COMMANDO Soldier C3000 Series Managed Switch Web GUI Guide

SoldierOS Version 3K.v1.10 onwards

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Chapter 1 Introduction

COMMANDO Soldier C3000 Series Switches offers a state of art quality product that can serve on real time high-speed Performance with input power AC as well as DC, covers larger physical distance up to 250 meters with copper cables as compared to other brands best switches. This series is having advance L3 features, which are highly reliable, conformance to international open standards, durable, serviceable, aesthetics, perceived quality, enhanced performance with larger range with copper cables and usability leads to value to money. Easy Management via lots of options like RIP V1/2, OSPF, Advanced Web-based Graphical User Interface (Web GUI), Industry standard Command Line interface (CLI), RADIUS/TACACS+, LLDP/LLDP-MED, Time based PoE/PoE+ Scheduling, DHCP server as well as zero touch provisioning whichever is suitable to our esteem customers.

COMMANDO Soldier C3000 Series switches are L3 Aggregation and Access Series Modular Routing Switches are fully managed L3 having 4, 24 and 48 GE switch ports or 24/48 SFP ports with perpetual PoE/PoE+/Ultra PoE++ IEEE 802.3 af/at/bt (15.4W, 30W, 90W) compliant or Non PoE models plus additional fixed 10G or 1G fiber/ 10GE or 1GE copper uplink ports or modular uplink as per requirement with perpetual PoE/PoE+/PoE++ for no power downtime required for network resiliency and high availability which delivering robust performance and intelligent switching for growing networks. This series switches are easy to deploy, use, manage and designed exclusively for enterprise-class aggregation layer and as edge networks Switches, specially built for Security, IoT, and Cloud networking needs of growing businesses, high-end campus networks for Small-Medium Business (SMB). Designed for operational simplicity to lower total cost of ownership, they enable scalable, secure, and energy-efficient business operations with intelligent and automated services. This intelligent managed routing switches designed for networks requiring High performance, High port density, High uplink bandwidth, Flexibility, Fault Tolerance, and Advanced Software features for maximum Return on Investment (ROI). Switch models are designed for full PoE capability on all ports, power and fan redundancy, Layer 3 feature support static and dynamic routing, these are optimized for today’s surveillance, mobile and IoT needs. Designed for operational simplicity to lower total cost of ownership, they enable scalable, secure, and energy-efficient business operations with intelligent and automated services.

It has high performance fixed uplink with fiber/copper 10G, 1G/10GE, 1GE ports fixed and modular uplink which helps it to meet the requirement of high-end campus LAN, Metro/Enterprise networks. Each switch is capable to deliver 15.4W PoE, 30W PoE+ and 90W PoE++ power on all ports along with automated power (ON/OFF) scheduling with perpetual IEEE 802.3af compliant PoE (Power over Ethernet), 802.3at compliant PoE+ (Power over Ethernet plus) and IEEE802.3bt type-4, Ultra PoE++(Ultra Power over Ethernet plus plus) and having power budget up to 2400W with RPS. Switches are PoE/PoE+/Ultra PoE++ capable to provide power across all access ports for wireless APs, security cameras, and other IoT devices which are used in surveillance. These switches are powerful and flexible enough for users to deploy PoE/PoE+/Ultra PoE++ standard supplies up to 90W of power per port which is backward compatible with 30W and 15.4W PD which makes it ideal for applications using high power wireless access points, PTZ (Pan Tilt Zoom) IP cameras, Surveillance cameras, VoIP telephony systems, kiosks, POS terminals, thin client, 802.11ac and 802.11ax access points, small cells, and connected LED lighting devices over longer distances up to 250 meters. The 90W Ultra PoE++, IEEE 802.3bt technology drives high-power infrastructure for smart building systems, safe cities, thin clients, and a lot more. Facility managers and building owners can adopt the standard to future-proof their all PoE/PoE+/Ultra PoE++ networks requirements. The outcome for them is lower installation and wiring costs. It's software includes OSPF, RIP, Static route, QoS Traffic classification based on Layer 2, Layer 3, Layer 4, and priority information Actions including ACL, CAR, and re-marking, Queue scheduling modes such as PQ, WFQ and PQ+WRR, Congestion avoidance mechanisms, including WRED and tail drop, Traffic shaping, SNMPv1/v2c/v3, Zero Touch Provisioning (ZTP), 802.1x authentication, RADIUS and TACACS+ authentication for login, DoS, ARP, MAC address attacks, broadcast storms, and heavy-traffic and ICMP attack defenses, Remote Network Monitoring (RMON).

These switches have advanced Security features, and advanced Quality of Service (QoS), ideal for all organizations considering reliable, affordable hardware with well-known CLI and simple Web managed real time interface. Automated PoE/PoE+/Ultra PoE++ scheduling, Scripting capabilities, Layer 3 routing, Automatic MDIX and Auto-negotiation on all ports select the right transmission modes (half or full duplex) as well as data transmission for crossover or straight-through cables dynamically. Moreover, with its innovative energy-efficient technology, can save up to 58% of power consumption, making it an eco-friendly perfect solution for your business network. These switches come with lifetime free software upgrades and patching to enhance features and supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance upgrades. This support allows customers to add new features and upgrades without having to pay a single dollar.

