User Guide

Easy Smart Configuration Utility

TL-SG1016DE/TL-SG1024DE/TL-SG1016PE

TL-SG105E/TL-SG108E/TL-SG108PE

REV3.1.0
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Chapter 1 About this Guide

This User Guide contains information for setup and guidance of the Easy Smart Configuration Utility. 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

In this Guide the following conventions are used:

- **Menu Name→Submenu Name** indicates the menu structure. **System→System Info→System Summary** means the System Summary page under the System Info menu option 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.

1.3 Overview of This Guide

Chapter	Introduction
Chapter 1 About This Guide	Introduces the guide structure and conventions.
Chapter 2 Getting Started	Introduces the installation and uninstallation of the utility, and the overview of its interface.

Chapter	Introduction
Chapter 3 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 login the Web management page. ● Backup and Restore: Save the current configuration file to your computer or download a backup configuration file to your switch. ● System Reboot: Reboot your switch. ● System Reset: Reset the switch to the default. ● Firmware Upgrade: Update the firmware of the switch.
Chapter 4 Switching	This module is used to configure the basic functions of the switch. ● Port Setting: Configure and view the basic parameters of each port, including the port status, speed, duplex mode and flow control. ● IGMP Snooping: Enable IGMP snooping feature and view the current IGMP Group information. ● LAG: Configure and view the information of the LAG group of the switch.

Chapter	Introduction
Chapter 5 Monitoring	This module is used to monitor the traffic information of the switch, and provide the convenient method to locate and solve the network problem. ● Port Statistics: View the statistic information of each port. ● Port Mirror: 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). ● Cable Test: Diagnose the connection status of the cable connected to the switch and the distance to the problem location. ● Loop Prevention: Detect loops using loopback detection packets, and then display an alert or further block the corresponding port.
Chapter 6 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 7 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 8 PoE	This module is used to configure the PoE function for the switch to supply power for PD devices.
Chapter 9 Help	Lists the help and version information of the utility.

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Chapter 2 Getting Started

2.1 Introduction

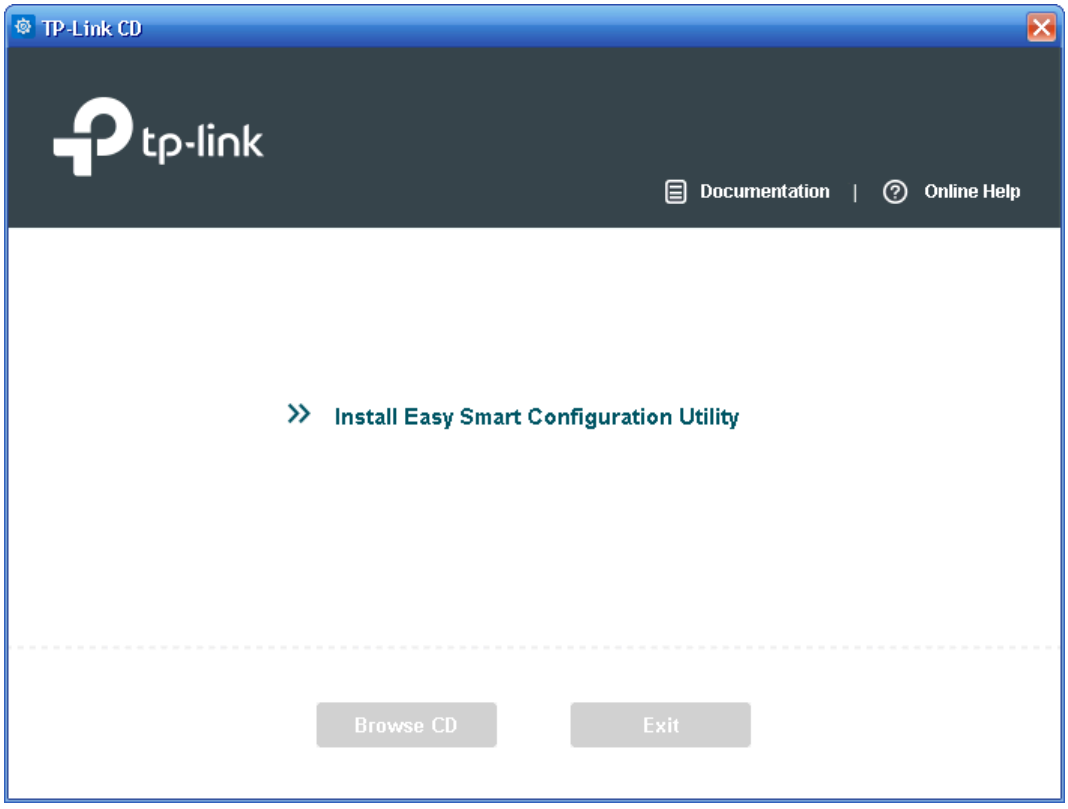
Easy Smart Configuration Utility is the management software for the TP-Link Easy Smart Switches. The utility allows operators to centrally manage entire networks of the Easy Smart Switches, which include TL-SG105E/TL-SG108E/TL-SG108PE/TL-SG1016DE/TL-SG1024DE/ TL-SG1016PE. Among of them, TL-SG105E V1.0 and TL-SG108E V1.0 can only be configured with Easy Smart Configuration Utility while others can also be managed on their Web-Management page. Throughout this guide, we will take TL-SG105E V3.0 for example.

2.2 Install the Easy Smart Configuration Utility

If an earlier version of the utility is present on your computer, please install this version to replace the older version.

1. Insert the provided resource CD that came with your switch into your computer that you want to use to manage your switches.

   The resource CD home screen displays.



   You can read the Easy Smart Configuration Utility User Guide by clicking **Documentation** in the upper right corner of the above screen and view all the files on the resource CD by clicking **Browse CD**.

If the home screen does not display, browse the files on the CD and double-click **AutoRun.exe**. You can also directly read the User Guide and double-click the icon in the Utility folder to install the utility with the same steps from the following step 2 to step 3.

2. Click the **Install Easy Smart Configuration Utility** link on the resource CD home screen.
   a. The InstallShield Wizard prepares the setup shown as the following screen. Please wait for a moment.

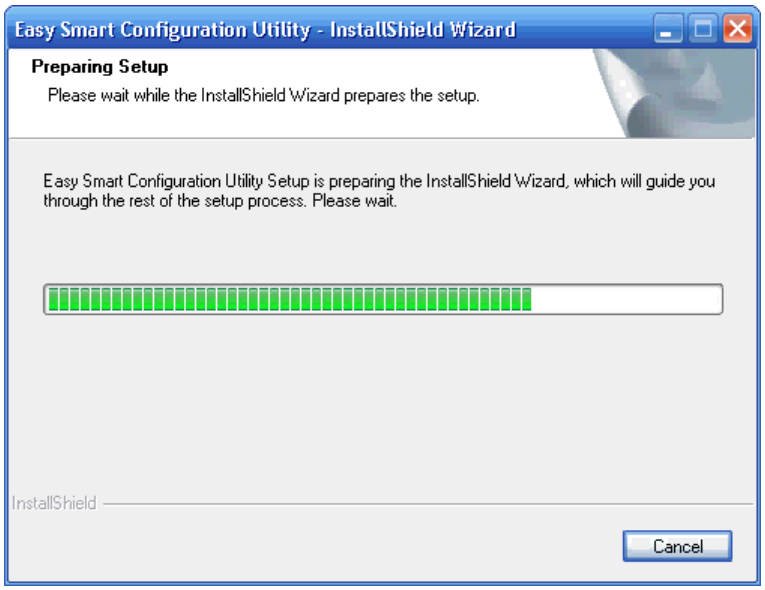


Figure 2-1 Preparing to Install

   b. Then the following screen will appear. Click **Next** to continue. If you want to stop the installation, click **Cancel**.

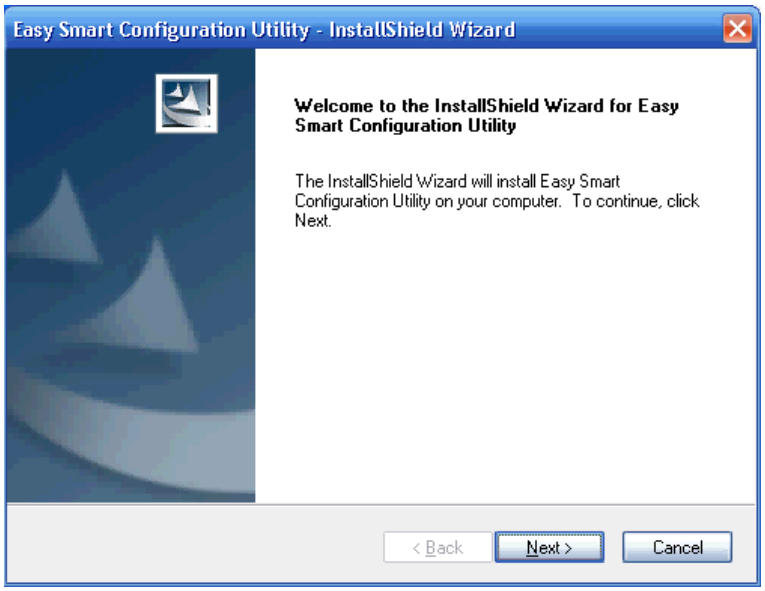


Figure 2-2 Welcome to the InstallShield Wizard

   c. Choose the destination location for the installation files and click **Next** to continue.

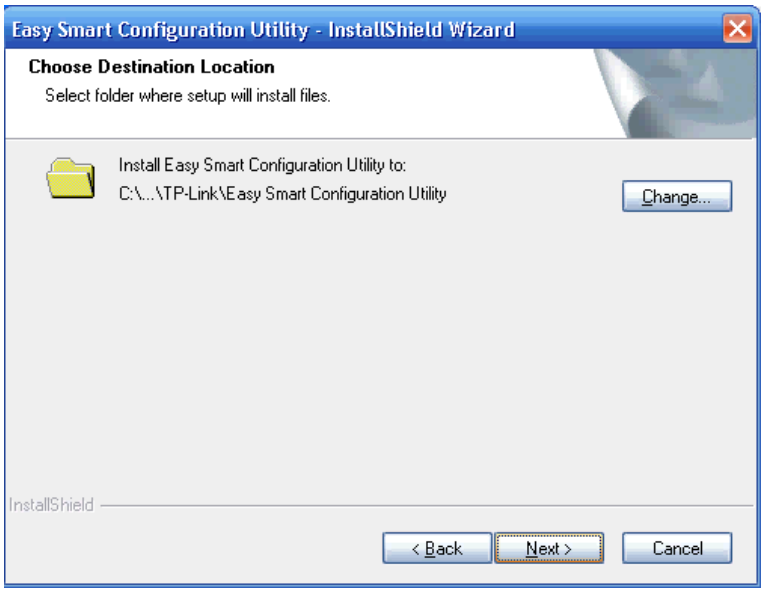


Figure 2-3 Choose Destination Location

By default, the installation files are saved in the Program Files folder of system disk. Click the **Change** button to modify the destination location properly to your need.

d. Now the wizard is ready to begin the installation. Click **Install** to begin the installation on the following screen.

