User Guide

Gigabit Easy Smart Switch

TL-SG1016DE/TL-SG1024DE/TL-SG1016PE

TL-SG105E/TL-SG108E/TL-SG108PE

REV3.1.0
1910011971

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http://www.tp-link.com

FCC STATEMENT (For TL-SG105E/TL-SG108E/TL-SG108PE only)

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

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

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) This device may not cause harmful interference.
2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC STATEMENT (For TL-SG1016DE/TL-SG1024DE/TL-SG1016PE only)

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.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) This device may not cause harmful interference.
2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE Mark Warning (For TL-SG105E/TL-SG108E/TL-SG108PE only)

CE

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

CE Mark Warning (For TL-SG1016DE/TL-SG1024DE/TL-SG1016PE only)

CE

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.

Industry Canada Statement (For TL-SG105E/TL-SG108E/TL-SG108PE only)

CAN ICES-3 (B)/NMB-3(B)

Industry Canada Statement (For TL-SG1016DE/TL-SG1024DE/TL-SG1016PE only)

CAN ICES-3 (A)/NMB-3(A)

BSMI Notice

安全諮詢及注意事項

- 請使用原裝電源供應器或只能按照本產品注明的電源類型使用本產品。
- 清潔本產品之前請先拔掉電源線。請勿使用液體、噴霧清潔劑或濕布進行清潔。
- 注意防潮，請勿將水或其他液體潑灑到本產品上。
- 插槽與開口供通風使用，以確保本產品的操作可靠並防止過熱，請勿堵塞或覆蓋開口。
- 請勿將本產品置放於靠近熱源的地方。除非有正常的通風，否則不可放在密閉位置中。
- 請不要私自打開機殼，不要嘗試自行維修本產品，請由授權的專業人士進行此項工作。

此為甲類資訊技術設備，于居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。(For TL-SG1016DE/TL-SG1024DETL-SG1016PE only)

Продукт сертифіковано згідно с правилами системи УкрСЕПРО на відповідність вимогам нормативних документів та вимогам, що передбачені чинними законодавчими актами України.

Safety Information

- When product has power button, the power button is one of the way to shut off the product; When there is no power button, the onl yway to completely shut off power is to disconnect the product or the power adapter from the power source.
- Don’t disassemble the product, or make repairs yourself. You run the risk of electric shock and voiding the limited warranty. If you need service, please contact us.
- Avoid water and wet locations.

Explanation of the symbols on the product label

Symbol	Explanation
⎓	DC voltage
~	AC voltage
⌂	Indoor use only



RECYCLING

This product bears the selective sorting symbol for Waste electrical and electronic equipment (WEEE). This means that this product must be handled pursuant to European directive 2012/19/EU in order to be recycled or dismantled to minimize its impact on the environment.

User has the choice to give his product to a competent recycling organization or to the retailer when he buys a new electrical or electronic equipment.

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Package Contents

The following items should be found in your box:

- One Gigabit Easy Smart Switch
- One power cord
- Two mounting brackets and other fittings (for TL-SG1016DE/TL-SG1024DE/ TL-SG1016PE only)
- Installation Guide
- Resource CD for TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/TL-SG1024DE/ TL-SG1016PE switch, including:
  - This User Guide
  - Easy Smart Configuration Utility.exe
  - Easy Smart Configuration Utility User Guide
  - Other Helpful Information

Note:

Make sure that the package contains the above items. If any of the listed items are damaged or missing, please contact your distributor.

Chapter 1 About this Guide

This User Guide contains information for setup and management of TL-SG105E/TL-SG108E/ TL-SG108PE/TL-SG1016DE/TL-SG1024DE/TL-SG1016PE Gigabit Easy Smart Switch. Please read this guide carefully before operation.

1.1 Intended Readers

This Guide is intended for network managers familiar with IT concepts and network terminologies.

1.2 Conventions

When using this guide, please notice that features of the switch may vary slightly depending on the model and software version you have, and on your location, language, and Internet service provider. All screenshots, images, parameters and descriptions documented in this guide are used for demonstration only.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute the warranty of any kind, express or implied. Users must take full responsibility for their application of any products.

In this Guide the following conventions are used:

- The switch or TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/TL-SG1024DE/ TL-SG1016PE mentioned in this Guide stands for TL-SG105E/TL-SG108E/TL-SG108PE/ TL-SG1016DE/TL-SG1024DE/TL-SG1016PE Gigabit Easy Smart Switch without any explanation.
- **Menu Name→Submenu Name→Tab page** indicates the menu structure. **System→System Info→System Summary** means the System Summary page under the System Info menu option that is located under the System menu.
- **Bold font** indicates a button, a toolbar icon, menu or menu item.

Symbols in this Guide：

Symbol	Description
Note:	Ignoring this type of note might result in a malfunction or damage to the device.
Tips:	This format indicates important information that helps you make better use of your device.

More Info:

- The latest software, management app and utility can be found at Download Center at *http://www.tp-link.com/support.*
- The Installation Guide (IG) can be found where you find this guide or inside the package of the switch.
- Specifications can be found on the product page at *http://www.tp-link.com.*
- A Technical Support Forum is provided for you to discuss our products at *http://forum.tp-link.com*.
- Our Technical Support contact information can be found at the Contact Technical Support page at *http://www.tp-link.com/support*.

1.3 Overview of This Guide

Chapter	Introduction
Chapter 1 About This Guide	Introduces the guide structure and conventions.
Chapter 2 Introduction	Introduces the features, application and appearance of TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/ TL-SG1024DE/TL-SG1016PE switch.
Chapter 3 Login to the Switch	Introduces how to log on to the Web management page.
Chapter 4 System	This module is used to configure system properties of the switch. Here mainly introduces: ● System Info: View device information and define the device description. ● IP Setting: Get and modify the network parameters of the switch. ● User Account: Modify the username and password for users to log on to the Web management page. ● System Tools: Manage the configuration file of the switch.
Chapter 5 Switching	Configure the basic functions of the switch.
Chapter 6 Monitoring	Monitor the traffic information of the switch, and provide the convenient method to locate and solve the network problem.
Chapter 7 VLAN	This module is used to configure VLANs to control broadcast in LANs. Here mainly introduces: ● MTU VLAN: Set the MTU VLAN mode. ● Port Based VLAN: Set the Port-Based VLAN mode ● 802.1Q VLAN: Set the 802.1Q Tag VLAN mode. ● 802.1Q PVID Setting: Configure 802.1Q PVID value.

Chapter	Introduction
Chapter 8 QoS	This module is used to configure QoS function to provide different quality of service for various network applications and requirements. Here mainly introduces: ● QoS Basic: Configure and view the basic parameters of QoS. ● Bandwidth Control: Configure and view the bandwidth control function information. ● Storm Control: Configure and view the storm control function information.
Chapter 9 PoE	This module is used to configure the PoE function for the switch to supply power for PD devices.
Appendix A Specifications	Lists the hardware specifications of the switch.

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Chapter 2 Introduction

Thanks for choosing the TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/TL-SG1024DE/ TL-SG1016PE Gigabit Easy Smart Switch!

2.1 Overview of the Switch

The TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/TL-SG1024DE/TL-SG1016PE Gigabit Easy Smart Switch is an ideal upgrade from an unmanaged switch, designed for Small and Medium Business networks that require simple network management. Network administrators can effectively monitor traffic via Port Mirroring, Loop Prevention and Cable Test features. To optimize traffic on your business network, they offer port-based, tag-based, DSCP-based QoS to keep latency-sensitive traffic moving smoothly and jitter-free. Additionally, port-based, tag-based and MTU VLAN can improve security and meet more network segmentation requirements. Moreover, with the innovative energy-efficient technology, they are eco-friendly solution for your business network.

Note:

For details about Easy Smart Configuration Utility, please refer to the User Guide of the Easy Smart Configuration Utility in the Resource CD.

2.2 Appearance Description

2.2.1 Front Panel

- TL-SG105E/TL-SG108E

The front panel of TL-SG105E is shown as Figure 2-1.

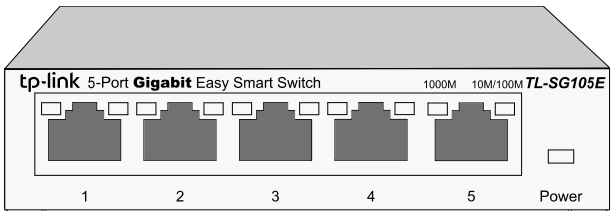


Figure 2-1 Front Panel of TL-SG105E

The front panel of TL-SG108E is shown as Figure 2-2.

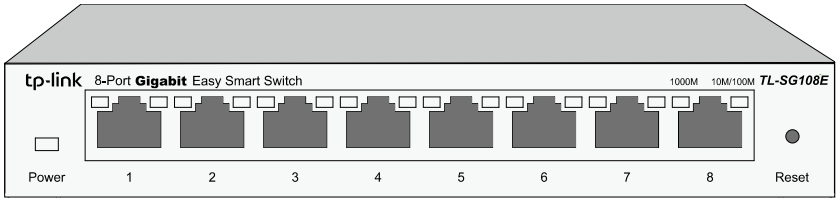


Figure 2-2 Front Panel of TL-SG108E

The following parts are located on the front panel of the switch:

- **Reset:** With the switch powered on, press this button for five seconds or above to reset the software setting back to factory default setting. (For TL-SG108E only)

- **1000Mbps Ports:** Designed to connect to the device with a bandwidth of 10Mbps, 100Mbps or 1000Mbps. Each has a corresponding 1000Mbps LED and 10/100Mbps LED.
- **LEDs**

Name	Status	Indication
Power	On	Power is on.
	Flashing	Power supply is abnormal.
	Off	Power is off or power supply is abnormal.
1000Mbps	On	A 1000Mbps device is connected to the corresponding port.
	Flashing	Data is being transmitted or received.
	Off	A 10/100Mbps device or no device is connected to the corresponding port.
10/100Mbps	On	A 10/100Mbps device is connected to the corresponding port.
	Flashing	Data is being transmitted or received.
	Off	No device is connected to the corresponding port.

■ TL-SG108PE

The front panel of TL-SG108PE is shown as Figure 2-3.

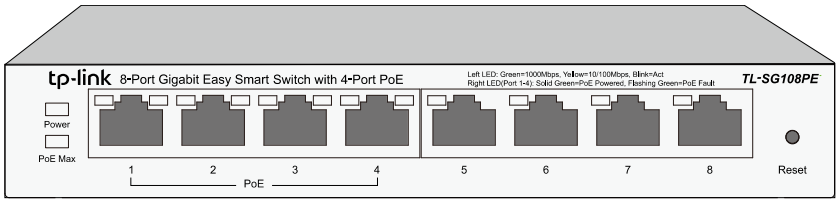


Figure 2-3 Front Panel of TL-SG108PE

The following parts are located on the front panel of the switch:

- **Reset:** With the switch powered on, press this button for five seconds or above to reset the software setting back to factory default setting.
- **1000Mbps Ports:** Designed to connect to the device with a bandwidth of 10Mbps, 100Mbps or 1000Mbps. Each has a corresponding Link/Act LED (Left LED). For Port 1– 4, each of them also has a PoE Status LED (Right LED).
- **LEDs**

Name	Status	Indication
Power	On	Power is on.
	Flashing	Power supply is abnormal.
	Off	Power is off or power supply is abnormal.
PoE Max	On	46W≤ The total power supply< 55W.
	Flashing	The total power supply≥ 55W.
	Off	The total power supply< 46W.

Link/Act	On(Green)	A 1000Mbps device is connected to the corresponding port.
	On(Yellow)	A 10/100Mbps device is connected to the corresponding port.
	Flashing	Data is being transmitted or received.
	Off	No device is connected to the corresponding port.
PoE Status	On	The port is supplying power normally.
	Flashing	The port is supplying power abnormally.
	Off	No PoE power supply is provided on the port.

■ TL-SG1016DE/TL-SG1024DE

The front panel of TL-SG1016DE is shown as Figure 2-4.

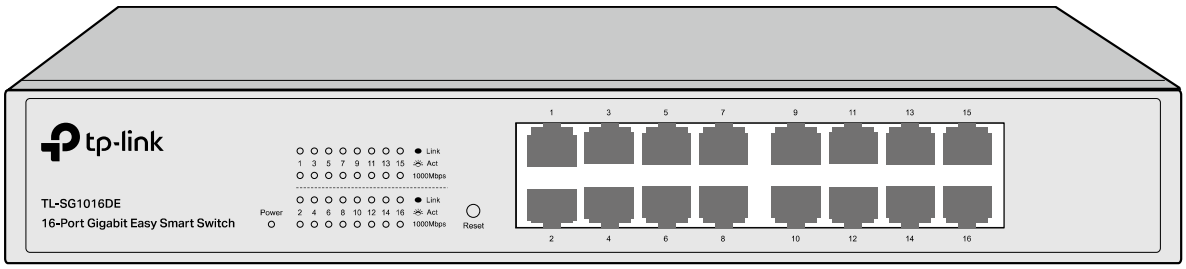


Figure 2-4 Front Panel of TL-SG1016DE

The front panel of TL-SG1024DE is shown as Figure 2-5.

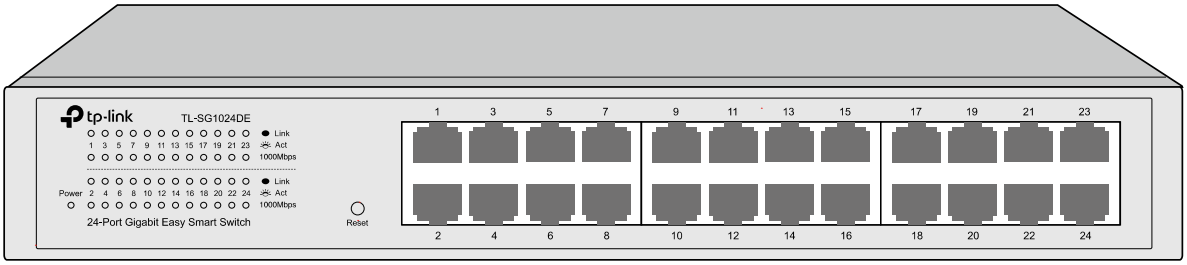


Figure 2-5 Front Panel of TL-SG1024DE

The following parts are located on the front panel of the switch:

- **Reset:** With the switch powered on, press this button for five seconds or above to reset the software setting back to factory default setting.
- **1000Mbps Ports:** Designed to connect to the device with a bandwidth of 10Mbps, 100Mbps or 1000Mbps. Each has a corresponding 1000Mbps LED and Link/Act LED.
- **LEDs**

Name	Status	Indication
Power	On	Power is on.
	Flashing	Power supply is abnormal.
	Off	Power is off or power supply is abnormal.
1000Mbps	On	A 1000Mbps device is connected to the corresponding port.

