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# Configuration Guide

## Managing Protocol VLAN

T1600G/T1700G/T1700X/T2500/T2600G/T2700G/T3700G Series Switches

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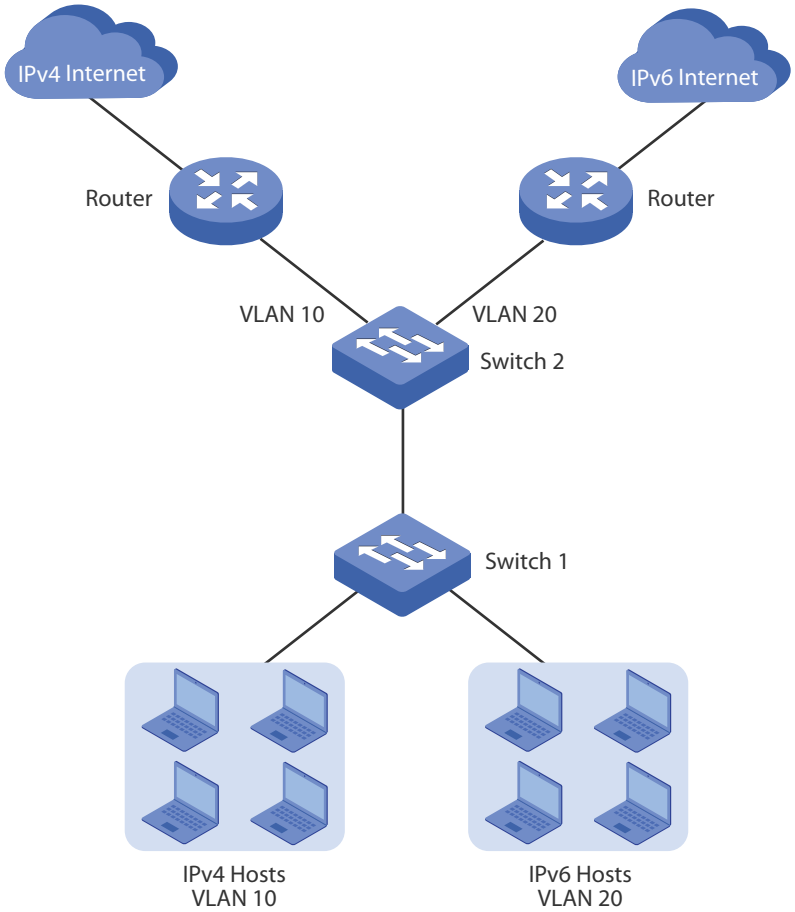
# 1 Protocol VLAN

Protocol VLAN is a technology that divides VLANs based on the network layer protocol. With the protocol VLAN rule configured on the basis of the existing 802.1Q VLAN, the switch can analyze special fields of received packets, encapsulate the packets in specific formats, and forward the packets of different protocols to the corresponding VLANs. Since different applications and services use different protocols, network administrators can use protocol VLAN to manage the network based on specific applications and services of network users.

The figure below shows a common application scenario of protocol VLAN. With protocol VLAN configured, Switch 2 can forward IPv4 and IPv6 packets from different VLANs to the IPv4 and IPv6 networks respectively.

**Figure 1-1 Common Application Scenario of Protocol VLAN**



# 2 Protocol VLAN Configuration

To complete protocol VLAN configuration, follow these steps:

1) Configure 802.1Q VLAN, including creating a VLAN and setting the port type.

2) Create protocol template.

3) Configure Protocol VLAN.

### Configuration Guidelines

- You can use the IP, ARP, RARP, and other protocol templates provided by TP-LINK switches, or create new protocol templates.
- In a protocol VLAN, when a port receives an untagged data packet, the switch will first search for the protocol VLAN matching the protocol type value of the packet. (If MAC VLAN is also configured, the switch will first process MAC VLAN.) If there is a match, the switch will insert the corresponding VLAN tag to the data packet and forward it within the VLAN. Otherwise, the switch will forward the data packet to the default VLAN based on the PVID (Port VLAN ID) of the receiving port. When the port receives a tagged data packet, the switch will directly process the data packet according to the processing rule of the 802.1 Q VLAN.

