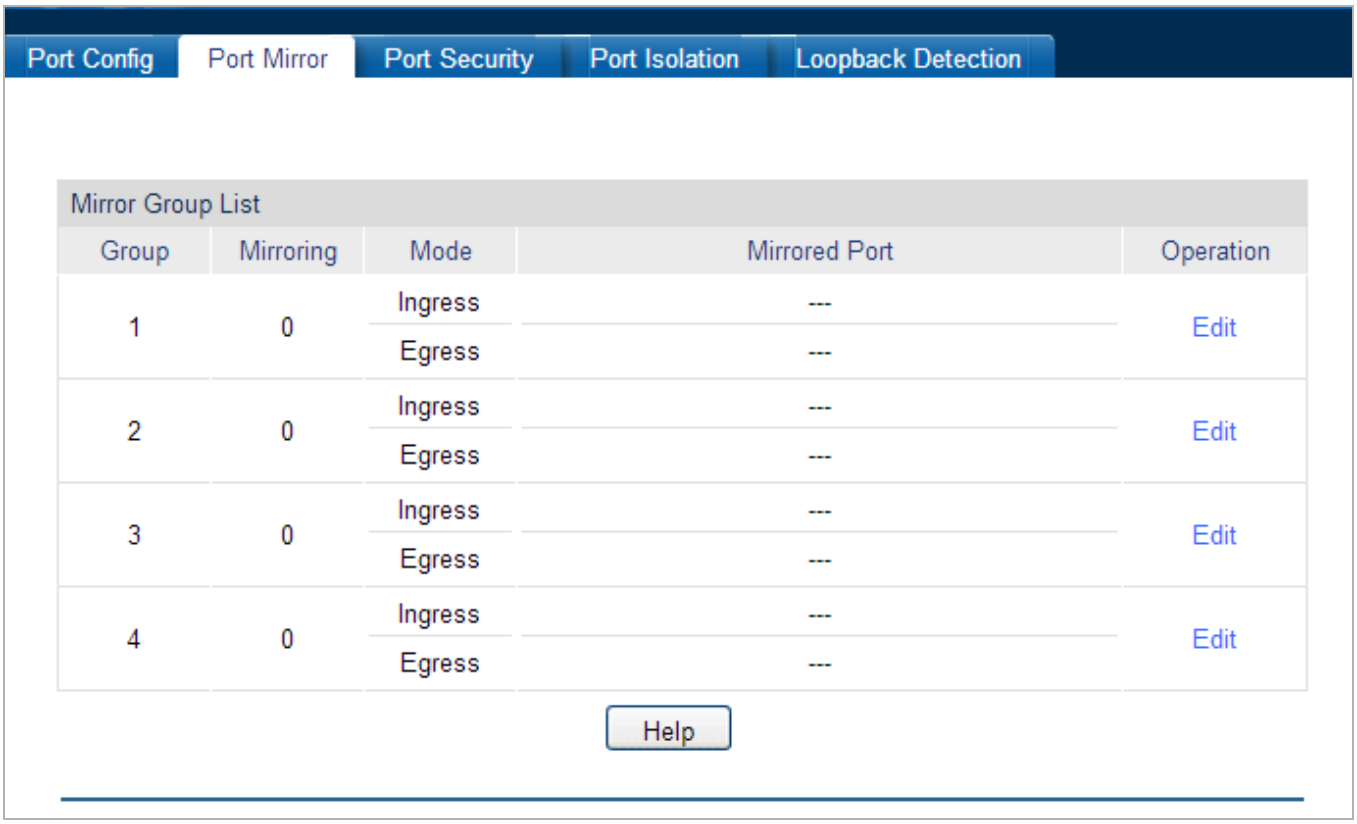


Figure 4-3-4: Port Mirror Page Screenshot

The page includes the following fields:

Object	Description
Mirror Group List	
• **Group**	Displays the mirror group number.
• **Mirroring**	Displays the mirroring port number.
• **Mode**	Displays the mirror mode.
• **Mirrored Port**	Displays the mirrored ports.
• **Operation**	Click **Edit** to configure the mirror group.

Click **Edit** and the following screen appears.

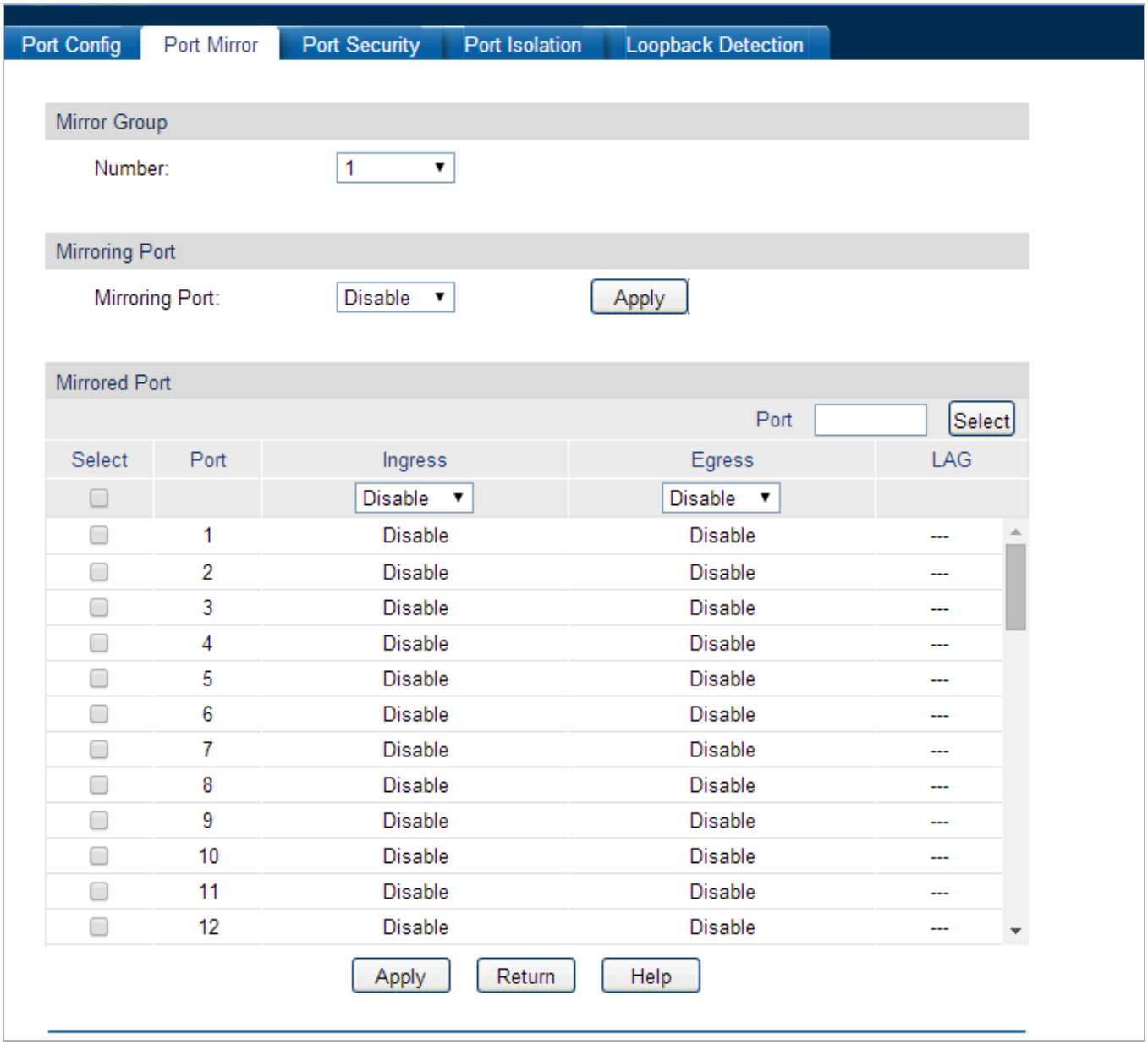


Figure 4-3-5: Port Mirror Edit Page Screenshot

The page includes the following fields:

Object	Description
Mirror Group	
• **Group**	Select the mirror group number that wants to configure.
Mirroring Port	
• **Mirroring Port**	Select the mirroring port number.
Mirrored Port	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port

	number you entered.
• **Select**	Select the desired port as a mirrored port. It is multi-optional.
• **Port**	Displays the port number.
• **Ingress**	Select Enable/Disable the Ingress feature. When the Ingress is enabled, the incoming packets received by the mirrored port will be copied to the mirroring port.
• **Egress**	Select Enable/Disable the Egress feature. When the Egress is enabled, the outgoing packets sent by the mirrored port will be copied to the mirroring port.
• **LAG**	Displays the LAG number which the port belongs to. The LAG member cannot be selected as the mirrored port or mirroring port.

- The LAG member cannot be selected as the mirrored port or mirroring port.
- A port cannot be set as the mirrored port and the mirroring port simultaneously.
- The Port Mirror function can span multiple VLANs to take effect.

Buttons

Apply: Click to apply changes.

Select: Click to select the port.

Return: Click to return to the previous screen.

Help: Click to display help web page.

4.3.1.3 Port Security

MAC Address Table maintains the mapping relationship between the port and the MAC address of the connected device, which is the base of the packet forwarding. The capacity of MAC Address Table is fixed. MAC Address Attack is the attack method that the attacker takes to obtain the network information illegally. The attacker uses tools to generate the cheating MAC address and quickly occupy the MAC Address Table. When the MAC Address Table is full, the Managed Switch will broadcast the packets to all the ports. At this moment, the attacker can obtain the network information via various sniffers and attacks. When the MAC Address Table is full, the packets traffic will flood to all the ports, which results in overload, lower speed, packets drop and even breakdown of the system.

Port Security is to protect the Managed Switch from the malicious MAC Address Attack by limiting the maximum number of MAC addresses that can be learned on the port. The port with Port Security feature enabled will learn the MAC address dynamically. When the learned MAC address number reaches the maximum, the port will stop learning. Thereafter, the other devices with the MAC address unlearned cannot access the network via this port; the screen in Figure 4-3-6 appears.

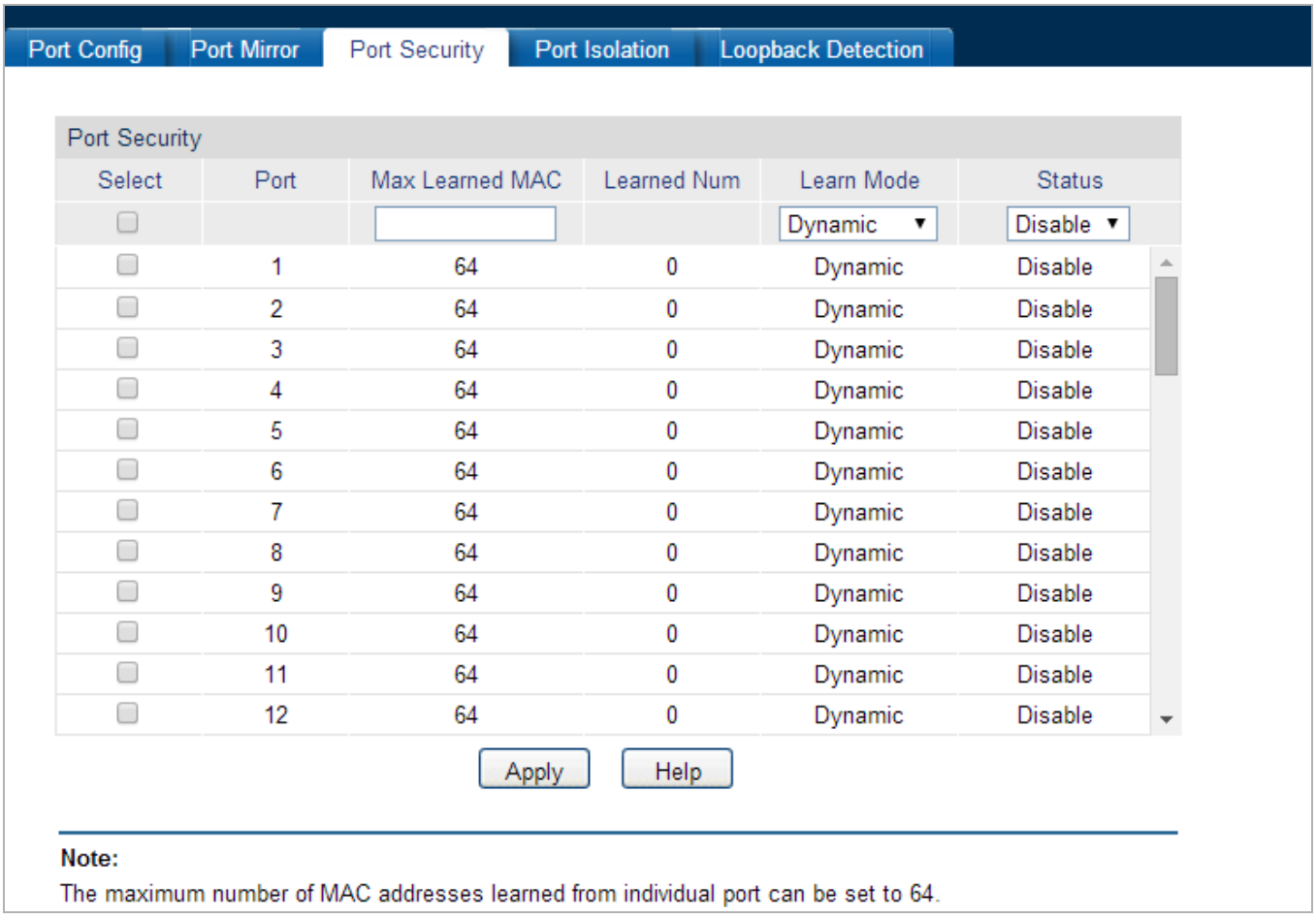


Figure 4-3-6: Port Security Page Screenshot

The page includes the following fields:

Object	Description
Port Security	

• **Select**	Select the desired port for Port Security configuration. It is multi-optional.
• **Port**	Displays the port number.
• **Max Learned MAC**	Specify the maximum number of MAC addresses that can be learned on the port.
• **Learned Num**	Displays the number of MAC addresses that have been learned on the port.
• **Learned Mode**	Select the Learn Mode for the port. • **Dynamic:** When Dynamic mode is selected, the learned MAC address will be deleted automatically after the aging time. • **Static:** When Static mode is selected, the learned MAC address will be out of the influence of the aging time and can only be deleted manually. The learned entries will be cleared after the Managed Switch is rebooted. • **Permanent:** When Permanent mode is selected, the learned MAC address will be out of the influence of the aging time and can only be deleted manually. The learned entries will be saved even the Managed Switch is rebooted.
• **Status**	Select Enable/Disable the Port Security feature for the port.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

Note The Port Security function is disabled for the LAG port member. Only the port is removed from the LAG will the Port Security function be available for the port.

4.3.1.4 Port Isolation

Port Isolation provides a method of restricting traffic flow to improve the network security by forbidding the port to forward packets to the ports that are not on its forward port list; the screen in Figure 4-3-7 appears.

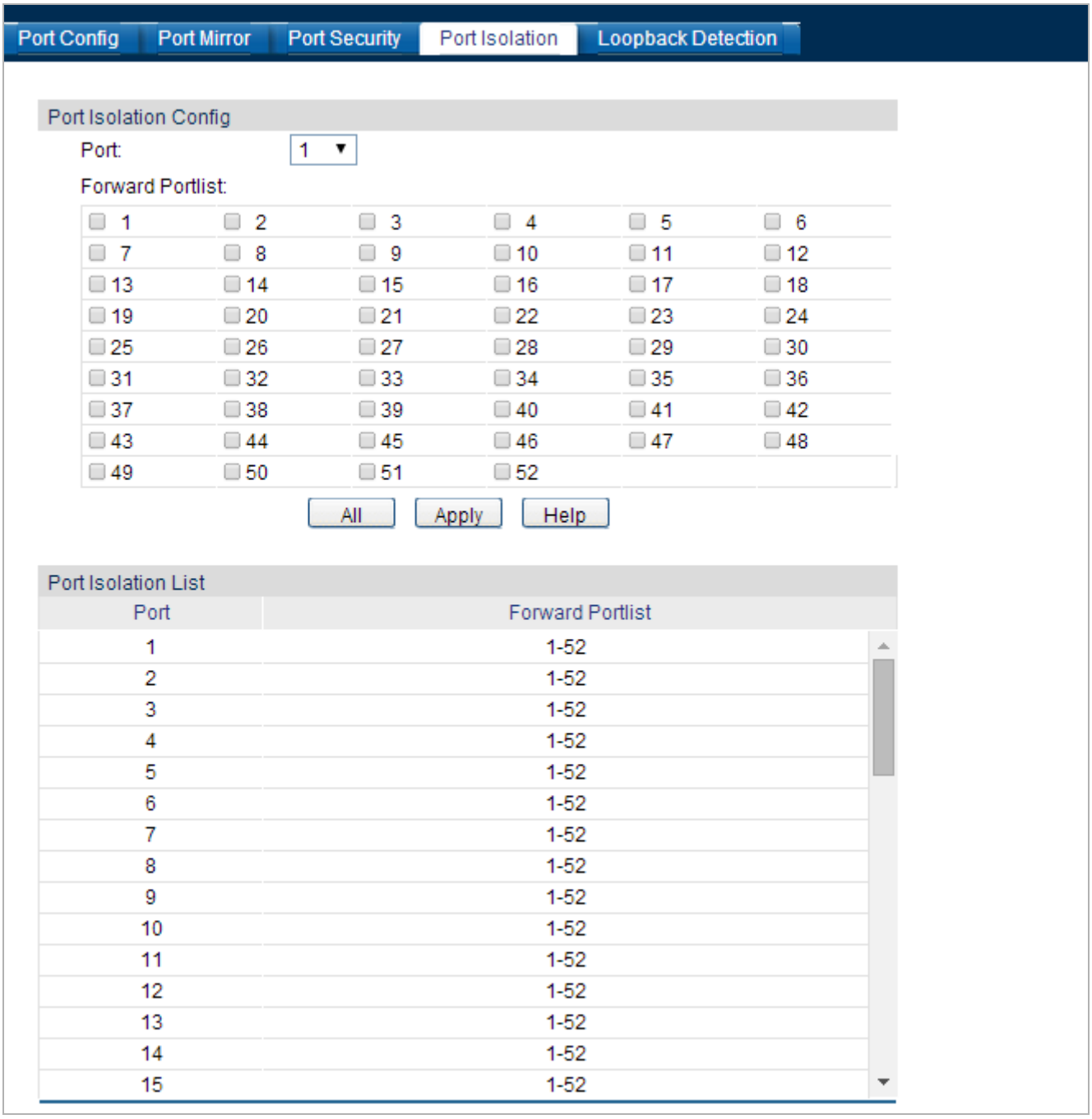


Figure 4-3-7: Port Isolation Page Screenshot

The page includes the following fields:

Object	Description
Port Isolation Config	
• **Port**	Select the port number to set its forward list.

• **Forward Port list**	Select the port that to be forwarded to.
Port Isolation List	
• **Port**	Display the port number.
• **Forward Port list**	Display the forward list.

Buttons

All: Click to select whole ports.

Apply: Click to apply changes.

Help: Click to display help web page.

4.3.1.5 Loopback Detection

With loopback detection feature enabled, the Managed Switch can detect loops using loopback detection packets. When a loop is detected, the Managed Switch will display an alert or further block the corresponding port according to the port configuration; the screen in Figure 4-3-8 appears.

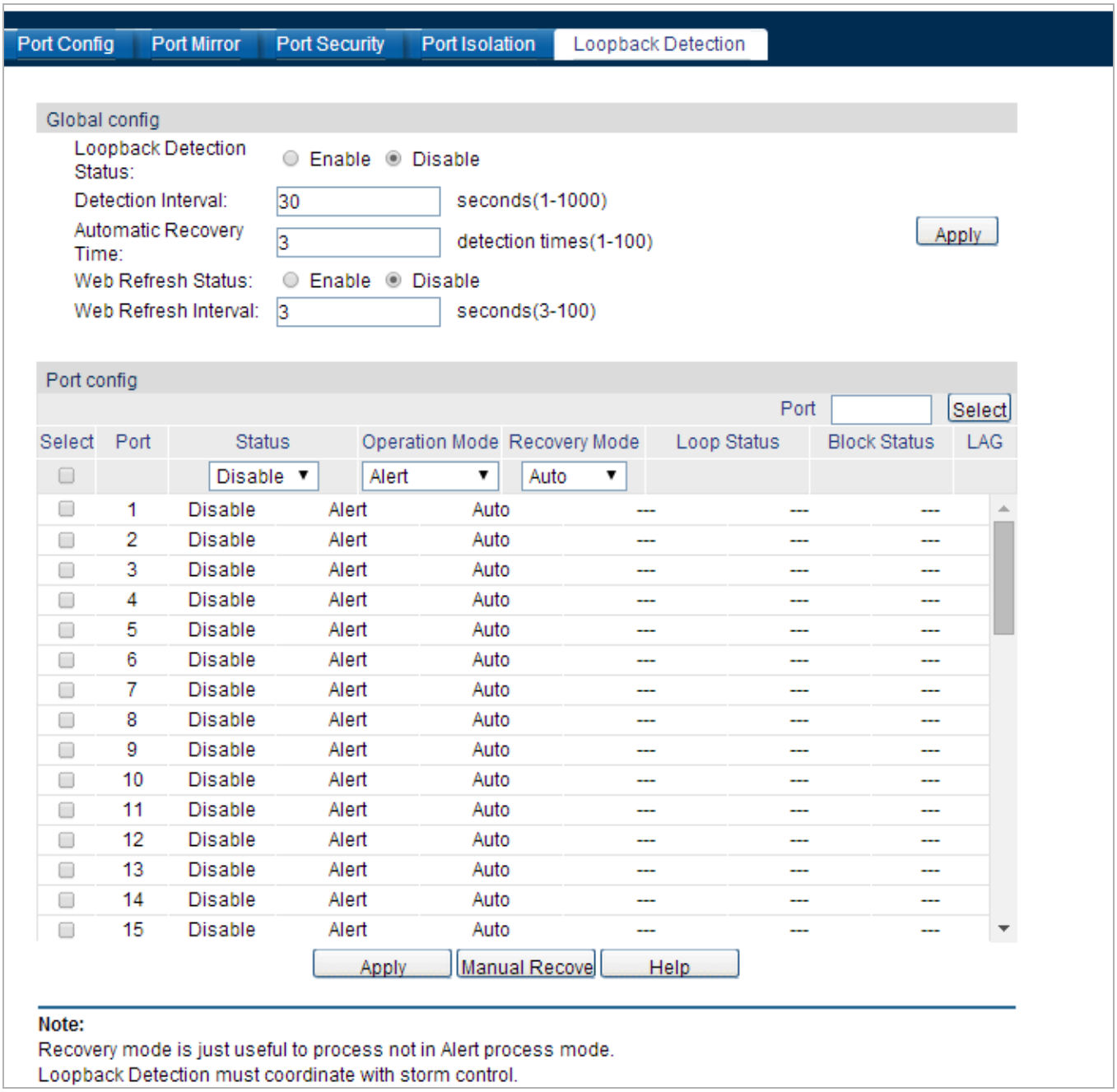


Figure 4-3-8: Loopback Detection Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **Loopback Detection**	Enable or disable loopback detection function globally.

Status	
• **Detection Interval**	Set a loopback detection interval between 1 and 1000 seconds. By default, it's 30 seconds.
• **Automatic Recovery Time**	Time allowed for automatic recovery when a loopback is detected. It can be set as integral multiple of detection interval.
• **Web Refresh Status**	Enable or disable web automatic refresh function.
• **Web Refresh Interval**	Set a web refresh interval between 3 and 100 seconds. By default, it's 3 seconds.
Port Config	
Port Select	Click the **Select** button to quickly select the corresponding port based on the port number you entered.
• **Select**	Select the desired port for loopback detection configuration. It is multi-optional.
• **Port**	Displays the port number.
• **Status**	Enable or disable loopback detection function for the port.
• **Operation Mode**	Select the mode how the Managed Switch processes the detected loops. • Alert**:** when a loop is detected, displays an alert. • Port based: when a loopback is detected, displays an alert and blocks the port.
• **Recovery Mode**	Select the mode how the blocked port recovers to normal status. • Auto: Block status can be automatically removed after recovery time. • Manual: Block status only can be removed manually.
• **Loop Status**	Displays the port status whether a loopback is detected.
• **Block Status**	Displays the port status about block or unblock.
• **LAG**	Displays the LAG number the port belongs to.

Buttons

Apply : Click to apply changes.

Manual Recover : Click to remove the block status of selected ports.

Help : Click to display help web page.

Note

- Recovery Mode is not selectable when Alert is chosen in Operation Mode.
- Loopback Detection must coordinate with storm control.

4.3.2 LAG

LAG (Link Aggregation Group) is to combine a number of ports together to make a single high-bandwidth data path, so as to implement the traffic load sharing among the member ports in the group and to enhance the connection reliability.

For the member ports in an aggregation group, their basic configuration must be the same. The basic configuration includes **STP**, **QoS**, **VLAN**, **port attributes**, **MAC Address Learning mode** and other associated settings. Further explanations are as follows:

- If the ports, which are enabled for the **802.1Q VLAN**, **STP**, **QoS** and **Port Configuration** (**Speed and Duplex**, **Flow Control**), are in a LAG, their configurations should be the same.
- The ports, which are enabled for the **Port Security**, **Port Mirror** and **MAC Address Filtering**, cannot be added to the LAG.

If the LAG is needed, suggest to configure the LAG function here before configuring the other functions for the member ports. The screen in Figure 4-3-9 appears.

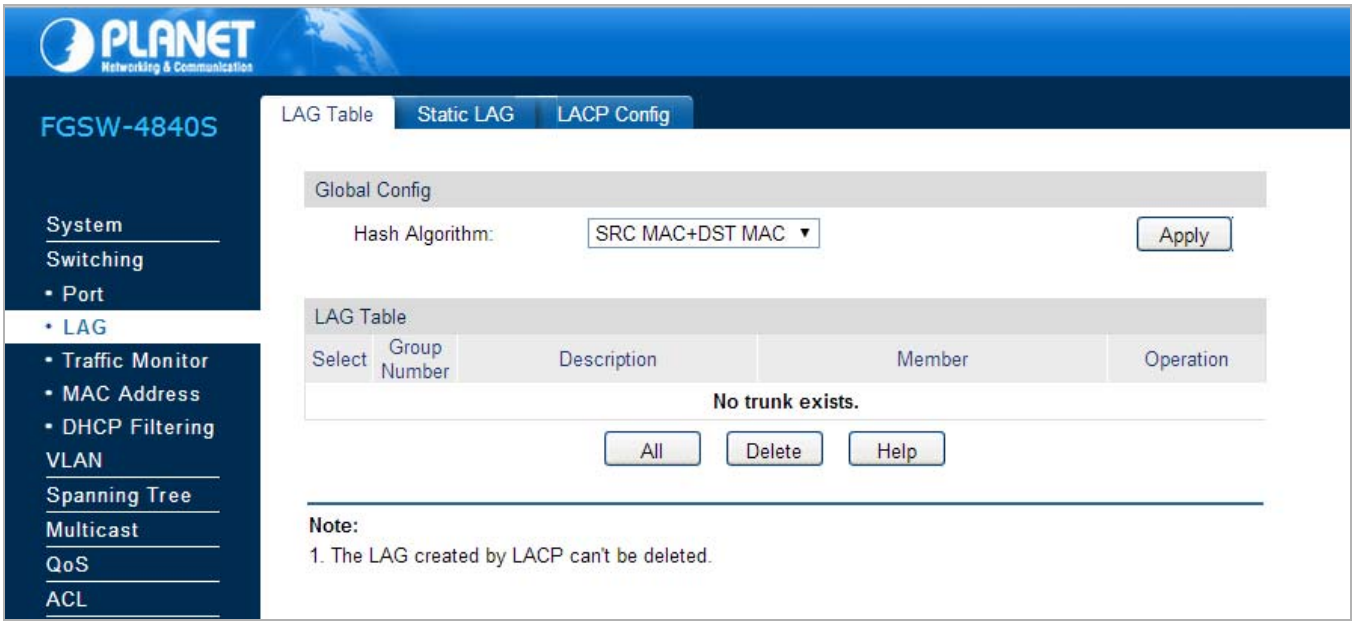


Figure 4-3-9: LAG Page Screenshot

The page includes the following fields:

Object	Description
• **LAG Table**	View the LAG Table on this page.
• **Static LAG**	Configure the static link aggregation function of the Managed Switch on this page.
• **LACP Config**	Configure the LACP function of the Managed Switch on this page.

Note

Calculate the bandwidth for a LAG: If a LAG consists of the four ports in the speed of 1000Mbps full duplex, the whole bandwidth of the LAG is up to 8000Mbps (2000Mbps x 4) because the bandwidth of each member port is 2000Mbps counting the up-linked speed of 1000Mbps and the down-linked speed of 1000Mbps.

Note

The traffic load of the LAG will be balanced among the ports according to the Aggregate Arithmetic. If the connections of one or several ports are broken, the traffic of these ports will be transmitted on the normal ports, so as to guarantee the connection reliability.

4.3.2.1 LAG Table

This page provides view the information of the current LAG of Managed Switch; the screen in Figure 4-3-10 appears.

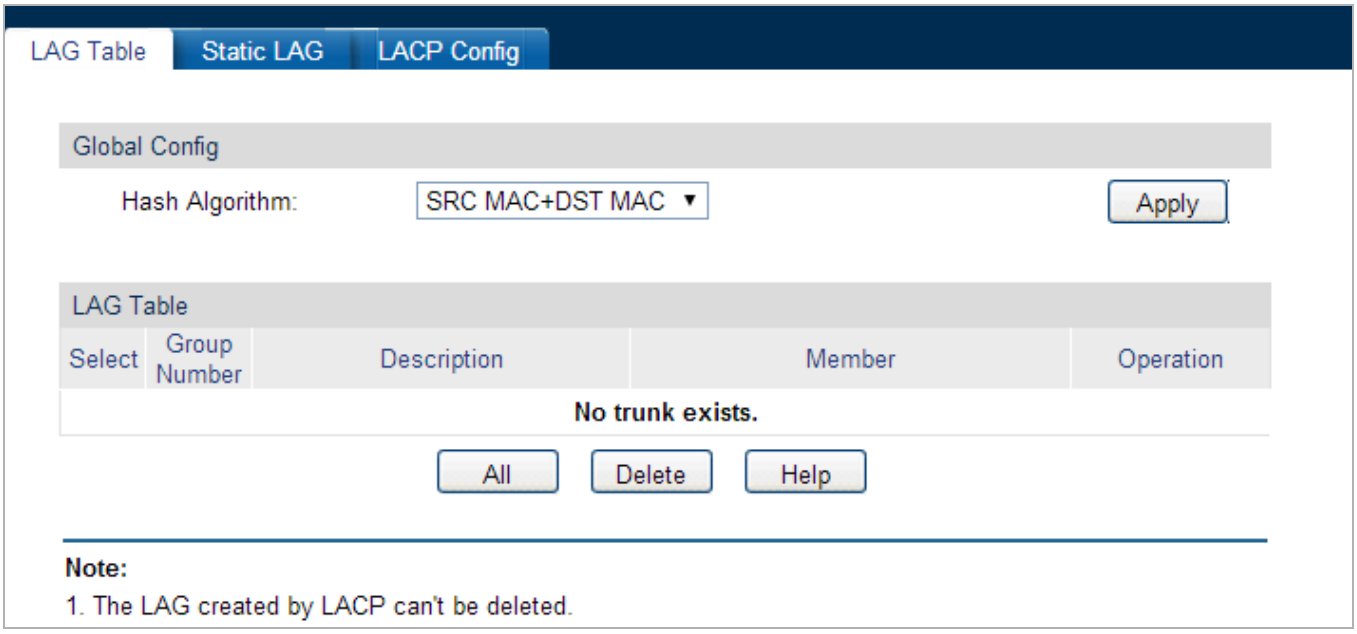
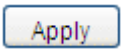


Figure 4-3-10: LAG Table Page Screenshot

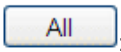
The page includes the following fields:

Object	Description
Global Config	
• **Hash Algorithm**	Select the applied scope of Aggregate Arithmetic, which results in choosing a port to transfer the packets. • **SRC MAC + DST MAC:** When this option is selected, the Aggregate Arithmetic will apply to the source and destination MAC addresses of the packets. • **SRC IP + DST IP:** When this option is selected, the Aggregate Arithmetic will apply to the source and destination IP addresses of the packets.
LAG Table	
• **Select**	Select the desired LAG. It is multi-optional.
• **Group Number**	Displays the LAG number here.
• **Description**	Displays the description of LAG.
• **Member**	Displays the LAG member.
• **Operation**	Allows you to view or modify the information for each LAG. • **Edit:** Click to modify the settings of the LAG. • **Detail:** Click to get the information of the LAG.

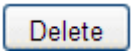
Buttons



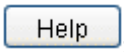
: Click to apply changes.



: Click to select whole ports.



: Click to delete current LAG group.



: Click to display help web page.

4.3.2.2 Static LAG

This page provides manually configuring the LAG of Managed Switch; the screen in Figure 4-3-11 appears.

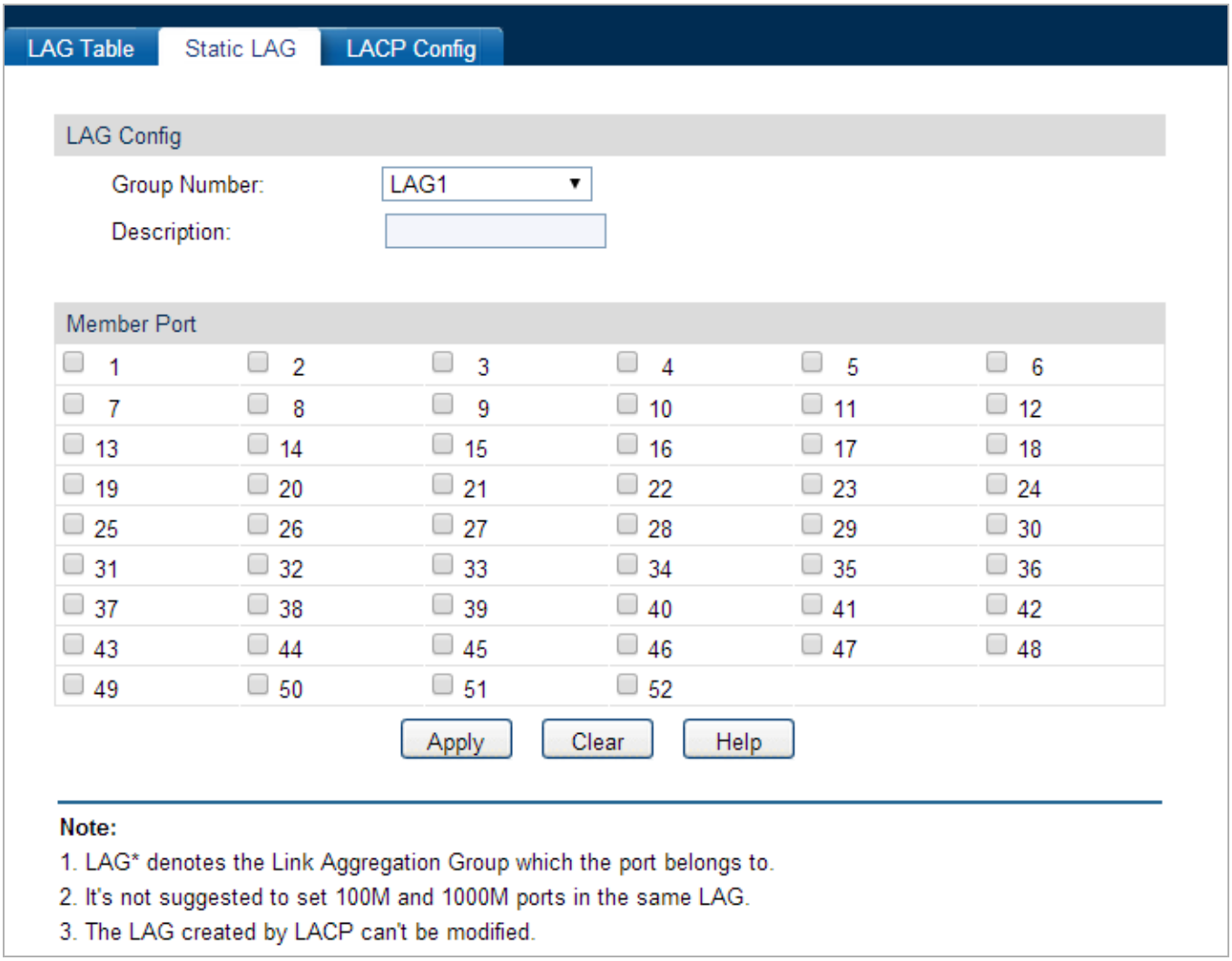


Figure 4-3-11: Static LAG Page Screenshot

The page includes the following fields:

Object	Description
LAG Config	
• **Group Number**	Select a Group Number for the LAG.
• **Description**	Displays the description of the LAG.
Member Port	
• **Member Port**	Select the port as the LAG member. Clearing all the ports of the LAG will delete this LAG.

Note

Calculate the bandwidth for a LAG: If a LAG consists of the four ports in the speed of 1000Mbps full duplex, the whole bandwidth of the LAG is up to 8000Mbps (2000Mbps x 4) because the bandwidth of each member port is 2000Mbps counting the up-linked speed of 1000Mbps and the down-linked speed of 1000Mbps.

The traffic load of the LAG will be balanced among the ports according to the Aggregate Arithmetic. If the connections of one or several ports are broken, the traffic of these ports will be transmitted on the normal ports, so as to guarantee the connection reliability.

Buttons

Apply: Click to apply changes.

Clear: Click to clear the ports.

Help: Click to display help web page.

4.3.2.3 LACP Config

LACP (Link Aggregation Control Protocol) is defined in IEEE802.3ad and enables the dynamic link aggregation and disaggregation by exchanging LACP packets with its partner. The Managed Switch can dynamically group similarly configured ports into a single logical link, which will highly extend the bandwidth and flexibly balance the load.

With the LACP feature enabled, the port will notify its partner of the system priority, system MAC, port priority, port number and operation key (operation key is determined by the physical properties of the port, upper layer protocol and admin key). The device with higher priority will lead the aggregation and disaggregation. System priority and system MAC decide the priority of the device. The smaller the system priority, the higher the priority of the device is. With the same system priority, the device owning the smaller system MAC has the higher priority. The device with the higher priority will choose the ports to be aggregated based on the port priority, port number and operation key. Only the ports with the same operation key can be selected into the same aggregation group. In an aggregation group, the port with smaller port priority will be considered as the preferred one. If the two port priorities are equal, the port with smaller port number is preferred. After an aggregation group is established, the selected ports can be aggregated together as one port to transmit packets.

This page allows configuring the LACP feature of the Managed Switch, the screen in Figure 4-3-12 appears.

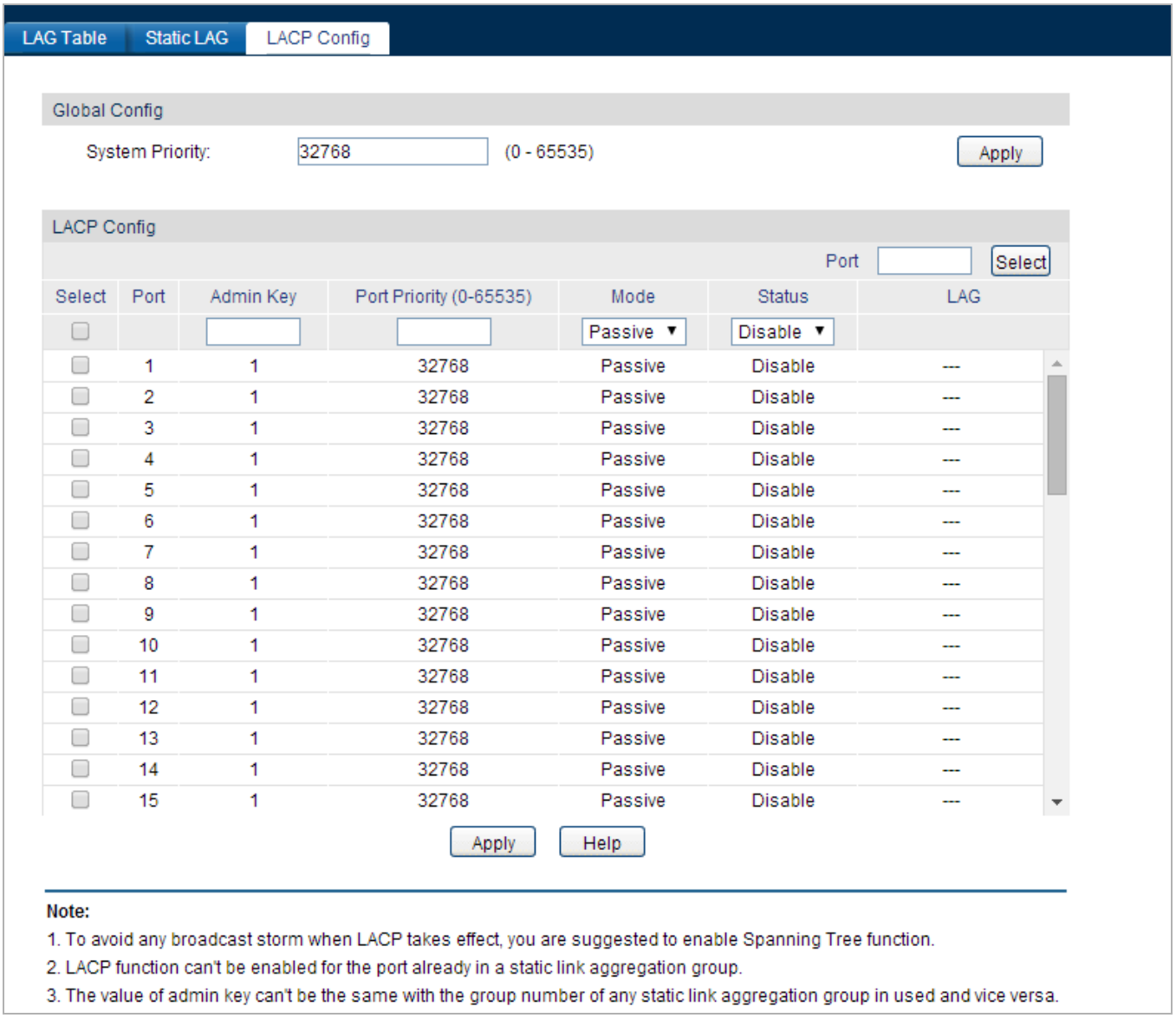


Figure 4-3-12: LACP Config Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **System Priority**	Specify the system priority for the Managed Switch. The system priority and MAC address constitute the system identification (ID). A lower system priority value indicates a higher system priority. When exchanging information between systems, the system with higher priority determines which link aggregation a link belongs to, and the system with lower priority adds the proper links to the link aggregation according to the selection of its partner.
LACP Config	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port number you entered.

• **Select**	Select the desired port for LACP configuration. It is multi-optional.
• **Port**	Displays the port number.
• **Admin Key**	Specify an admin key for the port. The member ports in a dynamic aggregation group must have the same admin key.
• **Port Priority (0-65535)**	Specify a Port Priority for the port. This value determines the priority of the port to be selected as the dynamic aggregation group member. The port with smaller Port Priority will be considered as the preferred one. If the two port priorities are equal; the port with smaller port number is preferred.
• **Mode**	Specify LACP mode for selected port.
• **Status**	Enable/Disable the LACP feature for your selected port.
• **LAG**	Displays the LAG number which the port belongs to.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.3.3 Traffic Monitor

The Traffic Monitor function, monitoring the traffic of each port, is implemented on the **Traffic Summary** and **Traffic Statistics** pages. The screen in Figure 4-3-13 appears.

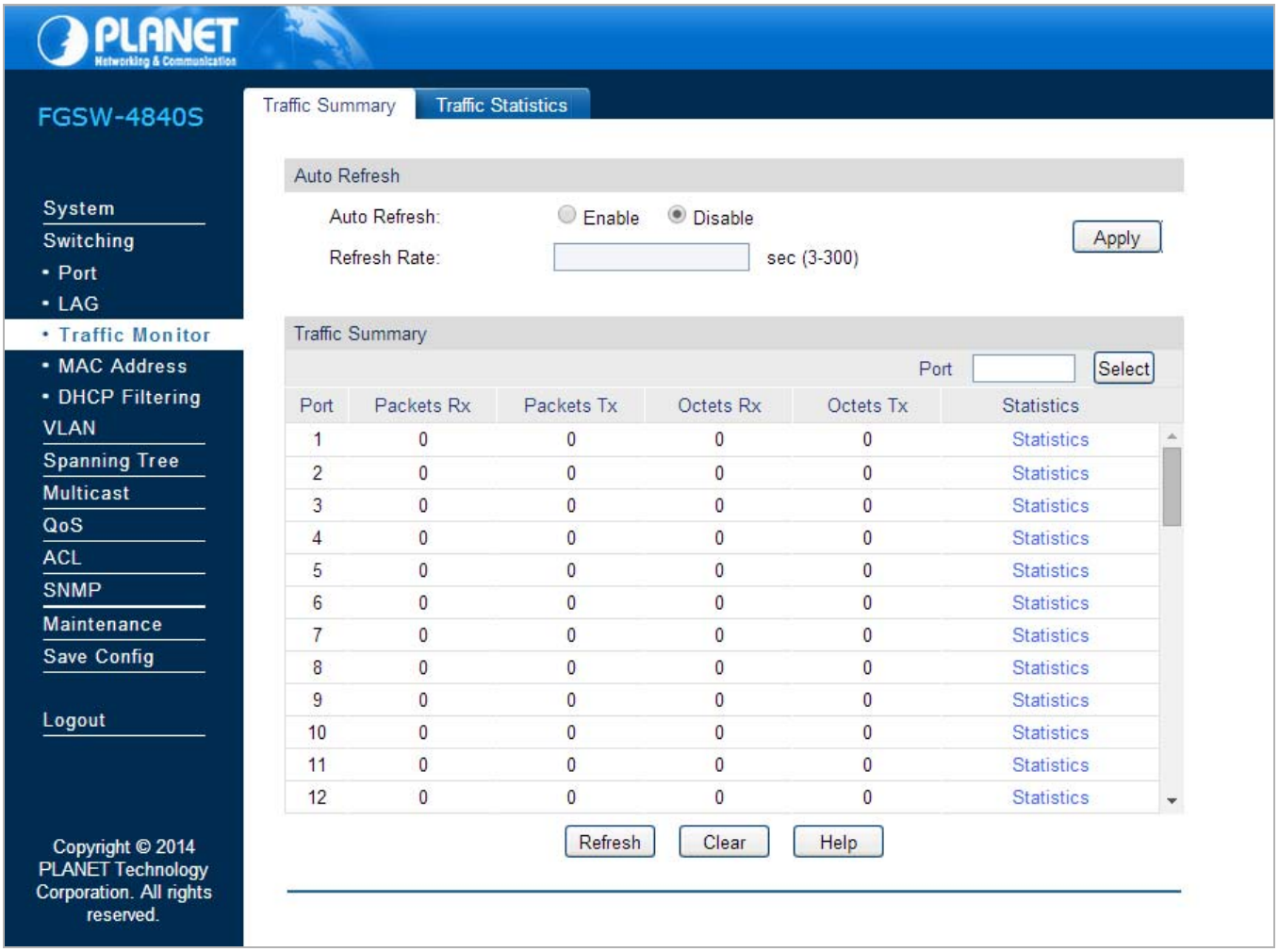


Figure 4-3-13: Traffic Monitor Page Screenshot

The page includes the following fields:

Object	Description
• **Traffic Summary**	The Traffic Summary screen displays the traffic information of each port.
• **Traffic Statistics**	The Traffic Statistics screen displays the detailed traffic information of each port.

4.3.3.1 Traffic Summary

This page provides displaying the traffic information of each port, which facilitates to monitor the traffic and analyze the network abnormity; the screen in Figure 4-3-14 appears.

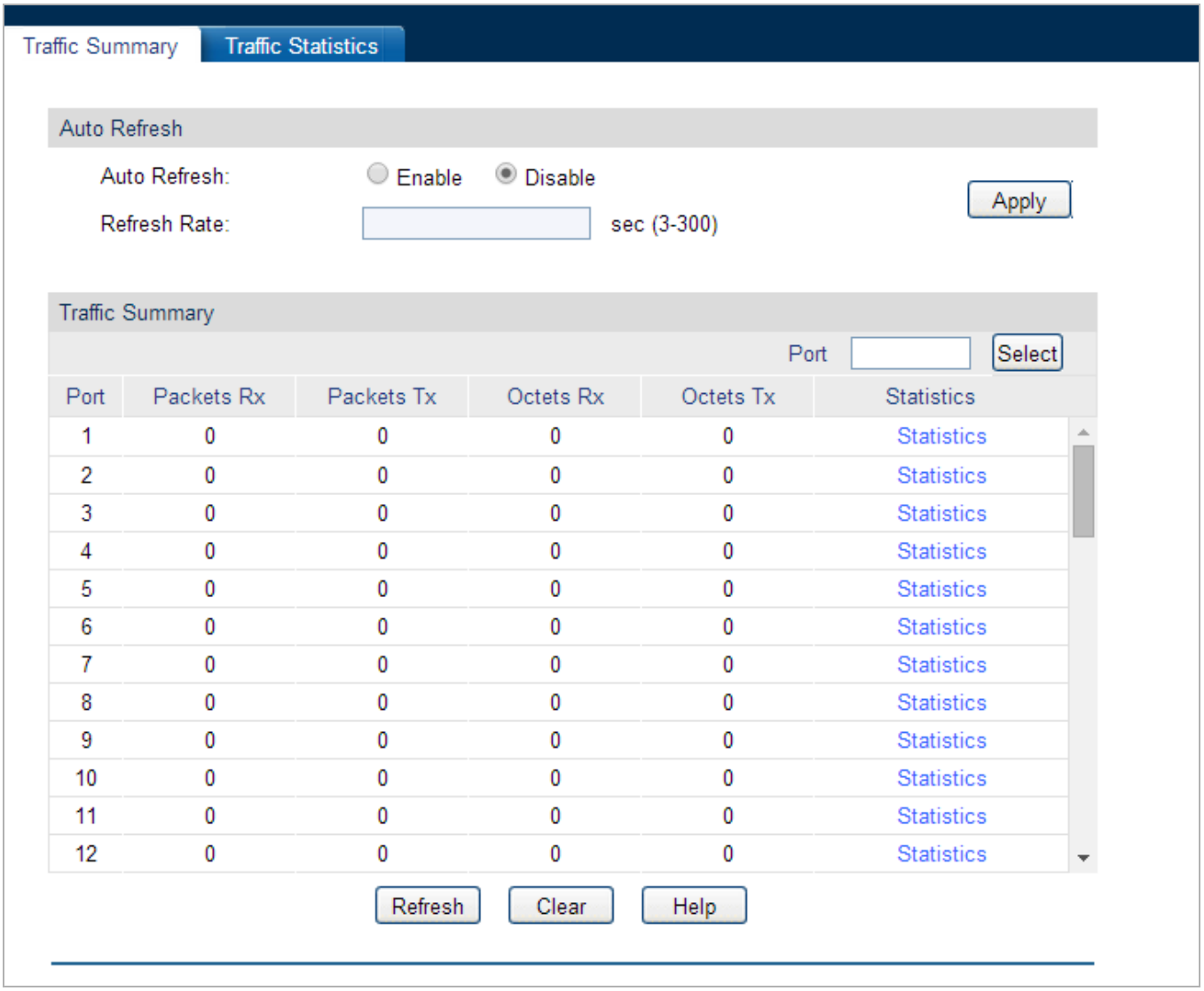


Figure 4-3-14: Traffic Summary Page Screenshot

The page includes the following fields:

Object	Description
Auto Refresh	
• **Auto Refresh**	Provides Enable/Disable refreshing the Traffic Summary automatically.
• **Refresh Rate**	Enter a value in seconds to specify the refresh interval.
Traffic Summary	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port number you entered.
• **Port**	Displays the port number.
• **Packets Rx**	Displays the number of packets received on the port. The error packets are not

	counted in.
• **Packets Tx**	Displays the number of packets transmitted on the port.
• **Octets Rx**	Displays the number of octets received on the port. The error octets are counted in.
• **Octets Tx**	Displays the number of octets transmitted on the port.
• **Statistics**	Click the **Statistics** button to view the detailed traffic statistics of the port.

4.3.3.2 Traffic Statistics

This page provides displaying the detailed traffic information of each port, which facilitates to monitor the traffic and locate faults promptly; the screen in Figure 4-3-15 appears.

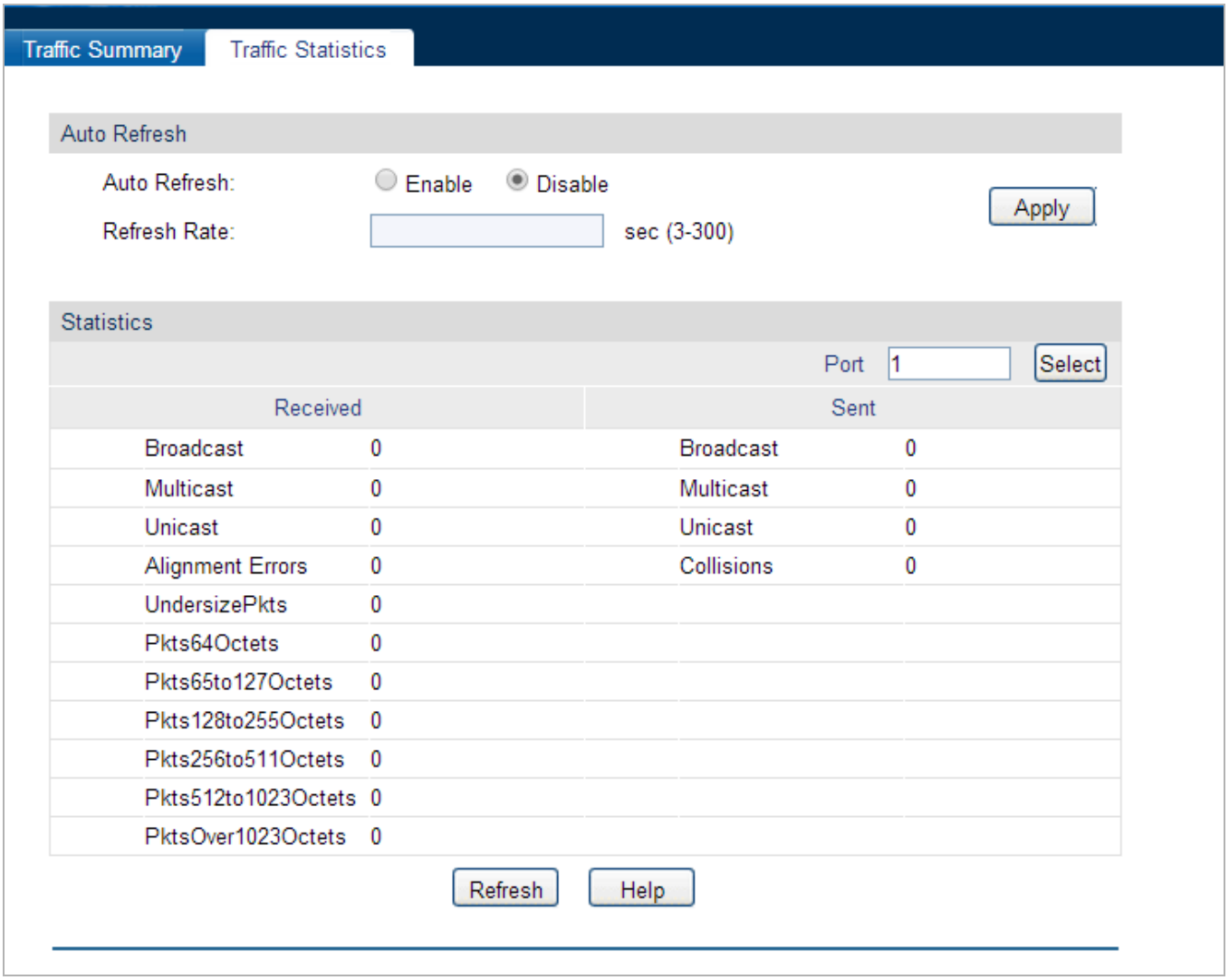


Figure 4-3-15: Traffic Statistics Page Screenshot

The page includes the following fields:

Object	Description
Auto Refresh	
• **Auto Refresh**	Provides Enable/Disable refreshing the Traffic Summary automatically.

• **Refresh Rate**	Enter a value in seconds to specify the refresh interval.
Statistics	
• **Port Select**	Enter a port number and click the Select button to view the traffic statistics of the corresponding port.
• **Receviced**	Displays the details of the packets received on the port.
• **Sent**	Displays the details of the packets transmitted on the port.
• **Broadcast**	Displays the number of good broadcast packets received or transmitted on the port. The error frames are not counted in.
• **Multicast**	Displays the number of good multicast packets received or transmitted on the port. The error frames are not counted in.
• **Unicast**	Displays the number of good unicast packets received or transmitted on the port. The error frames are not counted in.
• **Alignment Errors**	Displays the number of the received packets that have a bad Frame Check Sequence (FCS). The length of the packet is from 64 bytes to maximal bytes of the jumbo frame (usually 10240 bytes).
• **UndersizePkts**	Displays the number of the received packets (excluding error packets) that are less than 64 bytes long.
• **Pkts64Octets**	Displays the number of the received packets (including error packets) that are 64 bytes long.
• **Pkts65to127Octets**	Displays the number of the received packets (including error packets) that are between 65 and 127 bytes long.
• **Pkts128to255Octets**	Displays the number of the received packets (including error packets) that are between 128 and 255 bytes long.
• **Pkts256to511Octets**	Displays the number of the received packets (including error packets) that are between 256 and 511 bytes long.
• **Pkts512to1023Octets**	Displays the number of the received packets (including error packets) that are between 512 and 1023 bytes long.
• **PktsOver1023Octets**	Displays the number of the received packets (including error packets) that are over 1023 bytes.
• **Collisions**	Displays the number of collisions experienced by a port during packet transmissions.

4.3.4 MAC Address

The main function of the Managed Switch is forwarding the packets to the correct ports based on the destination MAC address of the packets. Address Table contains the port-based MAC address information, which is the base for the Managed Switch to forward packets quickly. The entries in the Address Table can be updated by auto-learning or configured manually. Most of the entries are generated and updated by auto-learning. In the stable networks, the static MAC address entries can facilitate the Managed Switch to reduce broadcast packets and enhance the efficiency of packets forwarding remarkably. The address filtering feature allows the Managed Switch to filter the undesired packets and forbid its forwarding so as to improve the network security.

The types and the features of the MAC Address Table are listed as follows:

Type	**Configuration Way**	**Aging out**	**Being kept after reboot** (if the configuration is saved)	**Relationship between the bound MAC address and the port**
Static Address Table	Manually configuring	No	Yes	The bound MAC address cannot be learned by the other ports in the same VLAN.
Dynamic Address Table	Automatically learning	Yes	No	The bound MAC address can be learned by the other ports in the same VLAN.
Filtering Address Table	Manually configuring	No	Yes	-

Table 5-1: Types and Features of Address Table

The screen in Figure 4-3-16 appears.

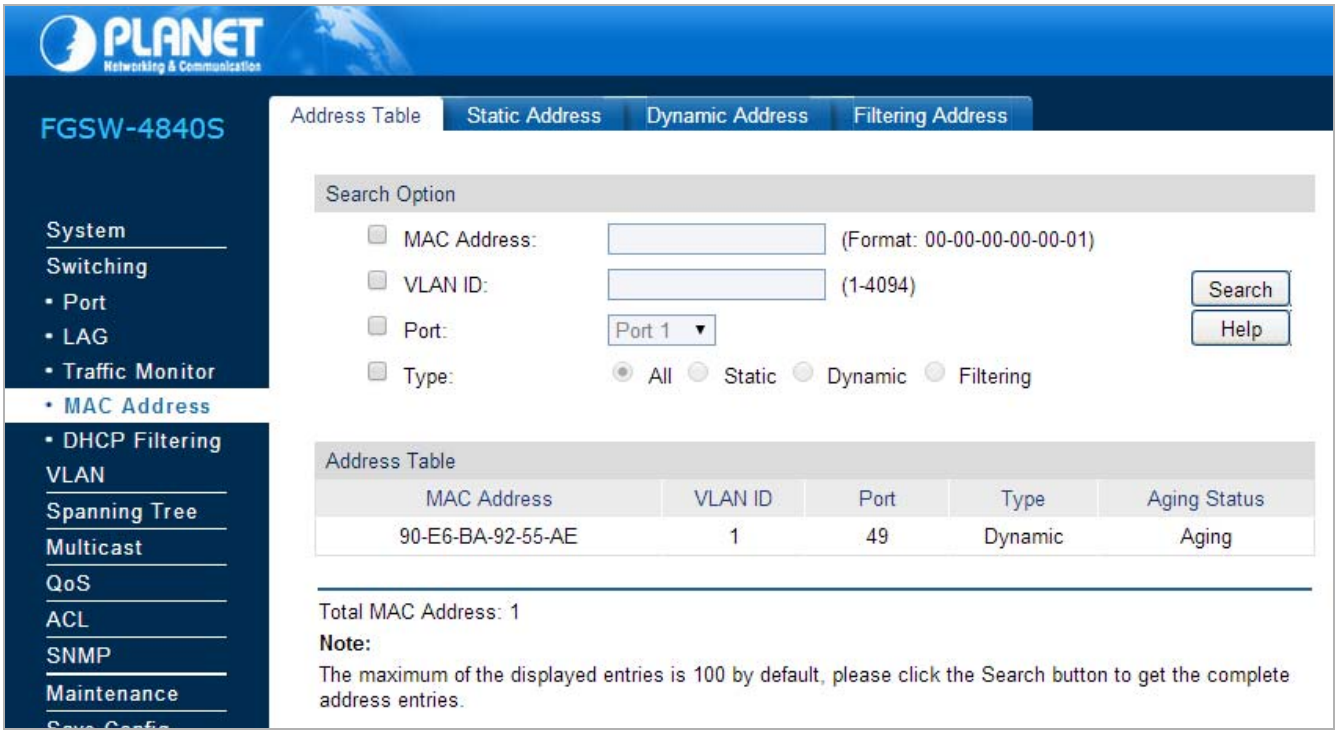


Figure 4-3-16: MAC Address Page Screenshot

The page includes the following fields:

Object	Description
• **Address Table**	Allow to view all the information of the Address Table.
• **Static Address**	The static address table maintains the static address entries which can be added or removed manually.
• **Dynamic Address**	The dynamic address can be generated by the auto-learning mechanism of the Managed Switch.
• **Filtering Address**	The filtering address is to forbid the undesired packets to be forwarded.

4.3.4.1 Address Table

This page provides viewing all the information of the Address Table; the screen in Figure 4-3-17appears.

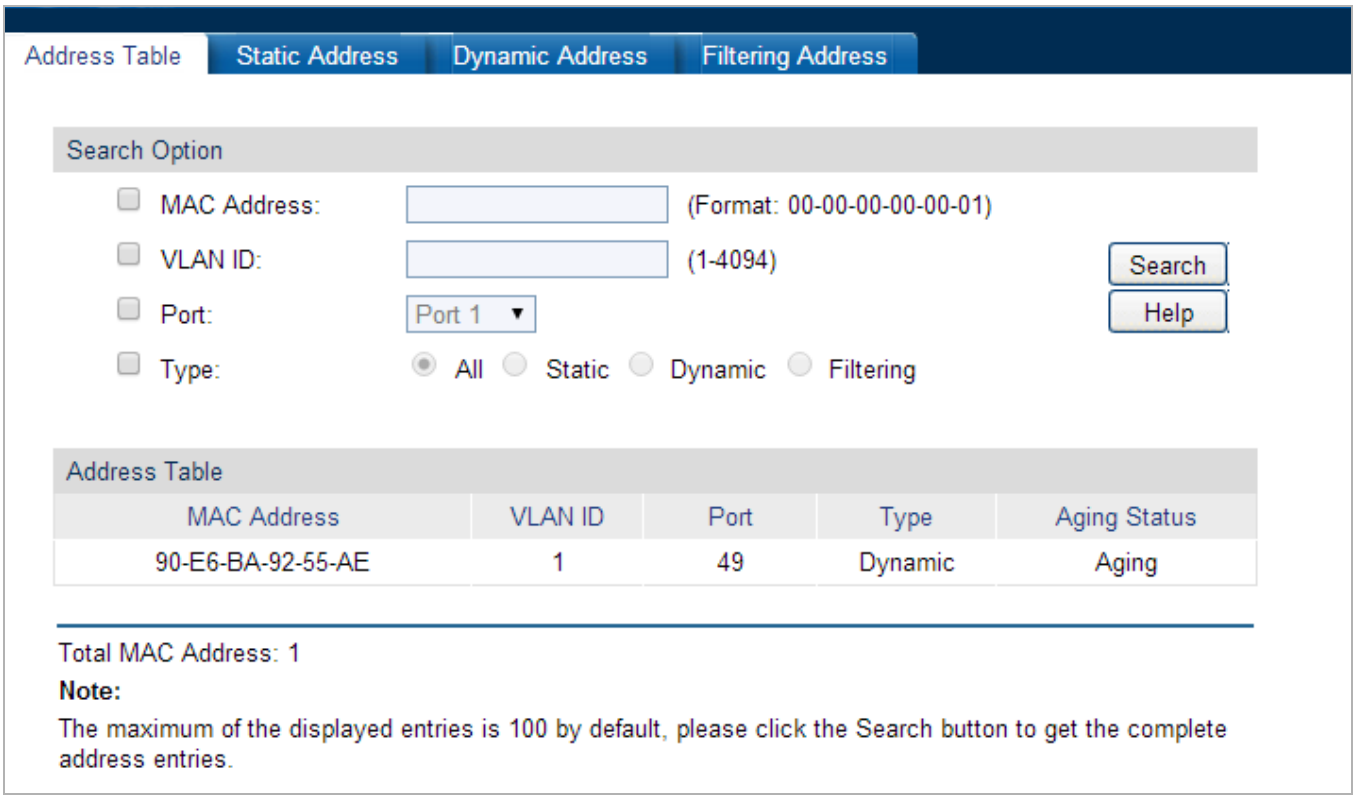


Figure 4-3-17: Address Table Page Screenshot

The page includes the following fields:

Object	Description
Search Option	
• **MAC Address**	Enter the MAC address of desired entry.
• **VLAN ID**	Enter the VLAN ID of desired entry.
• **Port**	Select the corresponding port number of your desired entry.

• **Type**	Select the type of your desired entry. ● **All:** This option allows the address table to display all the address entries. ● **Static:** This option allows the address table to display the static address entries only. ● **Dynamic:** This option allows the address table to display the dynamic address entries only. ● **Filtering:** This option allows the address table to display the filtering address entries only.
Address Table	
• **MAC Address**	Displays the MAC address learned by the Managed Switch.
• **VLAN ID**	Displays the corresponding VLAN ID of the MAC address.
• **Port**	Displays the corresponding Port number of the MAC address.
• **Type**	Displays the Type of the MAC address.
• **Aging Status**	Displays the Aging status of the MAC address.

Buttons

Search: Click to search.

Help: Click to display help web page.

4.3.4.2 Static Address

The static address table maintains the static address entries which can be added or removed manually, independent of the aging time. In the stable networks, the static MAC address entries can facilitate the Managed Switch to reduce broadcast packets and remarkably enhance the efficiency of packets forwarding without learning the address. The static MAC address learned by the port with **Port Security** enabled in the static learning mode will be displayed in the Static Address Table. The screen in Figure 4-3-18 appears.

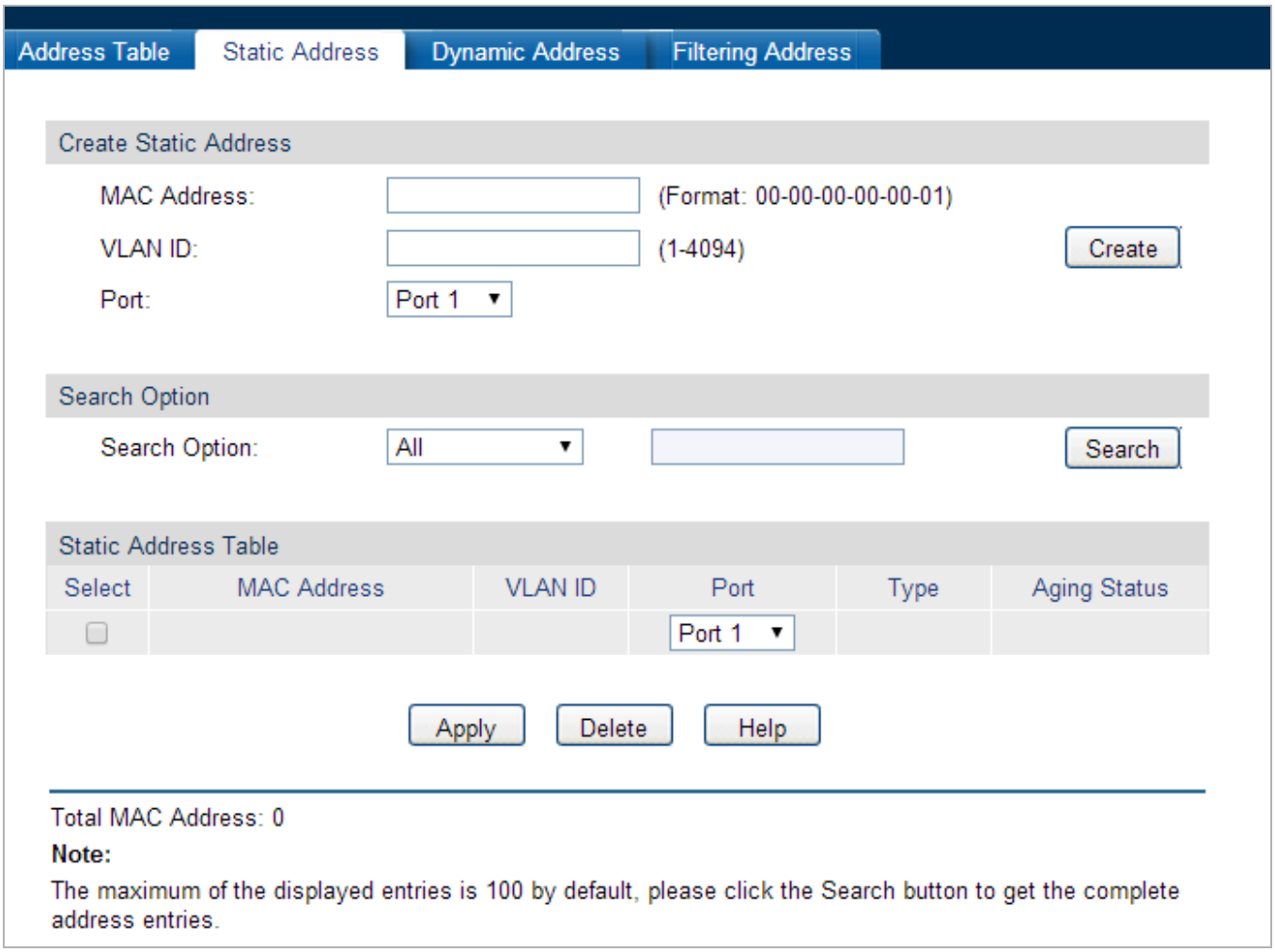


Figure 4-3-18: Static Address Page Screenshot

The page includes the following fields:

Object	Description
Create Static Address	
• **MAC Address**	Enter the static MAC Address to be bound.
• **VLAN ID**	Enter the corresponding VLAN ID of the MAC address.
• **Port**	Select a port from the pull-down list to be bound.
Search Option	
• **Search Option**	Select a Search Option from the pull-down list and click the **Search** button to find your desired entry in the Static Address Table.