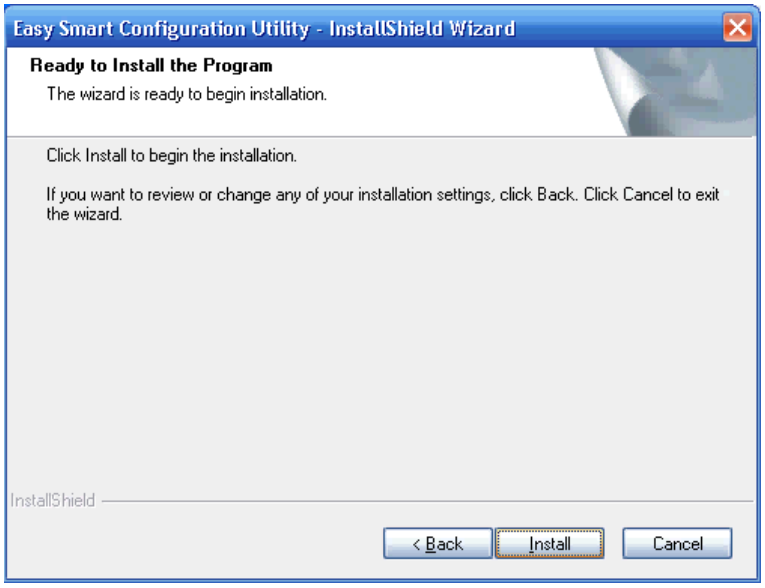


Figure 2-4 Ready to Install the Program

e. The InstallShield Wizard is installing Easy Smart Configuration Utility shown as the following screen. Please wait for a while.

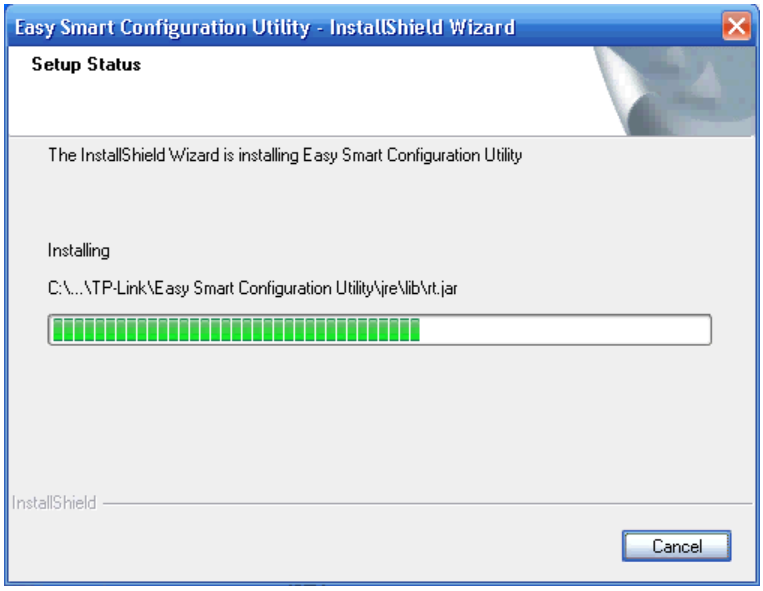


Figure 2-5 Setup Status

f. Click **Finish** to complete the installation on the following screen.

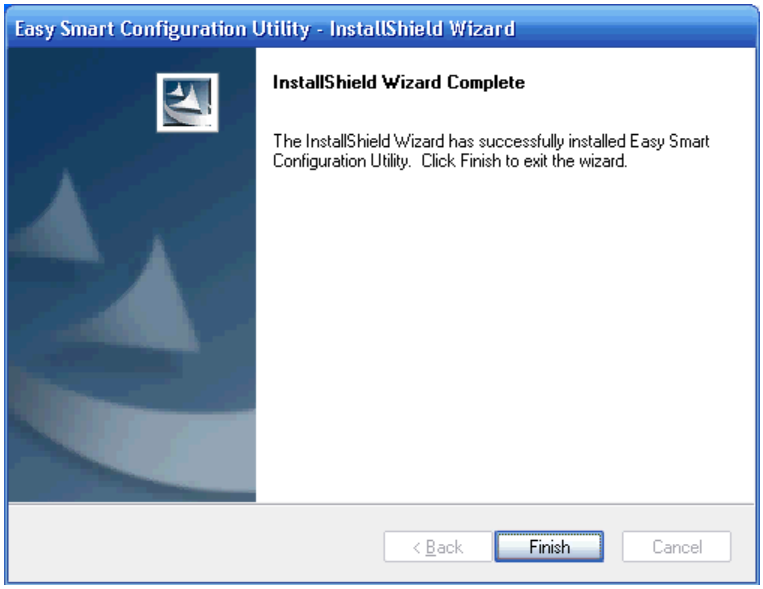


Figure 2-6 InstallShield Wizard Complete

3. The installation process creates a TP-Link subdirectory under the \Program Files directory on your computer, copies the utility program into the \Program Files\TP-Link\Easy Smart Configuration Utility directory, and places a utility icon on the computer desktop.

2.3 Switch Discovery

When the utility is launched, it immediately searches the network for TP-Link Easy Smart Switches.

The discovered switches are listed as below.

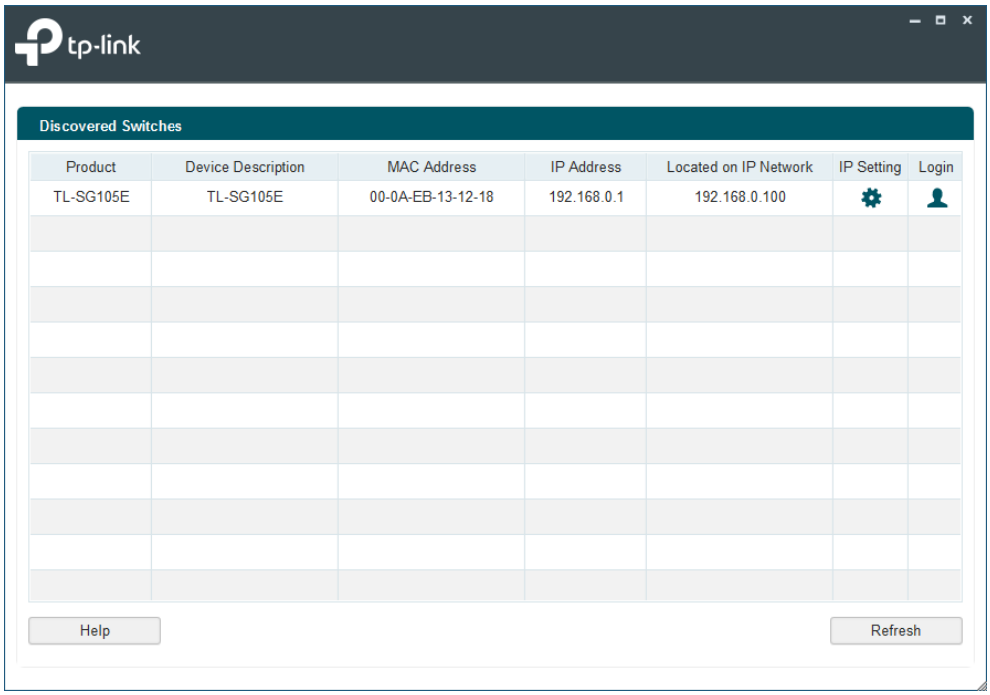


Figure 2-7 Main Page

Click **Help** in the left bottom to access the TP-Link support website for more help.

Note:

The maximum number of the discovered switches is 30.

2.4 Switch Setting

You can select a switch and click to configure or display its status.

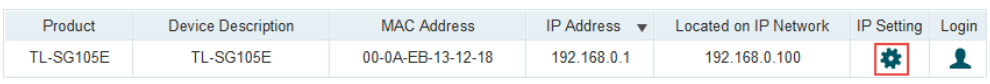


Figure 2-8 Discovered Switch

The setting figure will be shown as below:

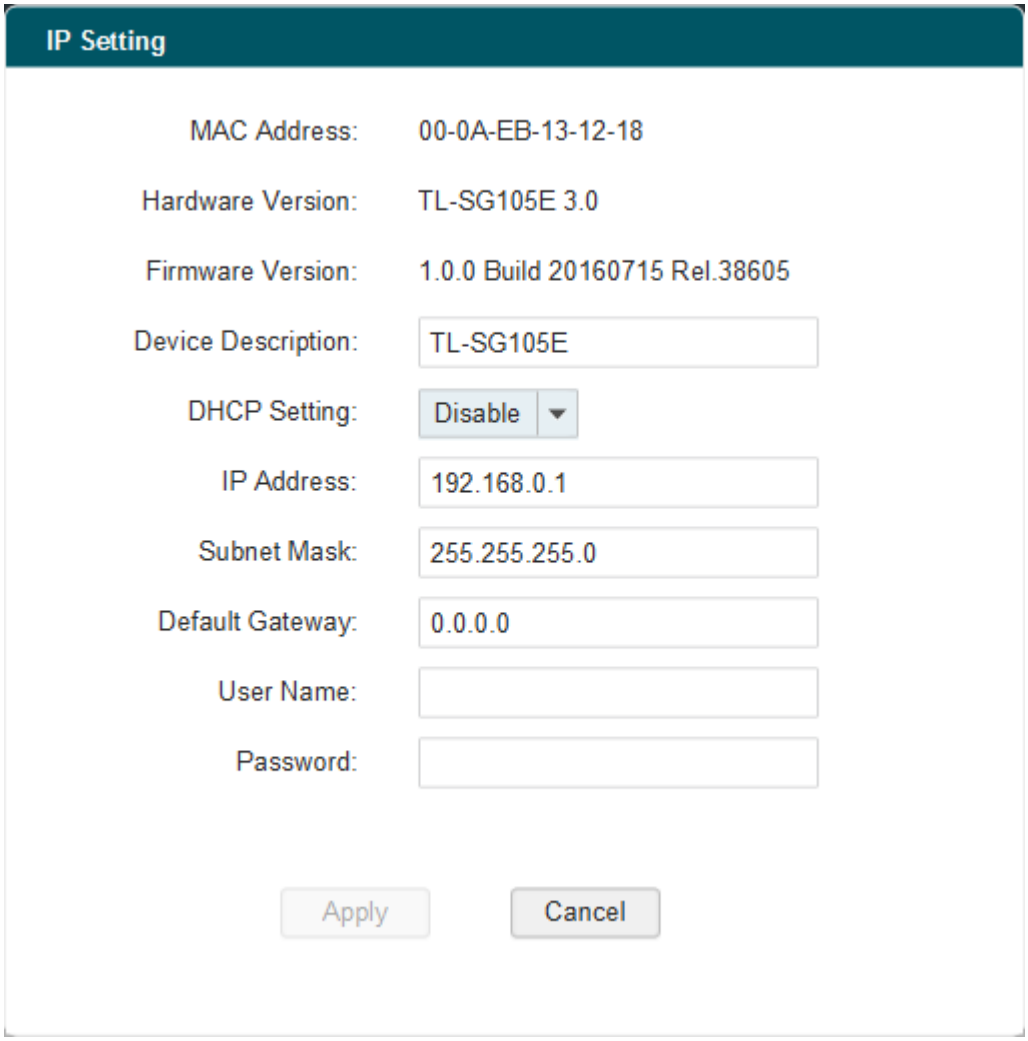


Figure 2-9 Switch Setting

You can configure the switch's Device Description, DHCP Setting, IP Address, Subnet Mask and Default Gateway on this page. The login User Name and Password are required to complete the configuration. By default, they are both **admin**.