## 2.1 Using the GUI

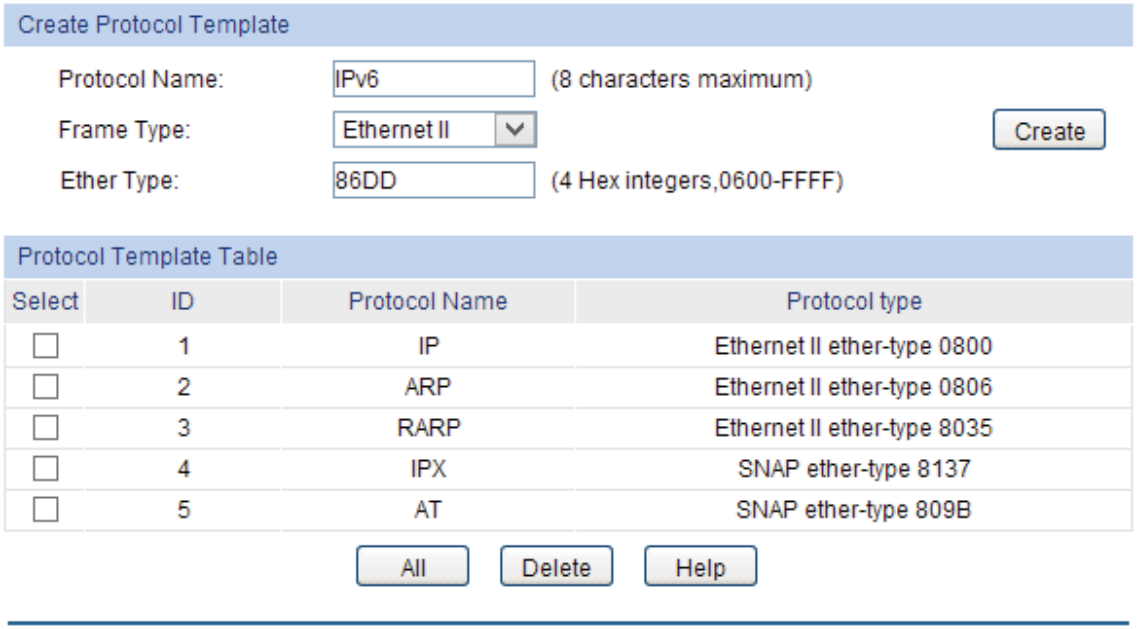
### 2.1.1 Configuring 802.1Q VLAN

Before configuring protocol VLAN, create an 802.1Q VLAN and set the port type according to network requirements. For details, refer to *Managing 802.1Q VLAN*.

## 2.1.2 Creating Protocol Template

Choose the menu **VLAN > Protocol VLAN > Protocol Template** to load the following page.

**Figure 2-1 Create a Protocol Template**




Follow these steps to create a protocol template:

1) Check whether your desired template already exists in the **Protocol Template Table** section. If not, create it in the **Create Protocol Template** section.

| | |
|---|---|
| Protocol Name | Enter the name of the new protocol template. |
| Frame Type | Select the frame type of the new protocol template.<br>For T2500 series switches, you need not configure the Frame Type. |
| Ether Type | Enter the Ethernet protocol type value for the protocol template.<br>This value is the EtherType field in the Ethernet frame and is used to specify the data type of the frame. |

2) Click **Create** to create the protocol template.

Note:

A protocol template that is bound to a VLAN cannot be deleted.

## 2.1.3 Configuring Protocol VLAN

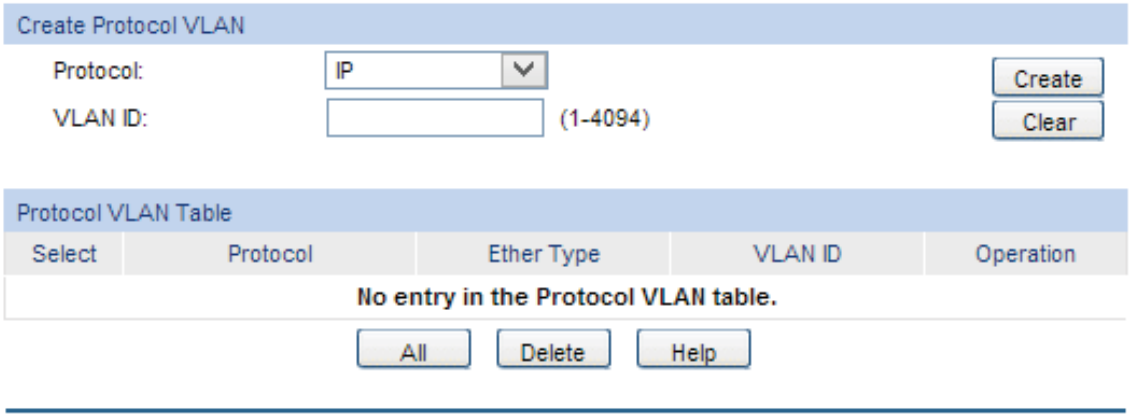
For T2500 series switches, you need to bind the protocol template to the VLAN, and enable protocol VLAN on the port. For details, refer to Binding the Protocol Template and Enabling Protocol VLAN on the Port.

For other series switches, you need to configure the protocol group. For details, refer to Configuring the Protocol Group.

## Binding the Protocol Template and Enabling Protocol VLAN on the Port

Choose the menu **VLAN > Protocol VLAN > Protocol VLAN** to load the following page.

**Figure 2-2 Configure Protocol VLAN**




Follow these steps to bind the protocol template:

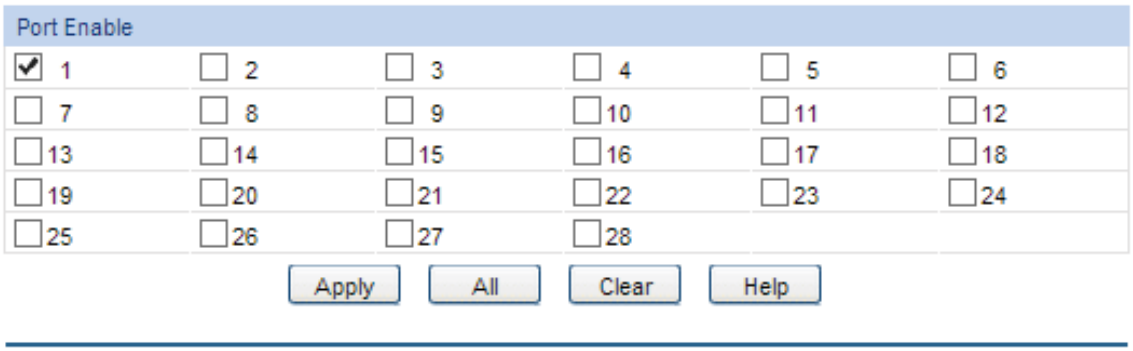
1) In the **Create Protocol VLAN** section, select the protocol and enter the VLAN ID to bind the protocol type to the VLAN.

| | |
|---|---|
| Protocol | Select the protocol type. |
| VLAN ID | Enter the ID of the 802.1Q VLAN to be bound to the protocol type. |

2) Click **Create** to create the protocol VLAN.

Choose the menu **VLAN > Protocol VLAN > Port Enable** to load the following page.