It has a 4K-entry VLAN table which provides VLAN classification according to port-based, protocol-and-port-based, MAC-based, and Flow-based capability. It also supports IVL (Independent VLAN Learning), SVL (Shared VLAN Learning), and IVL/SVL (both Independent and Shared VLAN Learning) for flexible network topology architecture. It provides IEEE802.1ad (Q-in-Q) for double tag insertion and removal function. In additions, VLAN translation function is also supported for Metro Ethernet applications with up to 32K entries L2 MAC table are supported with 2-left 4-way hashing algorithm which can effectively reduce collision ratio. An independent 4K-entry Multicast table is used to support Multicast functions, such as IGMP snooping. The device supports a 4K-entry VLAN/Ingress/Egress Access Control List (ACL). The ACL function supports L2/L3/L4 match fields and performs configurable actions, such as Drop/Permit/Redirect/Mirror /Logging/Policing/Ingress VLAN conversion/Egress VLAN conversion/QoS remarking/VLAN tag status assignment. Per-port ingress/egress bandwidth control and per-queue egress bandwidth control are supported. The device provides three types of packet scheduling, including SP (Strict Priority), WFQ (Weighted Fair Queuing), and WRR (Weighted Round Robin). Each port has 8 physical queues, and each queue provides a leaky bucket to shape the incoming traffic into the average rate behavior. The Broadcast/Multicast/Unknown-Multicast/Unknown-Unicast storm suppression function can inhibit external and internal malicious attacks. The device supports 4-sets of port mirror configurations to mirror ingress and egress traffic. RSPAN, sFlow are also supported for traffic monitoring purposes. For network management purposes, complete MIB counters are supported to provide forwarding statistics in real time. The link aggregation function enhances link redundancy and increases bandwidth linearly. It offers robust QoS to optimize traffic on your Business Network, these switches provide (Port-based/802.1p/DSCP) QoS to keep latencysensitive video and voice traffic jitter-free moving smoothly. Additionally, port-based, tag-based VLAN, Voice VLANs can improve security and meet more network segmentation requirements. This series switches also have provisioning of QOS, Static and dynamic routing for IPV6 clients.

Simplified Configuration and Management

Zero-Touch Provisioning (ZTP) simplifies installation of the switch.

Easy to manage via Console/web-Based Management (Web GUI) / Telnet / SSH / HTTPS.

Remote Manageability

Remote management is the process that allows the administrators to take full control of all operations using a remote. This remote management via Web GUI / Telnet / SSH / HTTPS will reduce time and money spent on management and maintenance and physical presence of Network Engineer.

Management by CLI - Console, Telnet (RFC854) up to 3 sessions

Management by Web GUI - HTTP, HTTPS for management Based on Remote Configuration and maintenance Using Telnet.

In this CLI guide we will understand Management by Command Line Interface (CLI) through console port, telnet management mode.

Accessing the Switch via console port

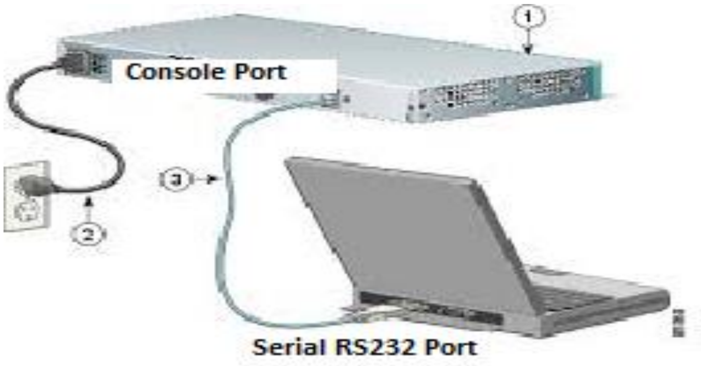
How to Login COMMANDO Series C3000 via console port?

The console interface is used by connecting the Switch to a VT100-compatible terminal or a computer running an ordinary terminal emulator program (e.g., the Hyper Terminal program included with the Windows operating system) using an RS-232C serial cable. Your terminal parameters will need to be set to:

- VT-100 compatible
- 115200 baud
- 8 data bits
- No parity
- One stop bit
- No flow control

Users may also access the same functions over a Telnet interface. Once you have set an IP address for your Switch, you can use a Telnet program (in VT-100 compatible terminal mode) to access and control the Switch. All the screens are identical, whether accessed from the console port or from a Telnet interface.

Step 1: Connect the Switch console port with PC/Laptop via console cable.