	Off	A 10/100Mbps device or no device is connected to the corresponding port.
Link/Act	On	A device is connected to the corresponding port but no activity.
	Flashing	Data is being transmitted or received.
	Off	No device is connected to the corresponding port.

■ TL_SG1016PE

The front panel of TL-SG1016PE is shown as Figure 2-6.

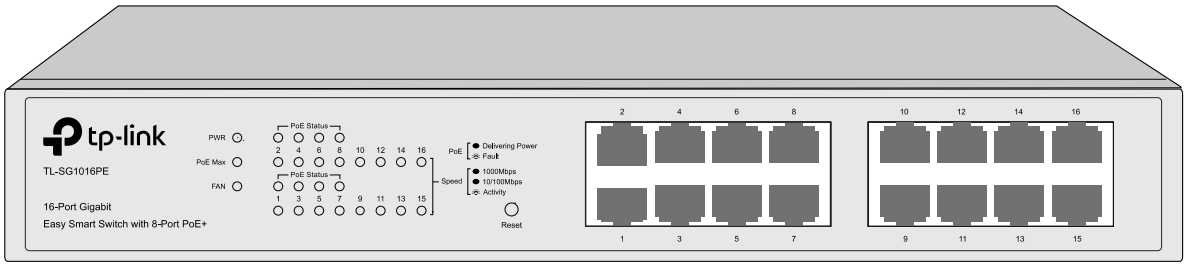


Figure 2-6 Front Panel of TL-SG1016PE

The following parts are located on the front panel of the switch:

- **Reset:** With the switch powered on, press this button for five seconds or above to reset the software setting back to factory default setting.
- **1000Mbps Ports:** Designed to connect to the device with a bandwidth of 10Mbps, 100Mbps or 1000Mbps. Each has a corresponding Speed LED. For Port 1– 8, each of them also has a PoE Status LED.
- **LEDs**

Name	Status		Indication
PWR	On		Power is on.
	Flashing		Power supply is abnormal.
	Off		Power is off or power supply is abnormal.
Speed	On	Green	The corresponding port is running at 1000Mbps.
		Yellow	The corresponding port is running at 10/100Mbps.
	Flashing		The corresponding port is transmitting or receiving data.
	Off		There is no device linked to the corresponding port.
PoE Status	On		The port is connecting and supplying power to a PD.
	Flashing		The PoE power circuit may be in short, the power current may be overloaded or non-standard PD is connected.
	Off		No PD is connected to the corresponding port, or no power is supplied according to the power limits of the port.

PoE Max	On	The power of all the connected PoE ports is between 103W and 110W. No power may be supplied if additional PDs are connected.
	Flashing	The power of all the connected PoE ports is ≥110W.
	Off	The power of all the connected PoE ports is <103W.
FAN	Green	The fan works properly.
	Yellow	The fan doesn't work properly.

2.2.2 Rear Panel

■ TL-SG105E/TL-SG108E/TL-SG108PE

The rear panel of TL-SG105E/TL-SG108E/TL-SG108PE features a power socket and a Kensington Security Slot (marked with). TL-SG105E also has a Reset button located on the rear panel.

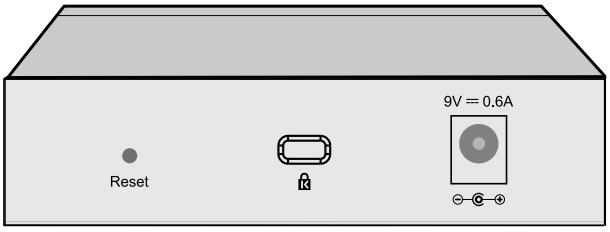


Figure 2-7 Rear Panel of TL-SG105E

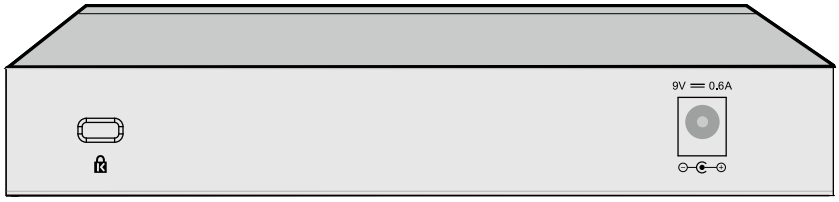


Figure 2-8 Rear Panel of TL-SG108E

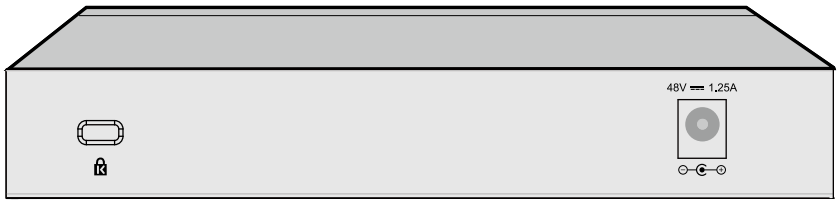


Figure 2-9 Rear Panel of TL-SG108PE

- **Reset:** With the switch powered on, press this button for five seconds or above to reset the software setting back to factory default setting. (For TL-SG105E only)
- **Kensington Security Slot:** Secure the lock (not provided) into the security slot to prevent the device from being stolen.
- **DC Power Socket:** Connect the female connector of the power cord here, and the male connector to the DC power outlet. Please make sure the voltage of the power supply meets the requirement of the input voltage.

■ TL-SG1016DE/TL-SG1024DE/TL-SG1016PE

The rear panel of TL-SG1016DE/TL-SG1024DE/TL-SG1016PE features a power socket and a Grounding Terminal (marked with ⏚). TL-SG1016PE also has a Kensington Security Slot (marked with) located on the rear panel.

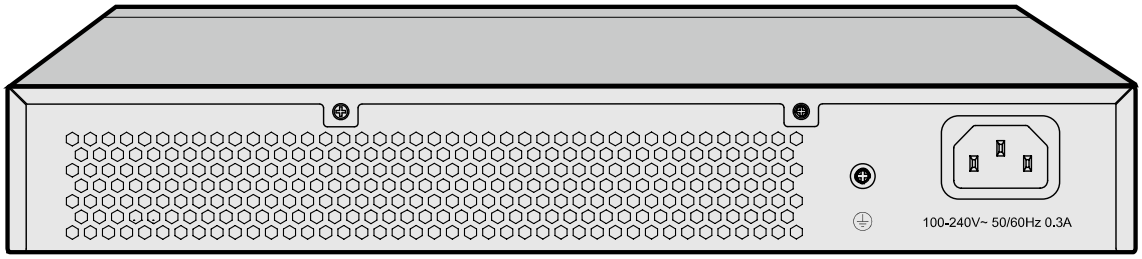


Figure 2-10 Rear Panel of TL-SG1016DE

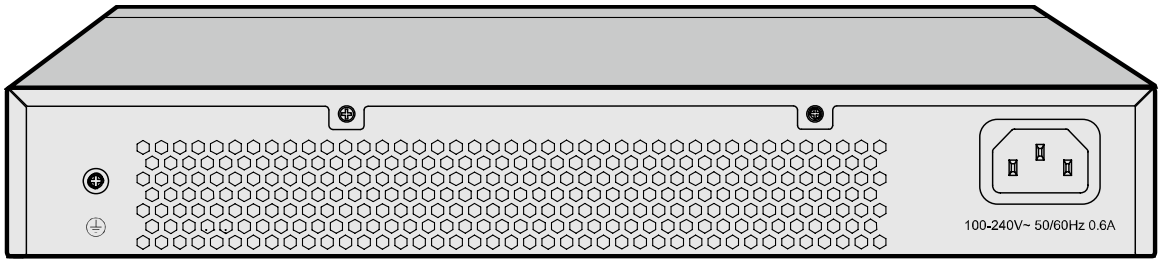


Figure 2-11 Rear Panel of TL-SG1024DE

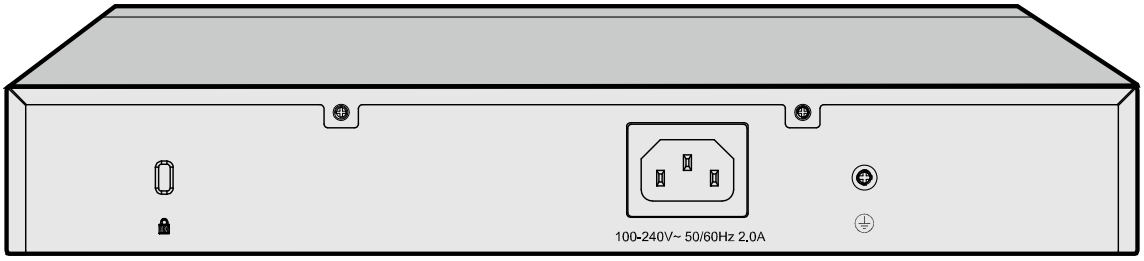


Figure 2-12 Rear Panel of TL-SG1016PE

- **Grounding Terminal:** TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/TL-SG1024DE/ TL-SG1016PE already comes with Lightning Protection Mechanism. You can also ground the switch through the PE (Protecting Earth) cable of AC cord or with Ground Cable.
- **AC Power Socket:** Connect the female connector of the power cord here, and the male connector to the AC power outlet. Please make sure the voltage of the power supply meets the requirement of the input voltage.
- **Kensington Security Slot:** Secure the lock (not provided) into the security slot to prevent the device from being stolen.

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Chapter 3 Login to the Switch

3.1 Login

1) To access the configuration utility, open a web-browser and type the default address http://192.168.0.1 in the address field of the browser, then press the **Enter** key.



Figure 3-1 Web-browser

Tips:

To log in to the switch, the IP address of your PC should be set in the same subnet addresses of the switch. The IP address is 192.168.0.x ("x" is any number from 2 to 254), Subnet Mask is 255.255.255.0.

2) After a moment, a login window will appear, as shown in Figure 3-2. Enter **admin** for the User Name and Password, both in lower case letters. Then click the **Login** button or press the **Enter** key.

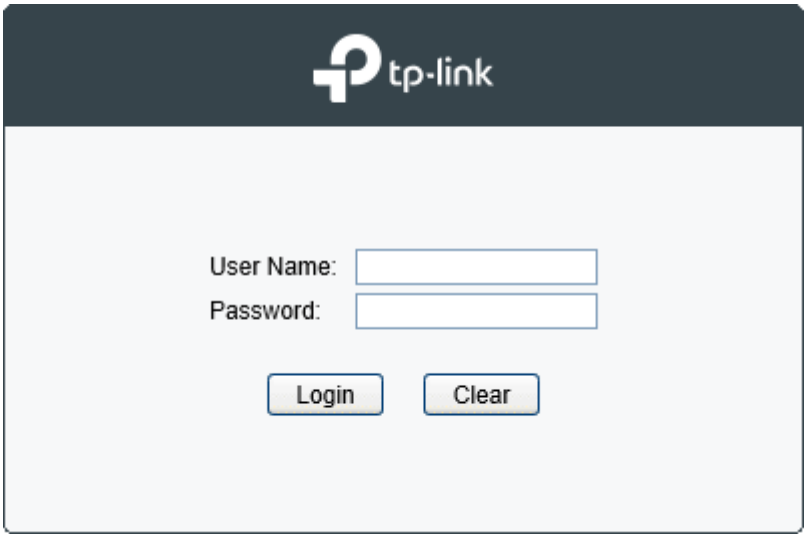


Figure 3-2 Login

3.2 Configuration

After a successful login, the main page will appear as Figure 3-3, and you can configure the function by clicking the setup menu on the left side of the screen.

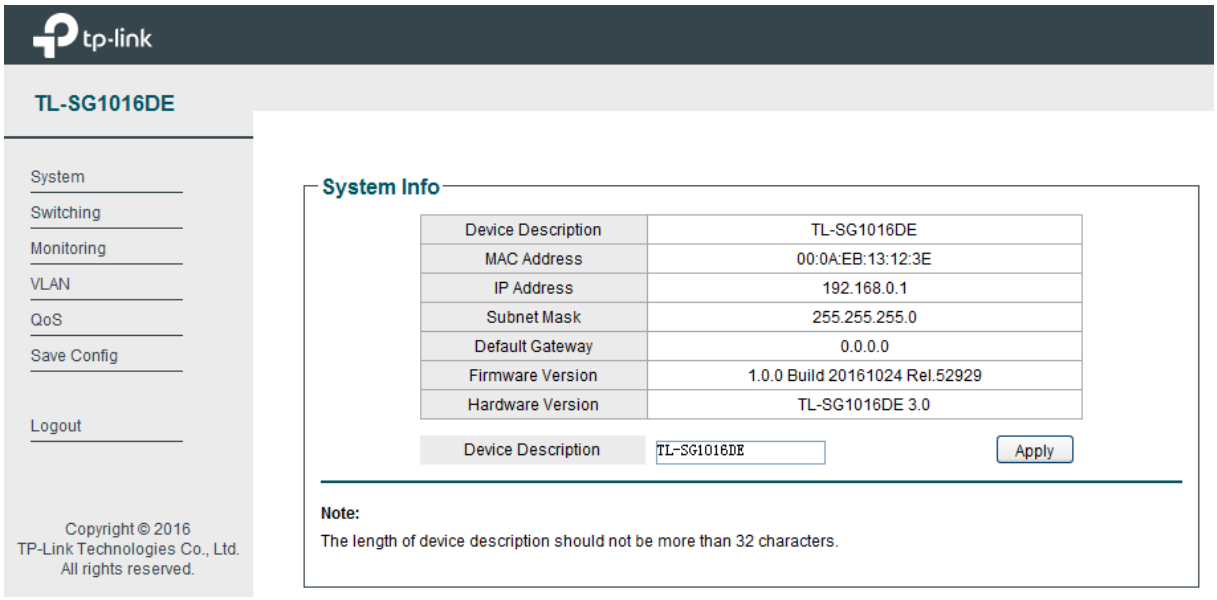


Figure 3-3 Main Setup-Menu

Note:

Clicking **Apply** can only make the new configurations effective before the switch is rebooted. If you want to keep the configurations effective even the switch is rebooted, please click **Save Config**. You are suggested to click **Save Config** before cutting off the power or rebooting the switch to avoid losing the new configurations.

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Chapter 4 System

The System module is mainly for basic settings of the switch, including four submenus: **System Info**, **IP Setting**, **User Account** and **System Tools**.

4.1 System Info

On this page you can view the system information and define the device description.

Choose the menu **System→System Info** to load the following page.