**Figure 2-3 Enable the Port**



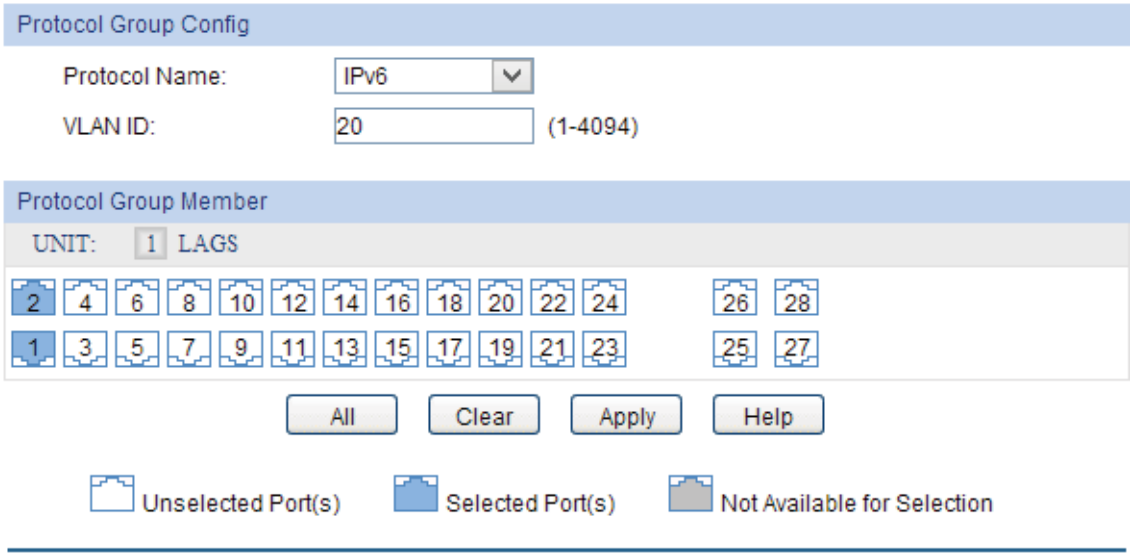

Follow these steps to enable protocol VLAN on the port:

Select a member port of the 802.1Q VLAN that has been bound to the protocol type. Click **Apply** to enable protocol VLAN on the port.

### Configuring the Protocol Group

Choose the menu **VLAN > Protocol VLAN > Protocol Group** to load the following page.

**Figure 2-4 Configure the Protocol Group**




Follow these steps to configure the protocol group:

1) In the **Protocol Group Config** section, select the protocol name and enter the VLAN ID to bind the protocol type to the VLAN.

| | |
|---|---|
| Protocol Name | Select the protocol type. |
| VLAN ID | Enter the ID of the 802.1Q VLAN to be bound to the protocol type. |

2) In the **Protocol Group Member** section, select the port or LAG to add to the protocol group.

3) Click **Apply** to make the settings effective.

Note:

For T2600G series switches, the member pot of an LAG (Link Aggregation Group) follows the configuration of the LAG but not its own. The configurations of the port can take effect only after it leaves the LAG.

## 2.2 Using the CLI

### 2.2.1 Configuring 802.1Q VLAN

Before configuring protocol VLAN, create an 802.1Q VLAN and set the port type according to network requirements. For details, refer to *Managing 802.1Q VLAN*.

## 2.2.2 Creating a Protocol Template

Follow these steps to create a protocol template:

| | |
|---|---|
| Step 1 | **configure**<br>Enter global configuration mode. |
| Step 2 | For T2500 series switches:<br>**protocol-vlan template name** *protocol-name* **ether-type** *type*<br>Create a protocol template.<br>*protocol-name*: Specify the protocol name with 1 to 8 characters.<br>*type*: Specify the Ethernet protocol type with 4 hexadecimal numbers.<br><br>For other series switches:<br>**protocol-vlan template name** *protocol-name* **frame { ether_2 ether-type** *type* **\| snap ether-type** *type* **\| llc dsap** *dsap_type* **ssap** *ssap_type* **}**<br>Create a protocol template.<br>*protocol-name:* Specify the protocol name with 1 to 8 characters.<br>*type*: Specify the Ethernet protocol type with 4 hexadecimal numbers.<br>*dsap_type*: Specify the destination service access point with 2 hexadecimal numbers.<br>*ssap_type*: Specify the source service access point with 2 hexadecimal numbers. |
| Step 3 | **end**<br>Return to Privileged EXEC Mode. |
| Step 4 | **copy running-config startup-config**<br>Save the settings in the configuration file. |

The following example shows how to create an IPv6 protocol template on T2600G-28TS:

**Switch#configure**

**Switch(config)#protocol template name** IPv6 **frame ether_2 ether-type** 86dd

**Switch(config)#show protocol-vlan template**

| Index | Protocol Name | Protocol Type |
|---|---|---|
| --- | --- | --- |
| 1 | IP | EthernetII ether-type 0800 |
| 2 | ARP | EthernetII ether-type 0806 |

| | | | |
|---|---|---|---|
| 3 | RARP | EthernetII | ether-type 8035 |
| 4 | IPX | SNAP | ether-type 8137 |
| 5 | AT | SNAP | ether-type 809B |
| 6 | IPv6 | EthernetII | ether-type 86DD |

