

# Configure Protocol-based VLAN Groups on a Switch through the CLI

## Introduction

A Virtual Local Area Network (VLAN) allows you to logically segment a Local Area Network (LAN) into different broadcast domains. In scenarios where sensitive data may be broadcast on a network, VLANs can be created to enhance security by designating a broadcast to a specific VLAN. Only users that belong to a VLAN are able to access and manipulate the data on that VLAN. VLANs can also be used to enhance performance by reducing the need to send broadcasts and multicasts to unnecessary destinations.

**Note:** To learn how to configure the VLAN settings on your switch through the web-based utility, click [here](#). For CLI-based instructions, click [here](#).

Networking devices on which multiple protocols are running cannot be grouped to a common VLAN. Non-standard devices are used to pass traffic between different VLANs in order to include the devices participating in a specific protocol. For this reason, you cannot take advantage of the many features of VLAN.

VLAN groups are used to load balance the traffic on a Layer 2 network. The packets are distributed with respect to different classifications and are assigned to VLANs. Many different classifications exist, and if more than one classification scheme is defined, the packets are assigned to the VLAN in this order:

- Tag — The VLAN number is recognized from the tag.
- MAC-based VLAN — The VLAN is recognized from the source Media Access Control (MAC)-to-VLAN mapping of the ingress interface.
- Subnet-based VLAN — The VLAN is recognized from the source Subnet-to-VLAN mapping of the ingress interface.
- Protocol-based VLAN — The VLAN is recognized from the Ethernet type Protocol-to-VLAN mapping of the ingress interface.
- PVID — VLAN is recognized from the port default VLAN ID.

**[To configure Protocol-based VLAN groups on your switch, follow these guidelines:](#)**

1. Create the VLANs. To learn how to configure the VLAN settings on your switch through the web-based utility, click [here](#). For CLI-based instructions, click [here](#).
2. Configure interfaces to VLANs. For instructions on how to assign interfaces to VLANs through the web-based utility of your switch, click [here](#). For CLI-based instructions, click [here](#).

**Note:** If the interface does not belong to the VLAN, the subnet-based groups to VLAN configuration setting will not take effect.

3. Configure protocol-based VLAN groups. For instructions on how to configure protocol-based VLAN Groups through the web-based utility of your switch, click [here](#).
4. (Optional) You can also configure the following:

- MAC-based VLAN Groups Overview — For instructions on how to configure MAC-based VLAN Groups through the web-based utility of your switch, click [here](#). For CLI-based instructions, click [here](#).
- Subnet-based VLAN Groups Overview — For instructions on how to configure subnet-based VLAN Groups through the web-based utility of your switch, click [here](#). For CLI-based instructions, click [here](#).

## Objective

Groups of protocols can be defined and then bound to a port. After the protocol group is bound to a port, every packet originating from a protocol in the group is assigned a VLAN that is configured in the protocol-based groups.

Forwarding of packets based on their protocol requires setting up groups of protocols and then mapping these groups to VLANs. This article provides instructions on how to define protocol groups and configure protocol-based groups to VLAN.

## Applicable Devices

- Sx350 Series
- SG350X Series
- Sx500 Series
- Sx550X Series

## Software Version

- 1.4.7.06 — Sx500
- 2.2.8.04 — Sx350, SG350X, Sx550X

## Configure Protocol-based VLAN Groups on the Switch through the CLI

### Create Protocol-based VLAN Group

Step 1. Log in to the switch console. The default username and password is cisco/cisco. If you have configured a new username or password, enter the credentials instead.

```
User Name:cisco
Password:*****
```

**Note:** The commands may vary depending on the exact model of your switch. In this example, the SG350X switch is accessed through Telnet.

Step 2. From the Privileged EXEC mode of the switch, enter the Global Configuration mode by entering the following:

```
SG350X#configure
```

Step 3. In the Global Configuration mode, configure a protocol-based classification rule by entering the following:

```
SG350X(config)#vlan database
```

```
SG350X#configure
SG350X(config)#vlan database
SG350X(config-vlan)#
```

Step 4. To map a protocol to a group of protocols, enter the following:

```
SG350X(config-vlan)#map protocol [protocol] [encapsulation-
value] protocols-group [group-id]
```

The options are:

- protocol — Specifies a 16-bit protocol number or one of the reserved names. The range is from 0x0600 to 0xFFFF. The value 0x8100 is not valid as the protocol number for Ethernet encapsulation. The following protocol names are reserved for Ethernet Encapsulation:
  - IP — An Ethernet V2 frame that has an IPv4 packet. The protocol number is 0x0800.
  - IPX — An Ethernet V2 frame with Internetwork Packet Exchange (IPX). The protocol numbers range from 0x8137 to 0x8138.
  - IPv6 — An Ethernet V2 frame that has an IPv6 packet. The protocol number is 0x86DD.
  - ARP — An Ethernet V2 frame with Address Resolution Protocol (ARP) packet. The protocol number is 0x0806.
  - User Defined — You can enter a protocol value in hex with length of four digits.
- encapsulation-value — (Optional) Specifies one of the following values:
  - ethernet — This parameter refers to the data packet on an Ethernet link. This is the default encapsulation. If the encapsulation value is not defined, Ethernet will be used as the encapsulation type.
  - rfc1042 — This parameter refers to Logical Link Control with Sub-Network Access Protocol (LLC-SNAP). These protocols work in combination to assure that data is transmitted effectively inside the network.
  - llcother — This parameter refers to Logical Link Control (LLC). It is the sublayer of the data link layer, which acts as an interface between the media access control sublayer and the network layer.
- group-id — Specifies the group number to be created. Group ID can range from one up to 2147483647.

```
SG350X#configure
SG350X(config)#vlan database
SG350X(config-vlan)#map protocol ip protocols-group 100
SG350X(config-vlan)#map protocol ipv6 ethernet protocols-group 200
SG350X(config-vlan)#
```

**Note:** In this example, the protocol-based VLAN groups 100 and 200 are created. Group 100 filters the IP Ethernet protocol, while Group 200 filters the IPv6 Ethernet protocol.

Step 5. To exit the Interface Configuration context, enter the following:

```
SG350X(config-vlan)#exit
```

```
SG350X#configure
SG350X(config)#vlan database
SG350X(config-vlan)#map protocol ip protocols-group 100
SG350X(config-vlan)#map protocol ipv6 ethernet protocols-group 200
SG350X(config-vlan)#exit
SG350X(config)#
```

You should now have configured the protocol-based VLAN groups on your switch through the CLI.

## Map Protocol-based VLAN Group to VLAN

Step 1. In the Global Configuration mode, enter the Interface Configuration context by entering the following:

```
SG350X#interface [interface-id | range interface-range]
```

The options are:

- interface-id — Specifies an interface ID to be configured.
- range interface-range — Specifies a list of VLANs. Separate nonconsecutive VLANs with a comma and no spaces. Use a hyphen to designate a range of VLANs.

```
SG350X#configure
SG350X(config)#vlan database
SG350X(config-vlan)#map protocol ip protocols-group 100
SG350X(config-vlan)#map protocol ipv6 ethernet protocols-group 200
SG350X(config-vlan)#exit
SG350X(config)#interface ge1/0/20
SG350X(config-if)#
```

**Note:** In this example, interface ge1/0/20 is used.

Step 2. In the Interface Configuration context, use the **switchport mode** command to configure the VLAN membership mode:

```
SG350X(config-if)#switchport mode general
```

- general — The interface can support all functions as defined in the IEEE 802.1q specification. The interface can be a tagged or untagged member of one or more VLANs.

```
SG350X#configure
SG350X(config)#vlan database
SG350X(config-vlan)#map protocol ip protocols-group 100
SG350X(config-vlan)#map protocol ipv6 ethernet protocols-group 200
SG350X(config-vlan)#exit
SG350X(config)#interface ge1/0/20
SG350X(config-if)#switchport mode general
SG350X(config-if)#
```

Step 3. (Optional) To return the port to the default VLAN, enter the following:

```
SG350X(config-if)#no switchport mode general
```

Step 4. To configure a protocol-based classification rule, enter the following:

```
SG350X(config-if)#switchport general map protocols-group [group-id]
vlan [vlan-id]
```

The options are:

- group-id — Specifies the protocol-based group ID to filter the traffic through the port. The range is from one up to 2147483647.
- vlan-id — Specifies the VLAN ID to which the traffic from the VLAN group is forwarded. The range is from one to 4094.

**Note:** In this example, the interface is assigned to protocol-based group 100 which is mapped to VLAN 20.

```
SG350X(config)#interface ge1/0/20
SG350X(config-if)#switchport mode general
SG350X(config-if)#switchport general map protocols-group 100 vlan 20
SG350X(config-if)#
```

Step 5. To exit the Interface Configuration context, enter the following:

```
SG350X(config-if)#exit
```

```
SG350X(config)#interface ge1/0/20
SG350X(config-if)#switchport mode general
SG350X(config-if)#switchport general map protocols-group 100 vlan 20
SG350X(config-if)#exit
SG350X(config)#
```

Step 6. (Optional) To remove the classification rule from the port or range of ports, enter the following:

```
SG350X(config-if)#no switchport general map protocols-groups group
```

Step 7. (Optional) Repeat steps 1 to 6 to configure more general ports and assign to the corresponding protocol-based VLAN groups.

```
SG350X(config)#interface ge1/0/20
SG350X(config-if)#switchport mode general
SG350X(config-if)#switchport general map protocols-group 100 vlan 20
SG350X(config-if)#exit
SG350X(config)#interface range ge1/0/31-35
SG350X(config-if-range)#switchport mode general
SG350X(config-if-range)#switchport general map protocols-group 200 vlan 30
SG350X(config-if-range)#
```

**Note:** In this example, interfaces that range from ge1/0/31 to 35 are assigned to protocol-based group 200 and assigned to VLAN 30.