	• **MAC:** Enter the MAC address of your desired entry. • **VLAN ID:** Enter the VLAN ID number of your desired entry. • **Port:** Enter the Port number of your desired entry.
Static Address Table	
• **Select**	Select the entry to delete or modify the corresponding port number. It is multi-optional.
• **MAC Address**	Displays the static MAC Address.
• **VLAN ID**	Displays the corresponding VLAN ID of the MAC address.
• **Port**	Displays the corresponding Port number of the MAC address. Here you can modify the port number to which the MAC address is bound. The new port should be in the same VLAN.
• **Type**	Displays the Type of the MAC address.
• **Aging Status**	Displays the Aging Status of the MAC address.

- If the corresponding port number of the MAC address is not correct, or the connected port (or the device) has been changed, the Managed Switch cannot forward the packets correctly. Please reset the static address entry appropriately.
- If the MAC address of a device has been added to the Static Address Table, connecting the device to another port will cause its address not to be recognized dynamically by the Managed Switch. Therefore, please ensure the entries in the Static Address Table are correct and valid.

- The MAC address in the Static Address Table cannot be added to the Filtering Address Table or bound to a port dynamically.
- This static MAC address bound function is not available if the 802.1X feature is enabled.

Buttons

Create: Click to add new static MAC Address.

Search: Click to search.

Apply: Click to apply changes.

Delete: Click to delete the current MAC address.

Help: Click to display help web page.

4.3.4.3 Dynamic Address

The dynamic address can be generated by the auto-learning mechanism of the Managed Switch. The Dynamic Address Table can update automatically by auto-learning or aging out the MAC address. To fully utilize the MAC address table, which has a limited capacity, the Managed Switch adopts an aging mechanism for updating the table. That is, the Managed Switch removes the MAC address entries related to a network device if no packet is received from the device within the aging time. This page provides configuring the dynamic MAC address entry and the screen in Figure 4-3-19 appears.

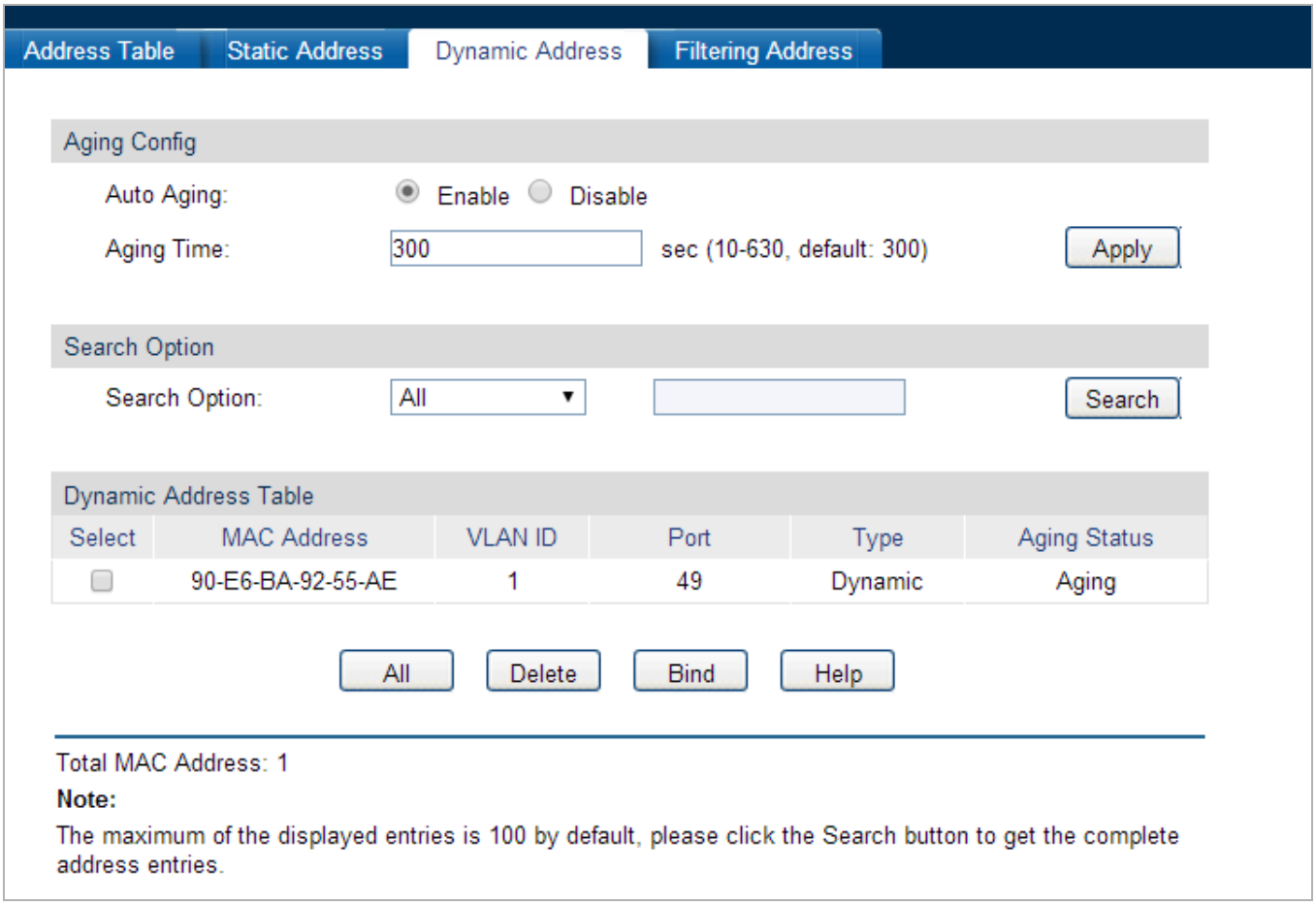


Figure 4-3-19: Dynamic Address Page Screenshot

The page includes the following fields:

Object	Description
Aging Config	
• **Auto Aging**	Allows to enable/disable the Auto Aging feature.
• **Aging Time**	Enter the Aging Time for the dynamic address.
Search Option	
• **Search Option**	Select a Search Option from the pull-down list and click the **Search** button to find your desired entry in the Dynamic Address Table. • **MAC:** Enter the MAC address of desired entry. • **VLAN ID:** Enter the VLAN ID number of desired entry.

	• **Port:** Enter the Port number of desired entry. • **LAG ID**：Enter the LAG ID of desired entry.
Dymanic Address Table	
• **Select**	Select the entry to delete the dynamic address or to bind the MAC address to the corresponding port statically. It is multi-optional.
• **MAC Address**	Displays the dynamic MAC Address.
• **VLAN ID**	Displays the corresponding VLAN ID of the MAC address.
• **Port**	Displays the corresponding port number of the MAC address.
• **Type**	Displays the Type of the MAC address.
• **Aging Status**	Displays the Aging Status of the MAC address.

Setting aging time properly helps implement effective MAC address aging. The aging time that is too long or too short results decreases the performance of the Managed Switch. If the aging time is too long, excessive invalid MAC address entries maintained by the Managed Switch may fill up the MAC address table. This prevents the MAC address table from updating with network changes in time. If the aging time is too short, the Managed Switch may remove valid MAC address entries. This decreases the forwarding performance of the Managed Switch. It is recommended to keep the default value.

Buttons

Apply: Click to apply changes.

Search: Click to search.

All: Click to select all the current MAC Address.

Delete: Click to delete the current MAC address.

Bind: Click the **Bind** button to bind the MAC address of selected entry to the corresponding port statically.

Help: Click to display help web page.

4.3.4.4 Filtering Address

The filtering address is to forbid the undesired packets to be forwarded; the filtering address can be added or removed manually, independent of the aging time. The filtering MAC address allows the Managed Switch to filter the packets which includes this MAC address as the source address or destination address, so as to guarantee the network security. The filtering MAC address entries act on all the ports in the corresponding VLAN and the screen in Figure 4-3-20 appears.

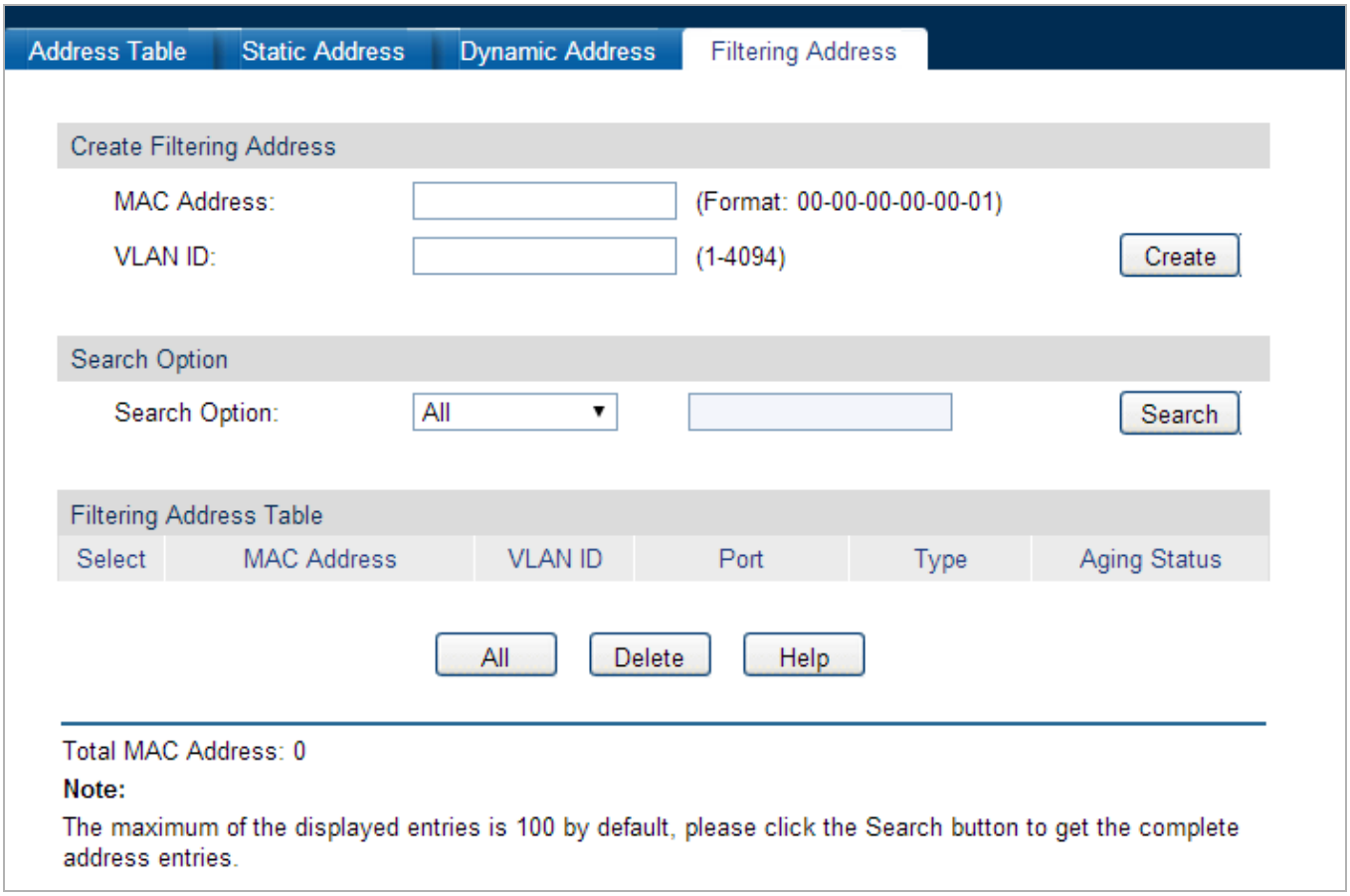


Figure 4-3-20: Filtering Address Page Screenshot

The page includes the following fields:

Object	Description
Create Filtering Address	
• **MAC Address**	Enter the MAC Address to be filtered.
• **VLAN ID**	Enter the corresponding VLAN ID of the MAC address.
Search Option	
• **Search Option**	Select a Search Option from the pull-down list and click the **Search** button to find your desired entry in the Filtering Address Table. • **MAC Address:** Enter the MAC address of desired entry. • **VLAN ID:** Enter the VLAN ID number of desired entry.
Filtering Address Table	
• **Select**	Select the entry to delete the corresponding filtering address. It is multi-optional.

• **MAC Address**	Displays the filtering MAC Address.
• **VLAN ID**	Displays the corresponding VLAN ID.
• **Port**	Here the symbol "__" indicates no specified port.
• **Type**	Displays the Type of the MAC address.
• **Aging Status**	Displays the Aging Status of the MAC address.

The MAC address in the Filtering Address Table cannot be added to the Static Address Table or bound to a port dynamically.

Buttons

Create: Click to add one new filtering address.

Search: Click to search.

All: Click to select all the current MAC Address.

Delete: Click to delete the current MAC address.

Help: Click to display help web page.

4.3.5 DHCP Filtering

Nowadays, the network is getting larger and more complicated. The amount of the PCs always exceeds that of the assigned IP addresses. The wireless network and the laptops are widely used and the locations of the PCs are always changed. Therefore, the corresponding IP address of the PC should be updated with a few configurations. DHCP (Dynamic Host Configuration Protocol) functions are to solve the above mentioned problems.

However, during the working process of DHCP, generally there is no authentication mechanism between Server and Client. If there are several DHCP servers in the network, network confusion and security problem will happen. To protect the Managed Switch from being attacked by illegal DHCP servers, configure the desired ports as trusted ports and only the clients connected to the trusted ports can receive DHCP packets from DHCP severs. Here the DHCP Filtering function performs to monitor the process of hosts obtaining IP addresses from DHCP servers.

➢ **DHCP Working Principle**

DHCP works via the "**Client/Server"** communication mode. The Client applies to the Server for configuration. The Server assigns the configuration information, such as the IP address, to the Client, so as to reach a dynamic employ of the network source. A Server can assign IP address to several Clients, which is illustrated in the following figure.

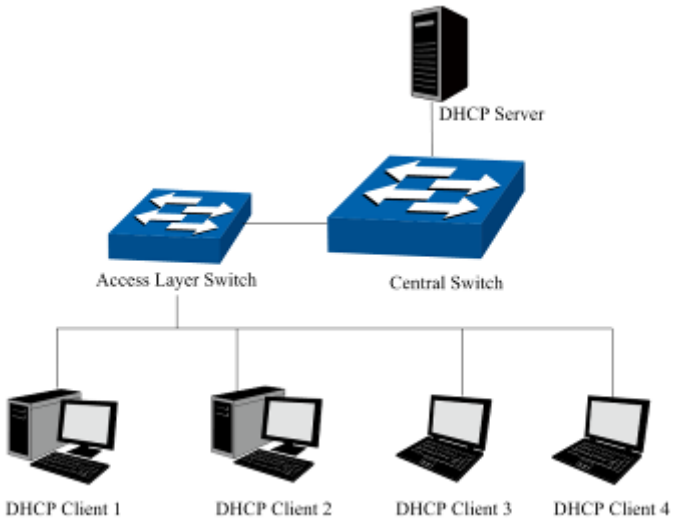


Figure 4-3-21: Network Diagram of DHCP

For different DHCP clients, DHCP server provides three IP address assigning methods:

(1) Manually assign the IP address: Allows the administrator to bind the static IP address to a specific client (e.g., WWW Server) via the DHCP server.

(2) Automatically assign the IP address: DHCP server assigns the IP address without an expiry time limitation to the clients.

(3) Dynamically assign the IP address: DHCP server assigns the IP address with an expiry time. When the time for the IP address expired, the client should apply for a new one.

Most clients obtain IP addresses dynamically, which is illustrated in the following figure.

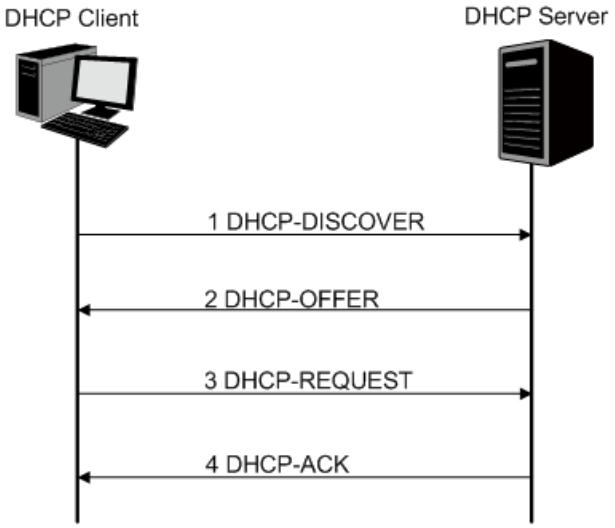


Figure 4-3-22: Interaction between a DHCP Client and a DHCP Server

（1） **DHCP-DISCOVER Stage:** The Client broadcasts the DHCP-DISCOVER packet to find the DHCP server.

（2） **DHCP-OFFER Stage:** Upon receiving the DHCP-DISCOVER packet, the DHCP server selects an IP address from the IP pool according to the assigning priority of the IP addresses and replies to the client with DHCP-OFFER packet carrying the IP address and other information.

（3） **DHCP-REQUEST Stage:** In the situation that there are several DHCP servers sending the DHCP-OFFER packets, the client will only respond to the first received DHCP-OFFER packet and broadcast the DHCP-REQUEST packet which includes the assigned IP address of the DHCP-OFFER packet.

（4） **DHCP-ACK Stage:** Since the DHCP-REQUEST packet is broadcasted, all DHCP servers on the network segment can receive it. However, only the requested server processes the request. If the DHCP server acknowledges assigning this IP address to the client, it will send the DHCP-ACK packet back to the client. Otherwise, the Server will send the DHCP-NAK packet to refuse assigning this IP address to the client.

➢ **DHCP Cheating Attack**

During the working process of DHCP, generally there is no authentication mechanism between Server and Client. If there are several DHCP servers in the network, network confusion and security problem will happen. The common cases incurring the illegal DHCP servers are the following two:

（1） It's common that the illegal DHCP server is manually configured by the user by mistake.

（2） Hacker exhausted the IP addresses of the normal DHCP server and then pretended to be a legal DHCP server to assign the IP addresses and the other parameters to Clients. For example, hacker used the pretended DHCP server to assign a modified DNS server address to users so as to induce the users to the evil financial website or electronic trading website and cheat the users of their accounts and passwords. The following figure illustrates the DHCP Cheating Attack implementation procedure.

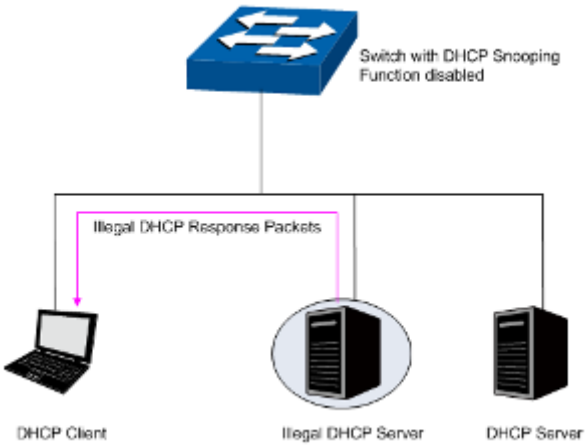


Figure 4-3-23: DHCP Cheating Attack Implementation Procedure

DHCP Filtering feature allows only the trusted ports to forward DHCP packets and thereby ensures that users get proper IP addresses. DHCP Filtering is to monitor the process of hosts obtaining the IP addresses from DHCP servers, and record the IP address, MAC address, VLAN and the connected Port number of the Host for automatic binding. DHCP Filtering feature prevents the network from the DHCP Server Cheating Attack by discarding the DHCP packets on the distrusted port, so as to enhance the network security. The screen in Figure 4-3-24 appears.

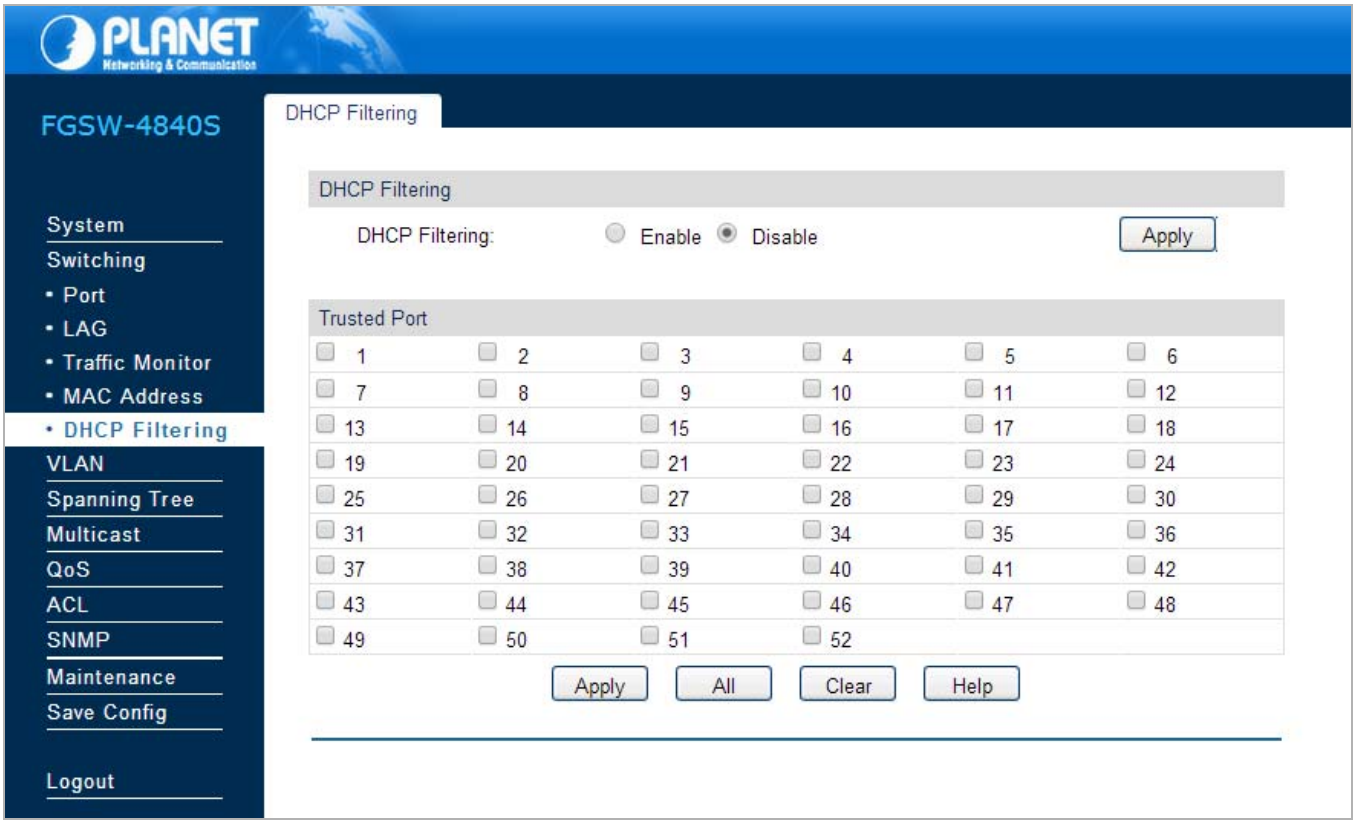


Figure 4-3-24: DHCP Filtering Page Screenshot

The page includes the following fields:

Object	Description
DHCP Filtering	
• **DHCP Filtering**	Enable/Disable the DHCP Filtering function globally.
Trusted Port	
• **Trusted Port**	Select the desired port(s) to be Trusted Port(s). Only the Trusted Port(s) can receive DHCP packets from DHCP Servers. Click the **All** buttons to select all ports. Click the **Clear** button to select none.

Buttons

Apply: Click to apply changes.

All: Click to select all ports.

Clear: Click to select none.

Help: Click to display help web page.

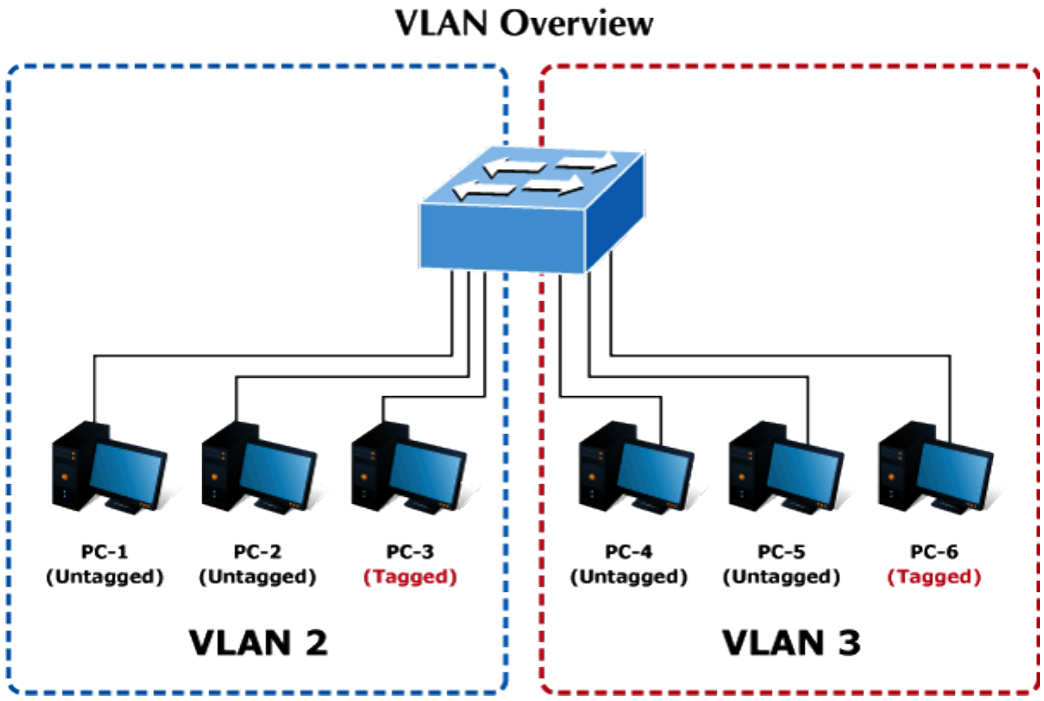
4.4 VLAN

VLAN Overview

A Virtual Local Area Network (VLAN) is a network topology configured according to a logical scheme rather than the physical layout. VLAN can be used to combine any collection of LAN segments into an autonomous user group that appears as a single LAN. VLAN also logically segment the network into different broadcast domains so that packets are forwarded only between ports within the VLAN. Typically, a VLAN corresponds to a particular subnet, although not necessarily.

VLAN can enhance performance by conserving bandwidth, and improve security by limiting traffic to specific domains.

A VLAN is a collection of end nodes grouped by logic instead of physical location. End nodes that frequently communicate with each other are assigned to the same VLAN, regardless of where they are physically on the network. Logically, a VLAN can be equated to a broadcast domain, because broadcast packets are forwarded to only members of the VLAN on which the broadcast was initiated.



Note

No matter what basis is used to uniquely identify end nodes and assign these nodes VLAN membership, packets cannot cross VLAN without a network device performing a routing function between the VLAN.

Note

The Managed Switch supports IEEE 802.1Q VLAN. The port untagging function can be used to remove the 802.1 tag from packet headers to maintain compatibility with devices that are tag-unaware.

4.4.1 IEEE 802.1Q VLAN

In large networks, routers are used to isolate broadcast traffic for each subnet into separate domains. This Managed Switch provides a similar service at Layer 2 by using VLANs to organize any group of network nodes into separate broadcast domains. VLANs confine broadcast traffic to the originating group, and can eliminate broadcast storms in large networks. This also provides a more secure and cleaner network environment.

An IEEE 802.1Q VLAN is a group of ports that can be located anywhere in the network, but communicate as though they belong to the same physical segment.

VLANs help to simplify network management by allowing you to move devices to a new VLAN without having to change any physical connections. VLANs can be easily organized to reflect departmental groups (such as Marketing or R&D), usage groups (such as e-mail), or multicast groups (used for multimedia applications such as videoconferencing).

VLANs provide greater network efficiency by reducing broadcast traffic, and allow you to make network changes without having to update IP addresses or IP subnets. VLANs inherently provide a high level of network security since traffic must pass through a configured Layer 3 link to reach a different VLAN.

This Managed Switch supports the following VLAN features:

- Up to 512 VLANs based on the IEEE 802.1Q standard
- Port overlapping, allowing a port to participate in multiple VLANs
- End stations can belong to multiple VLANs
- Passing traffic between VLAN-aware and VLAN-unaware devices

IEEE 802.1Q Standard

IEEE 802.1Q (tagged) VLAN are implemented on the Managed Switch. 802.1Q VLAN require tagging, which enables them to span the entire network (assuming all switches on the network are IEEE 802.1Q-compliant).

VLAN allow a network to be segmented in order to reduce the size of broadcast domains. All packets entering a VLAN will only be forwarded to the stations (over IEEE 802.1Q enabled switches) that are members of that VLAN, and this includes broadcast, multicast and unicast packets from unknown sources.

VLAN can also provide a level of security to your network. IEEE 802.1Q VLAN will only deliver packets between stations that are members of the VLAN. Any port can be configured as either **tagging** or **untagging**:

- The untagging feature of IEEE 802.1Q VLAN allows VLAN to work with legacy switches that don't recognize VLAN tags in packet headers.
- The tagging feature allows VLAN to span multiple 802.1Q-compliant switches through a single physical connection and allows Spanning Tree to be enabled on all ports and work normally.

Some relevant terms:

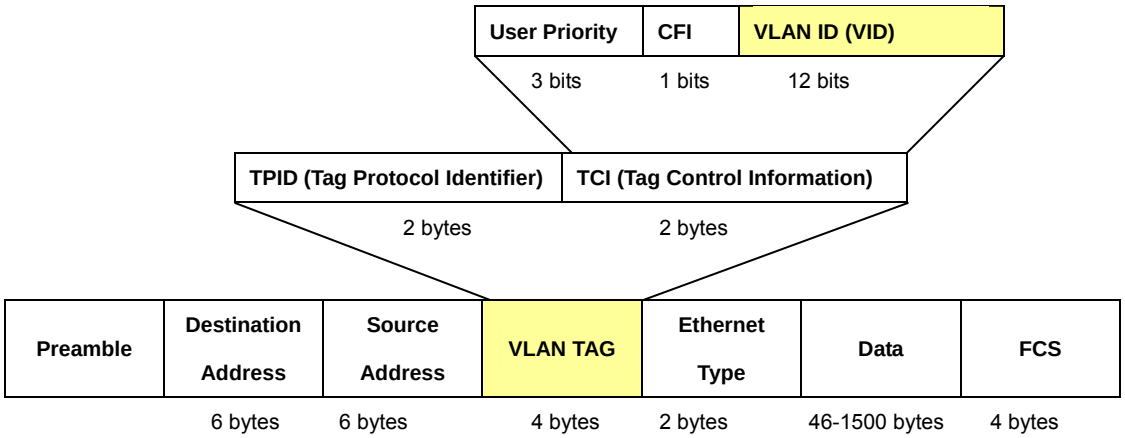
- **Tagging** - The act of putting 802.1Q VLAN information into the header of a packet.
- **Untagging** - The act of stripping 802.1Q VLAN information out of the packet header.

802.1Q VLAN Tags

The figure below shows the 802.1Q VLAN tag. There are four additional octets inserted after the source MAC address. Their presence is indicated by a value of **0x8100** in the Ether Type field. When a packet's Ether Type field is equal to 0x8100, the packet carries the IEEE 802.1Q/802.1p tag. The tag is contained in the following two octets and consists of 3 bits of user priority, 1 bit of Canonical Format Identifier (CFI - used for encapsulating Token Ring packets so they can be carried across Ethernet backbones), and 12 bits of **VLAN ID (VID)**. The 3 bits of user priority are used by 802.1p. The VID is the VLAN identifier and is used by the 802.1Q standard. Because the VID is 12 bits long, 4094 unique VLAN can be identified.

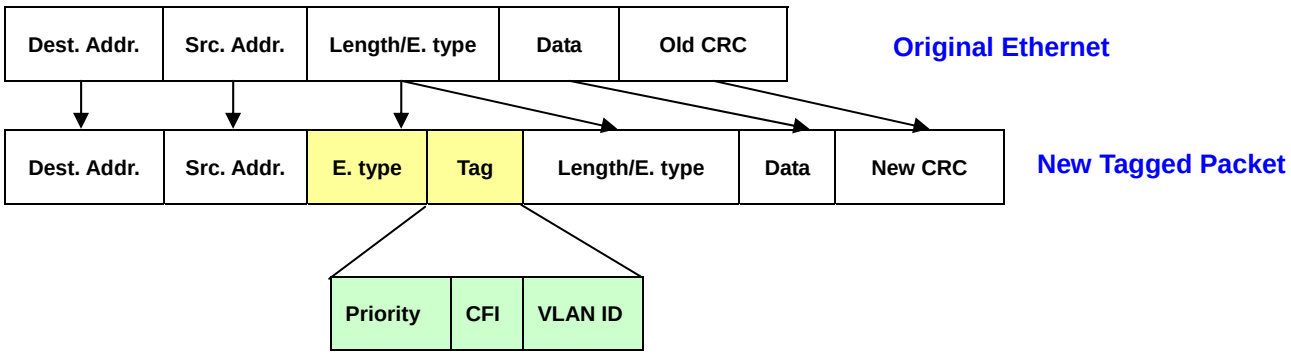
The tag is inserted into the packet header making the entire packet longer by 4 octets. All of the information originally contained in the packet is retained.

802.1Q Tag



The Ether Type and VLAN ID are inserted after the MAC source address, but before the original Ether Type/Length or Logical Link Control. Because the packet is now a bit longer than it was originally, the Cyclic Redundancy Check (CRC) must be recalculated.

Adding an IEEE802.1Q Tag



Port VLAN ID

Packets that are tagged (are carrying the 802.1Q VID information) can be transmitted from one 802.1Q compliant network device to another with the VLAN information intact. This allows 802.1Q VLAN to span network devices (and indeed, the entire network – if all network devices are 802.1Q compliant).

Every physical port on a switch has a PVID. 802.1Q ports are also assigned a PVID, for use within the switch. If no VLAN are defined on the switch, all ports are then assigned to a default VLAN with a PVID equal to 1. Untagged packets are assigned the

PVID of the port on which they were received. Forwarding decisions are based upon this PVID, in so far as VLAN are concerned. Tagged packets are forwarded according to the VID contained within the tag. Tagged packets are also assigned a PVID, but the PVID is not used to make packet forwarding decisions, the VID is.

Tag-aware switches must keep a table to relate PVID within the switch to VID on the network. The switch will compare the VID of a packet to be transmitted to the VID of the port that is to transmit the packet. If the two VID are different the switch will drop the packet. Because of the existence of the PVID for untagged packets and the VID for tagged packets, tag-aware and tag-unaware network devices can coexist on the same network.

A switch port can have only one PVID, but can have as many VID as the switch has memory in its VLAN table to store them.

Because some devices on a network may be tag-unaware, a decision must be made at each port on a tag-aware device before packets are transmitted – should the packet to be transmitted have a tag or not? If the transmitting port is connected to a tag-unaware device, the packet should be untagged. If the transmitting port is connected to a tag-aware device, the packet should be tagged.

Default VLANs

The Managed Switch initially configures one VLAN, VID = 1, called **"default."** The factory default setting assigns all ports on the Managed Switch to the **"default"**. As new VLAN are configured in Port-based mode, their respective member ports are removed from the "default."

Assigning Ports to VLANs

Before enabling VLANs for the Managed Switch, you must first assign each port to the VLAN group(s) in which it will participate. By default all ports are assigned to VLAN 1 as untagged ports. Add a port as a tagged port if you want it to carry traffic for one or more VLANs, and any intermediate network devices or the host at the other end of the connection supports VLANs. Then assign ports on the other VLAN-aware network devices along the path that will carry this traffic to the same VLAN(s), either manually or dynamically using GVRP. However, if you want a port on this Managed Switch to participate in one or more VLANs, but none of the intermediate network devices nor the host at the other end of the connection supports VLANs, then you should add this port to the VLAN as an untagged port.

VLAN-tagged frames can pass through VLAN-aware or VLAN-unaware network interconnection devices, but the VLAN tags should be stripped off before passing it on to any end-node host that does not support VLAN tagging.

VLAN Classification

When the Managed Switch receives a frame, it classifies the frame in one of two ways. If the frame is untagged, the Managed Switch assigns the frame to an associated VLAN (based on the default VLAN ID of the receiving port). But if the frame is tagged, the Managed Switch uses the tagged VLAN ID to identify the port broadcast domain of the frame.

Port Overlapping

Port overlapping can be used to allow access to commonly shared network resources among different VLAN groups, such as file servers or printers. Note that if you implement VLANs which do not overlap, but still need to communicate, you can connect them by enabled routing on this Managed Switch.

Untagged VLANs

Untagged (or static) VLANs are typically used to reduce broadcast traffic and to increase security. A group of network users assigned to a VLAN form a broadcast domain that is separate from other VLANs configured on the Managed Switch. Packets are forwarded only between ports that are designated for the same VLAN. Untagged VLANs can be used to manually isolate user groups or subnets.

4.4.2 VLAN Config

This page provides configuring the 802.1Q VLAN and its ports; the screen in Figure 4-4-2 appears.

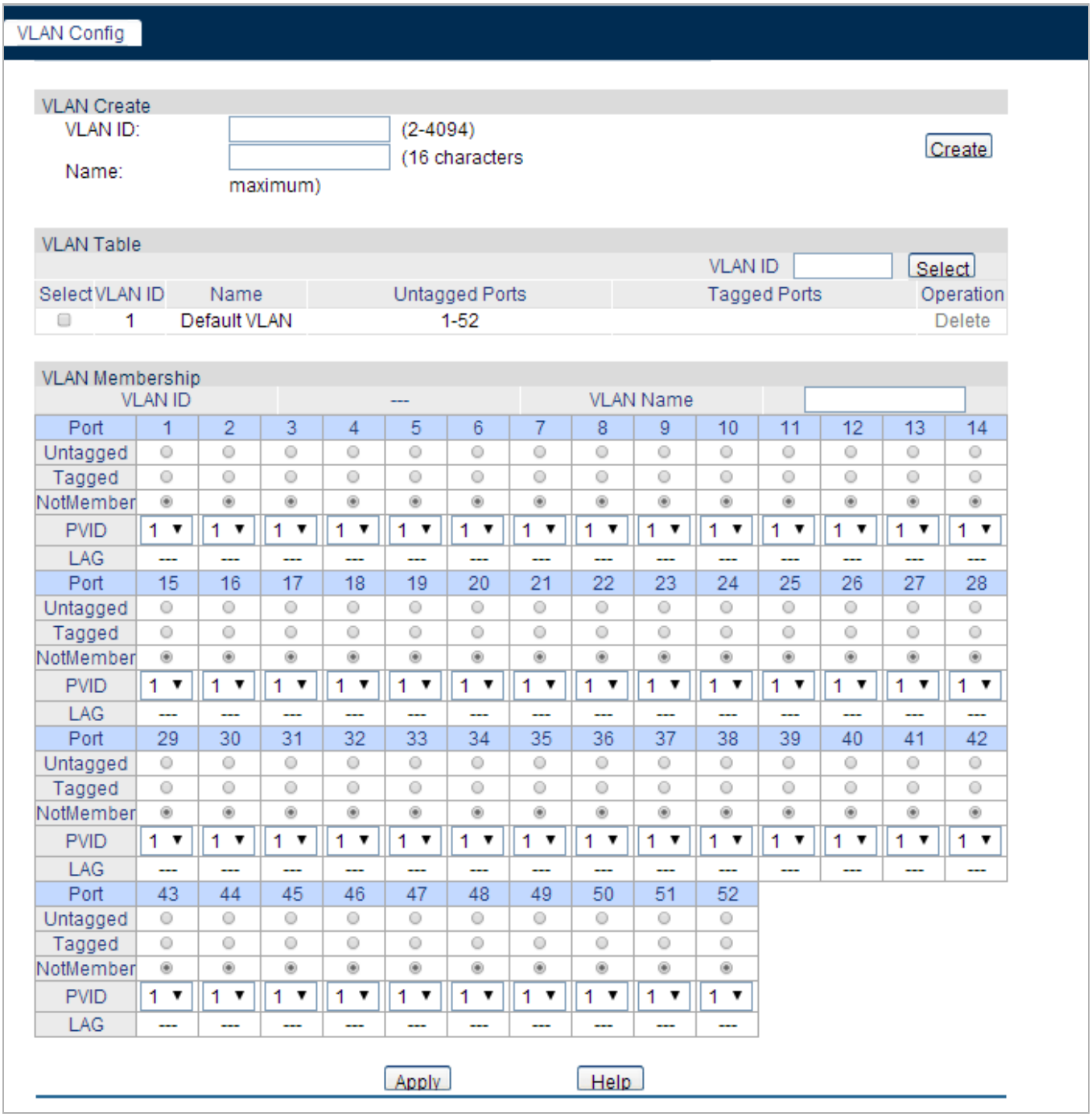


Figure 4-4-2: VLAN Config Page Screenshot

The page includes the following fields:

Object	Description
VLAN Create	
• **VLAN ID**	Enter the VLAN ID that wants to create. It ranges from 2 to 4094.
• **Name**	Give a name to the VLAN for identification.

VLAN Table	
• **VLAN ID Select**	Click the **Select** button to quickly select the corresponding VLAN based on the VLAN ID you entered.
• **Select**	Select the desired port for configuration.
• **VLAN ID**	Displays the VLAN ID.
• **Name**	Displays the name of the specific VLAN.
• **Untagged Ports**	Show the untagged ports of the specific VLAN.
• **Tagged Ports**	Show the tagged ports of the specific VLAN.
• **Operation**	Delete the specific VLAN when clicking the word **"Delete"**.
VLAN Membership	
• **VLAN ID**	Displays the VLAN ID that is chosen.
• **VLAN Name**	Set the name of the VLAN that is chosen.
• **Port**	Displays the port number.
• **Untagged**	The port will be an untagged member of the specific VLAN if selected.
• **Tagged**	The port will be a tagged member of the specific VLAN if selected.
• **NotMember**	The port will not be a member of the specific VLAN if selected.
• **PVID**	Change the PVID of the specific port.
• **LAG**	Displays the LAG to which the port belongs.

Buttons

Create: Click to new 802.1Q VLAN groups.

Apply: Click to apply changes.

Help: Click to display help web page.

Note

- The VLAN ID range is 2 to 4094.
- The VLAN name can accept 16 characters only.

VLAN setting example:

- Separate VLANs
- 802.1Q VLAN Trunk

Two separate 802.1Q VLANs

The diagram shows how the Managed Switch handles Tagged and Untagged traffic flow for two VLANs. VLAN Group 2 and VLAN Group 3 are separated VLANs. Each VLAN isolate network traffic so only members of the VLAN receive traffic from the same VLAN members. The screen in Figure 4-4-3 appears and Table 4-4-1 describes the port configuration of the Managed Switches.

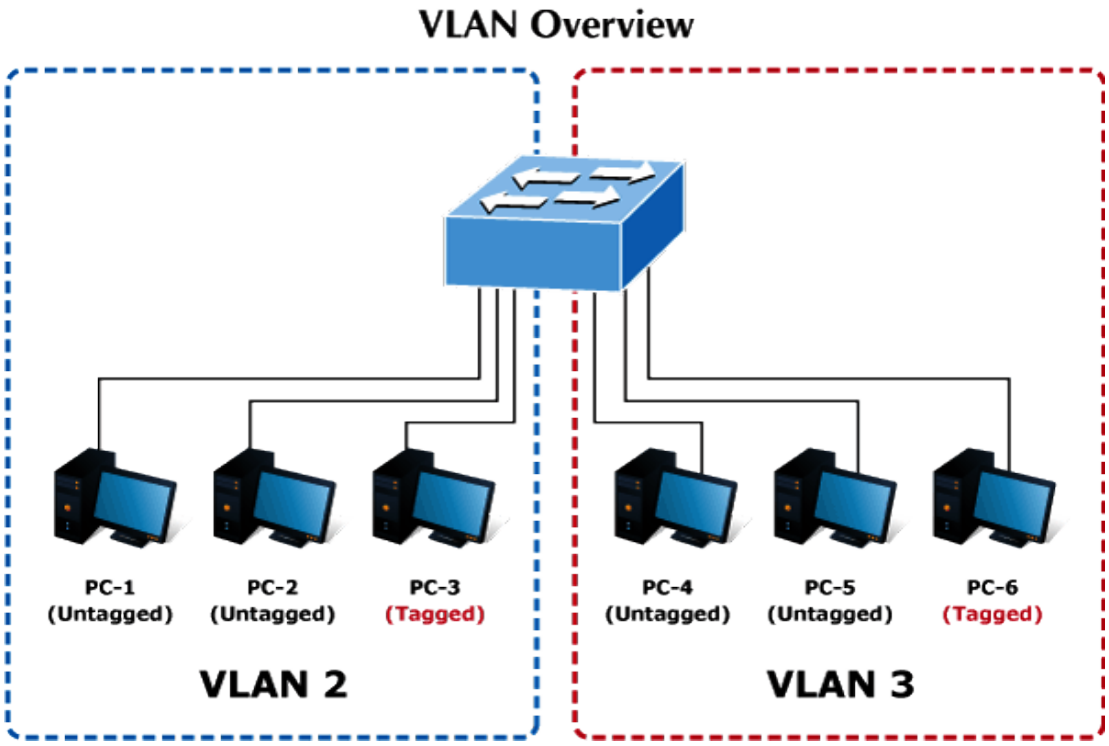


Figure 4-4-3: Two Separate VLAN Diagrams

VLAN Group	VID	Untagged Members	Tagged Members
VLAN Group 1	1	Port-7~Port-8	N/A
VLAN Group 2	2	Port-1,Port-2	Port-3
VLAN Group 3	3	Port-4,Port-5	Port-6

Table 4-4-1: VLAN and Port Configuration

The scenario is described as follows:

■ Untagged packet entering VLAN 2

1. While **[PC-1]** an **untagged** packet enters **Port-1**, the Managed Switch will tag it with a **VLAN Tag=2**. **[PC-2]** and **[PC-3]** will receive the packet through **Port-2** and **Port-3**.
2. [PC-4],[PC-5] and [PC-6] received no packet.
3. While the packet leaves **Port-2**, it will be stripped away becoming an **untagged** packet.
4. While the packet leaves **Port-3**, it will be kept as a **tagged** packet with **VLAN Tag=2**.

■ Tagged packet entering VLAN 2

1. While **[PC-3]** a **tagged** packet with **VLAN Tag=2** enters **Port-3**, **[PC-1]** and **[PC-2]** will receive the packet through **Port-1** and **Port-2**.
2. While the packet leaves **Port-1** and **Port-2**, it will be stripped away becoming an **untagged** packet.

■ Untagged packet entering VLAN 3

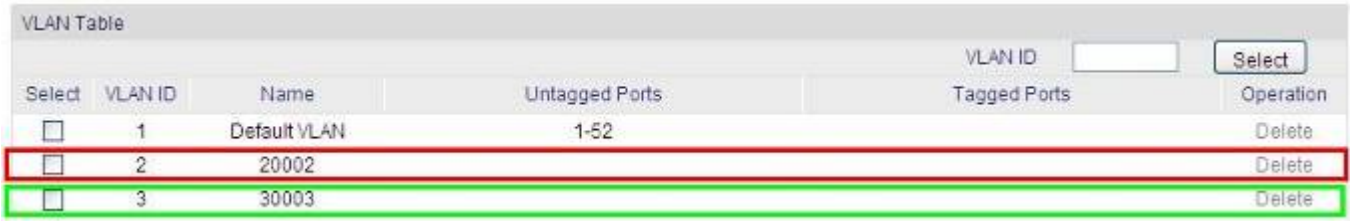
1. While **[PC-4]** an **untagged** packet enters **Port-4**, the Managed Switch will tag it with a **VLAN Tag=3**. **[PC-5]** and **[PC-6]** will receive the packet through **Port-5** and **Port-6**.
2. While the packet leaves **Port-5**, it will be stripped away becoming an **untagged** packet.
3. While the packet leaves **Port-6**, it will be kept as a **tagged** packet with **VLAN Tag=3**.

In this example, VLAN Group 1 is set as default VLAN, but only focuses on VLAN 2 and VLAN 3 traffic flow.

Setup steps

1. Create VLAN Group 2 and 3

Add VLAN group 2 and group 3.



2. Assign member port to VLAN group 2 and group 3:

Port-1,Port-2 and Port-3: VLAN 2 group.

Port-4,Port-5 and Port-6: VLAN 3 group.

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☑	2	20002	1-3		Delete
☐	3	30003	4-6		Delete

VLAN Membership

VLAN ID 2 VLAN Name 20002

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	◉	◉	◉	○	○	○	○	○	○	○	○	○	○	○
Tagged	○	○	○	○	○	○	○	○	○	○	○	○	○	○
NotMember	○	○	○	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
PVID	1	1	1	1	1	1	1	1	1	1	1	1	1	1
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☐	2	20002	1-3		Delete
☑	3	30003	4-6		Delete

VLAN Membership

VLAN ID 3 VLAN Name 30003

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	○	○	○	◉	◉	◉	○	○	○	○	○	○	○	○
Tagged	○	○	○	○	○	○	○	○	○	○	○	○	○	○
NotMember	◉	◉	◉	○	○	○	◉	◉	◉	◉	◉	◉	◉	◉
PVID	1	1	1	1	1	1	1	1	1	1	1	1	1	1
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---

3. Assign Tagged/Untagged to each port:

4. Assign PVID to each port:

VLAN ID = 2:

Port-1 & 2 = Untagged with PVID 2.

Port-3 = Tagged with PVID 2.

Port -4~6 = Not Member.

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☑	2	20002	1-2	3	Delete
☐	3	30003	4-6		Delete

VLAN Membership

VLAN ID: 2 VLAN Name: 20002

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	◉	◉	○	○	○	○	○	○	○	○	○	○	○	○
Tagged	○	○	◉	○	○	○	○	○	○	○	○	○	○	○
NotMember	○	○	○	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
PVID	2	2	2	1	1	1	1	1	1	1	1	1	1	1
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Port	15	16	17	18	19	20	21	22	23	24	25	26	27	28

VLAN ID = 3:

Port-4 & 5 = Untagged with PVID 3.

Port -6 = Tagged with PVID 3.

Port-1~3 = Not Member.

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☐	2	20002	1-2	3	Delete
☑	3	30003	4-5	6	Delete

VLAN Membership

VLAN ID: 3 VLAN Name: 30003

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	○	○	○	◉	◉	○	○	○	○	○	○	○	○	○
Tagged	○	○	○	○	○	◉	○	○	○	○	○	○	○	○
NotMember	◉	◉	◉	○	○	○	◉	◉	◉	◉	◉	◉	◉	◉
PVID	2	2	2	3	3	3	1	1	1	1	1	1	1	1
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Port	15	16	17	18	19	20	21	22	23	24	25	26	27	28

VLAN Trunking between two 802.1Q aware switches

Most of the cases are used for "**Uplink**" to other switches. VLANs are separated at different switches, but they need to access with other switches within the same VLAN group. The screen in Figure 4-4-4 appears.

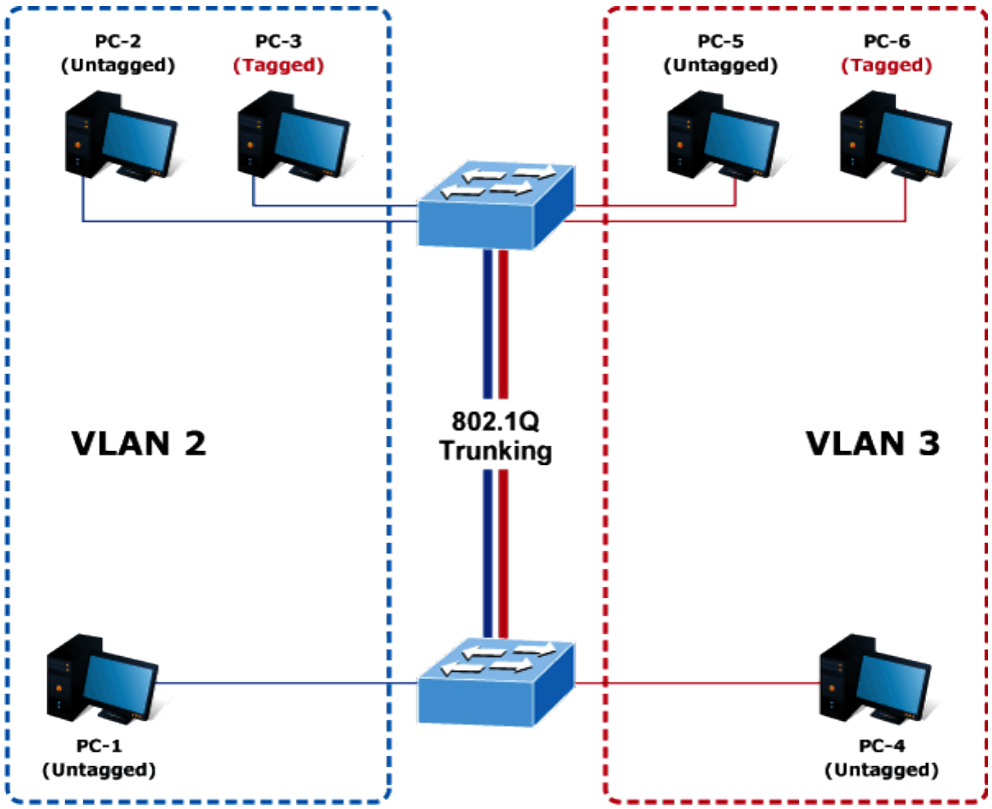


Figure 4-4-4: VLAN Trunking between Two 802.1Q Aware Switches Diagrams

Setup steps

1. Create VLAN Group 2 and 3

Add VLAN group 2 and group 3.

VLAN Table

VLAN ID [ ] Select

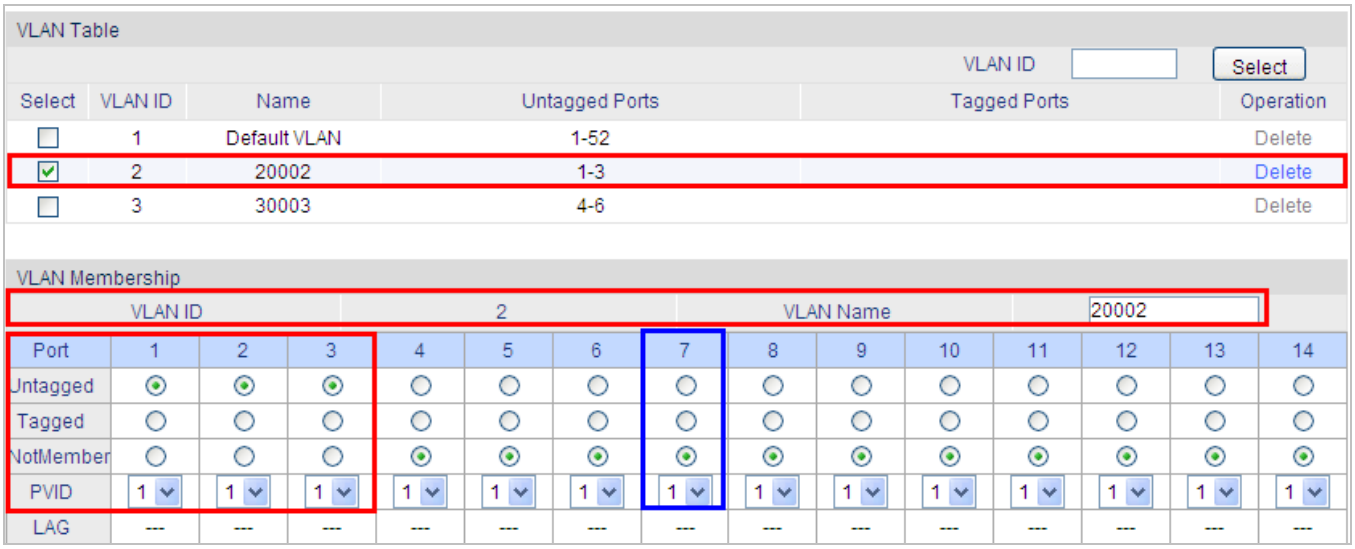
Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☐	2	20002			Delete
☐	3	30003			Delete

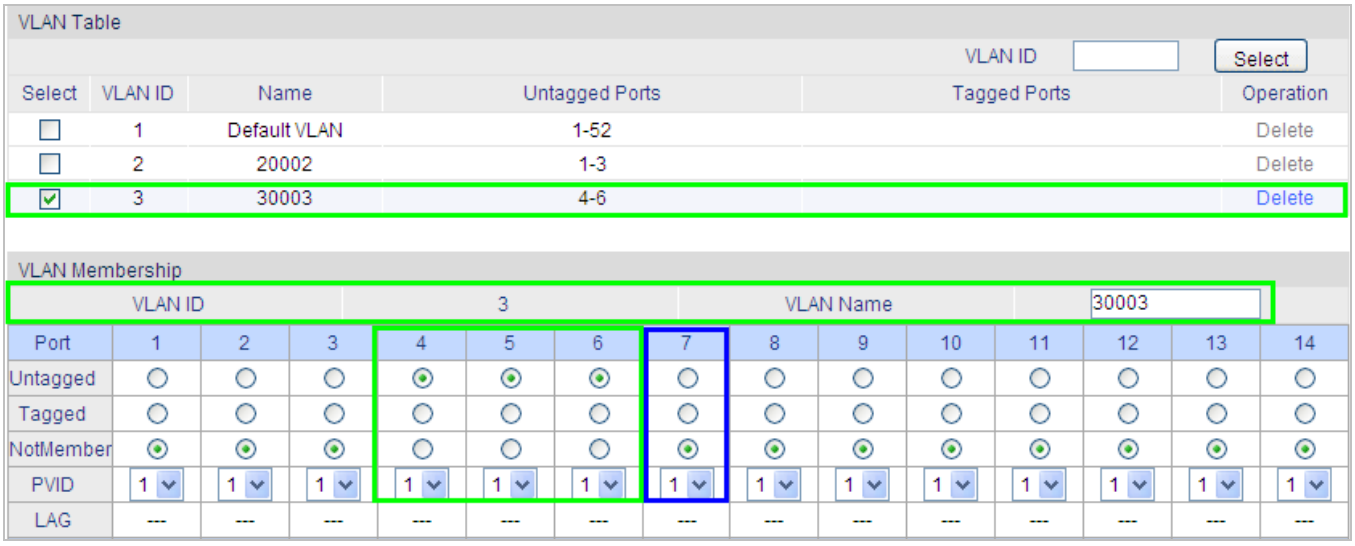
2. Assign member port to VLAN group 2 and group 3:

Port-1,Port-2 and Port-3: VLAN 2 group.

Port-4,Port-5 and Port-6: VLAN 3 group.

Port-7 : VLAN 1 group.





3. Assign Tagged/Untagged to each port:

4. Assign PVID to each port:

VLAN ID = 1:

Port-1~3 = Untagged with PVID 2.

Port-4~6 = Untagged with PVID 3.

Port -7 = Tagged with PVID 1.

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☑	1	Default VLAN	1-52		Delete
☐	2	20002	1-2	3	Delete
☐	3	30003	4-5	6	Delete

VLAN Membership

VLAN ID 1 VLAN Name Default VLAN

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	◉	◉	◉	◉	◉	◉	○	◉	◉	◉	◉	◉	◉	◉
Tagged	○	○	○	○	○	○	◉	○	○	○	○	○	○	○
NotMember	○	○	○	○	○	○	○	○	○	○	○	○	○	○
PVID	2	2	2	3	3	3	1	1	1	1	1	1	1	1
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---

VLAN ID = 2:

Port-1 & 2 = Untagged with PVID 2.

Port-3 = Tagged with PVID 2.

Port-7 = Tagged with PVID 1.

Port -4~6 = Not Member.

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☑	2	20002	1-2	3	Delete
☐	3	30003	4-5	6	Delete

VLAN Membership

VLAN ID 2 VLAN Name 20002

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	◉	◉	○	○	○	○	○	○	○	○	○	○	○	○
Tagged	○	○	◉	○	○	○	◉	○	○	○	○	○	○	○
NotMember	○	○	○	◉	◉	◉	○	◉	◉	◉	◉	◉	◉	◉
PVID	2	2	2	3	3	3	1	1	1	1	1	1	1	1
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---

VLAN ID = 3:

Port-4 & 5 = Untagged with PVID 3.

Port -6 = Tagged with PVID 3.

Port -7= Tagged with PVID 1.

Port-1~3 = Not Member.

VLAN Table

VLAN ID [ ] Select

Select	VLAN ID	Name	Untagged Ports	Tagged Ports	Operation
☐	1	Default VLAN	1-52		Delete
☐	2	20002	1-2	3	Delete
☑	3	30003	4-5	6	Delete

VLAN Membership

VLAN ID 3 VLAN Name 30003

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Untagged	○	○	○	◉	◉	○	○	○	○	○	○	○	○	○
Tagged	○	○	○	○	○	◉	◉	○	○	○	○	○	○	○
NotMember	◉	◉	◉	○	○	○	○	◉	◉	◉	◉	◉	◉	◉
PVID	2 ▼	2 ▼	2 ▼	3 ▼	3 ▼	3 ▼	1 ▼	1 ▼	1 ▼	1 ▼	1 ▼	1 ▼	1 ▼	1 ▼
LAG	---	---	---	---	---	---	---	---	---	---	---	---	---	---

4.5 Spanning Tree

Theory

The Spanning Tree Protocol can be used to detect and disable network loops, and to provide backup links between switches, bridges or routers. This allows the Managed Switch to interact with other bridging devices in your network to ensure that only one route exists between any two stations on the network, and provide backup links which automatically take over when a primary link goes down. The spanning tree algorithms supported by this Managed Switch include these versions:

- **STP – Spanning Tree Protocol (IEEE 802.1D)**
- **RSTP – Rapid Spanning Tree Protocol (IEEE 802.1w)**
- **MSTP – Multiple Spanning Tree Protocol (IEEE 802.1s)**

The **IEEE 802.1D Spanning Tree** Protocol and **IEEE 802.1w Rapid Spanning Tree** Protocol allow for the blocking of links between switches that form loops within the network. When multiple links between switches are detected, a primary link is established. Duplicated links are blocked from use and become standby links. The protocol allows for the duplicate links to be used in the event of a failure of the primary link. Once the Spanning Tree Protocol is configured and enabled, primary links are established and duplicated links are blocked automatically. The reactivation of the blocked links (at the time of a primary link failure) is also accomplished automatically without operator intervention.

This automatic network reconfiguration provides maximum uptime to network users. However, the concepts of the Spanning Tree Algorithm and protocol are a complicated and complex subject and must be fully researched and understood. It is possible to cause serious degradation of the performance of the network if the Spanning Tree is incorrectly configured. Please read the following before making any changes from the default values.

The Managed Switch STP performs the following functions:

- Creates a single spanning tree from any combination of switching or bridging elements.
- Creates multiple spanning trees – from any combination of ports contained within a single Managed Switch, in user specified groups.
- Automatically reconfigures the spanning tree to compensate for the failure, addition, or removal of any element in the tree.
- Reconfigures the spanning tree without operator intervention.

Bridge Protocol Data Units

For STP to arrive at a stable network topology, the following information is used:

- The unique Managed Switch identifier.
- The path cost to the root associated with each Managed Switch port.
- The port identifier.

STP communicates between switches on the network using Bridge Protocol Data Units (BPDUs). Each BPDU contains the following information:

- The unique identifier of the Managed Switch that the transmitting Managed Switch currently believes is the root

switch.

- The path cost to the root from the transmitting port.
- The port identifier of the transmitting port.

The Managed Switch sends BPDUs to communicate and construct the spanning-tree topology. All switches connected to the LAN on which the packet is transmitted will receive the BPDU. BPDUs are not directly forwarded by the Managed Switch, but the receiving switch uses the information in the frame to calculate a BPDU, and, if the topology changes, initiates a BPDU transmission.

The communication between switches via BPDUs results in the following:

- One Managed Switch is elected as the root switch.
- The shortest distance to the root switch is calculated for each Managed Switch.
- A designated Managed Switch is selected. This is the Managed Switch closest to the root switch through which packets will be forwarded to the root.
- A port for each Managed Switch is selected. This is the port providing the best path from the Managed Switch to the root switch.
- Ports included in the STP are selected.

Creating a Stable STP Topology

It is to make the root port a fastest link. If all switches have STP enabled with default settings, the Managed Switch with the lowest MAC address in the network will become the root switch. By increasing the priority (lowering the priority number) of the best Managed Switch, STP can be forced to select the best Managed Switch as the root switch.

When STP is enabled using the default parameters, the path between source and destination stations in a switched network might not be ideal. For instance, connecting higher-speed links to a port that has a higher number than the current root port can cause a root-port change.

STP Port States

The BPDUs take some time to pass through a network. This propagation delay can result in topology changes where a port that transitioned directly from a Blocking state to a Forwarding state could create temporary data loops. Ports must wait for new network topology information to propagate throughout the network before starting to forward packets. They must also wait for the packet lifetime to expire for BPDU packets that were forwarded based on the old topology. The forward delay timer is used to allow the network topology to stabilize after a topology change. In addition, STP specifies a series of states a port must transition through to further ensure that a stable network topology is created after a topology change.

Each port on a switch using STP exists is in one of the following five states:

- **Blocking** – the port is blocked from forwarding or receiving packets.
- **Listening** – the port is waiting to receive BPDU packets that may tell the port to go back to the blocking state.
- **Learning** – the port is adding addresses to its forwarding database, but not yet forwarding packets.
- **Forwarding** – the port is forwarding packets.
- **Disabled** – the port only responds to network management messages and must return to the blocking state first.

A port transitions from one state to another as follows:

- From initialization (switch boot) to blocking.
- From blocking to listening or to disabled.
- From listening to learning or to disabled.
- From learning to forwarding or to disabled.
- From forwarding to disabled.
- From disabled to blocking.

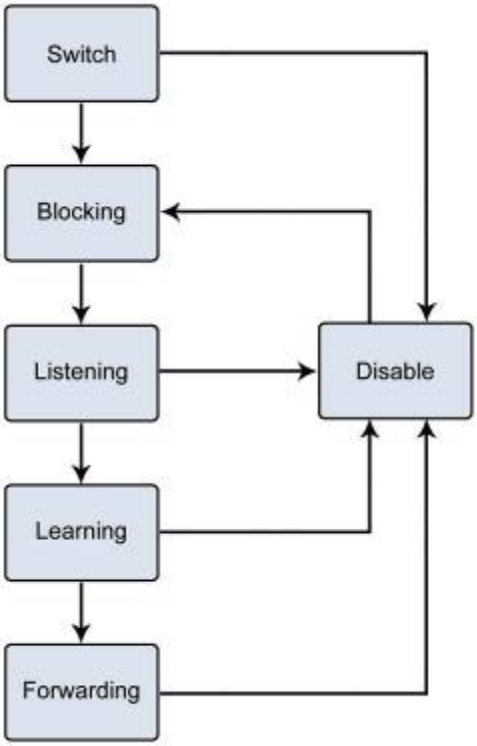


Figure 4-5-1: STP Port State Transitions

You can modify each port state by using management software. When you enable STP, every port on every Managed Switch in the network goes through the blocking state and then transitions through the states of listening and learning at power up. If properly configured, each port stabilizes to the forwarding or blocking state. No packets (except BPDUs) are forwarded from, or received by, STP enabled ports until the forwarding state is enabled for that port.

2. STP Parameters

STP Operation Levels

The Managed Switch allows for two levels of operation: the Managed Switch level and the port level. The Managed Switch level forms a spanning tree consisting of links between one or more switches. The port level constructs a spanning tree consisting of groups of one or more ports. The STP operates in much the same way for both levels.

On the switch level, STP calculates the Bridge Identifier for each Managed Switch and then sets the Root Bridge and the Designated Bridges.

On the port level, STP sets the Root Port and the Designated Ports.

The following are the user-configurable STP parameters for the switch level:

Parameter	Description	Default Value
Bridge Identifier(Not user configurable except by setting priority below)	A combination of the User-set priority and the switch's MAC address. The Bridge Identifier consists of two parts: a 16-bit priority and a 48-bit Ethernet MAC address 32768 + MAC.	32768 + MAC
Priority	A relative priority for each switch – lower numbers give a higher priority and a greater chance of a given switch being elected as the root bridge.	32768
Hello Time	The length of time between broadcasts of the hello message by the switch.	2 seconds
Maximum Age Timer	Measures the age of a received BPDU for a port and ensures that the BPDU is discarded when its age exceeds the value of the maximum age timer.	20 seconds
Forward Delay Timer	The amount time spent by a port in the learning and listening states waiting for a BPDU that may return the port to the blocking state.	15 seconds

The following are the user-configurable STP parameters for the port or port group level:

Variable	Description	Default Value
Port Priority	A relative priority for each port –lower numbers give a higher priority and a greater chance of a given port being elected as the root port.	128
Port Cost	A value used by STP to evaluate paths – STP calculates path costs and selects the path with the minimum cost as the active path.	200,000-100Mbps Fast Ethernet ports 20,000-1000Mbps Gigabit Ethernet ports 0 - Auto

Default Spanning-Tree Configuration

Feature	Default Value
Enable state	STP disabled for all ports
Port priority	128
Port cost	0
Bridge Priority	32,768

User-Changeable STA Parameters

The Managed Switch's factory default setting should cover the majority of installations. However, it is advisable to keep the default settings as set at the factory; unless, it is absolutely necessary. The user changeable parameters in the Managed Switch are as follows:

Priority – A Priority for the Managed Switch can be set from 0 to 65535. 0 is equal to the highest Priority.