**Switch(config)#end**

**Switch#copy running-config startup-config**

## 2.2.3 Configuring Protocol VLAN

Follow these steps to configure protocol VLAN:

| | |
|---|---|
| Step 1 | **configure**<br>Enter global configuration mode. |
| Step 2 | **show protocol-vlan template**<br>Check the index of each protocol template. |
| Step 3 | **protocol-vlan vlan** *vid* **template** *index*<br>Bind the protocol template to the VLAN.<br>*vid* : ID of the 802.1Q VLAN where the port with protocol VLAN enabled is.<br>*index* : Protocol template index. |
| Step 4 | **interface [fastEthernet** *port* **\| range fastEthernet** *port-list* **\| gigabitEthernet** *port* **\| range gigabitEthernet** *port-list***]**<br>Enter interface configuration mode. |
| Step 5 | For T2500 series switches:<br>**protocol-vlan**<br>Enable protocol VLAN on the specified port.<br>For other series switches:<br>**show protocol-vlan vlan**<br>Check the protocol VLAN index (entry-id) of each protocol group.<br>**protocol-vlan group** *entry-id*<br>Add the specified port to the protocol group.<br>*entry-id:* Protocol VLAN index. |
| Step 6 | **end**<br>Return to Privileged EXEC Mode. |

| | |
|---|---|
| Step 7 | **copy running-config startup-config**<br>Save the settings in the configuration file. |

The following example shows how to bind the IPv6 protocol template to VLAN 10 on T2600G-28TS:

**Switch#configure**

**Switch(config)#show protocol-vlan template**

| Index | Protocol Name | Protocol Type |
|---|---|---|
| 1 | IP | EthernetII ether-type 0800 |
| 2 | ARP | EthernetII ether-type 0806 |
| 3 | RARP | EthernetII ether-type 8035 |
| 4 | IPX | SNAP ether-type 8137 |
| 5 | AT | SNAP ether-type 809B |
| 6 | IPv6 | EthernetII ether-type 86DD |

**Switch(config)#protocol-vlan vlan** 10 **template** 6

**Switch(config)#end**

**Switch#copy running-config startup-config**

The following example shows how to add port 1/0/2 to the IPv6 protocol group on T2600G-28TS:

**Switch#configure**

**Switch(config)#interface gigabitEthernet** 1/0/2

**Switch(config-if)#show protocol-vlan vlan**

| Index | Protocol-Name | VID | Member |
|---|---|---|---|
| 1 | IPv6 | 10 | |

**Switch(config-if)#protocol-vlan group** 1

**Switch(config-if)#show protocol-vlan vlan**

| Index | Protocol-Name | VID | Member |
|---|---|---|---|

```
--------  --------------------  ------  ------------
1         IPv6                  10      Gi1/0/2
```

**Switch(config-if)#end**

**Switch#copy running-config startup-config**

The following example shows how to enable protocol VLAN on port 1/0/1 on T2500-28TC:

**Switch#configure**

**Switch(config)#interface fastEthernet** 1/0/1

**Switch(config-if)#protocol-vlan**

**Switch(config-if)#show protocol-vlan interface**

```
Port          Status         LAG
-----------   ----------     -------
Fa1/0/25      Enabled        N/A
……
```

**Switch(config-if)#end**

**Switch#copy running-config startup-config**

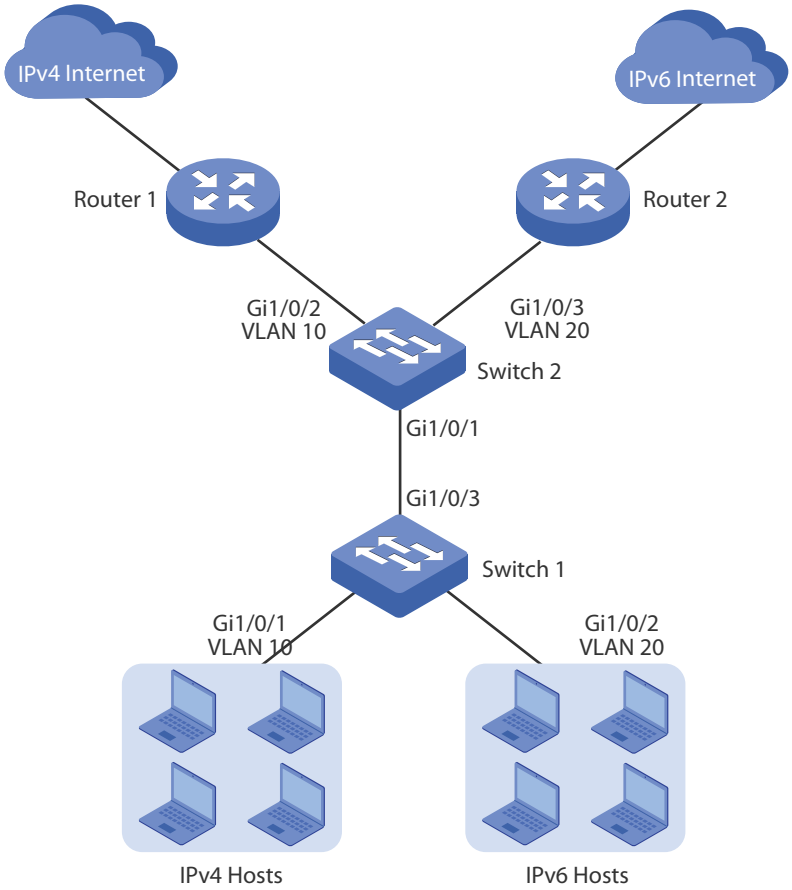
# 3 Configuration Example

## 3.1 Network Requirements

A company uses both IPv4 hosts and IPv6 hosts, and these hosts access the IPv4 network and IPv6 network respectively via different routers. It is required that IPv4 packets are forwarded to the IPv4 network, IPv6 packets are forwarded to the IPv6 network, and other packets are dropped.

The figure below shows the network topology. IPv4 hosts belong to VLAN 10, IPv6 hosts belong to VLAN 20, and these hosts access the network via Switch 1. Switch 2 is connected to two routers to access the IPv4 network and IPv6 network respectively. The routers belong to VLAN 10 and VLAN 20 respectively.

**Figure 3-1 Network Topology**




## 3.2 Configuration Scheme

You can configure protocol VLAN on port 1/0/1 of Switch 2 to meet this requirement. When this port receives packets, Switch 2 will forward them to the corresponding VLANs according to their protocol types.