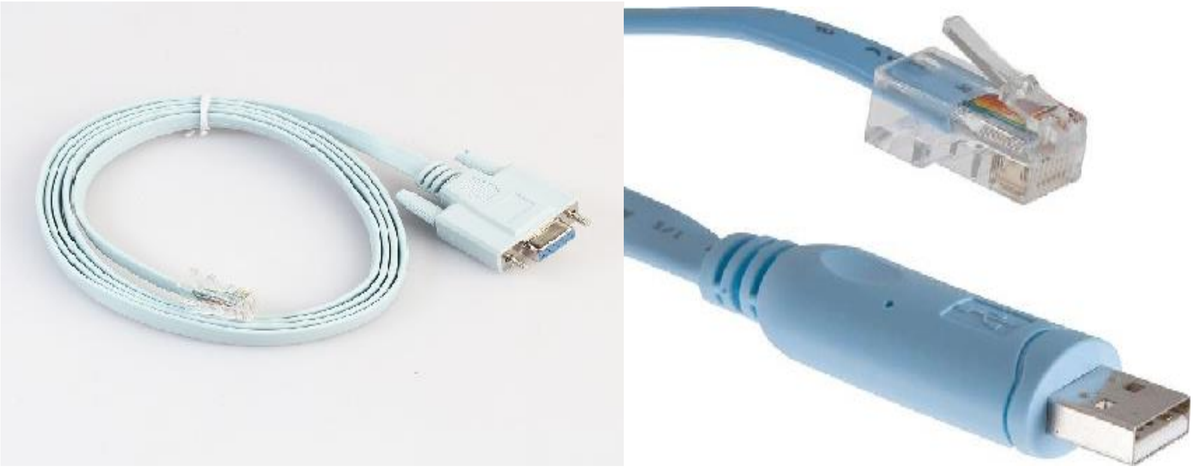
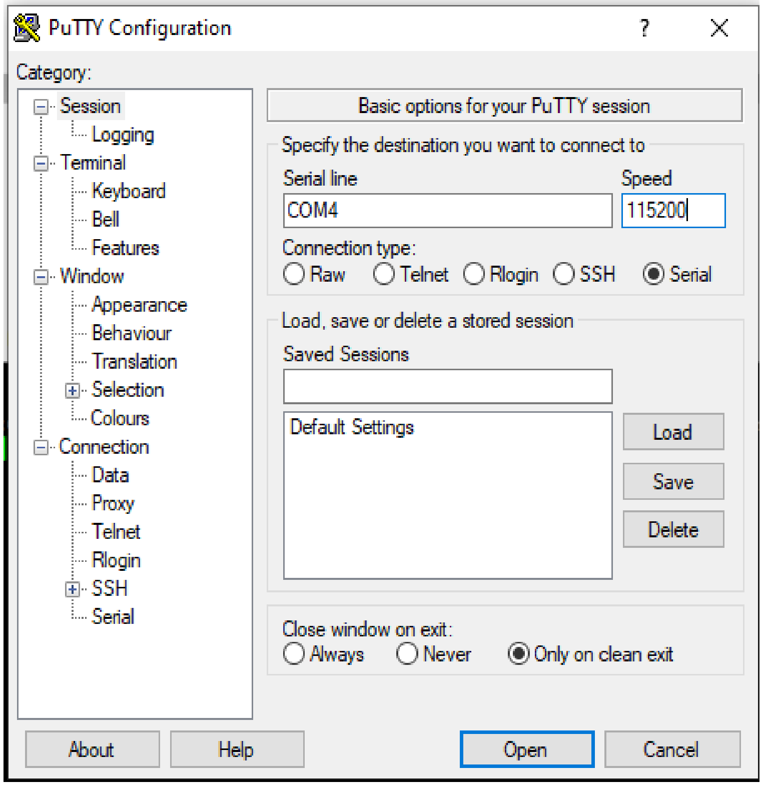


Fig-1. Connection of console port with PC/Laptop via console cable.

Step 2: The communication parameters configuration of the Putty Terminal with console is shown below Baud rate (Speed):115200



PuTTY Configuration

Basic options for your PuTTY session

Specify the destination you want to connect to

Serial line: COM4

Speed: 115200

Connection type: ○ Raw ○ Telnet ○ Rlogin ○ SSH ● Serial

Load, save or delete a stored session

Saved Sessions

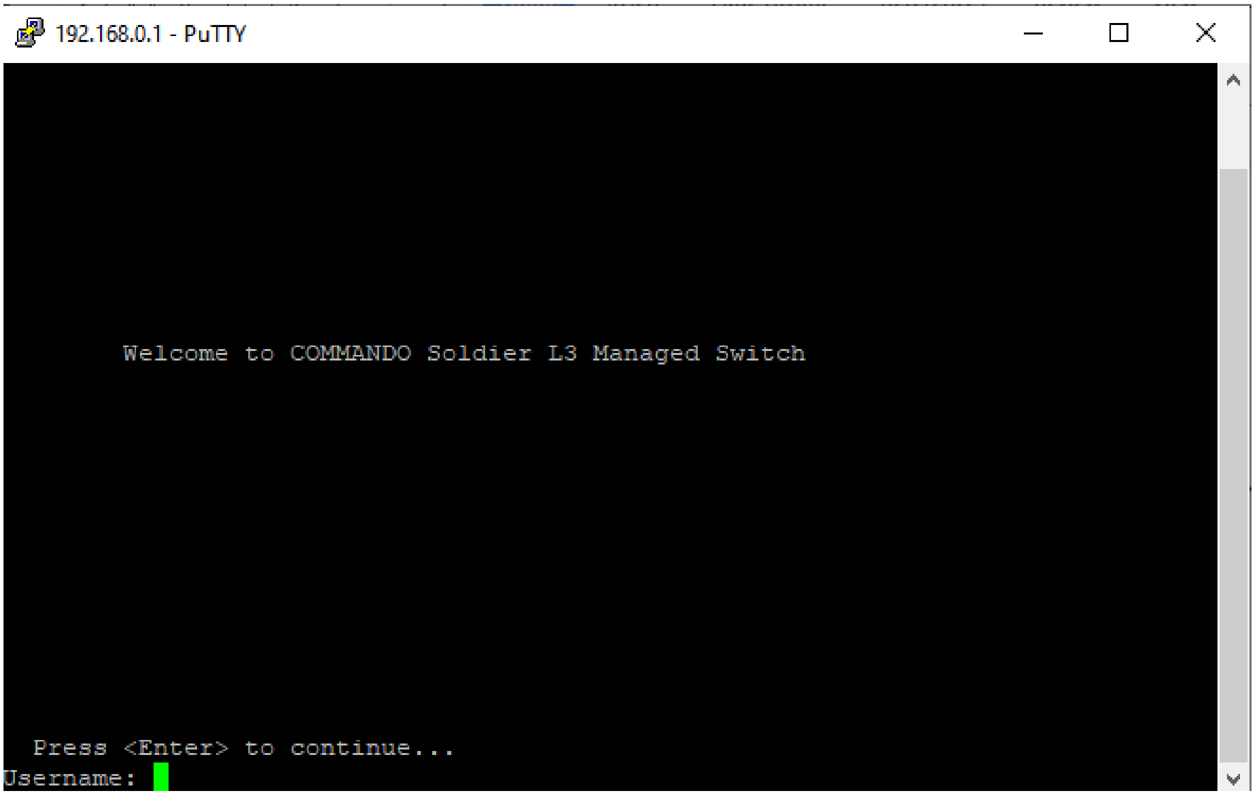
Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

Fig-2. Putty configuration in PC for console port access

Step 3: Click on **"Open".** You will get following window.