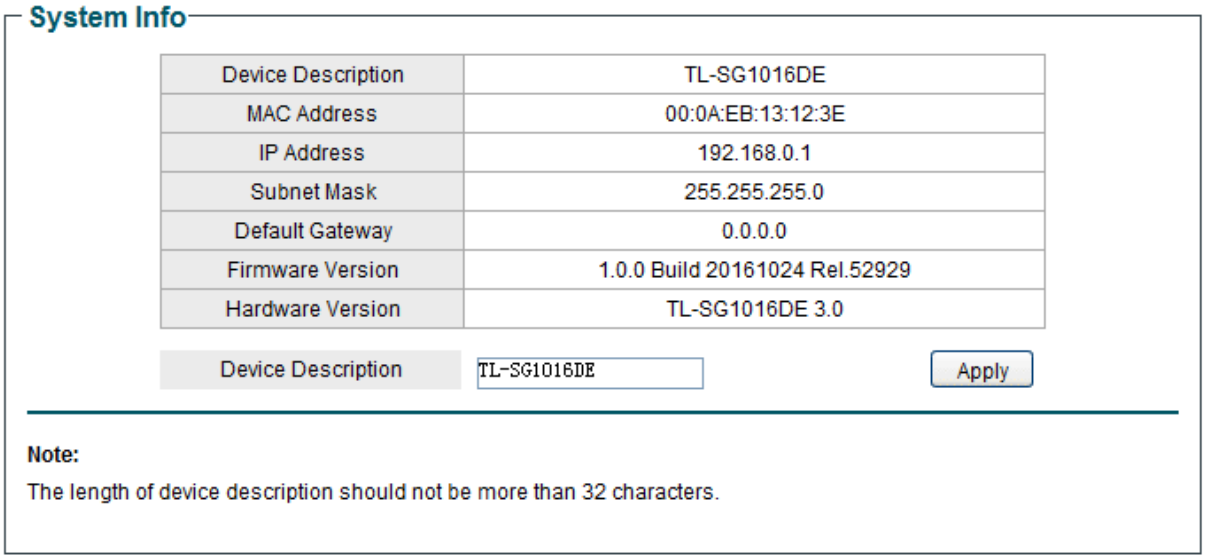


Figure 4-1 System Info

The following entries are displayed on this screen:

- **System Info**

Device Description: Displays the device model number.

MAC Address: Displays the MAC address of the switch.

IP Address: Displays the system IP address of the switch. The default system IP is 192.168.0.1 and you can change it appropriate to your needs.

Subnet Mask: Displays the subnet mask of the switch.

Default Gateway: Displays the default gateway of the switch.

Firmware Version: Displays the installed software version number.

Hardware Version: Displays the installed device hardware version number.

Device Description: Give a description to the device for identification.

4.2 IP Setting

Each device in the network possesses a unique IP Address. You can log on to the Web management page to operate the switch using this IP Address.

On this page you can get and modify the network parameters of the switch.

Choose the menu **System→IP Setting** to load the following page.

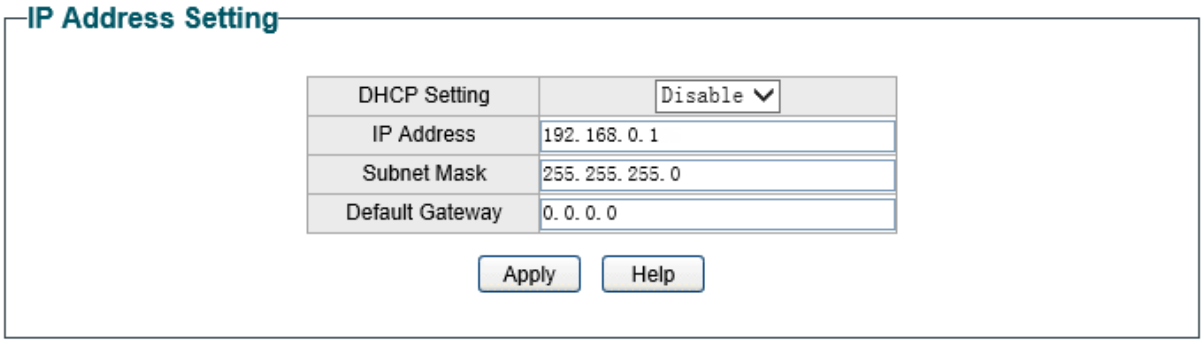


Figure 4-2 IP Address Setting

The following entries are displayed on this screen:

➢ **IP Address Setting**

DHCP Setting: Allows you to enable or disable the switch to serve as DHCP client. If DHCP client is enabled, the switch will obtain the IP address, subnet mask and default gateway from the DHCP server automatically; otherwise, these three items should be configured manually. By default, it is disabled.

IP Address: Specify the system IP address of the switch. The default system IP address is 192.168.0.1 and you can change it appropriate to your needs. The switch IP address must be compliant with the subnet layout.

Subnet Mask: Enter the subnet mask of the switch. Subnet mask is an address code that determines the size of the network. By default, the switch uses 255.255.255.0 as the subnet mask.

Default Gateway: Enter the default gateway of the switch. Gateway serves as the default destination where the packet is to be forwarded when its destination IP address is not within the switch's subnet.

Note:

1. The switch only possesses an IP address. The IP address newly configured will replace the original one.
2. Changing the IP address to a different IP segment will interrupt the network communication, so please keep the new IP address in the same IP segment with the local network.

4.3 User Account

On this page you can modify the username and password in order to refuse illegal users.

Choose the menu **System→User Account** to load the following page.

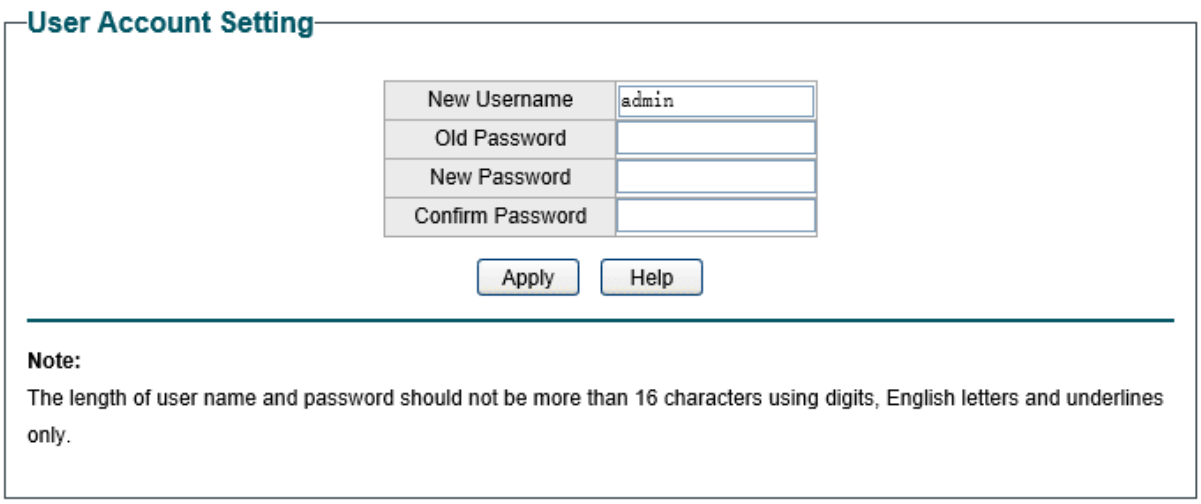


Figure 4-3 User Account Setting

You are kindly suggested to retype the new password in "Confirm Password" box instead of copying in order to avoid mistakes.

Note:

1. The length of user name and password should not be more than 16 characters using digits, English letters and underlines only.
2. The default username/password is admin/admin.

4.4 System Tools

The System Tools function, allowing you to manage the configuration file of the switch, can be implemented on **Backup and Restore**, **System Reboot, System Reset** and **Firmware Upgrade** pages.

4.4.1 Backup and Restore

On this page you can download the current configuration and save it as a file to your computer for your future configuration to upload a backup configuration file to restore your switch to this previous configuration.

Choose the menu **System→System Tools→Backup and Restore** to load the following page.

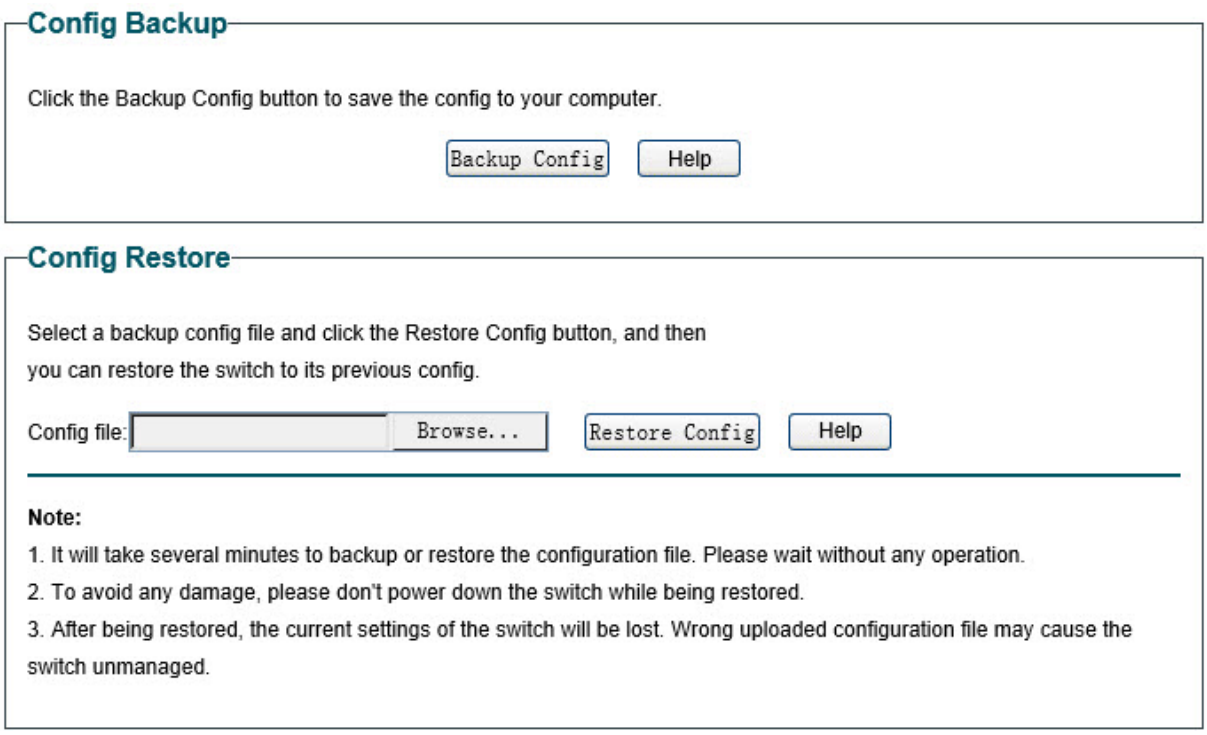


Figure 4-4 Backup and Restore

The following entries are displayed on this screen:

- **Config Backup**

  Backup Config: 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.

- **Config Restore**

  Restore Config: Click the **Restore Config** button to restore the backup configuration file. It will take effect after the switch automatically reboots.

Note:

1. It will take several minutes to backup or restore the configuration file. Please wait without any operation.
2. To avoid any damage, please don't power down the switch while being restored.
3. After being restored, the current settings of the switch will be lost. Wrong uploaded configuration file may cause the switch unmanaged.

4.4.2 System Reboot

On this page you can reboot the switch and return to the login page. Please save the current configuration before rebooting to avoid losing the configuration unsaved.

Choose the menu **System→System Tools→System Reboot** to load the following page.

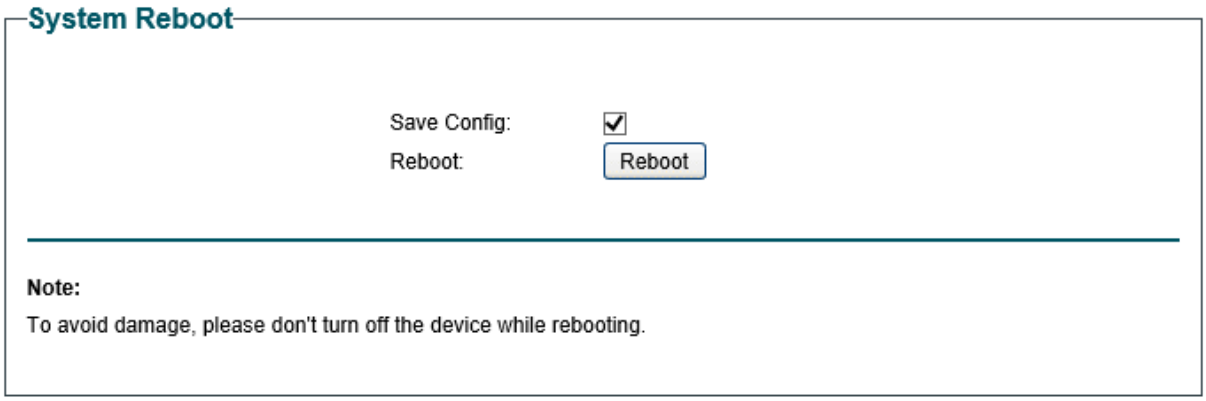


Figure 4-5 System Reboot

Note:

To avoid damage, please don't turn off the device while rebooting.

4.4.3 System Reset

On this page you can reset the switch to the default. All the settings will be cleared after the switch is reset.

Choose the menu **System→System Tools→System Reset** to load the following page.

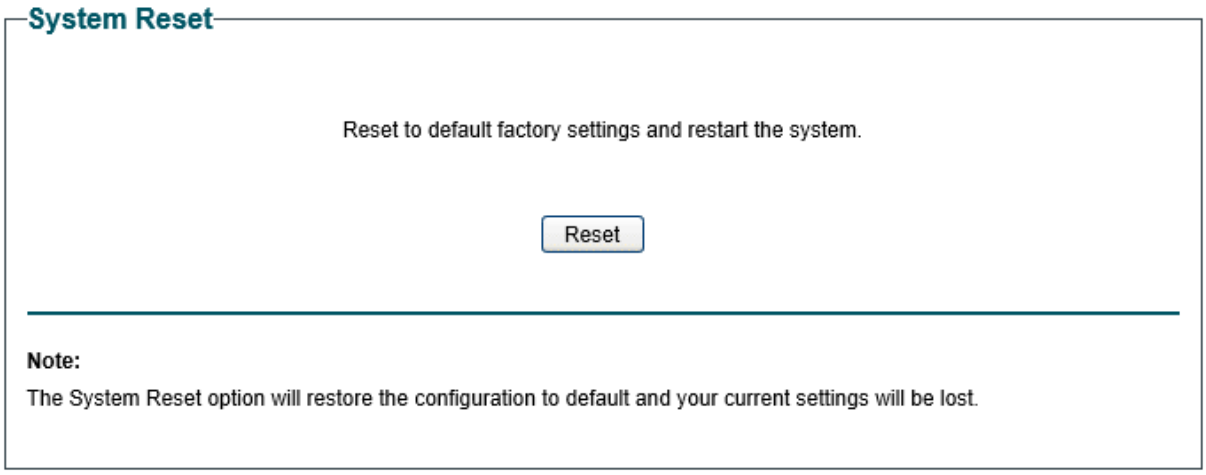


Figure 4-6 System Reset

Note:

The System Reset option will restore the configuration to default and your current settings will be lost.