Hello Time – The Hello Time can be from 1 to 10 seconds. This is the interval between two transmissions of BPDU packets sent by the Root Bridge to tell all other Switches that it is indeed the Root Bridge. If you set a Hello Time for Managed Switch, and it is not the Root Bridge, the set Hello Time will be used if and when Managed Switch becomes the Root Bridge.

The Hello Time cannot be longer than the Max. Age. Otherwise, a configuration error will occur.

Max. Age – The Max Age can be from 6 to 40 seconds. At the end of the Max Age, if a BPDU has still not been received from the Root Bridge, Managed Switch will start sending its own BPDU to all other Switches for permission to become the Root Bridge. If it turns out that Managed Switch has the lowest Bridge Identifier, it will become the Root Bridge.

Forward Delay Timer – The Forward Delay can be from 4 to 30 seconds. This is the time any port on the

Managed Switch spends in the listening state while moving from the blocking state to the forwarding state.

Observe the following formulas when setting the above parameters:

Max. Age _ 2 x (Forward Delay - 1 second)

Max. Age _ 2 x (Hello Time + 1 second)

Port Priority – A Port Priority can be from 0 to 240. The lower the number, the greater the probability the port will be chosen as the Root Port.

Port Cost – A Port Cost can be set from 0 to 200000000. The lower the number, the greater the probability the port will be chosen to forward packets.

3. Illustration of STP

A simple illustration of three switches connected in a loop is depicted in the below diagram. In this example, you can anticipate some major network problems if the STP assistance is not applied.

If switch A broadcasts a packet to switch B, switch B will broadcast it to switch C, and switch C will broadcast it to back to switch A and so on. The broadcast packet will be passed indefinitely in a loop, potentially causing a network failure. In this example, STP breaks the loop by blocking the connection between switch B and C. The decision to block a particular connection is based on the STP calculation of the most current Bridge and Port settings.

Now, if switch A broadcasts a packet to switch C, then switch C will drop the packet at port 2 and the broadcast will end there. Setting-up STP using values other than the defaults, can be complex. Therefore, you are advised to keep the default factory settings and STP will automatically assign root bridges/ports and block loop connections. Influencing STP to choose a particular switch as the root bridge using the Priority setting, or influencing STP to choose a particular port to block using the Port Priority and Port Cost settings is, however, relatively straight forward.

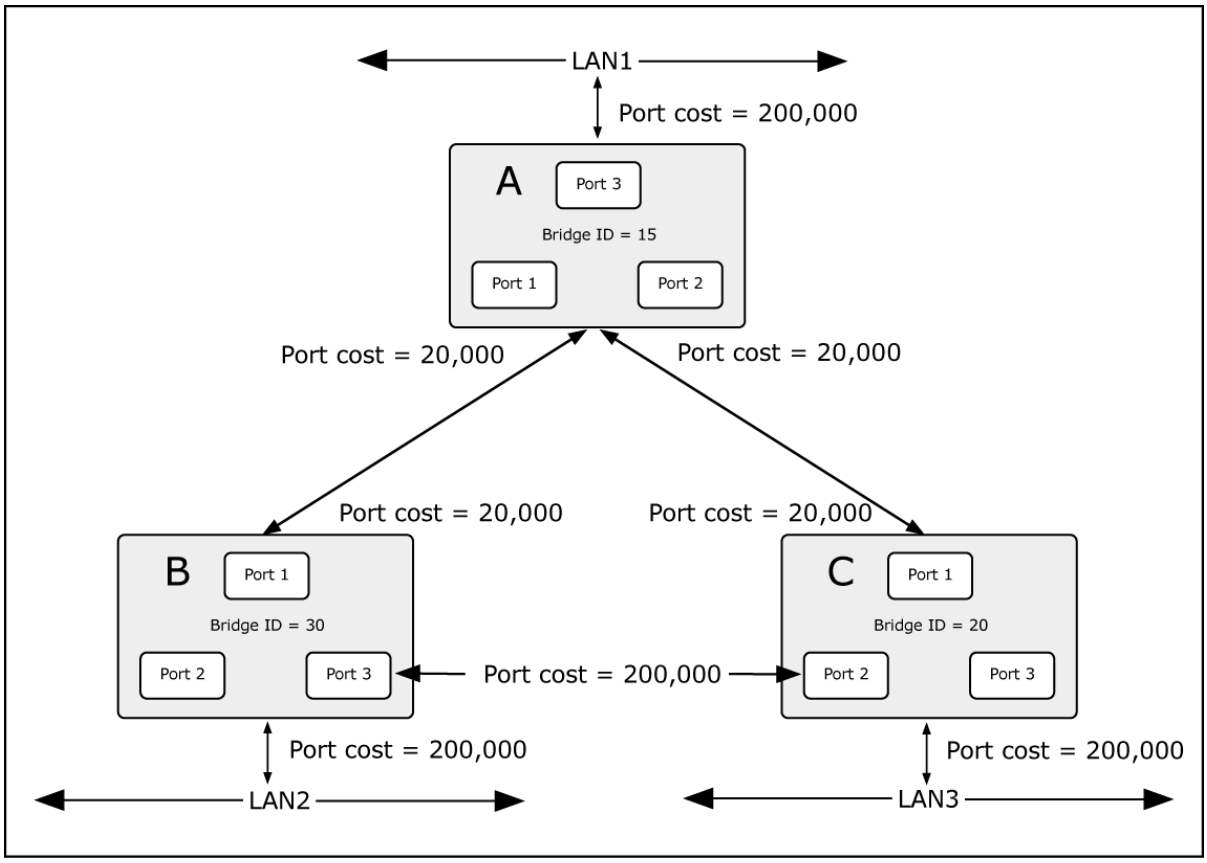


Figure 4-5-2: Before Applying the STA Rules

In this example, only the default STP values are used.

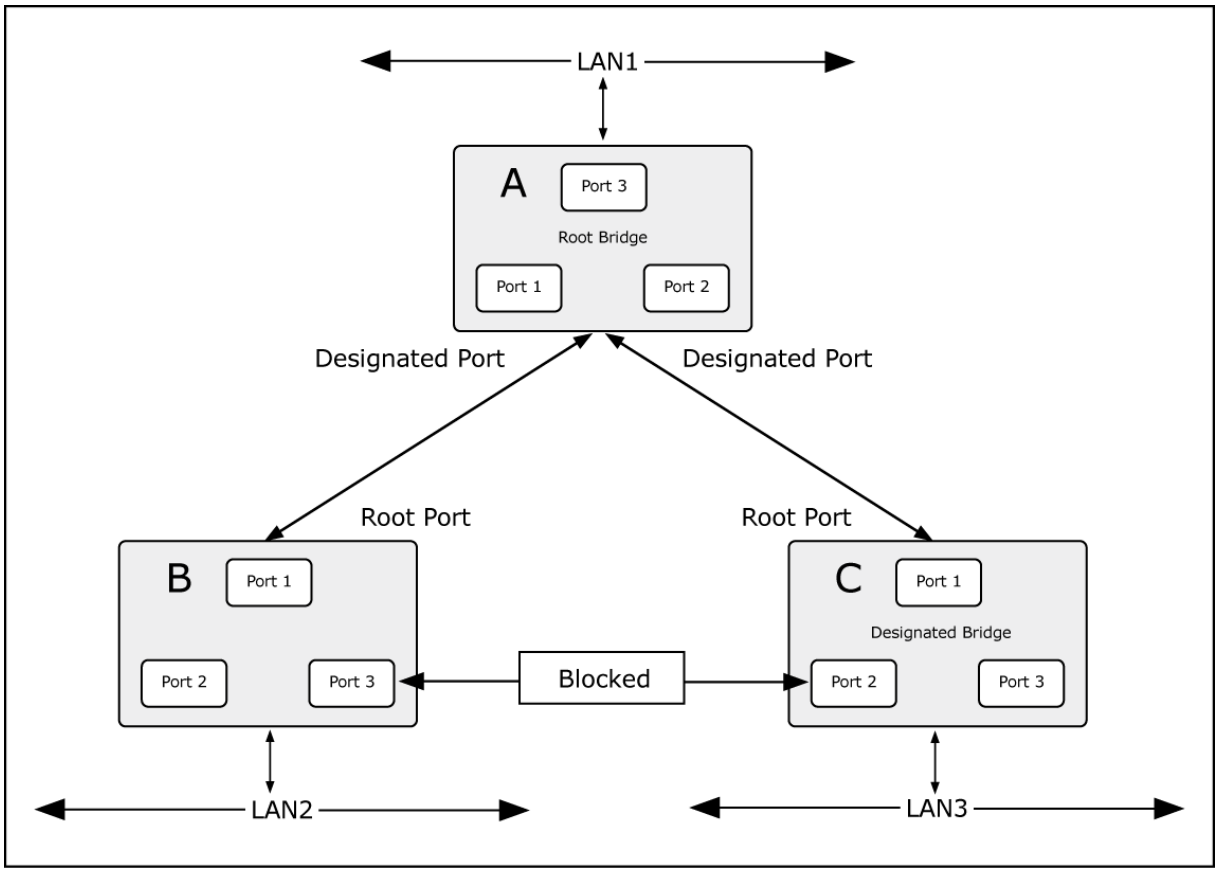


Figure 4-5-3: After Applying the STA Rules

The Managed Switch with the lowest Bridge ID (switch C) was elected the root bridge, and the ports were selected to give a high port cost between switches B and C. The two (optional) Gigabit ports (default port cost = 20,000) on switch A are connected to one (optional) Gigabit port on both switch B and C. The redundant link between switch B and C is deliberately chosen as a 100 Mbps Fast Ethernet link (default port cost = 200,000). Gigabit ports could be used, but the port cost should be increased from the default to ensure that the link between switch B and switch C is the blocked link.

The screen in Figure 4-5-4 appears.

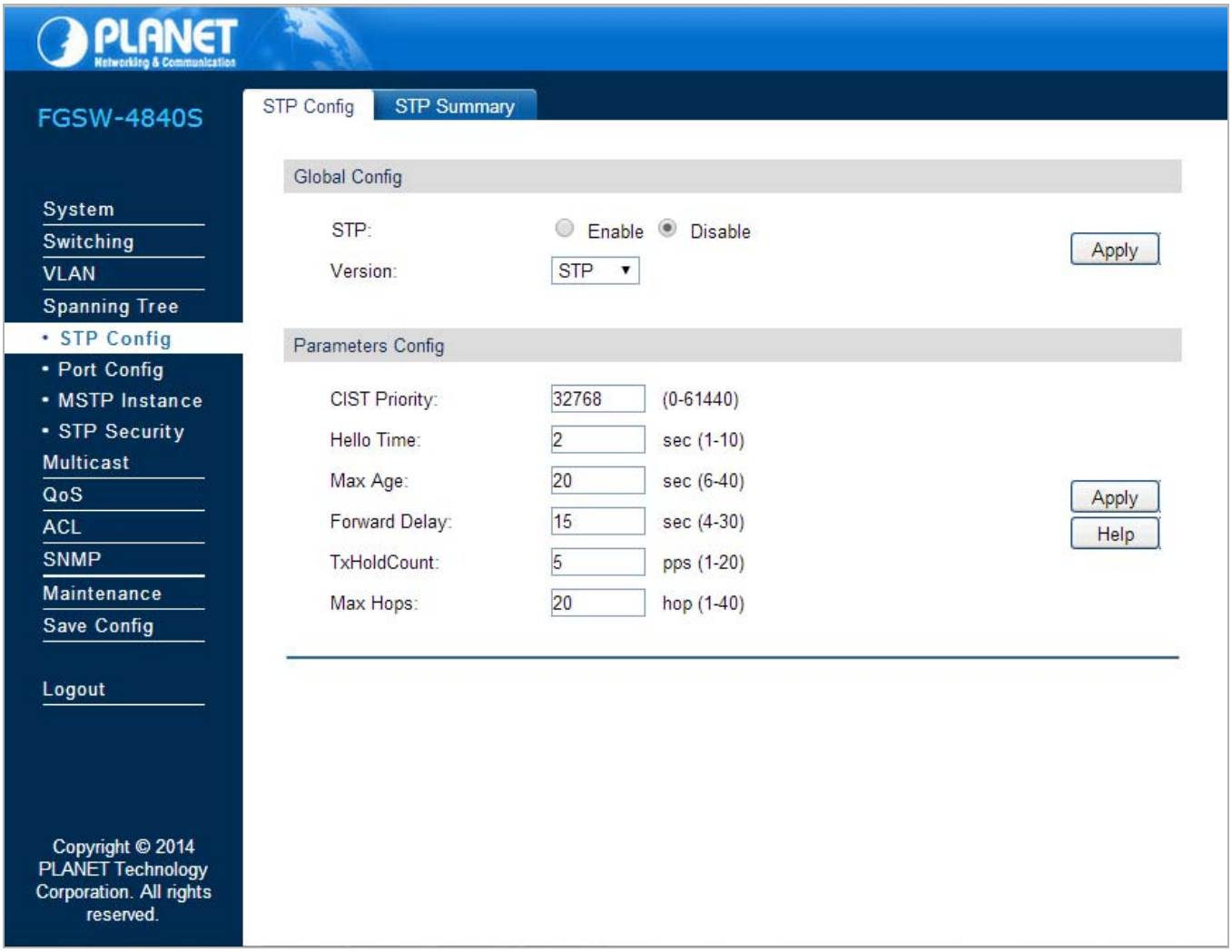


Figure 4-5-4: Spanning Tree Page Screenshot

This section has the following items:

STP Config	Configure global configuration of spanning tree function.
Port Config	Configure the parameters of the CIST ports for spanning tree function.
MSTP Instance	Configure the parameters of the MSTP Instance for spanning tree function.
STP Security	Configuring protection function for devices can prevent devices from any malicious attack against STP features.

4.5.1 STP Config

The STP Config function, for global configuration of spanning trees on the Managed Switch, can be implemented on **STP Config** and **STP Summary** pages. The screen in Figure 4-5-5 appears.

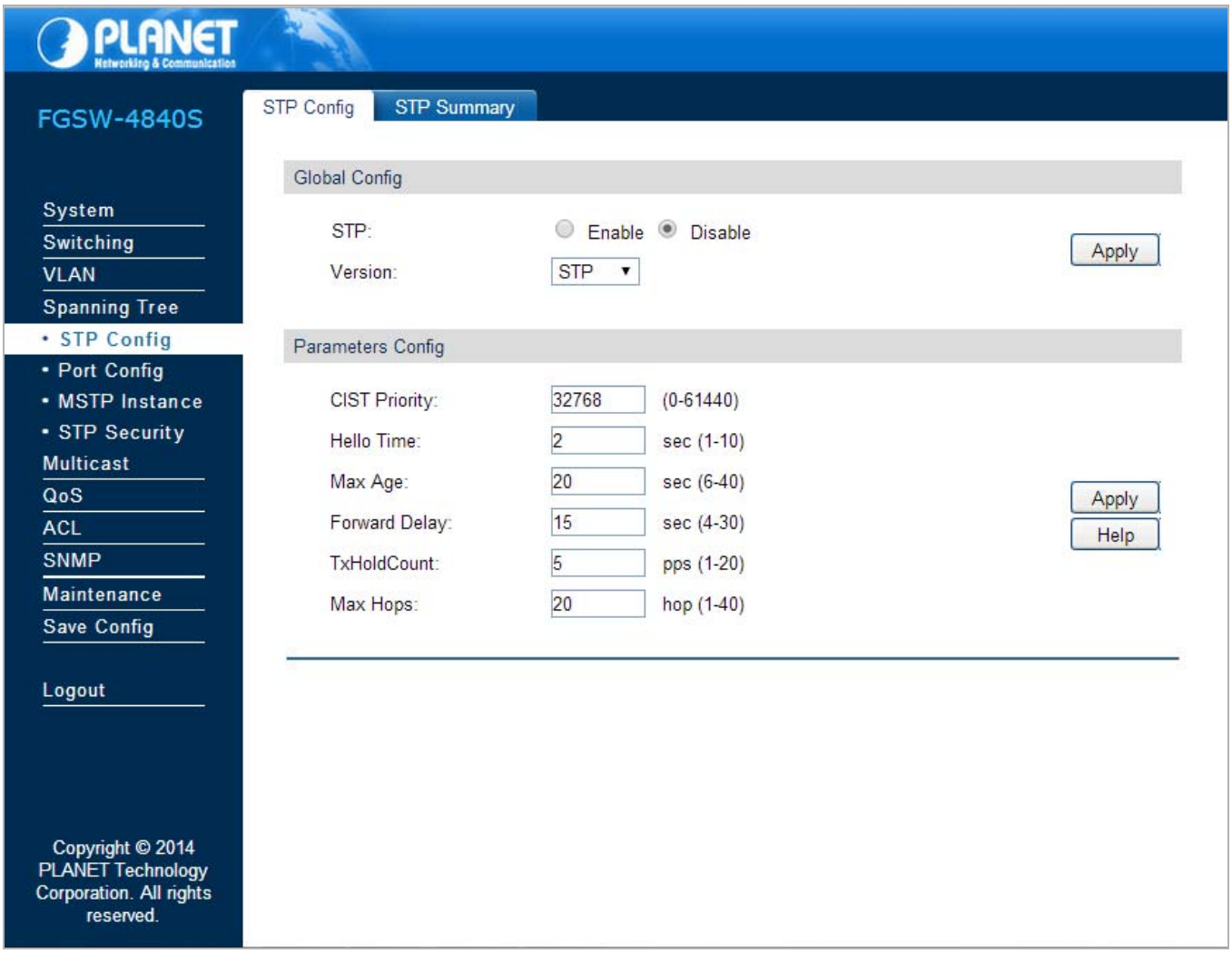


Figure 4-5-5: STP Config Page Screenshot

The page includes the following fields:

Object	Description
• **STP Config**	Global configuration of spanning tree on this page.
• **STP Summary**	View the related parameters of Spanning Tree function on this page.

4.5.1.1 STP Config

Before configuring spanning trees, it should make clear the roles each Managed Switch plays in each spanning tree instance. Only one Managed Switch can be the root bridge in each spanning tree instance. On this page you can globally configure the spanning tree function and related parameters.

The screen in Figure 4-5-6 appears.

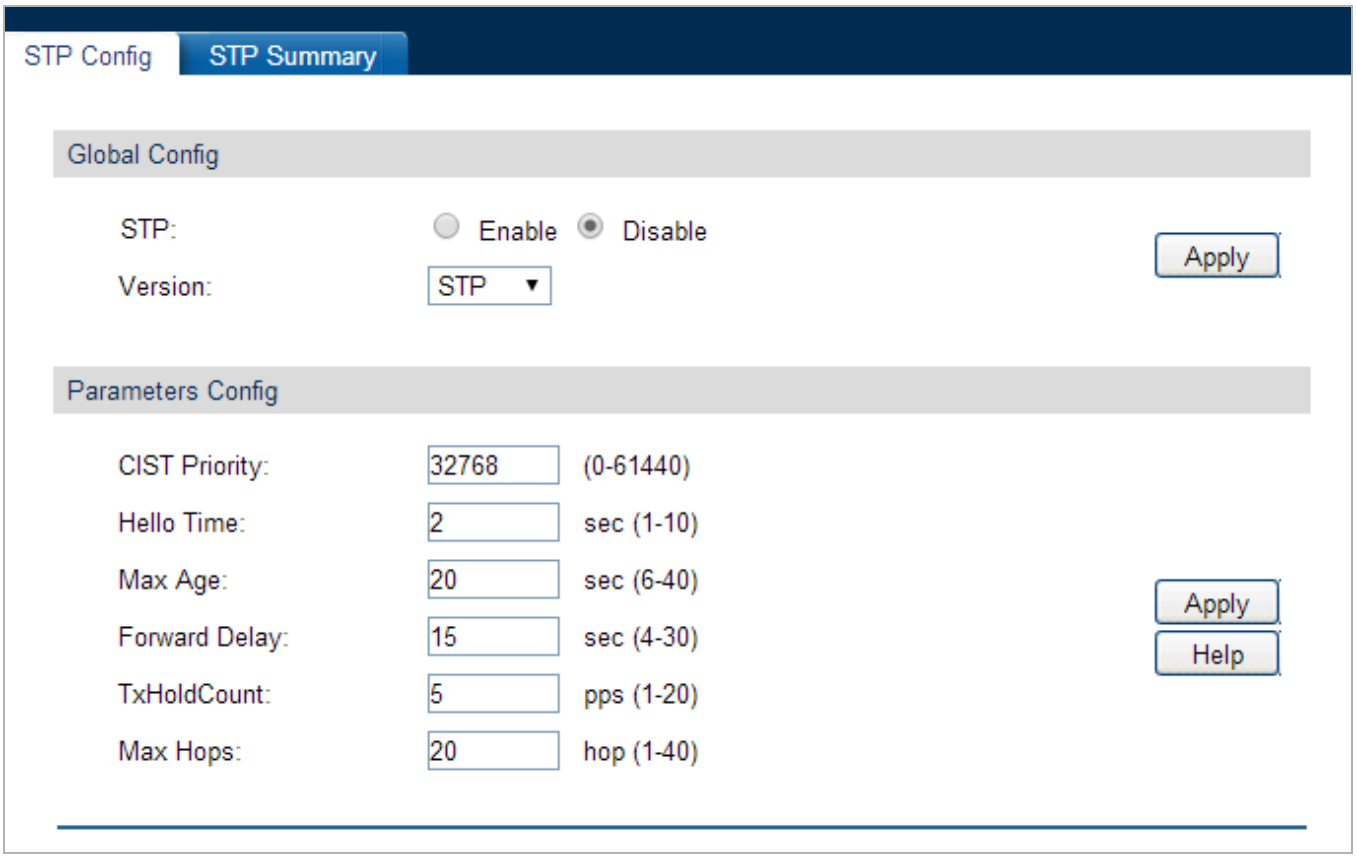


Figure 4-5-6: STP Config Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **STP**	Select Enable/Disable STP function globally on the Managed Switch.
• **Version**	Select the desired STP version on the Managed Switch. ● STP: Spanning Tree Protocol. ● RSTP: Rapid Spanning Tree Protocol. ● MSTP: Multiple Spanning Tree Protocol.
Parameters Config	
• **CIST Priority**	Enter a value from 0 to 61440 to specify the priority of the Managed Switch for comparison in the CIST. CIST priority is an important criterion on determining the root bridge. In the same condition, the Managed Switch with the highest priority will be chosen as the root bridge. The lower value has the higher priority. The default value is 32768 and should be exact divisor of 4096.

• **Hello Time**	Enter a value from 1 to 10 in seconds to specify the interval to send BPDU packets. It is used to test the links. 2*(Hello Time + 1) ≤ Max Age. The default value is 2 seconds.
• **Max Age**	Enter a value from 6 to 40 in seconds to specify the maximum time the Managed Switch can wait without receiving a BPDU before attempting to reconfigure. The default value is 20 seconds.
• **Forward Delay**	Enter a value from 4 to 30 in seconds to specify the time for the port to transit its state after the network topology is changed. 2*(Forward Delay-1) ≥ Max Age. The default value is 15 seconds.
• **TxHoldCount**	Enter a value from 1 to 20 to set the maximum number of BPDU packets transmitted per Hello Time interval. The default value is 5pps.
• **Max Hops**	Enter a value from 1 to 40 to set the maximum number of hops that occur in a specific region before the BPDU is discarded. The default value is 20 hops.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

Note

- The forward delay parameter and the network diameter are correlated. A too small forward delay parameter may result in temporary loops. A too large forward delay may cause a network unable to resume the normal state in time. The default value is recommended.
- An adequate hello time parameter can enable the Managed Switch to discover the link failures occurred in the network without occupying too much network resources. A too large hello time parameter may result in normal links being regarded as invalid when packets drop occurred in the links, which in turn result in spanning tree being regenerated. A too small hello time parameter may result in duplicated configuration being sent frequently, which increases the network load of the switches and wastes network resources. The default value is recommended.
- A too small max age parameter may result in the switches regenerating spanning trees frequently and cause network congestions to be falsely regarded as link problems. A too large max age parameter result in the switches unable to find the link problems in time, which in turn handicaps spanning trees being regenerated in time and makes the network less adaptive. The default value is recommended.
- If the TxHold Count parameter is too large, the number of MSTP packets being sent in each hello time may be increased with occupying too much network resources. The default value is recommended.

4.5.1.2 STP Summary

This page allows viewing the related parameters of Spanning Tree function; the screen in Figure 4-5-7 appears.

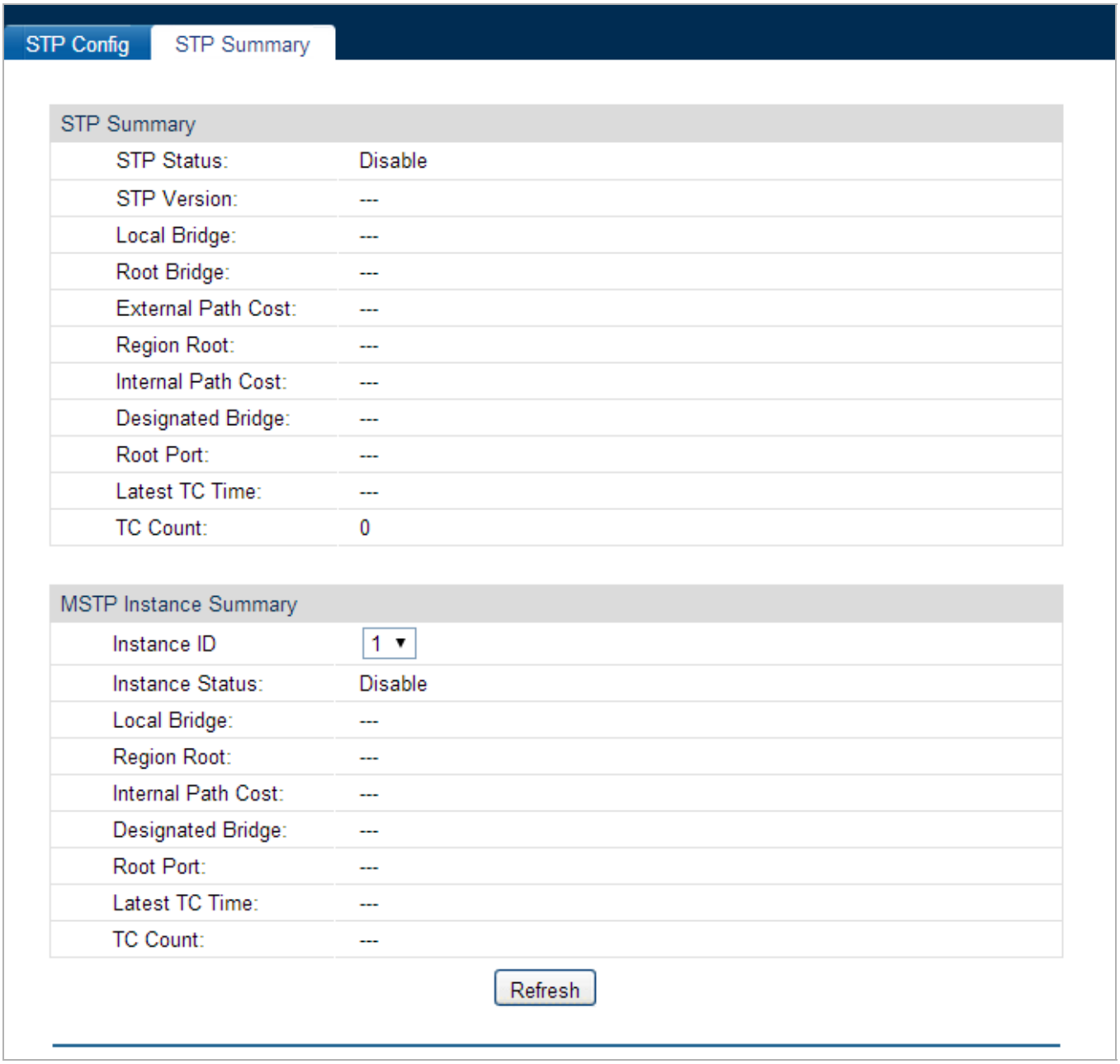


Figure 4-5-7: STP Summary Page Screenshot

The page includes the following fields:

Object	Description
STP Summary	
• **STP Status**	Displays the current STP Status.
• **STP Version**	Displays the current STP version.
• **Local Bridge**	Displays local bridge information.
• **Root Bridge**	Displays root bridge information.
• **External Path Cost**	Displays external path cost information.

• **Region Root**	Displays region root information.
• **Internal Path Cost**	Displays internal path cost information.
• **Designated Bridge**	Displays designated bridge information.
• **Root Port**	Displays root port information.
• **Latest TC Time**	Displays the latest TC time information.
• **TC Count**	Displays TC Count time information.
MSTP Instance Summary	
• **Instance ID**	Displays instance ID information.
• **Instance Status**	Displays instance status information.
• **Local Bridge**	Displays local bridge information.
• **Region Root**	Displays region root information.
• **Internal Path Cost**	Displays internal path cost information.
• **Designated Bridge**	Displays designated bridge information.
• **Root Port**	Displays root port information.
• **Latest TC Time**	Displays the latest TC time information.
• **TC Count**	Displays TC Count time information.

Button

Refresh: Click to refresh STP Summary status.

4.5.2 Port Config

The Port Config functions for per port configuration of spanning trees on the Managed Switch; the screen in Figure 4-5-8 appears.

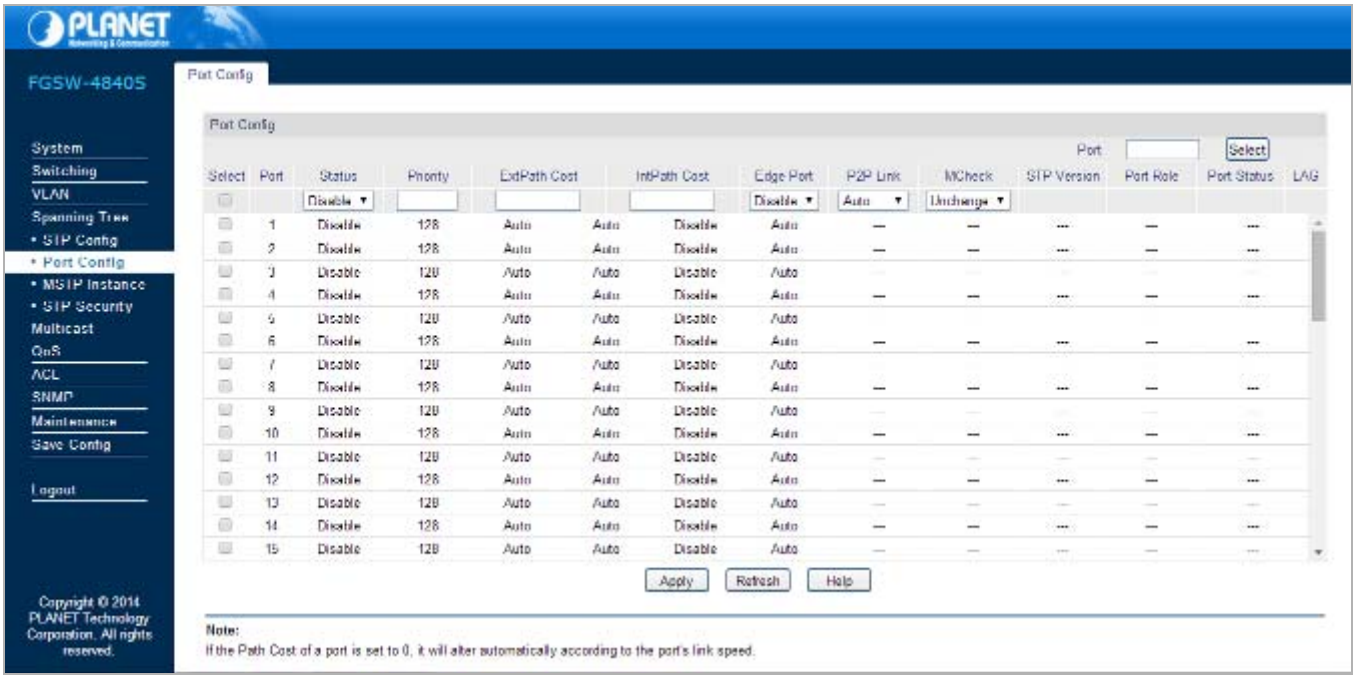


Figure 4-5-8: Port Config Page Screenshot

The page includes the following fields:

Object	Description
• **Port Config**	Configure the parameters of the CIST ports for spanning tree function.

4.5.2.1 Port Config

This page allows to configure the parameters of the CIST ports for spanning tree function on the Managed Switch; the screen in Figure 4-5-9 appears.

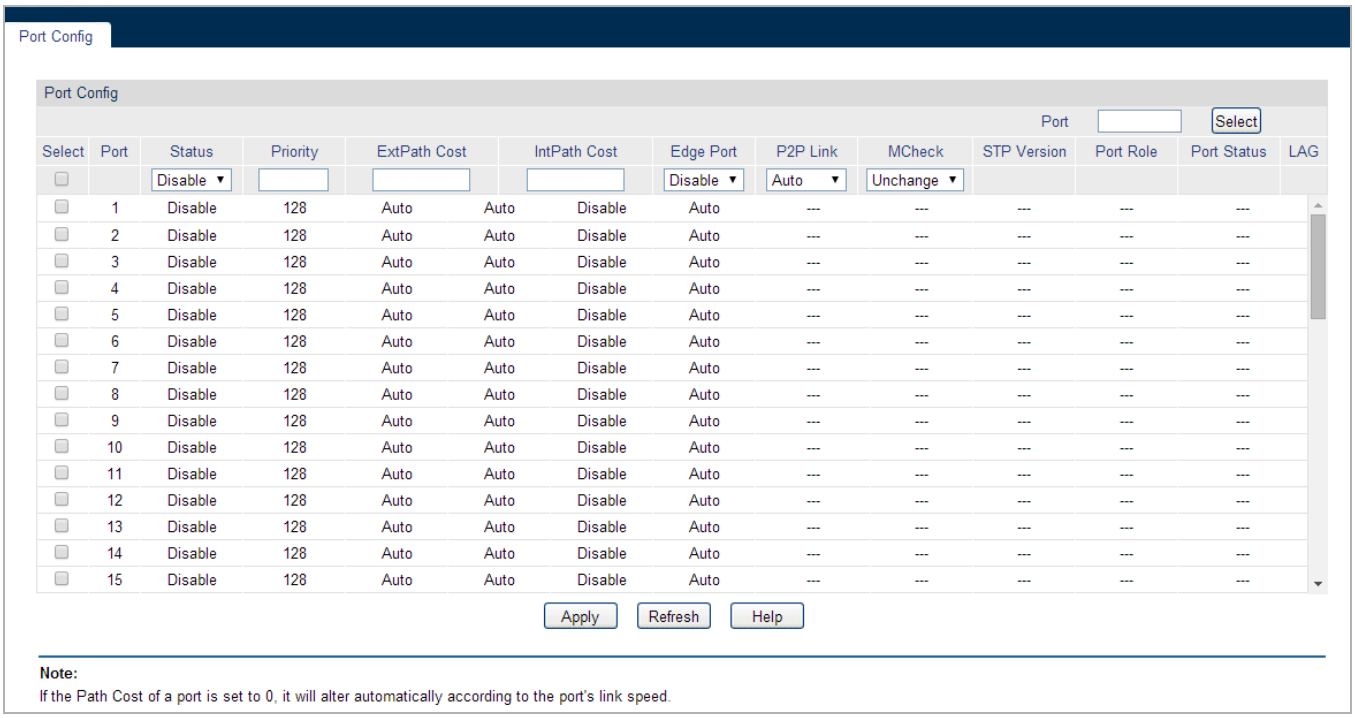


Figure 4-5-9: STP Port Config Page Screenshot

The page includes the following fields:

Object	Description
Port Config	
• **Port Select**	Click the **Select** button to quick-select the corresponding port based on the port number entered.
• **Select**	Select the desired port for STP configuration. It is multi-optional.
• **Port**	Displays the port number of the Managed Switch.
• **Status**	Select Enable /Disable STP function for the desired port.
• **Priority**	Enter a value from 0 to 240 divisible by 16. Port priority is an important criterion on determining if the port connected to this port will be chosen as the root port. The lower value has the higher priority.
• **ExtPath Cost**	ExtPath Cost is used to choose the path and calculate the path costs of ports in different MST regions. It is an important criterion on determining the root port. The lower value has the higher priority.
• **IntPath Cost**	IntPath Cost is used to choose the path and calculate the path costs of ports in an MST region. It is an important criterion on determining the root port. The lower value has the higher priority.
• **Edge Port**	Select Enable/Disable Edge Port. The edge port can transit its state from blocking to forwarding rapidly without waiting for forward delay.

• **P2P Link**	Select the P2P link status. If the two ports in the P2P link are root port or designated port, they can transit their states to forwarding rapidly to reduce the unnecessary forward delay.
• **MCheck**	Select Enable to perform MCheck operation on the port. Unchange means no MCheck operation.
• **STP Version**	Displays the STP version of the port.
• **Port Role**	Displays the role of the port played in the STP Instance. ● Root Port: Indicates the port that has the lowest path cost from this bridge to the Root Bridge and forwards packets to the root. ● Designated Port: Indicates the port that forwards packets to a downstream network segment or Managed Switch. ● Master Port: Indicates the port that connects a MST region to the common root. The path from the master port to the common root is the shortest path between this MST region and the common root. ● Alternate Port: Indicates the port that can be a backup port of a root or master port. ● Backup Port: Indicates the port that is the backup port of a designated port. ● Disabled: Indicates the port that is not participating in the STP. ● Forwarding: In this status the port can receive/forward data, receive/send BPDU packets as well as learn MAC address. ● Learning: In this status the port can receive/send BPDU packets and learn MAC address. ● Blocking: In this status the port can only receive BPDU packets. ● Disconnected: In this status the port is not participating in the STP.
• **Port Status**	Displays the working status of the port.
• **LAG**	Displays the LAG number which the port belongs to.

- Configure the ports connected directly to terminals as edge ports and enable the BPDU protection function as well. This not only enables these ports to transit to forwarding state rapidly but also secures your network.
- All the links of ports in a LAG can be configured as point-to-point links..

When the link of a port is configured as a point-to-point link, the spanning tree instances owning this port are configured as point-to-point links. If the physical link of a port is not a point-to-point link and you forcibly configure the link as a point-to-point link, temporary loops may be incurred.

Buttons

Apply: Click to apply changes.

Refresh: Click to refresh Port Config page.

Help: Click to display help web page.

4.5.3 MSTP Instance

The MSTP combines VLANs and spanning tree together via VLAN-to-instance mapping table (VLAN-to-spanning-tree mapping). By adding MSTP instances, it binds several VLANs to an instance to realize the load balance based on instances.

Only when the switches have the same MST region name, MST region revision and VLAN-to-Instance mapping table, the switches can be regarded as in the same MST region.

The MSTP Instance function can be implemented on the **Region Config**, **Instance Config** and **Instance Port Config** pages; the screen in Figure 4-5-10 appears.

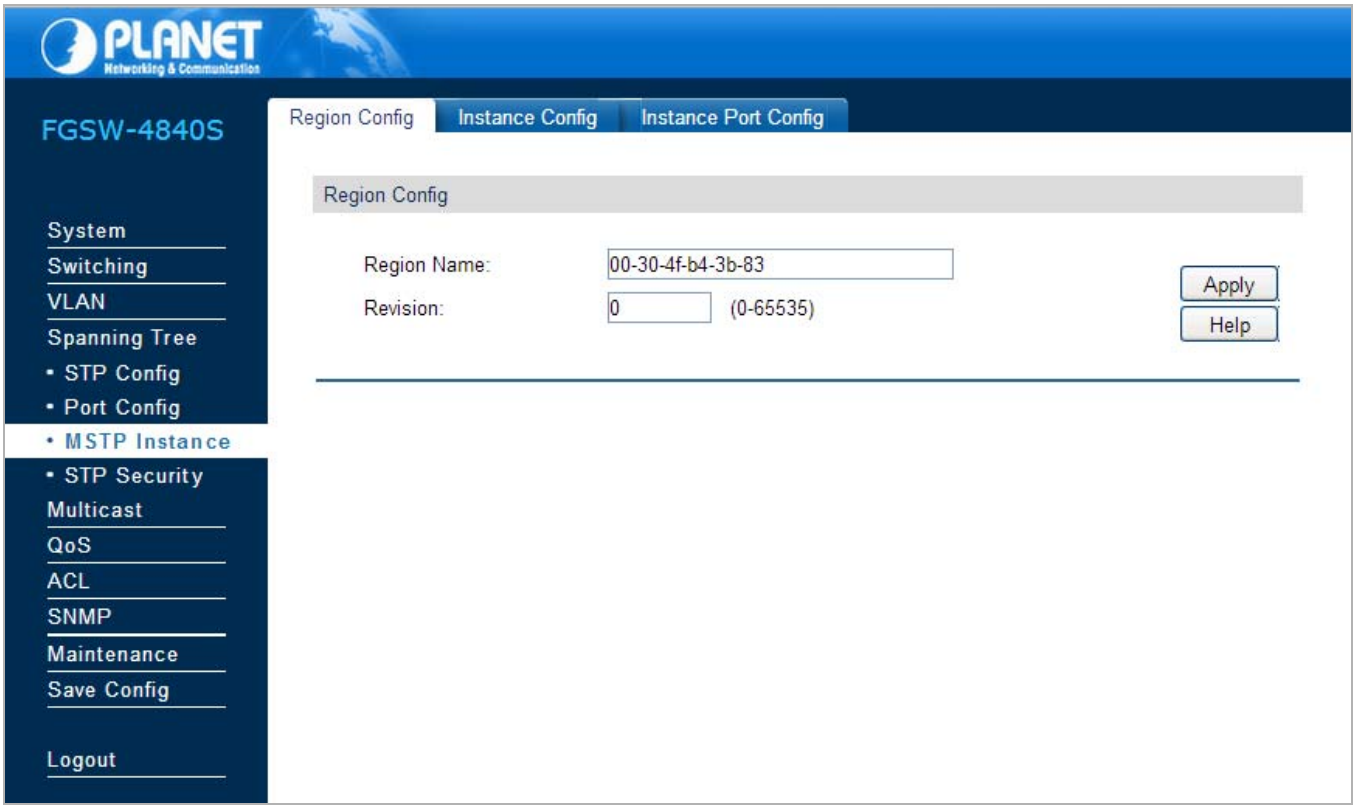


Figure 4-5-10: MSTP Instance Page Screenshot

The page includes the following fields:

Object	Description
• **Region Config**	Configure the name and revision of the MST region on this page.
• **Instance Config**	A property of MST region and it is used to describe the VLAN to Instance mapping configuration.
• **Instance Port Config**	Configure the parameters of the ports in different instance IDs as well as view status of the ports in the specified instance.

4.5.3.1 Region Config

This page allows configuring the name and revision of the MST region on the Managed Switch; the screen in Figure 4-5-11 appears.

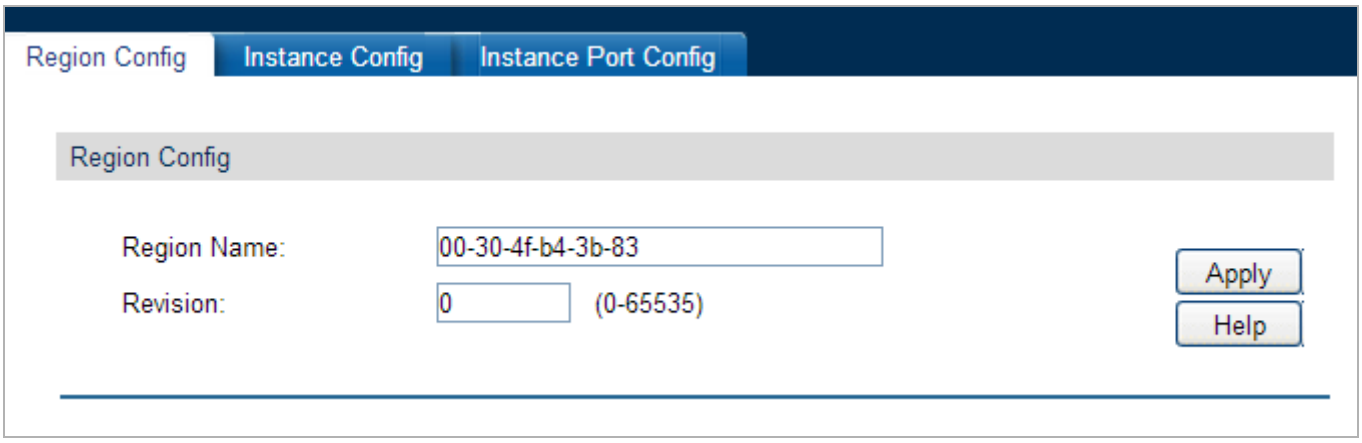


Figure 4-5-11: Region Config Page Screenshot

The page includes the following fields:

Object	Description
Region Config	
• **Region Name**	Create a name for MST region identification using up to 32 characters.
• **Revision**	Enter the revision from 0 to 65535 for MST region identification.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.5.3.2 Instance Config

The Instance Configuration, a property of MST region, is used to describe the VLAN to Instance mapping configuration. Assign VLAN to different instances appropriate to needs. Every instance is a VLAN group independent of other instances and CIST. The screen in Figure 4-5-12 appears.

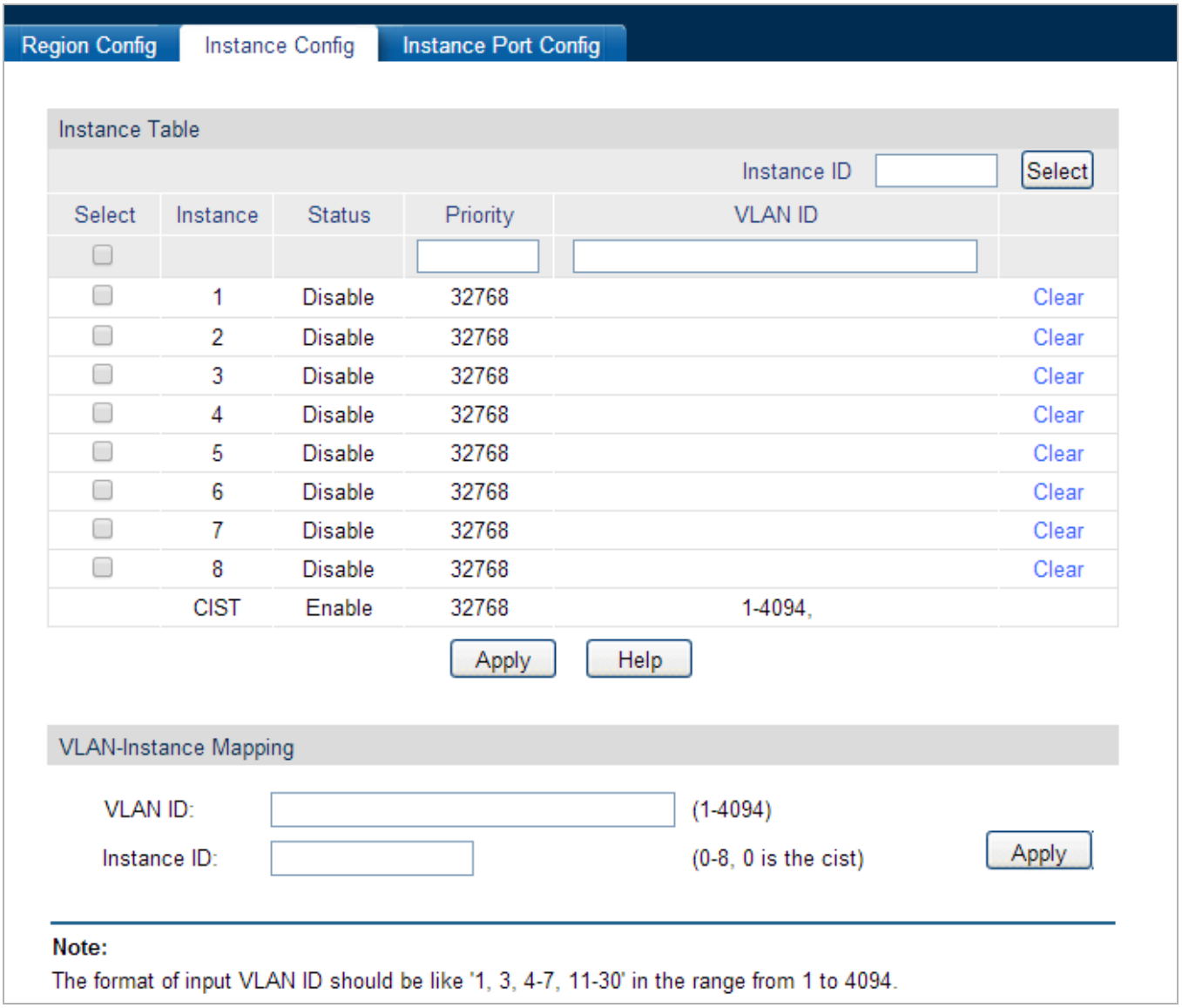


Figure 4-5-12: Instance Config Page Screenshot

The page includes the following fields:

Object	Description
Instance Table	
• **Instance ID Select**	Click the **Select** button to quickly select the corresponding Instance ID based on the ID number you entered.
• **Select**	Select the desired Instance ID for configuration. It is multi-optional.
• **Instance**	Displays Instance ID of the Managed Switch.
• **Status**	Select Enable/Disable the instance.
• **Priority**	Enter the priority of the Managed Switch in the instance. It is an important

	criterion on determining if the Managed Switch will be chosen as the root bridge in the specific instance.
• **VLAN ID**	Enter the VLAN ID which belongs to the corresponding instance ID. After modification here, the previous VLAN ID will be cleared and mapped to the CIST.
• **Clear**	Click the **Clear** button to clear up all VLAN IDs from the instance ID. The cleared VLAN ID will be automatically mapped to the CIST.
VLAN-Instance Mapping	
• **VLAN ID**	Enter the desired VLAN ID. After modification here, the new VLAN ID will be added to the corresponding instance ID and the previous VLAN ID won't be replaced.
• **Instance ID**	Enter the corresponding instance ID.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.5.3.3 Instance Port Config

A port can play different roles in different spanning tree instance. On this page, it allows to configure the parameters of the ports in different instance IDs as well as view status of the ports in the specified instance; the screen in Figure 4-5-13 appears.

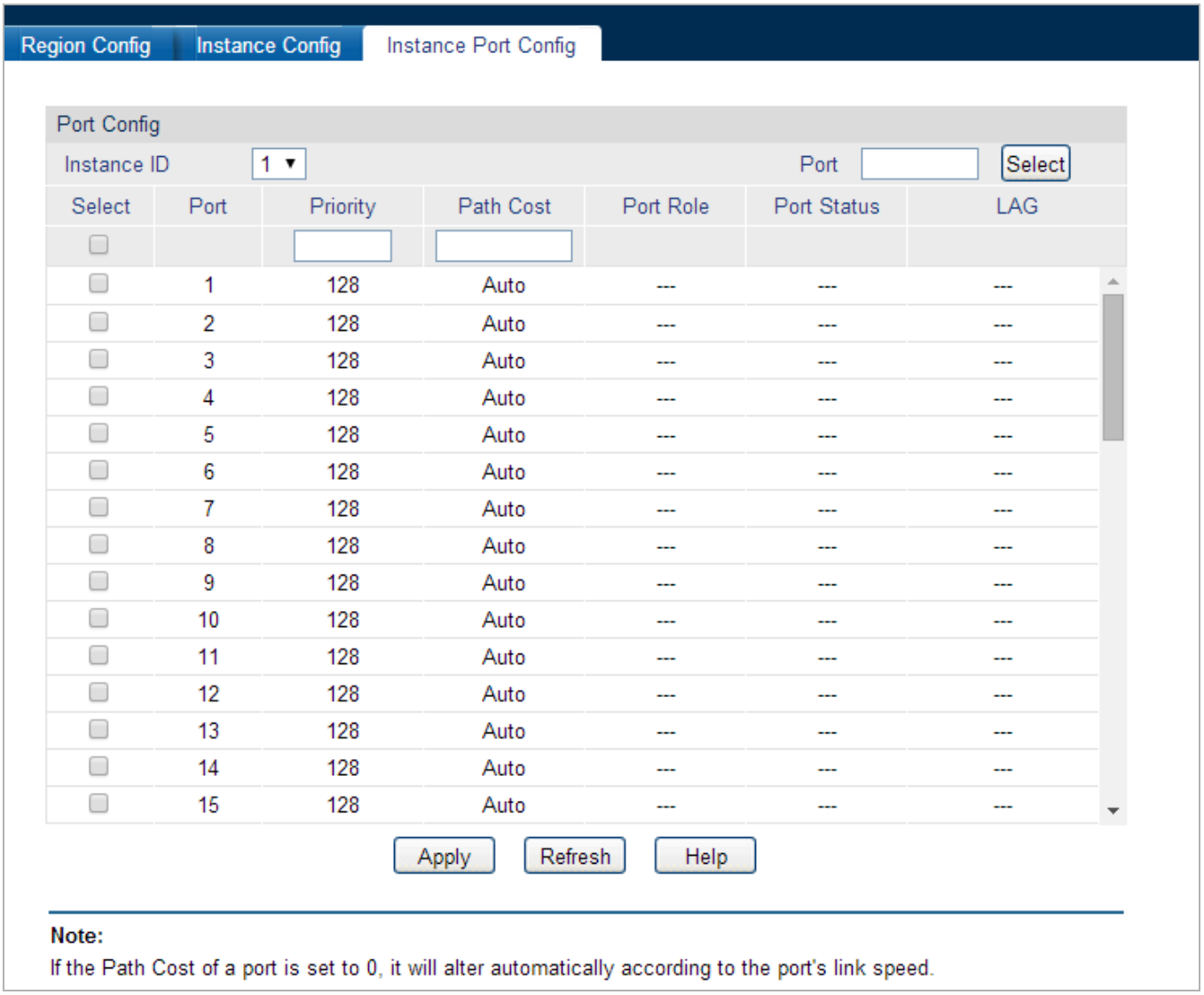


Figure 4-5-13: Instance Port Config Page Screenshot

The page includes the following fields:

Object	Description
Port Config	
• **Instance ID**	Select the desired instance ID for its port configuration.
• **Port Select**	Click the **Select** button to quick-select the corresponding port based on the port number you entered.
• **Select**	Select the desired port to specify its priority and path cost. It is multi-optional.
• **Port**	Displays the port number of the Managed Switch.

• **Priority**	Enter the priority of the port in the instance. It is an important criterion on determining if the port connected to this port will be chosen as the root port.
• **Path Cost**	Path Cost is used to choose the path and calculate the path costs of ports in an MST region. It is an important criterion on determining the root port. The lower value has the higher priority.
• **Port Role**	Displays the role of the port played in the MSTP Instance.
• **Port Status**	Displays the working status of the port.
• **LAG**	Displays the LAG number which the port belongs to.

■ The port status of one port in different spanning tree instances can be different.

Buttons

Apply: Click to apply changes.

Refresh: Click to refresh current web page.

Help: Click to display help web page.

4.5.4 STP Security

Configuring protection function for devices can prevent devices from any malicious attack against STP features. The STP Security function can be implemented on **Port Protect** and **TC Protect** pages. Port Protect function is to prevent the devices from any malicious attack against STP features. The screen in Figure 4-5-14 appears.

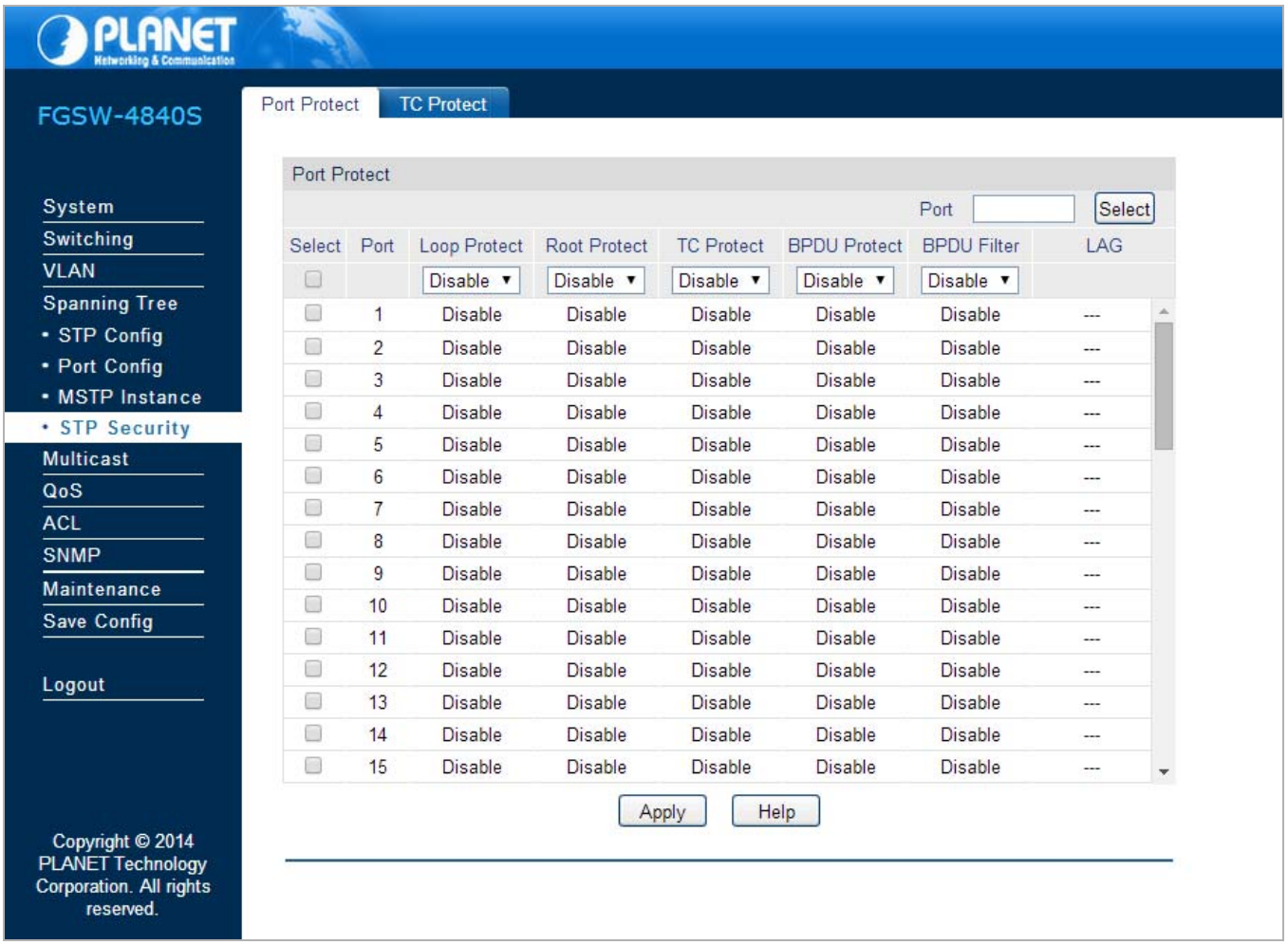


Figure 4-5-14: STP Security Page Screenshot

The page includes the following fields:

Object	Description
• **Port Protect**	Configure the port protect function on this page.
• **TC Protect**	Configure the TC protect function on this page.

4.5.4.1 Port Protect

This page allows to configure loop protect feature, root protect feature, TC protect feature, BPDU protect feature and BPDU filter feature for ports. Suggested to enable corresponding protection feature for the qualified ports; the screen in Figure 4-5-15 appears.

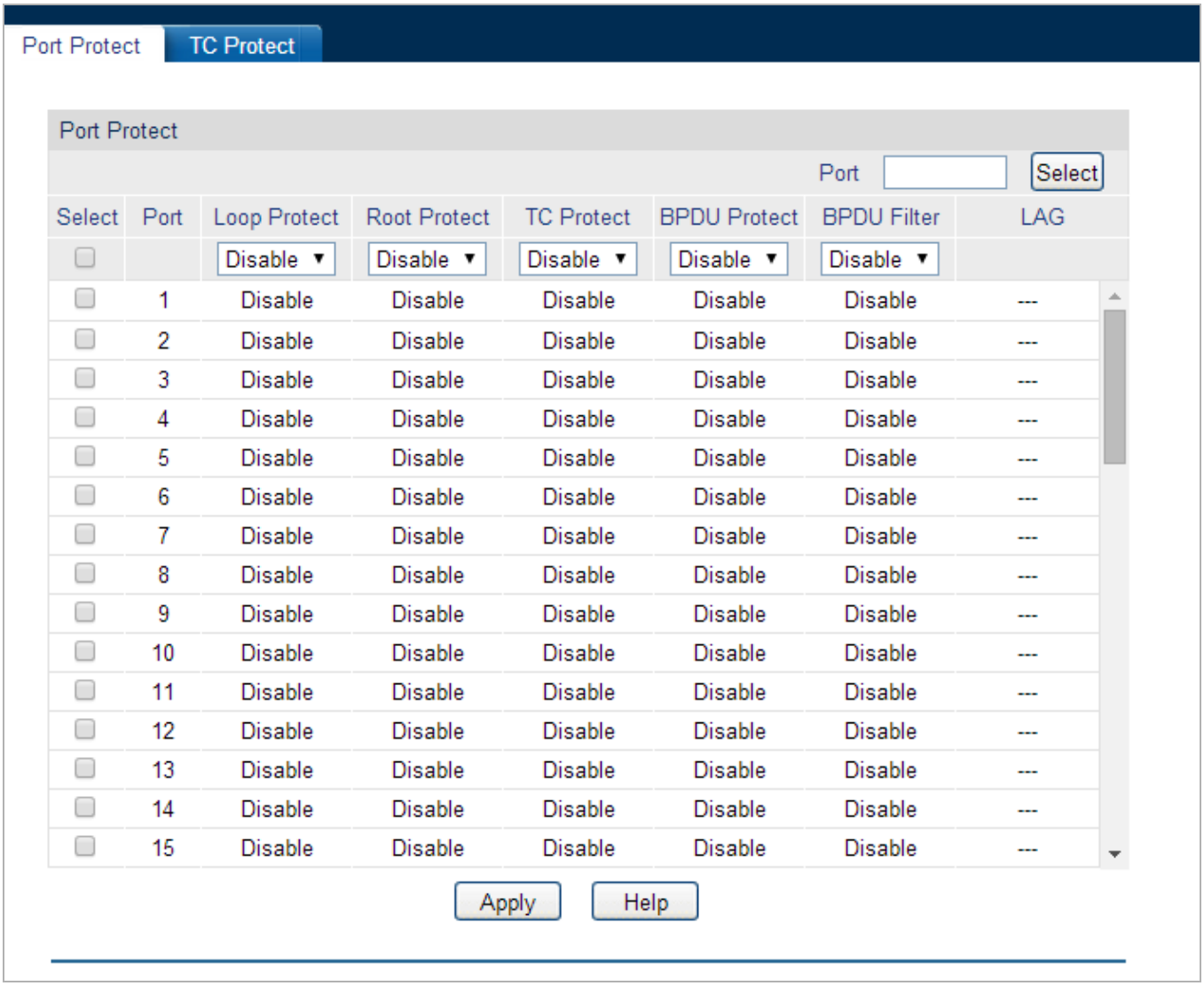


Figure 4-5-15: Port Protect Page Screenshot

The page includes the following fields:

Object	Description
Port Protect	
• **Port Select**	Click the **Select** button to quick-select the corresponding port based on the port number entered.
• **Select**	Select the desired port for port protect configuration. It is multi-optional.
• **Port**	Displays the port number of the Managed Switch.
• **Loop Protect**	Loop Protect is to prevent the loops in the network brought by recalculating STP

	because of link failures and network congestions.
• **Root Protect**	Root Protect is to prevent wrong network topology change caused by the role change of the current legal root bridge.
• **TC Protect**	TC Protect is to prevent the decrease of the performance and stability of the Managed Switch brought by continuously removing MAC address entries upon receiving TC-BPDUs in the STP network.
• **BPDU Protect**	BPDU Protect is to prevent the edge port from being attacked by maliciously created BPDUs.
• **BPDU Filter**	BPDU Filter is to prevent BPDUs flood in the STP network.
• **LAG**	Displays the LAG number which the port belongs to.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.5.4.2 TC Protect

When TC Protect is enabled for the port on **Port Protect** page, the TC threshold and TC protect cycle need to be configured on this page; the screen in Figure 4-5-16 appears.

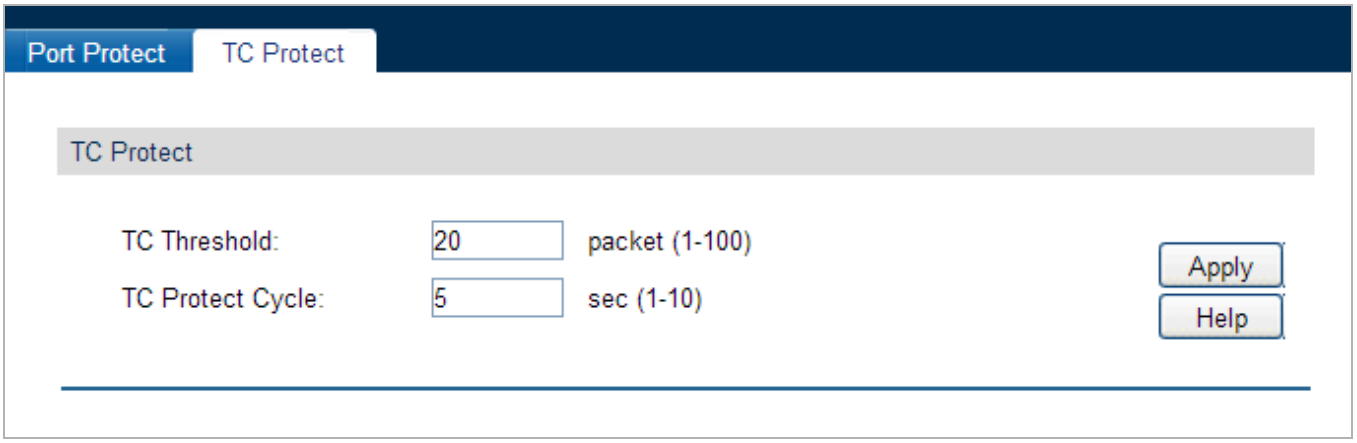


Figure 4-5-16: TC Protect Page Screenshot

The page includes the following fields:

Object	Description
TC Protect	
• **TC Threshold**	Enter a number from 1 to 100. It is the maximum number of the TC-BPDUs received by the Managed Switch in a TC Protect Cycle. The default value is 20
• **TC Protect Cycle**	Enter a value from 1 to 10 to specify the TC Protect Cycle. The default value is 5.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.6 Multicast

Multicast Overview

In the network, packets are sent in three modes: unicast, broadcast and multicast. In unicast, the source server sends separate copy information to each receiver. When a large number of users require this information, the server must send many pieces of information with the same content to the users. Therefore, large bandwidth will be occupied. In broadcast, the system transmits information to all users in a network. Any user in the network can receive the information, no matter the information is needed or not.

Point-to-multipoint multimedia business, such as video conferences and VoD (video-on-demand), plays an important part in the information transmission field. Suppose a point to multi-point service is required, unicast is suitable for networks with sparsely users, whereas broadcast is suitable for networks with densely distributed users. When the number of users requiring this information is not certain, unicast and broadcast deliver a low efficiency. Multicast solves this problem. It can deliver a high efficiency to send data in the point to multi-point service, which can save large bandwidth and reduce the network load. In multicast, the packets are transmitted in the following way as shown in Figure 4-6-1.

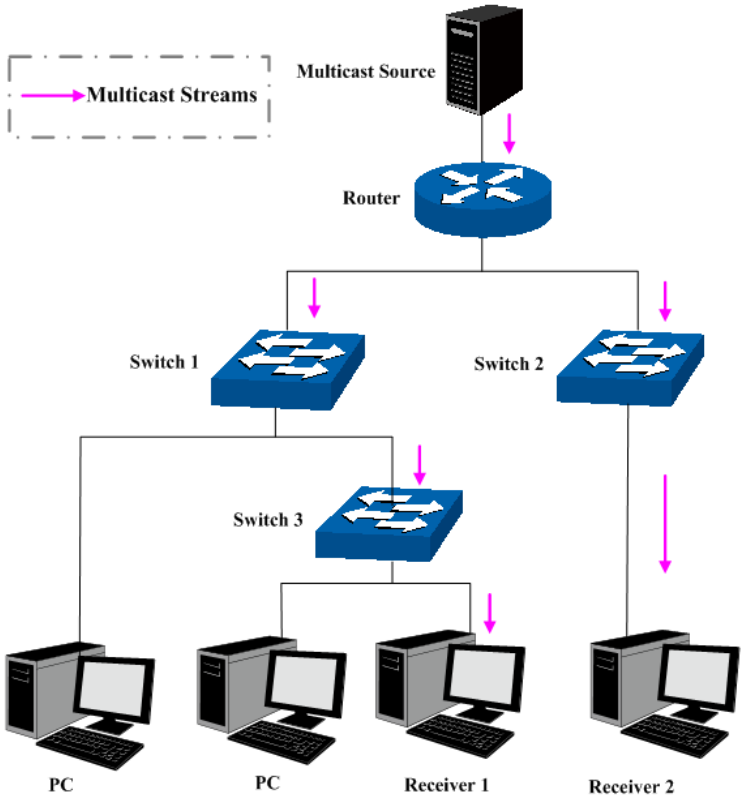


Figure 4-6-1: Information Transmission in the Multicast Mode

Features of multicast:

1. The number of receivers is not certain. Usually point-to-multipoint transmission is needed;
2. Multiple users receiving the same information form a multicast group. The multicast information sender just need to send the information to the network device once;
3. Each user can join and leave the multicast group at any time;
4. Real time is highly demanded and certain packets drop is allowed.