With the console port properly connected to a management computer, the following screen should be visible.



```
        Welcome to COMMANDO Soldier L3 Managed Switch




  Press <Enter> to continue...
Username:
```

Fig-3. COMMANDO Series C3000 Switch CLI access via console port

How to Login COMMANDO Series C3000 Web GUI and Enable Telnet?

Before Accessing Command Line Interface via telnet, you have to login to Web GUI of COMMANDO C3000 Switch. Connect one Ethernet port to your system with RJ45 LAN cable.

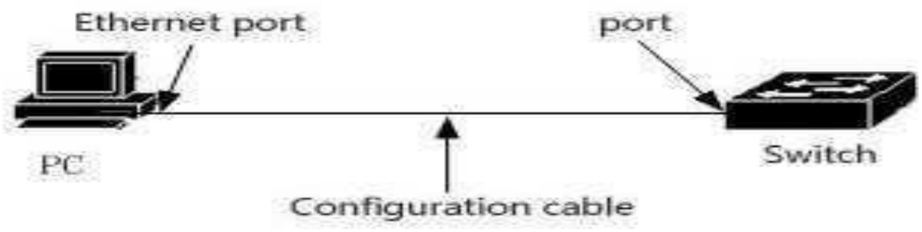
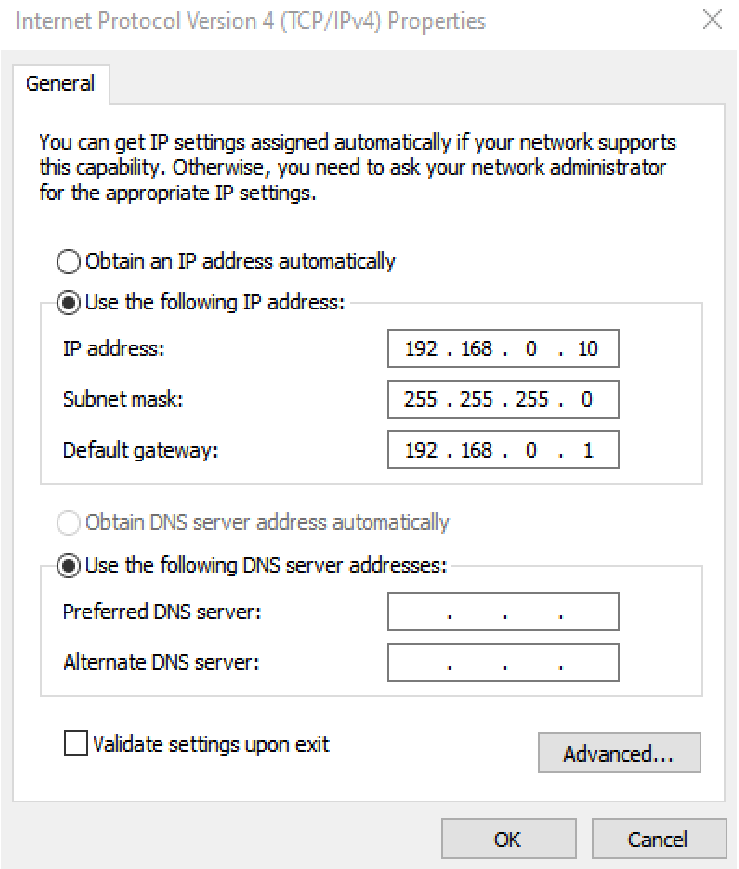


Fig-4. COMMANDO Series C3000 Switch port connected with PC via RJ45 LAN cable.

In PC following LAN setting required.

- Open **Network and sharing center**.
- Click **change Adapter** settings.
- Double click on **Local Area Connection**.
- Click **Properties**.
- Double click on **Internet Protocol Version 4 (TCP/IPv4)** option and set default IP as shown below.

IP Address: 192.168.0.(2-254)
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.0.1