4.4.4 Firmware Upgrade

The switch system can be upgraded via the Web management page. To upgrade the system is to get more functions and better performance. Go to http://www.tp-link.com to download the updated firmware.

Choose the menu **System→System Tools→Firmware Upgrade** to load the following page.

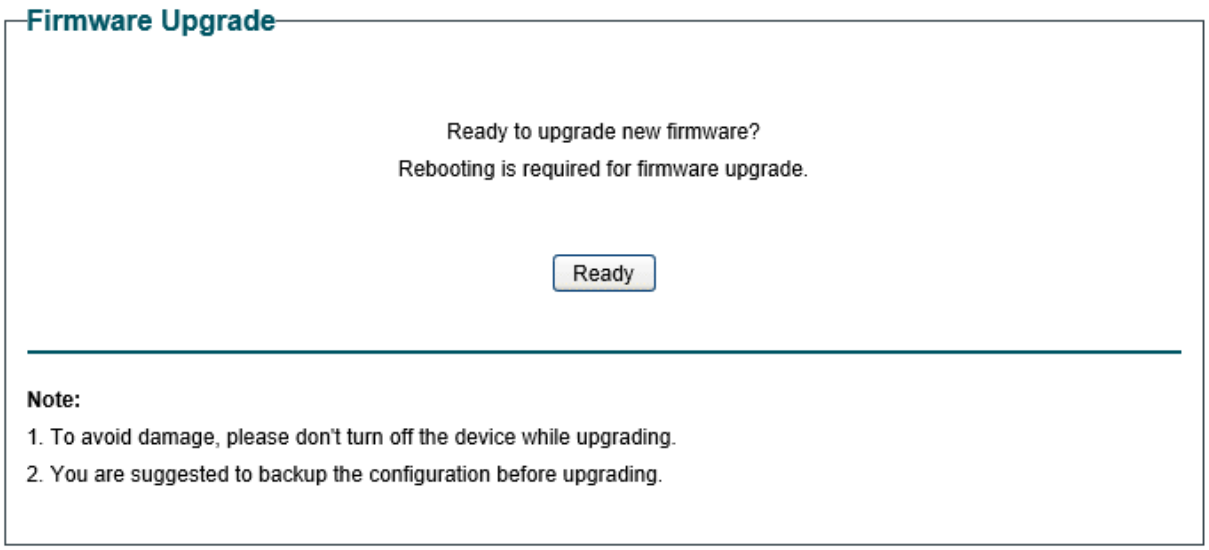


Figure 4-7 Firmware Upgrade

Click **Ready** and the following page will appear.

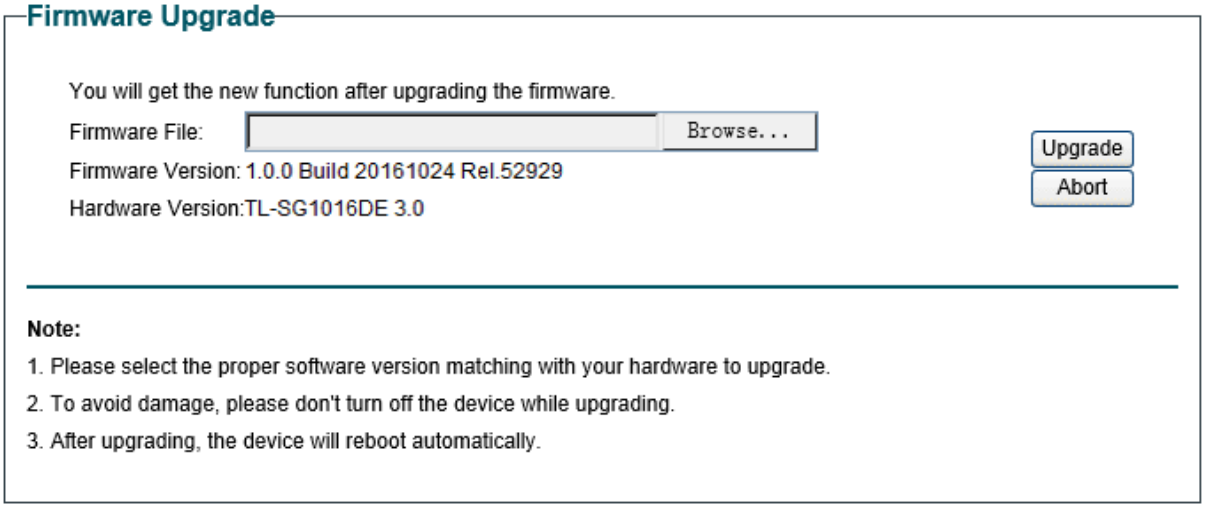


Figure 4-8 Select the Firmware

The following entries are displayed on this screen:

- **Upgurade**

Upgrade: Click the **Upgrade** button to upgrade the firmware of the switch.

Abort: Click the **Abort** button to stop the process of upgrade.

Note:

1. Don't interrupt the upgrade.

2. You are suggested to backup the configuration before upgrading.
3. Please select the proper software version matching with your hardware to upgrade.
4. To avoid damage, please don't turn off the device while upgrading.
5. After upgrading, the device will reboot automatically.

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Chapter 5 Switching

Switching module is used to configure the basic functions of the switch, including three submenus: **Port Setting**, **IGMP Snooping** and **LAG**.

5.1 Port Setting

On this page, you can configure and view the basic parameters of each port, including the port status, speed, duplex mode and flow control. As the parameters will affect the working mode of the port, please set the parameters appropriate to your needs.

Choose the menu **Switching→Port Setting** to load the following page.

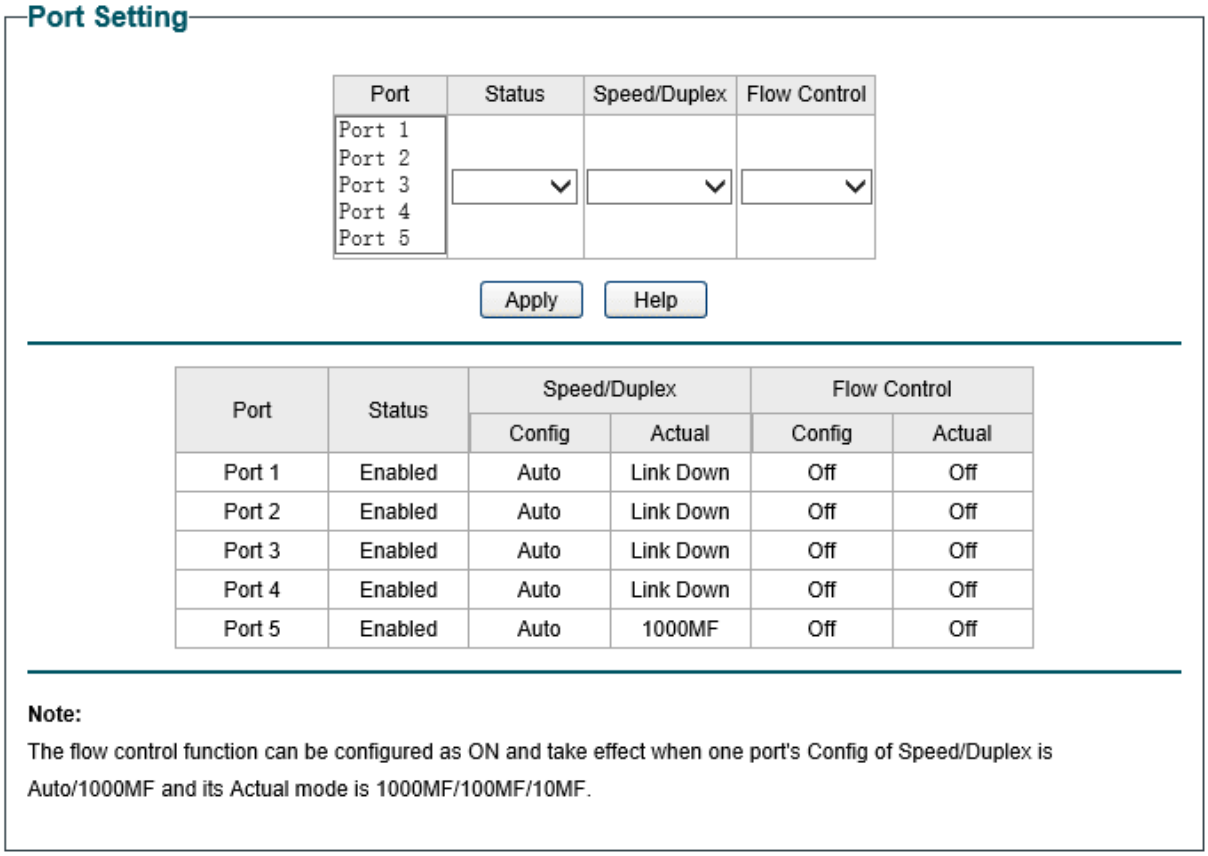


Figure 5-1 Port Setting

The following entries are displayed on this screen:

➢ **Port Setting**

Port: Select the desired port for configuration. It is multi-optional.

Status: Allows you to enable or disable the port. “Enable" indicates that the port is operational and "Disable" indicates the port is non-operational. If a port is unused for a long time, its status can be set to “Disable” to cut down the energy cost.

Speed/Duplex: Select the Speed and Duplex mode for the port. The device connected to the switch should be in the same Speed and Duplex mode with the switch. Available field values are “Auto”, “10M HD”, “10M FD”, “100M HD”, “100M FD” and “1000M FD”. "HD" stands for Half-Duplex and "FD" stands for Full-Duplex. "Auto" means auto negotiation.

Flow Control: Allows you to On/Off the Flow Control feature. When “On” is selected, the switch can synchronize the speed with its peer to avoid the packet loss caused by congestion.

Note:

The switch cannot be managed through the disabled port. Please enable the port which is used to manage the switch.

5.2 IGMP Snooping

Internet Group Management Protocol (IGMP) snooping is a multicast control mechanism, which can be used on the switch for dynamic registration of the multicast group.

IGMP Snooping allows the switch to recognize the IGMP messages transmitted between network stations or devices and an IGMP host. When receiving IGMP report message from the IGMP host, the switch will add the port to the multicast address table; when listening to IGMP leave message from the IGMP host, the switch will remove the port from the multicast address table. By managing and controlling the multicast address table, the broadcasting of multicast traffic can be effectively prevented in the network.

On this page you can enable IGMP Snooping feature, Report Message Suppression feature and view the current IGMP Group information.

Choose the menu **Switching→IGMP Snooping** to load the following page.

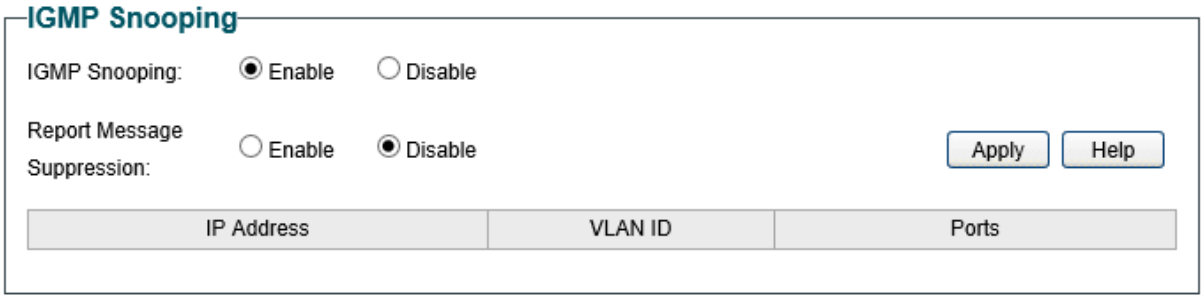


Figure 5-2 IGMP Snooping

The following entries are displayed on this screen:

➢ **IGMP Snooping**

IGMP Snooping: Enable or disable IGMP snooping function globally on the switch.

Report Message Suppression: Enable or disable Report Message Suppression function globally. If this function is enabled, the first Report Message from the listener will forward to the router ports while the subsequent Report Message will be suppressed to reduce the IGMP packets.

IP Address:	Displays the multicast IP address.
VLAN ID:	Displays the VLAN ID of the multicast group. If the packet does not carry VLAN ID, then here displays the PVID of the port. All port members of a multicast group should be divided to the same VLAN, and have the same PVID.
Ports:	Displays the forwarding port list of the multicast group.

5.3 LAG

LAG is used to combine a number of ports together to make a single high-bandwidth data path, which can highly extend the bandwidth. The bandwidth of the LAG is the sum of bandwidth of its member ports.

There are some rules on using LAG:

- For the member ports in a LAG group, their configuration of **Port setting** (**Speed and Duplex**, **Flow Control**), **QoS** must be the same.
- For the newly joined member ports in a LAG group, their default setting of **Port setting** (**Speed and Duplex**, **Flow Control**), **QoS** will be configured the same as that of the first member port in the LAG group.
- The LAG member ports cannot be set as mirroring port.
- Before setting the LAG, its member ports should be divided to the same VLAN, and have the same PVID and drop the untagged packet rule. Change of the LAG setting will not affect the VLAN setting.

If the LAG is needed, you are suggested to configure the LAG function here before configuring the other functions for the member ports.

On this page, you can configure and view the information of the LAG group of the switch.

Choose the menu **Switching→LAG** to load the following page.