When the switch IP Address is not in the same subnet with host IP Address, it can be discovered by the utility, but you cannot login the utility management page. Therefore, it needs to set the switch IP Address in the same subnet with host IP Address, which allows you to login the utility management page and configure the switch.

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 select the checkbox behind **Save Config**.

2.5 Refresh

Click **Refresh** in Figure 2-7 to restart the switch discovering process.

2.6 Utility Features Overview

You can select a switch and click or double click its corresponding entry to log on to the switch for further configuration. Please ensure that host IP address and switch IP address must be in the same subnet.

Figure 2-10 Discovered Switch

Enter the User Name and Password to login the configuration interface. They are both **admin** by default. You can select **Remember Me** to remember the User Name and Password.

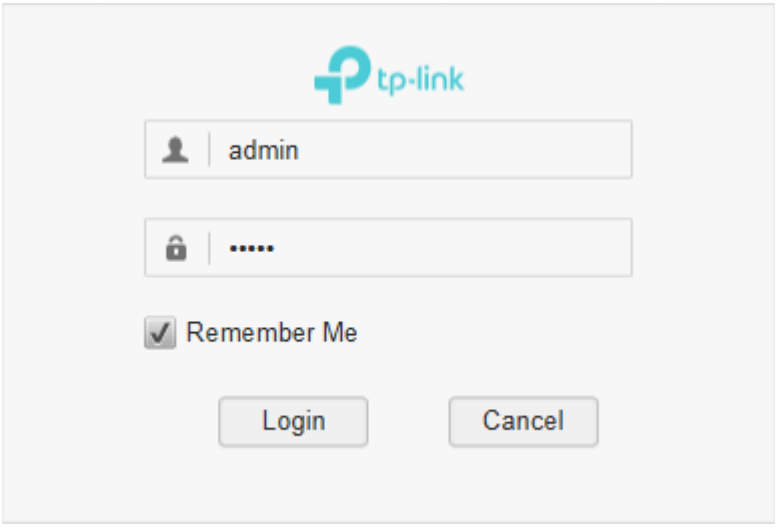


Figure 2-11 Login

The configuration figure is shown as blow:

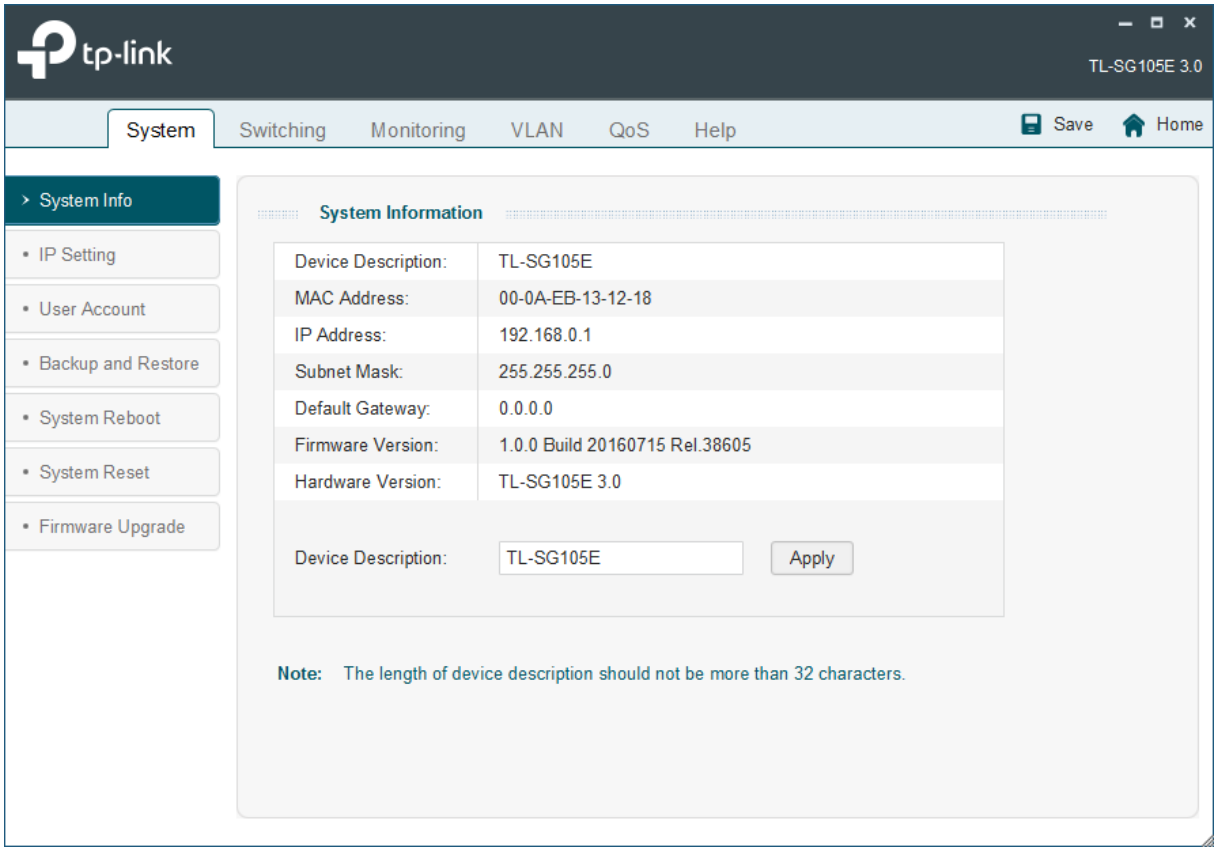


Figure 2-12 Switch Configuration

Device description field shows the device model number of the switch that you are managing.

Click the icon to save the current configurations.

Click the icon to return to the discovering page.

Note:

The switch you log on to should be in the same subnet with your computer.

2.7 Uninstall the Utility

If you want to remove the Easy Smart Configuration Utility, please take the following steps:

1. On the Windows taskbar, click the **Start** button, point to **All Programs→TP-Link → Easy Smart Configuration Utility**, and then click **Uninstall Easy Smart Configuration Utility**, shown as the following figure.