Multicast Address

1. Multicast IP Address:

As specified by IANA (Internet Assigned Numbers Authority), Class D IP addresses are used as destination addresses of multicast packets. The multicast IP addresses range from 224.0.0.0~239.255.255.255. The following table displays the range and description of several special multicast IP addresses.

Multicast IP address range	Description
224.0.0.0～224.0.0.255	Reserved multicast addresses for routing protocols and other network protocols
224.0.1.0～224.0.1.255	Addresses for video conferencing
239.0.0.0～239.255.255.255	Local management multicast addresses, which are used in the local network only

Table 4-6-1: Range of the Special Multicast IP

2. Multicast MAC Address:

When a unicast packet is transmitted in an Ethernet network, the destination MAC address is the MAC address of the receiver. When a multicast packet is transmitted in an Ethernet network, the destination is not a receiver but a group with uncertain number of members, so a multicast MAC address, a logical MAC address, is needed to be used as the destination address. As stipulated by IANA, the high-order 24 bits of a multicast MAC address begins with 01-00-5E while the low-order 23 bits of a multicast MAC address are the low-order 23 bits of the multicast IP address. The mapping relationship is described as Figure 4-6-2.

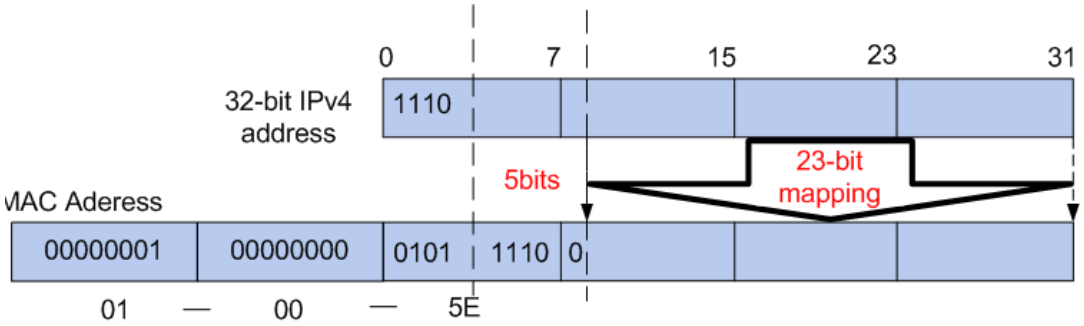


Figure 4-6-2: Mapping Relationship between Multicast IP Address and Multicast MAC Address

The high-order 4 bits of the IP multicast address are 1110, identifying the multicast group. Only 23 bits of the remaining low-order 28 bits are mapped to a multicast MAC address. In that way, 5 bits of the IP multicast address is not utilized. As a result, 32 IP multicast addresses are mapped to the same MAC addresses.

Multicast Address Table

The Managed Switch is forwarding multicast packets based on the multicast address table. As the transmission of multicast packets can not span the VLAN, the first part of the multicast address table is VLAN ID, based on which the received multicast packets are forwarded in the VLAN owning the receiving port. The multicast address table is not mapped to an egress port but a group port list. When forwarding a multicast packet, the Managed Switch looks up the multicast address table based on the destination multicast address of the multicast packet. If the corresponding entry can not be found in the table, the Managed Switch will broadcast the packet in the VLAN owning the receiving port. If the corresponding entry can be found in the table, it

indicates that the destination address should be a group port list, so the Managed Switch will duplicate this multicast data and deliver each port one copy. The general format of the multicast address table is described as Figure 4-6-3 below.

VLAN ID	Multicast IP	Port

Figure 4-6-3: Multicast Address Table

IGMP Snooping

In the network, the hosts apply to the near Router for joining (leaving) a multicast group by sending IGMP (Internet Group Management Protocol) messages. When the up-stream device forwards down the multicast data, the Managed Switch is responsible for sending them to the hosts. IGMP Snooping is a multicast control mechanism, which can be used on the Managed Switch for dynamic registration of the multicast group. The Managed Switch, running IGMP Snooping, manages and controls the multicast group via listening to and processing the IGMP messages transmitted between the hosts and the multicast router, thereby effectively prevents multicast groups being broadcasted in the network.

The Multicast is mainly for multicast management configuration of the Managed Switch, the screen in Figure 4-6-4 appears.

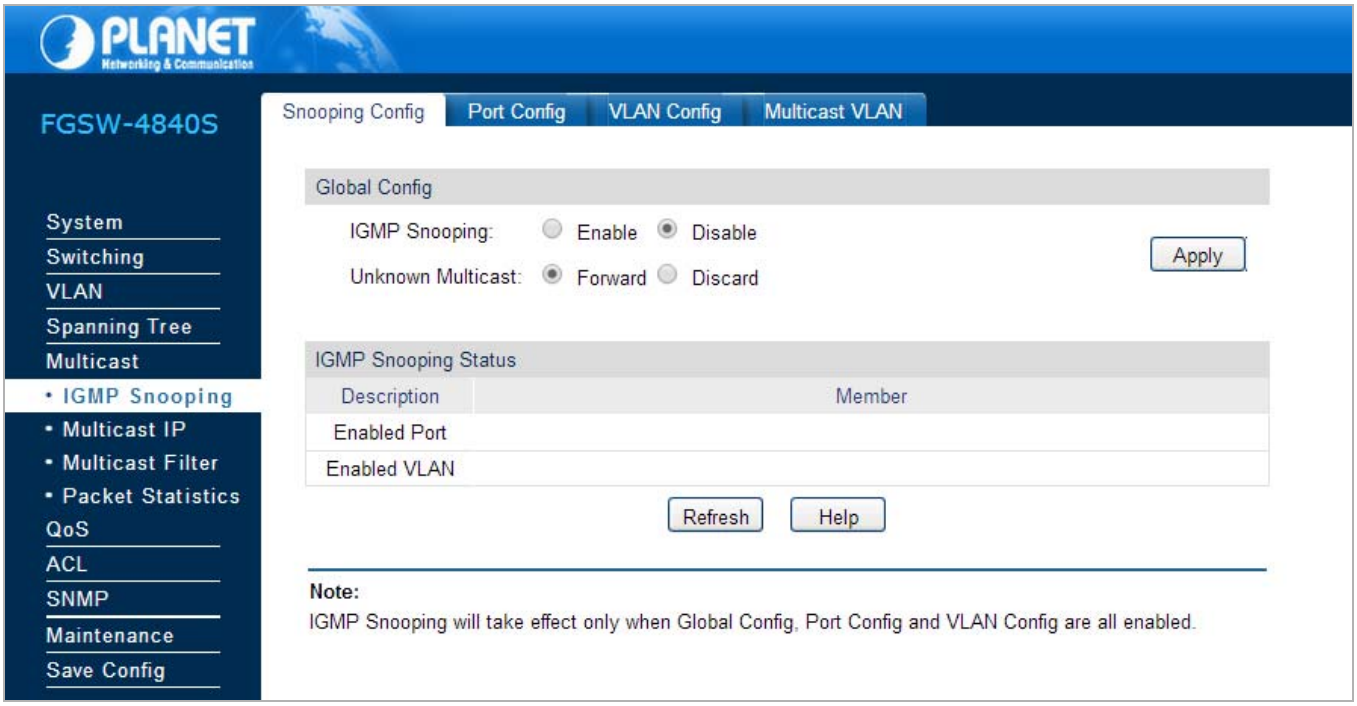


Figure 4-6-4: Multicast Page Screenshot

This section has the following items:

- **IGMP Snooping** Configure IGMP Snooping function of Managed Switch.
- **Multicast IP** Configure Multicast IP function of Managed Switch.
- **Multicast Filter** Configure Multicast Filtering function of Managed Switch.
- **Packet Statistics** Display Multicast packet statistics of Managed Switch.

4.6.1 IGMP Snooping

IGMP Snooping Process

The Managed Switch running IGMP Snooping, listens to the IGMP messages transmitted between the host and the router, and tracks the IGMP messages and the registered port. When receiving IGMP report message, the Managed Switch adds the port to the multicast address table; when the Managed Switch listens to IGMP leave message from the host, the router sends the Group-Specific Query message of the port to check if other hosts need this multicast, if yes, the router will receive IGMP report message; if no, the router will receive no response from the hosts and the Managed Switch will remove the port from the multicast address table. The router regularly sends IGMP query messages. After receiving the IGMP query messages, the Managed Switch will remove the port from the multicast address table if the Managed Switch receives no IGMP report message from the host within a period of time.

IGMP Messages

The Managed Switch running IGMP Snooping processes the IGMP messages of different types as follows.

1. IGMP Query Message

IGMP query message, sent by the router, falls into two types, IGMP general query message and IGMP group-specific-query message. The router regularly sends IGMP general message to query if the multicast groups contain any member. When receiving IGMP leave message, the receiving port of the router will send IGMP group-specific-query message to the multicast group and the Managed Switch will forward IGMP group-specific-query message to check if other members in the multicast group of the port need this multicast.

When receiving IGMP general query message, the Managed Switch will forward them to all other ports in the VLAN owning the receiving port. The receiving port will be processed: if the receiving port is not a router port yet, it will be added to the router port list with its router port time specified; if the receiving port is already a router port, its router port time will be directly reset.

When receiving IGMP group-specific-query message, the Managed Switch will send the group-specific query message to the members of the multicast group being queried.

2. IGMP Report Message

IGMP report message is sent by the host when it applies for joining a multicast group or responses to the IGMP query message from the router.

When receiving IGMP report message, the Managed Switch will send the report message via the router port in the VLAN as well as analyze the message to get the address of the multicast group the host applies for joining. The receiving port will be processed: if the receiving port is a new member port, it will be added to the multicast address table with its member port time specified; if the receiving port is already a member port, its member port time will be directly reset.

3. IGMP Leave Message

The host, running IGMPv1, does not send IGMP leave message when leaving a multicast group, as a result, the Managed Switch can not get the leave information of the host momentarily. However, after leaving the multicast group, the host does not send IGMP report message any more, so the Managed Switch will remove the port from the corresponding multicast address table when its member port time times out. The host, running IGMPv2 or IGMPv3, sends IGMP leave message when leaving a multicast group to inform the multicast router of its leaving.

When receiving IGMP leave message, the Managed Switch will forward IGMP group-specific-query message to check if other members in the multicast group of the port need this multicast and reset the member port time to the leave time. When the leave time times out, the Managed Switch will remove the port from the corresponding multicast group. If no other member is in the

group after the port is removed, the Managed Switch will send IGMP leave message to the router and remove the whole multicast group.

IGMP Snooping Fundamentals

1. Ports

Router Port: Indicates the Managed Switch port directly connected to the multicast router.

Member Port: Indicates a Managed Switch port connected to a multicast group member.

2. Timers

Router Port Time: Within the time, if the Managed Switch does not receive IGMP query message from the router port, it will consider this port is not a router port any more. The default value is 300 seconds.

Member Port Time: Within the time, if the Managed Switch does not receive IGMP report message from the member port, it will consider this port is not a member port any more. The default value is 260 seconds.

Leave Time: Indicates the interval between the Managed Switch receiving a leave message from a host and the Managed Switch removing the host from the multicast groups. The default value is 1 second.

The IGMP Snooping function can be implemented on **Snooping Config**, **Port Config**, **VLAN Config** and **Multicast VLAN** pages. The screen in Figure 4-6-5 appears.

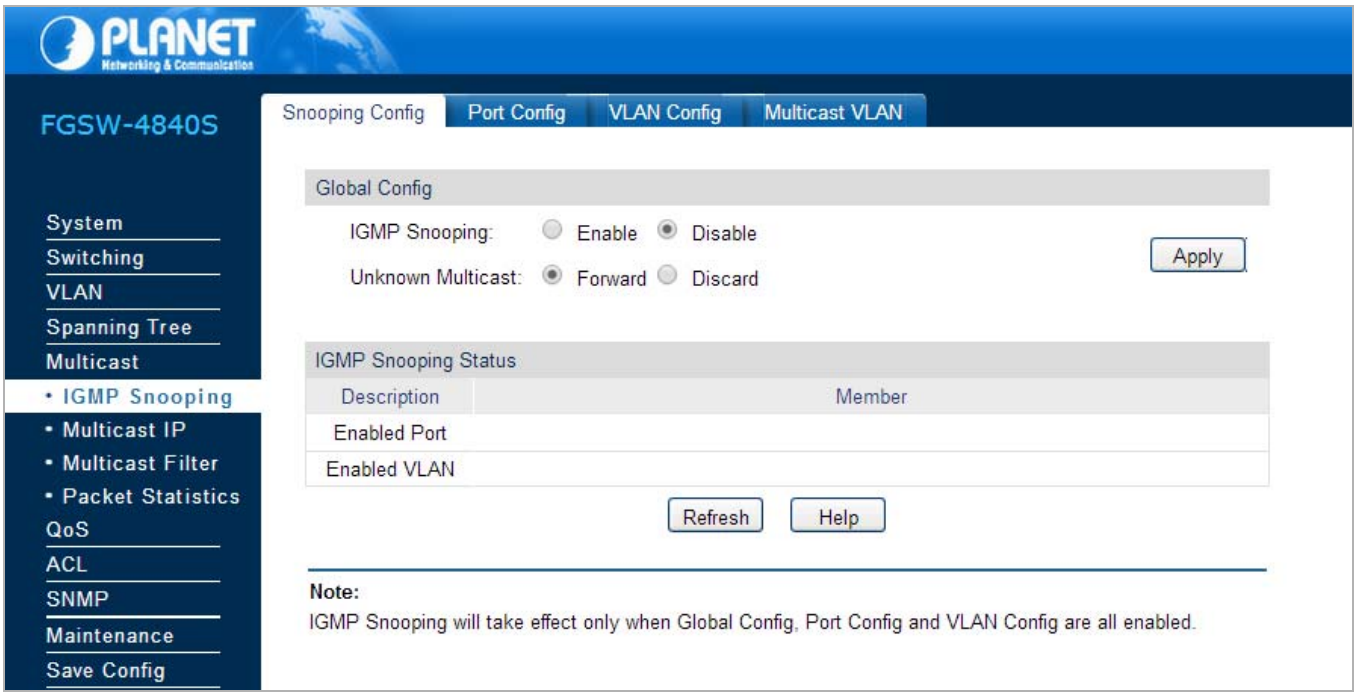


Figure 4-6-5: IGMP Snooping Page Screenshot

The page includes the following fields:

Object	Description
• **Snooping Config**	Configure the IGMP Snooping function on this page.
• **Port Config**	Configure the per port IGMP feature on this page.
• **VLAN Config**	Configure different IGMP parameters for different VLANs on this page.
• **Multicast VLAN**	Configure the Multicast VLAN function on this page.

4.6.1.1 Snooping Config

To configure the IGMP Snooping on the Managed Switch, please firstly configure IGMP global configuration and related parameters on this page. If the multicast address of the received multicast data is not in the multicast address table, the Managed Switch will broadcast the data in the VLAN. When Unknown Multicast Discard feature is enabled, the Managed Switch drops the received unknown multicast so as to save the bandwidth and enhance the process efficiency of the system. Please configure this feature appropriate to your needs; the screen in Figure 4-6-6 appears.

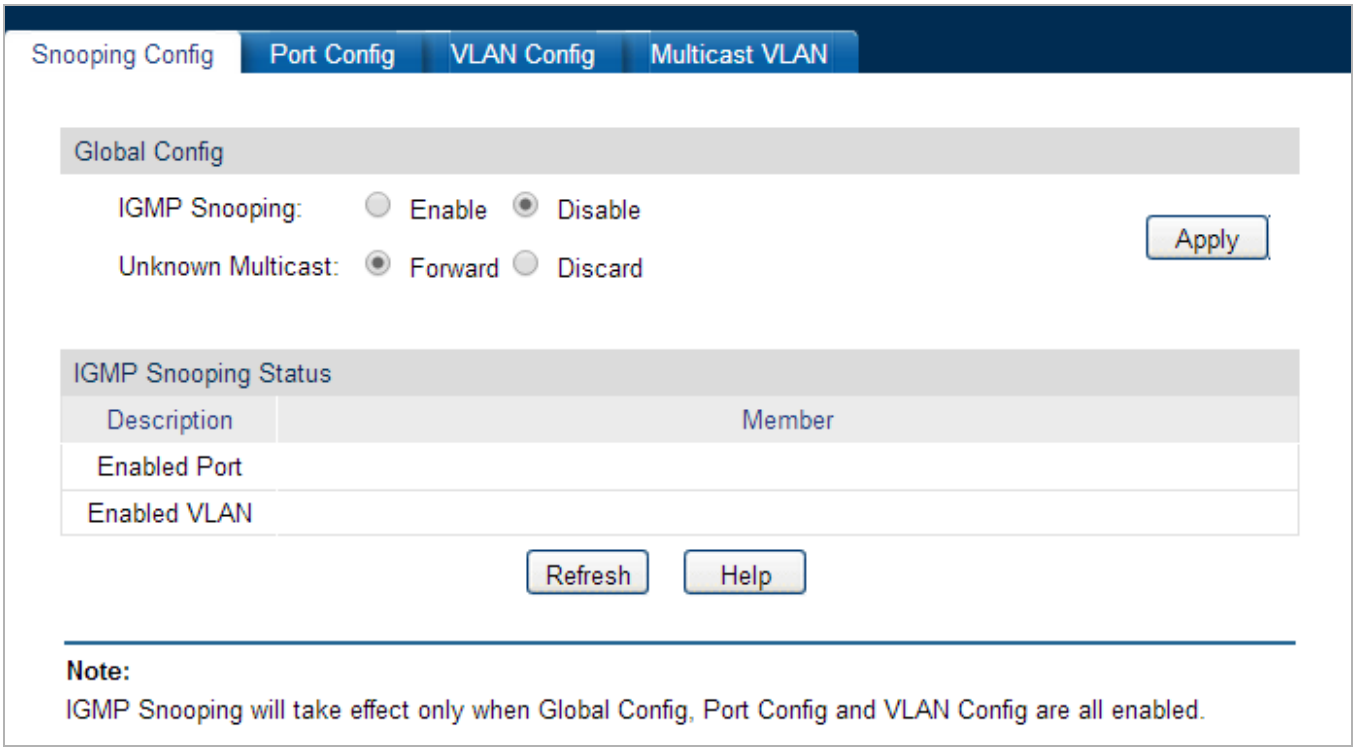


Figure 4-6-6: Snooping Config Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **IGMP Snooping**	Select Enable/Disable IGMP Snooping function globally on the Managed Switch.
• **Unknown Multicast**	Select the operation for the Managed Switch to process unknown multicast, Forward or Discard.
IGMP Snooping Status	
• **Description**	Displays IGMP Snooping status.
• **Member**	Displays the member of the corresponding status.

Buttons

Apply: Click to apply changes.

Refresh: Click to refresh current web page.

Help: Click to display help web page.

4.6.1.2 Port Config

This page allows to configure the per port IGMP feature of Managed Switch; the screen in Figure 4-6-7 appears.

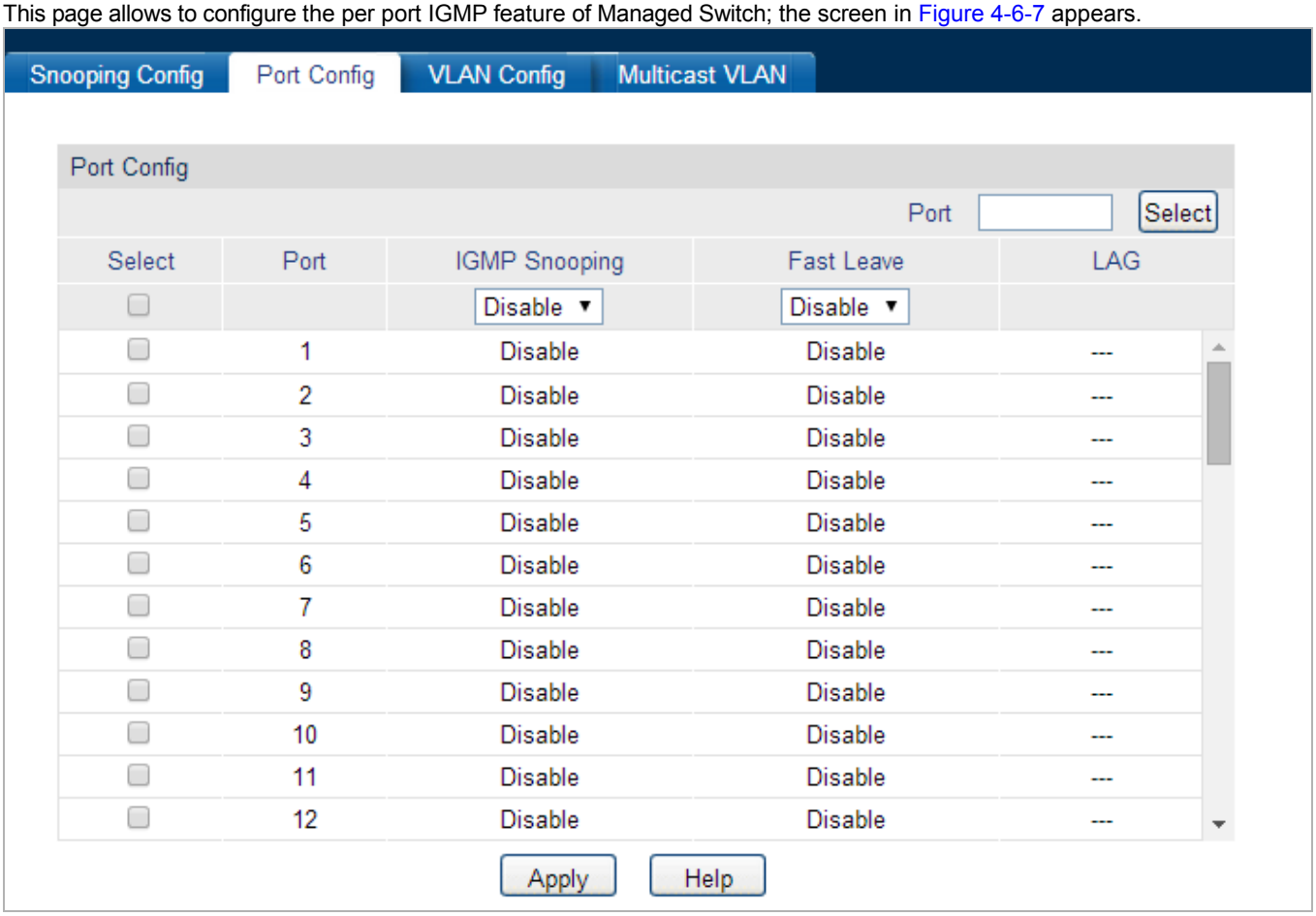


Figure 4-6-7: Port Config Page Screenshot

The page includes the following fields:

Object	Description
Port Config	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port number entered.
• **Select**	Select the desired port for IGMP Snooping feature configuration. It is multi-optional.
• **Port**	Displays the port of the Managed Switch.
• **IGMP Snooping**	Select Enable/Disable IGMP Snooping for the desired port.
• **Fast Leave**	Select Enable/Disable Fast Leave feature for the desired port. If Fast Leave is enabled for a port, the Managed Switch will immediately remove this port from the multicast group upon receiving IGMP leave messages.
• **LAG**	Displays the LAG number which the port belongs to.

Note

- Fast Leave on the port is effective only when the host supports IGMPv2 or IGMPv3.
- When both Fast Leave feature and Unknown Multicast Discard feature are enabled, the leaving of a user connected to a port owning multi-user will result in the other users intermitting the multicast business.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.6.1.3 VLAN Config

The multicast groups established by IGMP Snooping are based on VLANs, this page provides to configure different IGMP parameters for different VLANs; the screen in Figure 4-6-8 appears.

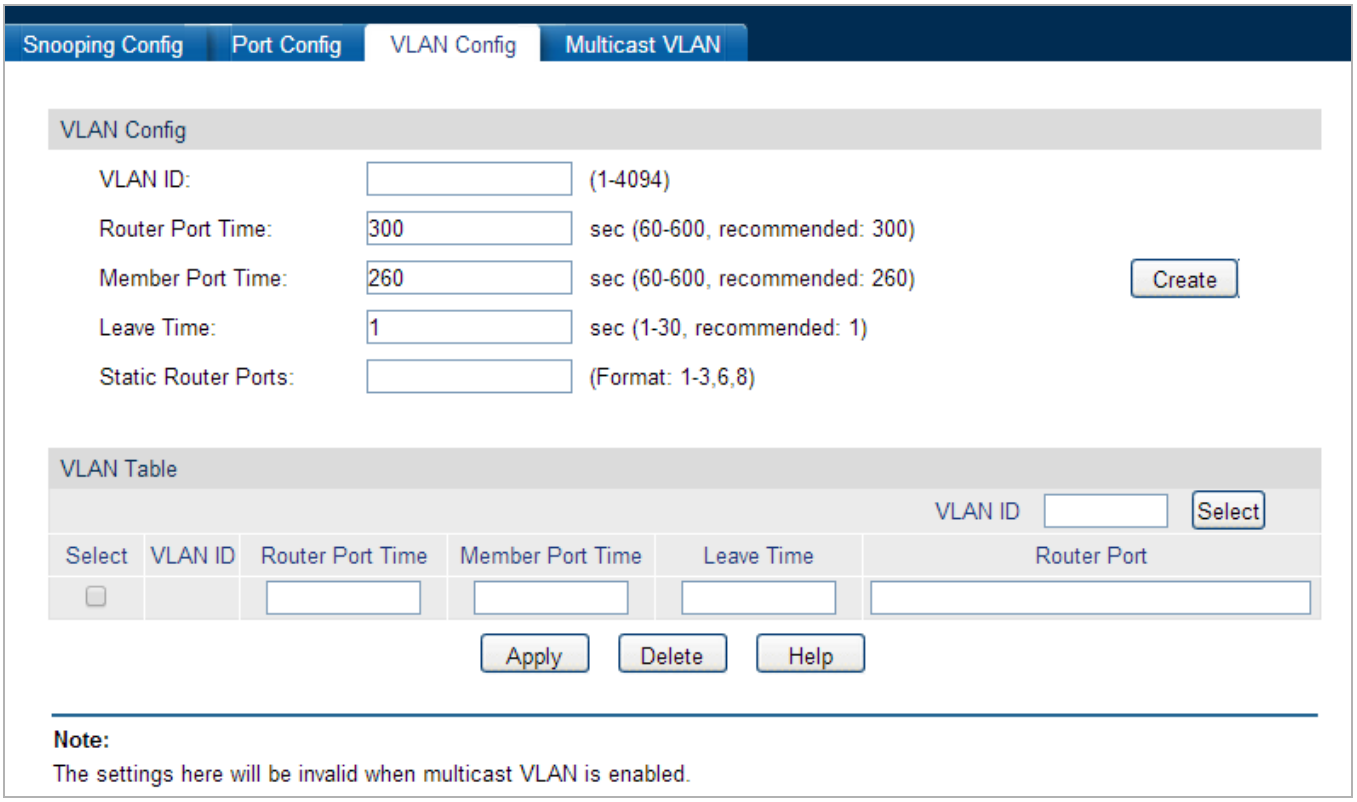


Figure 4-6-8: VLAN Config Page Screenshot

The page includes the following fields:

Object	Description
VLAN Config	
• **VLAN ID**	Enter the VLAN ID to enable IGMP Snooping for the desired VLAN.
• **Router Port Time**	Specify the aging time of the router port. Within this time, if the Managed Switch doesn't receive IGMP query message from the router port, it will consider this port is not a router port any more.
• **Member Port Time**	Specify the aging time of the member port. Within this time, if the Managed Switch doesn't receive IGMP report message from the member port, it will consider this port is not a member port any more.
• **Leave Time**	Specify the interval between the Managed Switch receiving a leave message from a host and the Managed Switch removing the host from the multicast groups.

• **Static Router Ports**	Select the static router port which is mainly used in the network with stable topology.
VLAN Table	
• **VLAN ID Select**	Click the **Select** button to quick-select the corresponding VLAN ID based on the ID number you entered.
• **Select**	Select the desired VLAN ID for configuration. It is multi-optional.
• **VLAN ID**	Displays the VLAN ID.
• **Router Port Time**	Displays the router port time of the VLAN.
• **Member Port Time**	Displays the member port time of the VLAN.
• **Leave Time**	Displays the leave time of the VLAN.
• **Router Port**	Displays the router port of the VLAN.

The settings here will be invalid when multicast VLAN is enabled.

Buttons

Create: Click to create a new VLAN configuration for IGMP Snooping.

Apply: Click to apply changes.

Delete: Click to delete VLAN configuration from VLAN table.

Help: Click to display help web page.

4.6.1.4 Multicast VLAN

In old multicast transmission mode, when users in different VLANs apply for join the same multicast group, the multicast router will duplicate this multicast information and deliver each VLAN owning a receiver one copy. This mode wastes a lot of bandwidth.

The issue above can be solved by configuring a multicast VLAN. By adding Managed Switch ports to the multicast VLAN and enabling IGMP Snooping, you can make users in different VLANs share the same multicast VLAN. This saves the bandwidth since multicast streams are transmitted only within the multicast VLAN and also guarantees security because the multicast VLAN is isolated from user VLANS.

Before configuring a multicast VLAN, you should firstly configure a VLAN as multicast VLAN and add the corresponding ports to the VLAN on the **802.1Q VLAN** page. If the multicast VLAN is enabled, the multicast configuration for other VLANs on the **VLAN Config** page will be invalid, that is, the multicast streams will be transmitted only within the multicast VLAN. The screen in Figure 4-6-9 appears.

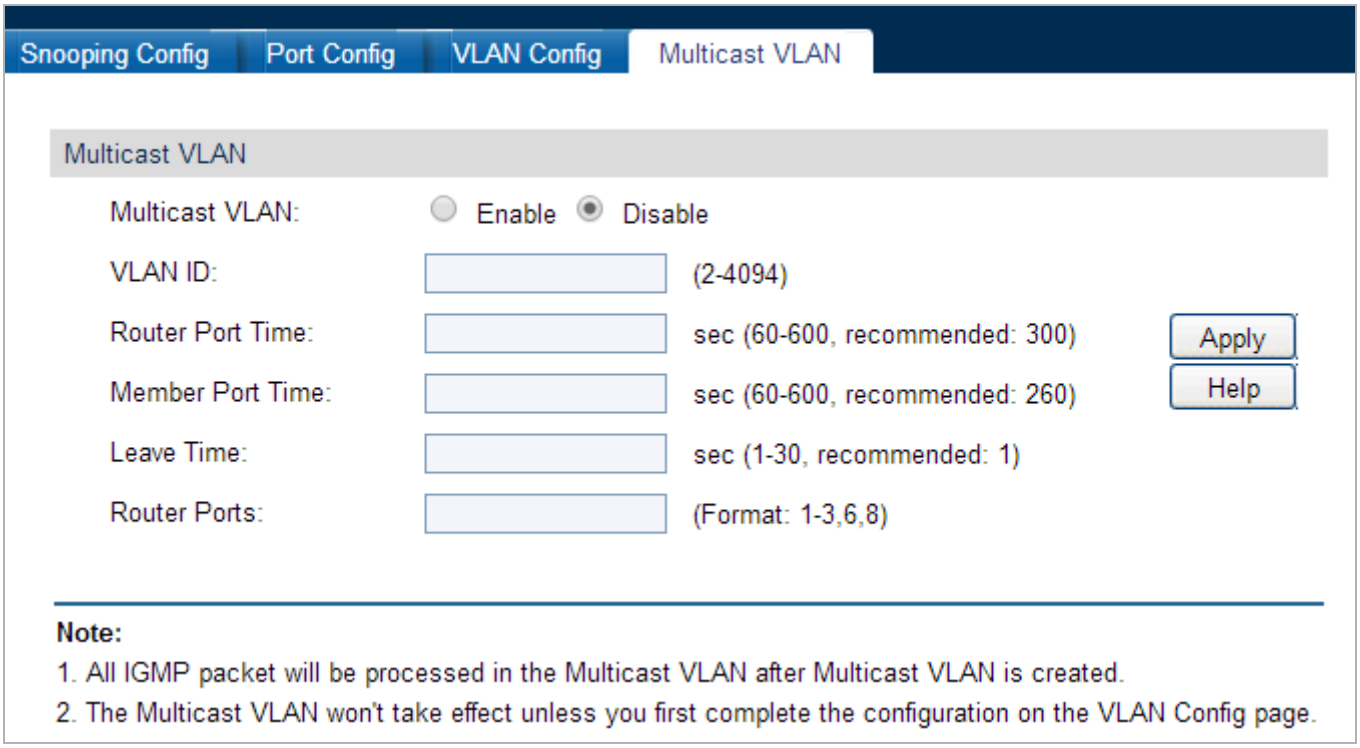


Figure 4-6-9: Multicast VLAN Page Screenshot

The page includes the following fields:

Object	Description
Multicast VLAN	
• **Multicast VLAN**	Select Enable/Disable Multicast VLAN feature.
• **VLAN ID**	Enter the VLAN ID of the multicast VLAN.
• **Router Port Time**	Specify the aging time of the router port. Within this time, if the Managed Switch doesn't receive IGMP query message from the router port, it will consider this port

	is not a router port any more.
• **Member Port Time**	Specify the aging time of the member port. Within this time, if the Managed Switch doesn't receive IGMP report message from the member port, it will consider this port is not a member port any more.
• **Leave Time**	Specify the interval between the Managed Switch receiving a leave message from a host, and the Managed Switch removing the host from the multicast groups.
• **Router Ports**	Select the static router port which is mainly used in the network with stable topology.

- The router port should be in the multicast VLAN, otherwise the member ports cannot receive multicast streams.
- The Multicast VLAN won't take effect unless you first complete the configuration for the corresponding VLAN owning the port on the **802.1Q VLAN** page.

- It is recommended to choose GENERAL as the link type of the member ports in the multicast VLAN.
- After a multicast VLAN is created, all the IGMP packets will be processed only within the multicast VLAN.

Buttons

Create: Click to create a new VLAN configuration for IGMP Snooping.

Apply: Click to apply changes.

Delete: Click to delete VLAN configuration from VLAN table.

Help: Click to display help web page.

4.6.2 Multicast IP

In a network, receivers can join different multicast groups appropriate to their needs. The Managed Switch forwards multicast streams based on multicast address table. The Multicast IP can be implemented on **Multicast IP Table**, **Static Multicast IP** page. The screen in Figure 4-6-10 appears.

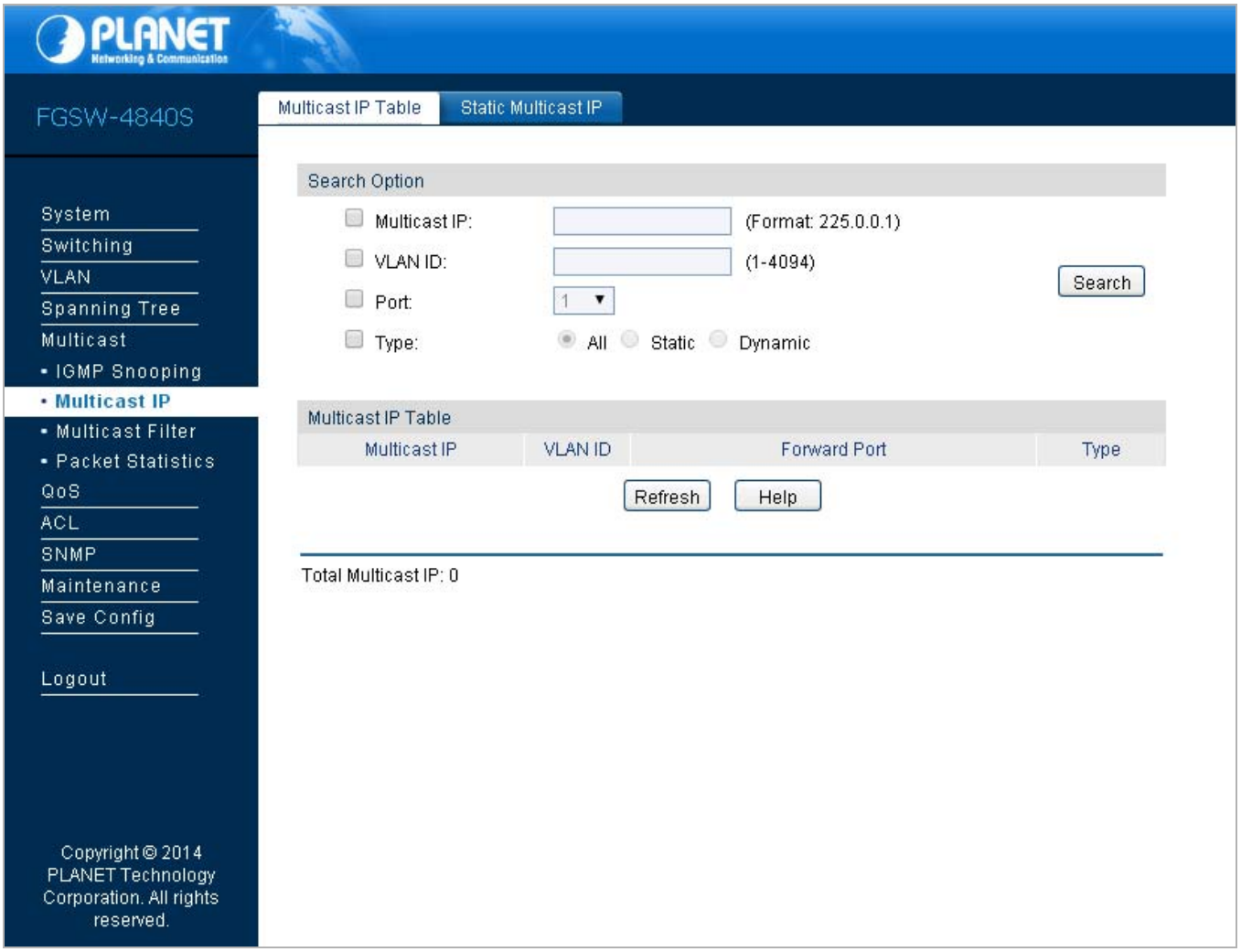


Figure 4-6-10: Multicast IP Page Screenshot

The page includes the following fields:

Object	Description
• **Multicast IP Table**	View the multicast IP table on the Managed Switch.
• **Static Multicast IP**	Configure the static multicast IP function on this page.

4.6.2.1 Multicast IP Table

In a network, receivers can join different multicast groups appropriate to their needs, the Managed Switch forwards multicast streams based on multicast address table. The Multicast IP can be implemented on **Multicast IP Table**, **Static Multicast IP** page; the screen in Figure 4-6-11 appears.

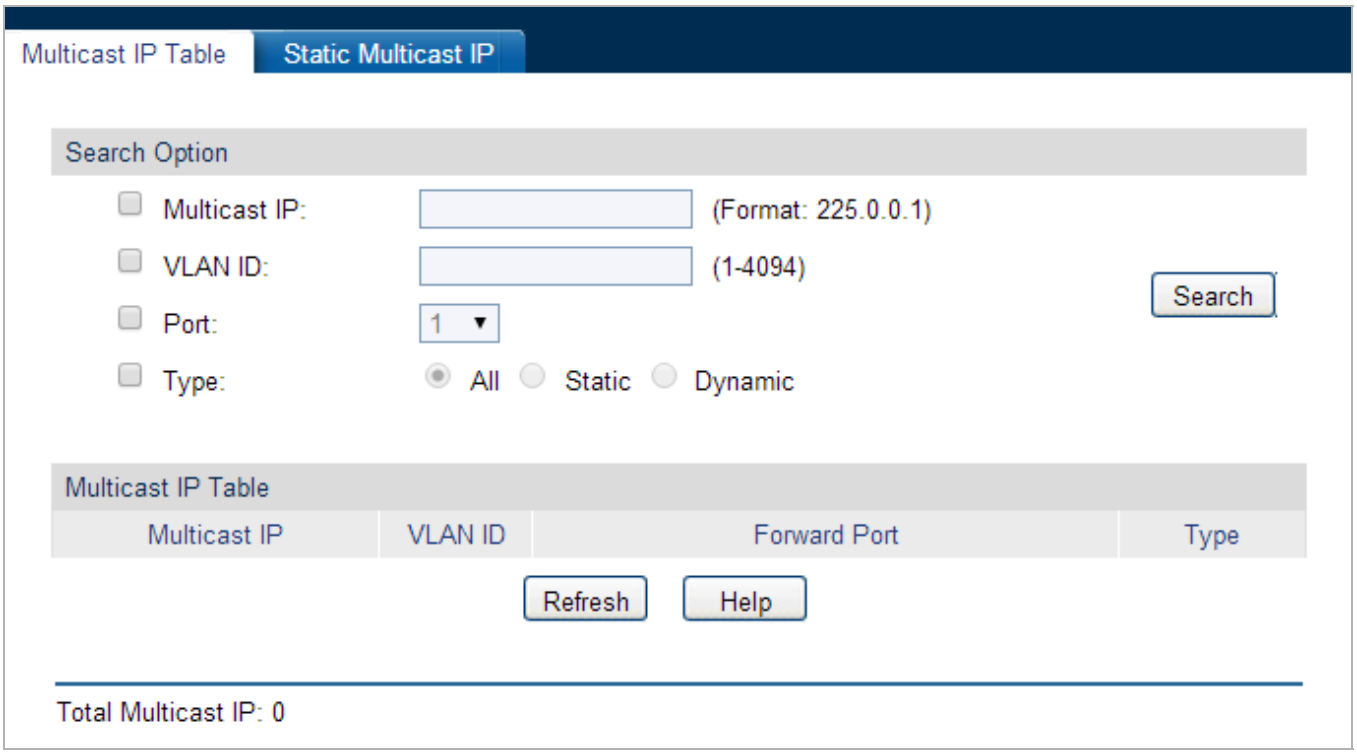


Figure 4-6-11: Multicast IP Table Page Screenshot

The page includes the following fields:

Object	Description
Search Option	
• **Multicast IP**	Enter the multicast IP address the desired entry must carry.
• **VLAN ID**	Enter the VLAN ID the desired entry must carry.
• **Port**	Select the port number the desired entry must carry.
• **Type**	Select the type the desired entry must carry. ● All: Displays all multicast IP entries. ● Static: Displays all static multicast IP entries. ● Dynamic: Displays all dynamic multicast IP entries.
Multicast IP Table	
• **Multicast IP**	Displays multicast IP address.
• **VLAN ID**	Displays the VLAN ID of the multicast group.
• **Forward Port**	Displays the forward port of the multicast group.
• **Type**	Displays the type of the multicast IP.

Note

If the configuration on VLAN Config page and multicast VLAN page is changed, the Managed Switch will clear up the dynamic multicast addresses in multicast address table and learn new addresses.

Buttons

Search: Click to search multicast IP.

Refresh: Click to refresh current web page.

Help: Click to display help web page.

4.6.2.2 Static Multicast IP

The Static Multicast IP table isolated from dynamic multicast group and multicast filter is not learned by IGMP Snooping. It can enhance the quality and security for information transmission in some fixed multicast groups; the screen in Figure 4-6-12 appears.

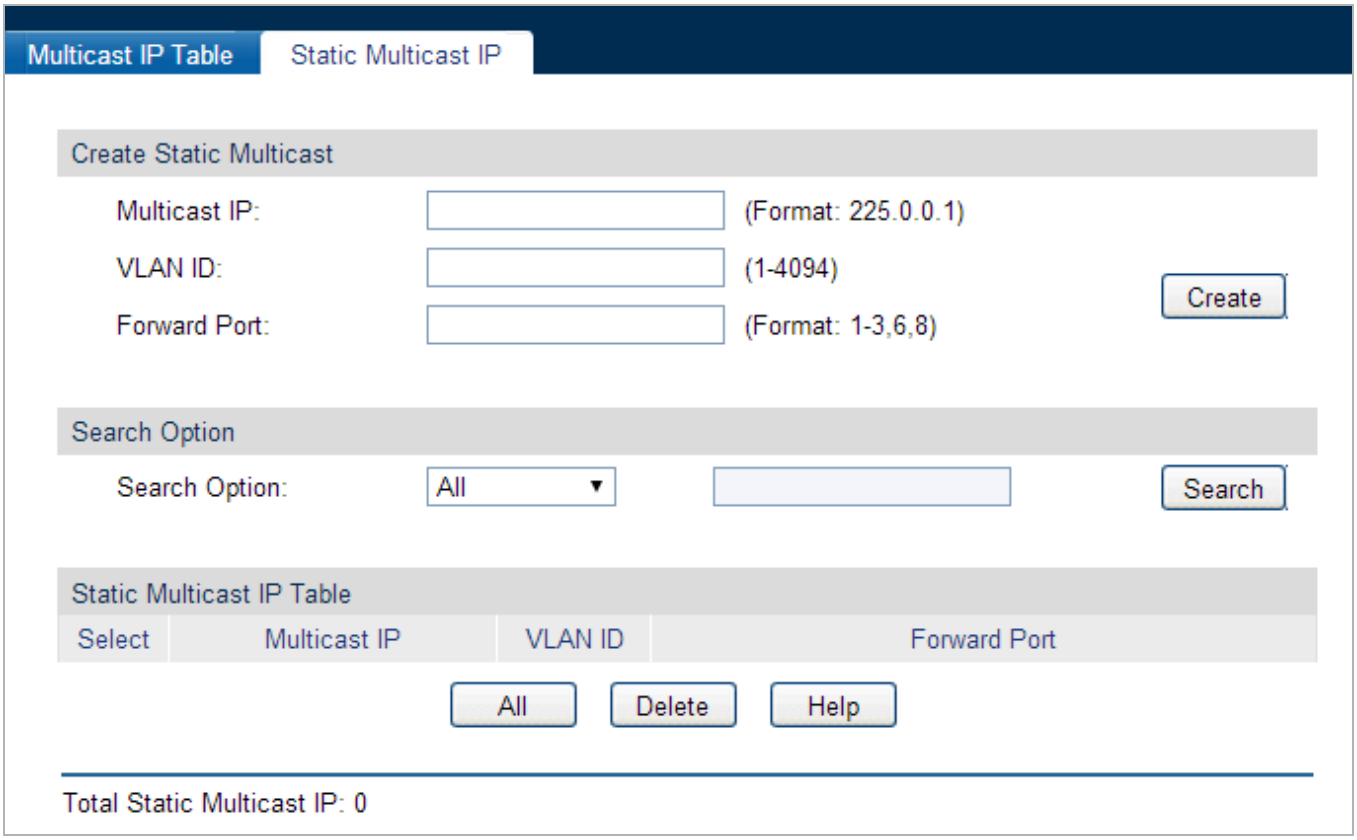


Figure 4-6-12: Static Multicast IP Page Screenshot

The page includes the following fields:

Object	Description
Create Static Multicast	
• **Multicast IP**	Enter static multicast IP address.

• **VLAN ID**	Enter the VLAN ID of the multicast IP.
• **Forward Port**	Enter the forward port of the multicast group.
Search Option	
• **Search Option**	Select the rules for displaying multicast IP table to find the desired entries quickly. ● **All:** Displays all static multicast IP entries. ● **Multicast IP:** Enter the multicast IP address the desired entry must carry. ● **VLAN ID:** Enter the VLAN ID the desired entry must carry. ● **Port:** Enter the port number the desired entry must carry.
Static Multicast IP Table	
• **Select**	Select the desired entry to delete the corresponding static multicast IP. It is multi-optional.
• **Multicast IP**	Displays the multicast IP.
• **VLAN ID**	Displays the VLAN ID of the multicast group.
• **Forward Port**	Displays the forward port of the multicast group.

Buttons

Create: Click to create a new static multicast IP.

Search: Click to search static multicast IP.

All: Click to select all static multicast IP.

Delete: Click to delete static multicast IP.

Help: Click to display help web page.

.4.6.3 Multicast Filter

When IGMP Snooping is enabled, you can specified the multicast IP-range the ports can join so as to restrict users ordering multicast programs via configuring multicast filter rules.

When applying for a multicast group, the host will send IGMP report message. After receiving the report message, the Managed Switch will firstly check the multicast filter rules configured for the receiving port. If the port can be added to the multicast group, it will be added to the multicast address table; if the port can not be added to the multicast group, the Managed Switch will drop the IGMP report message. In that way, the multicast streams will not be transmitted to this port, which allows you to control hosts joining the multicast group. The screen in Figure 4-6-13 appears.

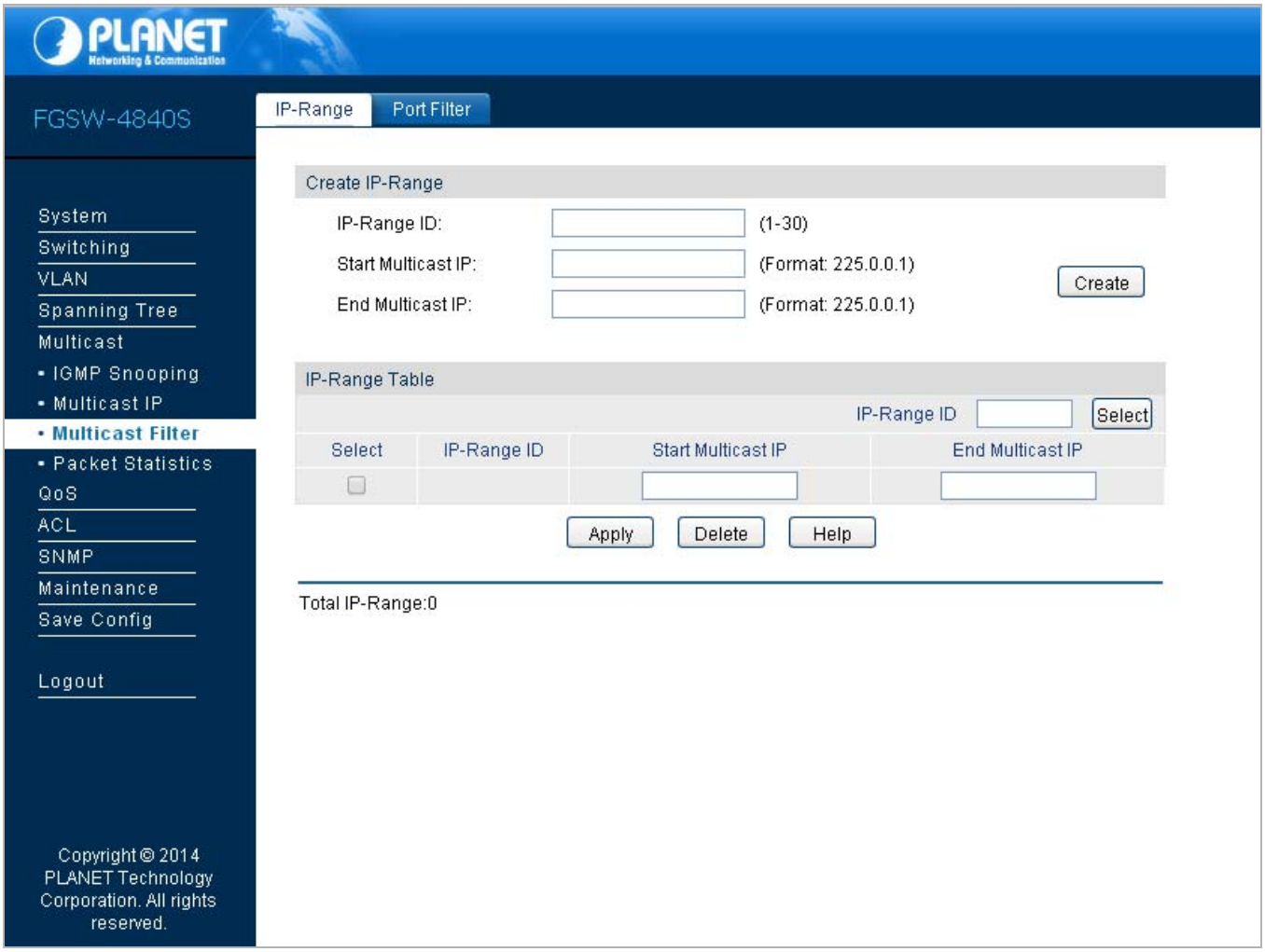


Figure 4-6-13: Multicast Filter Page Screenshot

The page includes the following fields:

Object	Description
• **IP-Range**	Configure the IP-Range function on this page.
• **Port Filter**	Configure the port filter function on this page.

4.6.3.1 IP-Range

This page provides to configure the desired IP-ranges to be filtered; the screen in Figure 4-6-14 appears.

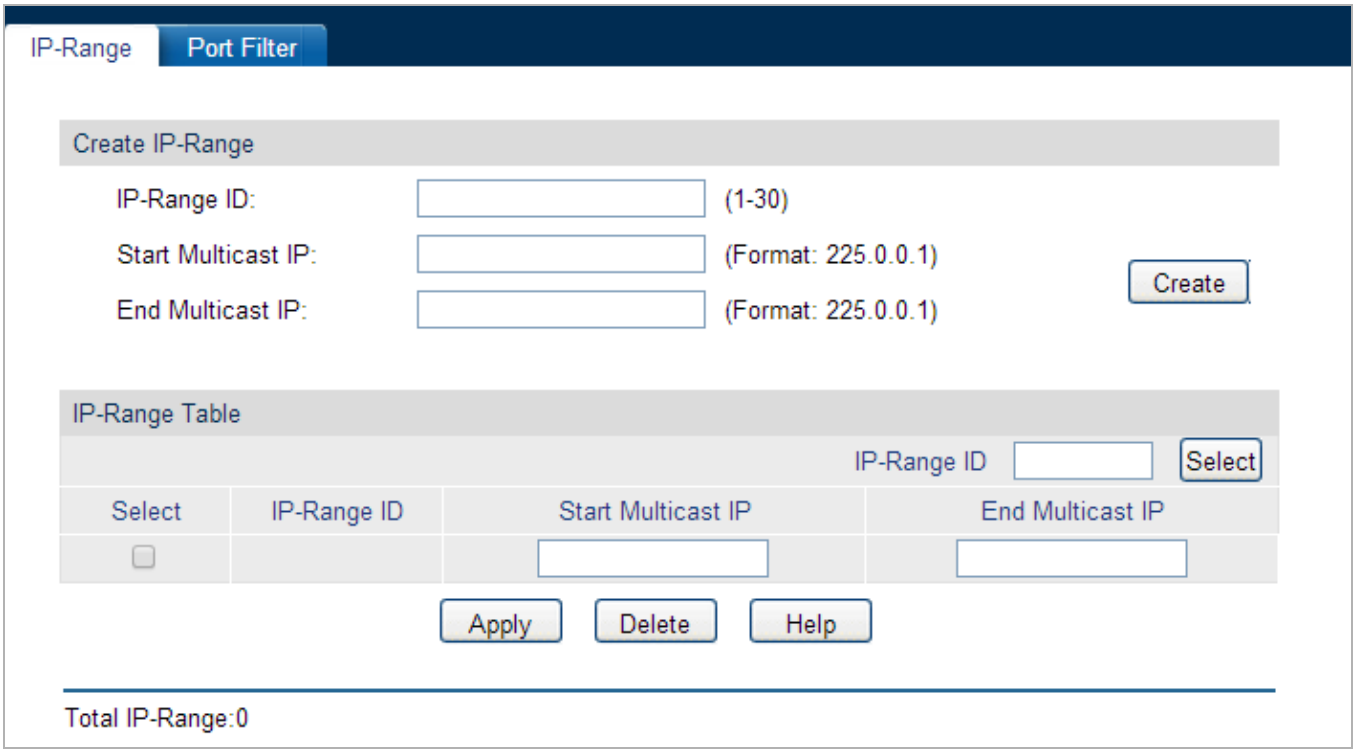


Figure 4-6-14: IP-Range Page Screenshot

The page includes the following fields:

Object	Description
Create IP-Range	
• **IP-Range ID**	Enter the IP-range ID.
• **Start Multicast IP**	Enter start multicast IP of the IP-range.
• **End Multicast IP**	Enter end multicast IP of the IP-range.
IP-Range Table	
• **IP-Range ID Select**	Click the **Select** button to quick-select the corresponding IP-range ID based on the ID number you entered.
• **Select**	Select the desired entry to delete or modify the corresponding IP-range. It is multi-optional.
• **IP-Range ID**	Displays IP-range ID.
• **Start Multicast IP**	Displays start multicast IP of the IP-range.
• **End Multicast IP**	Displays end multicast IP of the IP-range.

Buttons

Create: Click to create a new IP-Range.

Apply: Click to apply changes.

Delete: Click to delete IP-Range ID.

Help: Click to display help web page.

4.6.3.2 Port Filter

This page provides to configure the multicast filter rules for port. Take the configuration on this page and the configuration on IP-Range page together to implement multicast filter function on the Managed Switch; the screen in Figure 4-6-15 appears.

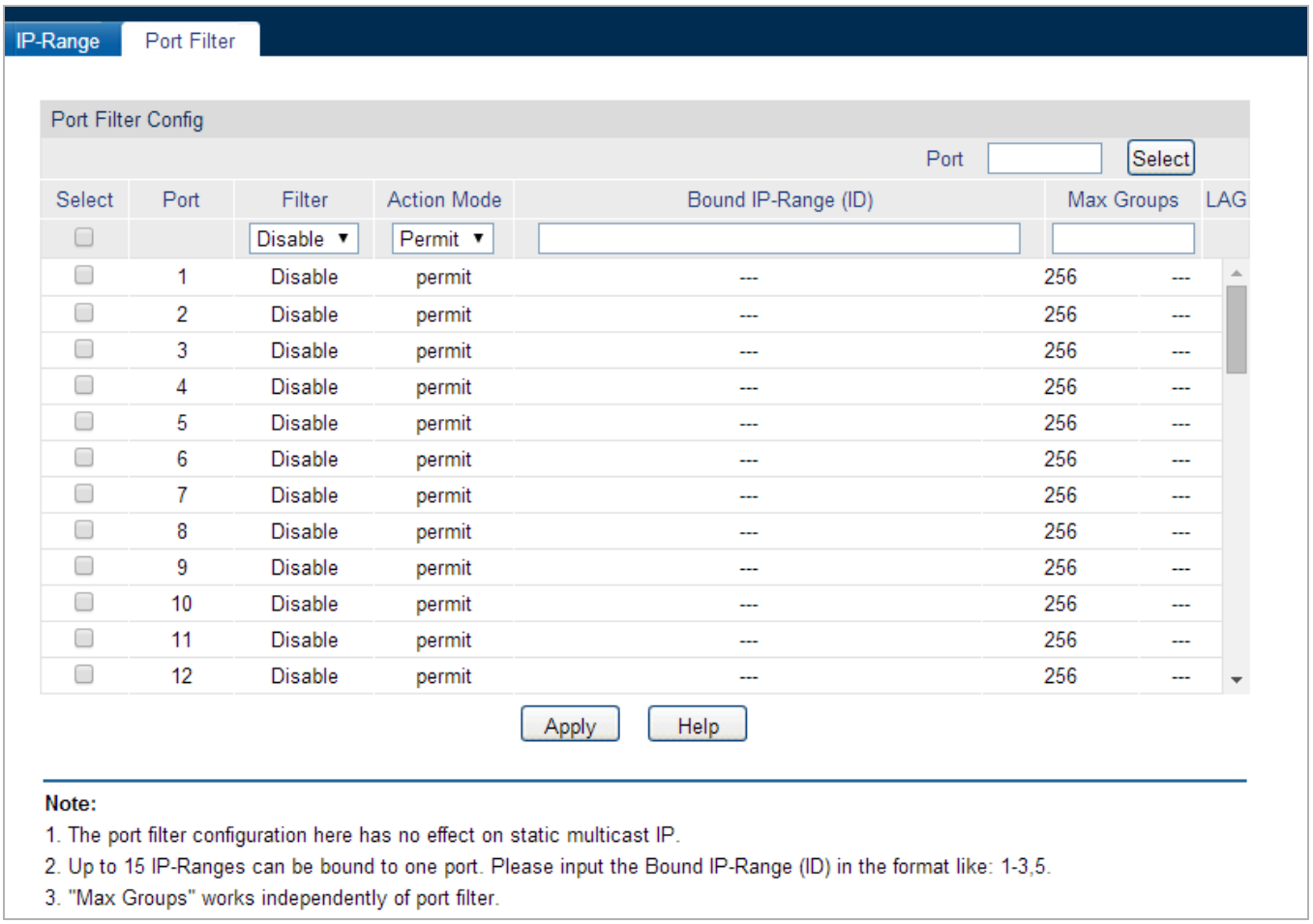


Figure 4-6-15: Port Filter Page Screenshot

The page includes the following fields:

Object	Description
Port Filter Config	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port number entered.
• **Select**	Select the desired port for multicast filtering. It is multi-optional.
• **Port**	Displays the port number.
• **Filter**	Select Enable/Disable multicast filtering feature on the port.
• **Action Mode**	Select the action mode to process multicast packets when the multicast IP is in the filtering IP-range. ● **Permit:** Only the multicast packets whose multicast IP is in the IP-range will be processed. ● **Deny:** Only the multicast packets whose multicast IP is not in the IP-range will be processed.
• **Bound IP-Range (ID)**	Enter the IP-rang ID the port will be bound to.

• **Max Groups**	Specify the maximum number of multicast groups to prevent some ports taking up too much bandwidth.
• **LAG**	Displays the LAG number which the port belongs to.

- Multicast Filter feature can only have effect on the VLAN with IGMP Snooping enabled.
- Multicast Filter feature has no effect on static multicast IP.
- Up to 5 IP-Ranges can be bound to one port.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.6.4 Packet Statistics

This page allows viewing the multicast data traffic on each port of the Managed Switch, which facilitates to monitor the IGMP messages in the network. The screen in Figure 4-6-16 appears.

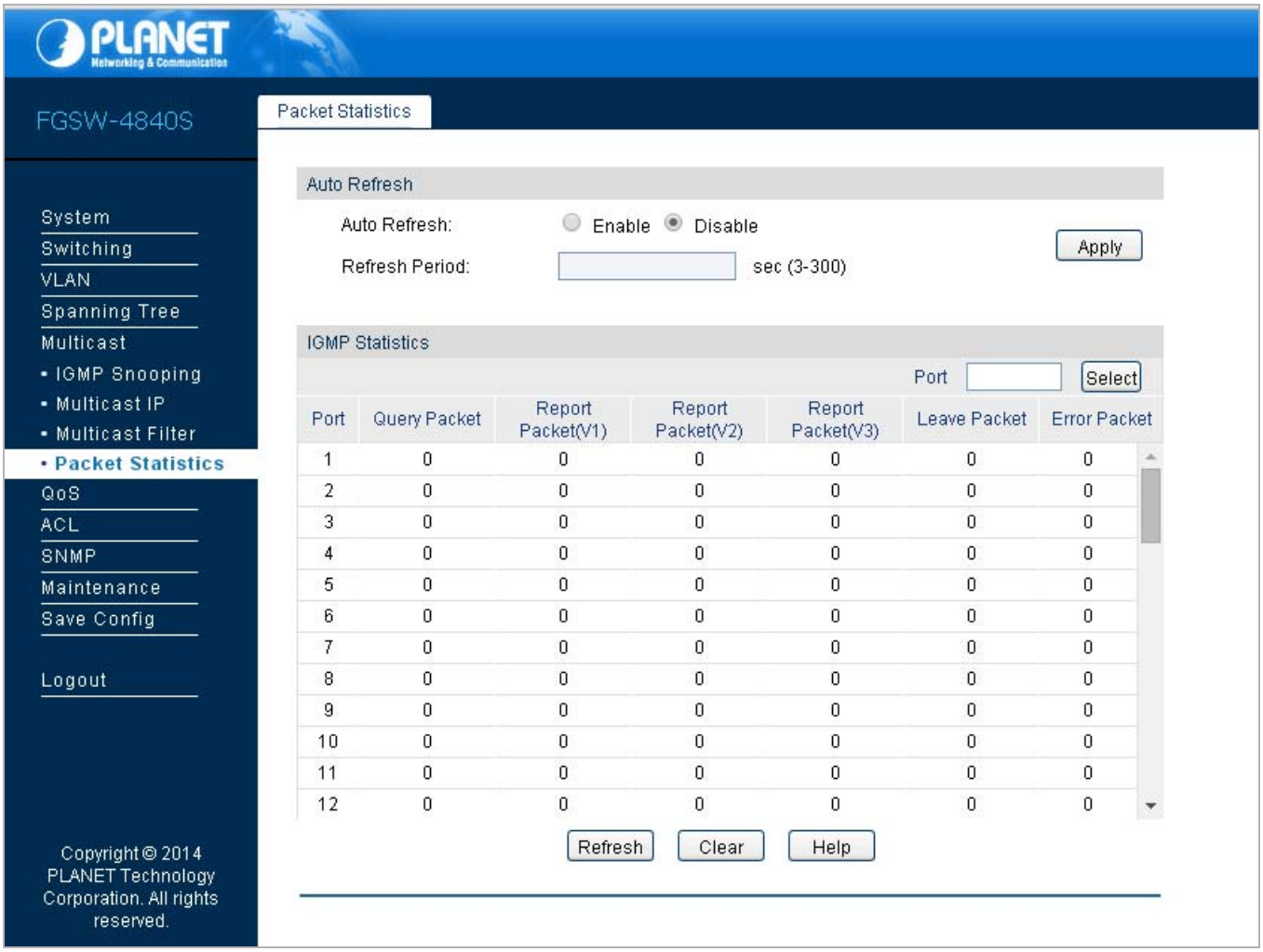


Figure 4-6-16: Packet Statistics Page Screenshot

The page includes the following fields:

Object	Description
• **Packet Statistics**	View the multicast data traffic on each port of the Managed Switch on this page.

4.6.4.1 Packet Statistics

This page allows viewing the multicast data traffic on each port of the Managed Switch, which facilitates to monitor the IGMP messages in the network. The screen in Figure 4-6-17 appears.

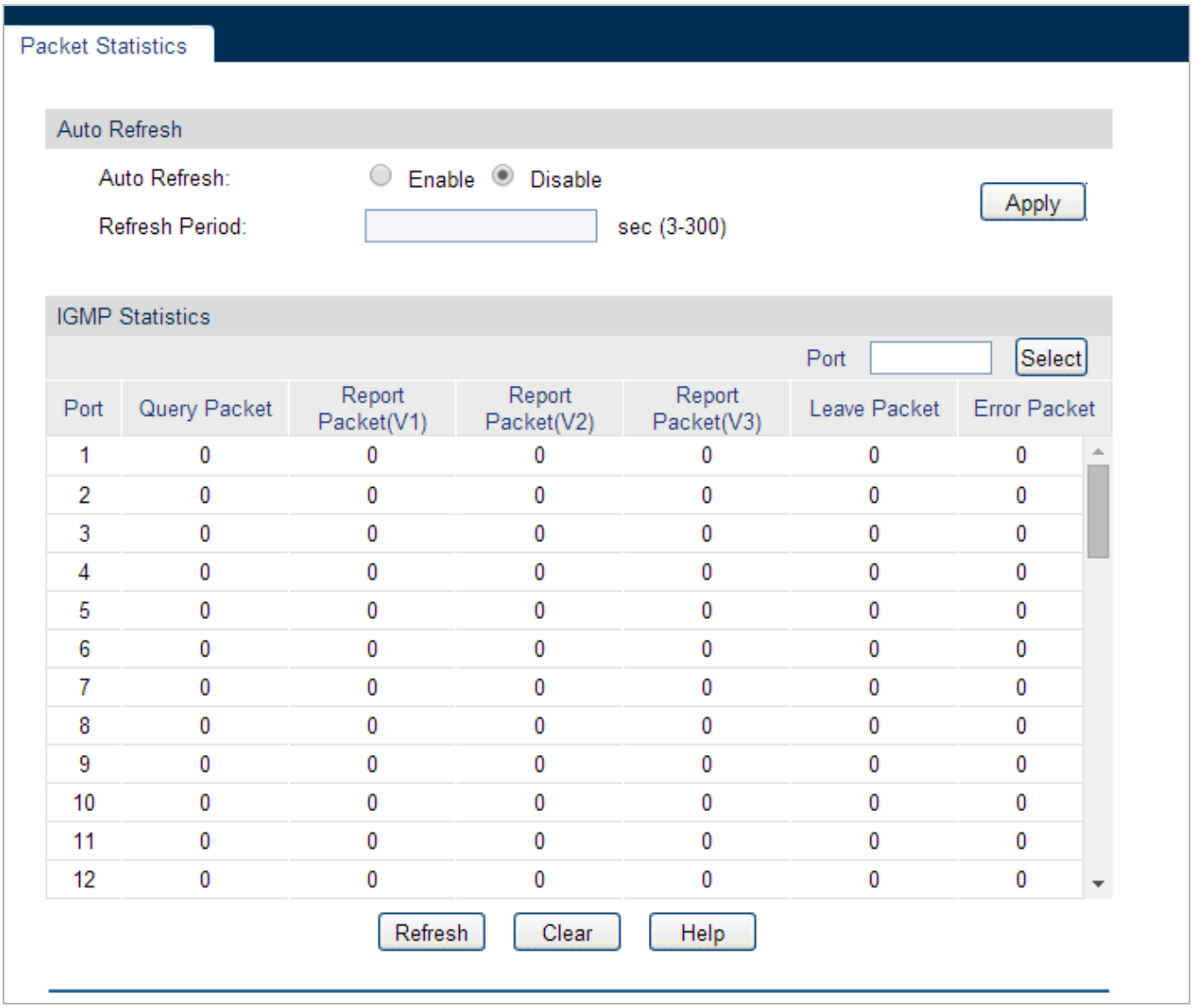


Figure 4-6-17: Packet Statistics Page Screenshot

The page includes the following fields:

Object	Description
Auto Refresh	
• **Auto Refresh**	Select Enable/Disable auto refresh feature.
• **Refresh Period**	Enter the time from 3 to 300 in seconds to specify the auto refresh period.
IGMP Statistics	
• **Port Select**	Click the **Select** button to quick-select the corresponding port based on the port number entered.
• **Port**	Displays the port number of the Managed Switch.

• **Query Packet**	Displays the number of query packets the port received.
• **Report Packet (V1)**	Displays the number of IGMPv1 report packets the port received.
• **Report Packet (V2)**	Displays the number of IGMPv3 report packets the port received.
• **Report Packet (V3)**	Displays the number of IGMPv3 report packets the port received.
• **Leave Packet**	Displays the number of leave packets the port received.
• **Error Packet**	Displays the number of error packets the port received.

Buttons

Apply : Click to apply changes.

Refresh : Click to refresh current web page.

Clear : Click to clear per port packet statistics.

Help : Click to display help web page.

4.7 QoS

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

QoS

This Managed Switch classifies the ingress packets, maps the packets to different priority queues and then forwards the packets according to specified scheduling algorithms to implement QoS function. The screen in Figure 4-7-1 appears.