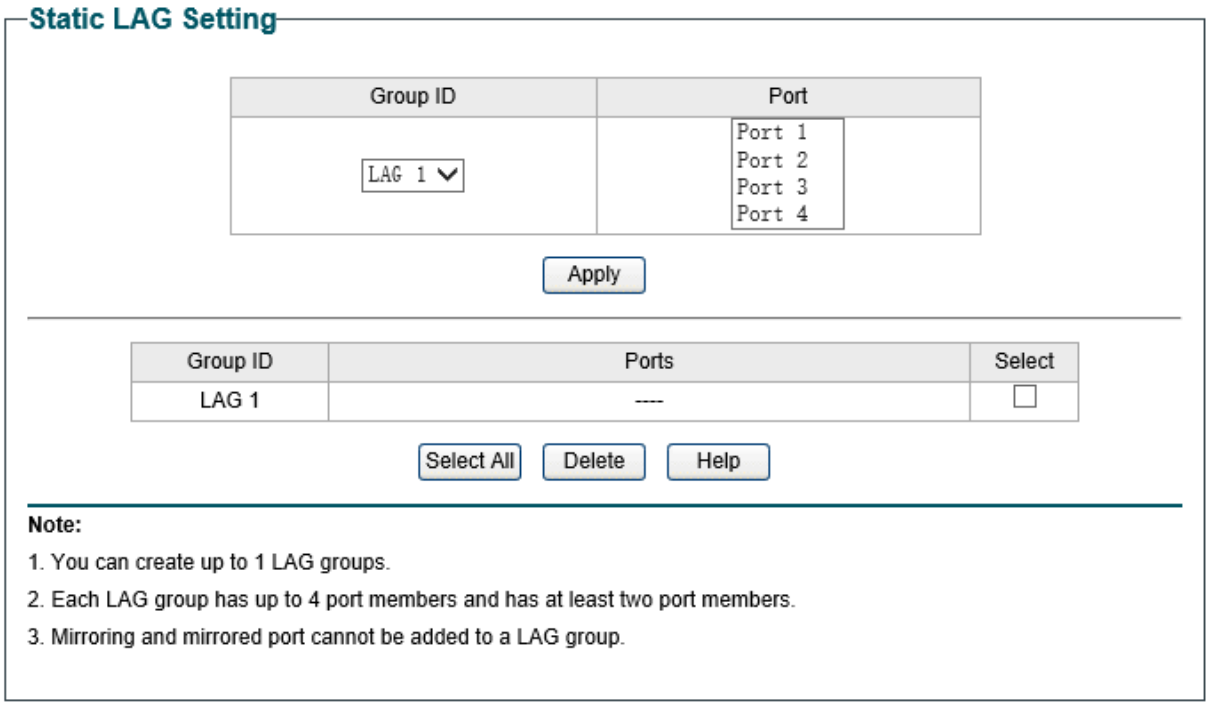


Figure 5-3 LAG Setting

Here you can configure and view the port parameters.

➢ **LAG Setting**

Group ID: Select an identified number for the trunk group from the drop-down list.

Port: Select the port as the trunk group member. It is multi-optional. Clearing all the ports of the trunk group will delete this trunk group.

Tips:

Calculate the bandwidth for a LAG group: If a LAG consists of the four ports whose Speed/Duplex mode is 1000Mbps/Full Duplex, the whole bandwidth of the LAG group is up to 8000Mbps (2000Mbps * 4) because the bandwidth of each member port is 2000Mbps counting the up-linked speed of 1000Mbps and the down-linked speed of 1000Mbps.

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Chapter 6 Monitoring

Monitoring module monitors the traffic information of the switch, and provides the convenient method to locate and solve the network problem, includes four submenus: **Port Statistics, Port Mirror**, **Cable Test** and **Loop Prevention**.

6.1 Port Statistics

On this page you can view the statistic information of each port, which facilitates you to monitor the traffic and locate faults promptly.

Choose the menu **Monitoring→Port Statistics** to load the following page.

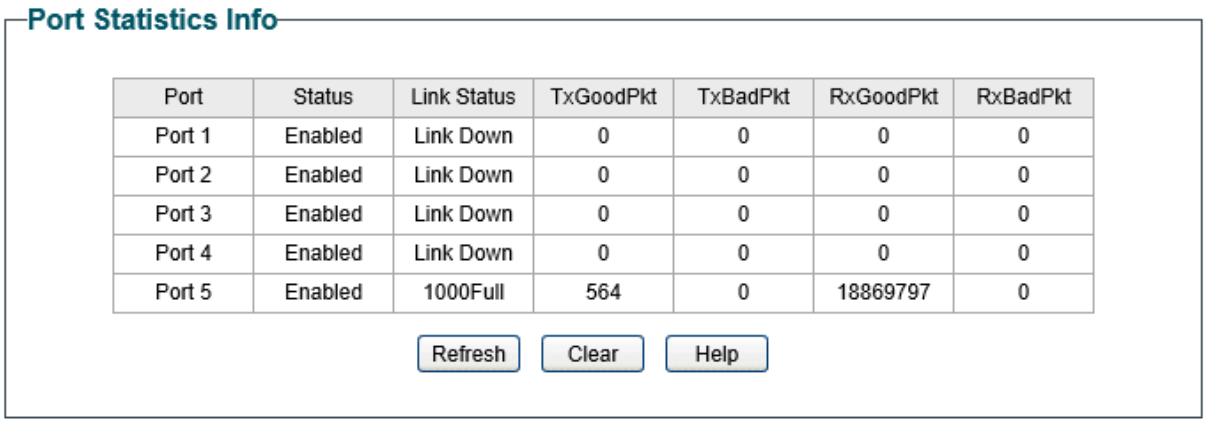


Figure 6-1 Port Statistics Info

The following entries are displayed on this screen:

➢ **Port Statistics Info**

Port: Displays the port number of the switch.

Status: Displays whether the port is enabled or disabled.

Link Status: Displays whether the port is link up or link down.

TxGoodPkt: Displays the number of good packets transmitted on the port. The error packets are not counted in.

TxBadPkt: Displays the number of error packets transmitted on the port.

RxGoodPkt: Displays the number of good packets received on the port. The error packets are not counted in.

RxBadPkt: Displays the number of error packets received on the port.

Note:

1. The frames with more than 1518 bytes, less than 64 bytes or with bad Frame Check Sequence (FCS) are recorded as BadPkts.
2. Because of the supporting feature of jumbo frame, the frames with more than 1518 bytes and less than 10000 bytes will be recorded as GoodPkts and BadPkts at the same time, and can be forwarded normally.

6.2 Port Mirror

Port mirror functions to monitor and mirror network traffic by forwarding copies of incoming and outgoing packets from one/multiple ports (mirrored port) to a specific port (mirroring port). Usually, the mirroring port is connected to a data diagnosis device, which is used to analyze the mirrored packets for monitoring and troubleshooting the network.

Choose the menu **Monitoring→Port Mirror** to load the following page.

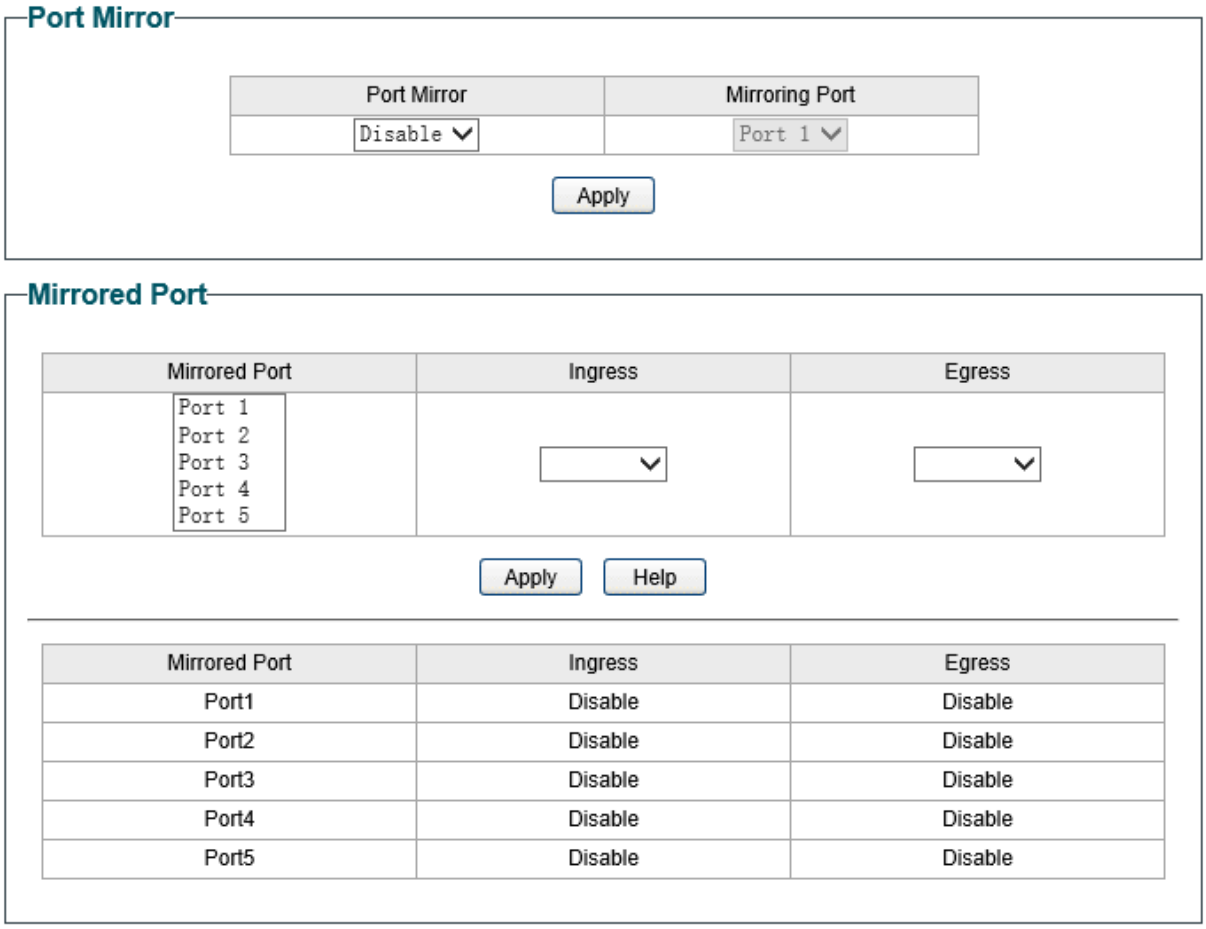


Figure 6-2 Port Mirror

The following entries are displayed on this screen:

- **Port Mirror**

  Port Mirror: Allows you to enable or disable the port mirror feature of the specified port.

  Mirroring Port: Select a port from the pull-down list as the mirroring port.

- **Mirrored Port**

  Mirrored Port: Select a port from the pull-down list as the mirrored port to monitor the traffic. LAG member cannot be defined here. It is multi-optional.

  Ingress: Select whether to monitor the ingress traffic. When the ingress is enabled, the ingress traffic received by the mirrored port will be copied to the mirroring port.

Egress: Select whether to monitor the egress traffic. When the egress is enabled, the outgoing packets sent by the mirrored port will be copied to the mirroring port.

Note:

1. The LAG member cannot be selected as the mirroring port.
2. A port cannot be set as the mirrored port and the mirroring port simultaneously.
3. The port mirror function can take effect span the multiple VLANs.

6.3 Cable Test

This switch provides cable test to diagnose the connection status of the cable connected to the switch and the distance to the problem location, which facilitates you to locate and diagnose the trouble spot of the network.

Choose the menu **Monitoring→Cable Test** to load the following page.

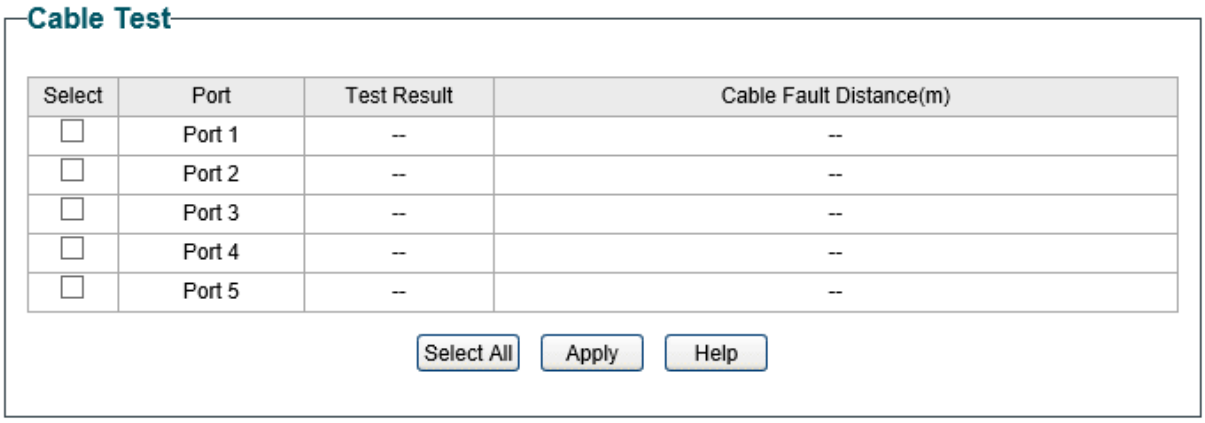


Figure 6-3 Cable Test

The following entries are displayed on this screen:

➢ **Cable Test**

Select: Click the check box to select the desired port for cable test. It is multi-optional.

Port: Displays the port number of the switch.

Test Result: Displays the connection status of the cable connected to the port. Test results include normal, short (or close), open and crosstalk.

Normal : The cable is normally connected.

Short (or Close): A short circuit caused by an abnormal contact of wires in the cable.

Open: No device is connected to the other end or the connectivity is broken.

Crosstalk: Impedance mismatch caused by the poor quality of the cable.

Cable Fault Distance(m): Displays the error length (in meters) of the cable.

Note:

The test result is just for your reference.

6.4 Loop Prevention

With loop prevention feature enabled, the switch can detect loops using loop detection packets. When a loop is detected, the switch will block the corresponding port automatically.

Choose the menu **Monitoring→Loop Prevention** to load the following page.

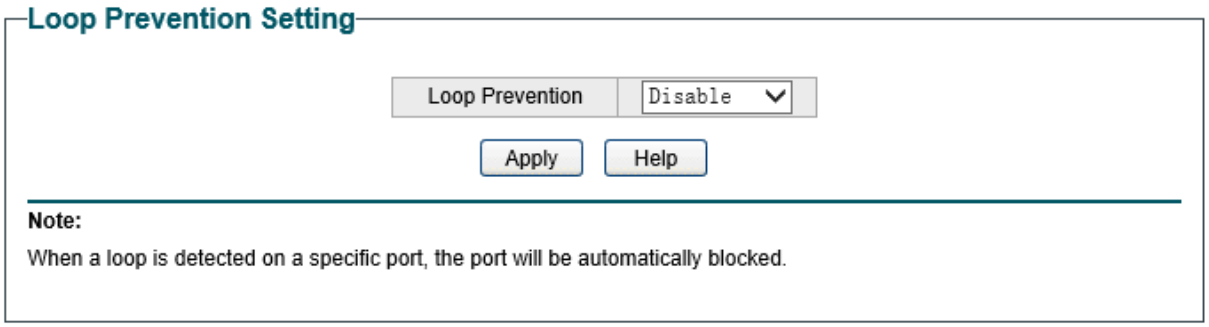


Figure 6-4 Loop Function Setting

The following entries are displayed on this screen:

- **Loop Prevention Setting**

  Loop Prevention: Allows you to enable or disable loop prevention function globally.

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Chapter 7 VLAN

The traditional Ethernet is a data network communication technology based on CSMA/CD (Carrier Sense Multiple Access/Collision Detect) via shared communication medium. Through the traditional Ethernet, the overfull hosts in LAN will result in serious collision, flooding broadcasts, poor performance or even breakdown of the Internet. Though connecting the LANs through switches can avoid the serious collision, the flooding broadcasts cannot be prevented, which will occupy plenty of bandwidth resources, causing potential serious security problems.