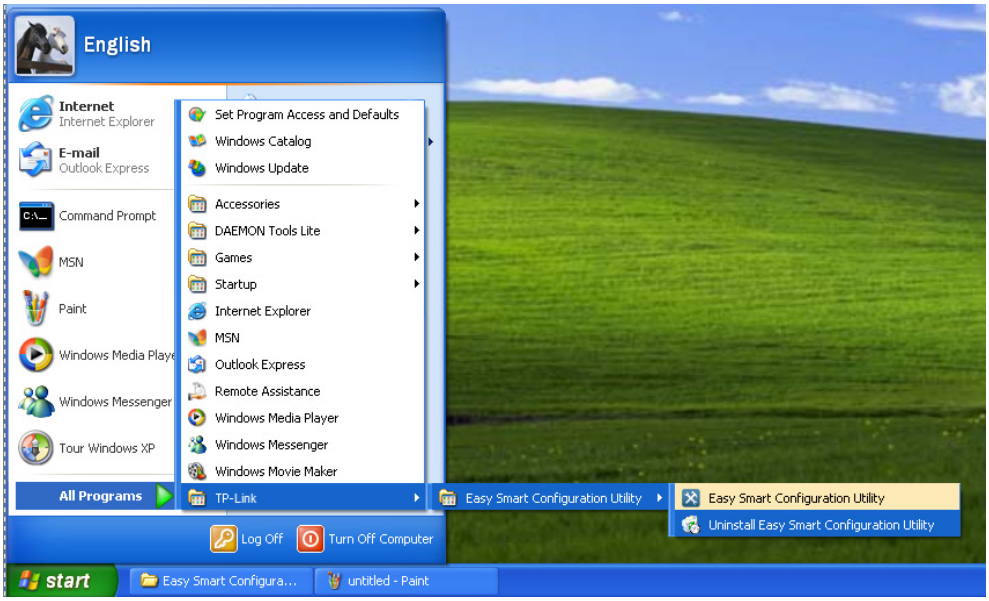


Figure 2-13 Preparing Setup

2. Then the following screen will appear. If you want to stop the remove process, click **Cancel**.

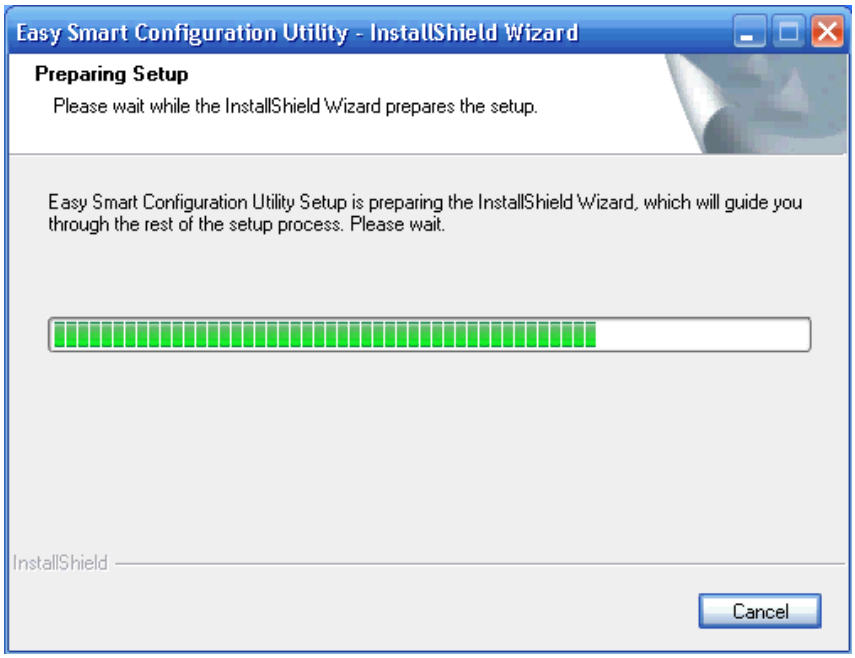


Figure 2-14 Preparing Setup

3. On the continued screen, click **Yes** to remove the utility from your PC.

Figure 2-15 Uninstall the Utility

4. Click **Finish** to complete.

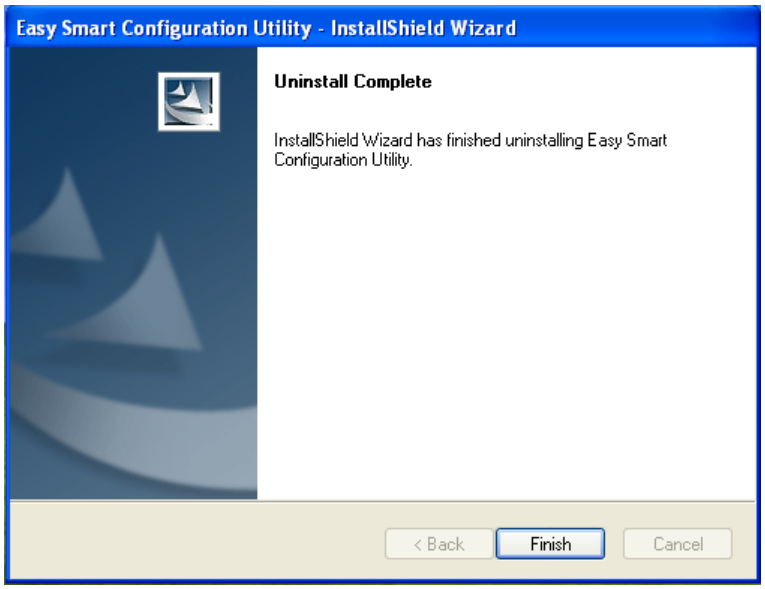


Figure 2-16 Uninstall Complete

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Chapter 3 System

The System module is mainly for system configuration of the switch, including seven submenus: **System Info**, **IP Setting**, **User Account**, **Backup and Restore**, **System Reboot**, **System Reset** and **Firmware Upgrade**.

3.1 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.

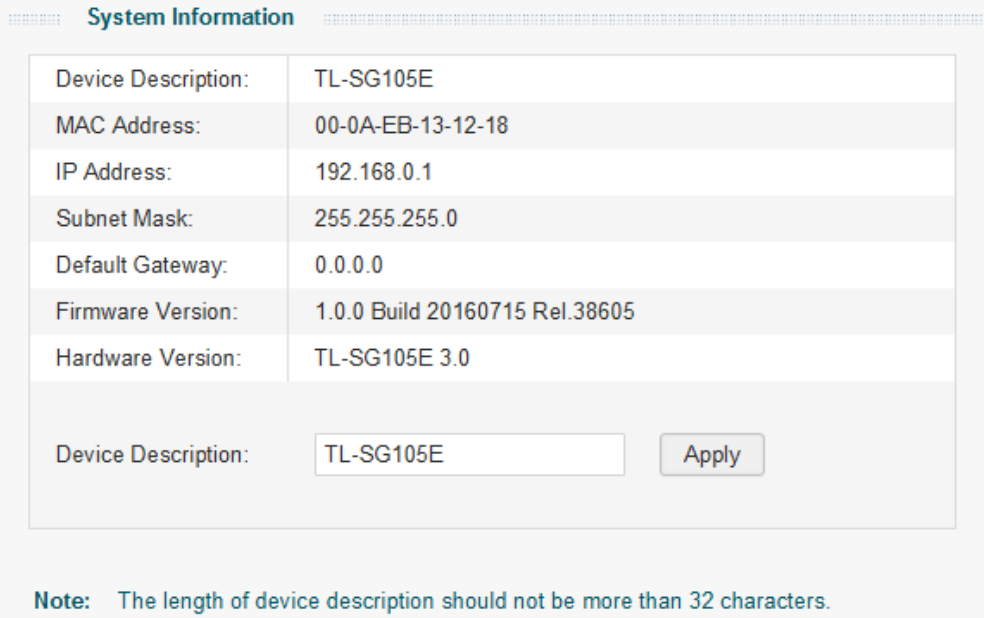

Figure 3-1 System Information

- **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.

3.2 IP Setting

Each device in the network possesses a unique IP address. You can login the IP Setting page to operate the switch using this IP address. The switch supports the DHCP mode to obtain an IP address from the DHCP server.

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.

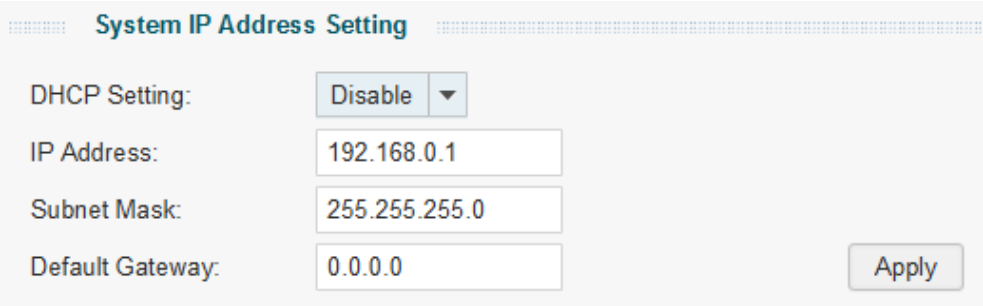

Figure 3-2 System IP Address Setting

The following entries are displayed on this screen:

➢ **System IP Address Setting**

DHCP Setting: Enable or disable the DHCP function. If DHCP setting 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: Enter the system IP of the switch. The default system IP is 192.168.0.1 and you can change it appropriate to your needs.

Subnet Mask: Enter the subnet mask of the switch. By default, the switch uses 255.255.255.0 as the subnet mask.

Default Gateway: Enter the default gateway of the switch.

3.3 User Account

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

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

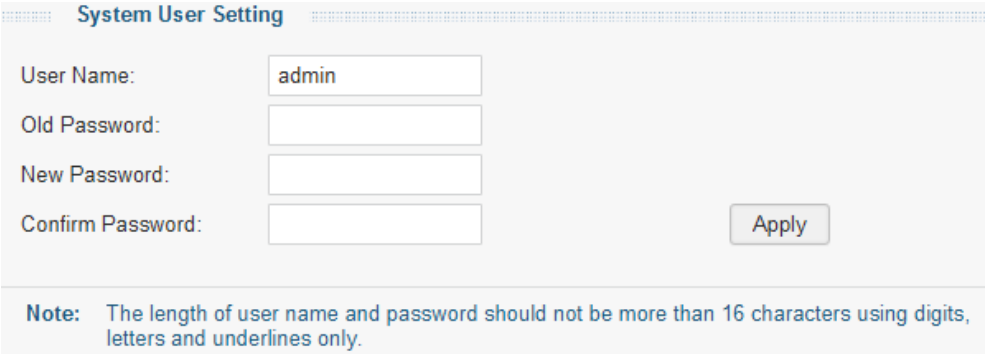

Figure 3-3 System User Setting

The following entries are displayed on this screen:

➢ **System User Setting**

User Name:	Create a name for administrator's login.
Old Password:	Type in the old password.
New Password:	Type in a new password for administrator's login.
Confirm Password:	Retype the new password.

Note:

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

3.4 Backup and Restore

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

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

Figure 3-4 System Config Backup

The following entries are displayed on this screen:

- **System 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.

- **System Config Restore**

  Restore Config: Click the **Choose File** button to select the backup configuration file, and then click the **Restore Config** button. It will take effect after the switch automatically reboots.

Note:

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

3.5 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 Reboot** to load the following page.

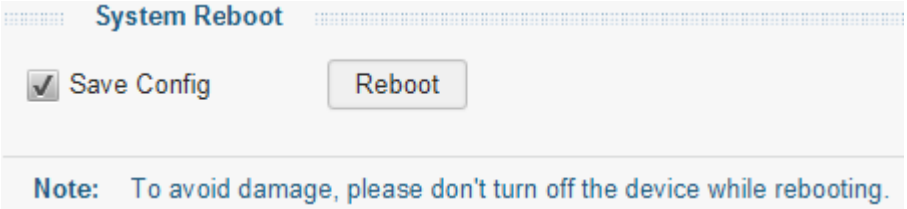

Figure 3-5 System Reboot

Note:

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

3.6 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 Reset** to load the following page.

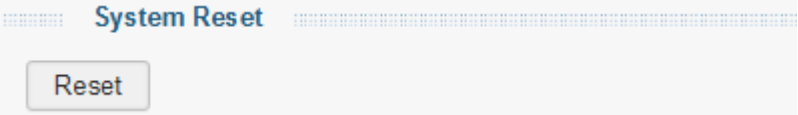

Figure 3-6 System Reset

Note:

After the system is reset, the switch will be reset to the default and all the settings will be cleared.

3.7 Firmware Upgrade

The switch system can be upgraded via this 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→Firmware Upgrade** to load the following page.

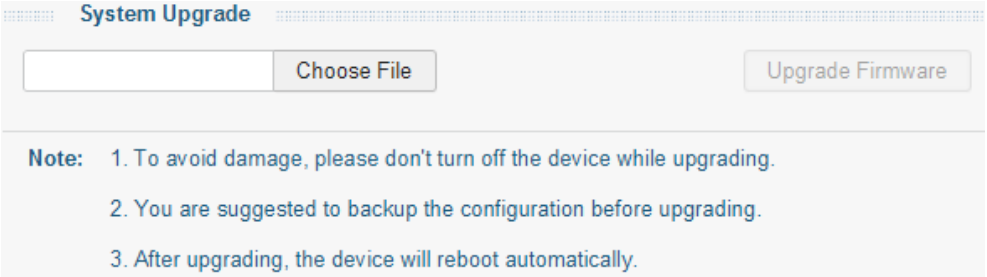

Figure 3-7 System Upgrade

Note:

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

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Chapter 4 Switching

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

4.1 Port Setting

On this page, you can configure the basic parameters for the ports. 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 you can enable the port when it is in need.

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.

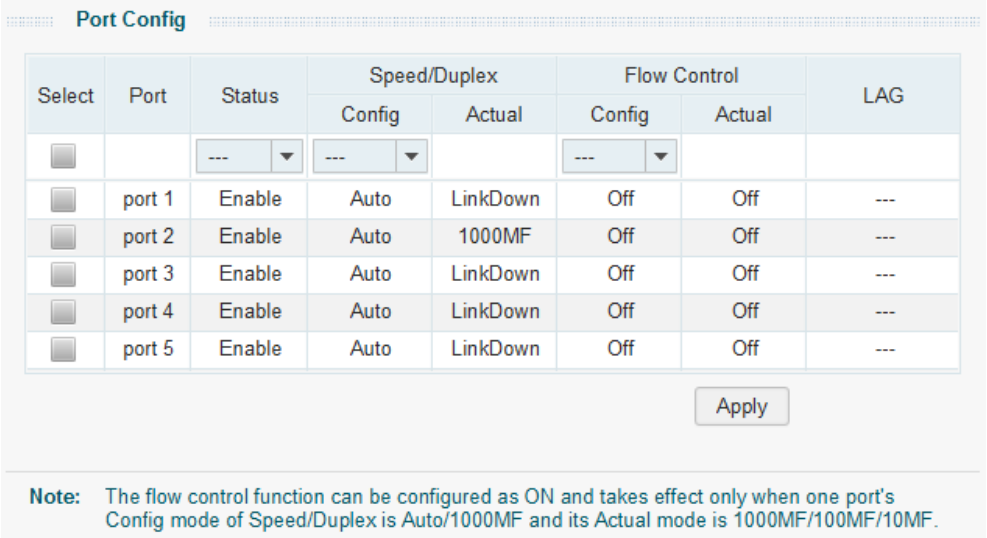

Figure 4-1 Port Config

The following entries are displayed on this screen:

➢ **Port Config**

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

Port: Displays the port number.