The overview of the configuration is as follows:

1) Create VLAN 10 and VLAN 20, set the port type, and add each port to the corresponding VLAN.

2) Use the IPv4 protocol template provided by the switch, and create the IPv6 protocol template.

3) Bind the protocol templates to the corresponding VLANs to form protocol groups, and add port 1/0/1 to the groups.

For Switch 1, configure 802.1Q VLAN according to the network topology.

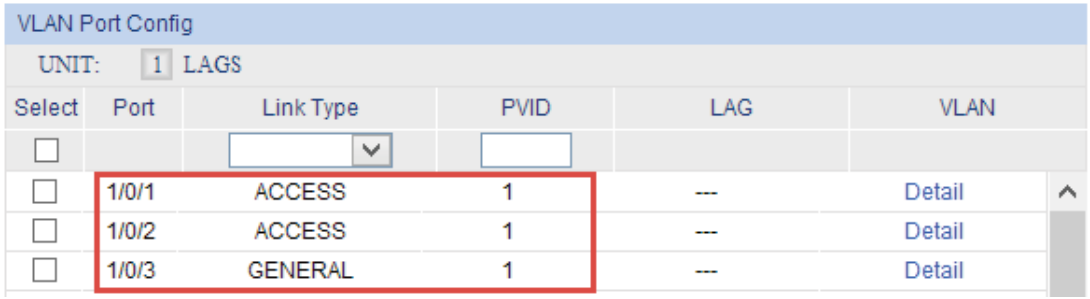
Exampled with T2600G-28TS, this chapter provides configuration procedures in two ways: using the GUI and using the CLI.

## 3.3 Using the GUI

### ■ Configurations for Switch 1

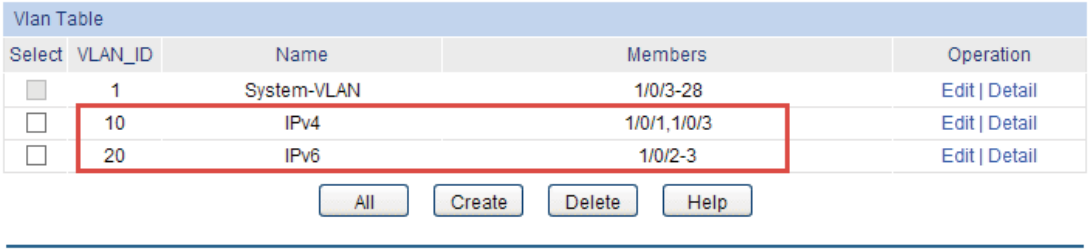
1) Choose the menu **VLAN > 802.1Q VLAN > Port Config** to load the following page. Set the link type of port 1/0/1 and port 1/0/2 as **Access**, and set the link type of port 1/0/3 as **General**.

**Figure 3-2 Port Configuration**




2) Choose the menu **VLAN > 802.1Q VLAN > VLAN Config** to load the following page. Create VLAN 10 and VLAN 20, add port 1/0/1 to VLAN 10, add port 1/0/2 to VLAN 20, add port 1/0/3 to both VLAN 10 and VLAN 20, and set the egress rule of port 1/0/3 as UNTAG.

**Figure 3-3 802.1Q VLAN Configuration**

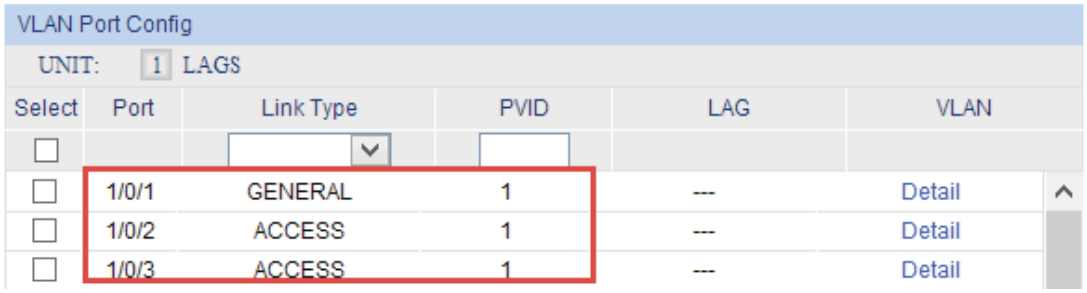



3) Click **Save Config** to make the settings effective.

## Configurations for Switch 2

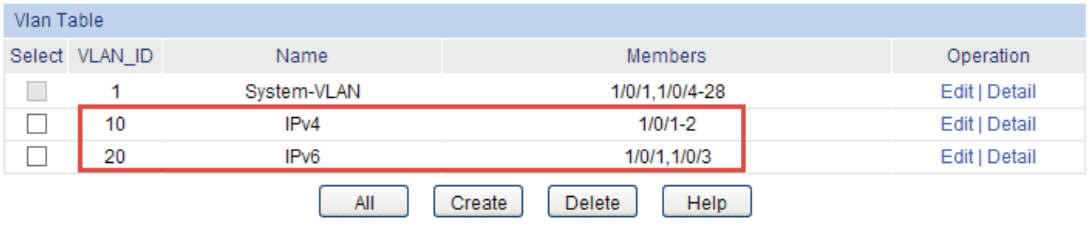
1) Choose the menu **VLAN > 802.1Q VLAN > Port Config** to load the following page. Set the type of port 1/0/2 and port 1/0/3 as **Access**, and set the type of port 1/0/1 as **General**.

**Figure 3-4 Port Configuration**




2) Choose the menu **VLAN > 802.1Q VLAN > VLAN Config** to load the following page. Create VLAN 10 and VLAN 20, add port 1/0/2 to VLAN 10, add port 1/0/3 to VLAN 20, add port 1/0/1 to both VLAN 10 and VLAN 20, and set the egress rule of port 1/0/1 as TAG.