A Virtual Local Area Network (VLAN) is a network topology configured according to a logical scheme rather than the physical layout. The VLAN technology is developed for switches to control broadcast in LANs. By creating VLANs in a physical LAN, you can divide the LAN into multiple logical LANs, each of which has a broadcast domain of its own. Hosts in the same VLAN communicate with one another as if they are in a LAN. However, hosts in different VLANs cannot communicate with one another directly. Therefore, broadcast packets are limited in a VLAN. Hosts in the same VLAN communicate with one another via Ethernet whereas hosts in different VLANs communicate with one another through the Internet devices such as router, the Lay3 switch, etc. The following figure illustrates a VLAN implementation.

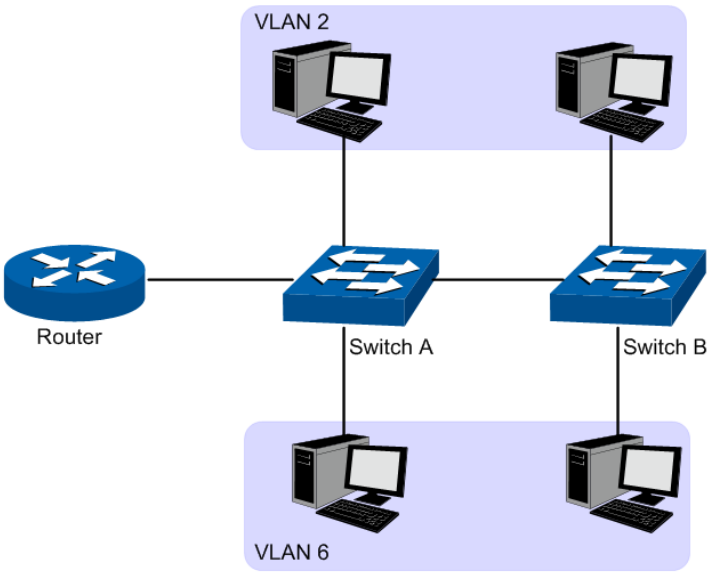


Figure 7-1 VLAN implementation

Compared with the traditional Ethernet, VLAN enjoys the following advantages.

（1） Broadcasts are confined to VLANs. This decreases bandwidth utilization and improves network performance.

（2） Network security is improved. VLANs cannot communicate with one another directly. That is, a host in a VLAN cannot access resources in another VLAN directly, unless routers or Layer 3 switches are used.

（3） Network configuration workload for the host is reduced. VLAN can be used to group specific hosts. When the physical position of a host changes within the range of the VLAN, you do not need to change its network configuration.

There are 3 types of VLAN modes supported in the switch:

1. MTU VLAN

MTU VLAN (Multi-Tenant Unit VLAN) defines an uplink port which will build up several VLANs with each of the other ports. Each VLAN contains two ports, the uplink port and one of the other ports in the switch, so the uplink port can communicate with any other port but other ports cannot communicate with each other.

2. Port Based VLAN

VLANs are divided based on ports. By default, the Port Based VLAN is enabled.

3. 802.1Q VLAN

The IEEE 802.1Q protocol defines a new format of the frame; it adds a Tag header in the original Ethernet frame, as follows:

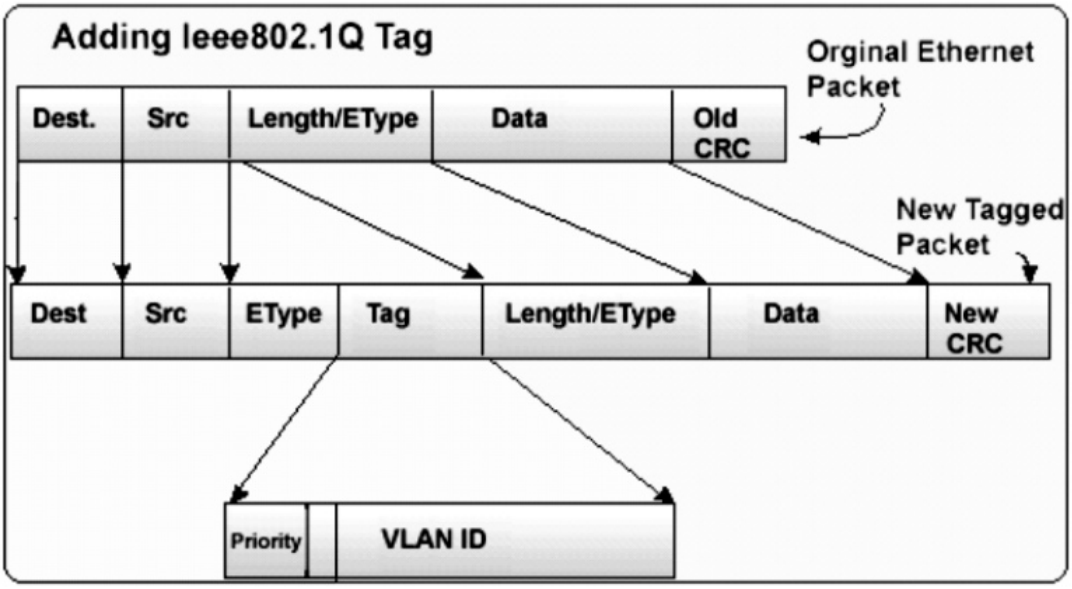


Figure 7-2 IEEE 802.1Q frame

VLAN tags in the packets are necessary for the switch to identify packets of different VLANs. The switch works at the data link layer in OSI model and it can identify the data link layer encapsulation of the packet only, so you can add the VLAN tag field into the data link layer encapsulation for identification.

IEEE 802.1Q Tag VLAN is divided by VLAN ID (VID). On receiving a frame, the switch checks the VID in the Tag header of the frame to decide which VLAN it belongs to. If the receiving frame doesn't contain the Tag header, the switch will assign a Tag to the frame, using the PVID of the port as its VID.

In this User Guide, the tagged packet refers to the packet with VLAN tag whereas the untagged packet refers to the packet without VLAN tag.

The VLAN module is mainly for VLAN configuration, including four submenus: **MTU VLAN**, **Port Based VLAN**, **802.1Q VLAN** and **802.1Q PVID Setting**.

7.1 MTU VLAN

On this page you can choose to enable MTU VLAN mode and configure VLANs.

Choose the menu **VLAN→MTU VLAN** to load the following page.



Figure 7-3 MTU VLAN Configuration

Note:

1. The uplink port will form several VLANs with each of the other ports. Each VLAN contains two ports, the uplink port and one of the other ports in the switch, thus the uplink port can communicate with any other port but other ports cannot communicate with each other.
2. For the first time the MTU VLAN mode is enabled, the switch will set port 1 as the uplink port by default.

7.2 Port Based VLAN

On this page you can configure Port Based VLAN feature and view the related settings.

Choose the menu **VLAN→Port Based VLAN** to load the following page.

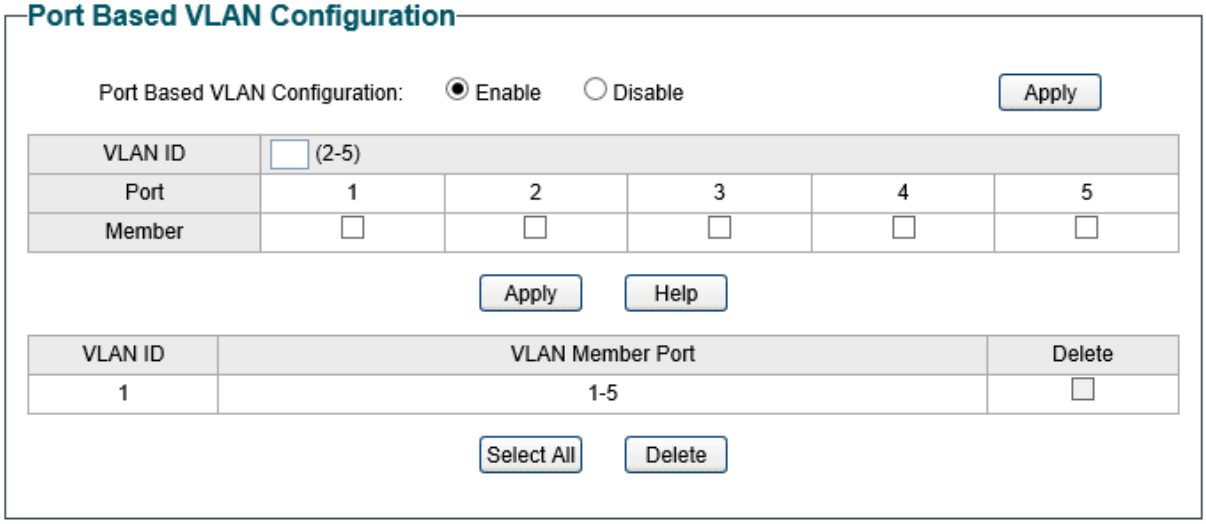


Figure 7-4 Port Based VLAN Configuration

To ensure the normal communication of the factory switch, the default VLAN of all ports is set to VLAN1. VLAN 1 cannot be deleted.

The following entries are displayed on this screen:

- **Port Based VLAN Configuration**

  Port Based VLAN Configuration: Enable or disable Port Based VLAN mode.

VLAN ID: Enter the ID number of VLAN. It ranges from 2 to 32.

Port: Displays the port number.

Member: Click the check box to select the port of the VLAN. It is multi-optional. If this field is checked, it indicates the port belongs to the current VLAN.

Note:

A VLAN cannot be the subset or superset of the other VLANs.

7.3 802.1Q VLAN

On this page you can configure 802.1Q VLAN feature and view the related settings.

Choose the menu **VLAN→802.1Q VLAN** to load the following page.

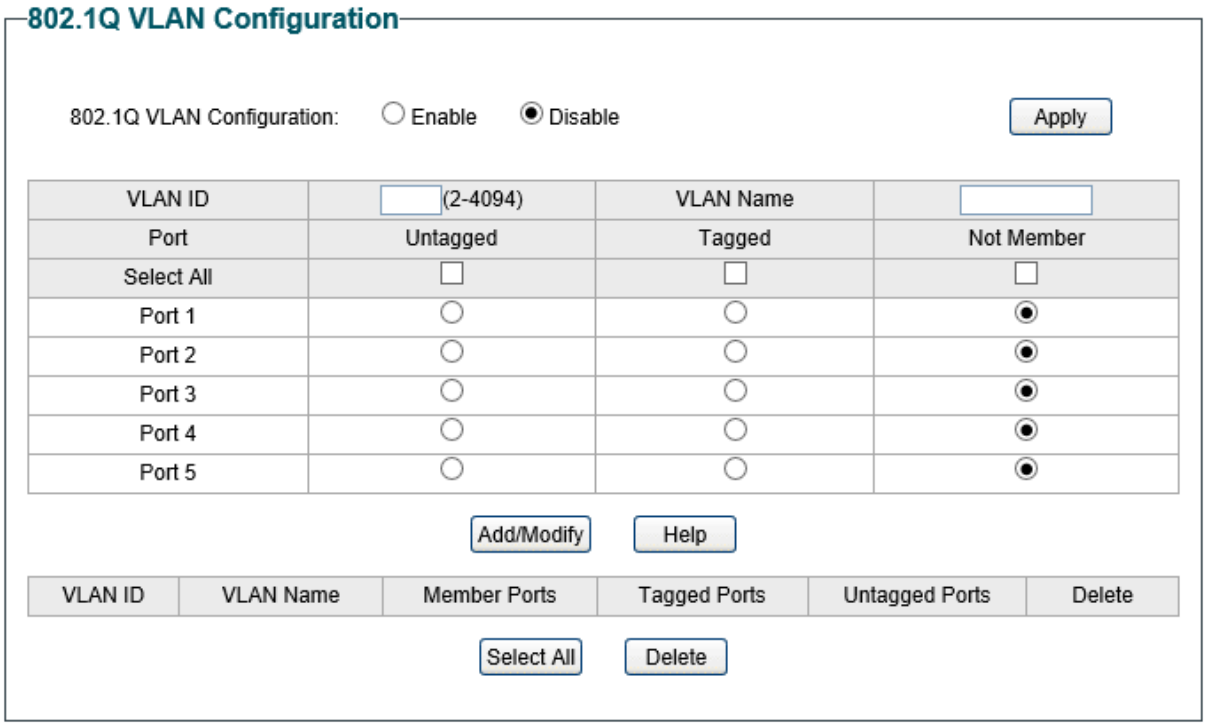


Figure 7-5 802.1Q VLAN Configuration

To ensure the normal communication of the factory switch, the default VLAN of all ports is set to be VLAN1. VLAN 1 cannot be modified or deleted.

The following entries are displayed on this screen:

- **802.1Q VLAN Configuration**

802.1Q VLAN Configuration: Enable or disable 802.1Q VLAN mode.

VLAN ID: Enter the ID number of VLAN. It ranges from 2 to 4094.

VLAN Name: Give a name to the VLAN for identification.

Port:	Displays the port number.
Untagged:	Click the check box to configure the egress rule of the traffic on this port as untagged. The switch drops the tag header before sending the packet.
Tagged:	Click the check box to configure the egress rule of the traffic on this port as tagged. The switch adds the tag header before sending the packet.
Not Member:	Click the check box to exclude the port from the current VLAN.

7.4 802.1Q PVID Setting

PVID (Port Vlan ID) is the default VID of the port. When the switch receives an un-VLAN-tagged packet, it will add a VLAN tag to the packet according to the PVID of its received port and forward the packets.

When creating VLANs, the PVID of each port, indicating the default VLAN to which the port belongs, is an important parameter with the following two purposes:

（1） When the switch receives an un-VLAN-tagged packet, it will add a VLAN tag to the packet according to the PVID of its received port

（2） PVID determines the default broadcast domain of the port, i.e. when the port receives UL packets or broadcast packets, the port will broadcast the packets in its default VLAN.

On this page you can configure PVID of the specified port. By default, the PVID of all ports is 1.

Choose the menu **VLAN→802.1Q PVID Setting** to load the following page.