Status: Allows you to Enable/Disable the port. When Enable is selected, the port can forward the packets normally.

Speed and Duplex:	**Config:** 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. When "Auto" is selected, the Speed and Duplex mode will be determined by auto-negotiation. **Actual:** Displays the actual working state of the port.
Flow Control:	**Config:** Select On/Off to Enable/Disable the Flow Control feature. When Flow Control is enabled, the switch can synchronize the speed with its peer to avoid the packet loss caused by congestion. **Actual:** Displays the state of the Flow Control function of the port. It is off by default.
LAG:	Displays the LAG number which the port belongs to.

Note:

1. The switch can not be managed through the disabled port. Please enable the port which is used to manage the switch.
2. The parameters of the port members in a LAG should be set as the same.

4.2 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 and view the current IGMP Group information.

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

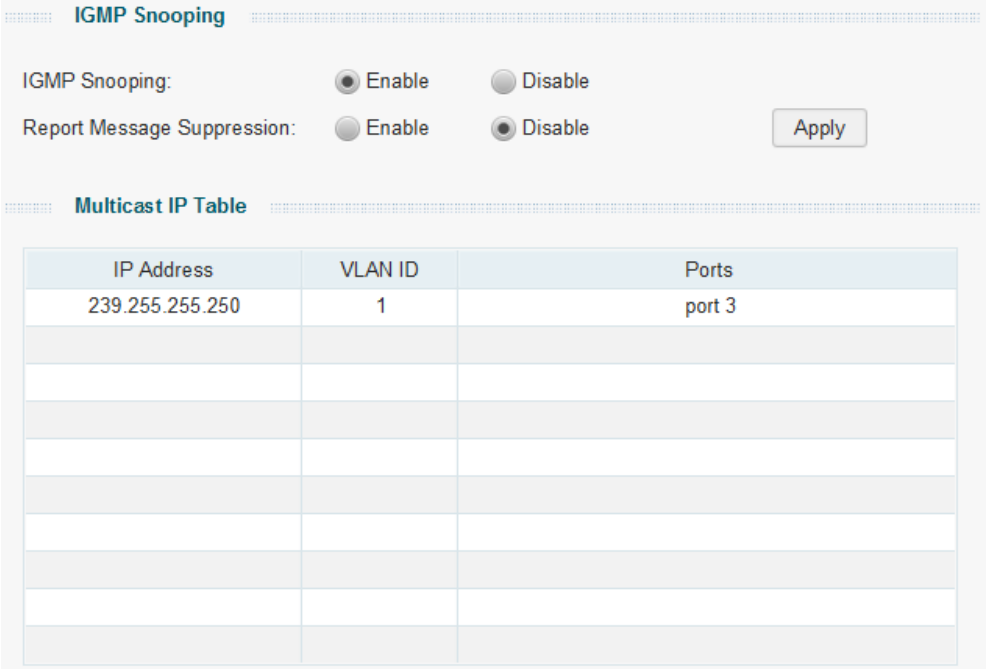

Figure 4-2 IGMP Snooping

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.

- **Multicast IP Table**

  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.

4.3 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.

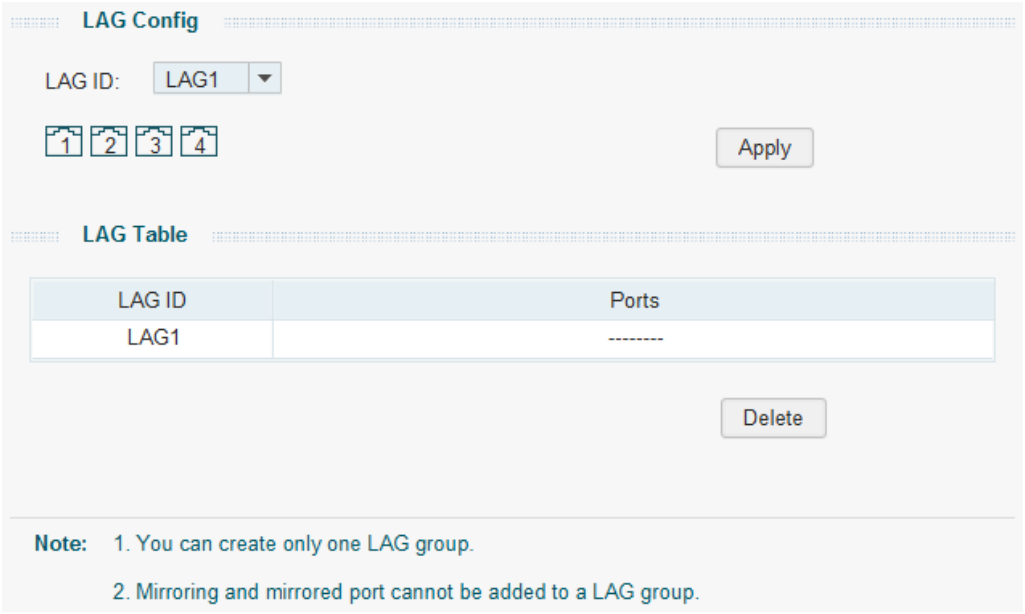

Figure 4-3 LAG Config

Here you can configure and view the port parameters.

- **LAG Config**

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

  Port: Select the port as the LAG group member. Clearing all the ports of the LAG group will delete this LAG group.

- **LAG Table**

  LAG ID: Displays the LAG number here.

  Ports: Displays the LAG member ports.

  Delete: Delete the selected LAG.

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Chapter 5 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**.

5.1 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.

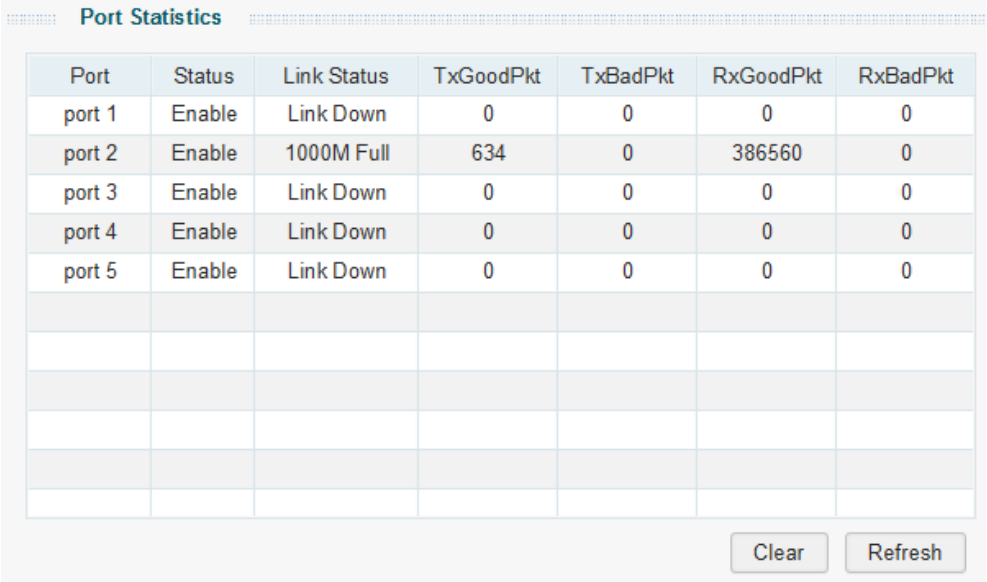

Figure 5-1 Port Statistics

The following entries are displayed on this screen:

- **Port Statistics**

Port: Displays the port number of the switch.

Status: Displays whether the port is enabled or disabled.

Link Status: Displays the link state of the port.

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.

5.2 Port Mirror

Port mirror function is 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.

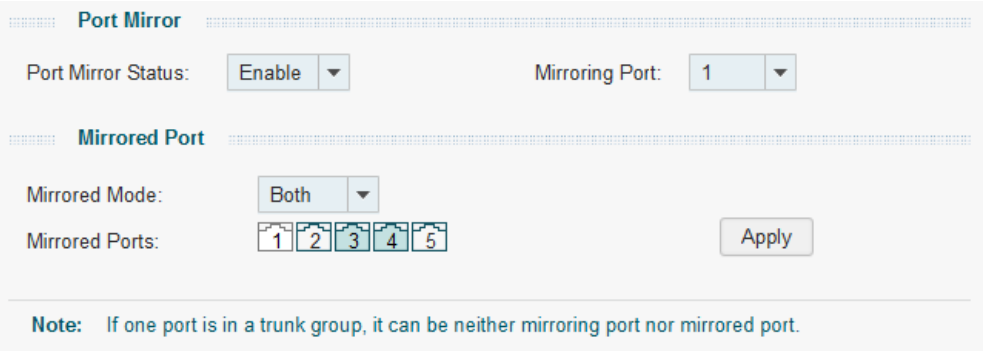

Figure 5-2 Port Mirror (for TL-SG105E/TL-SG108E/TL-SG108PE)

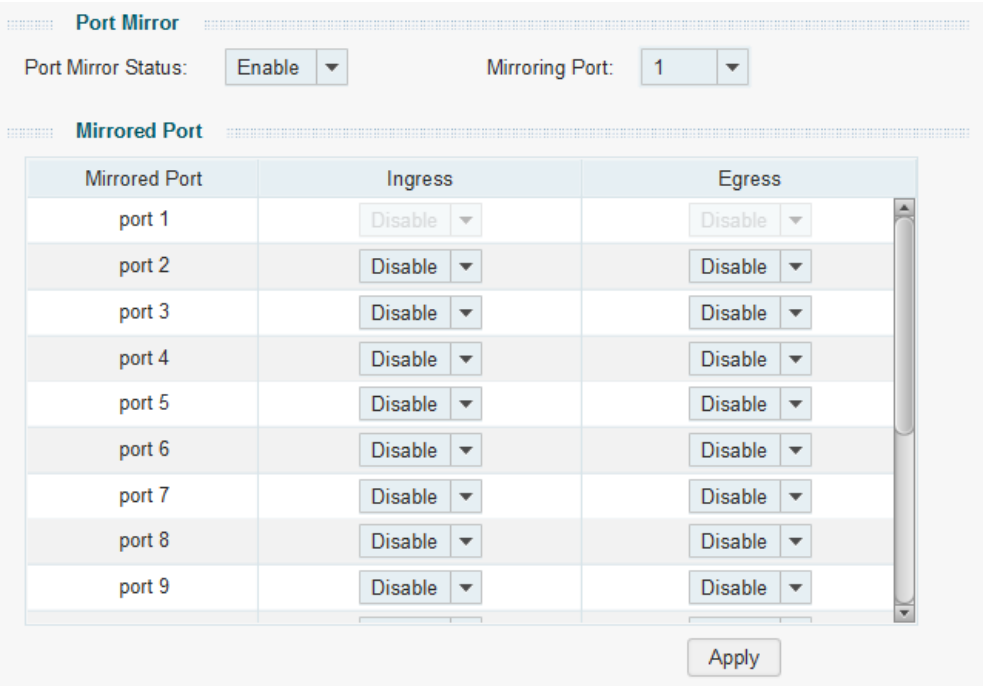

Figure 5-3 Port Mirror (for TL-SG1016DE/TL-SG1024DE/TL-SG1016PE)

The following entries are displayed on this screen:

- **Port Mirror**

  Port Mirror Status: Enable or disable the port mirror feature of the specified port.