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 0 . 10

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 0 . 1

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

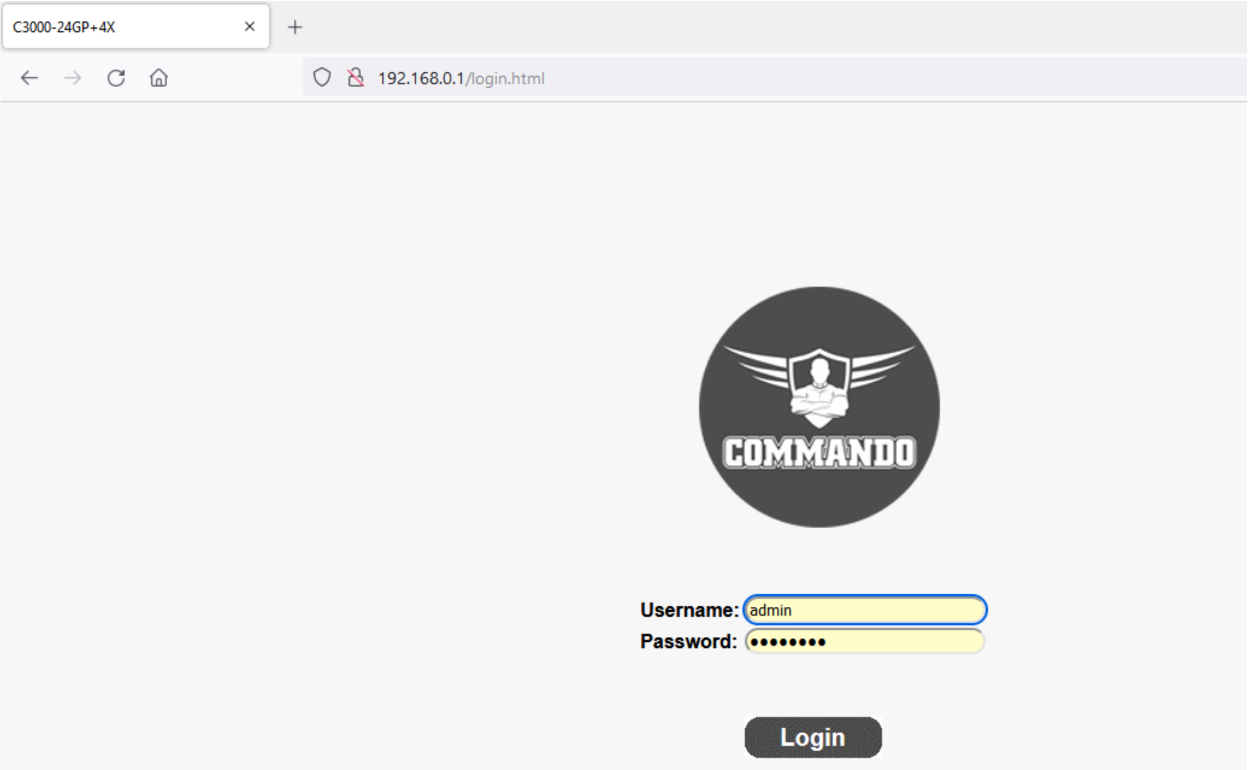
□ Validate settings upon exit

Fig-5. Local Area Connection properties for Web Interface

Now Open any web browser type http://192.168.0.1 and hit **"Enter"** following window will appear.

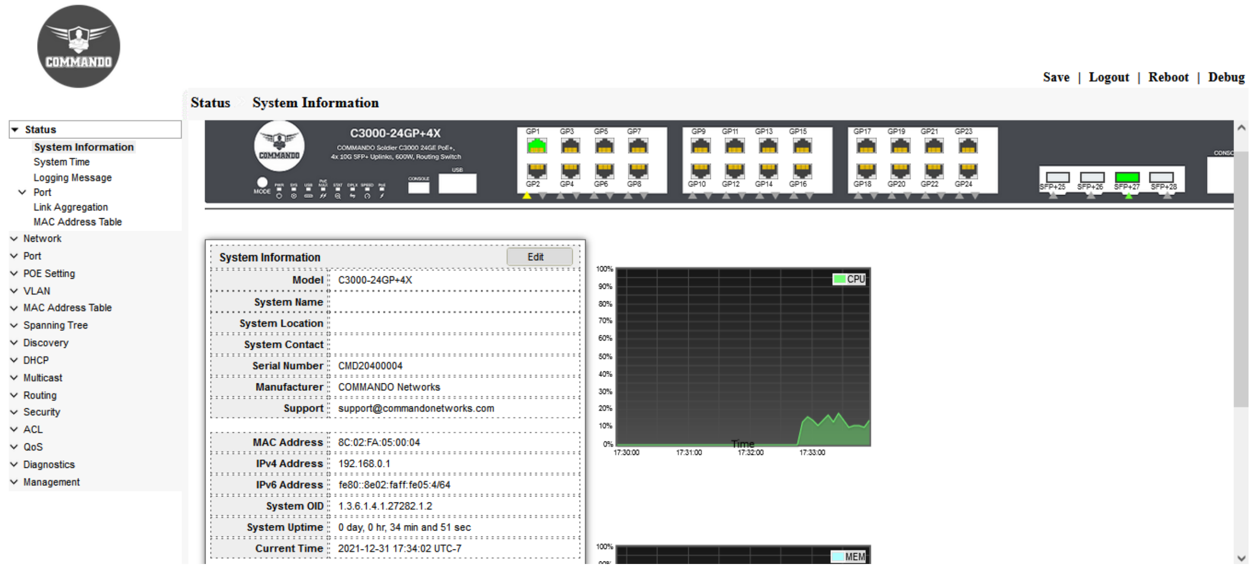
Use following login details to enter in Web GUI mode,
Username: **admin**
Password: ********
(Note: Password is mentioned on backside of device)

Enter the login button. COMMANDO C3000 series switch starting Page appears.



Username: admin
Password: ••••••••

Fig-6. COMMANDO C3000 Switch Web GUI Administrator Login Page



Status System Information

System Information

Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1
IPv6 Address	fe80::8e02:faff:fe05:4/64
System OID	1.3.6.1.4.1.27282.1.2
System Uptime	0 day, 0 hr, 34 min and 51 sec
Current Time	2021-12-31 17:34:02 UTC-7

Fig-7. COMMANDO C3000 Switch Web GUI starting Page

Following steps are required to access CLI via telnet lines.