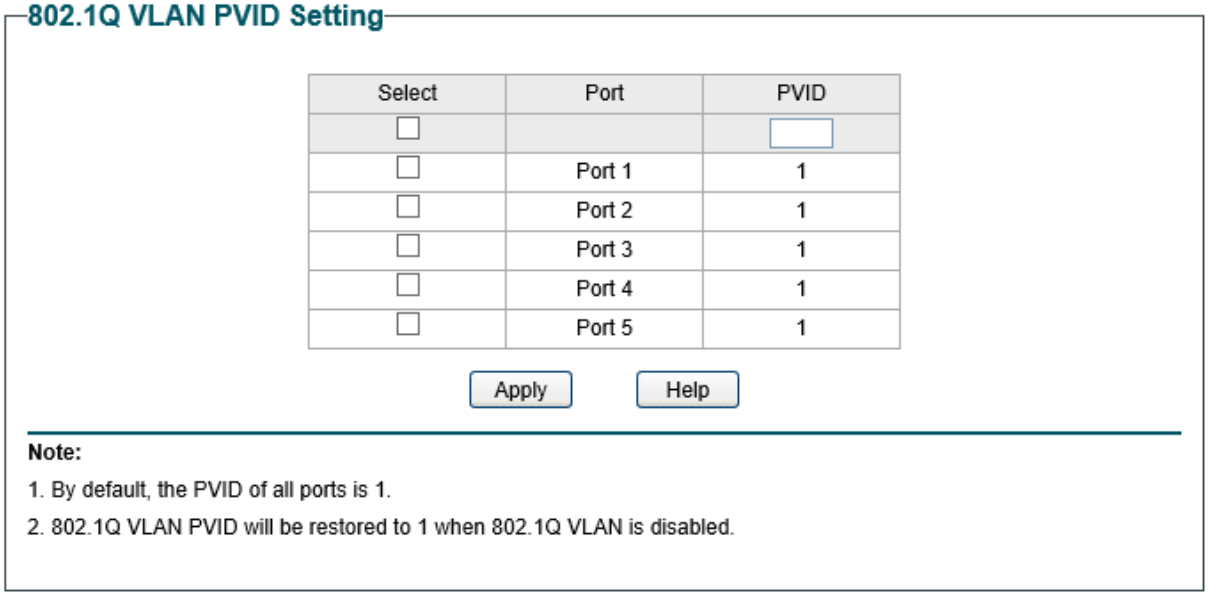


Figure 7-6 802.1Q VLAN PVID Setting

The following entries are displayed on this screen:

- **802.1Q VLAN PVID Setting**

Select:	Select the desired port for configuration. It is multi-optional.
Port:	Displays the port number.
PVID:	Enter a PVID number for the port. When adding the tag header to the received untagged packet, the switch will automatically uses this PVID value as the VLAN ID of the added tag.

Note:
802.1Q VLAN should be enabled before setting PVID.

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Chapter 8 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 switch classifies the ingress packets, maps the packets to different priority queues and then forwards the packets according to weighted round robin (WRR) scheduling algorithm to implement QoS function.

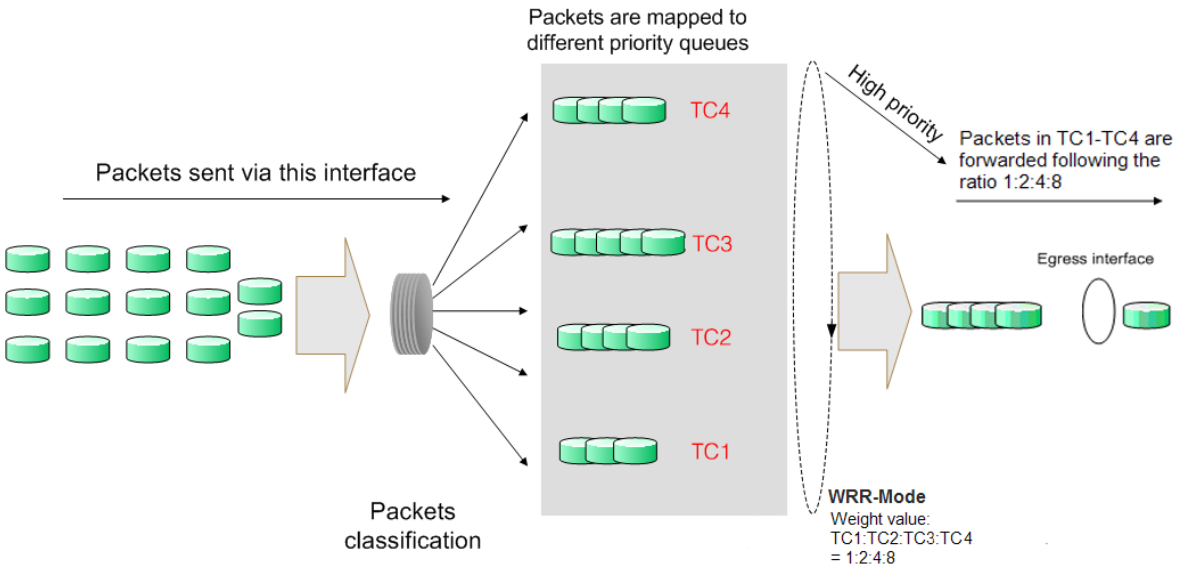


Figure 8-1 QoS function

- 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 switch implements three QoS modes based on port /802.1P /DSCP.
- 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. 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 TC1, TC2, TC3 and TC4 is 1:2:4:8.

➢ **QoS Mode**

This switch implements three QoS modes based on port /802.1P /DSCP. By default, the QoS mode based on port is enabled and the others are optional.

1. Port Based

When port-base QoS mode is enabled, the user can manually map the ingress packets of the port to four different priority queues. After that, the switch will preferentially send packets in the queue with higher priority, and only when the queue with higher priority is empty, packets in the queue with lower priority are sent.

2. 802.1P Based

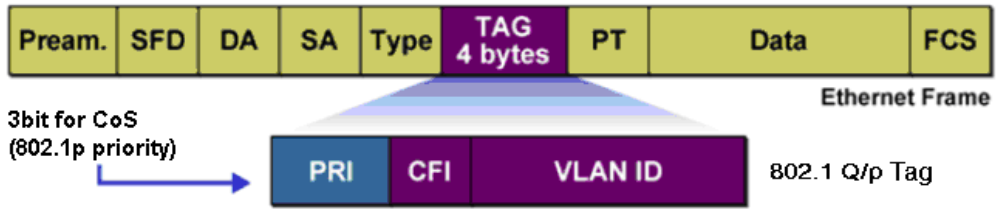


Figure 8-2 802.1Q frame

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. The 802.1p priority value determines how the switch maps the ingress packets to the priority queues. The mapping relationship between eight 802.1p priority value and priority queues is shown as follows:

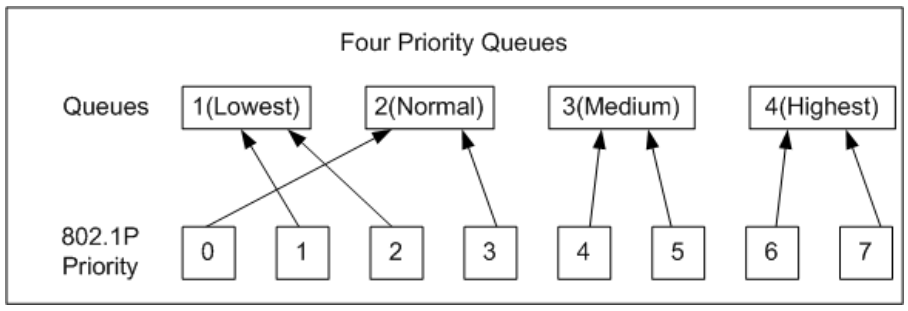


Figure 8-3 Map 802.1P priority

- Priority 1 and 2 are assigned to the 1 (Lowest) priority queue.
- Priority 0 and 3 are assigned to the 2 (Normal) priority queue.
- Priority 4 and 5 are assigned to the 3 (Medium) priority queue.
- Priority 6 and 7 are assigned to the 4 (Highest) priority queue.

When 802.1P QoS mode is enabled, the switch will automatically map the ingress packets to priority queues based on the 802.1p priority and the above mapping relationship. After that, the switch will preferentially send packets in the queue with higher priority, and only when the queue with higher priority is empty, packets in the queue with lower priority are sent. As for the untagged packets, the switch will forward it according to the default port-based QoS mode.

3. DSCP based

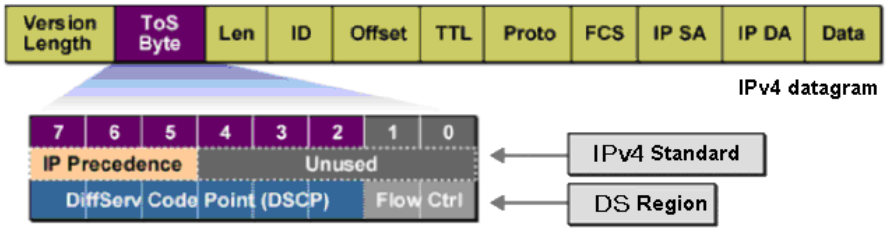


Figure 8-4 IP datagram

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 priority in the range of 0 to 63. The last 2 bits (bit 6 and bit 7) are reserved. The mapping relationship between sixty-four DSCP priority value and priority queues is shown as follows:

- Priority 0 to 15 are assigned to the 1 (Lowest) priority queue.
- Priority 16 to 31 are assigned to the 2 (Normal) priority queue.
- Priority 32 to 47 are assigned to the 3 (Medium) priority queue.
- Priority 48 to 63 are assigned to the 4 (Highest) priority queue.

When DSCP QoS mode is enabled, the switch will automatically map the ingress packets to priority queues based on the DSCP precedence and the above mapping relationship. After that, packets in all the queues are sent in order based on the weight value for each queue. The switch implements four scheduling queues, TC1, TC2, TC3 and TC4. TC1 has the lowest priority while TC4 has the highest priority. The weight value ratio of TC1, TC2, TC3 and TC4 is 1:2:4:8. As for the untagged packets, the switch will forward it according to the default priority mode.

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

8.1 QoS Basic

This switch classifies the ingress packets, maps the packets to different priority queues and then forwards the packets to implement QoS function.

This switch implements three priority modes based on port /802.1P /DSCP. The port-based QoS mode supports four priority queues. The port priority queues are labeled as 1, 2, 3, and 4.

On this page you can configure and view QoS mode and the port-based priority setting.

Choose the menu **QoS→QoS Basic** to load the following page.

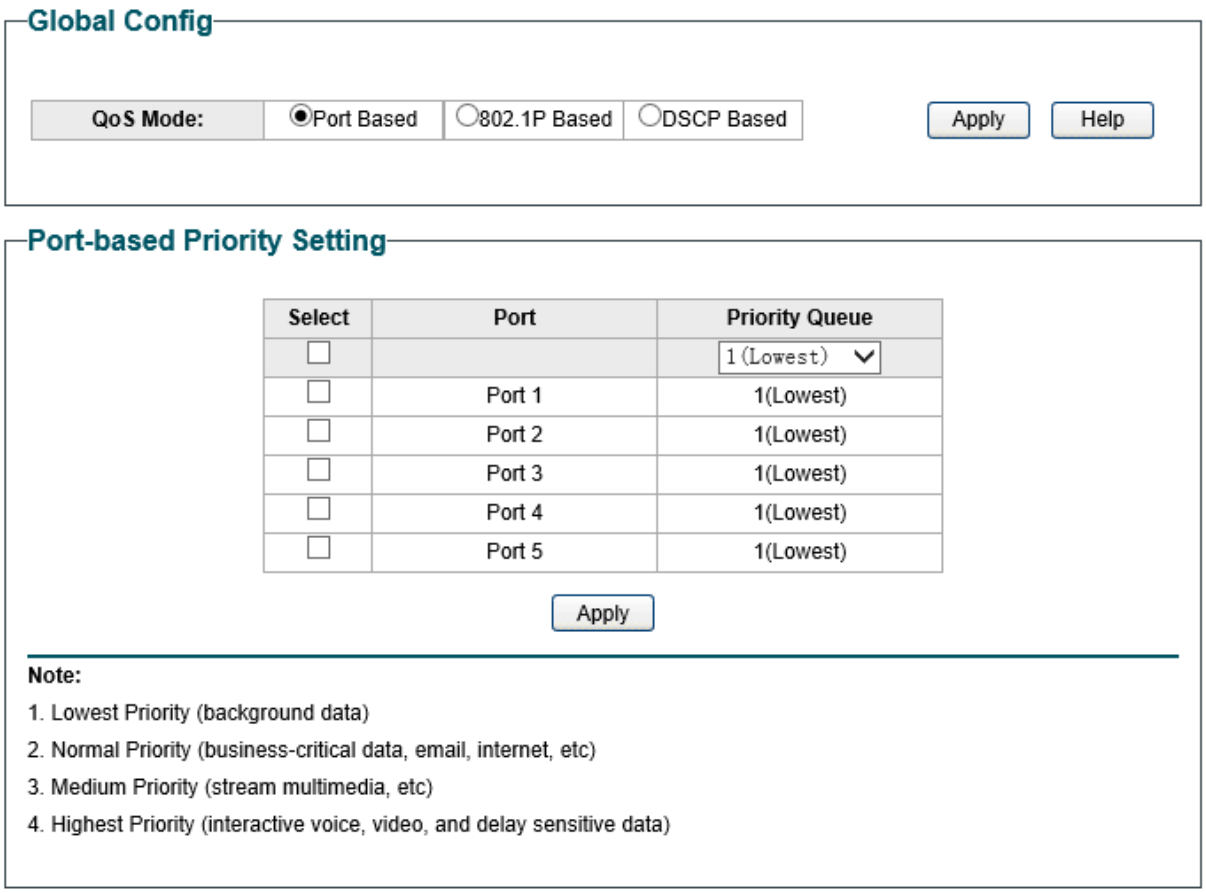


Figure 8-5 QoS Basic

The following entries are displayed on this screen:

➢ **Global Config**

QoS Mode: Select the desired QoS mode.

- **Port Based:** The switch classifies the ingress packets and maps the packets to different priority queues based on which port the packets come from.
- **802.1p Based:** The switch classifies the ingress packets and maps the packets to different priority queues based on the 802.1p priority field in the 802.1Q tag.
- **DSCP Based:** The switch classifies the ingress packets and maps the packets to different priority queues based on the DSCP priority field in the IP ToS field.

➢ **Port-based Priority Setting**

Port: Select the desired port to configure its priority queue. It is multi-optional.

Priority Queue: Specify the priority queue the packets from the port are mapped to. The priorities are labeled as 1~4 and among them the bigger the value, the higher the priority.

8.2 Bandwidth Control

Bandwidth control 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.

On this page you can configure and view the bandwidth control function information.

Choose the menu **QoS→Bandwidth Control** to load the following page.