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

- **Mirrored Port**

  Mirrored Mode: Select a mode as the mirrored mode.

  Ingress: the incoming packets received by the mirrored port will be copied to the mirroring port.

  Egress: the outgoing packets sent by the mirrored port will be copied to the mirroring port.

  Both: all the incoming and outgoing packets of the mirrored port will be copied to the mirroring port.

  Note: For TL-SG1016DE/TL-SG1024DE/TL-SG1016PE, you can choose enable or disable **Ingress** and **Egress** to control the packets to be copied.

  Mirrored Ports: Click the port icon to select the corresponding port as mirrored port to monitor the traffic.

  For TL-SG108E V1.0, with only one port as mirrored port, it supports ingress and egress monitoring; when two or more ports is selected as mirrored ports, it only supports the ingress monitoring.

Note:

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

5.3 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.

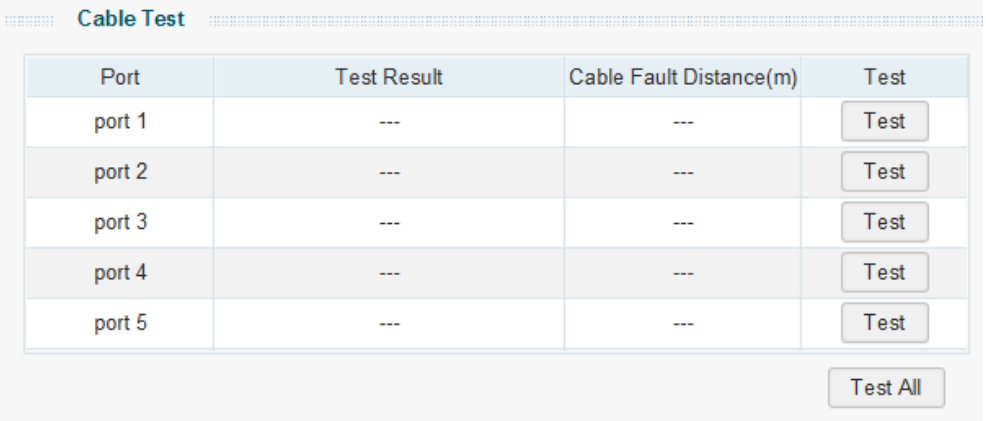

Figure 5-4 Cable Test

The following entries are displayed on this screen:

➢ **Cable Test**

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, close (or short), open and crosstalk.

Normal : The cable is normally connected.

Close (or short): 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.
Test:	Click **Test** to diagnose the cable connected to this port.
Test ALL:	Click **Test All** to carry on the cable test on all ports.

Note:

The test result is just for your reference.

5.4 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.

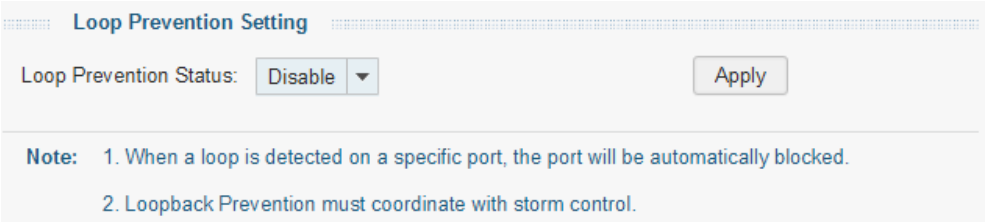

Figure 5-5 Loop Prevention Setting

The following entries are displayed on this screen:

- **Loop Prevention Setting**

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

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Chapter 6 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.

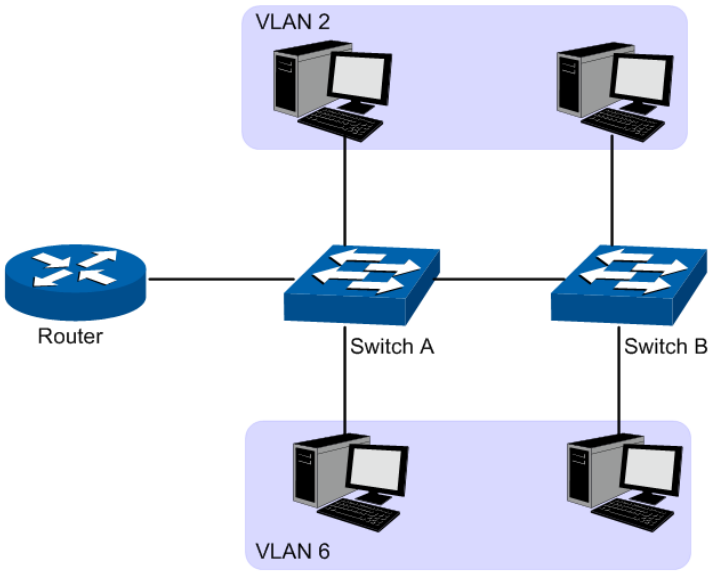

Figure 6-1 VLAN Implementation

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:

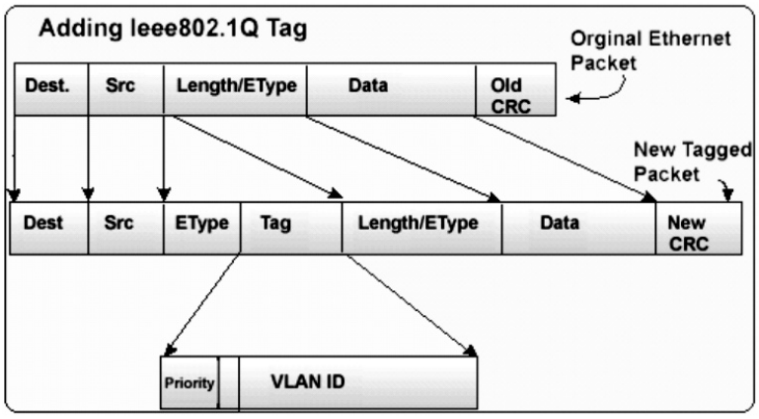

Figure 6-2 IEEE 802.1Q Frame

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**.

6.1 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.

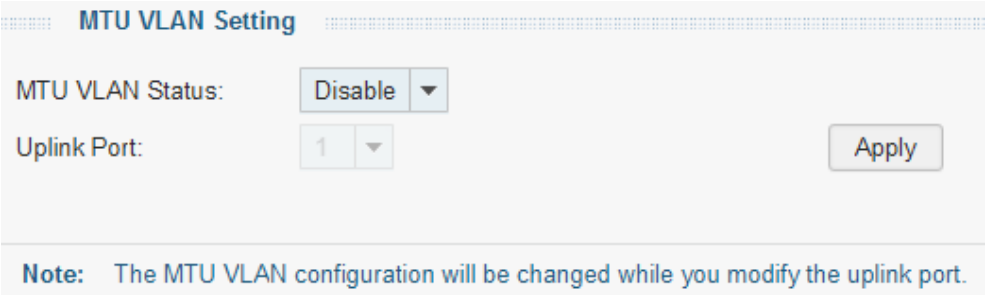

Figure 6-3 MTU VLAN Configuration

The following entries are displayed on this screen:

- **MTU VLAN Setting**

  MTU VLAN Status: Enable/Disable the MTU VLAN function globally.

  Uplink Port: Select the uplink port from the drop-down list.

6.2 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.

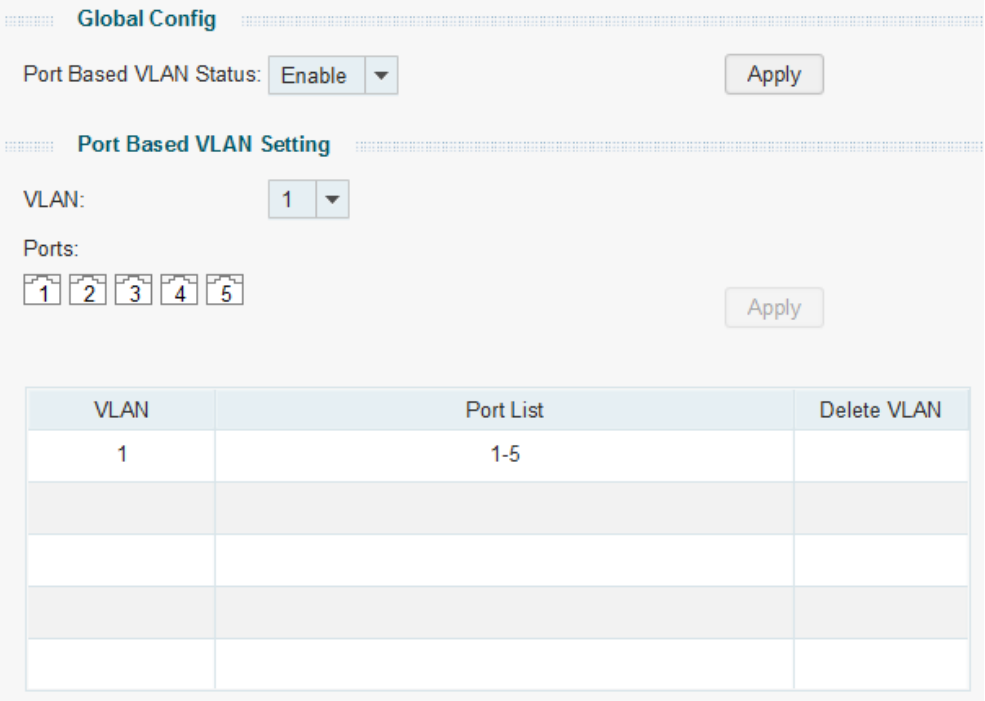

Figure 6-4 Port Based VLAN Configuration

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:

- **Global Config**

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

- **Port Based VLAN Setting**

  VLAN ID: Select the ID number of VLAN from the drop-down list.