Management>>Management Access>>Management Service

Click on **Management**

Click on **Management Access**

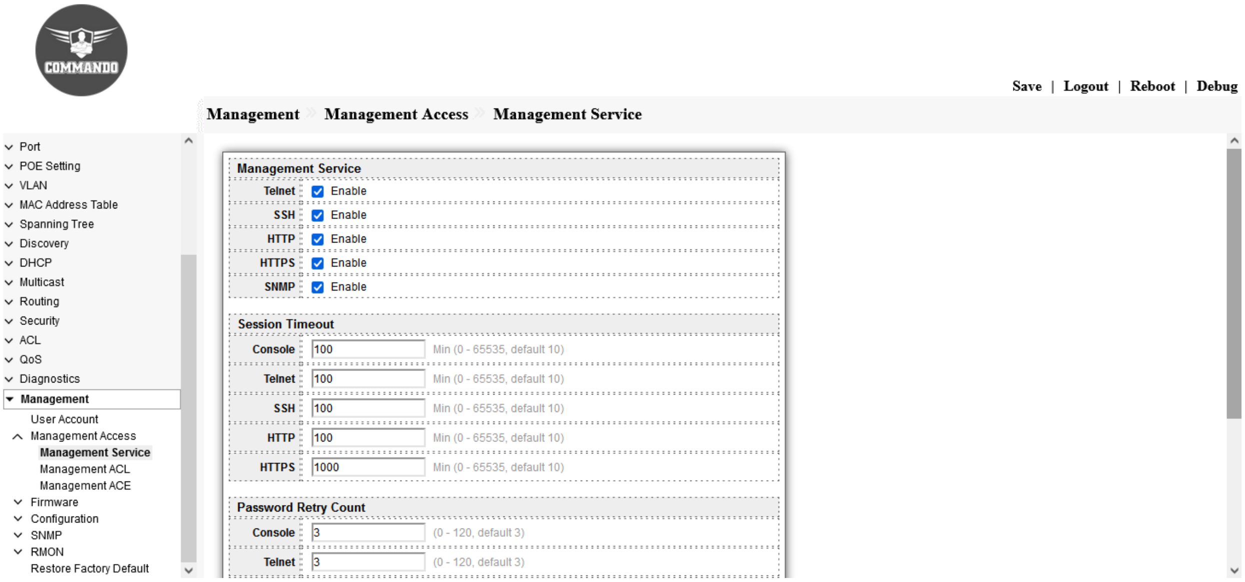
Click on **Management Services**

Telnet Click on ☑

“Apply” and **“Save”** the configuration.

This is required stage before accessing COMMANDO C3000 Switch Command Line Interface (CLI) to enable **“Telnet”.** By default, **“Telnet”** service is disabled by default, so you must enable it manually.

Management >>Management Access>>Management Service is very important page to enable and disable Telnet, SSH, HTTP, HTTPS, SNMP and Set Session Timeout (By default 10min), Password Retry Count (By default 3), Silent Time (To block all further login attempts until the timer expires By default is 0 second) .



Management Service

Telnet	☑ Enable
SSH	☑ Enable
HTTP	☑ Enable
HTTPS	☑ Enable
SNMP	☑ Enable

Session Timeout

Console	100	Min (0 - 65535, default 10)
Telnet	100	Min (0 - 65535, default 10)
SSH	100	Min (0 - 65535, default 10)
HTTP	100	Min (0 - 65535, default 10)
HTTPS	1000	Min (0 - 65535, default 10)

Password Retry Count

Console	3	(0 - 120, default 3)
Telnet	3	(0 - 120, default 3)

Fig-8. COMMANDO C3000 Switch Management Access service.

Users access CLI through TELNET

Following are the steps to access CLI via telnet.

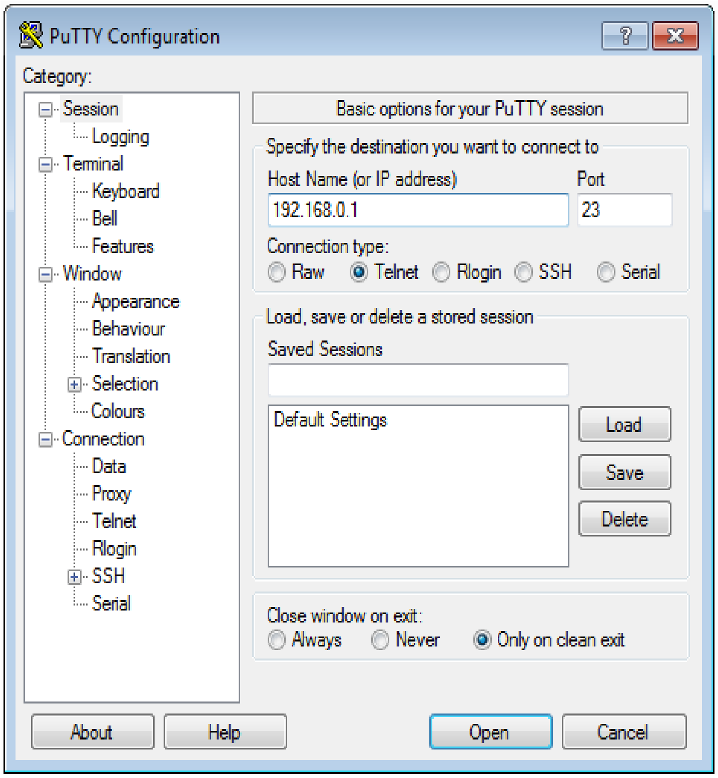
Step 1: Connect the LAN port of PC/Laptop with any Ethernet port of the switch by LAN cable.