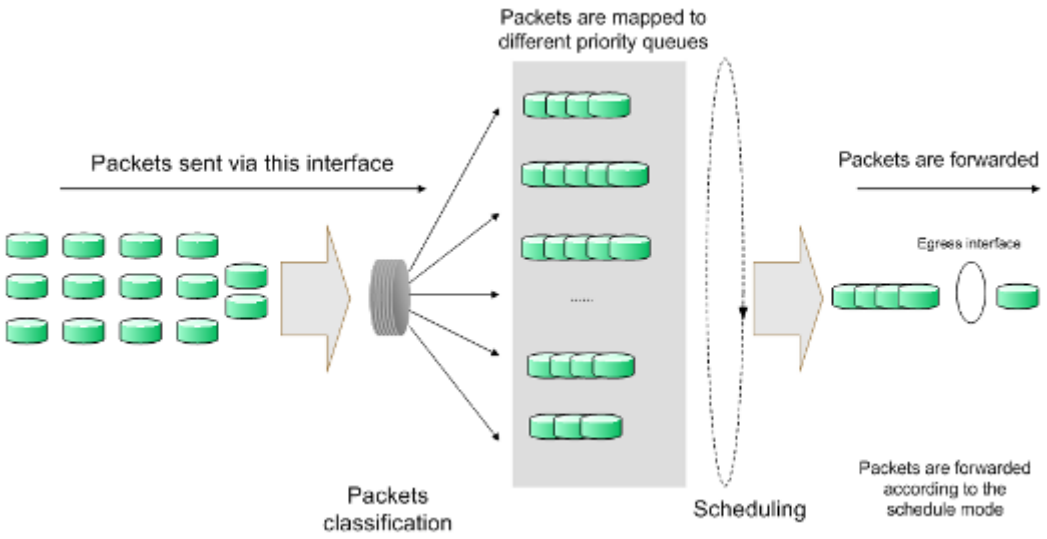


Figure 4-7-1: QoS Function

- Traffic classification: Identifies packets conforming to certain characters according to certain rules.
- Map: The user can map the ingress packets to different priority queues based on the priority modes. This Managed Switch implements three priority modes based on port, on 802.1P and on DSCP.
- Queue scheduling algorithm: When the network is congested, the problem that many packets compete for resources must be solved, usually in the way of queue scheduling. The Managed Switch supports four schedule modes: SP, WRR, SP+WRR and Equ.

Priority Mode

This Managed Switch implements three priority modes based on port, on 802.1P and on DSCP. By default, the priority mode based on port is enabled and the other two modes are optional.

1. Port Priority

Port priority is a priority level of the port. After port priority is configured, the data stream will be mapped to the egress queues directly according to the priority level of the port.

2. 802.1P Priority

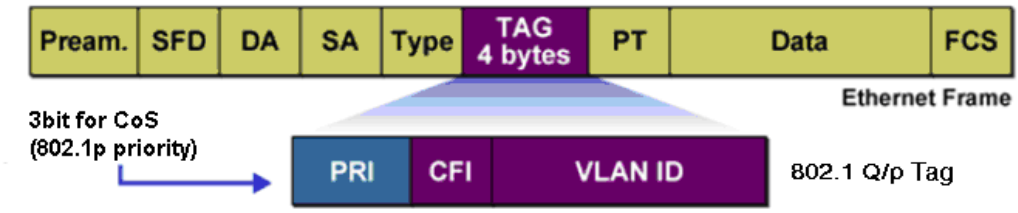


Figure 4-7-2: 802.1Q Frame

As shown in the figure above, each 802.1Q Tag has a Pri field, comprising 3 bits. The 3-bit priority field is 802.1p priority in the range of 0 to 7. 802.1P priority determines the priority of the packets based on the Pri value. On the Web management page of the Managed Switch, you can configure different priority tags mapping to the corresponding priority levels, and then the switch determine which packet is sent preferentially when forwarding packets. The switch processes untagged packets based on the default priority mode.

3. DSCP Priority

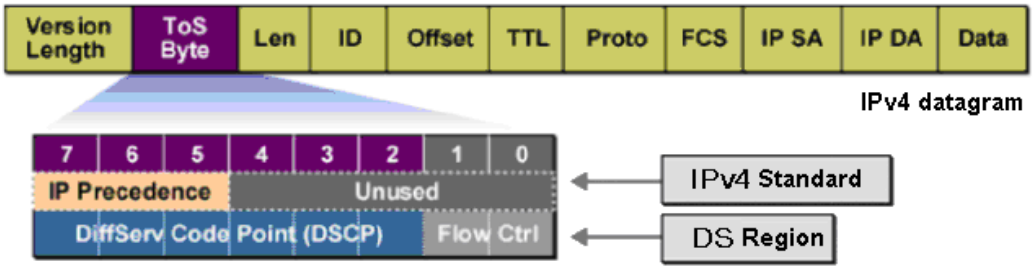


Figure 4-7-3: IP Datagram

As shown in the figure above, the ToS (Type of Service) in an IP header contains 8 bits. The first three bits indicate IP precedence in the range of 0 to 7. RFC2474 re-defines the ToS field in the IP packet header, which is called the DS field. The first six bits (bit 0-bit 5) of the DS field indicate DSCP precedence in the range of 0 to 63. The last 2 bits (bit 6 and bit 7) are reserved. On the Web management page, you can configure different DS field mapping to the corresponding priority levels. Non-IP datagram with 802.1Q tag are mapped to different priority levels based on 802.1P priority mode; the untagged non-IP datagram are mapped based on port priority mode.

Schedule Mode

When the network is congested, the problem that many packets compete for resources must be solved, usually in the way of queue scheduling. The Managed Switch implements four scheduling queues, TC0, TC1, TC2 and TC3. TC0 has the lowest priority while TC3 has the highest priority. The Managed Switch provides four schedule modes: SP, WRR, SP+WRR and Equ.

1. SP-Mode: Strict-Priority Mode. In this mode, the queue with higher priority will occupy the whole bandwidth. Packets in the queue with lower priority are sent only when the queue with higher priority is empty. The Managed Switch has four egress queues labeled as TC0, TC1, TC2 and TC3. In SP mode, their priorities increase in order. TC3 has the highest priority. The disadvantage of SP queue is that: if there are packets in the queues with higher priority for a long time in congestion, the packets in the queues with lower priority will be "starved to death" because they are not served.

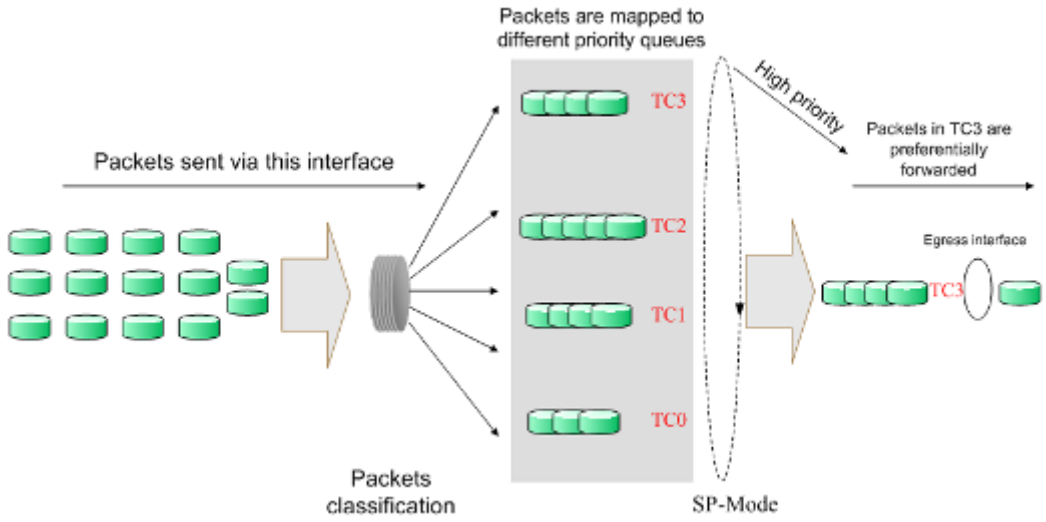


Figure 4-7-4: SP-Mode

2. WRR-Mode: Weight Round Robin Mode. In this mode, packets in all the queues are sent in order based on the weight value for each queue and every queue can be assured of a certain service time. The weight value indicates the occupied proportion of the resource. WRR queue overcomes the disadvantage of SP queue that the packets in the queues with lower priority can not get service for a long time. In WRR mode, though the queues are scheduled in order, the service time for each queue is not fixed, that is to say, if a queue is empty, the next queue will be scheduled. In this way, the bandwidth resources are made full use of. The default weight value ratio of TC0, TC1, TC2 and TC3 is 1:2:4:8.

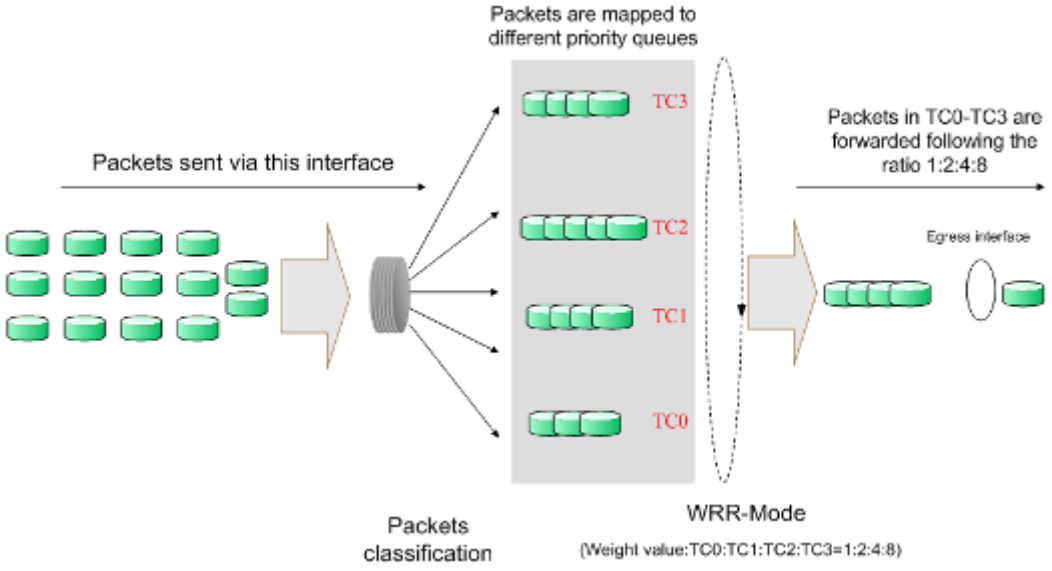


Figure 4-7-5: WRR-Mode

3. SP+WRR-Mode: Strict-Priority + Weight Round Robin Mode. In this mode, this Managed Switch provides two scheduling groups, SP group and WRR group. Queues in SP group and WRR group are scheduled strictly based on strict-priority mode while the queues inside WRR group follow the WRR mode. In SP+WRR mode, TC3 is in the SP group; TC0, TC1 and TC2 belong to the WRR group and the weight value ratio of TC0, TC1 and TC2 is 1:2:4. In this way, when scheduling queues, the Managed Switch allows TC3 to occupy the whole bandwidth following the SP mode and the TC0, TC1 and TC2 in the WRR group will take up the bandwidth according to their ratio 1:2:4.

4. Equ-Mode: Equal-Mode. In this mode, all the queues occupy the bandwidth equally. The weight value ratio of all the queues is 1:1:1:1.

The QoS module is mainly for traffic control and priority configuration, including three submenus: **DiffServ**, **Bandwidth Control** and **Voice VLAN**.

The QoS function is used to configure the basic functions of the Managed Switch, the screen in Figure 4-7-6 appears.

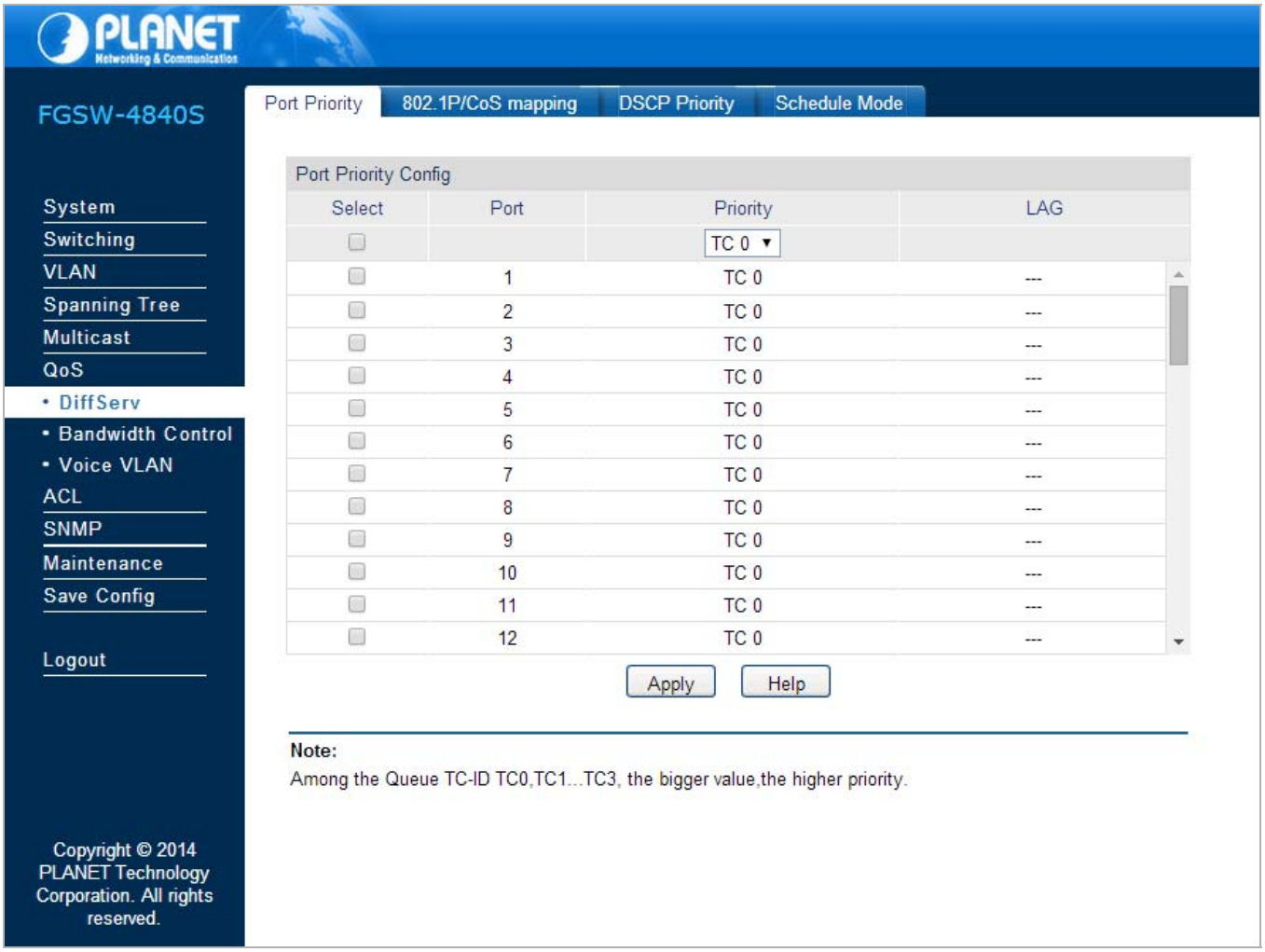


Figure 4-7-6: QoS Page Screenshot

This section has the following items:

- **Diffserv** Configure per port basic features of Managed Switch.
- **Bandwidth Control** Configure static trunk or LACP on this page.
- **Voice VLAN** The Managed Switch per port Ethernet Traffic statistics monitor.

4.7.1 DiffServ

This Managed Switch classifies the ingress packets, maps the packets to different priority queues and then forwards the packets according to specified scheduling algorithms to implement QoS function, implements three priority modes based on port, on 802.1P and on DSCP, and supports four queue scheduling algorithms. The port priorities are labeled as TC0, TC1, TC2 and TC3, the DiffServ function can be implemented on **Port Priority**, **802.1P Priority**, **DSCP Priority** and **Schedule Mode** pages. The screen in Figure 4-7-7 appears.

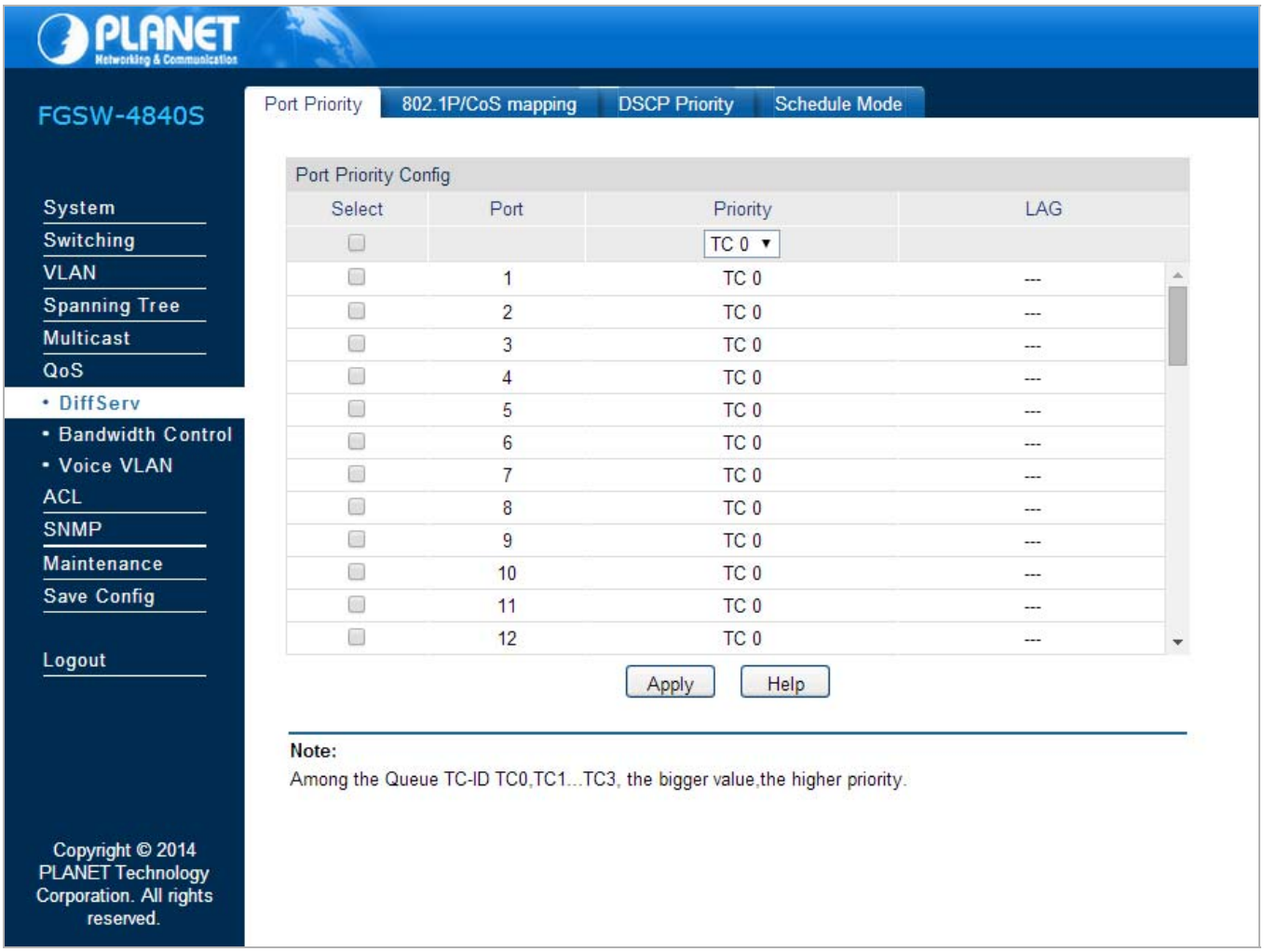


Figure 4-7-7: DiffServ Page Screenshot

The page includes the following fields:

Object	Description
• **Port Priority**	Configure the port priority on this page.
• **802.1P/CoS mapping**	Configure the 802.1P/CoS mapping on this page.
• **DSCP Priority**	Configure the DSCP priority on this page.
• **Schedule Mode**	Configure the schedule mode on this page.

4.7.1.1 Port Priority

This page provides configure the port priority, the screen in Figure 4-7-8 appears.

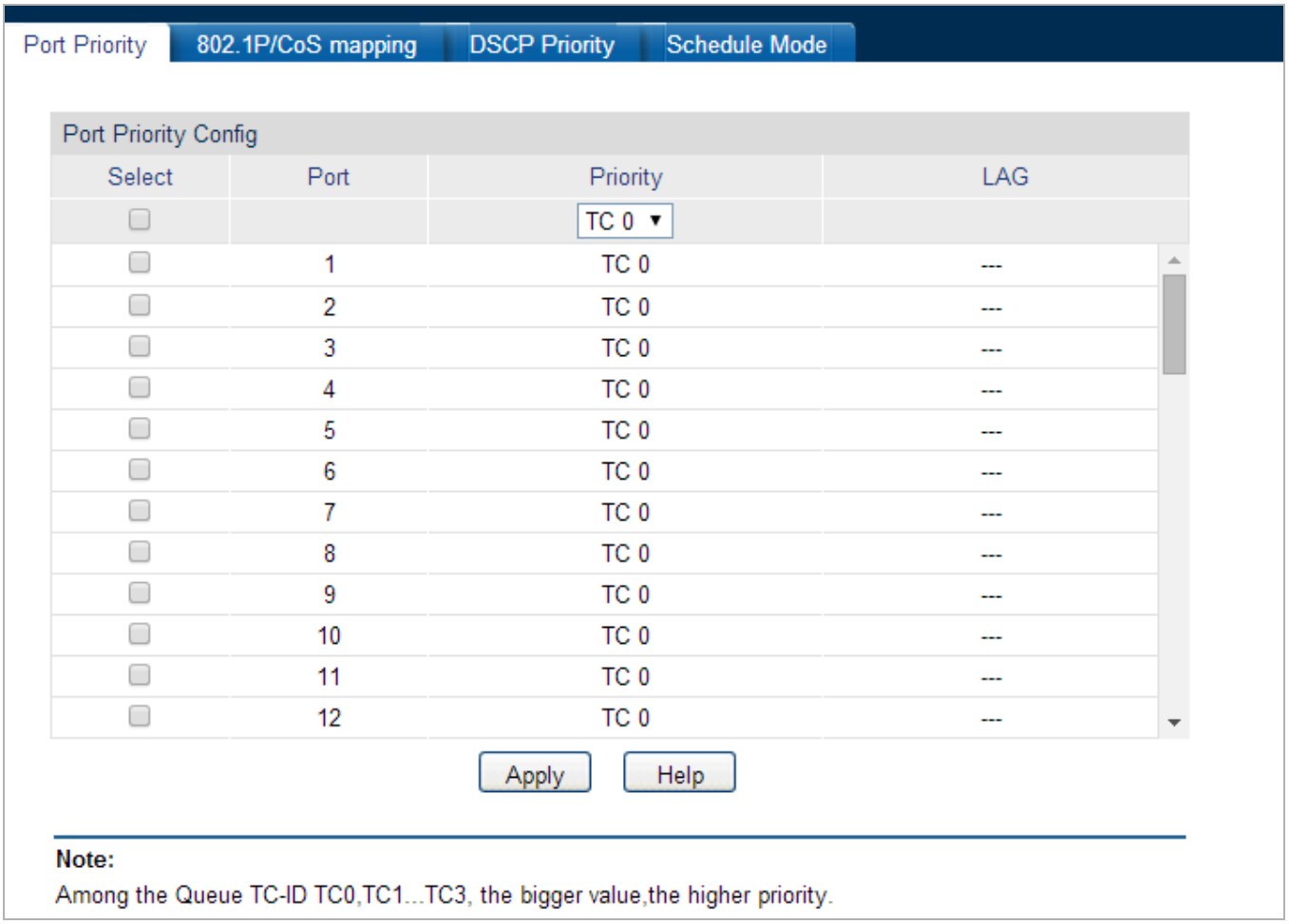


Figure 4-7-8: Port Priority Config Page Screenshot

The page includes the following fields:

Object	Description
Port Priority Config	
• **Select**	Select the desired port to configure its priority. It is multi-optional.
• **Port**	Displays the physical port number of the Managed Switch.
• **Priority**	Specify the priority for the port.
• **LAG**	Displays the LAG number which the port belongs to.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.7.1.2 802.1P/CoS mapping

This page provides configure 802.1P priority. 802.1P gives the Pri field in 802.1Q tag a recommended definition. This field is used to divide packets into 8 priorities. When 802.1P Priority is enabled, the packets with 802.1Q tag are mapped to different priority levels based on 802.1P priority mode. The untagged packets are mapped based on port priority mode; the screen in Figure 4-7-9 appears.

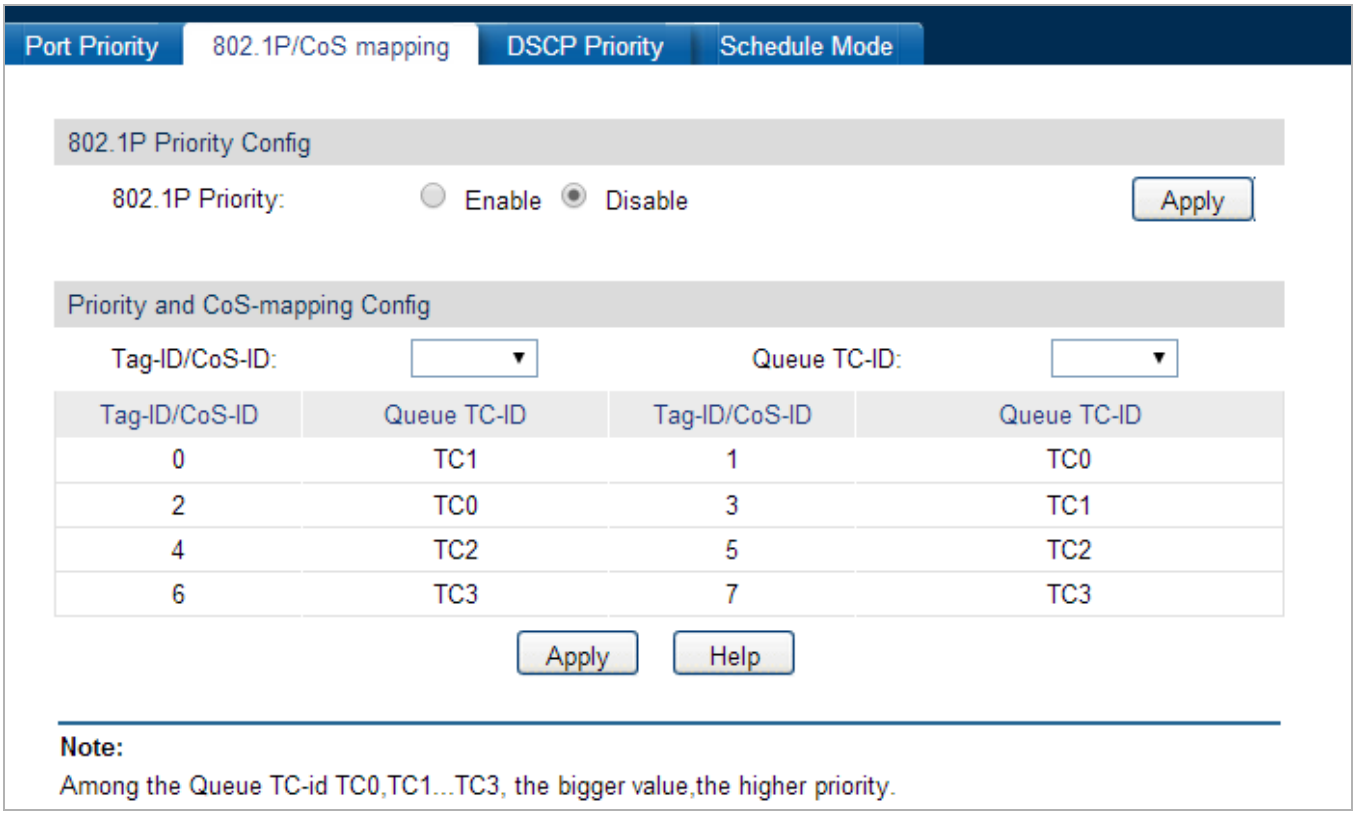


Figure 4-7-9: 802.1P/CoS mapping Config Page Screenshot

The page includes the following fields:

Object	Description
802.1P Port Priority Config	
• **802.1P Port Priority**	Select Enable/Disable 802.1P Priority.
Priority and CoS-mapping Config	
• **Tag-ID/CoS-ID**	Indicates the precedence level defined by IEEE 802.1P or the CoS ID.
• **Queue TC-ID**	Indicates the priority level of egress queue the packets with tag and CoS-id are mapped to. The priority levels of egress queue are labeled as TC0, TC1, TC2 and TC3.

Note: To complete QoS function configuration, please go to the **Schedule Mode** page to select a schedule mode after the configuration is finished on this page.

4.7.1.3 DSCP Priority

This page provides configure DSCP priority. DSCP (DiffServ Code Point) is a new definition to IP ToS field given by IEEE. This field is used to divide IP datagram into 64 priorities. When DSCP Priority is enabled, IP datagram are mapped to different priority levels based on DSCP priority mode; non-IP datagram with 802.1Q tag are mapped to different priority levels based on 802.1P priority mode if 802.1P Priority mode is enabled; the untagged non-IP datagram are mapped based on port priority mode; the screen in Figure 4-7-10 appears.

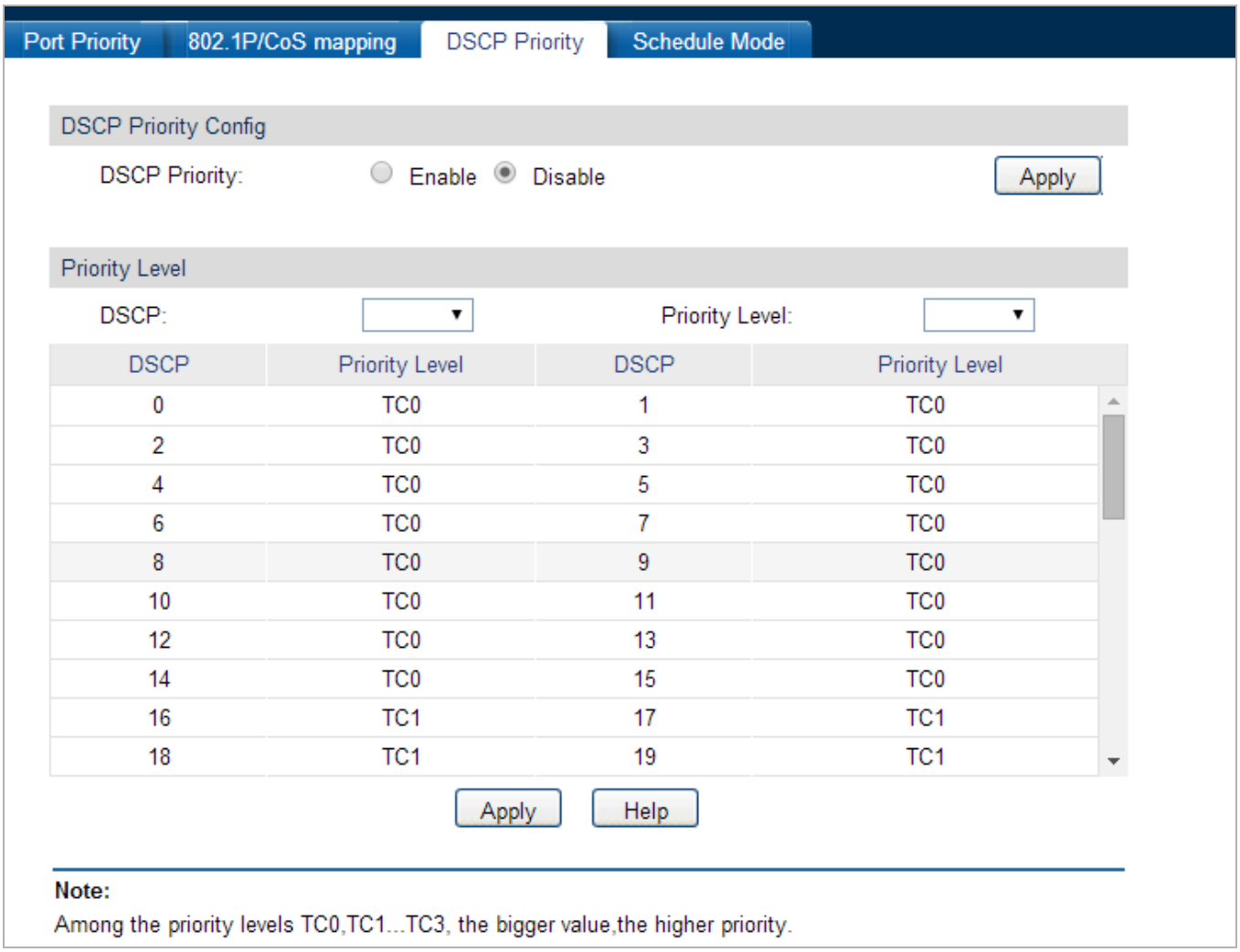


Figure 4-7-10: DSCP Priority Config Page Screenshot

The page includes the following fields:

Object	Description
DSCP Priority Config	
• **DSCP Priority**	Select Enable or Disable DSCP Priority.
Priority Level	
• **DSCP**	Indicates the priority determined by the DS region of IP datagram. It ranges from 0 to 63.
• **Priority Level**	Indicates the priority level the packets with tag are mapped to. The priority levels are labeled as TC0, TC1, TC2 and TC3.

To complete QoS function configuration, you have to go to the **Schedule Mode** page to select a schedule mode after the configuration is finished on this page.

4.7.1.4 Schedule Mode

This page provides select a schedule mode for the Managed Switch, when the network is congested, the issue that many packets compete for resources must be solved, usually in the way of queue scheduling. The Managed Switch will control the forwarding sequence of the packets according to the priority queues and scheduling algorithms set. On this Managed Switch, the priority levels are labeled as TC0, TC1… TC3 and the screen in Figure 4-7-11 appears.

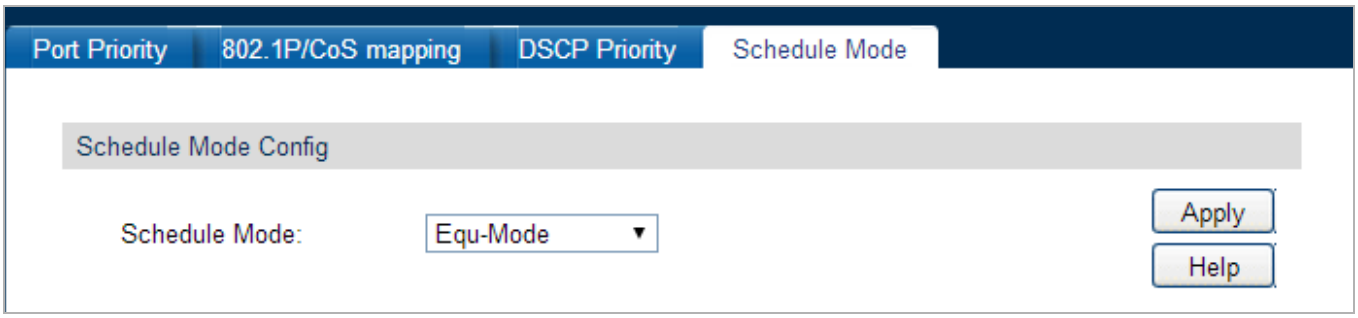


Figure 4-7-11: Schedule Mode Config Page Screenshot

The page includes the following fields:

Object	Description
Schedule Mode Config	
• **SP- Mode**	Strict-Priority Mode. In this mode, the queue with higher priority will occupy the whole bandwidth. Packets in the queue with lower priority are sent only when the queue with higher priority is empty.
• **WRR-Mode**	Weight Round Robin Mode. In this mode, packets in all the queues are sent in order based on the weight value for each queue. The weight value ratio of TC0, TC1, TC2 and TC3 is 1:2:4:8.
• **SP+WRR Mode**	Strict-Priority + Weight Round Robin Mode. In this mode, this Managed Switch provides two scheduling groups, SP group and WRR group. Queues in SP group and WRR group are scheduled strictly based on strict-priority mode while the queues inside WRR group follow the WRR mode. In SP+WRR mode, TC3 is in the SP group; TC0, TC1 and TC2 belong to the WRR group and the weight value ratio of TC0, TC1 and TC2 is 1:2:4. In this way, when scheduling queues, the Managed Switch allows TC3 to occupy the whole bandwidth following the SP mode and the TC0, TC1 and TC2 in the WRR group will take up the bandwidth according to their ratio 1:2:4.
• **Equ-Mode**	Equal-Mode. In this mode, all the queues occupy the bandwidth equally. The weight value ratio of all the queues is 1:1:1:1.

4.7.2 Bandwidth Control

The Bandwidth function allowing to control the traffic rate and broadcast flow on each port to ensure network in working order, can be implemented on **Rate Limit** and **Storm Control** pages; the screen in Figure 4-7-12 appears.

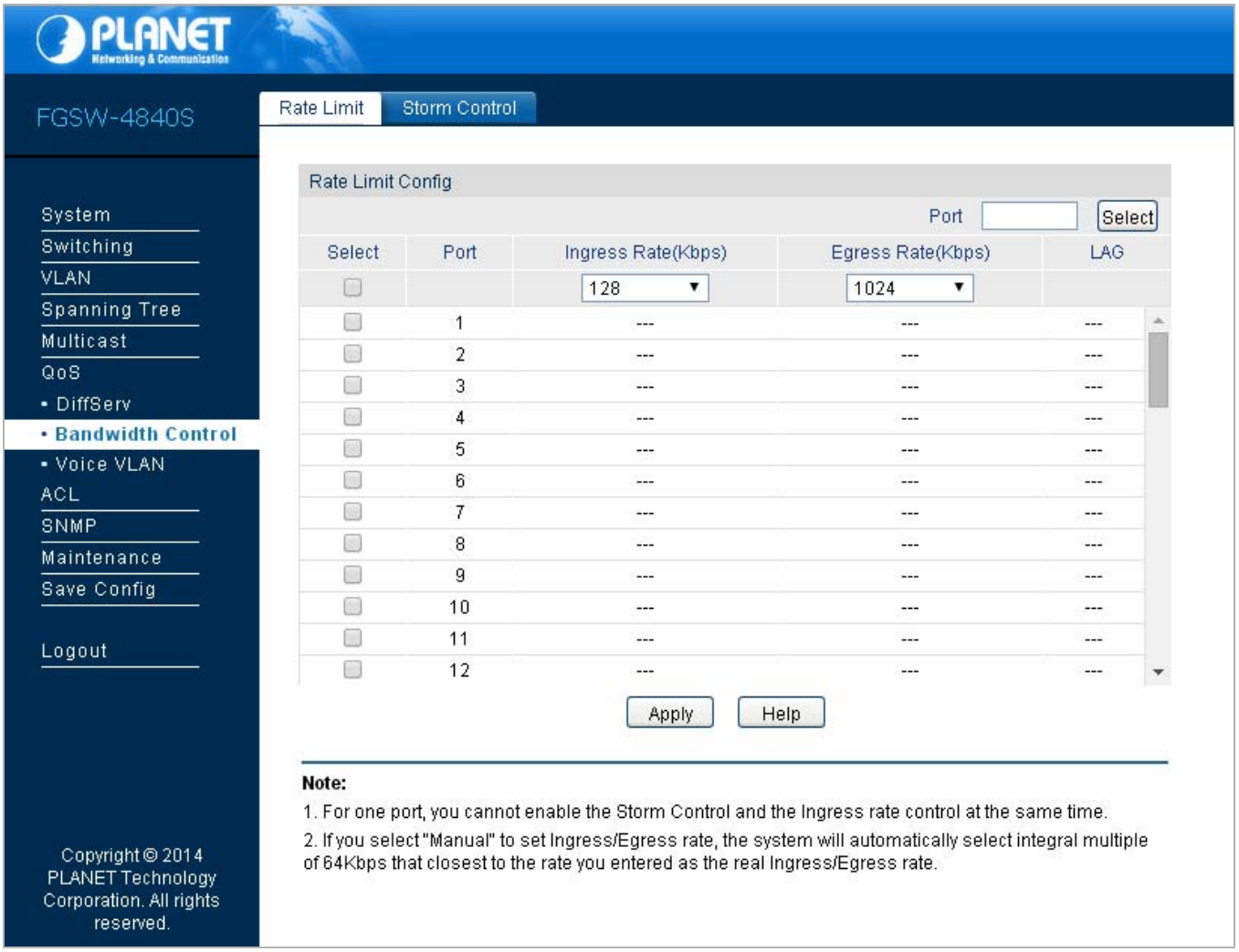


Figure 4-7-12: Bandwidth Control Page Screenshot

The page includes the following fields:

Object	Description
• **Rate Limit**	Configure the rate limit function on this page.
• **Storm Control**	Configure the storm control function on this page.

4.7.2.1 Rate Limit

This page provides Rate limit functions to control the ingress/egress traffic rate on each port via configuring the available bandwidth of each port. In this way, the network bandwidth can be reasonably distributed and utilized, the screen in Figure 4-7-13 appears.

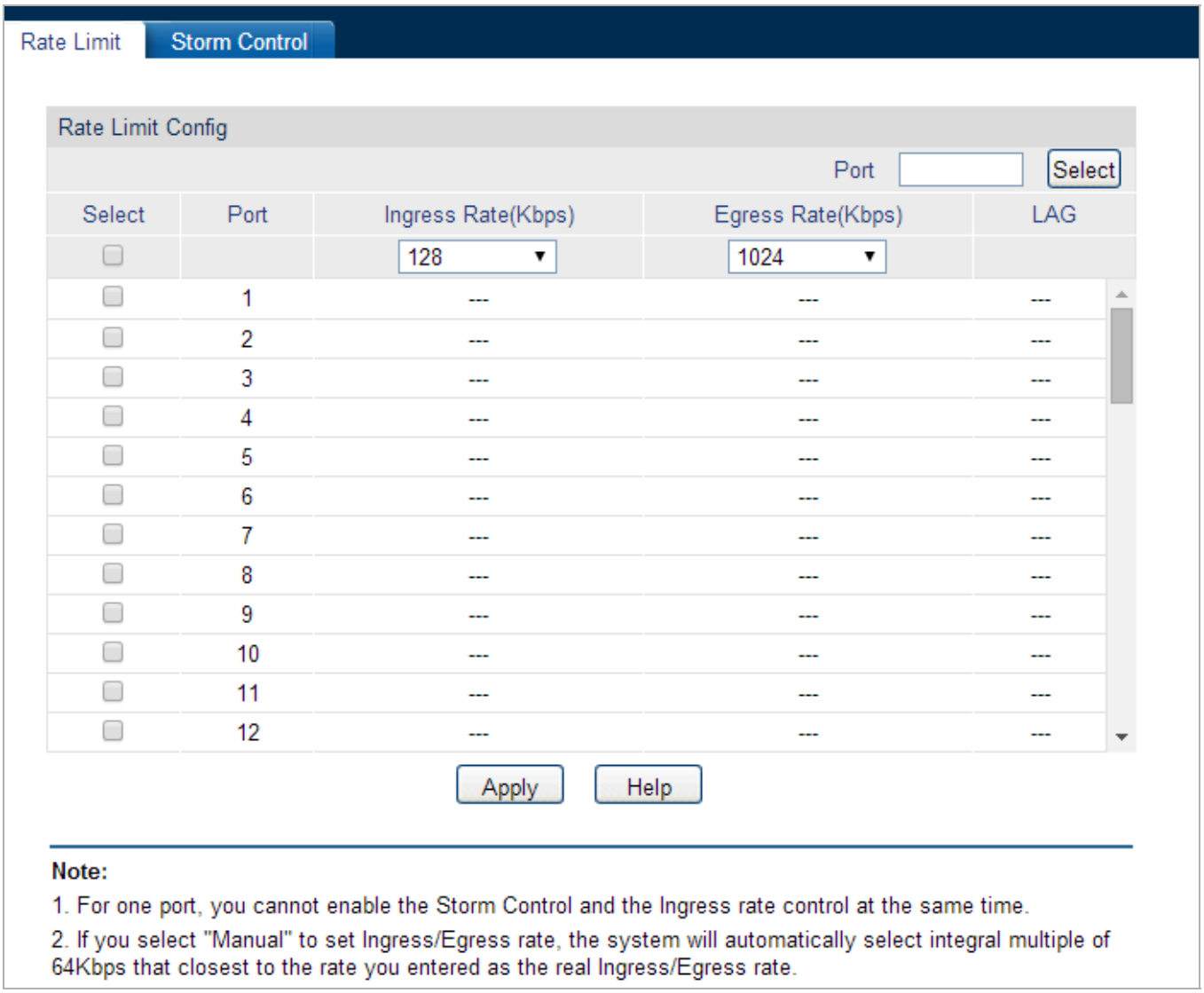


Figure 4-7-13: Rate Limit Config Page Screenshot

The page includes the following fields:

Object	Description
Rate Limit Config	
• **Port Select**	Click the **Select** button to quick-select the corresponding port based on the port number entered.
• **Select**	Select the desired port for Rate configuration. It is multi-optional.
• **Port**	Displays the port number of the Managed Switch.
• **Ingress Rate(Kbps)**	Configure the bandwidth for receiving packets on the port and select a rate from the

	dropdown list or select **"Manual"** to set Ingress rate, the system will automatically select integral multiple of 64Kbps that closest to the rate you entered as the real Ingress rate.
• **Egress Rate(Kbps)**	Configure the bandwidth for sending packets on the port and select a rate from the dropdown list or select **"Manual"** to set Egress rate, the system will automatically select integral multiple of 64Kbps that closest to the rate you entered as the real Egress rate.
• **LAG**	Displays the LAG number which the port belongs to.

- Once enable ingress rate limit feature for the storm control-enabled port, storm control feature will be disabled for this port.
- When selecting **"Manual"** to set Ingress/Egress rate, the system will automatically select integral multiple of 64Kbps that closest to the rate entered as the real Ingress/Egress rate. For example, enter 1000Kbps for egress rate; the system will automatically select 1024Kbps as the real Egress rate.
- When egress rate limit feature is enabled for one or more ports, suggested to disable the flow control on each port to ensure the Managed Switch works normally.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.7.2.2 Storm Control

This page provides Storm Control function allows the Managed Switch to filter broadcast, multicast and UL frame in the network. If the transmission rate of the three kind packets exceeds the set bandwidth, the packets will be automatically discarded to avoid network broadcast storm; the screen in Figure 4-7-14 appears.

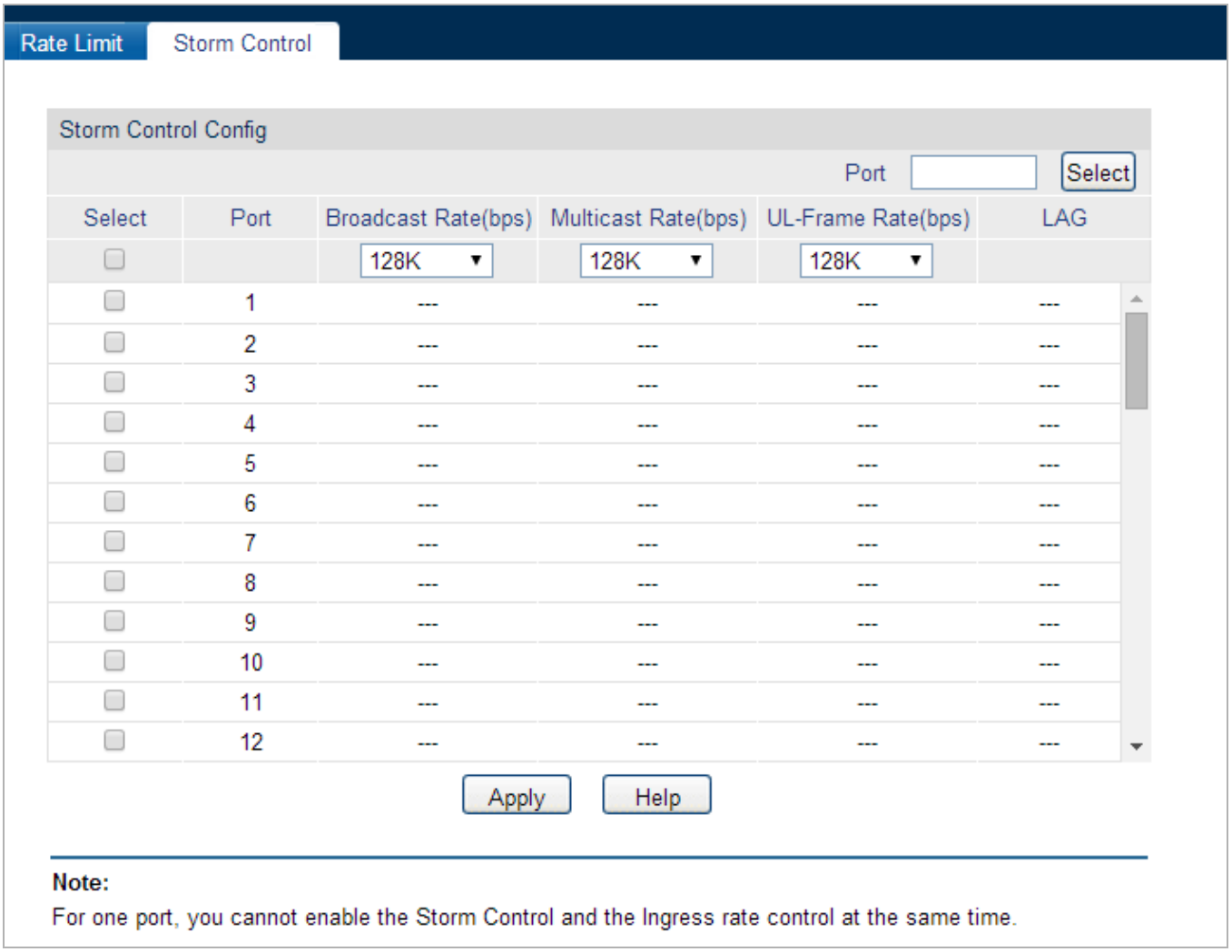


Figure 4-7-14: Storm Control Config Page Screenshot

The page includes the following fields:

Object	Description
Storm Control Config	
• **Port Select**	Click the **Select** button to quickly select the corresponding port based on the port number entered.
• **Select**	Select the desired port for Storm Control configuration. It is multi-optional.
• **Port**	Displays the port number of the Managed Switch.
• **Broadcast Rate(bps)**	Select the bandwidth for receiving broadcast packets on the port. The packet traffic exceeding the bandwidth will be discarded. Select Disable to disable the storm

	control function for the port.
• **Multicast Rate(bps)**	Select the bandwidth for receiving multicast packets on the port. The packet traffic exceeding the bandwidth will be discarded. Select Disable to disable the storm control function for the port.
• **UL-Frame Rate(bps)**	Select the bandwidth for receiving UL-Frame on the port. The packet traffic exceeding the bandwidth will be discarded. Select Disable to disable the storm control function for the port.
• **LAG**	Displays the LAG number which the port belongs to.

Once storm control feature for the ingress rate limit-enabled port is enabled, ingress rate limit feature will be disabled for this port.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.7.3 Voice VLAN

The Voice VLANs are configured specially for voice data stream. By configuring Voice VLANs and adding the ports with voice devices attached to voice VLANs, perform QoS-related configuration for voice data, ensuring the transmission priority of voice data stream and voice quality.

OUI Address (Organizationally unique identifier address)

The Managed Switch can determine whether a received packet is a voice packet by checking its source MAC address. If the source MAC address of a packet complies with the OUI addresses configured by the system, the packet is determined as voice packet and transmitted in voice VLAN.

An OUI address is a unique identifier assigned by IEEE (Institute of Electrical and Electronics Engineers) to a device vendor. It comprises the first 24 bits of a MAC address. You can recognize which vendor a device belongs to according to the OUI address. The following table shows the OUI addresses of several manufacturers. The following OUI addresses are preset of the Managed Switch by default.

Number	OUI Address	Vendor
1	00-01-e3-00-00-00	Siemens phone
2	00-03-6b-00-00-00	Cisco phone
3	00-04-0d-00-00-00	Avaya phone
4	00-60-b9-00-00-00	Philips/NEC phone
5	00-d0-1e-00-00-00	Pingtel phone
6	00-e0-75-00-00-00	Polycom phone
7	00-e0-bb-00-00-00	3com phone

Table 4-7-1: OUI addresses on the Managed Switch

Port Voice VLAN Mode

A voice VLAN can operate in two modes: automatic mode and manual mode.

Automatic Mode: In this mode, the Managed Switch automatically adds a port which receives voice packets to voice VLAN and determines the priority of the packets through learning the source MAC of the UNTAG packets sent from IP phone when it is powered on. The aging time of voice VLAN can be configured on the Managed Switch. If the Managed Switch does not receive any voice packet on the ingress port within the aging time, the Managed Switch will remove this port from voice VLAN. Voice ports are automatically added into or removed from voice VLAN.

Manual Mode: You need to manually add the port of IP phone to voice VLAN, and then the Managed Switch will assign ACL rules and configure the priority of the packets through learning the source MAC address of packets and matching OUI address.

In practice, the port voice VLAN mode is configured according to the type of packets sent out from voice device and the link type of the port. The following table shows the detailed information.

Port Voice VLAN Mode	Voice Stream Type	Link type of the port and processing mode
Automatic Mode	TAG voice stream	Untagged: Not supported.
		Tagged: Supported. The default VLAN of the port can not be voice VLAN.
	UNTAG voice stream	Untagged: Supported.
		Tagged: Not supported.
Manual Mode	TAG voice stream	Untagged: Not supported.
		Tagged：Supported. The default VLAN of the port should not be voice VLAN.
	UNTAG voice stream	Untagged: Supported.
		Tagged: Not supported.

Table 4-7-2: Port Voice VLAN Mode and Voice Stream Processing Mode

Security Mode of Voice VLAN

When voice VLAN is enabled for a port, it can configure its security mode to filter data stream. If security mode is enabled, the port just forwards voice packets, and discards other packets whose source MAC addresses do not match OUI addresses. If security mode is not enabled, the port forwards all the packets.

Security Mode	Packet Type	Processing Mode
Enable	UNTAG packet	When the source MAC address of the packet is the OUI address that can be identified, the packet can be transmitted in the voice VLAN. Otherwise, the packet will be discarded.
	Packet with voice VLAN TAG	
	Packet with other VLAN TAG	The processing mode for the device to deal with the packet is determined by whether the port permits the VLAN or not, independent of voice VLAN security mode.
Security Mode	**Packet Type**	**Processing Mode**
Disable	UNTAG packet	Do not check the source MAC address of the packet and all the packets can be transmitted in the voice VLAN.
	Packet with voice VLAN TAG	
	Packet with other VLAN TAG	The processing mode for the device to deal with the packet is determined by whether the port permits the VLAN or not, independent of voice VLAN security mode.

Table 4-7-3: Security Mode and Packets Processing Mode

Don't transmit voice stream together with other business packets in the voice VLAN except for some special requirements.

The Voice VLAN function can be implemented on **Global Config, Port Config** and **OUI Config** pages; the screen in Figure 4-7-15 appears.

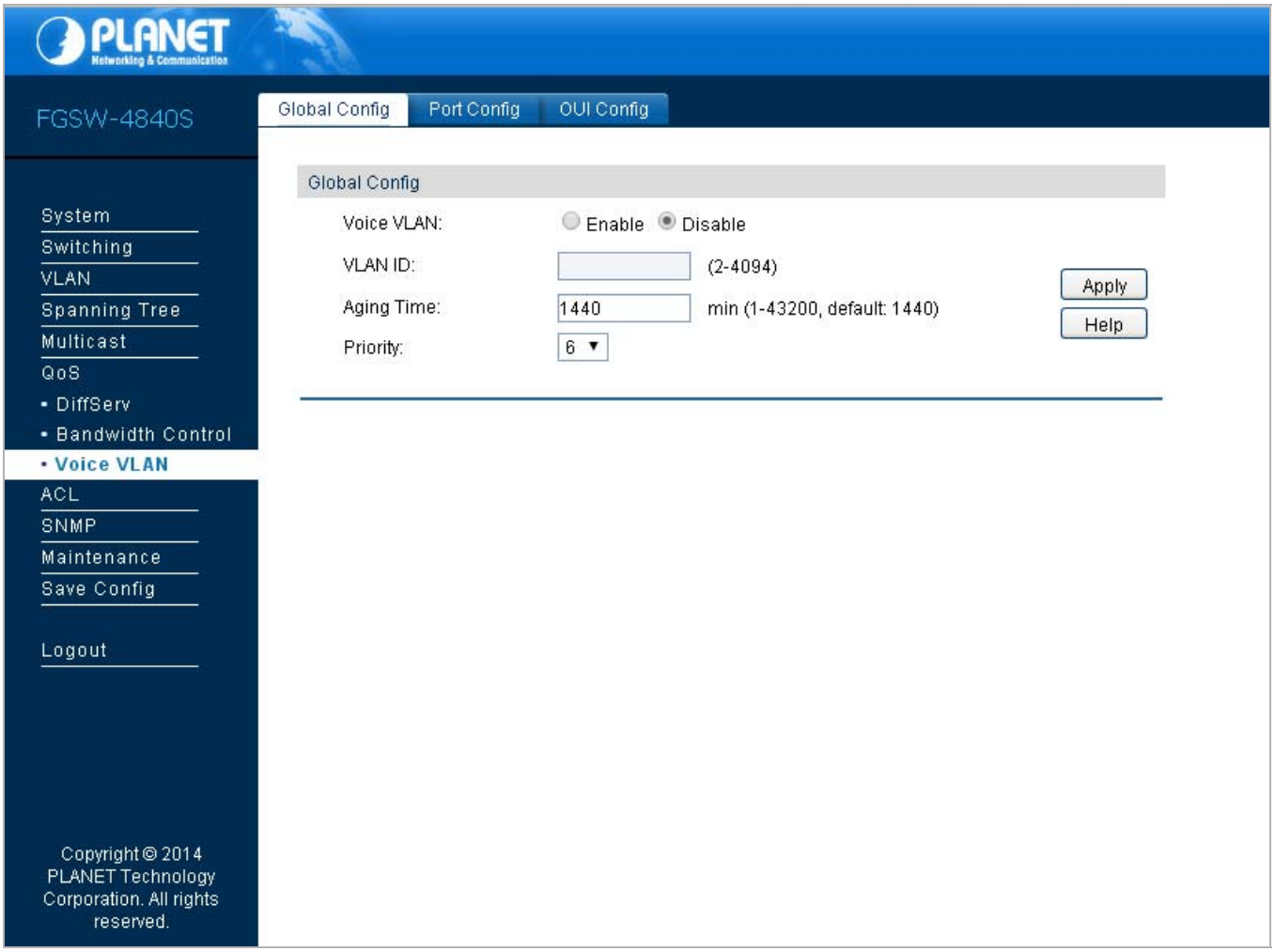


Figure 4-7-15: Voice VLAN Config Page Screenshot

The page includes the following fields:

Object	Description
• **Global Config**	Configure Voice VLAN global config on this page.
• **Port Config**	Configure per port Voice VLAN config on this page.
• **OUI Config**	Configure OUI config on this page.

4.7.3.1 Global Config

This page provides configure the global parameters of the voice VLAN, including VLAN ID and aging time; the screen in Figure 4-7-16 appears.

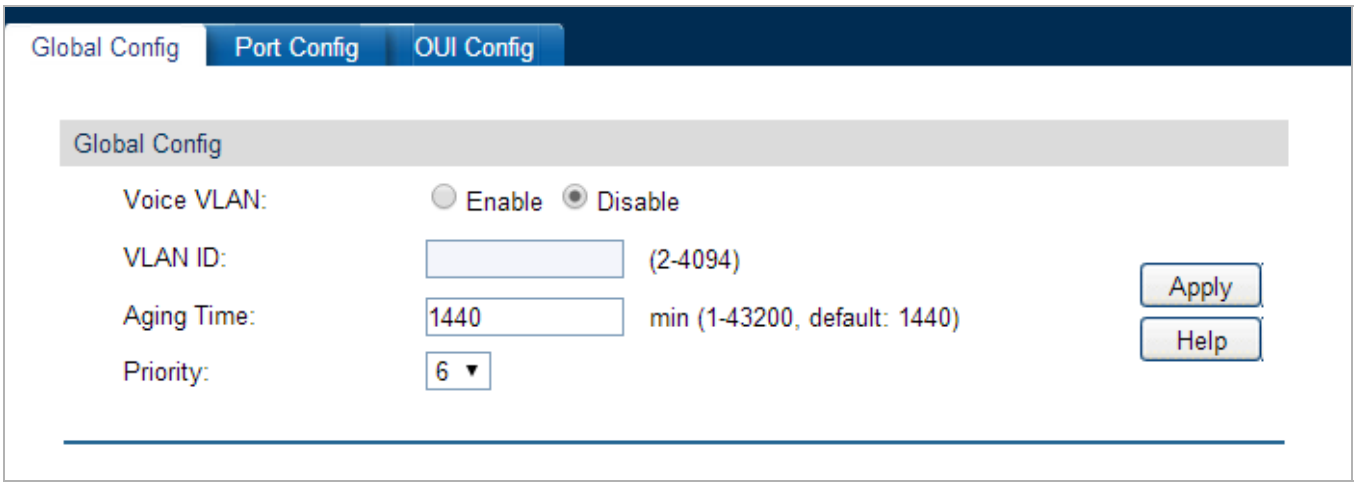


Figure 4-7-16: Global Config Page Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **Voice VLAN**	Select Enable/Disable Voice VLAN function.
• **VLAN ID**	Enter the VLAN ID of the voice VLAN.
• **Aging Time**	Specifies the living time of the member port in auto mode after the OUI address is aging out.
• **Prioity**	Select the priority of the port when sending voice data.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.7.3.2 Port Config

Before the voice VLAN function is enabled, the parameters of the ports in the voice VLAN should be configured on this page; the screen in Figure 4-7-17 appears.

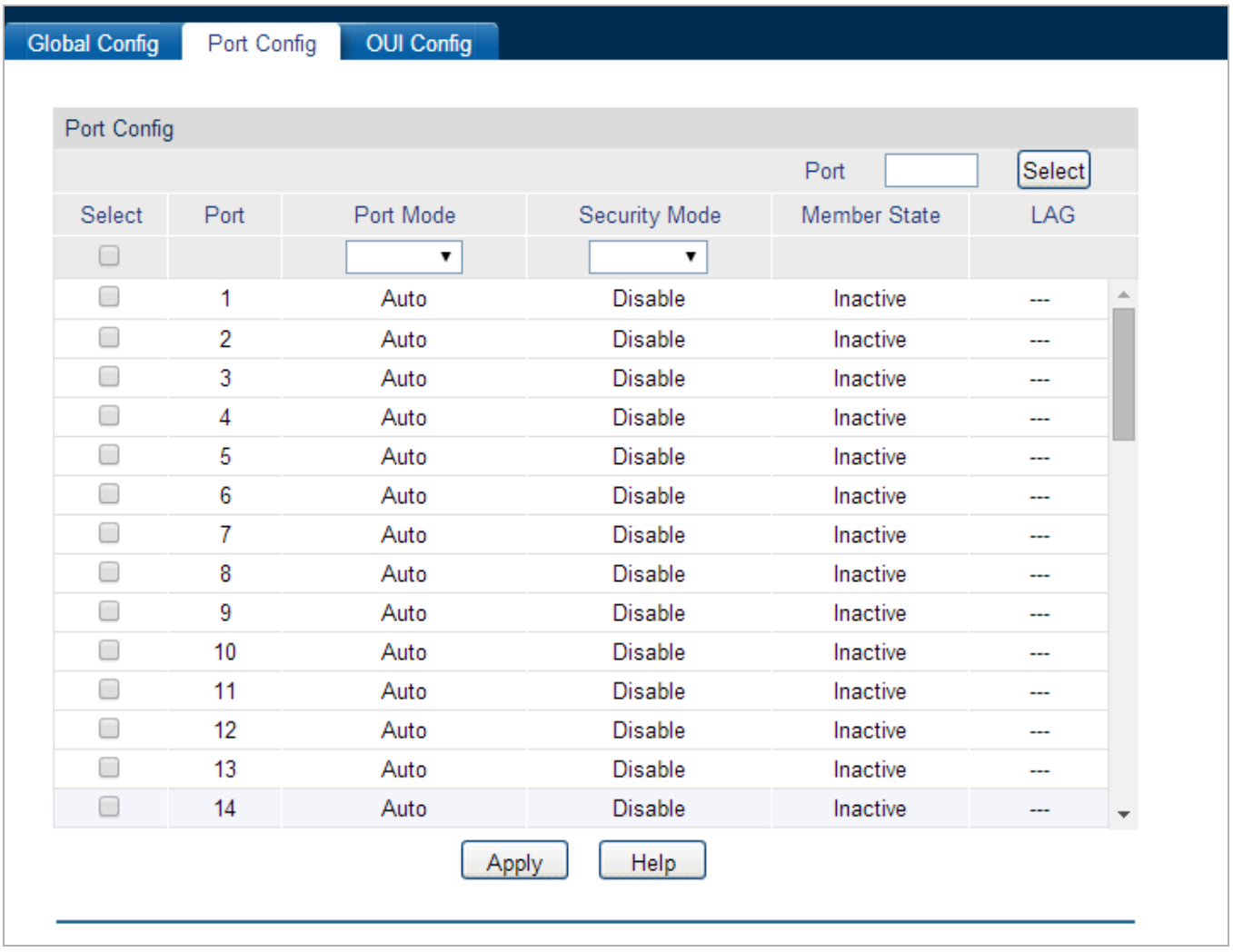


Figure 4-7-17: Port Config Page Screenshot

The page includes the following fields:

Object	Description
Port Config	
• **Port Select**	Click the **Select** button to quick-select the corresponding port based on the port number you entered.
• **Select**	Select the desired port for voice VLAN configuration. It is multi-optional.
• **Port**	Displays the port number of the Managed Switch.
• **Port Mode**	Select the mode for the port to join the voice VLAN. ● **Auto:** In this mode, the switch automatically adds a port to the voice VLAN or removes a port from the voice VLAN by checking whether the port receives voice data or not. ● **Manual:** In this mode, you can manually add a port to the voice VLAN or

	remove a port from the voice VLAN.
• **Security Mode**	Configure the security mode for forwarding packets. ● **Disable:** All packets are forwarded. **Enable:** Only voice data are forwarded.
• **Member State**	Displays the state of the port in the current voice VLAN.
• **LAG**	Displays the LAG number which the port belongs to.

- To enable voice VLAN function for the LAG member port, please ensure its member state accords with its port mode.
- If a port is a member port of voice VLAN, changing its port mode to be "Auto" will make the port leave the voice VLAN and will not join the voice VLAN automatically until it receives voice streams.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.7.3.3 OUI Config

The Managed Switch supports OUI creation and adds the MAC address of the special voice device to the OUI table of the Managed Switch. The Managed Switch determines whether a received packet is a voice packet by checking its OUI address. The Managed Switch analyzes the received packets. If the packets are recognized as voice packets, the access port will be automatically added to the Voice VLAN; the screen in Figure 4-7-18 appears.

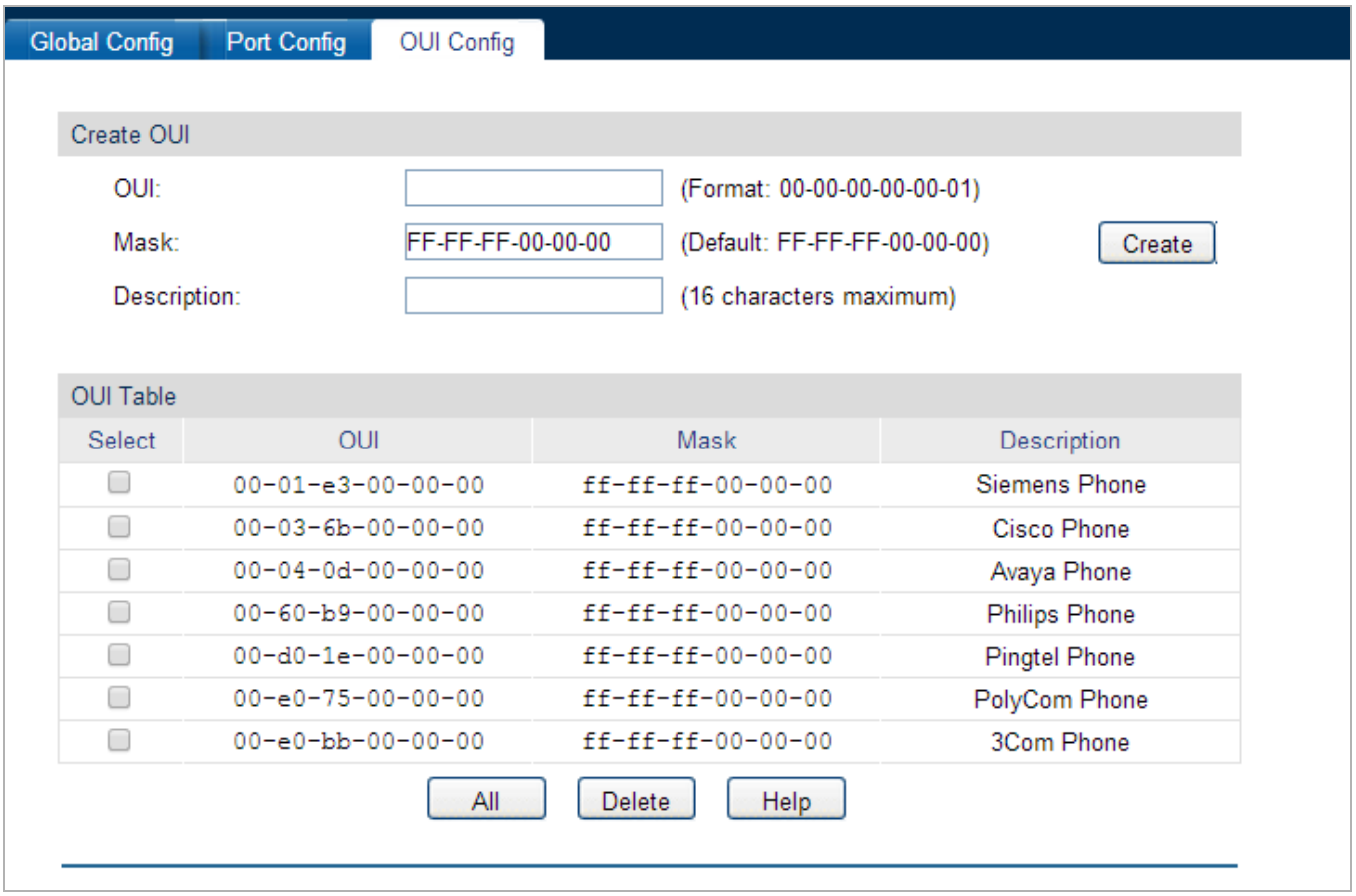
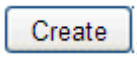


Figure 4-7-18: OUI Config Page Screenshot

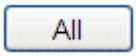
The page includes the following fields:

Object	Description
Create OUI	
• **OUI**	Enter the OUI address of the voice device.
• **Mask**	Enter the OUI address mask of the voice device.
• **Description**	Give a description to the OUI for identification.
OUI Table	
• **Select**	Select the desired entry to view the detailed information.
• **OUI**	Displays the OUI address of the voice device.
• **Mask**	Displays the OUI address mask of the voice device.
• **Description**	Displays the description of the OUI.