  Ports: Click the port icon to select the port of the VLAN. It is multi-optional. If this field is selected, it indicates the port belongs to the current VLAN.

  VLAN: Displays the ID number of VLAN.

  Port List: Displays the port members in the VLAN.

  Delete VLAN: Click **Delete** to delete the corresponding VLAN.

Note:

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

6.3 802.1Q 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.

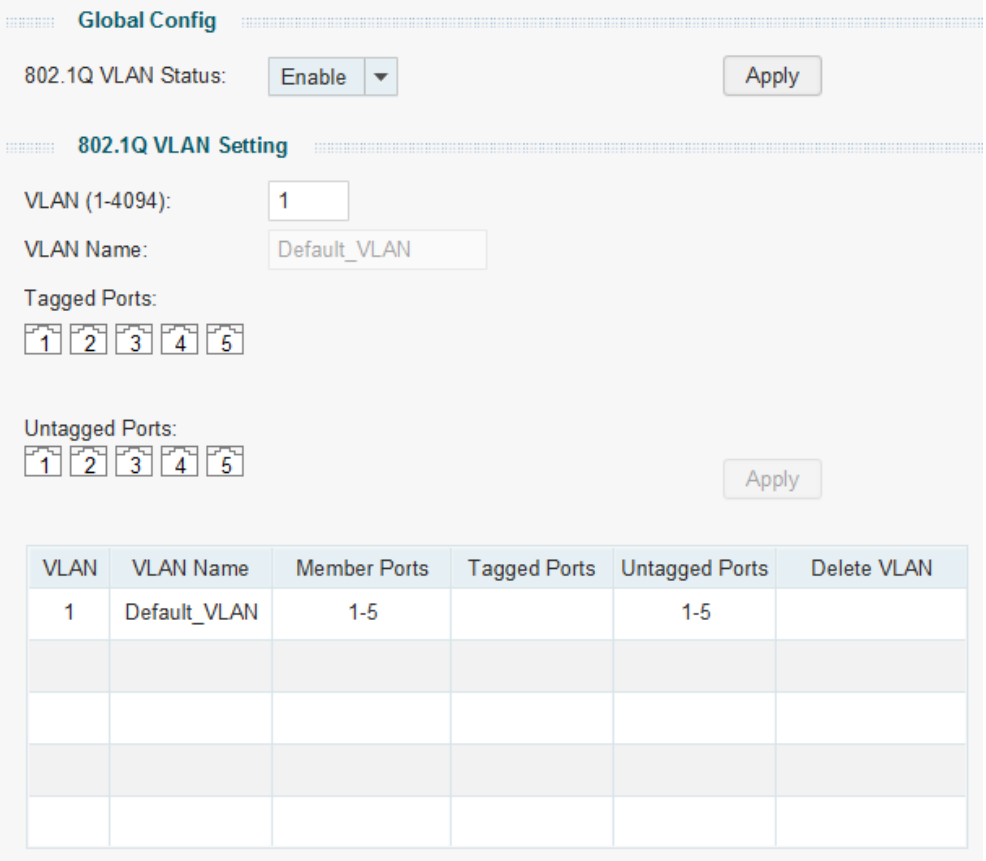

Figure 6-5 802.1Q VLAN Configuration

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:

- **Global Config**

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

- **802.1Q VLAN Setting**

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

VLAN Name：	Give a name to the VLAN for identification.
Untagged Ports：	Click the port icon to configure the egress rule of the traffic on this port as untagged. The switch drops the tag header before sending the packet.
Tagged Ports：	Click the port icon to configure the egress rule of the traffic on this port as tagged. The switch adds the tag header before sending the packet.
VLAN ID：	Displays the ID number of VLAN.
VLAN Name：	Displays the user-defined name of VLAN.
Member Ports：	Displays the port members in the VLAN.
Tagged Ports：	Displays the tagged port members in the VLAN.
Untagged Ports:	Displays the untagged port members in the VLAN.
Delete VLAN:	Click **Delete** to delete the corresponding VLAN.

6.4 802.1Q 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 packet.

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 VLAN PVID Setting** to load the following page.

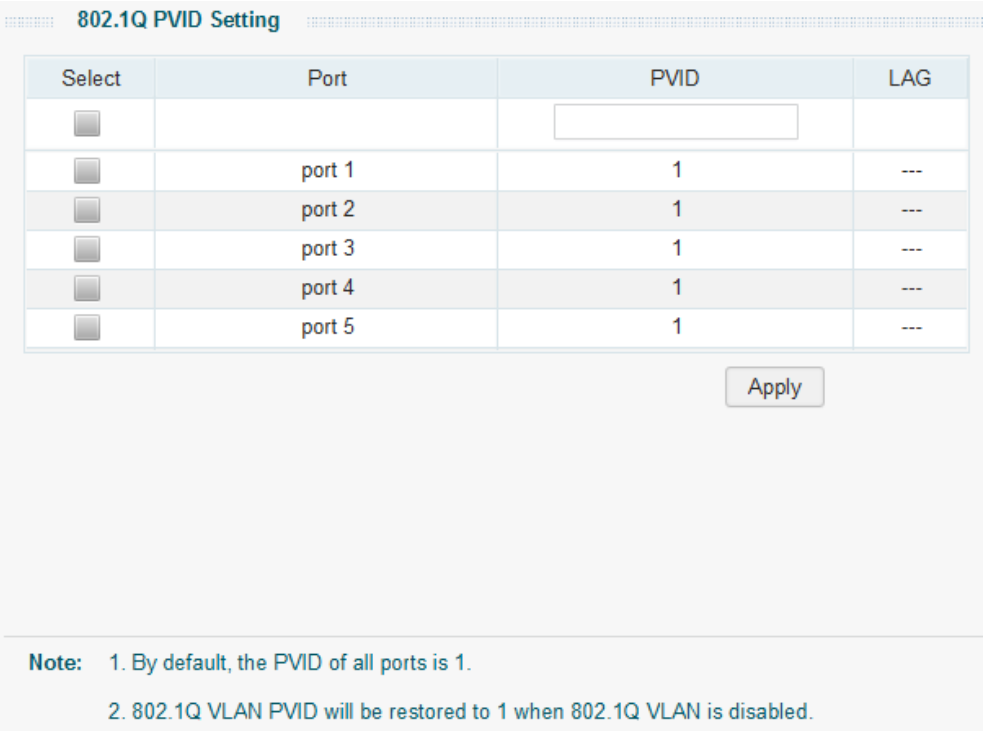

Figure 6-6 802.1Q VLAN PVID Setting

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.

LAG: Displays the LAG to which the port belongs.

Note:

1. 802.1Q VLAN should be enabled before setting PVID.
2. You can go to **Switching→LAG** page to configure the LAG status of the port.

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Chapter 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 switch classifies the ingress packets, maps the packets to four different priority queues and then forwards the packets according to WRR scheduling algorithms to implement QoS function.

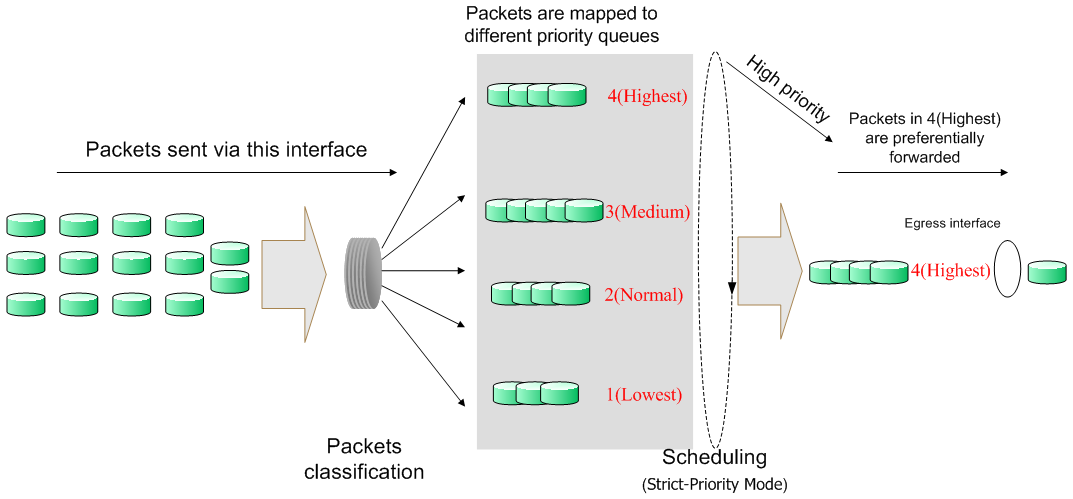

Figure 7-1 QoS Function

- Traffic classification: Identifies packets conforming to certain characters according to certain rules.
- Map: This switch supports four priority queues. The priority queues are labeled as 1(Lowest), 2(Normal), 3(Medium) and 4(Highest), among them the bigger the value, the higher the priority. The ingress packets are mapped to four different priority queues based on the QoS modes. This 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. In all QoS modes, this switch adopts WRR scheduling algorithm. In WRR scheduling algorithm, 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.

➢ **QoS Mode**

This 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 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

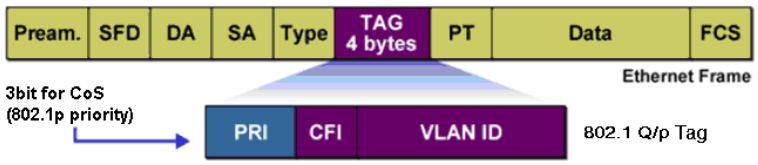

Figure 7-2 802.1Q Frame

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. 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:

- 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, 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.

3. DSCP based

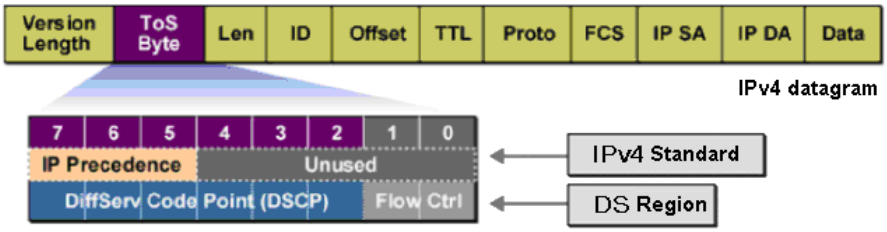

Figure 7-3 IP datagram

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 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**.

7.1 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, on 802.1P or on 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.