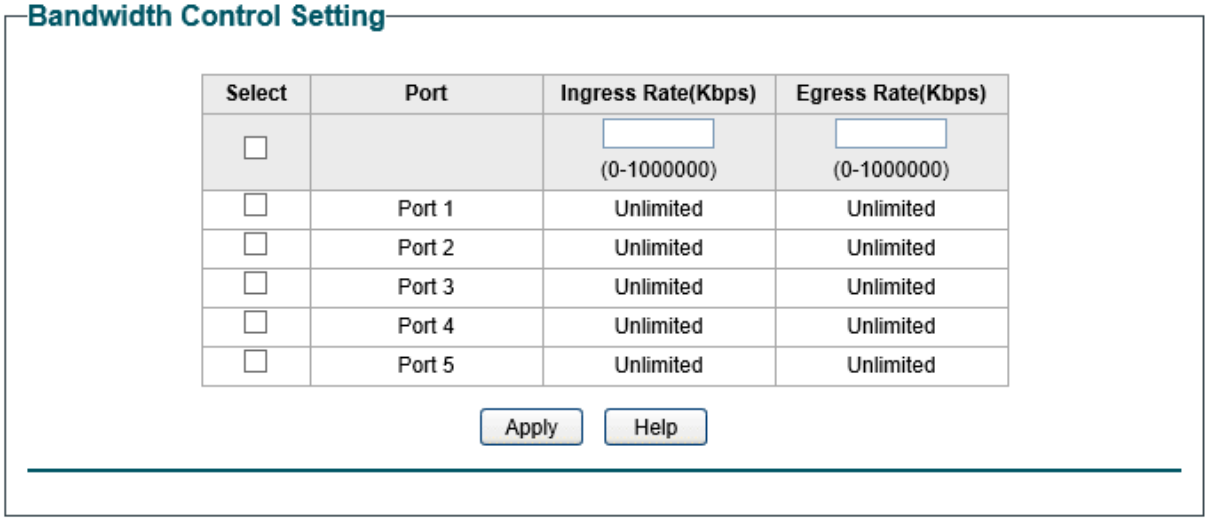


Figure 8-6 Bandwidth Control Setting

The following entries are displayed on this screen:

➢ **Bandwidth Control Setting**

Port: Select the desired port for bandwidth control configuration. It is multi-optional.

Ingress Rate(Kbps): Here you can configure the port ingress rate limit. If the rate for receiving packets on the port exceeds the set rate, the packets will be discarded.

Egress Rate(Kbps): Here you can configure the port egress rate limit. If the rate for sending packets on the port exceeds the set rate, the packets will be discarded.

Note:

1. A port cannot enable both Storm Control and Ingress Rate Control at the same time.
2. When egress bandwidth control feature is enabled for one or more ports, you are suggested to disable the flow control on each port to ensure the switch works normally.

8.3 Storm Control

Storm control function allows the switch to filter broadcast, multicast and UL frame in the network. If the transmission rate of the chosen packets exceeds the set bandwidth, the packets will be automatically discarded to avoid network broadcast storm.

On this page you can configure and view the storm control function information.

Choose the menu **QoS→Storm Control** to load the following page.

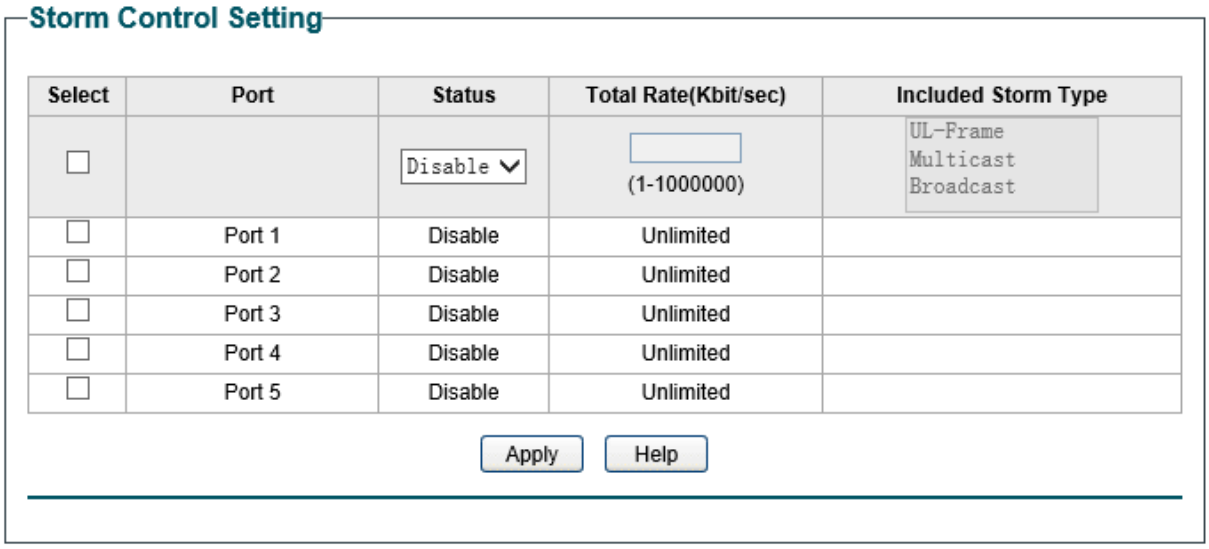


Figure 8-7 Storm Control Setting

The following entries are displayed on this screen:

➢ **Storm Control Setting**

Port: Select the desired port for storm control configuration. It is multi-optional.

Status: Allows you to enable or disable the storm control function.

Total Rate(Kbit/sec): Select the rate for receiving packets on the port. The packet traffic exceeding the rate will be discarded. It ranges from 0 to 1000000, and must be integral multiple of 64.

Included Storm Type: Select to filter broadcast/multicast/UL frame in the network, if the transmission rate of the chosen packets exceeds the set rate, the packets will be automatically discarded to avoid network broadcast storm. It is multi-optional.

- **UL-Frame:** If UL-Frame packets traffic exceeds the rate on the port, they will be discarded.
- **Multicast:** If multicast packets traffic exceeds the rate on the port, they will be discarded.
- **Broadcast:** If broadcast packets traffic exceeds the rate on the port, they will be discarded.

Note:

If you enable storm control feature for the ingress rate control-enabled port, the ingress rate control feature will be disabled for this port.

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Chapter 9 PoE

Note:

Only TL-SG1016PE supports configuring PoE function.

PoE (Power over Ethernet) technology describes a system to transmit electrical power along with data to remote devices over standard twisted-pair cable in an Ethernet network. It is especially useful for supplying power to IP telephones, wireless LAN access points, cameras and so on.

➢ **Composition**

A PoE system usually consists of PSE and PD.

PSE: Power sourcing equipment (PSE) is a device such as a switch that provides power on the Ethernet cable to the linked device.

PD: A powered device (PD) is a device accepting power from the PSE and thus consumes energy. PDs fall into two types, standard PDs and nonstandard PDs. Standard PDs refer to the powered devices that comply with IEEE 802.3af and IEEE 802.3at. Examples include wireless LAN access points, IP Phones, IP cameras, network hubs, embedded computers etc.

➢ **Advantage**

- Cheap cabling: The remote device such as cameras can be powered by PSE in no need of prolonging its power cord additionally and Ethernet cable is much cheaper than AC wire or power cord.
- Easy to connect: PoE uses only one Ethernet cable with no need of external power supply.
- Reliable: A powered device can be either powered by PSE using Ethernet cable or powered through the provided power adapter. It is very convenient to provide a backup power supply for the PDs.
- Flexibility: In compliance with IEEE 802.3af and IEEE 802.3at, global organizations can deploy PoE everywhere without concern for any local variance in AC power standards, outlets, plugs, or reliability.
- Wide use: It can be applied to wireless LAN access points, IP Phones, IP cameras, network hubs, embedded computers etc.

TL-SG1016PE is a Power Sourcing Equipment (PSE). Ports 1-8 on the switch support Power over Ethernet (PoE) function, which can automatically detect and supply power for those powered devices (PDs) complying with IEEE 802.3af and IEEE 802.3at. The maximum power TL-SG1016PE can supply is 110W and the maximum power each PoE port can supply is 30W.

9.1 PoE Config

On this page, you can configure the parameters to implement PoE function.

Choose the menu **PoE→PoE Config** to load the following page.

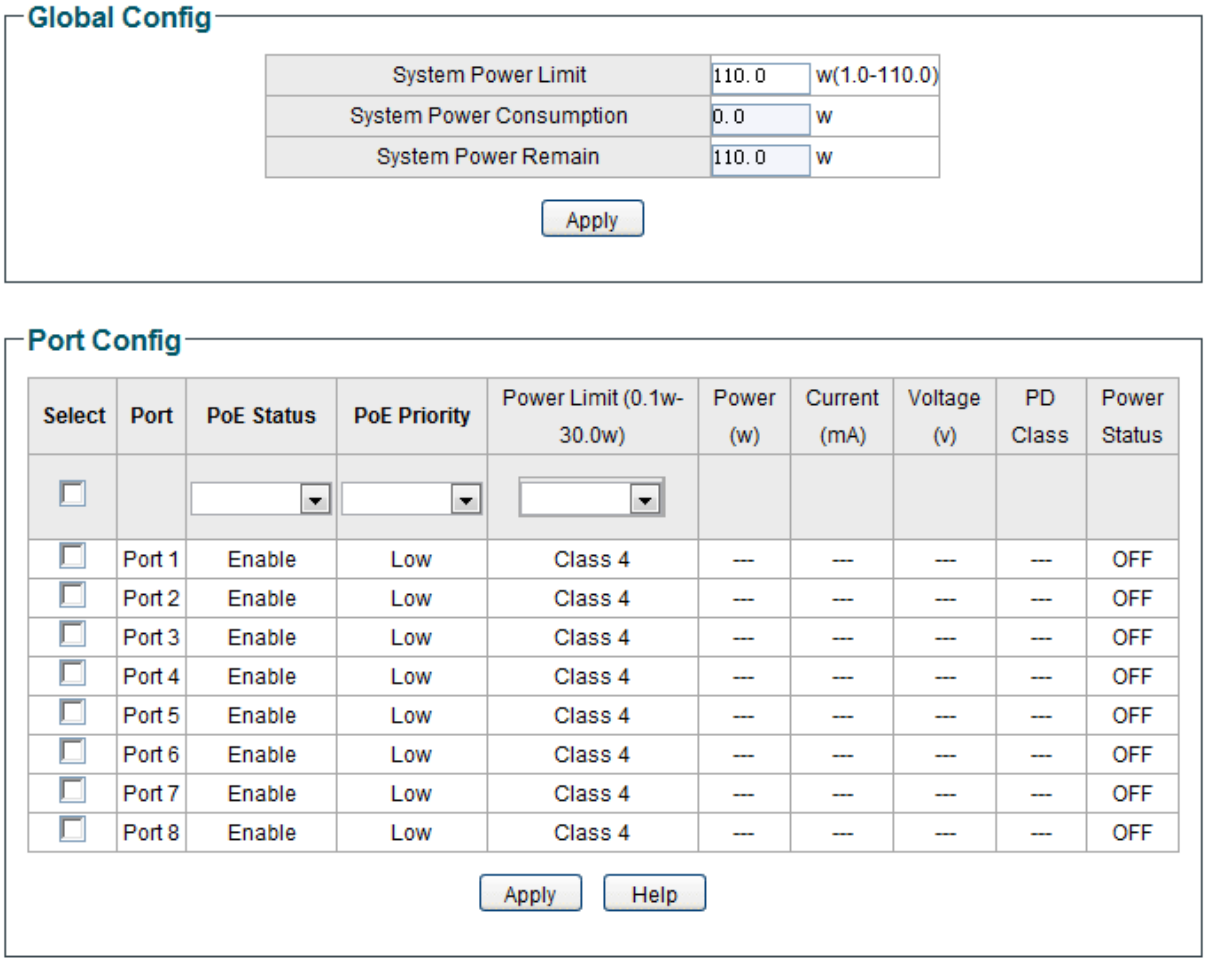


Figure 9-1 PoE Config

The following entries are displayed on this screen:

- **Global Config**

  System Power Limit: Specify the max power the PoE switch can supply. It ranges from 1W to 110W.

  System Power Consumption: Displays the PoE switch's real time system power consumption.

  System Power Remain: Displays the PoE switch's real time remaining system power.

- **Port Config**

  Port: Select the desired port for PoE configuration. It is multi-optional.

PoE Status:	Select to disable/enable the PoE feature for the corresponding port. If set enable, the corresponding port can supply power to the linked PD (Powered Device).
PoE Priority:	The priority levels include High, Middle and Low in descending order. When the supply power exceeds the system power limit, the port with lower priority will stop supplying power; If these ports have the same priority levels, the port with larger port number will stop supplying power first.
Power Limit (0.1w-30w):	Defines the max power the corresponding port can supply. Class1 represents 4W, Class2 represents 7W, Class3 represents 15.4W and Class4 represents 30W.
Power (W):	Displays the port's real time power supply.
Current (mA):	Displays the port's real time current.
Voltage (V):	Displays the port's real time voltage.
PD Class:	Displays the class the linked PD (Powered Device) belongs to.
Power Status:	Displays the port's real time power status.

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Appendix A: Specifications

Standards	IEEE802.3 Ethernet Media Access Control (MAC) Protocol
	IEEE802.3i 10Base-T Ethernet
	IEEE802.3u 100Base-TX Fast Ethernet
	IEEE802.3ab 1000Base-T Gigabit Ethernet
	IEEE802.3x Flow Control
	IEEE802.3af (only TL –SG108PE/TL-SG1016PE support)
	IEEE802.3at (only TL-SG1016PE supports)
	IEEE802.1p QoS
	IEEE802.1q VLAN
Transmission Rate	Ethernet: 10Mbps HD, 20Mbps FD
	Fast Ethernet: 100Mbps HD, 200Mbps FD
	Gigabit Ethernet: 2000Mbps FD
Transmission Medium	10Base-T: UTP/STP of Cat. 3 or above
	100Base-TX: UTP/STP of Cat. 5 or above
	1000Base-T: 4-pair UTP (≤100m) of Cat. 5, Cat. 5e, Cat.6 or above
LED	For TL-SG105E/ TL-SG108E: Power, 10/100Mbps,1000Mbps For TL-SG108PE: Power, PoE Max , Link/Act(Port 1- 8), PoE Status(Port 1- 4) For TL-SG1016DE/ TL-SG1024DE: Power, 1000Mbps, Link/Act For TL-SG1016PE: PWR, PoE Max, Speed(Port1- 16), PoE Status(Port 1- 8), FAN
Transmission Method	Store and Forward
Packets Forwarding Rate	10BASE-T：14881pps/port 100BASE-TX：148810pps/port 1000Base-T：1488095pps/port

Operating Environment	Operating Temperature: 0℃ to 40℃
	Storage Temperature: -40℃ to 70℃
	Operating Humidity: 10% to 90% RH Non-condensing
	For TL-SG105E/ TL-SG108E/ TL-SG108PE: Storage Humidity: 5% to 95% RH Non-condensing For TL-SG1016DE/ TL-SG1024DE/TL-SG1016PE: Storage Humidity: 5% to 90% RH Non-condensing

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