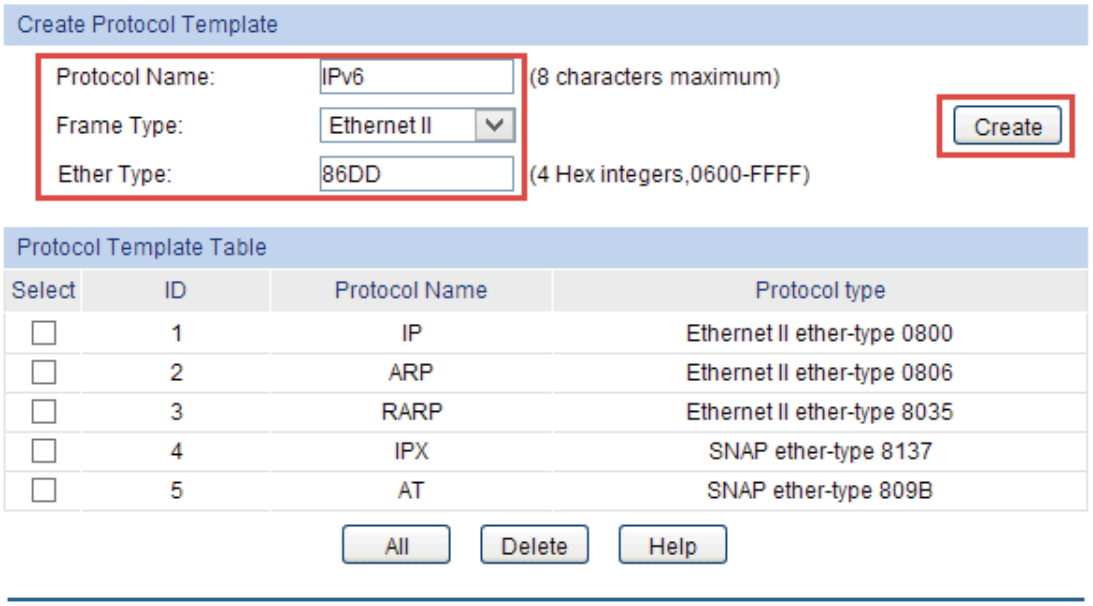
**Figure 3-5 802.1Q VLAN Configuration**




3) Choose the menu **VLAN > Protocol VLAN > Protocol Template** to load the following page. Enter **IPv6** in the protocol name, select the **Ethernet II** frame type, enter **86DD** in the Ether Type field, and click **Create** to create the IPv6 protocol template.

*Tips:* The IPv4 protocol template is already provided by the switch, you only need to create the IPv6 protocol template.

**Figure 3-6 Create the IPv6 Protocol Template**




4) Choose the menu **VLAN > Protocol VLAN > Protocol Group** to load the following page. Select the IP protocol name (that is the IPv4 protocol template), enter VLAN ID 10, select port 1, and click **Apply**. Select the IPv6 protocol name, enter VLAN ID 20, select port 1, and click **Apply**.

**Figure 3-7 Configure the IPv4 Protocol Group**

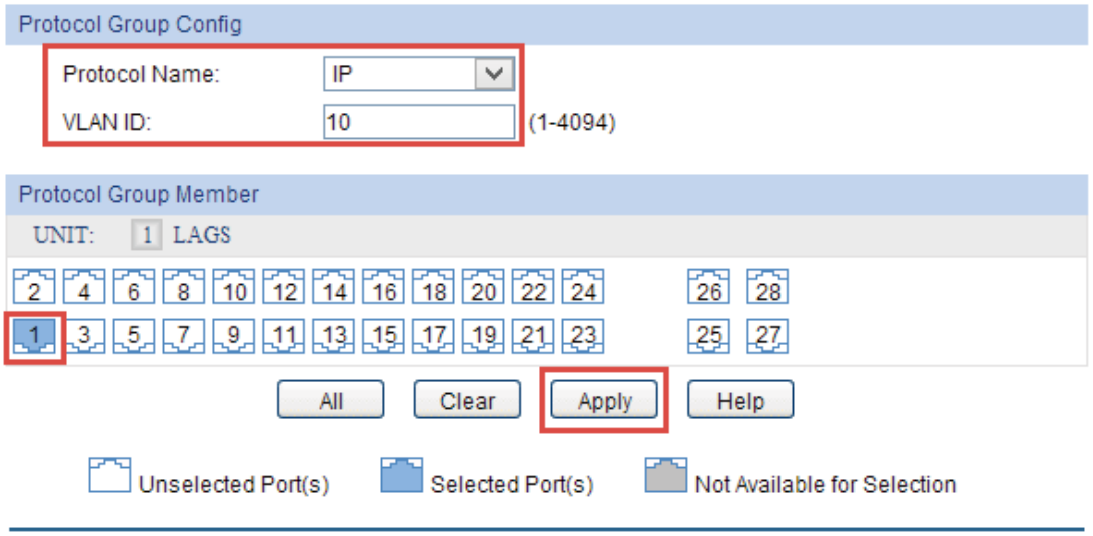
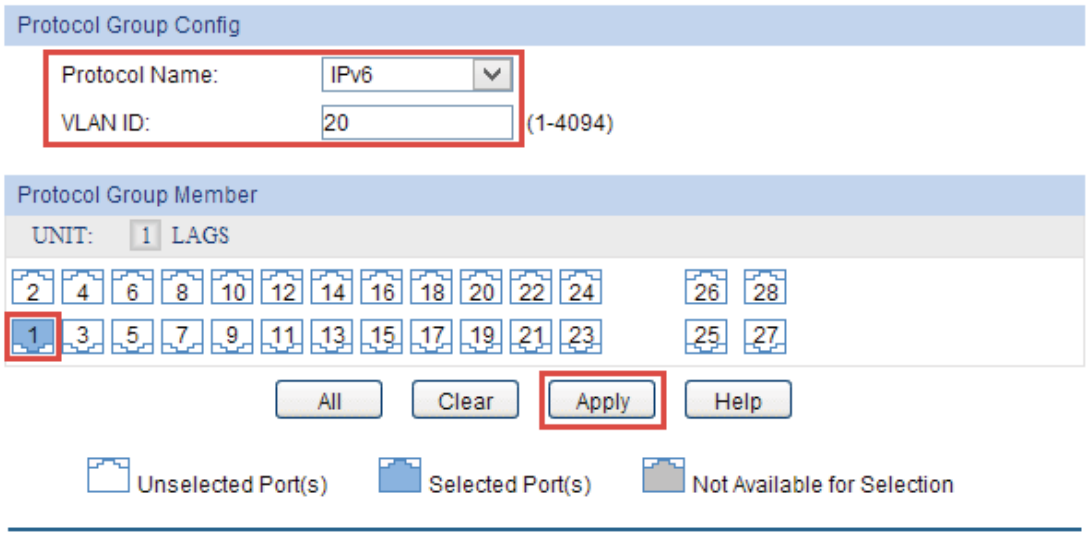
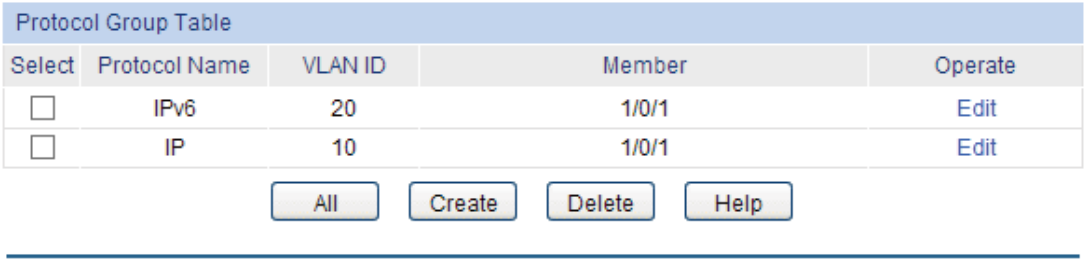