Step 8. Enter the **end** command to go back to the Privileged EXEC mode:

```
SG350X(config-if-range)#end
```

```
SG350X#configure
SG350X(config)#vlan database
SG350X(config-vlan)#map protocol ip protocols-group 100
SG350X(config-vlan)#map protocol ipv6 ethernet protocols-group 200
SG350X(config-vlan)#exit
SG350X(config)#interface ge1/0/20
SG350X(config-if)#switchport mode general
SG350X(config-if)#switchport general map protocols-group 100 vlan 20
SG350X(config-if)#exit
SG350X(config)#interface range ge1/0/31-35
SG350X(config-if-range)#switchport mode general
SG350X(config-if-range)#switchport general map protocols-group 200 vlan 30
SG350X(config-if-range)#end
SG350X#
```

You should now have mapped protocol-based VLAN groups to the VLANs on your switch through the CLI.

## Show Protocol-based VLAN Groups

Step 1. To display the protocols that belong to the defined protocol-based classification rules, enter the following in the Privileged EXEC mode:

```
SG350X#show vlan protocols-groups
```

```
SG350X(config)#interface range ge1/0/31-35
SG350X(config-if-range)#switchport mode general
SG350X(config-if-range)#switchport general map protocols-group 200 vlan 30
SG350X(config-if-range)#end
SG350X#show vlan protocols-groups
```

Encapsulation	Protocol	Group Id
ethernet	0800	100
ethernet	86dd	200

```
SG350X#
```

Step 2. (Optional) To display the classification rules of a specific port on the VLAN, enter the following:

```
SG350X#show interfaces switchport [interface-id]
```

- interface-id — Specifies an interface ID.

**Note:** Each port mode has its own private configuration. The **show interfaces switchport** command displays all these configurations, but only the port mode configuration that corresponds to the current port mode displayed in Administrative Mode area is active.

```

SG350X#show interfaces switchport ge1/0/20
Gathering information...

S-VLAN Ethernet Type: 0x8100 (802.1q)
Name: ge1/0/20
Switchport: enable
Administrative Mode: general
Operational Mode: up
Access Mode VLAN: 1
Access Multicast TV VLAN: none
Trunking Native Mode VLAN: 1
Trunking VLANs: 1
General PVID: 1
General VLANs: none
General Egress Tagged VLANs: none
General Forbidden VLANs: none
General Ingress Filtering: enabled
General Acceptable Frame Type: all
General GVRP status: disabled
Customer Mode VLAN: none
Customer Multicast TV VLANs: none
Private-vlan promiscuous-association primary VLAN: none
Private-vlan promiscuous-association Secondary VLANs: none
Private-vlan host-association primary VLAN: none
Private-vlan host-association Secondary VLAN: none

VLAN Mapping Tunnel - no resources

VLAN Mapping One-To-One - no resources

Classification rules:
Classification type Group ID VLAN ID
-----
Protocol          100    20

SG350X#

```

**Note:** In this example, the administrative and operational statuses of interface ge1/0/20 are displayed. The Classification rules table shows that the interface has been mapped to a Protocol-based VLAN Group 100 and traffic will be forwarded to VLAN 20.

Step 3. (Optional) In the Privileged EXEC mode of the switch, save the configured settings to the startup configuration file, by entering the following:

```
SG350X#copy running-config startup-config
```

```

SG350X#copy running-config startup-config
Overwrite file [startup-config]... (Y/N)[N] ?

```

Step 4. (Optional) Press **Y** for Yes or **N** for No on your keyboard once the Overwrite file [startup-config]... prompt appears.



```
SG350X#copy running-config startup-config
Overwrite file [startup-config]... (Y/N)[N] ?Y
16-May-2017 05:45:25 %COPY-I-FILECPY: Files Copy - source URL running-config destination
URL flash://system/configuration/startup-config
16-May-2017 05:45:28 %COPY-N-TRAP: The copy operation was completed successfully
SG350X#
```

You should now have displayed the protocol-based VLAN group and port configuration settings on your switch.

**Important:** To proceed with configuring the VLAN group settings on your switch, follow the [guidelines](#) above.