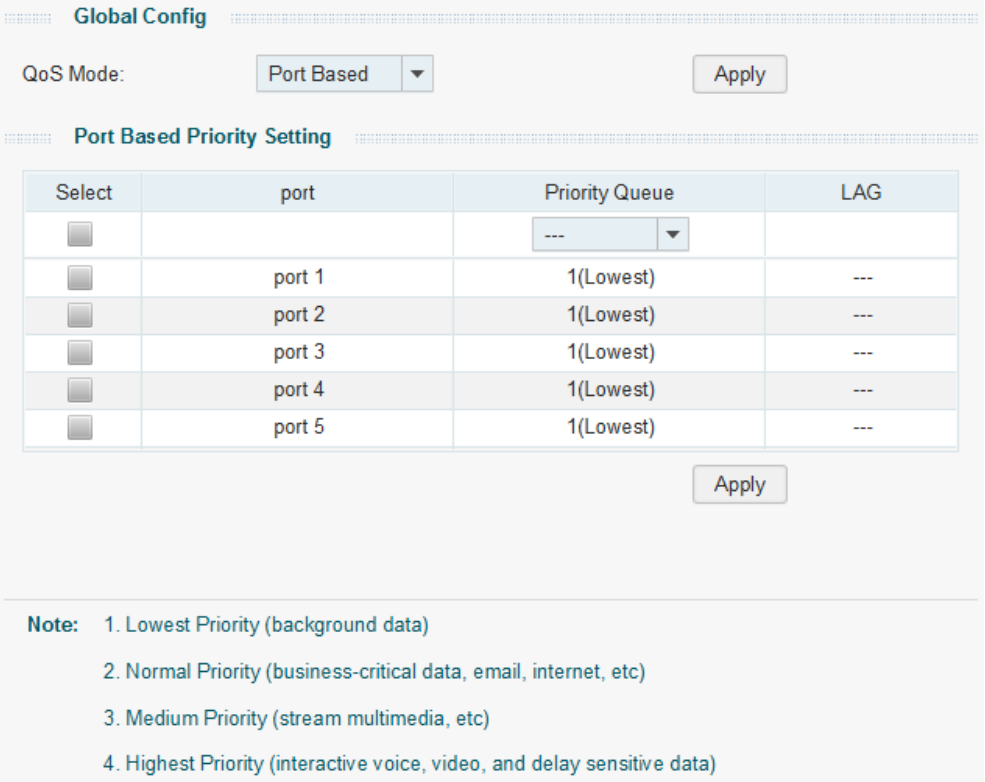

Figure 7-4 QoS Basic

The following entries are displayed on this screen:

➢ **Global Config**

QoS Mode: Select the desired QoS mode.

- **Port Based:** The packets are mapped to 4 priority levels based on ingress port.
- **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**

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

Port: Displays the port number.

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.

LAG: Displays the LAG number which the port belongs to.

7.2 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.

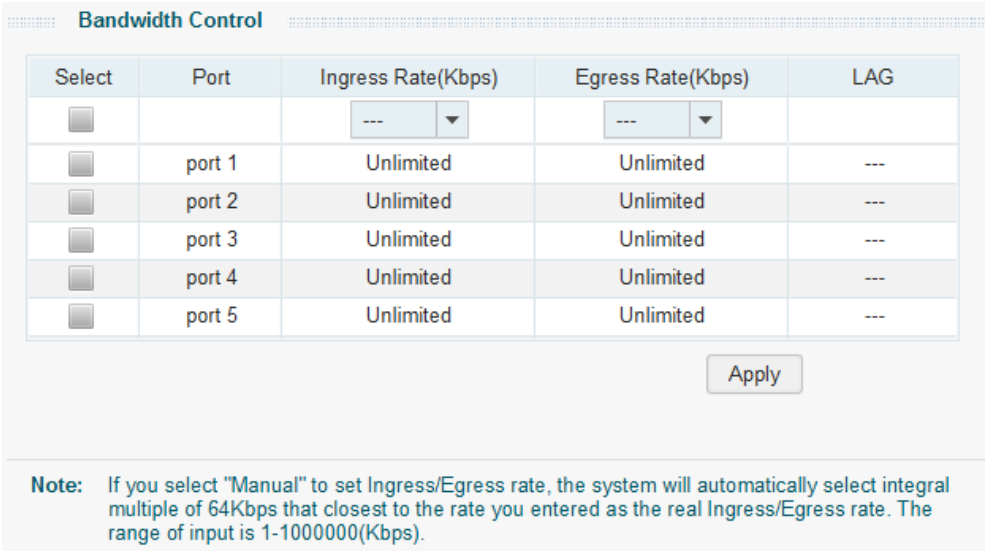

Figure 7-5 Bandwidth Control Setting

The following entries are displayed on this screen:

- **Bandwidth Control**

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

  Port: Displays the port number of the switch.

  Ingress Rate (Kbps): Configure the bandwidth for receiving packets on the port. You can 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. You can 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.

Note:

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.

7.3 Storm Control

Storm Control function allows the switch to filter broadcast, multicast and UL frame in the network. If the transmission rate of the three kind 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.

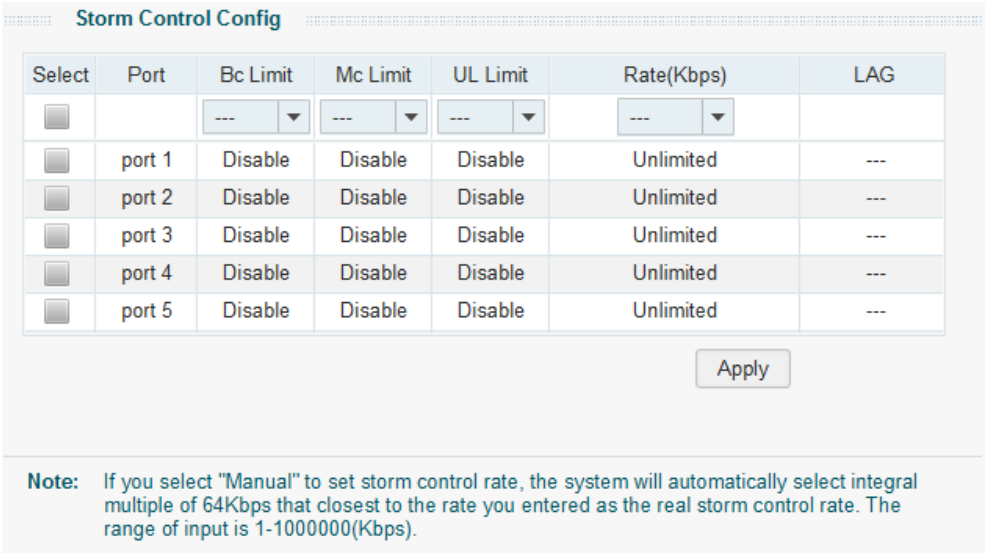

Figure 7-6 Storm Control Setting

The following entries are displayed on this screen:

➢ **Storm Control Config**

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

Port:	Displays the port number of the switch.
Bc Limit:	Enable/Disable broadcast control feature for the port.
Mc Limit:	Enable/Disable multicast control feature for the port.
UL Limit:	Enable/Disable UL-Frame control feature for the port.
Rate (Kbps):	Select the bandwidth for receiving the specified packet on the port. The packet traffic exceeding the bandwidth will be discarded.
LAG:	Displays the LAG number which the port belongs to.

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Chapter 8 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.

8.1 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.

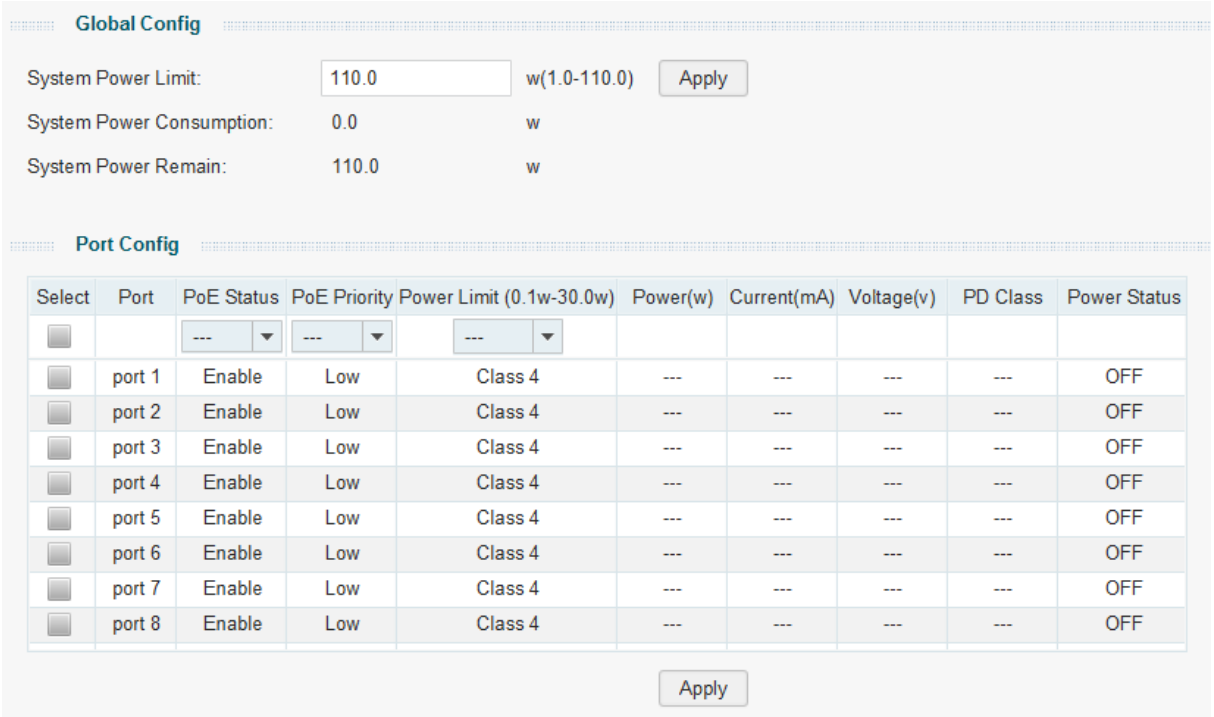

Figure 8-1 PoE Config

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**

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

  Port: Displays the port number of the switch.

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-30.0w):	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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Chapter 9 Help

This page contains two submenus: **Help** and **About**.

9.1 Help

Choose the menu **Help→Help** to load the following page.

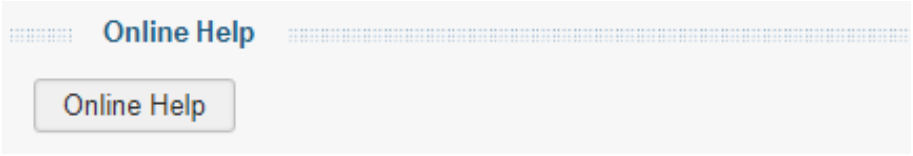

Figure 9-1 Help

Click **Online Help** to access the TP-Link support website and the online user guide for the Easy Smart Configuration Utility (the latest copy of this manual).

9.2 About

To view the utility software version, choose the menu **Help→About**.

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