**Figure 3-8 Configure the IPv6 Protocol Group5) View the configuration**




5) Choose the menu **VLAN > Protocol VLAN > Protocol Group Table** to load the following page. Here you can view the protocol VLAN configuration.

**Figure 3-9 Protocol VLAN configuration**




6) Click **Save Config** to make the settings effective.

## 3.4 Using the CLI

### ■ Configurations for Switch 1

1) Create VLAN 10 and VLAN 20.

Switch_1#configure

Switch_1(config)#vlan 10

Switch_1(config-vlan)#name IPv4

Switch_1(config-vlan)#exit

Switch_1(config)#vlan 20

Switch_1(config-vlan)#name IPv6

Switch_1(config-vlan)#exit

2) For port 1/0/3, set the type as General , set the egress rule as untagged, and add it to both VLAN 10 and VLAN 20.

```
Switch_1(config)#interface gigabitEthernet 1/0/3
Switch_1(config-if)#switchport mode general
Switch_1(config-if)#switchport general allowed vlan 10,20 untagged
Switch_1(config-if)#exit
```

3) For port 1/0/1 and port 1/0/2, set the type as Access, and add them to VLAN 10 and VLAN 20 respectively.

```
Switch_1(config)#interface gigabitEthernet 1/0/1
Switch_1(config-if)#switchport mode access
Switch_1(config-if)#switchport access vlan 10
Switch_1(config-if)#exit
Switch_1(config)#interface gigabitEthernet 1/0/2
Switch_1(config-if)#switchport mode access
Switch_1(config-if)#switchport access vlan 20
Switch_1(config-if)#exit
Switch_1(config)#end
Switch_1#copy running-config startup-config
```

## Configurations for Switch 2

1) Create VLAN 10 and VLAN 20.

```
Switch_2#configure
Switch_2(config)#vlan 10
Switch_2(config-vlan)#name IPv4
Switch_2(config-vlan)#exit
Switch_2(config)#vlan 20
Switch_2(config-vlan)#name IPv6
Switch_2(config-vlan)#exit
```

2) For port 1/0/1, set the type as General , set the egress rule as tagged, and add it to both VLAN 10 and VLAN 20.

```
Switch_2(config)#interface gigabitEthernet 1/0/1
Switch_2(config-if)#switchport mode general
Switch_2(config-if)#switchport general allowed vlan 10,20 tagged
Switch_2(config-if)#exit
```

3) For port 1/0/2 and port 1/0/3, set the type as Access, and add them to VLAN 10 and VLAN 20 respectively.

```
Switch_2(config)#interface gigabitEthernet 1/0/2
Switch_2(config-if)#switchport mode access
Switch_2(config-if)#switchport access vlan 10
Switch_2(config-if)#exit
Switch_2(config)#interface gigabitEthernet 1/0/3
Switch_2(config-if)#switchport mode access
Switch_2(config-if)#switchport access vlan 20
Switch_2(config-if)#exit
```

4) Create the IPv6 protocol template.

```
Switch_2(config)#protocol-vlan template name IPv6 frame ether_2 ether-type 86dd
Switch_2(config)#show protocol-vlan template
Index       Protocol Name      Protocol Type
----        ---------          ------------------------------------
1           IP                 EthernetII  ether-type   0800
2           ARP                EthernetII  ether-type   0806
3           RARP               EthernetII  ether-type   8035
4           IPX                SNAP        ether-type   8137
5           AT                 SNAP        ether-type   809b
6           IPv6               Ethernet II  ether-type   86dd
```