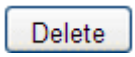
Buttons



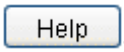
: Click to create a new OUI item.



: Click to choose all OUI items from OUI table.



: Click to delete OUI item from OUI table.



: Click to display help web page.

4.8 ACL

ACL (Access Control List) is used to filter data packets by configuring a series of match conditions and operations. It provides a flexible and secured access control policy and facilitates you to control the network security. The ACL function is used to configure the ACL functions of the Managed Switch; the screen in Figure 4-8-1 appears.

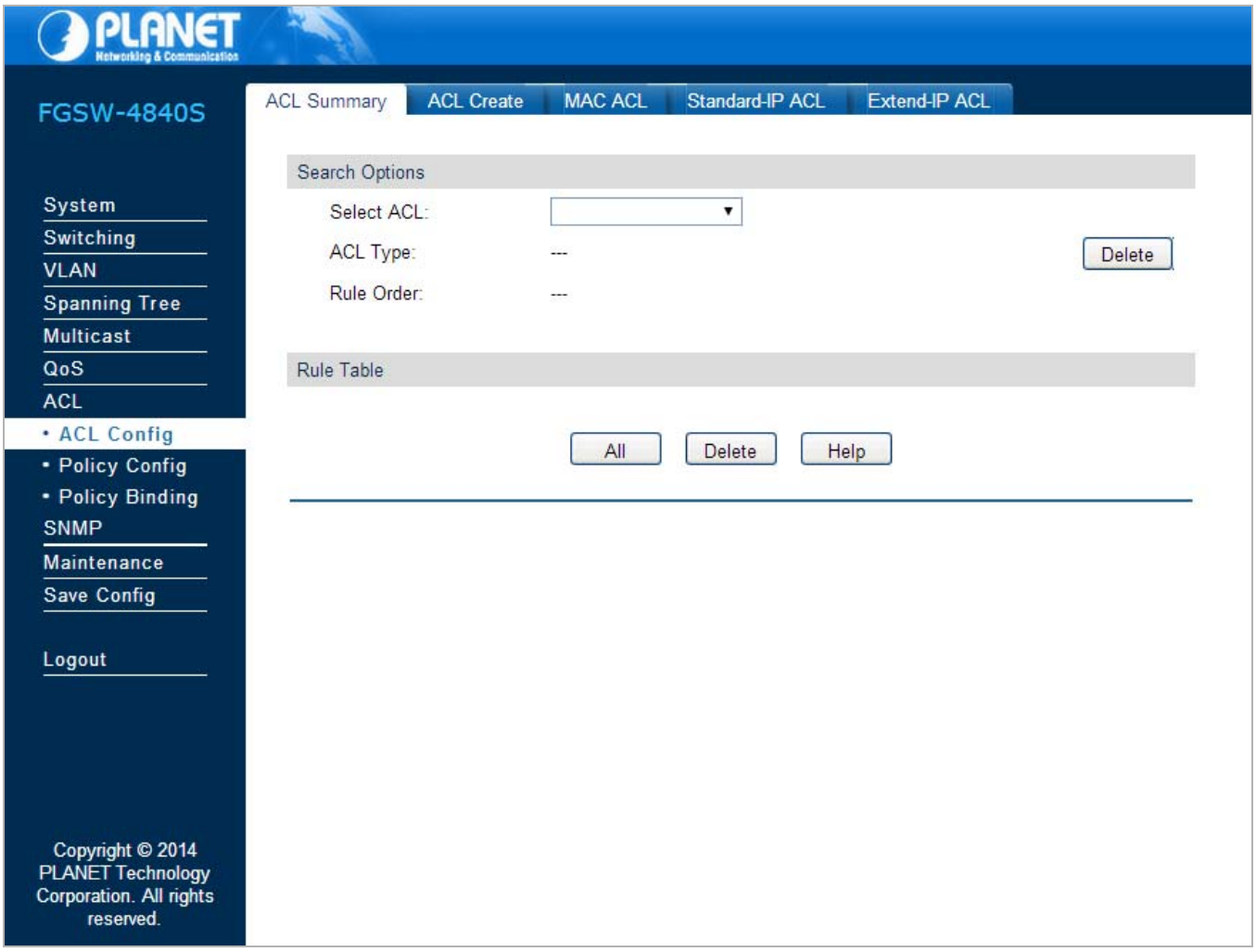


Figure 4-8-1: ACL Page Screenshot

This section has the following items:

- **ACL Config** Configure ACL function of Managed Switch.
- **Policy Config** Configure ACL Policy on this page.
- **Policy Binding** Configure ACL Policy Binding function on this page.

4.8.1 ACL Config

An ACL may contain a number of rules, and each rule specifies a different package range. Packets are matched in match order. Once a rule is matched, the Managed Switch processes the matched packets taking the operation specified in the rule without considering the other rules, which can enhance the performance of the Managed Switch; the screen in Figure 4-8-2 appears.

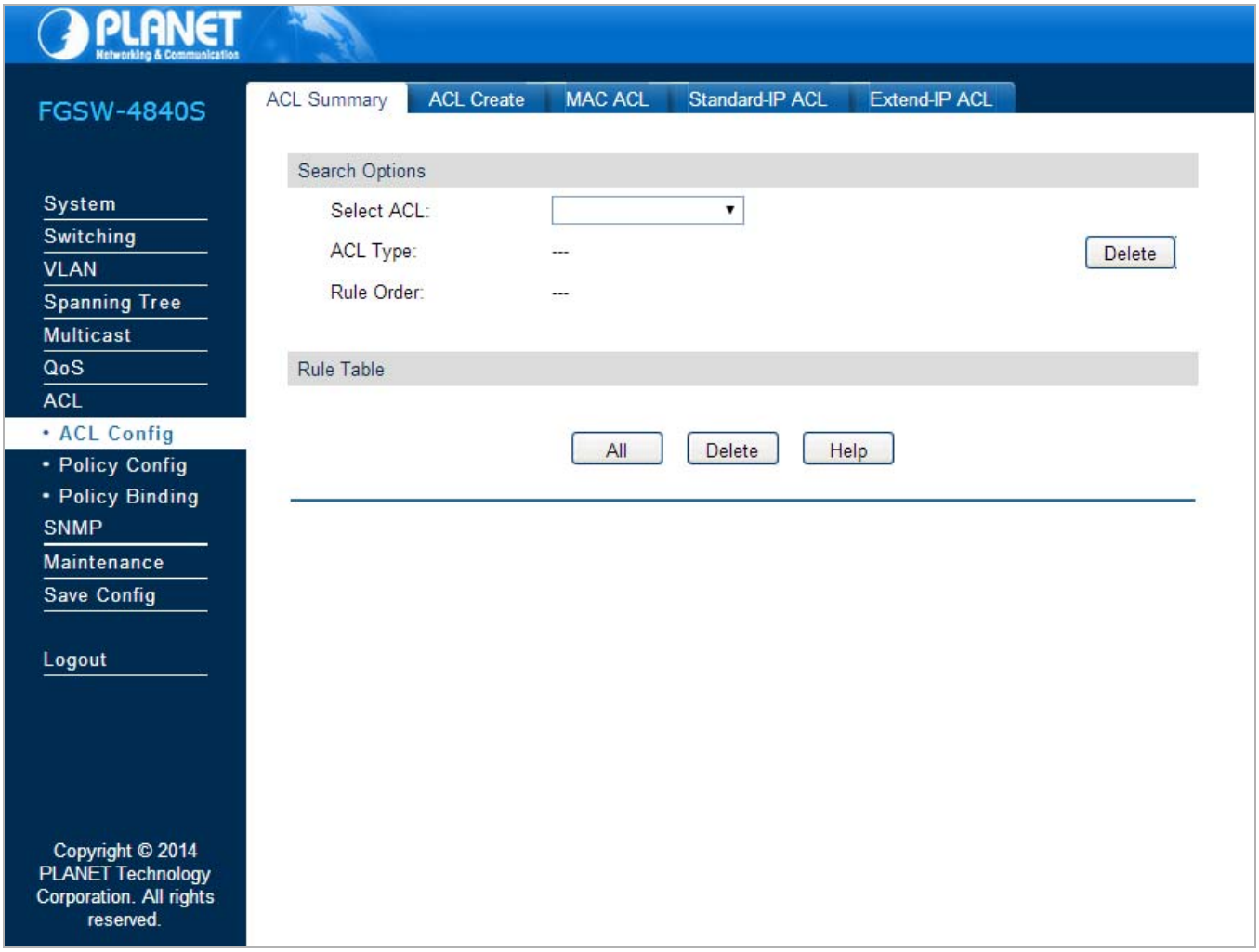


Figure 4-8-2: ACL Config Page Screenshot

The page includes the following fields:

Object	Description
• **ALC Summary**	View the current ACLs configured on this page.
• **ACL Create**	Provide ACL create function on this page.
• **MAC ACL**	Provide MAC ACL function on this page.
• **Standard-IP ACL**	Provide Standard-IP ACL function on this page.
• **Extend-IP ACL**	Provide Extend-IP ACL function on this page.

4.8.1.1 ACL Summary

This page allows viewing the current ACLs configured and the screen in Figure 4-8-3 appears.

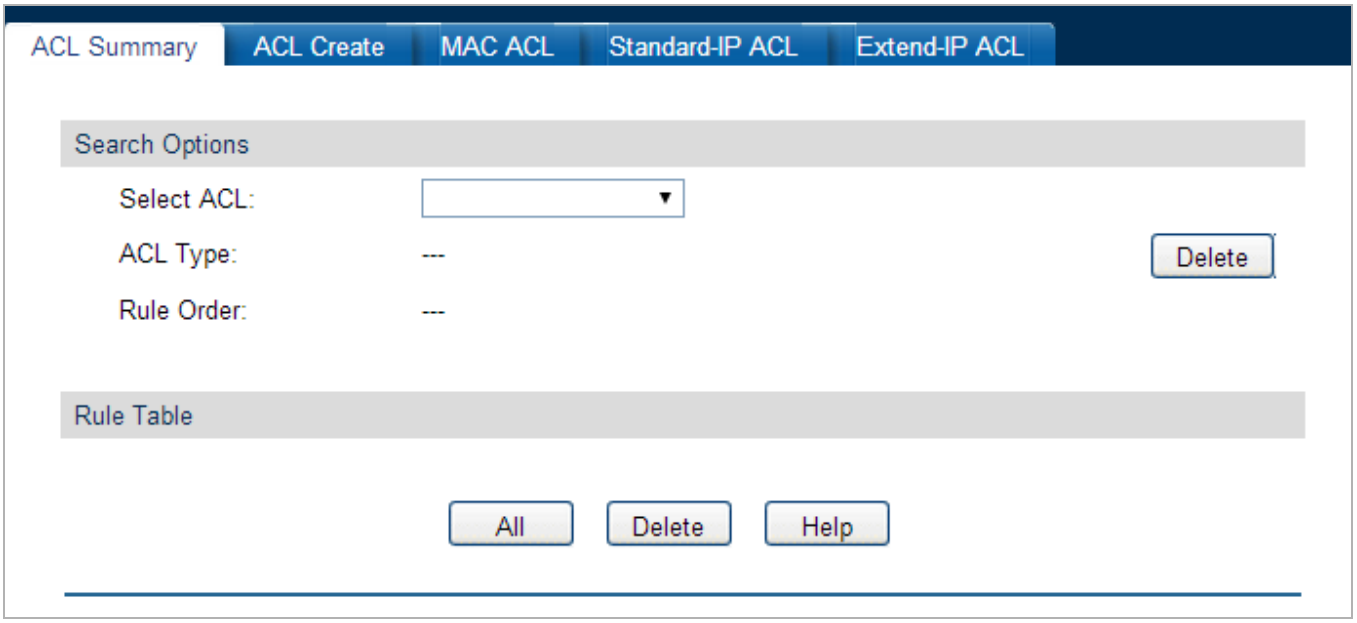


Figure 4-8-3: ACL Summary Page Screenshot

The page includes the following fields:

Object	Description
Search Options	
• **Select ACL**	Select the ACL have created.
• **ACL Type**	Displays the type of the ACL that select.
• **Rule Order**	Displays the rule order of the ACL that select.
Rule Table	
• **Rule Table**	Display the rule table of the ACL that selected. Also can edit the rules, view the details of them and move them up and down.

Buttons

All: Click to choose all ACL items from ACL Summary table.

Delete: Click to delete ACL items from ACL Summary table.

Help: Click to display help web page.

4.8.1.2 ACL Create

This page allows create ACL item and the screen in Figure 4-8-4 appears.

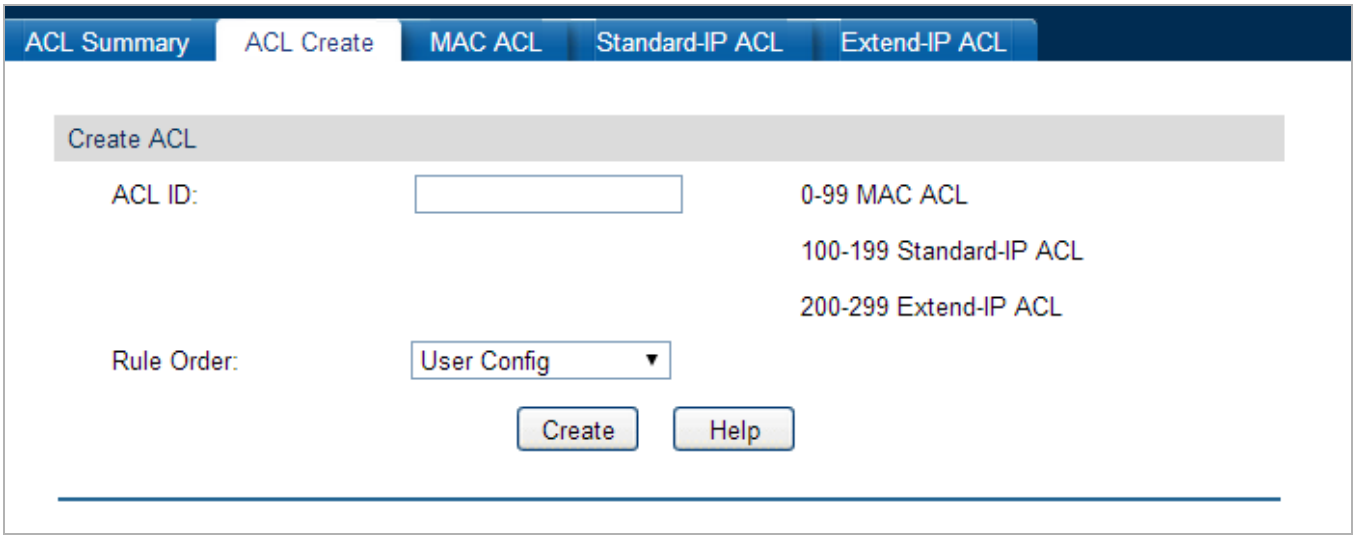


Figure 4-8-4: ACL Create Page Screenshot

The page includes the following fields:

Object	Description
Create ACL	
• **ACL ID**	Enter ACL ID of the ACL that want to create.
• **Rule Order**	User Config order is set to be match order in this ACL.

Buttons

Create: Click to create ACL items.

Help: Click to display help web page.

4.8.1.3 MAC ACL

The MAC ACLs analyze and process packets based on a series of match conditions, which can be the source MAC addresses and destination MAC addresses carried in the packets; the screen in Figure 4-8-5 appears.

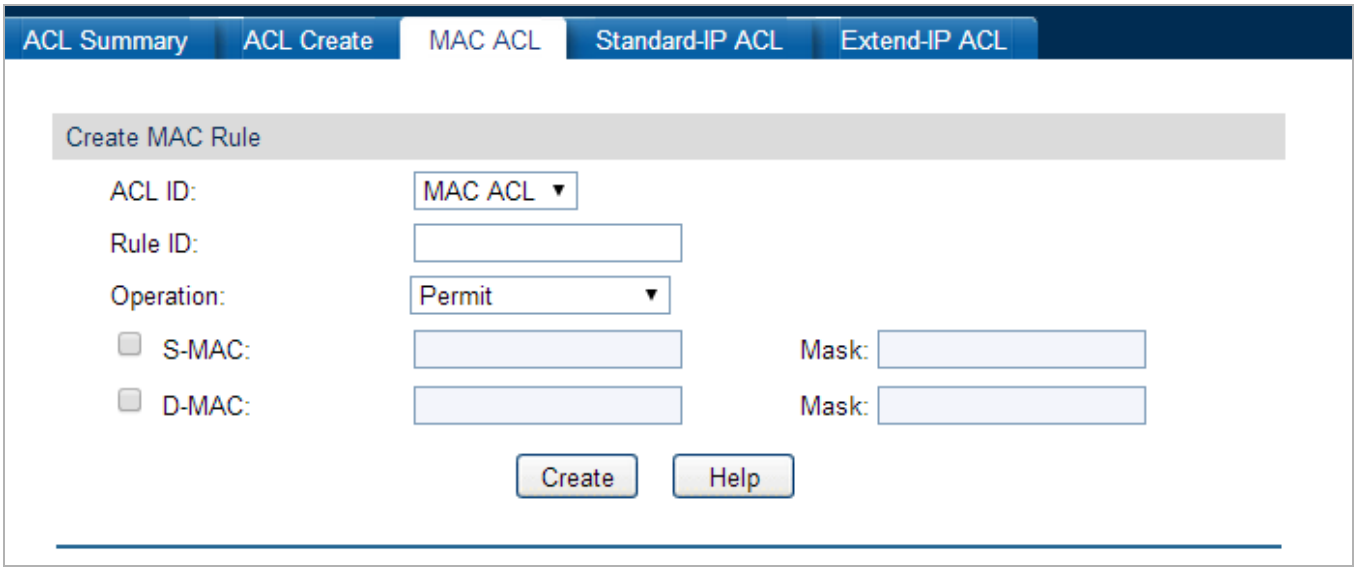


Figure 4-8-5: MAC ACL Page Screenshot

The page includes the following fields:

Object	Description
Create MAC Rule	
• **ACL ID**	Select the desired MAC ACL for configuration.
• **Rule ID**	Enter the rule ID.
• **Operation**	Select the operation for the Managed Switch to process packets which match the rules. ● **Permit:** Forward packets. ● **Deny:** Discard Packets.
• **S-MAC**	Enter the source MAC address contained in the rule.
• **D-MAC**	Enter the destination MAC address contained in the rule.
• **Mask**	Enter MAC address mask. If it is set to 1, it must strictly match the address.

Buttons

Create: Click to create MAC ACL items.

Help: Click to display help web page.

4.8.1.4 Standard-IP ACL

The Standard-IP ACLs analyze and process data packets based on a series of match conditions, which can be the source IP addresses and destination IP addresses carried in the packets; the screen in Figure 4-8-6 appears.

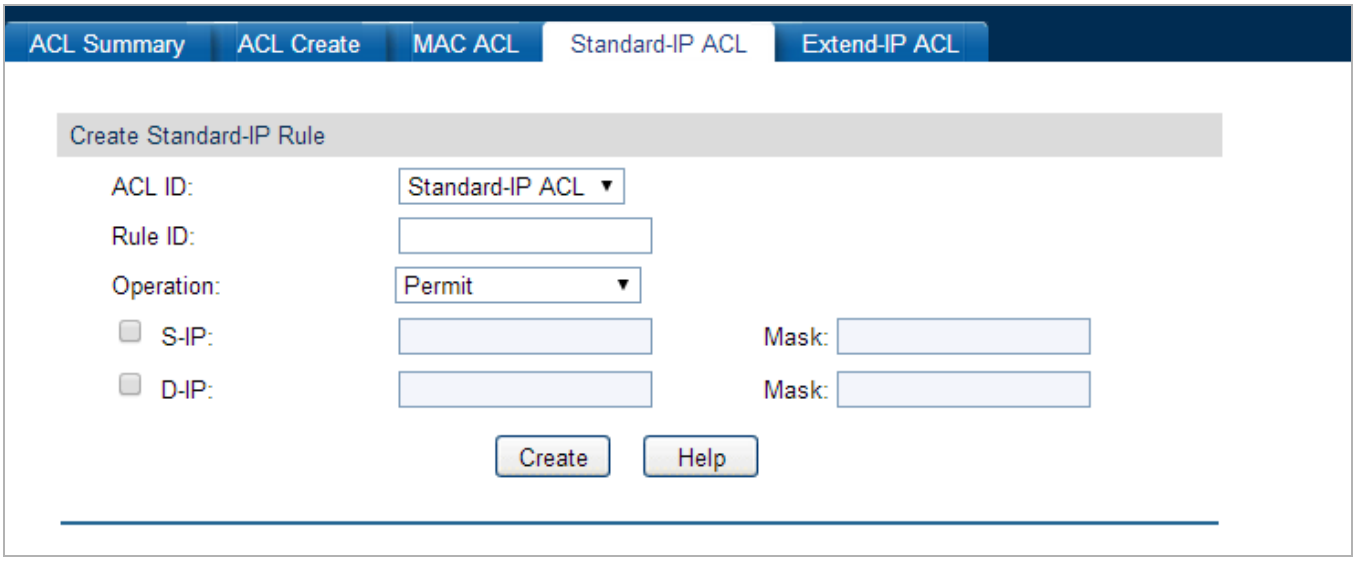


Figure 4-8-6: Standard-IP ACL Page Screenshot

The page includes the following fields:

Object	Description
Create Standard-IP Rule	
• **ACL ID**	Select the desired Standard-IP ACL for configuration.
• **Rule ID**	Enter the rule ID.
• **Operation**	Select the operation for the Managed Switch to process packets which match the rules. ● **Permit:** Forward packets. ● **Deny:** Discard Packets.
• **S-IP**	Enter the source IP address contained in the rule.
• **D-IP**	Enter the destination IP address contained in the rule.
• **Mask**	Enter IP address mask. If it is set to 1, it must strictly match the address.

Buttons

Create: Click to create Standard-IP ACL items.

Help: Click to display help web page.

4.8.1.5 Extend-IP ACL

The Extend-IP ACLs analyze and process data packets based on a series of match conditions, which can be the source IP addresses, destination IP addresses, IP protocol and other information of this sort carried in the packets; the screen in Figure 4-8-7 appears.

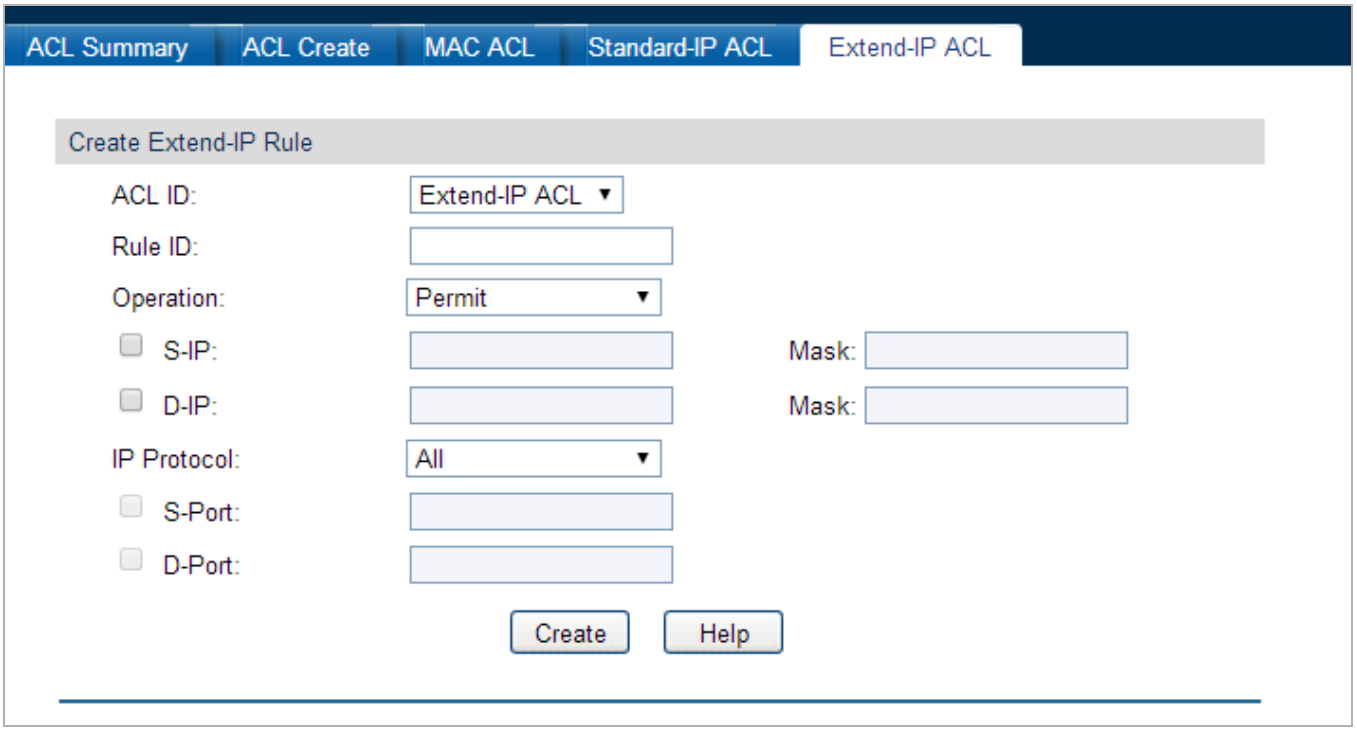


Figure 4-8-7: Extend-IP ACL Page Screenshot

The page includes the following fields:

Object	Description
Create Extend-IP Rule	
• **ACL ID**	Select the desired Extend-IP ACL for configuration.
• **Rule ID**	Enter the rule ID.
• **Operation**	Select the operation for the Managed Switch to process packets which match the rules. ● **Permit:** Forward packets. ● **Deny:** Discard Packets.
• **S-IP**	Enter the source IP address contained in the rule.
• **D-IP**	Enter the destination IP address contained in the rule.
• **Mask**	Enter IP address mask. If it is set to 1, it must strictly match the address.
• **IP Protocol**	Select IP protocol contained in the rule.
• **S-Port**	Configure TCP/IP source port contained in the rule when TCP/UDP is selected from the pull-down list of IP Protocol.
• **D-Port**	Configure TCP/IP destination port contained in the rule when TCP/UDP is selected from the pull-down list of IP Protocol.

4.8.2 Policy Config

A Policy is used to control the data packets those match the corresponding ACL rules by configuring ACLs and actions together for effect. The operations here include stream mirror, stream condition, QoS remarking and redirect; the screen in Figure 4-8-8 appears.

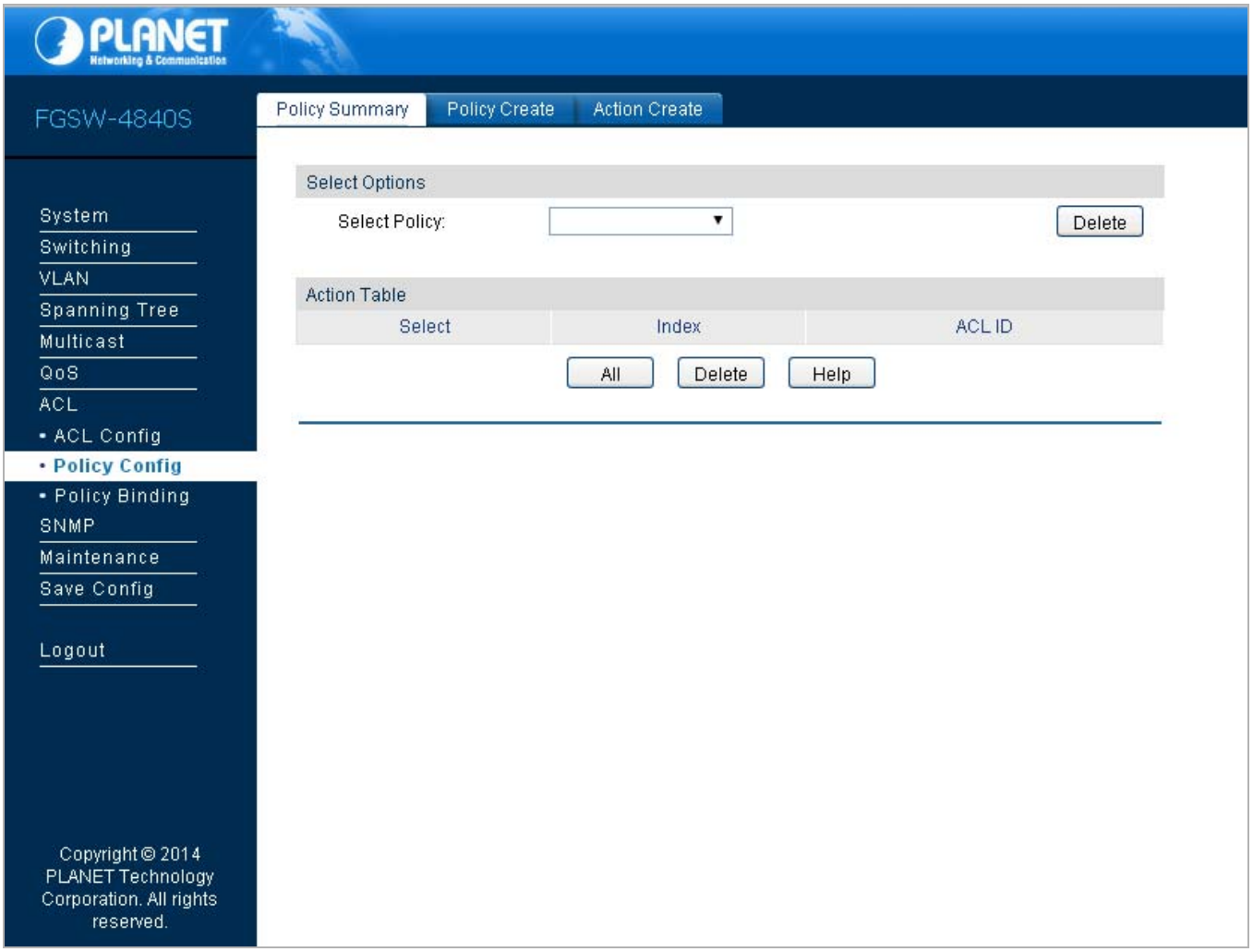


Figure 4-8-8: Policy Config Page Screenshot

The page includes the following fields:

Object	Description
• **Policy Summary**	View the current policy configured on this page.
• **Policy Create**	Provide policy create function on this page.
• **Action Create**	Provide action create function on this page.

4.8.2.1 Policy Summary

This page allows viewing the ACL and the corresponding operations in the policy; the screen in Figure 4-8-9 appears.

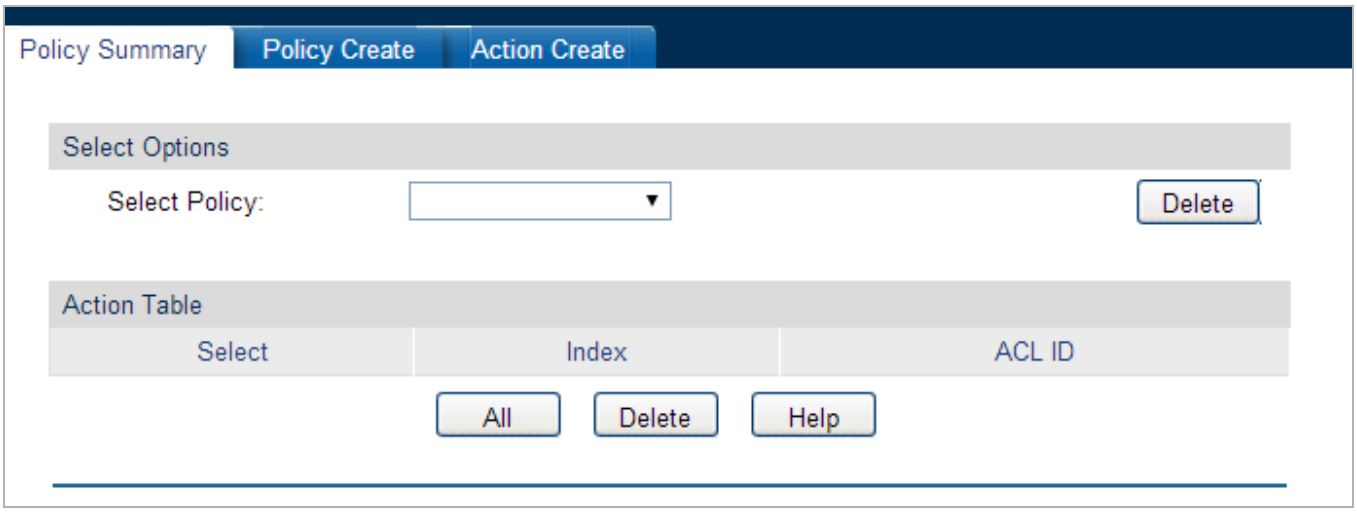


Figure 4-8-9: Policy Summary Page Screenshot

The page includes the following fields:

Object	Description
Select Options	
• **Select Policy**	Select name of the desired policy for view. If want to delete the desired policy, please click the **Delete** button.
Action Table	
• **Select**	Select the desired entry to delete the corresponding policy.
• **Index**	Displays the index of the policy.
• **ACL ID**	Displays the ID of the ACL contained in the policy.

Buttons

All: Click to choose all policy items from Policy Summary table.

Delete: Click to delete policy items from action table.

Help: Click to display help web page.

4.8.2.2 Policy Create

This page allows create policy item and the screen in Figure 4-8-10 appears.

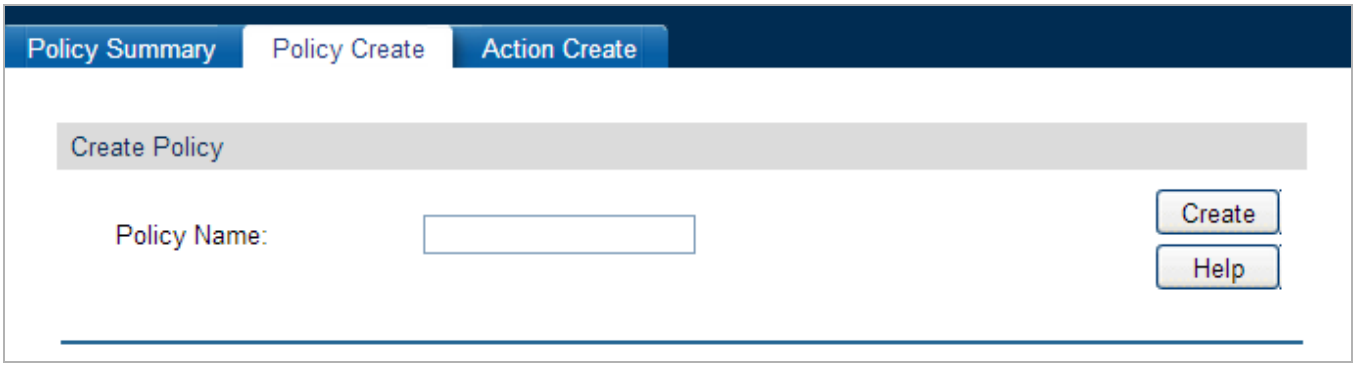


Figure 4-8-10: Policy Create Page Screenshot

The page includes the following fields:

Object	Description
Create Policy	
• **Policy Name**	Enter the name of the policy.

Buttons

Create: Click to create policy items.

Help: Click to display help web page.

4.8.2.3 Action Create

This page allows add ACL for the policy and the screen in Figure 4-8-11 appears.

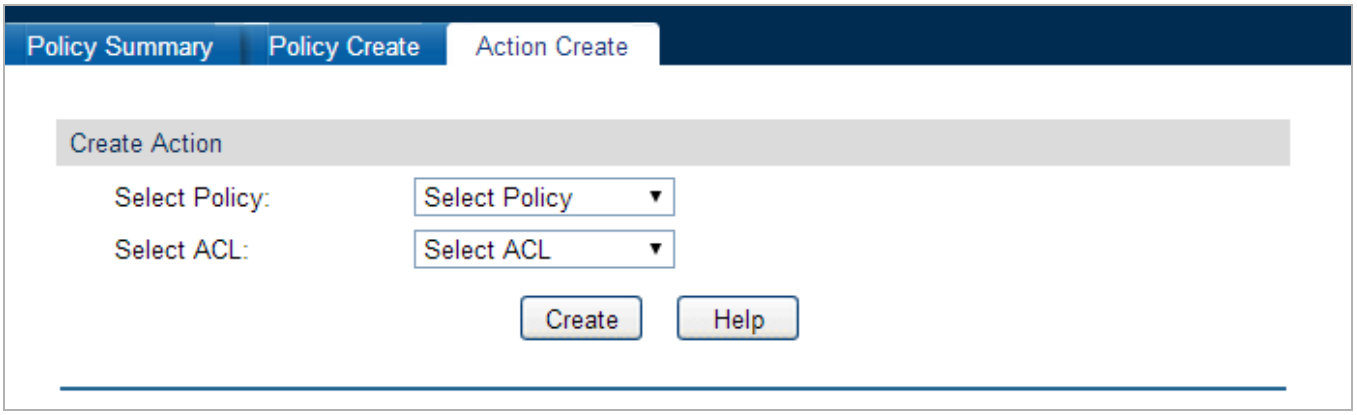


Figure 4-8-11: Action Create Page Screenshot

The page includes the following fields:

Object	Description
Create Action	
• **Select Policy**	Select the name of the policy.
• **Select ACL**	Select the ACL for configuration in the policy.

Buttons

Create: Click to create action items.

Help: Click to display help web page.

4.8.3 Policy Binding

The Policy Binding function can have the policy take its effect on a specific port / VLAN. The policy will take effect only when it is bound to a port/VLAN. In the same way, the port/VLAN will receive the data packets and process them based on the policy only when the policy is bound to the port/VLAN; the screen in Figure 4-8-12 appears.

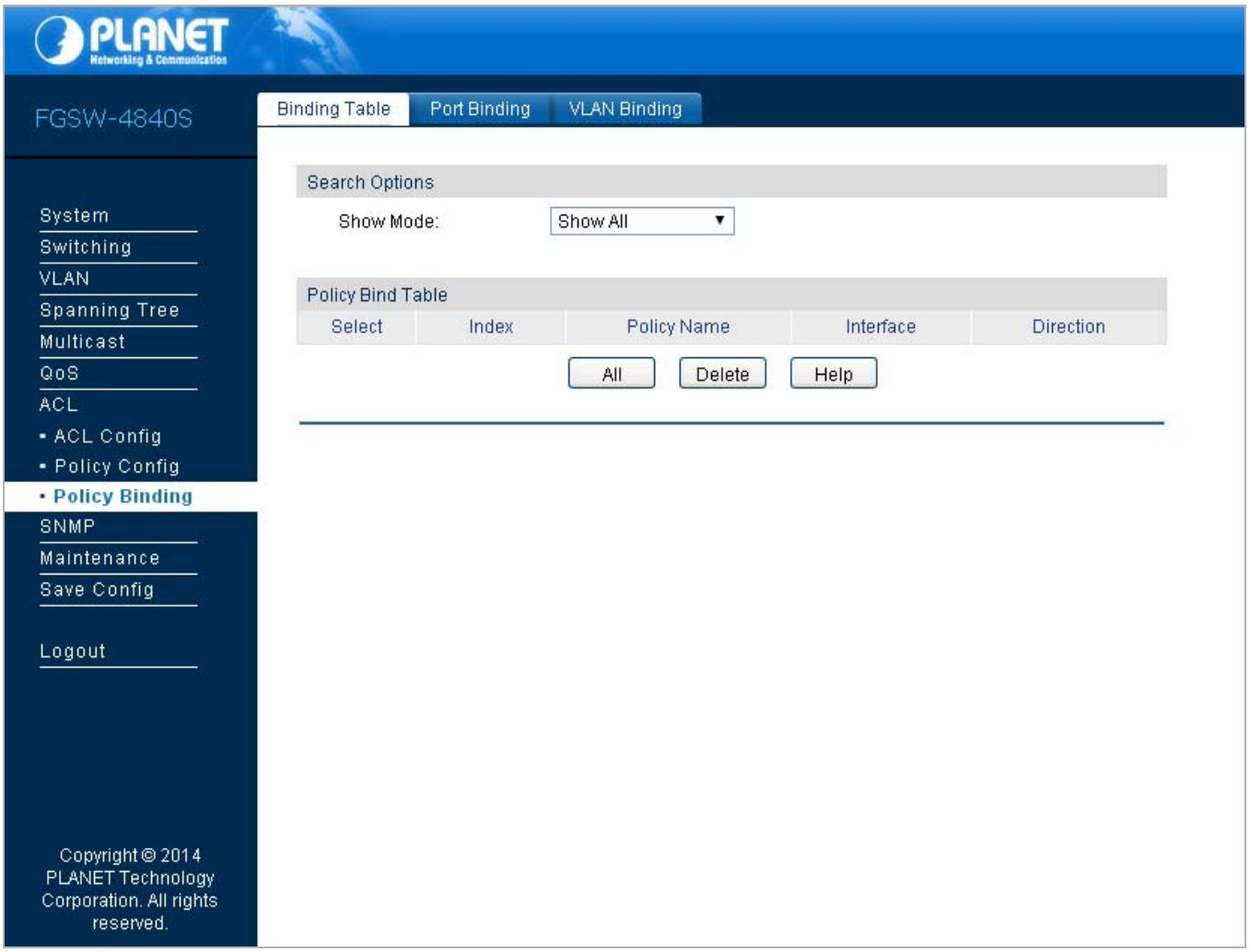


Figure 4-8-12: Policy Binding Page Screenshot

The page includes the following fields:

Object	Description
• **Binding Table**	View the binding table on this page.
• **Port Binding**	Provide port binding function on this page.
• **VLAN Binding**	Provide VLAN binding function on this page.

4.8.3.1 Binding Table

This page allows viewing the policy bound to port / VLAN and the screen in Figure 4-8-13 appears.

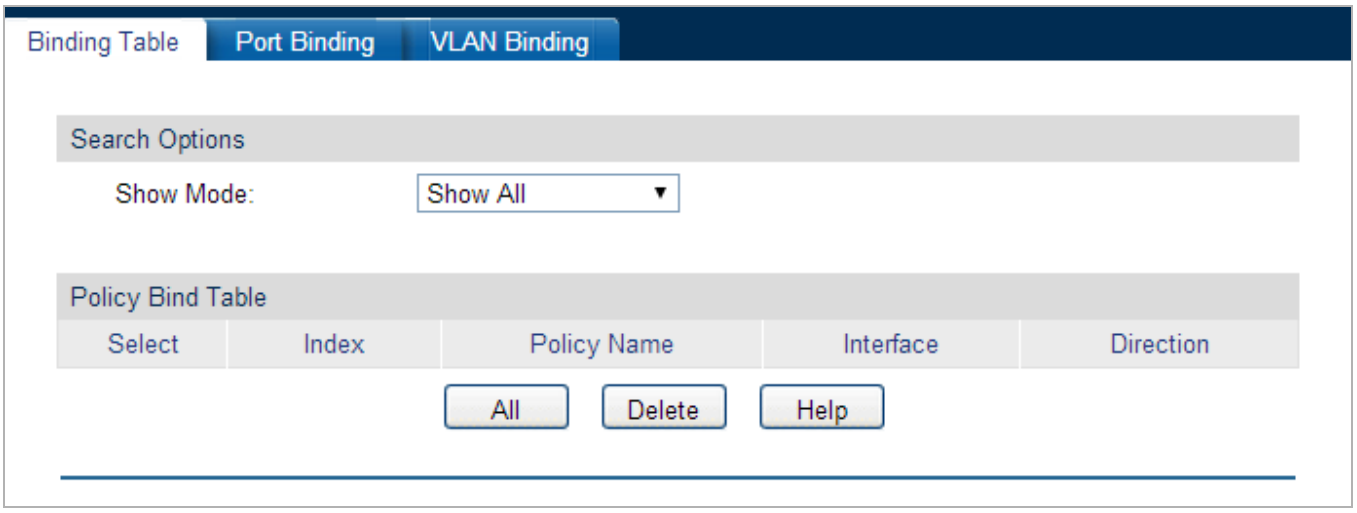


Figure 4-8-13: Binding Table Page Screenshot

The page includes the following fields:

Object	Description
Select Options	
• **Show Mode**	Select a show mode appropriate to current needs.
Policy Bind Table	
• **Select**	Select the desired entry to delete the corresponding binding policy.
• **Index**	Displays the index of the binding policy.
• **Policy Name**	Displays the name of the binding policy.
• **Interface**	Displays the port number or VLAN ID bound to the policy.
• **Direction**	Displays the binding direction.

Buttons

All: Click to choose all policy items from Policy Summary table.

Delete: Click to delete policy items from action table.

Help: Click to display help web page.

4.8.3.2 Port Binding

This page allows bind a policy to a port and the screen in Figure 4-8-14 appears.

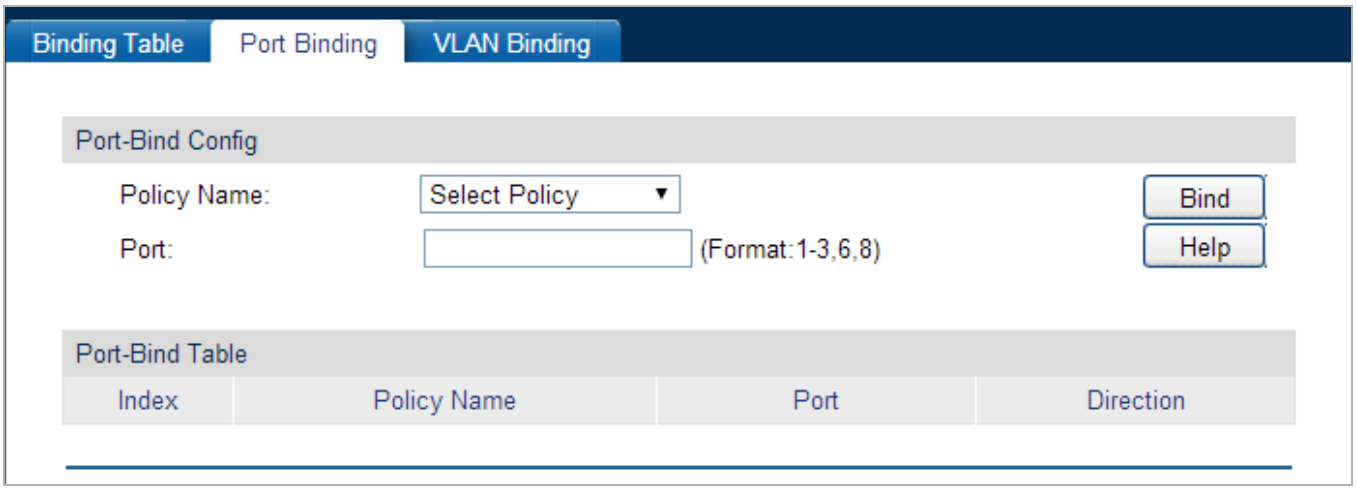


Figure 4-8-14: Port Binding Page Screenshot

The page includes the following fields:

Object	Description
Port-Bind Config	
• **Policy Name**	Select the name of the policy that wants to bind.
• **Port**	Enter the number of the port that to bind.
Port-Bind Table	
• **Index**	Displays the index of the binding policy.
• **Policy Name**	Displays the name of the binding policy.
• **Port**	Displays the number of the port bound to the corresponding policy.
• **Direction**	Displays the binding direction.

Buttons

Bind: Click to choose to bind a policy to port.

Help: Click to display help web page.

4.8.3.3 VLAN Binding

This page allows bind a policy to a VLAN and the screen in Figure 4-8-15 appears.

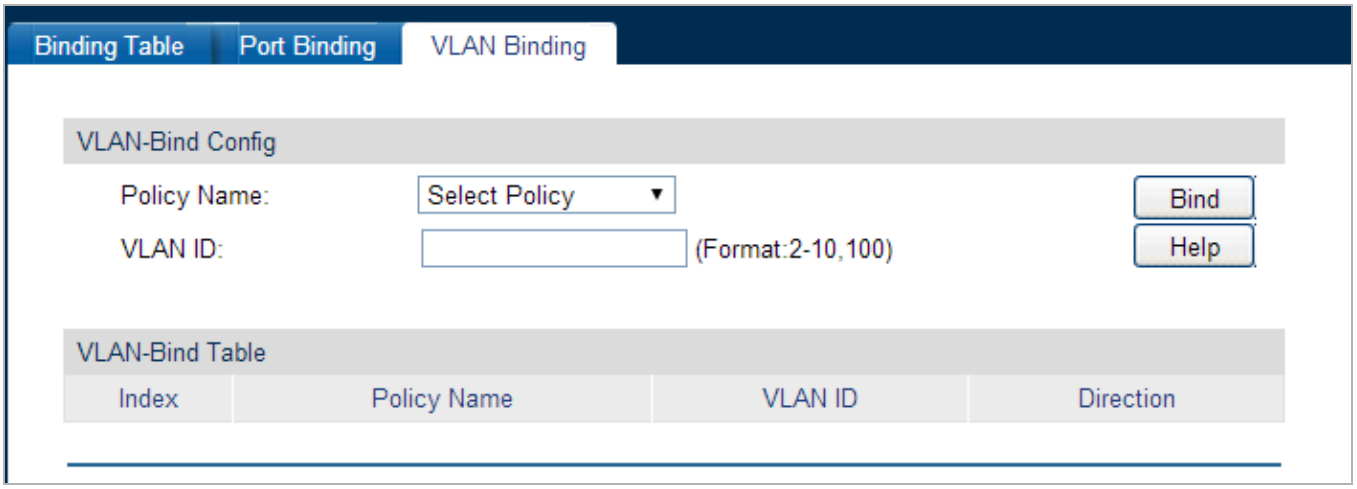


Figure 4-8-15: VLAN Binding Page Screenshot

The page includes the following fields:

Object	Description
VLAN-Bind Config	
• **Policy Name**	Select the name of the policy that wants to bind.
• **VLAN ID**	Enter the ID of the VLAN that want to bind.
VLAN-Bind Table	
• **Index**	Displays the index of the binding policy.
• **Policy Name**	Displays the name of the binding policy.
• **VLAN ID**	Displays the ID of the VLAN bound to the corresponding policy.
• **Direction**	Displays the binding direction.

Buttons

Bind: Click to choose to bind a policy to VLAN.

Help: Click to display help web page.

4.9 SNMP

SNMP Overview

The **Simple Network Management Protocol (SNMP)** is an application layer protocol that facilitates the exchange of management information between network devices. It is part of the **Transmission Control Protocol/Internet Protocol (TCP/IP)** protocol suite. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

An SNMP-managed network consists of three key components: Network management stations (NMSs), SNMP agents, Management information base (MIB) and network-management protocol：

- **Network management stations (NMSs)：**Sometimes called consoles, these devices execute management applications that monitor and control network elements. Physically, NMSs are usually engineering workstation-caliber computers with fast CPUs, megapixel color displays, substantial memory, and abundant disk space. At least one NMS must be present in each managed environment.
- **Agents：**Agents are software modules that reside in network elements. They collect and store management information such as the number of error packets received by a network element.
- **Management information base (MIB)：**A MIB is a collection of managed objects residing in a virtual information store. Collections of related managed objects are defined in specific MIB modules.
- **network-management protocol：**A management protocol is used to convey management information between agents and NMSs. SNMP is the Internet community's de facto standard management protocol.

SNMP Operations

SNMP itself is a simple request/response protocol. NMSs can send multiple requests without receiving a response.

- **Get --** Allows the NMS to retrieve an object instance from the agent.
- **Set --** Allows the NMS to set values for object instances within an agent.
- **Trap --** Used by the agent to asynchronously inform the NMS of some event. The SNMPv2 trap message is designed to replace the SNMPv1 trap message.

SNMP community

An SNMP community is the group that devices and management stations running SNMP belong to. It helps define where information is sent. The community name is used to identify the group. A SNMP device or agent may belong to more than one SNMP community. It will not respond to requests from management stations that do not belong to one of its communities. SNMP default communities are:

- **Write** = private
- **Read** = public

The screen in Figure 4-9-1 appears.

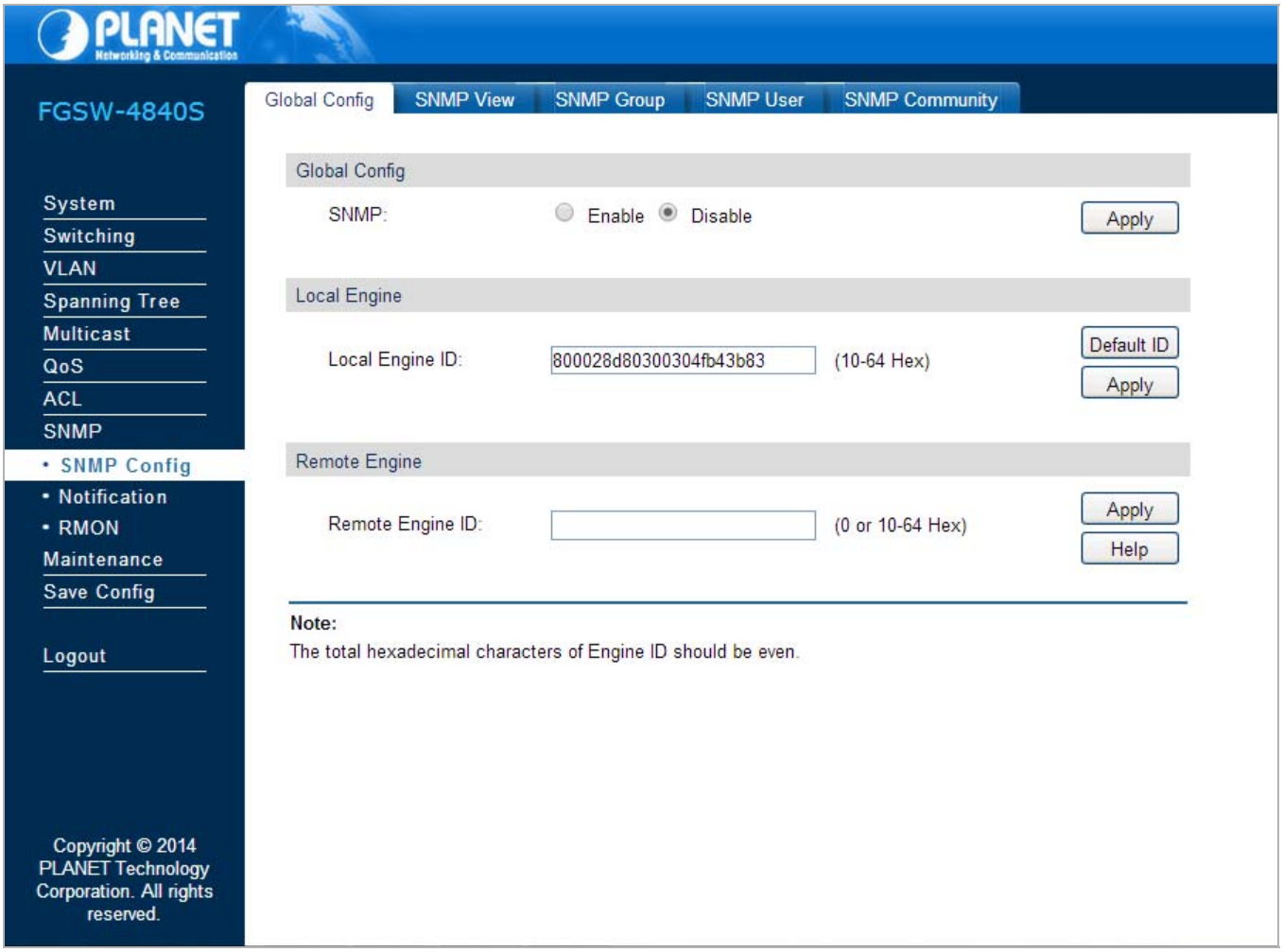


Figure 4-9-1: SNMP Page Screenshot

This section has the following items:

SNMP Config	Configure SNMP function of Managed Switch.
Notification	Configure notification function on this page.
RMON	Configure RMON function on this page.

4.9.1 SNMP Config

The **SNMP Config** can be implemented on the **Global Config**, **SNMP View**, **SNMP Group**, **SNMP User** and **SNMP Community** pages; the screen in Figure 4-9-2 appears.

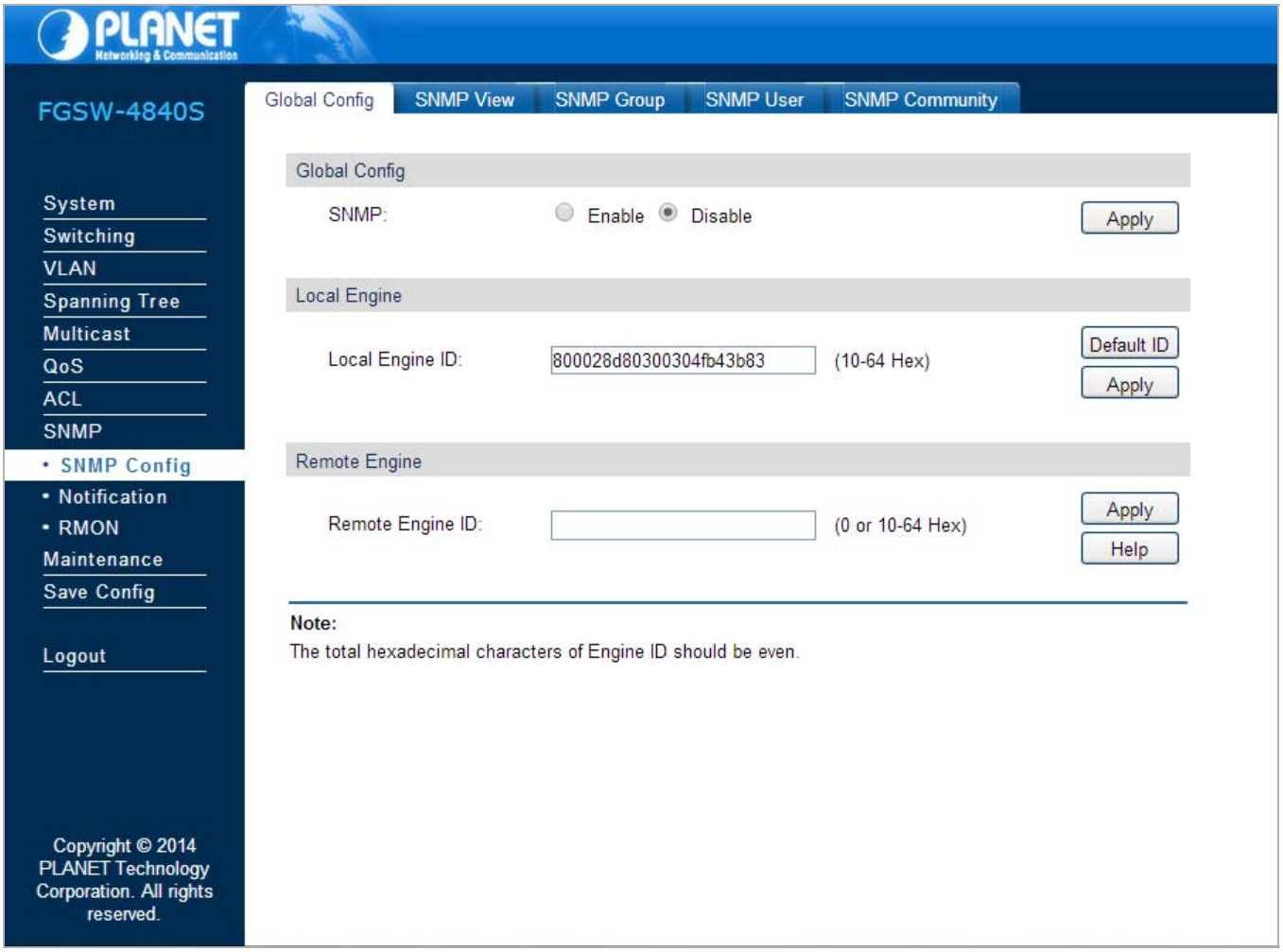


Figure 4-9-2: SNMP Page Screenshot

The page includes the following fields:

Object	Description
• **Global Config**	Provide SNMP Global Config on this page.
• **SNMP View**	View the SNMP Configured on this page.
• **SNMP Group**	Provide SNMP Group Config on this page.
• **SNMP User**	Provide SNMP User Config on this page.
• **SNMP Community**	Provide SNMP Community Config on this page.

4.9.1.1 Global Config

This page allows enabled SNMP function and the screen in Figure 4-9-3 appears.

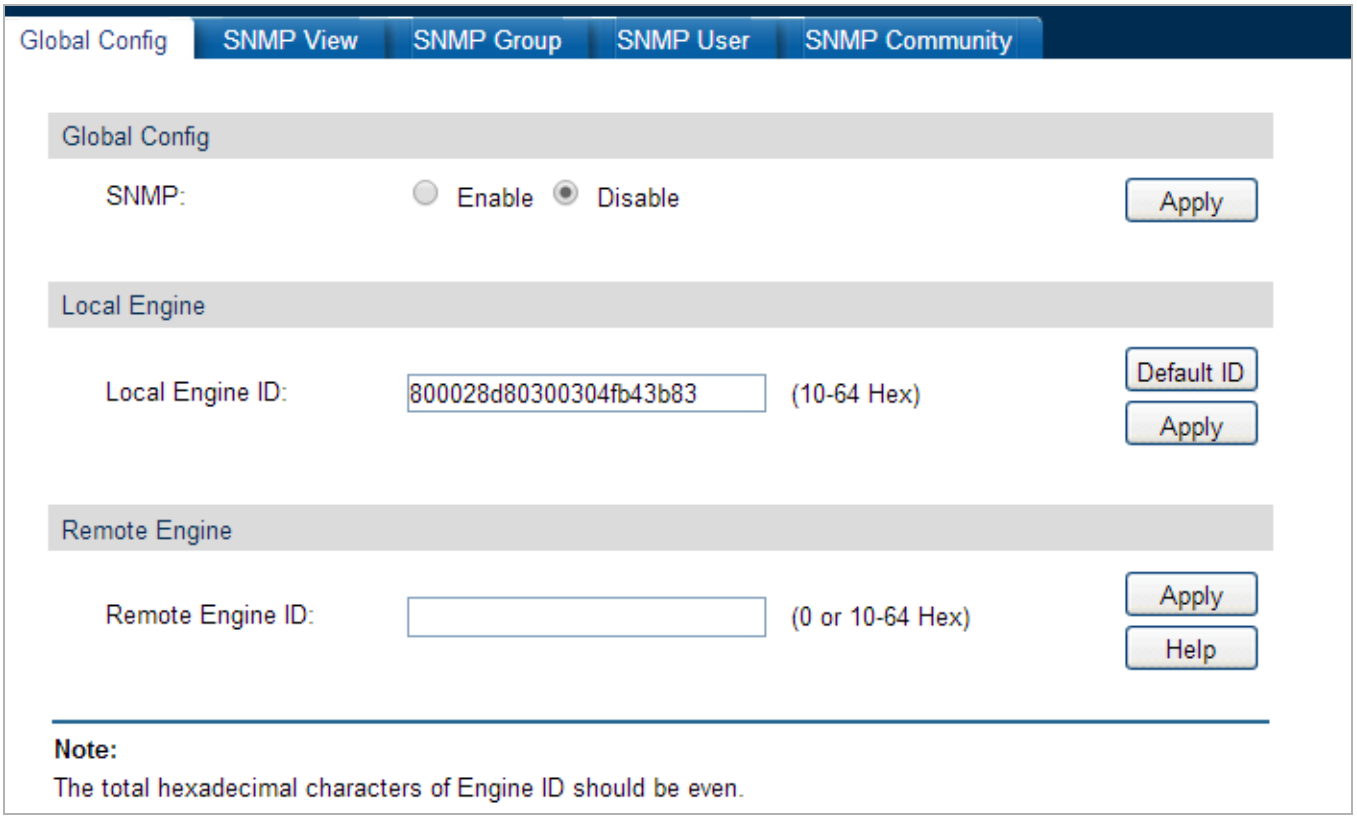


Figure 4-9-3: Global ConfigPage Screenshot

The page includes the following fields:

Object	Description
Global Config	
• **SNMP**	Enable / Disable the SNMP function.
Local Engine	
• **Local Engine ID**	Specify the Managed Switch's Engine ID for the remote clients. The Engine ID is a unique alphanumeric string used to identify the SNMP engine on the Managed Switch.
Remote Engine	
• **Remote Engine ID**	Specify the Remote Engine ID for Managed Switch. The Engine ID is a unique alphanumeric string used to identify the SNMP engine on the remote device which receives traps and informs from Managed Switch.

Buttons

Apply : Click to apply changes.

Default ID : Click for reset to default local engine ID.

Help: Click to display help web page.

Note: The amount of Engine ID characters must be even.

4.9.1.2 SNMP View

The OID (Object Identifier) of the SNMP packets is used to describe the managed objects of the Managed Switch, and the MIB (Management Information Base) is the set of the OIDs. The SNMP View is created for the SNMP management station to manage MIB objects, the screen in Figure 4-9-4 appears.

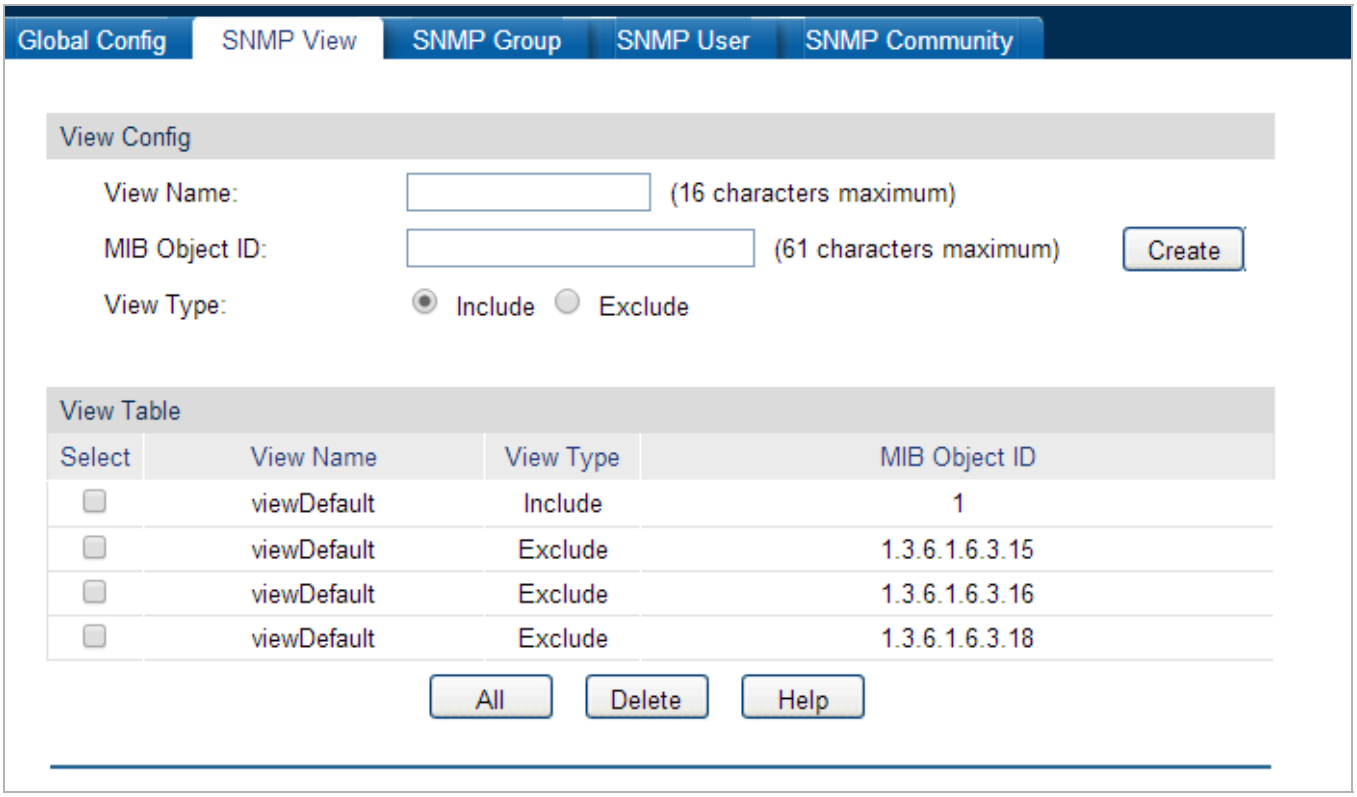


Figure 4-9-4: SNMP View Page Screenshot

The page includes the following fields:

Object	Description
View Config	
• **View Name**	Give a name to the View for identification, each View can include several entries with the same name.
• **MIB Object ID**	Enter the Object Identifier (OID) for the entry of View.
• **View Type**	Select the type for the view entry. • Include: The view entry can be managed by the SNMP management station. • Exclude: The view entry can not be managed by the SNMP management station.

View Table	
• **Select**	Select the desired entry to delete the corresponding view. All the entries of a View will be deleted together.
• **View Name**	Displays the name of the View entry.
• **View Type**	Displays the type of the View entry.
• **MIB Object ID**	Displays the OID of the View entry.

Buttons

Create: Click to create a new SNMP view.

All: Click to choose all view items from view table.

Delete: Click to delete view items from view table.

Help: Click to display help web page.

4.9.1.3 SNMP Group

This page provide configure SNMP Group to control the network access by providing the users in various groups with different management rights via the Read View, Write View and Notify View; the screen in Figure 4-9-5 appears.