Step 2:

The communication parameters configuration of the Putty Terminal with TELNET is shown below:

IP Address: **192.168.0.1**

Port: **23**



Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): 192.168.0.1

Port: 23

Connection type: ○ Raw ● Telnet ○ Rlogin ○ SSH ○ Serial

Load, save or delete a stored session

Saved Sessions

Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

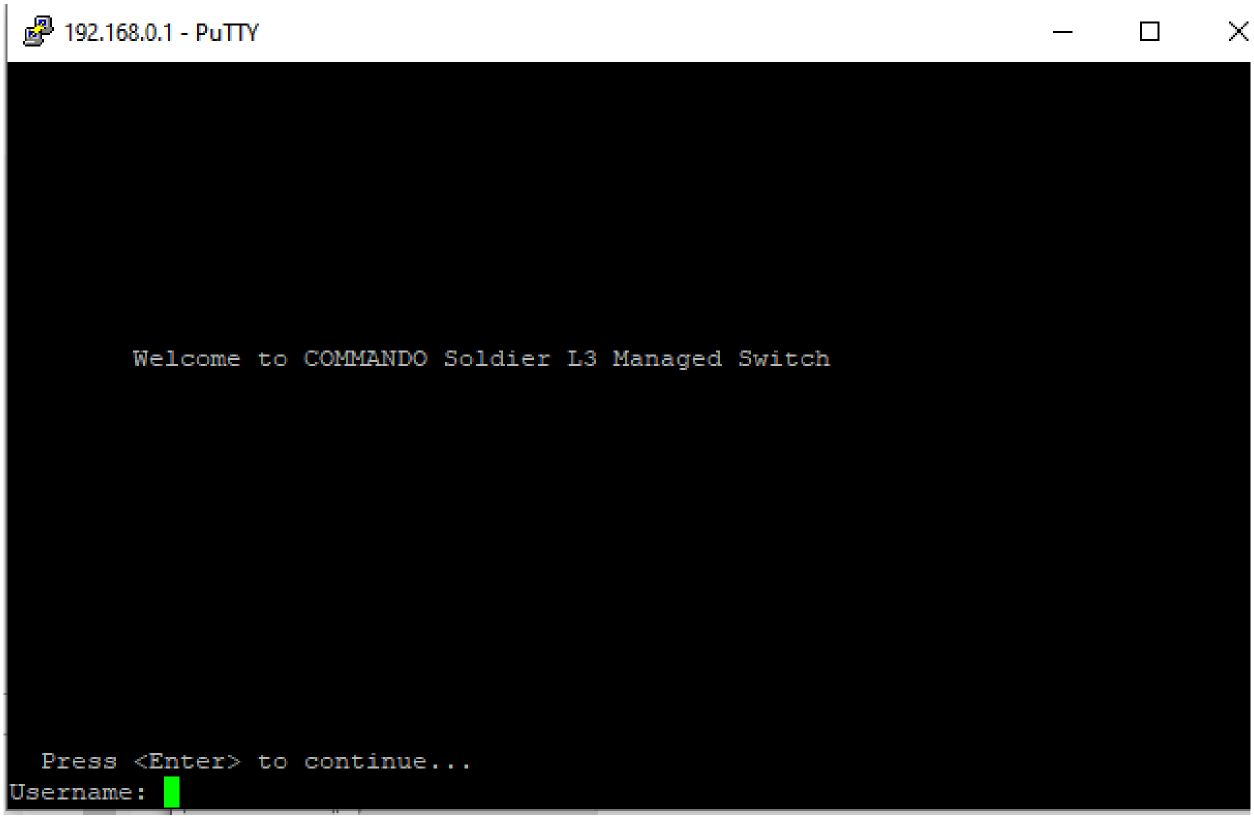
Fig-9. Putty configuration in PC for Telnet access

Step 3: Click on **"Open"**. You will get following window.

Username: **admin**

Password: ********

(Note: Password is mentioned on backside of device)



```
        Welcome to COMMANDO Soldier L3 Managed Switch




  Press <Enter> to continue...
Username:
```

Fig-10. COMMANDO Series C3000 Switch CLI access via telnet

1.1 Web browse based graphical user interface (Web GUI)

Introduction

COMMANDO C3000 Series SoldierOS had a web browser based graphical user interface (Web GUI). This is inbuilt in each COMMANDO C3000 series switches. You can use either the CLI via Console/Telnet or Web GUI for managing C3000 Series Switches. COMMANDO Networks recommend that you use this Web GUI which can configure almost everything as you needed in simple and user-friendly manner. This Web GUI is a state of art having world class features with which you can configure basic, advance, and special feature very easily. After setting the Proper PC LAN parameter given above and in Web browser giving IP address 192.168.0.1 you will get the login page.