5) Configure the protocol groups.

```
Switch_2(config)#protocol-vlan vlan 10 template 1

Switch_2(config)#protocol-vlan vlan 20 template 6
```

6) Add port 1/0/1 to the protocol groups.

```
Switch_2(config)#show protocol-vlan vlan

Index       Protocol-Name     VID          Member

----        ---------------   ----------   -------------

 1          IP                10

 2          IPv6              20

Switch_2(config)#interface gigabitEthernet 1/0/1

Switch_2(config-if)#protocol-vlan group 1

Switch_2(config-if)#protocol-vlan group 2

Switch_2(config-if)#exit

Switch_2(config)#end

Switch_2#copy running-config startup-config
```

## Configuration File

### ■ Switch 1

```
Switch_1#configure

Switch_1(config)#vlan 10

Switch_1(config-vlan)#name IPv4

Switch_1(config-vlan)#exit

Switch_1(config)#vlan 20

Switch_1(config-vlan)#name IPv6

Switch_1(config-vlan)#exit

Switch_1(config)#interface gigabitEthernet 1/0/3

Switch_1(config-if)#switchport mode trunk

Switch_1(config-if)#switchport trunk allowed  vlan 10,20
```

```
Switch_1(config-if)#exit
Switch_1(config)#interface gigabitEthernet 1/0/1
Switch_1(config-if)#switchport mode access
Switch_1(config-if)#switchport access vlan 10
Switch_1(config-if)#exit
Switch_1(config)#interface gigabitEthernet 1/0/2
Switch_1(config-if)#switchport mode access
Switch_1(config-if)#switchport access vlan 20
Switch_1(config-if)#end
Switch_1#copy running-config startup-config
```

- Switch 2

```
Switch_2#configure
Switch_2(config)#vlan 10
Switch_2(config-vlan)#name IPv4
Switch_2(config-vlan)#exit
Switch_2(config)#vlan 20
Switch_2(config-vlan)#name IPv6
Switch_2(config-vlan)#exit
Switch_2(config)#interface gigabitEthernet 1/0/1
Switch_2(config-if)#switchport mode general
Switch_2(config-if)#switchport general allowed vlan 10,20 tagged
Switch_2(config-if)#exit
Switch_2(config)#interface gigabitEthernet 1/0/2
Switch_2(config-if)#switchport mode access
Switch_2(config-if)#switchport access vlan 10
Switch_2(config-if)#exit
Switch_2(config)#interface gigabitEthernet 1/0/3
```

```
Switch_2(config-if)#switchport mode access

Switch_2(config-if)#switchport access vlan 20

Switch_2(config-if)#exit

Switch_2(config)#protocol-vlan template name IPv6 frame ether_2 ether-type 86dd

Switch_2(config)#show protocol-vlan template

Index       Protocol Name       Protocol Type

----        ---------           ------------------------------------

1           IP                  EthernetII  ether-type   0800

2           ARP                 EthernetII  ether-type   0806

3           RARP                EthernetII  ether-type   8035

4           IPX                 SNAP        ether-type   8137

5           AT                  SNAP        ether-type   809b

6           IPv6                Ethernet II  ether-type   86dd

Switch_2(config)#protocol-vlan vlan 10 template 1

Switch_2(config)#protocol-vlan vlan 20 template 6

Switch_2(config)#show protocol-vlan vlan

Index       Protocol-Name     VID          Member

----        ---------------   ----------   -------------

1           IP                10

2           IPv6              20

Switch_2(config)#interface gigabitEthernet 1/0/1

Switch_2(config-if)#protocol-vlan group 1

Switch_2(config-if)#protocol-vlan group 2

Switch_2(config-if)#exit

Switch_2(config)#end

Switch_2#copy running-config startup-config
```

## Verify the Configurations

### Switch 1

Verify 802.1Q VLAN configuration:

Switch_1#show vlan

| VLAN | Name | Status | Ports |
|---|---|---|---|
| 1 | System-VLAN | active | Gi1/0/3, Gi1/0/4, Gi1/0/5, Gi1/0/6<br>Gi1/0/7, Gi1/0/8, Gi1/0/9, Gi1/0/10<br>.....<br>Gi1/0/27, Gi1/0/28 |
| 10 | IPv4 | active | Gi1/0/1, Gi1/0/3 |
| 20 | IPv6 | active | Gi1/0/2, Gi1/0/3 |

### Switch 2:

Verify 802.1Q VLAN configuration:

Switch_2#show vlan

| VLAN | Name | Status | Ports |
|---|---|---|---|
| 1 | System-VLAN | active | Gi1/0/1, Gi1/0/4, Gi1/0/5, Gi1/0/6<br>Gi1/0/7, Gi1/0/8, Gi1/0/9, Gi1/0/10<br>..... |
| 10 | IPv4 | active | Gi1/0/1, Gi1/0/2 |
| 20 | IPv6 | active | Gi1/0/1, Gi1/0/3 |

Verify protocol group configuration:

```
Switch_2#show protocol-vlan vlan

Index     Protocol-Name     VID      Member

--------  ---------------------  ------  -------------

 1        IP                 10       Gi1/0/1

 2        IPv6               20       Gi1/0/1
```

# 4 Appendix: Default Parameters

Default settings of Protocol VLAN are listed in the following table.

**Table 4-1 Default Settings of Protocol VLAN**

| Parameter | Defualt Setting | | |
|---|---|---|---|
| Protocol Template Table | 1 | IP | Ethernet II ether-type 0800 |
| | 2 | ARP | Ethernet II ether-type 0806 |
| | 3 | RARP | Ethernet II ether-type 8035 |
| | 4 | IPX | SNAP ether-type 8137 |
| | 5 | AT | SNAP ether-type 809B |