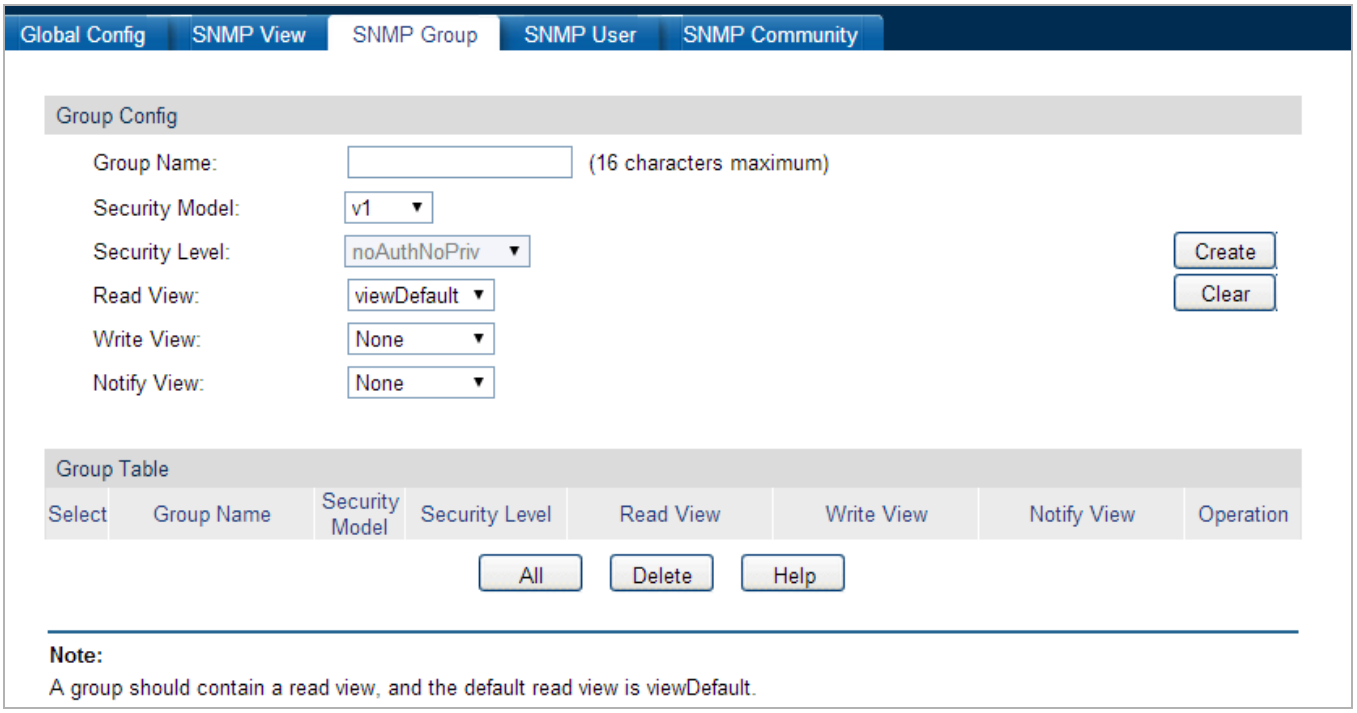


Figure 4-9-5: SNMP Group Page Screenshot

The page includes the following fields:

Object	Description
Group Config	
• **Group Name**	Enter the SNMP Group name. The Group Name, Security Model and Security Level compose the identifier of the SNMP Group. The Groups with these three items the same are considered to be the same.
• **Security Model**	Select the Security Model for the SNMP Group. • **v1:** SNMPv1 is defined for the group. In this model, the Community Name is used for authentication. SNMP v1 can be configured on the SNMP Community page directly. • **v2c:** SNMPv2c is defined for the group. In this model, the Community Name is used for authentication. SNMP v2c can be configured on the SNMP Community page directly. • **v3:** SNMPv3 is defined for the group. In this model, the USM mechanism is used for authentication. If SNMPv3 is enabled, the Security Level field is enabled for configuration.
• **Security Level**	Select the Security Level for the SNMP v3 Group. • **noAuthNoPriv:** No authentication and no privacy security level is used.

	• **authNoPriv:** Only the authentication security level is used. • **authPriv:** Both the authentication and the privacy security levels are used.
• **Read View**	Select the View to be the Read View. The management access is restricted to read-only, and changes cannot be made to the assigned SNMP View.
• **Write View**	Select the View to be the Write View. The management access is writing only and changes can be made to the assigned SNMP View. The View defined both as the Read View and the Write View can be read and modified.
• **Notify View**	Select the View to be the Notify View. The management station can receive trap messages of the assigned SNMP view generated by the Managed Switch's SNMP agent.
Group Table	
• **Select**	Select the desired entry to delete the corresponding group. It is multi-optional.
• **Group Name**	Displays the Group Name here.
• **Security Model**	Displays the Security Model of the group.
• **Security Level**	Displays the Security Level of the group.
• **Read View**	Displays the Read View name in the entry.
• **Write View**	Displays the Write View name in the entry.
• **Notify View**	Displays the Notify View name in the entry.
• **Operation**	Click the **Edit** button to modify the Views in the entry and click the **Modify** button to apply.

Note

■ Every Group should contain a Read View. The default Read View is viewDefault.

Buttons

Create: Click to create a new SNMP group.

Clear: Click to clear unsave information.

All: Click to choose all SNMP group items from SNMP group table.

Delete: Click to delete SNMP group items from SNMP group table.

Help: Click to display help web page.

4.9.1.4 SNMP User

The User in an SNMP Group can manage the Managed Switch via the management station software, the User and its Group has the same security level and access right; the screen in Figure 4-9-6 appears.

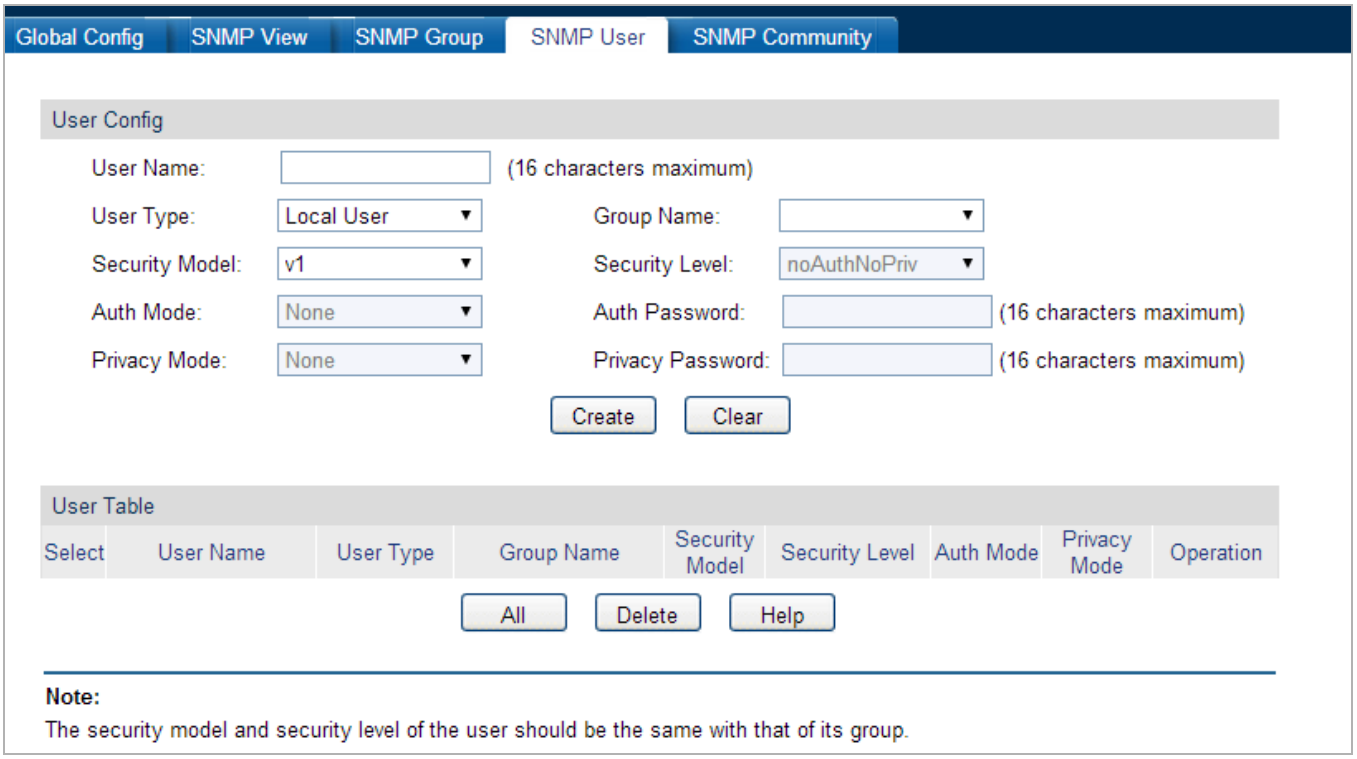


Figure 4-9-6: SNMP User Page Screenshot

The page includes the following fields:

Object	Description
User Config	
• **User Name**	Enter the User Name here.
• **User Type**	Select the type for the User. • Local User: Indicates that the user is connected to a local SNMP engine. • Remote User: Indicates that the user is connected to a remote SNMP engine.
• **Group Name**	Select the Group Name of the User. The User is classified to the corresponding Group according to its Group Name, Security Model and Security Level.
• **Security Model**	Select the Security Model for the User.
• **Security Level**	Select the Security Level for the SNMP v3 User.
• **Auth Mode**	Select the Authentication Mode for the SNMP v3 User. • **None:** No authentication method is used. • **MD5:** The port authentication is performed via HMAC-MD5 algorithm. SHA: The port authentication is performed via SHA (Secure Hash Algorithm). This authentication mode has a higher security than MD5 mode.

• **Auth Password**	Enter the password for authentication.
• **Privacy Mode**	Select the Privacy Mode for the SNMP v3 User. • **None:** No privacy method is used. • **DES:** DES encryption method is used.
• **Privacy Password**	Enter the Privacy Password.

User Table

• **Select**	Select the desired entry to delete the corresponding User. It is multi-optional.
• **User Name**	Displays the name of the User.
• **User Type**	Displays the User Type.
• **Group Name**	Displays the Group Name of the User.
• **Security Model**	Displays the Security Model of the User.
• **Security Level**	Displays the Security Level of the User.
• **Auth Mode**	Displays the Authentication Mode of the User.
• **Privacy Mode**	Displays the Privacy Mode of the User.
• **Operation**	Click the **Edit** button to modify the Group of the User and click the **Modify** button to apply.

Note

■ The SNMP User and its Group should have the same Security Model and Security Level.

Buttons

Create: Click to create a new SNMP user

Clear: Click to clear unsave information.

All: Click to choose all SNMP user items from SNMP user table.

Delete: Click to delete SNMP user items from SNMP user table.

Help: Click to display help web page.

4.9.1.5 SNMP Community

The SNMP v1 and SNMP v2c adopt community name authentication, the community name can limit access to the SNMP agent from SNMP network management station, functioning as a password. If SNMP v1 or SNMP v2c is employed, it can directly configure the SNMP Community on this page without configuring SNMP Group and User; the screen in Figure 4-9-7 appears.

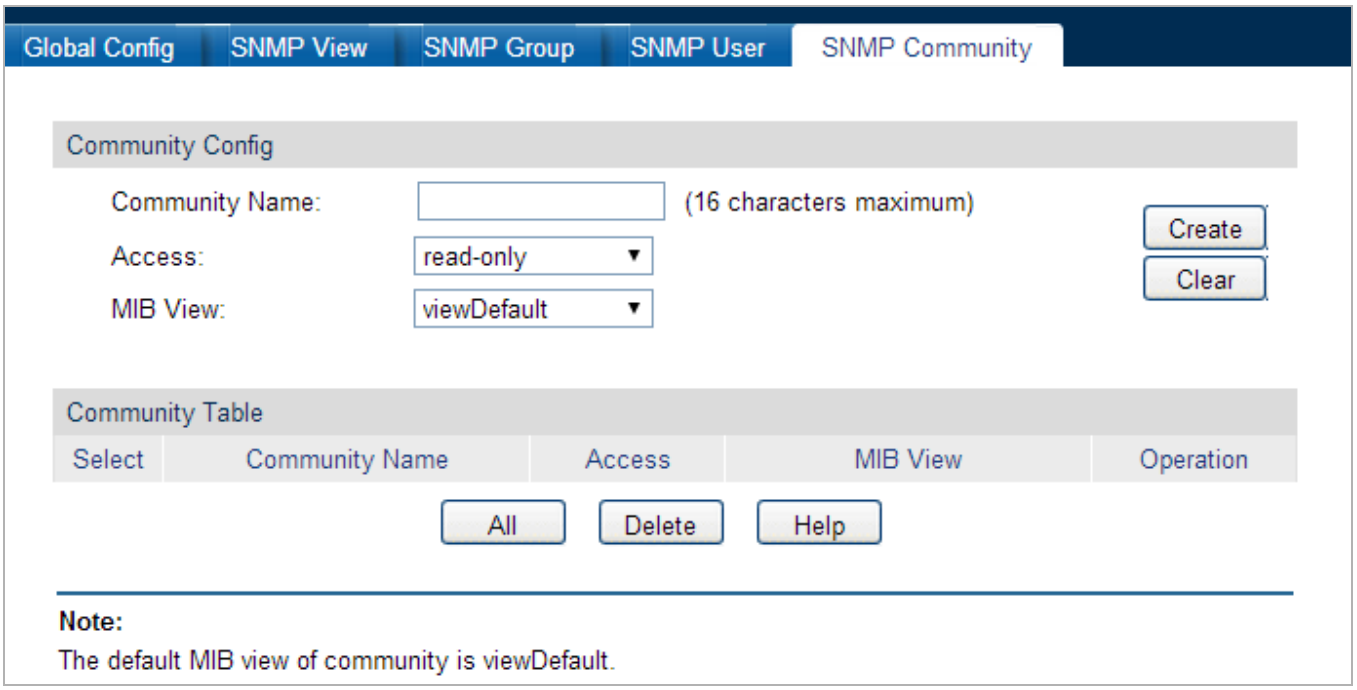


Figure 4-9-7: SNMP Community Page Screenshot

The page includes the following fields:

Object	Description
Community Config	
• **Community Name**	Enter the Community Name here.
• **Access**	Defines the access rights of the community. • **read-only:** Management right of the Community is restricted to read-only, and changes cannot be made to the corresponding View. • **read-write:** Management right of the Community is read-write and changes can be made to the corresponding View.
• **MIB View**	Select the MIB View for the community to access.
Community Table	
• **Select**	Select the desired entry to delete the corresponding Community. It is multi-optional.
• **Community Name**	Displays the Community Name here.
• **Access**	Displays the right of the Community to access the View.
• **MIB View**	Displays the Views which the Community can access.
• **Operation**	Click the **Edit** button to modify the MIB View and the Access right of the Community, and then click the **Modify** button to apply.

The default MIB View of SNMP Community is viewDefault

Buttons

Create: Click to create a new SNMP community

Clear: Click to clear unsave information.

All: Click to choose all SNMP community items from SNMP community table.

Delete: Click to delete SNMP community items from SNMP community table.

Help: Click to display help web page.

4.9.2 Notification

With the Notification function enabled, the Managed Switch can initiatively report to the management station about the important events that occur on the Views (e.g., the managed device is rebooted), which allows the management station to monitor and process the events in time.

The notification information includes the following two types:

Trap：Trap is the information that the managed device initiatively sends to the Network management station without request.

Inform：Inform packet is sent to inform the management station and ask for the reply. The Managed Switch will resend the inform request if it doesn't get the response from the management station during the Timeout interval, and it will terminate resending the inform request if the resending times reach the specified Retry times. The Inform type, employed on SNMPv2c and SNMPv3, has a higher security than the Trap type.

The screen in Figure 4-9-8 appears.

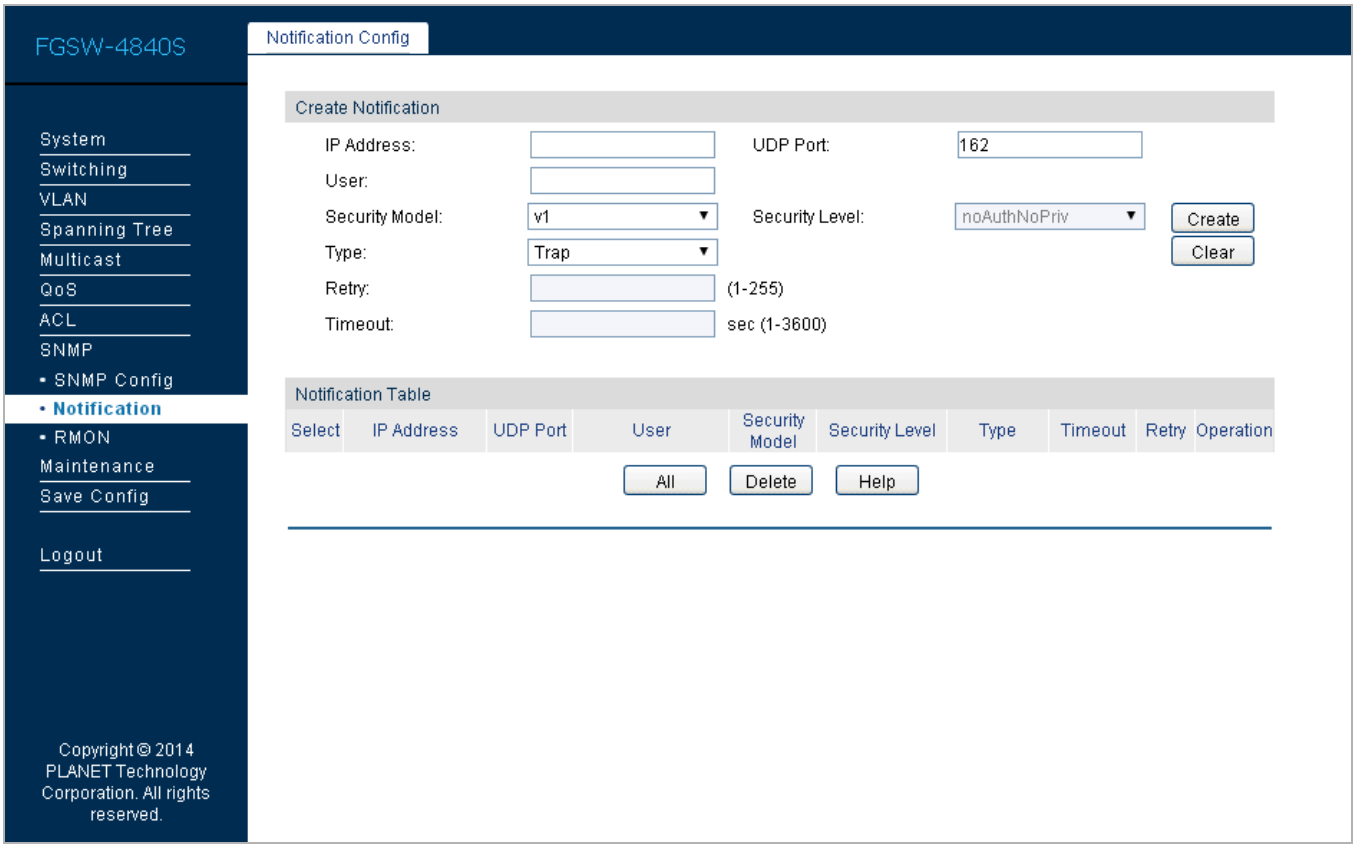


Figure 4-9-8: SNMP Notification Page Screenshot

The page includes the following fields:

Object	Description
• **Notification Config**	Provide SNMP notification config on this page.

4.9.2.1 Notification Config

This page provides SNMP notification function and the screen in Figure 4-9-9 appears.

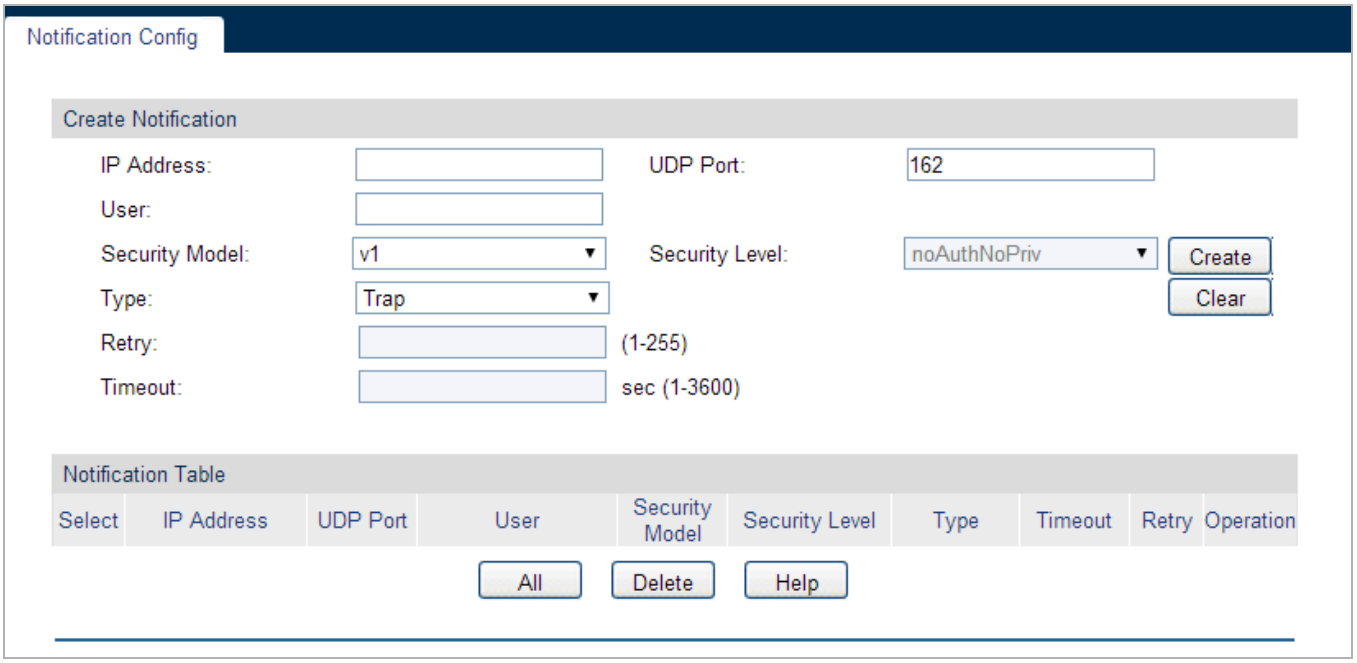


Figure 4-9-9: Notification Config Page Screenshot

The page includes the following fields:

Object	Description
Create Notification	
• **IP Address**	Enter the IP Address of the management Host.
• **UDP Port**	Enter the number of the UDP port used to send notifications. The UDP port functions with the IP address for the notification sending. The default is 162.
• **User**	Enter the User name of the management station.
• **Security Model**	Select the Security Model of the management station.
• **Security Level**	Select the Security Level for the SNMP v3 User. • **noAuthNoPriv:** No authentication and no privacy security level are used. • **authNoPriv:** Only the authentication security level is used. • **authPriv:** Both the authentication and the privacy security levels are used.
• **Type**	Select the type for the notifications. • **Trap:** Indicates traps are sent. • **Inform:** The Inform type, employed on SNMPv2c and SNMPv3, has a higher security than the Trap type.
• **Retry**	Specify the amount of times the Managed Switch resends an inform request. The Managed Switch will resend the inform request if it doesn't get the response from the management station during the **Timeout** interval, and it will terminate resending the inform request if the resending times reach the specified **Retry** times.

• **Timeout**	Specify the maximum time for the Managed Switch to wait for the response from the management station before resending a request.
Notification Table	
• **Select**	Select the desired entry to delete the corresponding management station.
• **IP Address**	Displays the IP Address of the management host.
• **UDP Port**	Displays the UDP port used to send notifications.
• **User**	Displays the User name of the management station.
• **Security Model**	Displays the Security Model of the management station.
• **Security Level**	Displays the Security Level for the SNMP v3 User.
• **Type**	Displays the type of the notifications.
• **Timeout**	Displays the maximum time for the Managed Switch to wait for the response from the management station before resending a request.
• **Retry**	Displays the amount of times the Managed Switch resends an inform request.
• **Operation**	Click the **Edit** button to modify the corresponding entry and click the **Modify** button to apply.

Buttons

Create: Click to create a new SNMP notification.

Clear: Click to clear unsave information.

All: Click to choose all SNMP notification items from SNMP notification table.

Delete: Click to delete SNMP notification items from SNMP notification table.

Help: Click to display help web page.

4.9.3 RMON

RMON (Remote Monitoring) based on SNMP (Simple Network Management Protocol) architecture, functions to monitor the network. RMON is currently a commonly used network management standard defined by Internet Engineering Task Force (IETF), which is mainly used to monitor the data traffic across a network segment or even the entire network so as to enable the network administrator to take the protection measures in time to avoid any network malfunction. In addition, RMON MIB records network statistics information of network performance and malfunction periodically, based on which the management station can monitor network at any time effectively. RMON is helpful for network administrator to manage the large-scale network since it reduces the communication traffic between management station and managed agent.

RMON Group

This Managed Switch supports the following four RMON Groups defined on the RMON standard (RFC1757): History Group, Event Group, Statistic Group and Alarm Group.

RMON Group	Function
History Group	After a history group is configured, the Managed Switch collects and records network statistics information periodically, based on which the management station can monitor network effectively.
Event Group	Event Group is used to define RMON events. Alarms occur when an event is detected.
Statistic Group	Statistic Group is set to monitor the statistic of alarm variables on the specific ports.
Alarm Group	Alarm Group is configured to monitor the specific alarm variables. When the value of a monitored variable exceeds the threshold, an alarm event is generated, which triggers the Managed Switch to act in the set way.

The screen in Figure 4-9-10 appears.

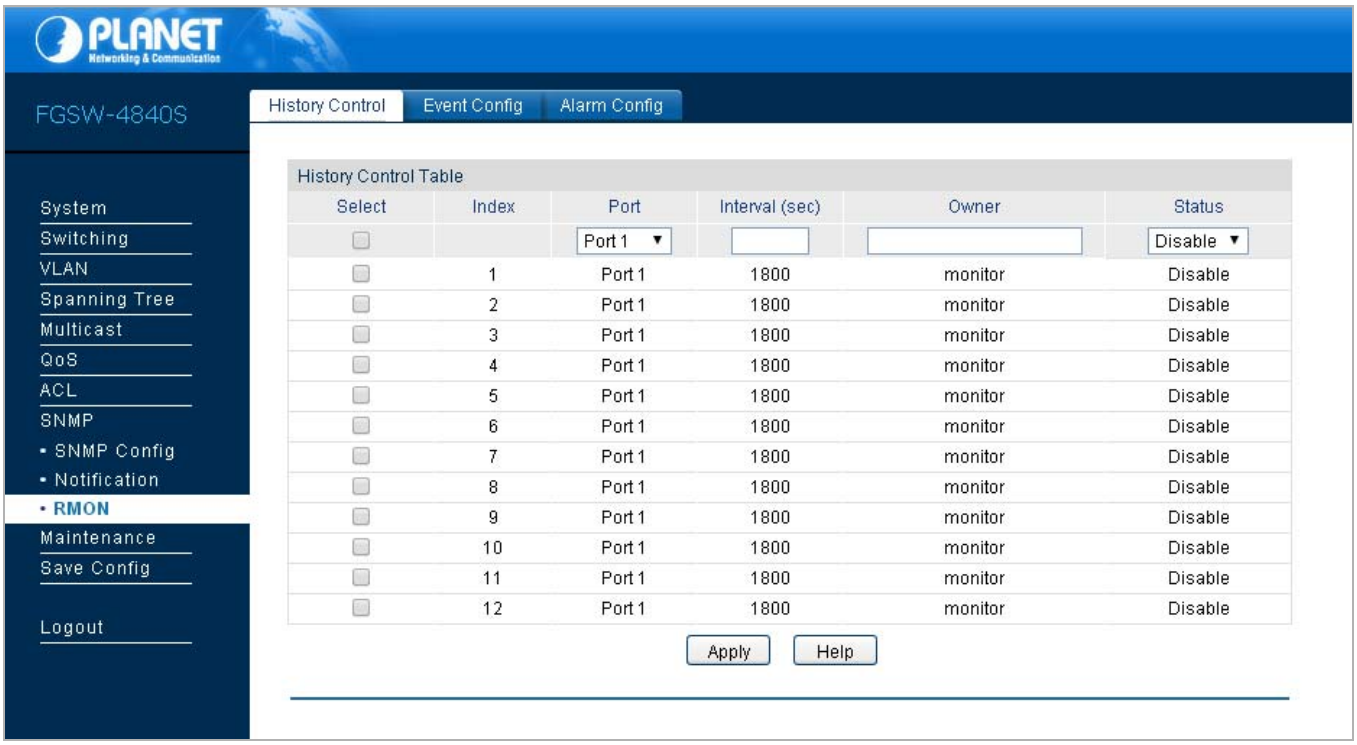


Figure 4-9-10: SNMP RMON Page Screenshot

The page includes the following fields:

Object	Description
• **Histoty Control**	Provide SNMP RMON history control on this page.
• **Event Config**	Provide SNMP RMON event config on this page.
• **Alarm Config**	Provide SNMP RMON alarm config on this page.

4.9.3.1 History Control

This page provides SNMP RMON History control function and the screen in Figure 4-9-11 appears.

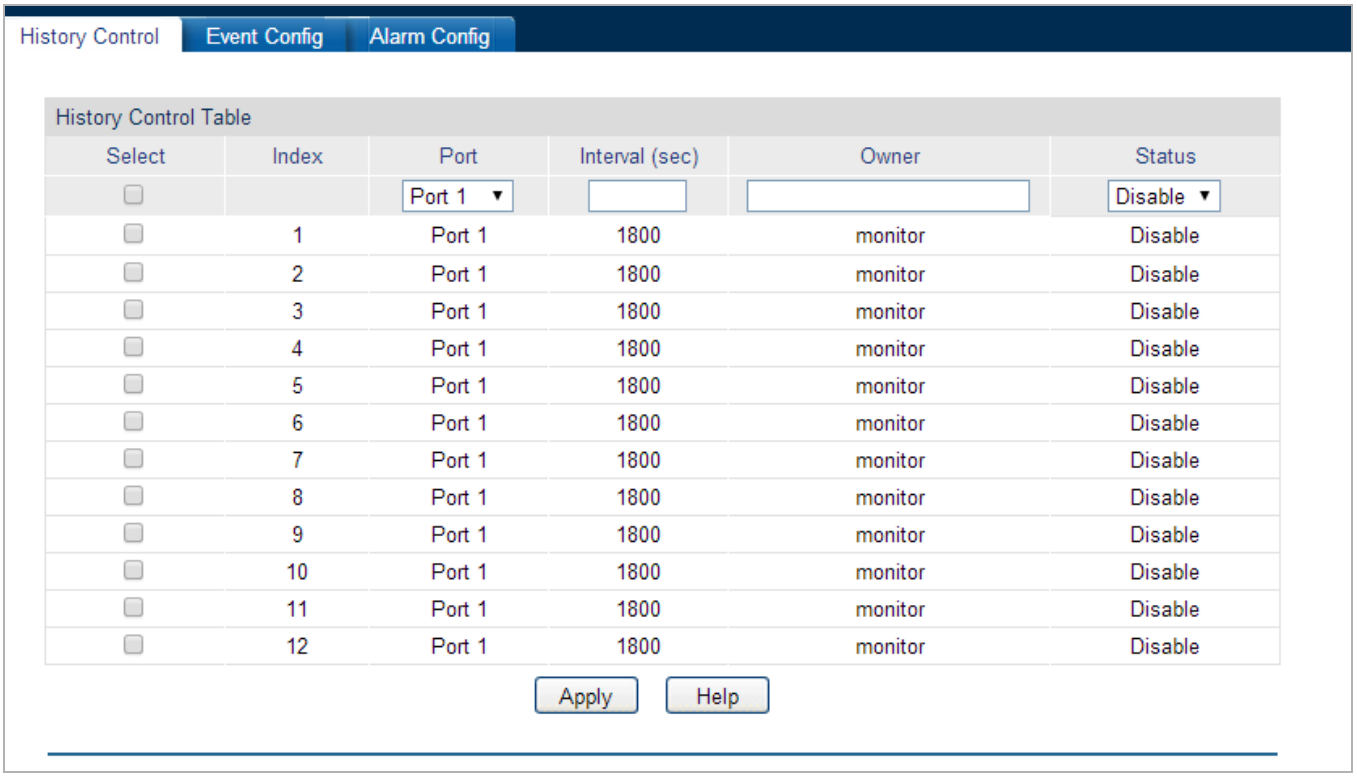


Figure 4-9-11: History Control Page Screenshot

The page includes the following fields:

Object	Description
History Control Table	
• **Select**	Select the desired entry for configuration.
• **Index**	Displays the index number of the entry.
• **Port**	Specify the port from which the history samples were taken.
• **Interval (sec)**	Specify the interval to take samplings from the port.
• **Owner**	Enter the name of the device or user that defined the entry.
• **Status**	Select Enable/Disable the corresponding sampling entry.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.9.3.2 Event Config

This page provides SNMP RMON event config function and the screen in Figure 4-9-12 appears.

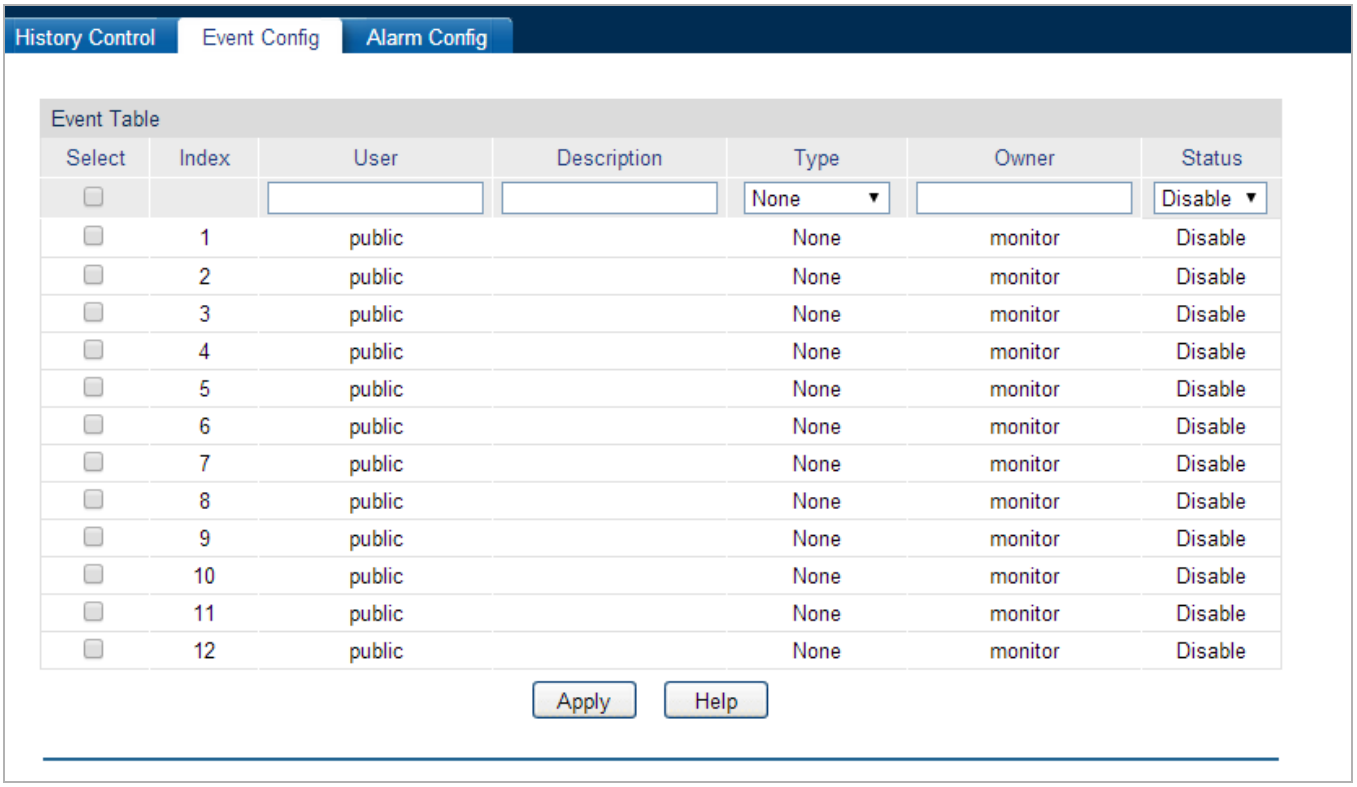


Figure 4-9-12: Event Config Page Screenshot

The page includes the following fields:

Object	Description
Event Table	
• **Select**	Select the desired entry for configuration.
• **Index**	Displays the index number of the entry.
• **User**	Enter the name of the User or the community to which the event belongs.
• **Description**	Give a description to the event for identification.
• **Type**	Select the event type, which determines the act way of the network device in response to an event. • **None:** No processing.

	• **Log:** Logging the event. • **Notify:** Sending trap messages to the management station. • **Log&Notify:** Logging the event and sending trap messages to the management station.
• **Owner**	Enter the name of the device or user that defined the entry.
• **Status**	Select Enable/Disable the corresponding event entry.

Buttons

Apply : Click to apply changes.

Help : Click to display help web page.

4.9.3.3 Alarm Config

This page provides SNMP RMON statistic group and alarm Group function; the screen in Figure 4-9-13 appears.

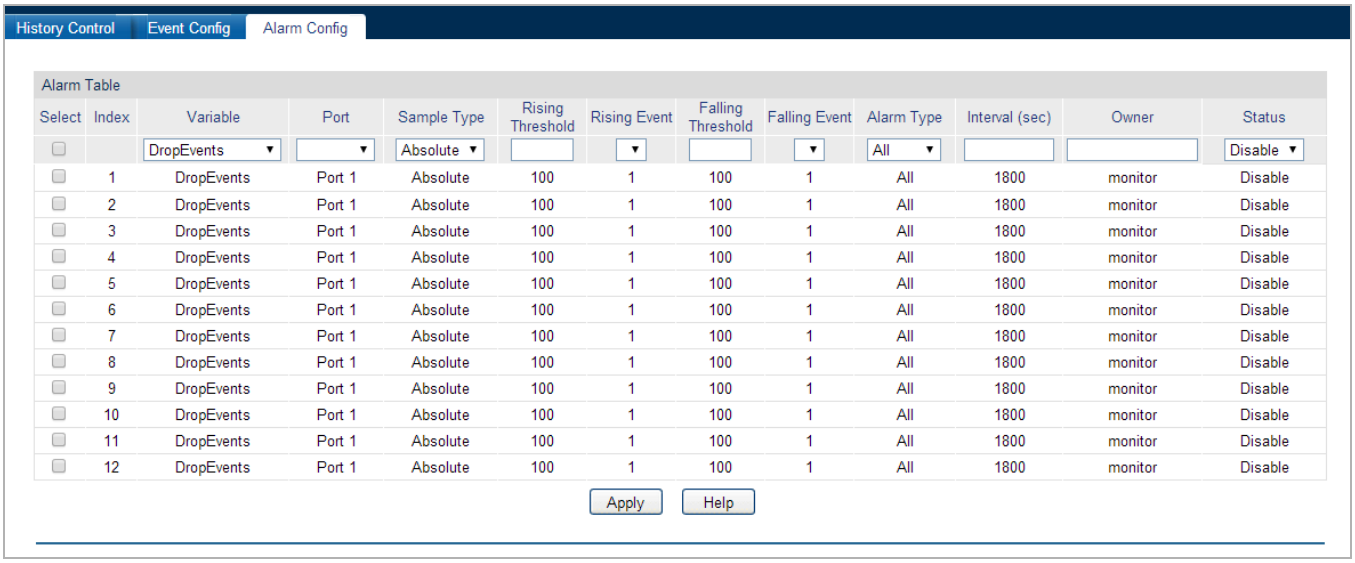


Figure 4-9-13: Alarm Config Page Screenshot

The page includes the following fields:

Object	Description
Alarm Table	
• **Select**	Select the desired entry for configuration.
• **Index**	Displays the index number of the entry.
• **Variable**	Select the alarm variables from the pull-down list.
• **Port**	Select the port on which the Alarm entry acts.
• **Sample Type**	Specify the sampling method for the selected variable and comparing the value against the thresholds. • **Absolute:** Compares the values directly with the thresholds at the end of the sampling interval. **Delta:** Subtracts the last sampled value from the current value. The difference in the values is compared to the threshold.
• **Rising Threshold**	Enter the rising counter value that triggers the Rising Threshold alarm.
• **Rising Event**	Select the index of the corresponding event which will be triggered if the sampled value is larger than the Rising Threshold.
• **Falling Threshold**	Enter the falling counter value that triggers the Falling Threshold alarm.
• **Falling Event**	Select the index of the corresponding event which will be triggered if the sampled value is lower than the Falling Threshold.
• **Alarm Type**	Specify the type of the alarm. • **All:** The alarm event will be triggered either the sampled value exceeds the Rising Threshold or is under the Falling Threshold.

	• **Rising:** When the sampled value exceeds the Rising Threshold, an alarm event is triggered. • **Falling:** When the sampled value is under the Falling Threshold, an alarm event is triggered.
• **Interval(sec)**	Enter the alarm interval time in seconds.
• **Owner**	Enter the name of the device or user that defined the entry.
• **Status**	Select Enable/Disable the corresponding alarm entry.

When alarm variables exceed the Threshold on the same direction continuously for several times, an alarm event will only be generated for the first time, that is, the Rising Alarm and Falling Alarm are triggered alternately for that the alarm following to Rising Alarm is certainly a Falling Alarm and vice versa.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.10 Maintenance

The Maintenance, assembling the commonly used system tools to manage the Managed Switch, provides the convenient method to locate and solve the network issue. The screen in Figure 4-10-1 appears.

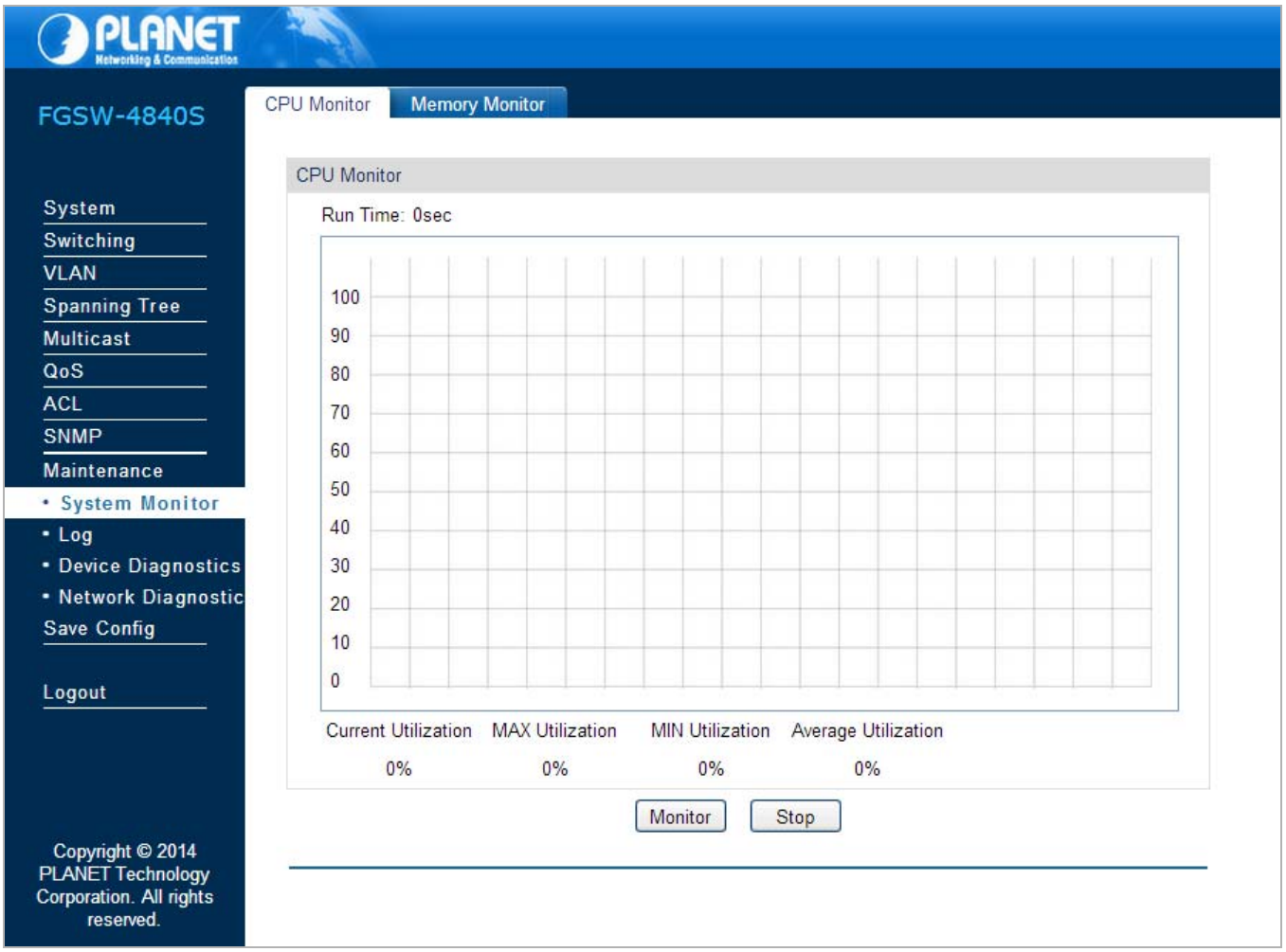


Figure 4-10-1: Maintenance Page Screenshot

This section has the following items:

- **System Monitor** Provide system monitor function on this page.
- **Log** Provide log function on this page.
- **Device Diagnostics** Provide device diagnostics function on this page.
- **Network Diagnostics** Provide network diagnostics function on this page.

4.10.1 System Monitor

The System Monitor functions to display the utilization status of the memory and the CPU of Managed Switch via the data graph. The CPU utilization rate and the memory utilization rate should fluctuate stably around a specific value. If the CPU utilization rate or the memory utilization rate increases markedly, please detect whether the network is being attacked; the screen in Figure 4-10-2 appears.

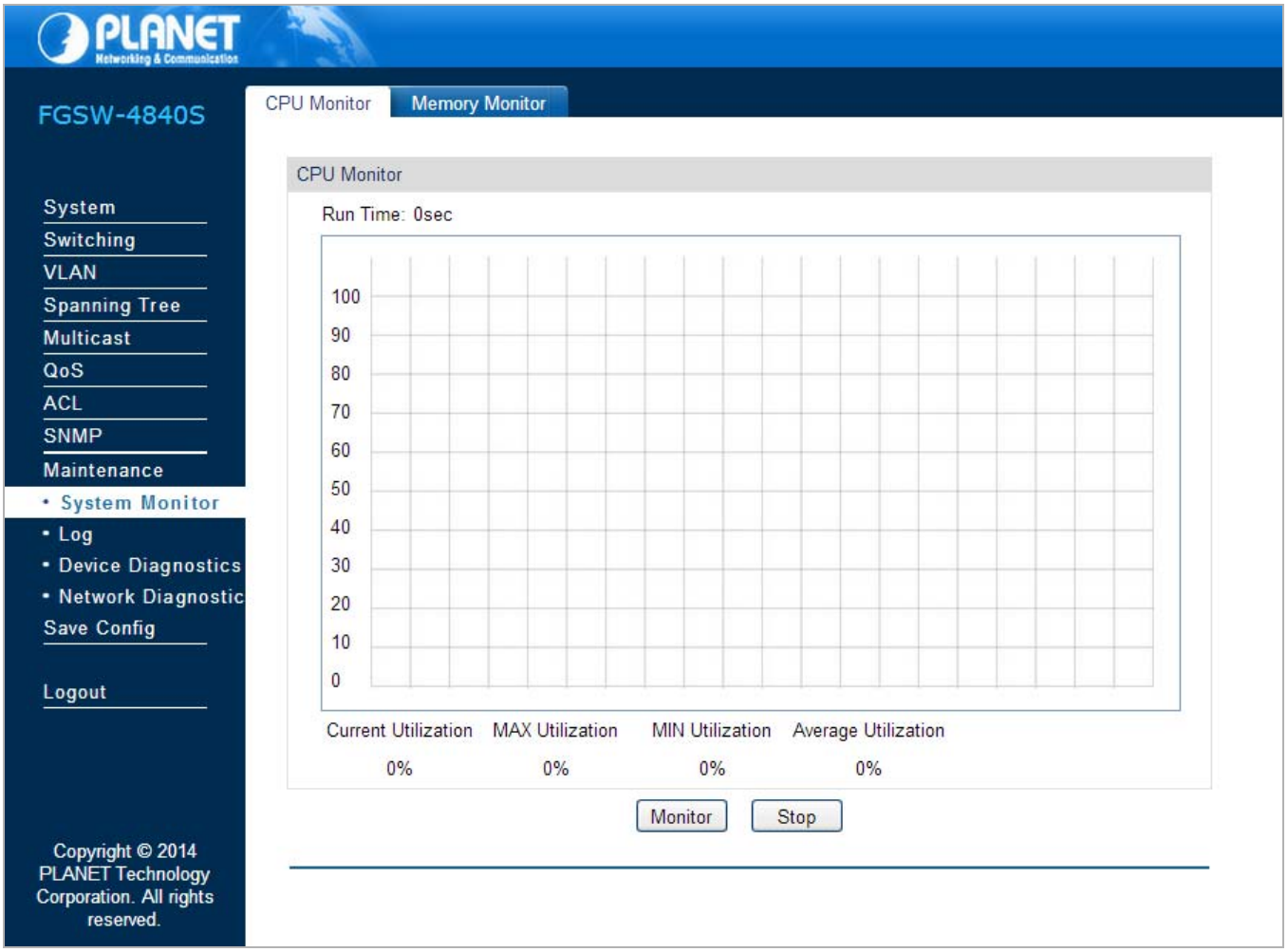


Figure 4-10-2: System Monitor Page Screenshot

The page includes the following fields:

Object	Description
• **CPU Monitor**	Provide CPU monitor function on this page.
• **Memory Monitor**	Provide memory monitor function on this page.

4.10.1.1 CPU Monitor

Click the **Monitor** button to enable the Managed Switch to monitor and display its CPU utilization rate every four seconds; the screen in Figure 4-10-3 appears.

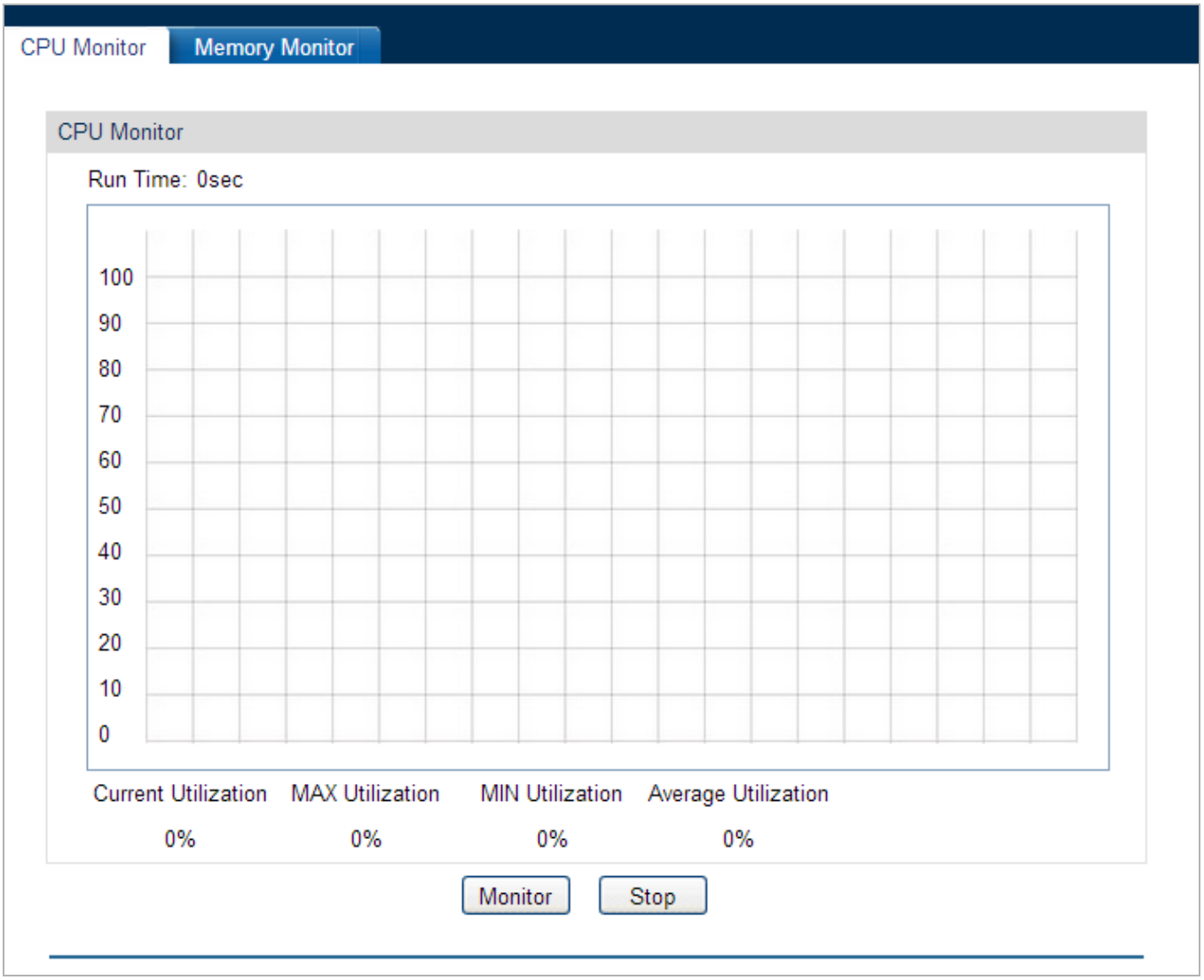


Figure 4-10-3: CPU Monitor Page Screenshot

Buttons

Monitor : Click to start CPU monitor function.

Stop : Click to stop CPU monitor function.

4.10.1.2 Memory Monitor

Click the **Monitor** button to enable the Managed Switch to monitor and display its memory utilization rate every four seconds; the screen in Figure 4-10-4 appears.

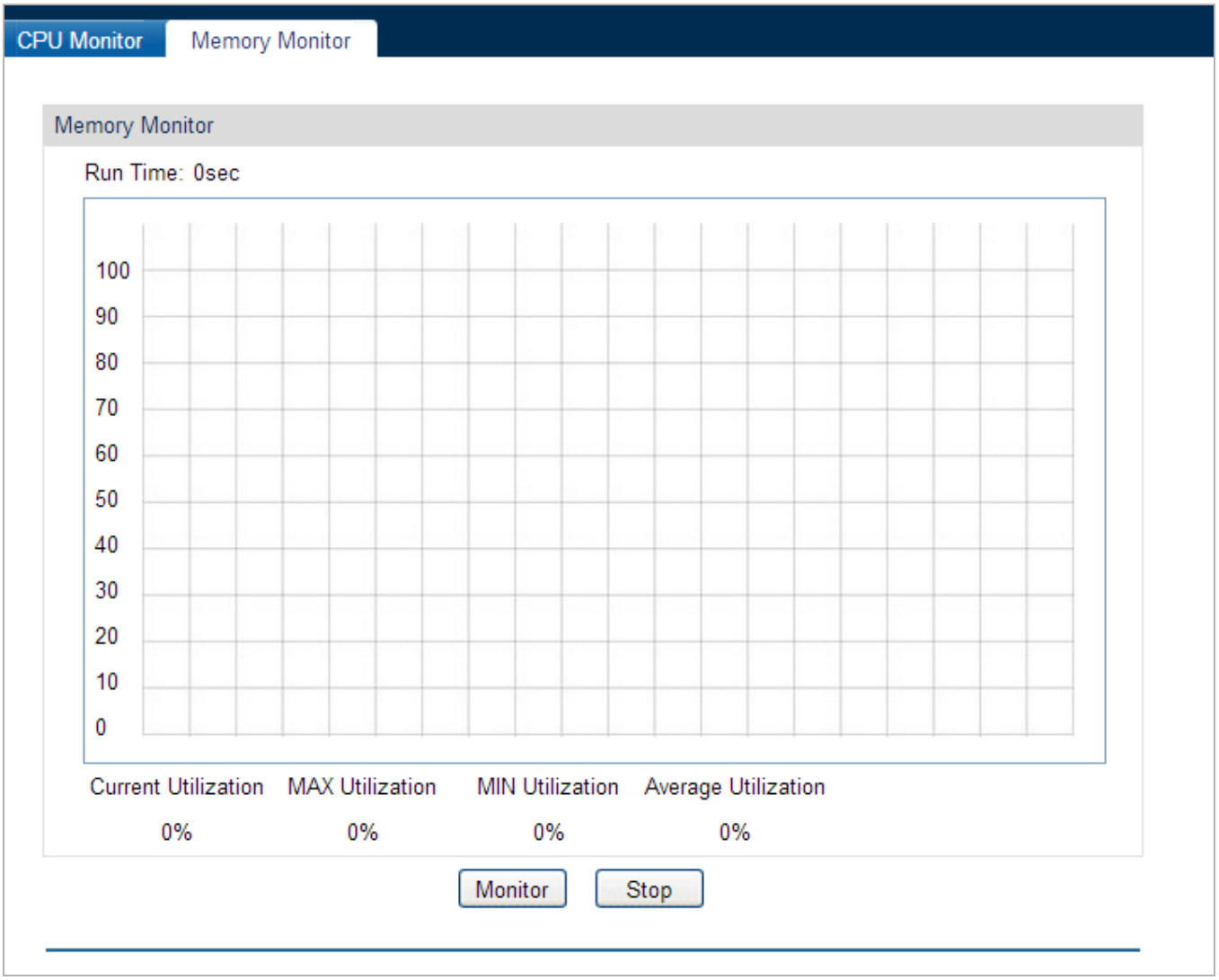


Figure 4-10-4: Memory Monitor Page Screenshot

Buttons

Monitor : Click to start Memory monitor function.

Stop : Click to stop Memory monitor function.

4.10.2 Log

The Log system of Managed Switch can record, classify and manage the system information effectively, providing powerful support for network administrator to monitor network operation and diagnose malfunction; the screen in Figure 4-10-5 appears.

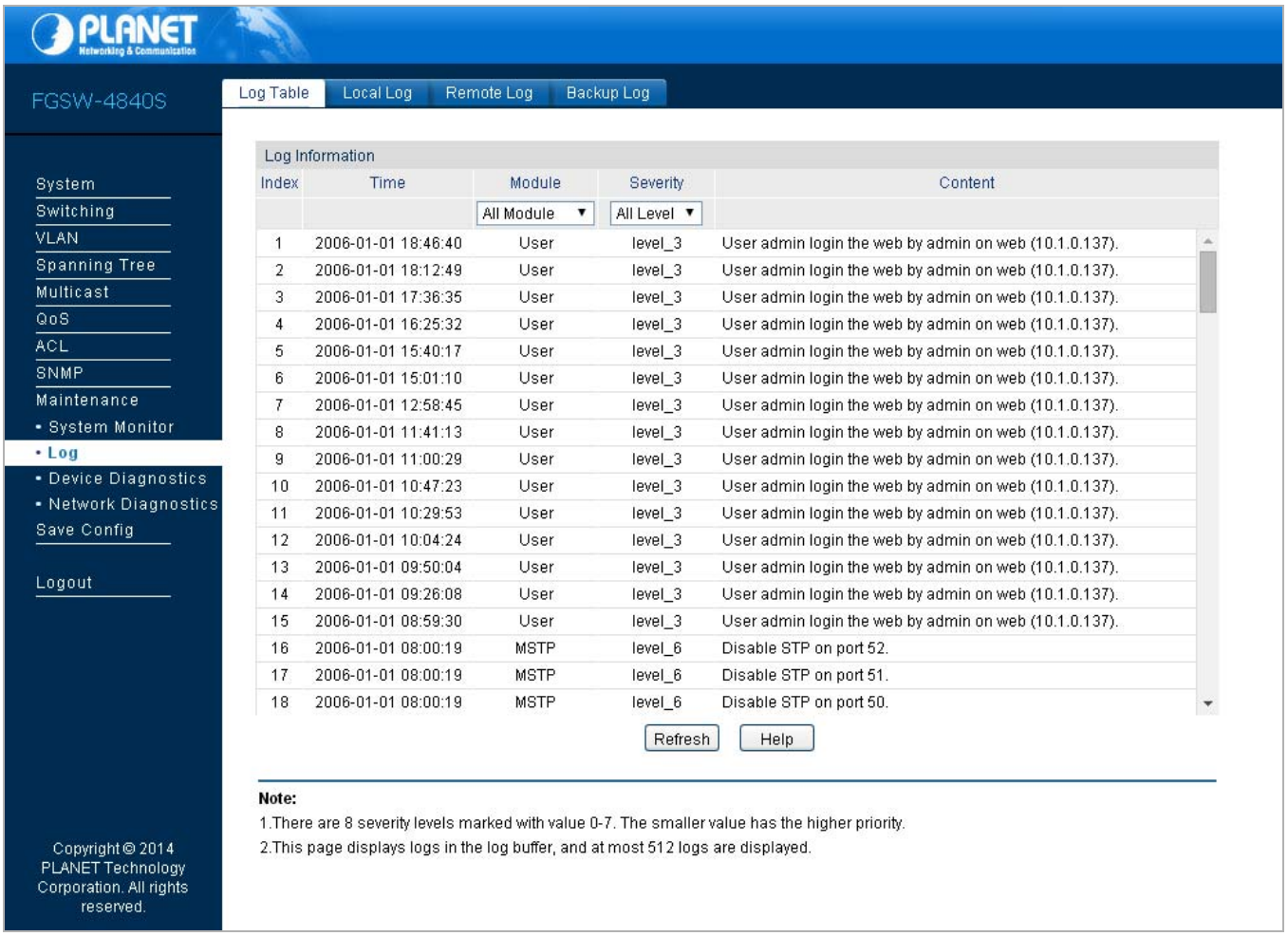


Figure 4-10-5: Log Page Screenshot

The page includes the following fields:

Object	Description
• **Log Table**	Provide log table function on this page.
• **Local Log**	Provide local log function on this page.
• **Remote Log**	Provide remote log function on this page.
• **Backup Log**	Provide backup log function on this page.

4.10.2.1 Log Table

The Managed Switch supports logs output to two directions, namely, log buffer and log file, the information in log buffer will be lost after the Managed Switch is rebooted or powered off, whereas the information in log file will be kept effective even the Managed Switch is rebooted or powered off. The Log Table displays the system log information in log buffer and the screen in Figure 4-10-6 appears.

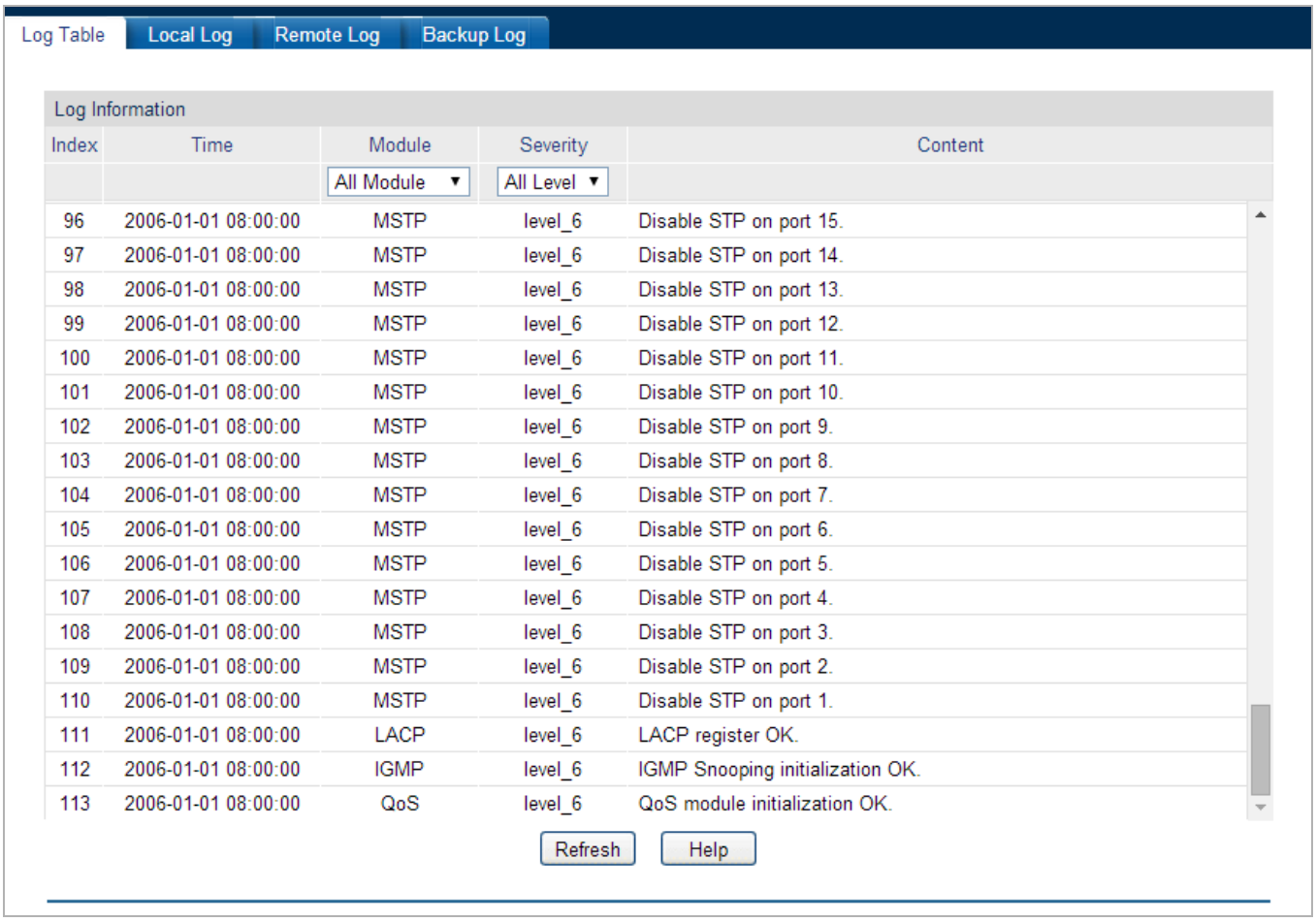


Figure 4-10-6: Log Table Page Screenshot

The page includes the following fields:

Object	Description
Log Information	
• **Index**	Displays the index of the log information.
• **Time**	Displays the time when the log event occurs. The log can get the correct time after configure on the **System ->System Info->System Time** Web management page.
• **Module**	Displays the module which the log information belongs to. To select a item from the drop-down list to display the corresponding log information.
• **Severity**	Displays the severity level of the log information. To select a severity level to display the log information whose severity level value is the same or smaller.
• **Content**	Displays the content of the log information.

- The logs are classified into eight levels based on severity. The higher the information severity is, the lower the corresponding level is.
- This page displays logs in the log buffer, and at most 511 logs are displayed.

Buttons

Refresh: Click to refresh current web page.

Help: Click to display help web page.

4.10.2.2 Local Log

The Local Log is the log information saved in Managed Switch. By default, all system logs are saved in log buffer and the logs with severities from level_0 to level_4 are saved in log file meanwhile; the screen in Figure 4-10-7 appears.

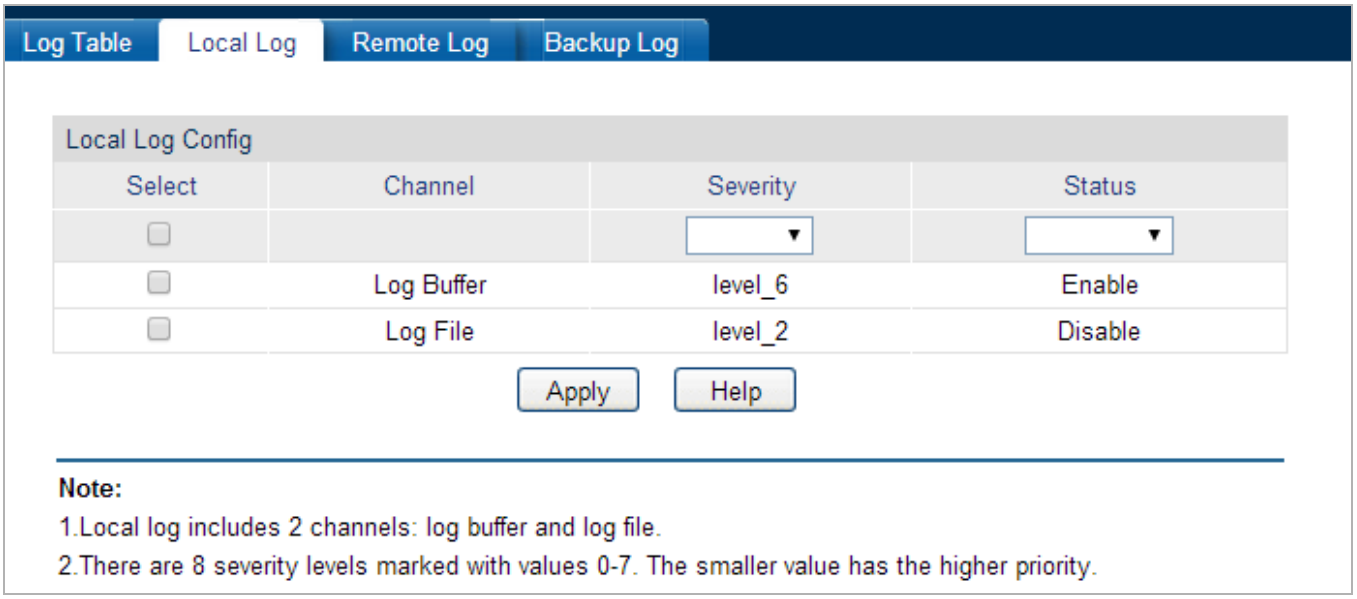


Figure 4-10-7: Local Log Page Screenshot

The page includes the following fields:

Object	Description
Local Log Config	
• **Select**	Select the desired entry to configure the corresponding local log.
• **Channel / Log Buffer**	Indicates the RAM for saving system log. The inforamtion in the log buffer is displayed on the Log Table page. It will be lost when the Managed Switch is restarted.
• **Channel / Log File**	Indicates the flash sector for saving system log. The inforamtion in the log file will not be lost after the Managed Switch is restarted and can be exported on the Backup Log page.
• **Severity**	Specify the severity level of the log information output to each channel. Only the log with the same or smaller severity level value will be output.
• **Status**	Enable/Disable the channel.

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.10.2.3 Remote Log

The Remote log feature enables the Managed Switch to send system logs to the Log Server. Log Server is to centralize the system logs from various devices for the administrator to monitor and manage the whole network; the screen in Figure 4-10-8 appears.

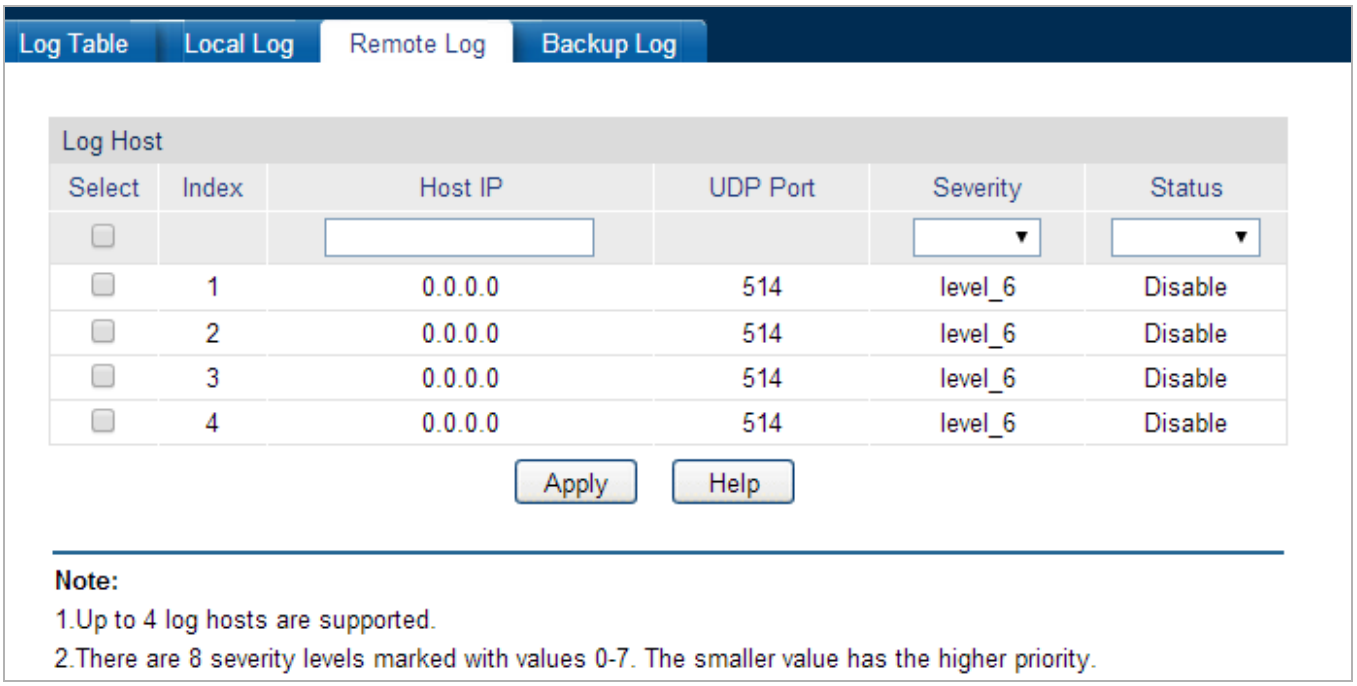


Figure 4-10-8: Remote Log Page Screenshot

The page includes the following fields:

Object	Description
Log Host	
• **Select**	Select the desired entry to configure the corresponding remote log.
• **Index**	Displays the index of the log host. The Managed Switch supports 4 log hosts.
• **Host IP**	Configure the IP for the log host.
• **UDP Port**	Displays the UDP port used for receiving/sending log information. Here we use the standard port 514.
• **Severity**	Specify the severity level of the log information sent to each log host. Only the log with the same or smaller severity level value will be sent to the corresponding log host.
• **Status**	Enable/Disable the log host.

Note: The Log Server software is not provided. If necessary, please download it on the Internet

Buttons

Apply: Click to apply changes.

Help: Click to display help web page.

4.10.2.4 Backup Log

The Backup Log feature enables the system logs saved in the Managed Switch to be output as a file for device diagnosis and statistics analysis, when a critical error results in the breakdown of the system, it can export the logs to get some related important information about the error for device diagnosis after the Managed Switch is restarted. The screen in Figure 4-10-9 appears.

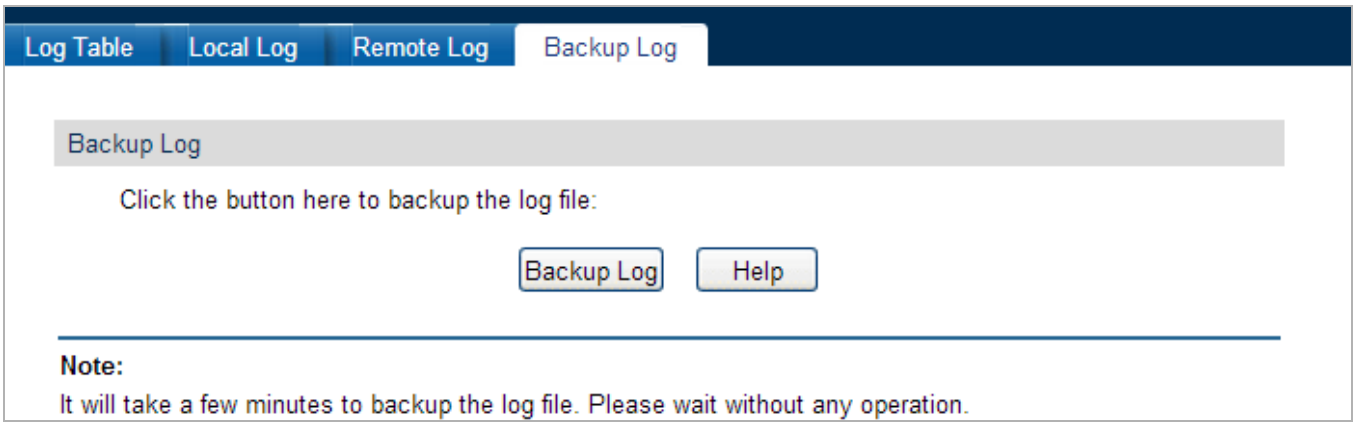


Figure 4-10-9: Backup Log Page Screenshot

The page includes the following fields:

Object	Description
Backup Log	
• **Backup Log**	Click the **Backup Log** button to save the log as a file to computer.

Note: It will take a few minutes to back up the log file. Please wait without any operation.

Buttons

Backup Log: Click to backup log files.

Help: Click to display help web page.

4.10.3 Device Diagnostics

This page provides Cable Test and Loopback functions for device diagnose and the screen in Figure 4-10-10 appears.

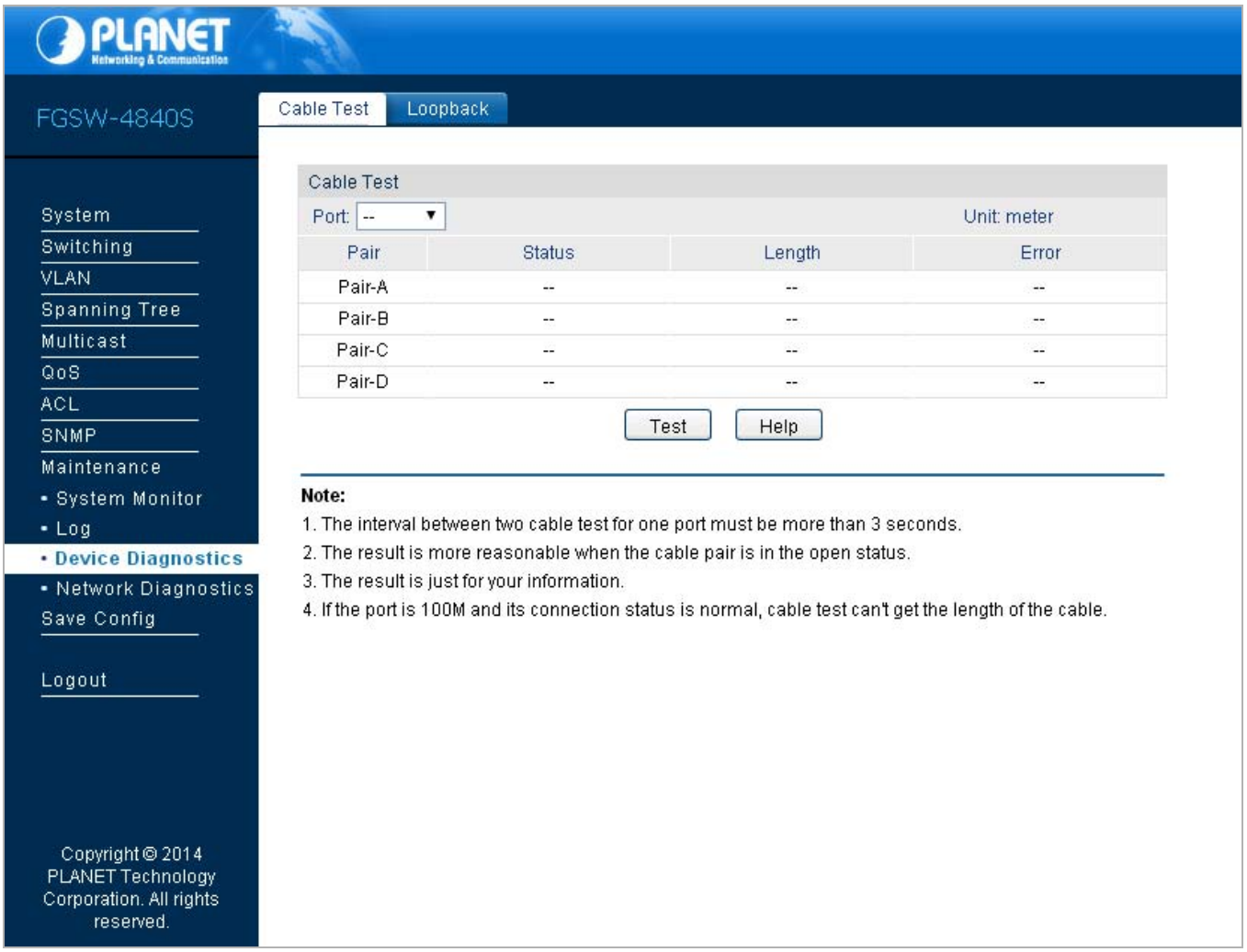


Figure 4-10-10: Device Diagnostics Page Screenshot

The page includes the following fields:

Object	Description
• **Cable Test**	Provide cable test function on this page.
• **Loopback**	Provide loopback function on this page.

4.10.3.1 Cable Test

The Managed Switch supports logs output to two directions, namely, log buffer and log file, the information in log buffer will be lost after the Managed Switch is rebooted or powered off, whereas the information in log file will be kept effective even the Managed Switch is rebooted or powered off. The Log Table displays the system log information in log buffer and the screen in Figure 4-10-11 appears.

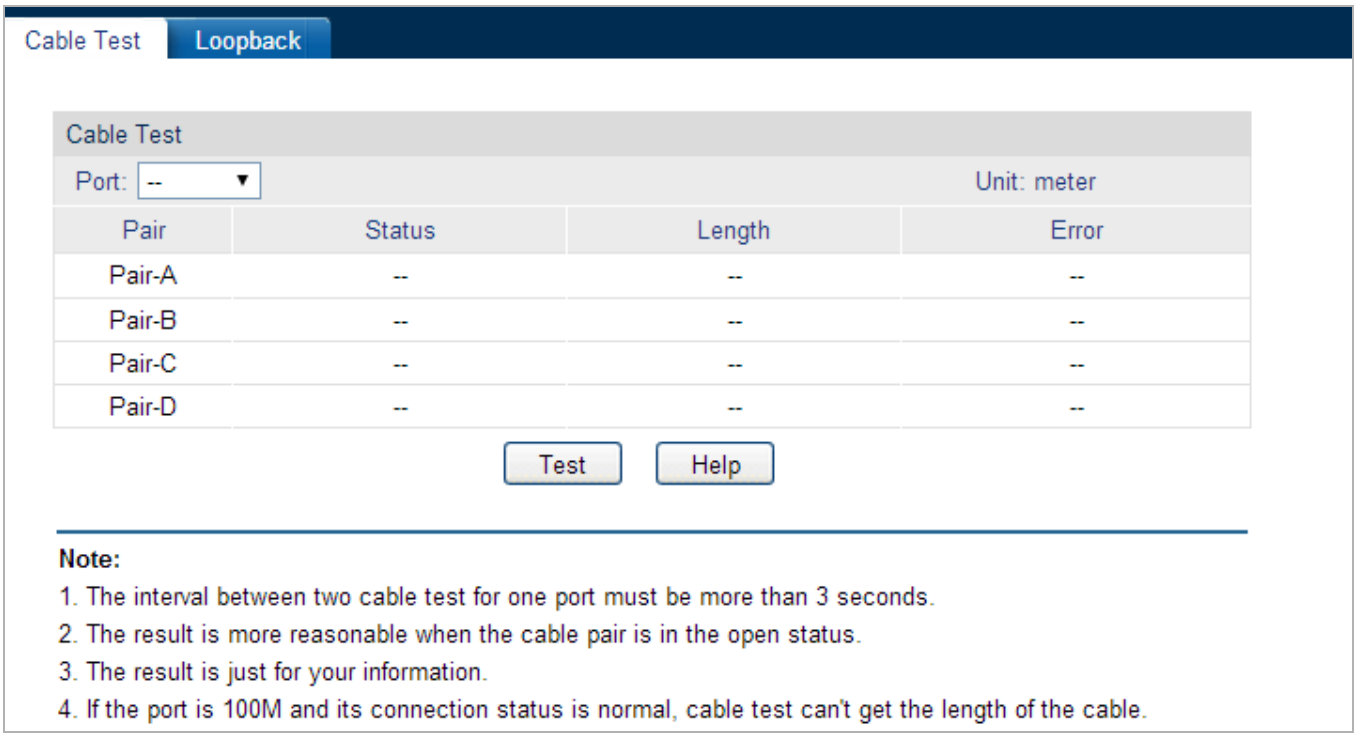


Figure 4-10-11: Cable Test Page Screenshot

The page includes the following fields:

Object	Description
Cable Test	
• **Port**	Select the port for cable testing.
• **Pair**	Displays the Pair number.
• **Status**	Displays the connection status of the cable connected to the port. The test results of the cable include normal, close, open or impedance.
• **Length**	If the connection status is normal, here displays the length range of the cable.
• **Error**	If the connection status is close, open or impedance, here displays the error length of the cable.

Buttons

Test: Click to start the cable test function.

Help: Click to display help web page.

Note

- The interval between two cable tests for one port must be more than 3 seconds.
- The result is more reasonable when the cable pair is in the open status.
- The test result is just for your reference.
- If the port is 100Mbps and its connection status is normal, cable test can't get the length of the cable.

4.10.3.2 Loopback

The Loopback test function, looping the sender and the receiver of the signal, is used to test whether the port of the Managed Switch is available as well as to check and analyze the physical connection status of the port to help to locate and solve network malfunctions. The screen in Figure 4-10-12 appears.

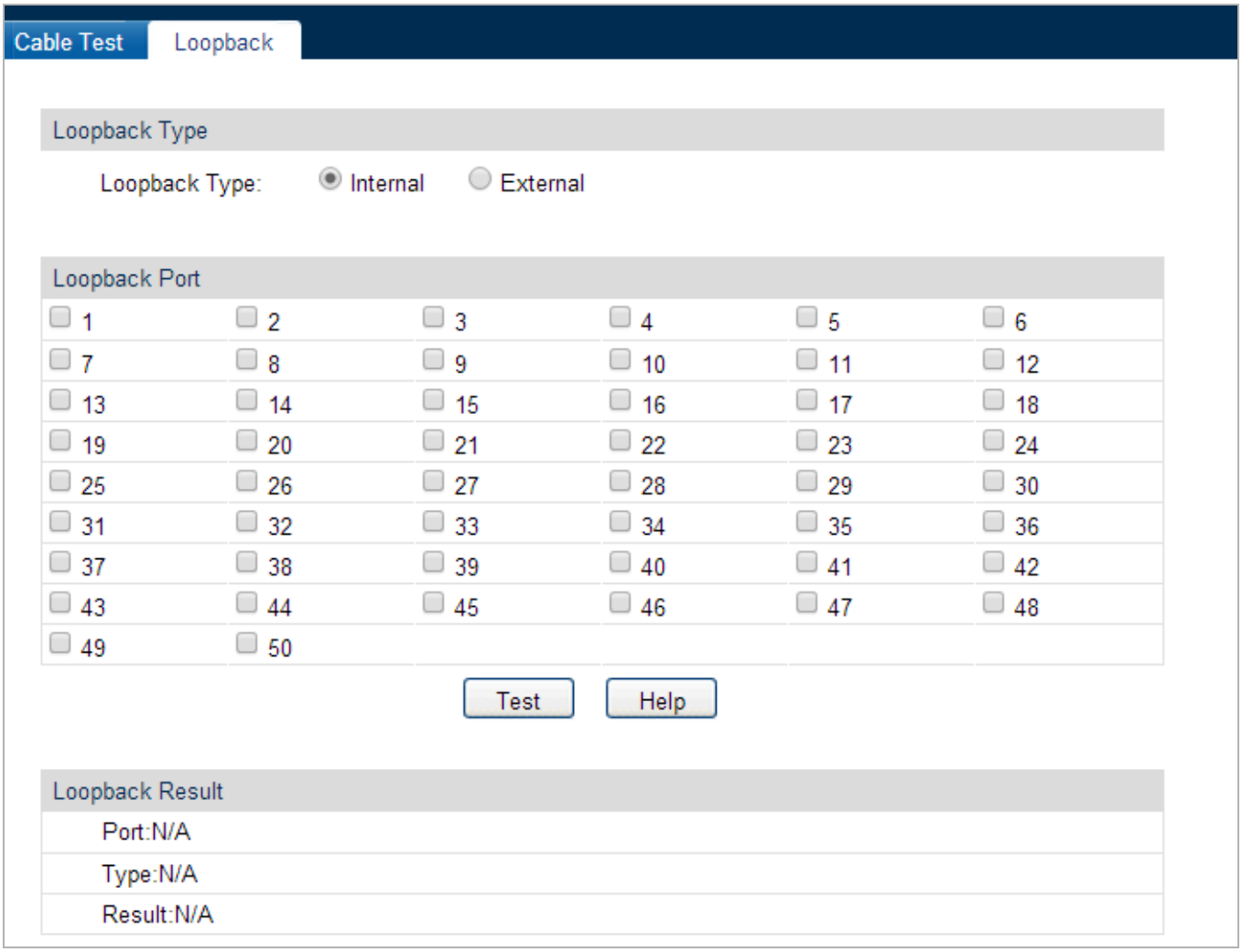


Figure 4-10-12: Loopback Test Page Screenshot

The page includes the following fields:

Object	Description
Loopback Type	

• **Loopback Type**	**Internal:** select Internal to test whether the port is available. **External:** select External to test whether the device connected to the port of the Managed Switch is available.
Loopback Port	
• **Loopback Port**	Select the desired port for loopback test.
Loopback Result	
• **Port: N/A**	Display the port information.
• **Type: N/A**	Display the loopback test type result.
• **Result: N/A**	Display the loopback test result.

Buttons

Test: Click to start the cable test function.

Help: Click to display help web page.

4.10.4 Network Diagnostics

This page provides Ping test and Tracert test functions for network diagnose and the screen in Figure 4-10-13 appears.

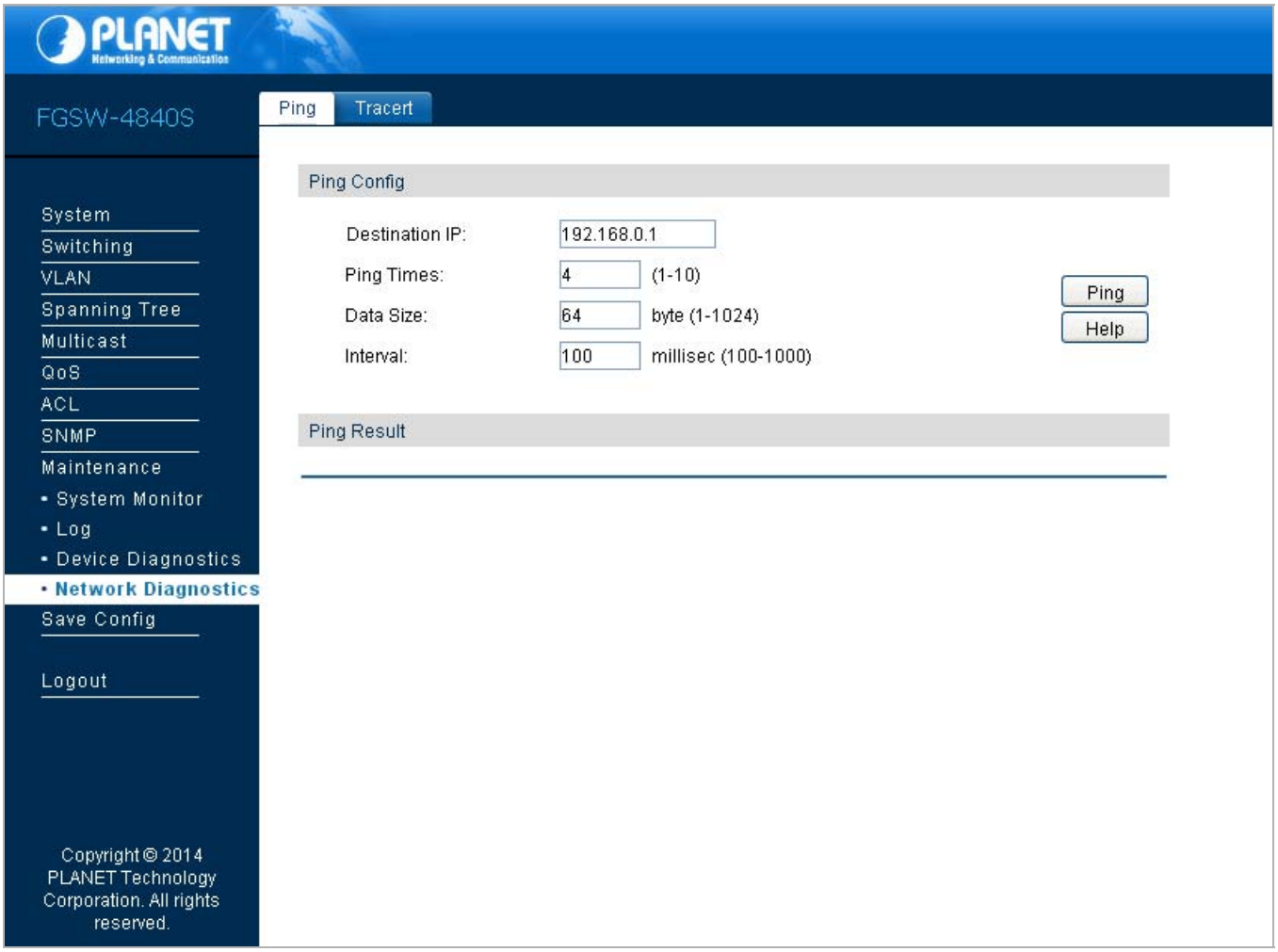


Figure 4-10-13: Network Diagnostics Page Screenshot

The page includes the following fields:

Object	Description
• **Ping Test**	Provide ping test function on this page.
• **Tracert**	Provide tracert function on this page.

4.10.4.1 Ping Test

The Ping test function, testing the connectivity between the Managed Switch and one node of the network, facilitates to test the network connectivity and reachability of the host so as to locate the network malfunctions. The screen in Figure 4-10-14 appears.

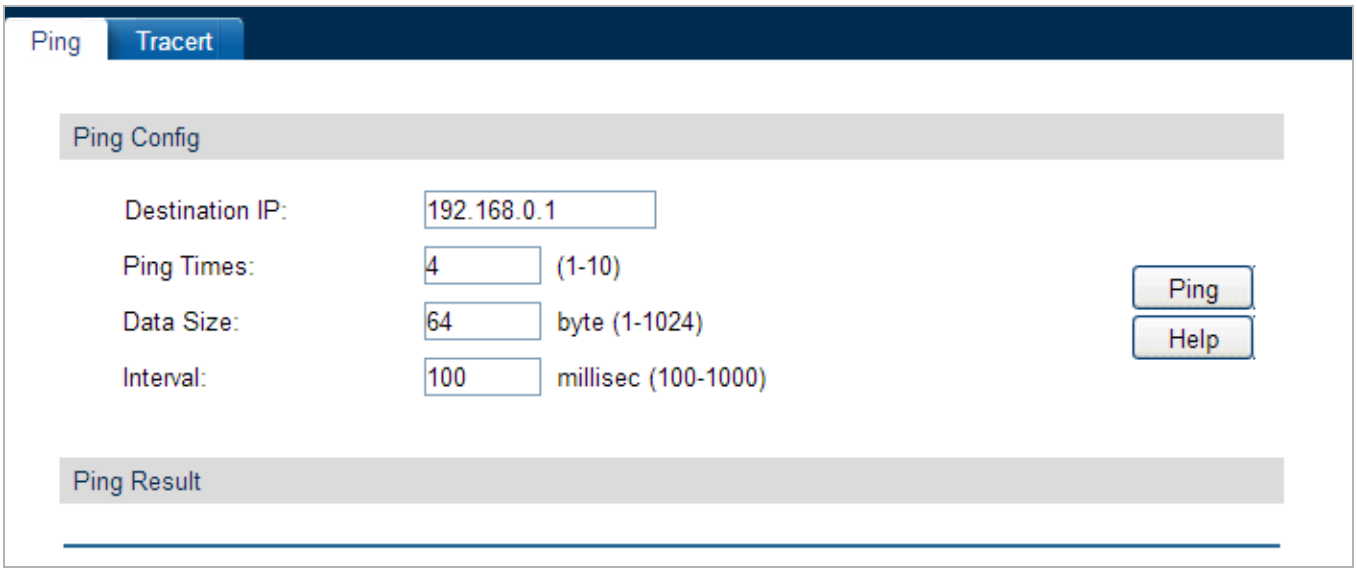


Figure 4-10-14: Ping Test Page Screenshot

The page includes the following fields:

Object	Description
Ping Config	
• **Destination IP**	Enter the IP address of the destination node for Ping test.
• **Ping Times**	Enter the amount of times to send test data during Ping testing. The default value is recommended.
• **Data Size**	Enter the size of the sending data during Ping testing. The default value is recommended.
• **Interval**	Specify the interval to send ICMP request packets. The default value is recommended.
Ping Result	
• **Ping Result**	Display the ping result.

Buttons

Ping : Click to start the ping function.

Help : Click to display help web page.

4.10.4.2 Tracert

The Tracert test function is used to test the connectivity of the gateways during its journey from the source to destination of the test data. When malfunctions occur to the network, it can locate trouble spot of the network with this tracert test. The screen in Figure 4-10-15 appears.

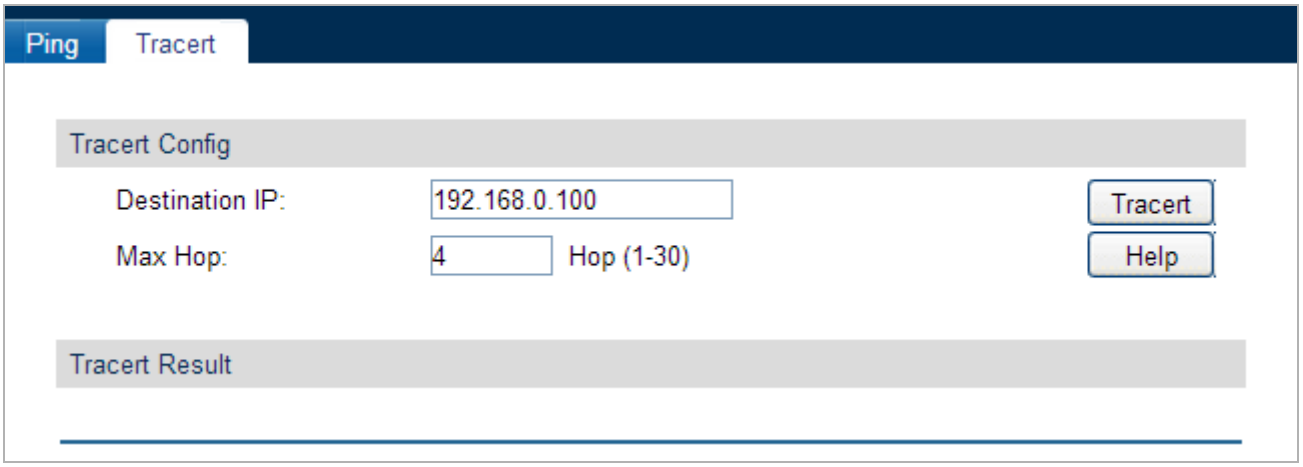


Figure 4-10-15: Tracert Page Screenshot

The page includes the following fields:

Object	Description
Tracert Config	
• **Destination IP**	Enter the IP address of the destination device.
• **Max Hop**	Specify the maximum number of the route hops the test data can pass through.
Tracert Result	
• **Tracert Result**	Display the tracert result.

Buttons

Tracert : Click to start the tracert function.

Help : Click to display help web page.

4.11 Save Config

This page provides configuration save function of the Managed Switch; the screens in Figure 4-11-1 & Figure 4-11-2 & Figure 4-11-3 appear.

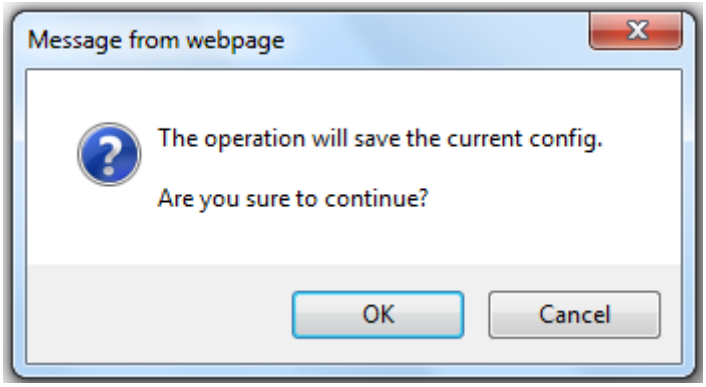


Figure 4-11-1: Save Config Page Screenshot

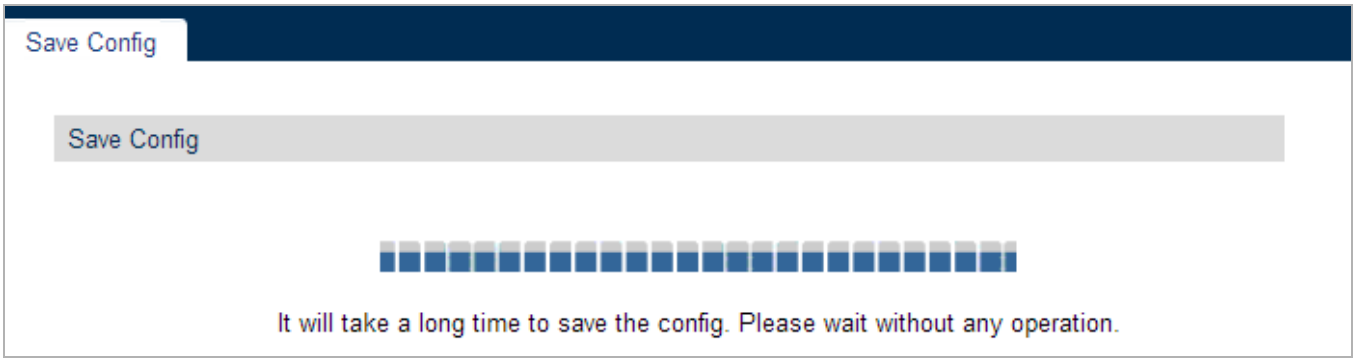


Figure 4-11-2: Save Config Page Screenshot

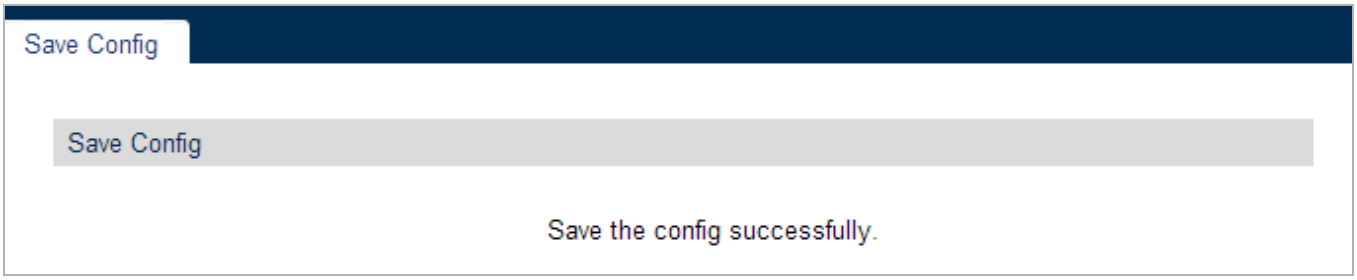


Figure 4-11-3: Save Config Successfully Page Screenshot

4.12 Logout

This page provides logout function of the Managed Switch; the screen in Figure 4-12-1 appears.

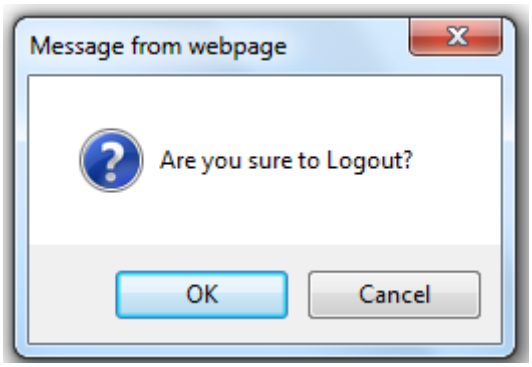


Figure 4-12-1: Logout Page Screenshot

5. COMMAND LINE INTERFACE

5.1 Accessing the CLI

When accessing the management interface for the Managed Switch via a Telnet connection, the Managed Switch can be managed by entering command keywords and parameters at the prompt. Using the Managed Switch's command-line interface (CLI) is very similar to entering commands on a UNIX system. This chapter describes how to use the Command Line Interface (CLI).

5.2 Telnet Login

The Managed Switch supports telnet for remote management, the Managed Switch asks for user name and password for remote login when using telnet; please use **"admin"** for username & password.

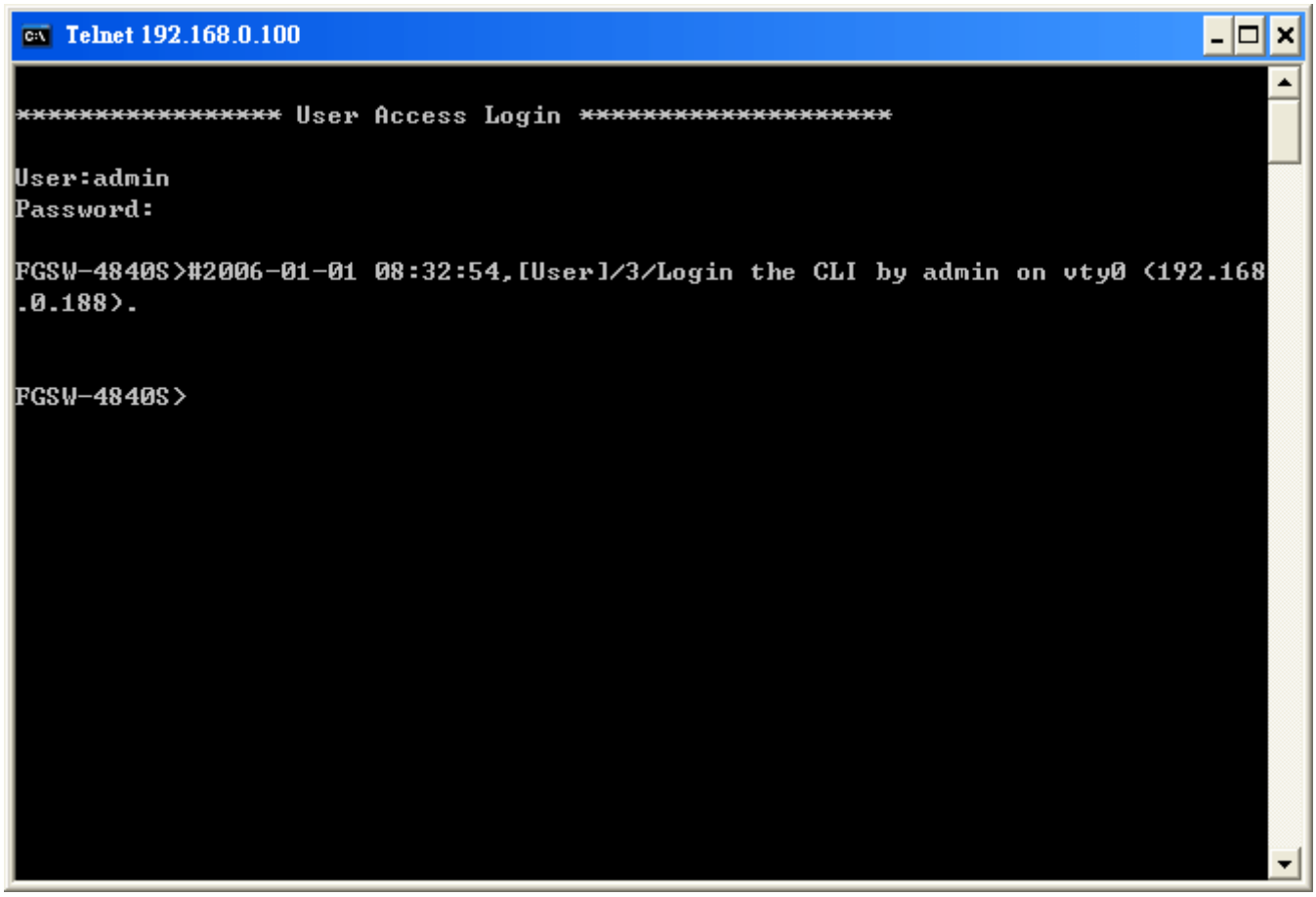
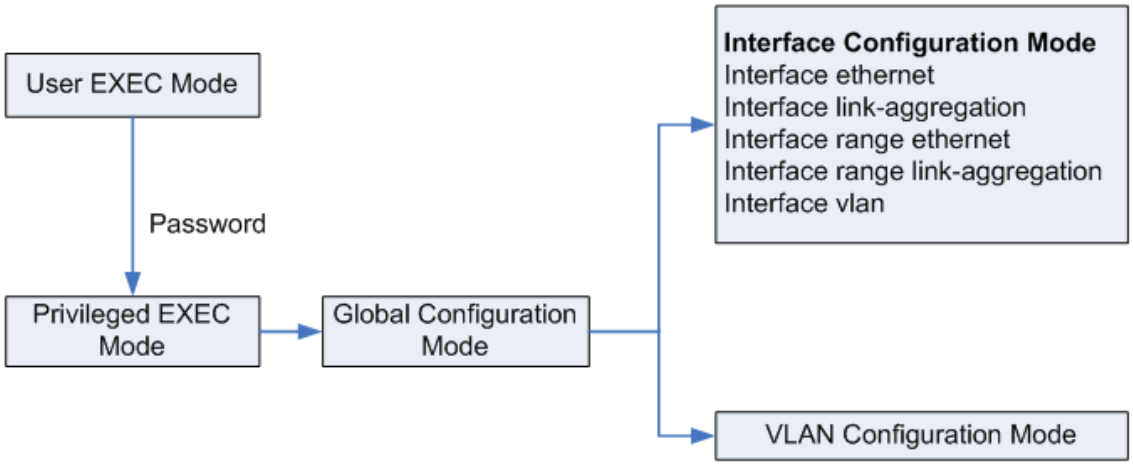


Figure 5-1: Telnet Login Screen

6. COMMAND LINE MODE

The CLI groups all the commands in appropriate modes according to the nature of the command. A sample of the CLI command modes are described below. Each of the command modes supports specific software commands.

The CLI is divided into different command modes: User EXEC Mode, Privileged EXEC Mode, Global Configuration Mode, Interface Configuration Mode and VLAN Database (VLAN Configuration Mode). Interface Configuration Mode can also be divided into Interface Ethernet, Interface link-aggregation and some other modes, which is shown as the following diagram.



The following table gives detailed information about the Accessing path, Prompt of each mode and how to exit the current mode and access the next mode.

Mode	Accessing Path	Prompt	Logout or Access the next mode
User EXEC Mode	Primary mode once it is connected with the Managed Switch.	**FGSW-4840S>**	Use the **exit** command to disconnect the Managed Switch. Use the **enable** command to access Privileged EXEC mode.
Privileged EXEC Mode	Use the **enable** command to enter this mode from User EXEC mode.	**FGSW-4840S#**	Use the **exit** command to disconnect the Managed Switch. Enter the **disable or the exit** command to return to User EXEC mode. Enter **configure** command to access Global Configuration mode.
Global Configuration Mode	Use the **configure** command to enter this mode from Privileged EXEC mode.	**FGSW-4840S (config)#**	Use the **exit** or the **end** command or press **Ctrl+Z** to return to Privileged EXEC mode. Use the **interface** *type number* command to access interface Configuration mode. Use the **vlan database** to access VLAN Configuration mode.

Interface Configuration Mode	Use the **interface** *type number* command to enter this mode from Global Configuration mode.	**FGSW-4840S (config-if)#**	Use the **end** command or press **Ctrl+Z** to return to Privileged EXEC mode. Enter **exit** command to return to Global Configuration mode. A port number must be specified in the **interface** command.
VLAN Configuration Mode	Use the **vlan database** command to enter this mode from Global Configuration mode.	**FGSW-4840S (config-vlan)#**	Use the **end** command or press **Ctrl+Z** to return to Privileged EXEC mode. Enter the **exit** command to return to Global configuration mode.

Table 6-1: CLI Command Modes

The user is automatically in User EXEC Mode after the connection between the PC and the Managed Switch is established by a telnet connection.

Each command mode has its own set of specific commands. To configure some commands, you should access the corresponding command mode firstly.

- **Global Configuration Mode**:
  In this mode, global commands are provided, such as the Spanning Tree, Schedule Mode and so on.
- **Interface Configuration Mode**:
  In this mode, users can configure one or several ports, different ports corresponds to different commands.

a). Interface Ethernet: Configure parameters for an Ethernet port, such as Duplex-mode, flow control status.

b). Interface range Ethernet: Configure parameters for several Ethernet ports.

c). Interface link-aggregation: Configure parameters for a link-aggregation, such as broadcast storm.

d). Interface range link-aggregation: Configure parameters for multi-trunks.

e). Interface vlan: Configure parameters for the vlan-port.

- **Vlan Configuration Mode**:
  In this mode, users can create a VLAN and add a specified port to the VLAN.

Some commands are global, that means they can be performed in all modes:

show: display all information of Managed Switch, for example: statistic information, port information, VLAN information.

history: Display the commands history.

The CLI provides the following modes:

User EXEC Mode

When the operator logs into the CLI, the User Mode is the initial mode. The User Mode contains a limited set of commands. The command prompt shown at this level is:

Command Prompt: FGSW-4840S >

Privileged EXEC Mode

To have access to the full suite of commands, the operator must enter the Privileged Mode. The Privileged Mode requires password authentication. From Privileged Mode, the operator can issue any Exec command to enter the Global Configuration mode. The command prompt shown at this level is:

Command Prompt: FGSW-4840S #

Global Configuration Mode

This mode permits the operator to make modifications to the running configuration. General setup commands are grouped in this mode. From the Global Configuration mode, the operator can enter the Interface Configuration mode. The command prompt at this level is:

Command Prompt: FGSW-4840S (Config)#

From the Global Config mode, the operator may enter the following configuration modes:

6.1 User EXEC Mode Commands

6.1.1 broadcast command

Description:

Write message to all users logged in

Syntax:

broadcast WORD - Message to broadcast

6.1.2 enable command

Description:

Enter privileged EXEC mode

Syntax:

enable

6.1.3 logout command

Description:

Logout the system

Syntax:

logout

6.1.4 loopback Command

Description:

The loopback interface command is used to test whether the port is available or not

Syntax:

loopback interface { fastEthernet port | gigabitEthernet port } { internal | external }

6.1.5 ping command

Description:

The ping command is used to test the connectivity between the Managed Switch and one node of the network

Syntax:

ping A.B.C.D - Destination IP address

6.1.6 tracert command

Description:

The tracert command is used to test the connectivity of the gateways during its journey from the source to destination of the test data

Syntax:

tracert {ip-addr} [maxHops]

6.1.7 exit command

Description:

The exit command is used to return to the previous Mode from the current Mode

Syntax:

exit

6.1.8 history command

Description:

The history command is used to show the latest 20 commands that entered in the current mode since the Managed Switch is powered. Also clear all the commands that entered

Syntax:

history / history clear

6.2 Privileged Mode Commands

6.2.1 broadcast command

Description:

Write message to all users logged in

Syntax:

broadcast WORD - Message to broadcast

6.2.2 configure command

Description:

The configure command is used to access Global Configuration Mode from Privileged EXEC Mode

Syntax:

configure

6.2.3 copy command

Description:

Copy from one file to another

Syntax:

copy running-config startup-config

copy startup-config tftp ip-address ip-addr filename name

copy tftp startup-config ip-address ip-addr filename name

6.2.4 disable command

Description:

The disable command is used to return to User EXEC Mode from Privileged EXEC Mode

Syntax:

disable

6.2.5 firmware command

Description:

The firmware command is used to upgrade the Managed Switch system file via the TFTP server

Syntax:

firmware upgrade ip-address ip-addr filename name

6.2.6 logout command

Description:

Logout the system

Syntax:

logout

6.2.7 loopback Command

Description:

The loopback interface command is used to test whether the port is available or not

Syntax:

loopback interface { fastEthernet port | gigabitEthernet port } { internal | external }

6.2.8 ping command

Description:

The ping command is used to test the connectivity between the Managed Switch and one node of the network

Syntax:

ping A.B.C.D - Destination IP address

6.2.9 reboot command

Description:

The command is used to reboot the Managed Switch. To avoid damage, please don't turn off the device while rebooting

Syntax:

reboot

6.2.10 reset command

Description:

The reset command is used to reset the Managed Switch's software. After resetting, all configuration of the Managed Switch will restore to the factory defaults and your current settings will be lost

Syntax:

reset

6.2.11 tracert command

Description:

The tracert command is used to test the connectivity of the gateways during its journey from the source to destination of the test data

Syntax:

tracert {ip-addr} [maxHops]

6.2.12 Clear command

Description:

Clear statistic

Syntax:

clear counters

clear IP

clear logging [buffer | flash]

6.2.13 exit command

Description:

The exit command is used to return to the previous Mode from the current Mode

Syntax:

exit

6.2.14 history command

Description:

The history command is used to show the latest 20 commands that entered in the current mode since the Managed Switch is powered. Also clear all the commands that entered

Syntax:

history / history clear

6.2.15 show command

Description:

Display system information

Syntax:

show access-list	- Display ACL information
show bandwidth	- Display bandwidth rate configuration
show cable-diagnostics	- Display Cable diagnostics results
show etherchannel	- Display EtherChannel information
show interface	- Display interface status and configuration
show ip	- Display IP information
show lacp	- Display Port channel information
show logging	- Display Log information
show loopback-detection	- Display Loopback detection information
show mac	- Display MAC information
show monitor	- Display Monitor information
show port	- Display Ethernet port configuration
show process	- Display Cpu statistic
show qos	- Display QoS information
show rmon	- Display SNMP RMON information
show running-config	- Display current operating configuration
show snmp-server	- Display SNMP information
show spanning-tree	- Display Spanning Tree information
show storm-control	- Display storm control configuration
show system-info	- Display System information
show system-time	- Display current system time
show user	- Display User account information
show vlan	- Display VLAN information
show voice	- Display Voice VLAN configuration

6.3 Global Config Mode Commands

6.3.1 access-list Command

Description:

Add an access list entry

Syntax:

access-list create access-list-num

access-list extended acl-id rule rule-id { deny | permit } [[sip source-ip] smask source-ip-mask] [[dip destination-ip] dmask destination-ip-mask] [s-port s-port] [d-port d-port] [protocol protocol]

no access-list extended acl-id rule rule-id

access-list policy action policy-name acl-id

no access-list policy action policy-name acl-id

access-list policy name name

no access-list policy name name

access-list standard acl-id rule rule-id { *deny* | *permit* } [[sip source-ip] smask source-ip-mask] [[dip destination-ip] dmask destination-ip-mask]

no access-list standard acl-id rule rule-id

6.3.2 Contact-info Command

Description:

The contact-info command is used to configure the system contact information. To clear the system contact information, please use no contact-info command

Syntax:

contact-info contact_info

no contact-info

6.3.3 enable Command

Description:

Configure enable password

Syntax:

enable password - Assign the privileged level password

6.3.4 hostname Command

Description:

The hostname command is used to configure the system name. To clear the system name information, please use no hostname command

Syntax:

hostname hostname

no hostname

6.3.5 interface Command

Description:

Enter interface configuration mode

Syntax:

interface fastEthernet (1/0/1-1/0/48) - FastEthernet interface number

interface gigabitEthernet (1/0/49-1/0/52) - GigabitEthernet interface number

interface range fastEthernet (1/0/1-48) - FastEthernet interface number list

interface range gigabitEthernet (1/0/49-52) - GigabitEthernet interface number list

interface vlan<1-4094> - VLAN interface number

6.3.6 ip Command

Description:

IP address commands

Syntax:

ip dhcp filtering

no ip dhcp filtering

ip http secure-server

no ip http secure-server

ip http secure-server download certificate ssl-cert ip-address ip-addr

ip http secure-server download key ssl-key ip-address ip-addr

ip igmp snooping

no ip igmp snooping

ip management-vlan vlan-id

ip ssh download { v1 | v2 } key-file ip-address ip-addr

ip ssh max-client num

no ip ssh max-client

ip ssh server

no ip ssh server

ip ssh timeout value

no ip ssh timeout

ip ssh version { v1 | v2 }

no ip ssh version { v1 | v2 }

6.3.7 lacp Command

Description:

LACP configuration

Syntax:

lacp system-priority pri

no lacp system-priority

6.3.8 location Command

Description:

The location command is used to configure the system location. To clear the system location information, please use no location command

Syntax:

location location

no location

6.3.9 logging Command

Description:

Modify message logging facilities

Syntax:

logging buffer level

no logging buffer

logging file flash level

no logging file flash

logging host index idx host-ip level

no logging host index idx

6.3.10 loopback-detection Command

Description:

The loopback-detection command is used to enable the loopback detection function globally. To disable it, please use no loopback detection command

Syntax:

loopback-detection

no loopback-detection

loopback-detection interval interval-time

loopback-detection recovery-time recovery-time

6.3.11 mac Command

Description:

Global MAC configuration subcommands

Syntax:

mac access-list access-list-num

no mac access-list access-list-num

mac address-table aging-time aging-time

no mac address-table aging-time

mac address-table filtering mac mac-addr vid vid

no mac address-table filtering {[mac mac-addr] [vid vid]}

mac address-table static mac mac-addr vid vid interface { fastEthernet port | gigabitEthernet port }

no mac address-table static { mac mac-addr | vid vid | mac mac-addr vid vid | interface { fastEthernet port | gigabitEthernet port } }

6.3.12 monitor Command

Description:

Monitoring different system events

Syntax:

monitor session session_num destination interface { fastEthernet port | gigabitEthernet port }

no monitor session session_num

monitor session session_num source interface { fastEthernet port-list | gigabitEthernet port-list } mode

no monitor session session_num source interface { fastEthernet port-list | gigabitEthernet port-list } mode

6.3.13 port-channel Command

Description:

EtherChannel configuration

Syntax:

port-channel load-balance { src-dst-mac | src-dst-ip }

no port-channel load-balance

6.3.14 qos Command

Description:

Configure quality of service (QoS) on the device

Syntax:

qos cos

no qos cos

qos dscp

no qos dscp

qos queue cos-map { tag/cos-id } { tc-id }

no qos queue cos-map

qos queue dscp-map { dscp-list } { tc-id }

no qos queue dscp-map

qos queue mode { sp | wrr | sp+wrr | equ }

no qos queue mode

6.3.15 rmon Command

Description:

SNMP RMON configuration

Syntax:

rmon alarm index interface { fastEthernet port | gigabitEthernet port } [alarm-variable { drop | revbyte | revpkt | bpkt | mpkt | crc-lign | undersize | oversize | fragment | jabber | collision | 64 | 65-127 | 128-511 | 512-1023 | 1024-10240 }] [s-type { absolute | delta}] [rising-threshold r-hold] [rising-event-index r-event] [falling-threshold f-hold] [falling-event-index f-event] [a-type { rise | fall | all }] [owner owner-name] [interval interval]

no rmon alarm index

rmon event index [user user-name] [description descript] [type { none | log | notify | log-notify }] [owner owner-name]

no rmon event index

rmon history index interface { fastEthernet port | gigabitEthernet port } [interval seconds] [owner owner-name]

no rmon history index

6.3.16 snmp-server Command

Description:

SNMP server configuration commands

Syntax:

snmp-server

no snmp-server

snmp-server community name { read-only | read-write } mib-view

no snmp-server community name

snmp-server engineID { [local local-engineID] [remote remote-engineID] }

no snmp-server engineID

snmp-server group name [smode { v1 | v2c | v3 }] [slev { noAuthNoPriv | authNoPriv | authPriv }] [read read-view] [write write-view] [notify notify-view]

no snmp-server group name smode { v1 | v2c | v3 } slev { noAuthNoPriv | authNoPriv | authPriv }

snmp-server host ip udp-port user-name [smode { v1 | v2c | v3 }] [slev { noAuthNoPriv | authNoPriv | authPriv }] [type { trap | inform }] [retries retries] [timeout timeout]

no snmp-server host ip user-name

snmp-server traps { bandwidth-control | cpu | flash | ipaddr-change |loopback-detection | storm-control | spanning-tree }

no snmp-server traps { bandwidth-control | cpu | flash | ipaddr-change |loopback-detection | storm-control | spanning-tree }

snmp-server user name { local | remote } group-name [smode { v1 | v2c | v3 }] [slev { noAuthNoPriv | authNoPriv | authPriv }] [cmode { none | MD5 | SHA }] [cpwd confirm-pwd] [emode { none | DES }] [epwd encrypt-pwd]

no snmp-server user name

snmp-server view name mib-oid { include | exclude }

no snmp-server view name mib-oid

6.3.17 spanning tree Command

Description:

Configure spanning tree subsystem

Syntax:

spanning-tree

no spanning-tree

spanning-tree hold-count value

no spanning-tree hold-count

spanning-tree max-hops value

no spanning-tree max-hops

spanning-tree mode { stp | rstp | mstp }

no spanning-tree mode

spanning-tree mst configuration

no spanning-tree mst configuration

spanning-tree mst instance instance-id priority pri

no spanning-tree mst instance instance-id priority

spanning-tree mst instance instance-id {[port-priority pri] | [cost cost]}

no spanning-tree mst instance instance-id

spanning-tree priority pri

no spanning-tree priority

spanning-tree tc-defend threshold threshold period period

no spanning-tree tc-defend

spanning-tree timer {[forward-time forward-time] [hello-time hello-time] [max-age max-age]}

no spanning-tree timer

6.3.18 system-time Command

Description:

System-time configuration

Syntax:

system-time dst date {smonth} {sday} {stime} {emonth} {eday} {etime} [offset]

no system-time dst

system-time dst predefined {USA | Australia | Europe| New-Zealand}

no system-time dst

system-time dst recurring {sweek} {sday} {smonth} {stime} {eweek} {eday} {emonth} {etime} [offset]

no system-time dst

system-time manual time (Set the date and time manually, MM/DD/YYYY-HH:MM:SS)

system-time ntp { timezone } { ntp-server } { backup-ntp-server } { fetching-rate }

6.3.19 user Command

Description:

Add a new user or modify an exist user

Syntax:

user name user-name password password [type { guest | admin }] [status { disable | enable}] [secret {simple | cipher}]

no user name user-name

user access-control ip-based ip-addr ip-mask

no user access-control

user access-control mac-based mac-addr

no user access-control

user access-control port-based interface { fastEthernet port | gigabitEthernet port | range fastEthernet port-list | range gigabitEthernet port-list }

no user access-control

user idle-timeout minutes (The timeout time, ranging from 5 to 30 in minutes. By default, the value is 10).

no user idle-timeout

user max-number admin-num guest-num

no user max-number

6.3.20 vlan Command

Description:

VLAN commands

Syntax:

vlan vlan-list
no vlan vlan-list
name descript
no name

clear counters

clear ip igmp snooping statistics

clear logging [buffer | flash]

end

exit

history

show

6.3.21 voice Command

Description:

Configure voice VLAN

Syntax:

voice vlan vlan-id

no voice vlan

voice vlan aging time time (It ranges from 1 to 43200 and the default value is 1440)

no voice vlan aging time

voice vlan mac-address mac-addr mask mask [description descript]

no voice vlan mac-address mac-addr

voice vlan priority pri (priority ranging from 0 to 7, and the default value is 6_

no voice vlan priority

6.3.22 clear Command

Description:

Clear statistic

Syntax:

clear counters

clear ip igmp snooping statistics

clear logging [buffer | flash]

6.3.23 end Command

Description:

Return to privileged EXEC mode

Syntax:

end

6.3.24 exit Command

Description:

Exit current mode

Syntax:

exit

6.3.25 history Command

Description:

Display the latest 20 commands entered in the current mode

Syntax:

hstory

6.3.26 show Command

Description:

Display system information

Syntax:

show access-list	- Display ACL information
show bandwidth	- Display bandwidth rate configuration
show cable-diagnostics	- Display Cable diagnostics results
show etherchannel	- Display EtherChannel information
show interface	- Display interface status and configuration
show ip	- Display IP information
show lacp	- Display Port channel information
show logging	- Display Log information
show loopback-detection	- Display Loopback detection information
show mac	- Display MAC information
show monitor	- Display Monitor information
show port	- Display Ethernet port configuration
show process	- Display Cpu statistic
show qos	- Display QoS information
show rmon	- Display SNMP RMON information
show running-config	- Display current operating configuration
show snmp-server	- Display SNMP information
show spanning-tree	- Display Spanning Tree information
show storm-control	- Display storm control configuration
show system-info	- Display System information
show system-time	- Display current system time
show user	- Display User account information
show vlan	- Display VLAN information
show voice	- Display Voice VLAN configuration

7. SWITCH OPERATION

7.1 Address Table

The Managed Switch is implemented with an address table. This address table is composed of many entries. Each entry is used to store the address information of some node in network, including MAC address, port no, etc. This information comes from the learning process of Ethernet Switch.

7.2 Learning

When one packet comes in from any port, the Managed Switch will record the source address, port no. and the other related information in address table. This information will be used to decide either forwarding or filtering for future packets.

7.3 Forwarding & Filtering

When one packet comes from some port of the Ethernet Switching, it will also check the destination address besides the source address learning. The Ethernet Switching will look up the address table for the destination address. If not found, this packet will be forwarded to all the other ports except the port, which this packet comes in. And these ports will transmit this packet to the network it connected. If found, and the destination address is located at a different port from this packet that comes in, the Ethernet Switching will forward this packet to the port where this destination address is located according to the information from address table. But, if the destination address is located at the same port with this packet coming in, then this packet will be filtered, thereby increasing the network throughput and availability

7.4 Store-and-Forward

Store-and-Forward is one type of packet-forwarding techniques. A Store-and-Forward Ethernet Switching stores the incoming frame in an internal buffer, do the complete error checking before transmission. Therefore, no error packets occurrence, it is the best choice when a network needs efficiency and stability.

The Ethernet Switch scans the destination address from the packet-header, searches the routing table pro-vided for the incoming port and forwards the packet, only if required. The fast forwarding makes the switch attractive for connecting servers directly to the network, thereby increasing throughput and availability. How-ever, the switch is most commonly used to segment existence hubs, which nearly always improves overall performance. An Ethernet Switching can be easily configured in any Ethernet network environment to signifi-cantly boost bandwidth using conventional cabling and adapters.

Due to the learning function of the Ethernet switching, the source address and corresponding port number of each incoming and outgoing packet are stored in a routing table. This information is subsequently used to filter packets whose destination address is on the same segment as the source address. This confines network traffic to its respective domain and reduce the overall load on the network.

The Managed Switch performs **"Store and forward"** therefore, no error packets occur. More reliably, it reduces the re-transmission rate. No packet loss will occur.

7.5 Auto-Negotiation

The STP ports on the Managed Switch have built-in **"Auto-negotiation"**. This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detect the modes and speeds at the second of both device is connected and capable of, both 10Base-T and 100Base-TX devices can connect with the port in either Half- or Full-Duplex mode. 1000Base-T can be only connected in Full-duplex mode.

8. TROUBLESHOOTING

This chapter contains information to help you solve your issue. If the Managed Switch is not functioning properly, make sure the Managed Switch is set up according to instructions in this manual.

■ **The Link LED is not lit**

Solution:

Check the cable connection and remove duplex mode of the Managed Switch.

■ **Some stations cannot talk to other stations located on the other port**

Solution:

Please check the VLAN settings, trunk settings, or port enabled / disabled status.

■ **Performance is bad**

Solution:

Check the full duplex status of the Managed Switch. If the Managed Switch is set to full duplex and the partner is set to half duplex, then the performance will be poor. Please also check the in/out rate of the port.

■ **Why the Managed Switch doesn't connect to the network**

Solution:

1. Check the LNK/ACT LED on the Managed Switch.
2. Try another port on the Managed Switch.
3. Make sure the cable is installed properly.
4. Make sure the cable is the right type.
5. Turn off the power. After a while, turn on power again.

■ **100Base-TX port link LED is lit, but the traffic is irregular**

Solution:

Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

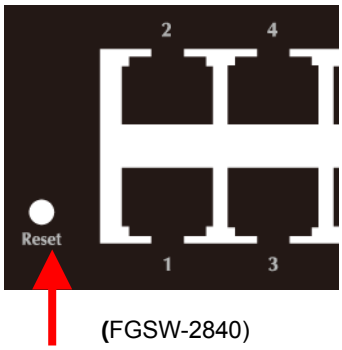
■ **Switch does not power up**

Solution:

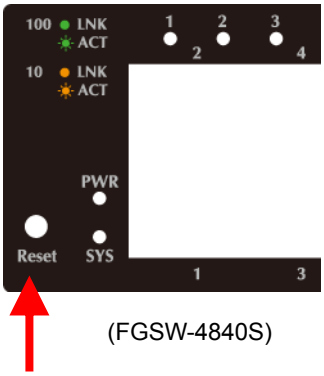
1. AC power cord not inserted or faulty
2. Check whether the AC power cord is inserted correctly
3. Replace the power cord if the cord is inserted correctly; check that the AC power source is working by connecting a different device in place of the switch.
4. If that device works, refer to the next step.
5. If that device does not work, check the AC power

IP Address has been changed or forgotten (like admin and password) –

To reset the IP address to the default IP Address **"192.168.0.100"** or reset the password to default value. Press the hardware **reset button** on the front panel for about **5 seconds.** After the device is rebooted, you can login the management Web interface within the same subnet of 192.168.0.xx.



(FGSW-2840)



(FGSW-4840S)

APPENDIX A

A.1 Switch's RJ45 Pin Assignments 1000Mbps, 1000Base-T

Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

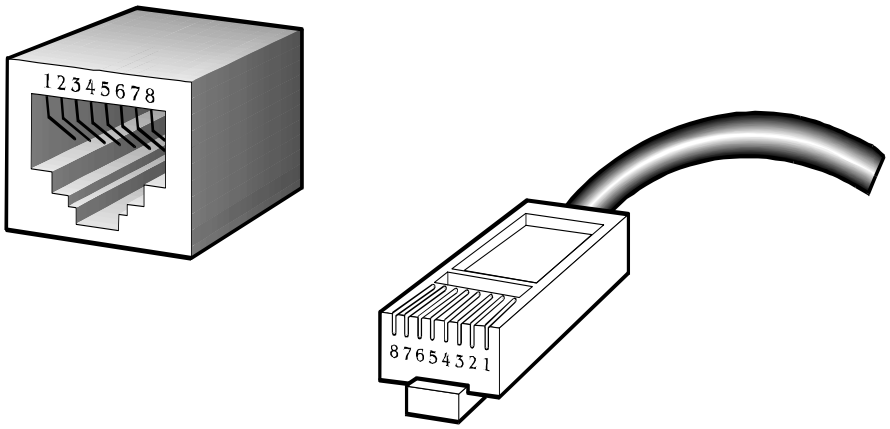
Implicit implementation of the crossover function within a twisted-pair cable, or at a wiring panel, while not expressly forbidden, is beyond the scope of this standard.

A.2 10/100Mbps, 10/100Base-TX

When connecting your 10/100Mbps Ethernet Switch to another switch, a bridge or a hub, a straight or crossover cable is necessary. Each port of the Switch supports auto-MDI/MDI-X detection. That means you can directly connect the Switch to any Ethernet devices without making a crossover cable. The following table and diagram show the standard RJ-45 receptacle/ connector and their pin assignments:

RJ45 Connector pin assignment		
Contact	MDI Media Dependent Interface	MDI-X Media Dependent Interface-Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	

The standard cable, RJ45 pin assignment



The standard RJ45 receptacle/connector

There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

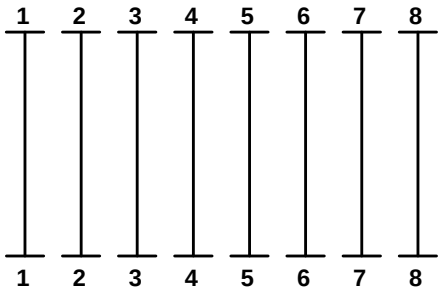
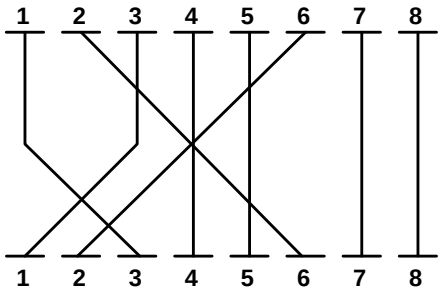
Straight-through Cable		SIDE 1	SIDE 2
	SIDE 1	1 = White / Orange	1 = White / Orange
		2 = Orange	2 = Orange
		3 = White / Green	3 = White / Green
		4 = Blue	4 = Blue
		5 = White / Blue	5 = White / Blue
		6 = Green	6 = Green
		7 = White / Brown	7 = White / Brown
	SIDE 2	8 = Brown	8 = Brown
Crossover Cable		**SIDE 1**	**SIDE 2**
	SIDE 1	1 = White / Orange	1 = White / Green
		2 = Orange	2 = Green
		3 = White / Green	3 = White / Orange
		4 = Blue	4 = Blue
		5 = White / Blue	5 = White / Blue
		6 = Green	6 = Orange
		7 = White / Brown	7 = White / Brown
	SIDE 2	8 = Brown	8 = Brown

Figure A-1: Straight-through and Crossover Cable

Please make sure your connected cables are with the same pin assignment and color as the above table before deploying the cables into your network.

EC Declaration of Conformity

For the following equipment:

*Type of Product : 24-Port 10/100TX + 4-Port Gigabit with 2 Combo 100/1000X SFP Managed Switch

*Model Number : FGSW-2840

* Produced by:
Manufacturer's Name : **Planet Technology Corp.**
Manufacturer's Address : 10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.).

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive on (2004/108/EC).
For the evaluation regarding the EMC, the following standards were applied:

EN 55022	(2010+AC: 2011)
EN 61000-3-2	(2006+A1:2009+A2:2009)
EN 61000-3-3	(2013)
EN 55024	(2010)
IEC 61000-4-2	(2008)
IEC 61000-4-3	(2010)
IEC 61000-4-4	(2012)
IEC 61000-4-5	(2005)
IEC 61000-4-6	(2013)
IEC 61000-4-8	(2009)
IEC 61000-4-11	(2004)
EN 60950-1	(2006+A11:2009+A1:2010+A12:2011+A2:2013)

Responsible for marking this declaration if the:

☒ **Manufacturer** ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname **Kent Kang**

Position / Title : **Product Manager**

Taiwan	**10th, Oct., 2014**	Kent Kang
Place	*Date*	*Legal Signature*

PLANET TECHNOLOGY CORPORATION

e-mail: sales@planet.com.tw http://www.planet.com.tw
10F., No.96, Minquan Rd., Xindian Dist., New Taipei City, Taiwan, R.O.C. Tel:886-2-2219-9518 Fax:886-2-2219-9528

EC Declaration of Conformity

For the following equipment:

*Type of Product : 48-Port 10/100TX + 2-Port Gigabit + 2-Port 1000X SFP Managed Switch

*Model Number : FGSW-4840S

* Produced by:
Manufacturer's Name : **Planet Technology Corp.**
Manufacturer's Address : 10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.).

is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility Directive on (2004/108/EC).
For the evaluation regarding the EMC, the following standards were applied:

EN 55022	(2010+AC: 2011)
EN 61000-3-2	(2006+A1:2009+A2:2009)
EN 61000-3-3	(2013)
EN 55024	(2010)
IEC 61000-4-2	(2008)
IEC 61000-4-3	(2010)
IEC 61000-4-4	(2012)
IEC 61000-4-5	(2005)
IEC 61000-4-6	(2013)
IEC 61000-4-8	(2009)
IEC 61000-4-11	(2004)
EN 60950-1	(2006+A11:2009+A1:2010+A12:2011+A2:2013)

Responsible for marking this declaration if the:

☒ **Manufacturer** ☐ **Authorized representative established within the EU**

Authorized representative established within the EU (if applicable):

Company Name: **Planet Technology Corp.**

Company Address: **10F., No.96, Minquan Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)**

Person responsible for making this declaration

Name, Surname **Kent Kang**

Position / Title : **Product Manager**

Taiwan	**27th, Aug., 2014**	Kent Kang
Place	*Date*	*Legal Signature*

PLANET TECHNOLOGY CORPORATION

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