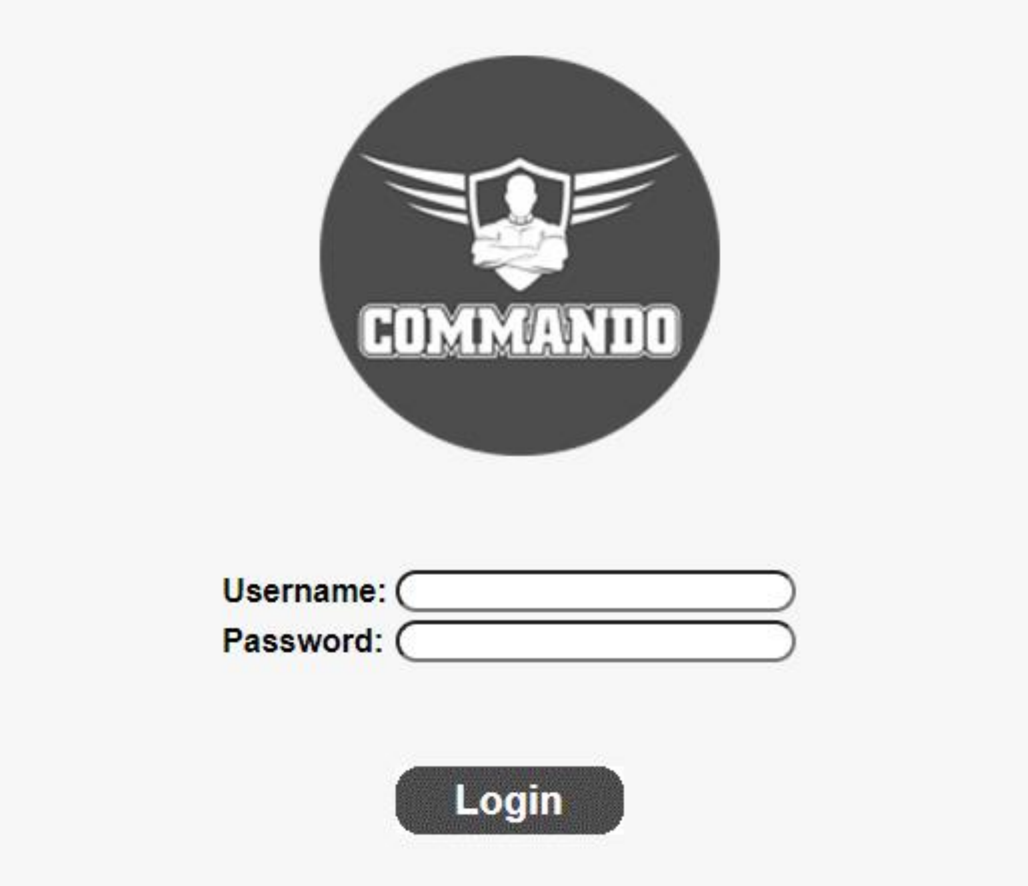


Fig 1.1 Username and Password page of C3000 Series Switches

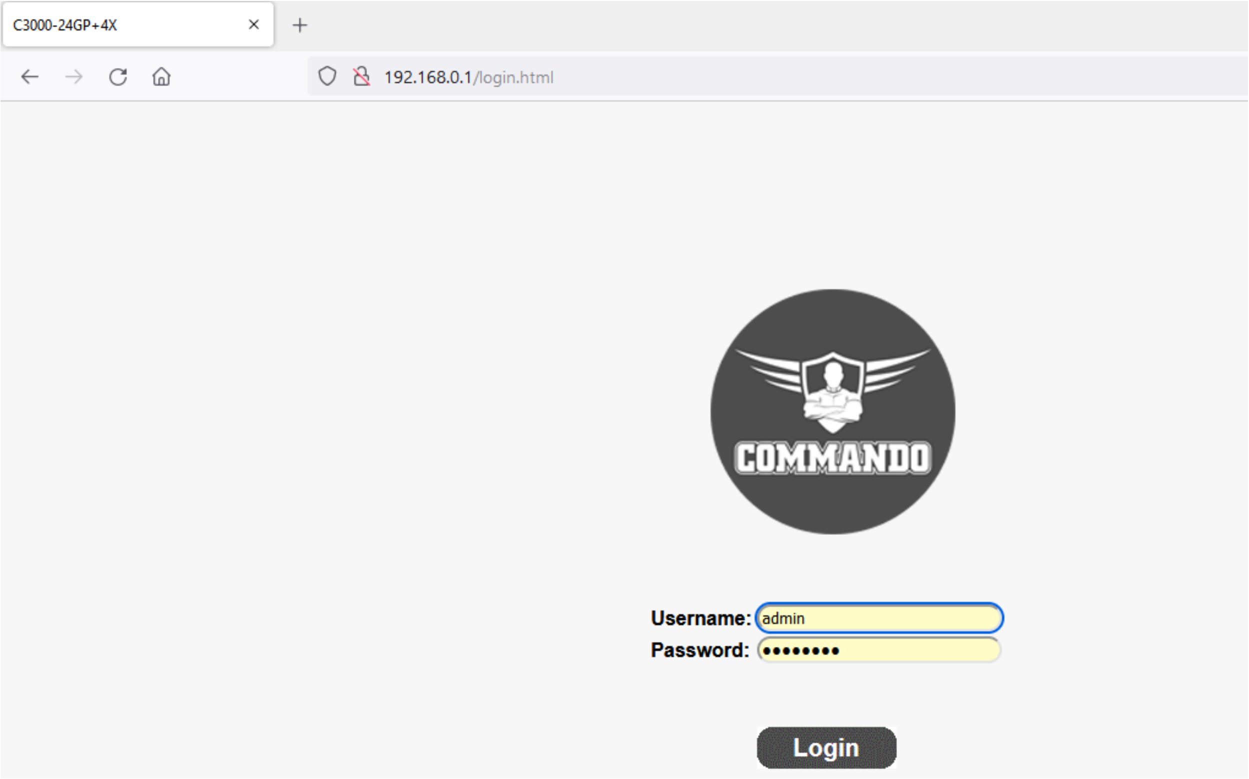


Fig 1.2 Default Login page of C3000 Series Switches

Note: With C3000 Web based Graphical User Interface (Web GUI)

1. You can change default IP 192.168.0.1 to any desired IP address.

2. You can change Factory set username--> admin and password-->*******.

3. Factory set default Password is written on the Backside of device.

After you login the web page successfully, you will see the System information page which provides you real time status of Switch. This page shows very important System information of this C3000 device which can help in troubleshooting network issues. The upper frame is the front panel frame, which shows the connection situation of each port. If a port is connected and link is up and working properly then the corresponding port on the front panel will be green.

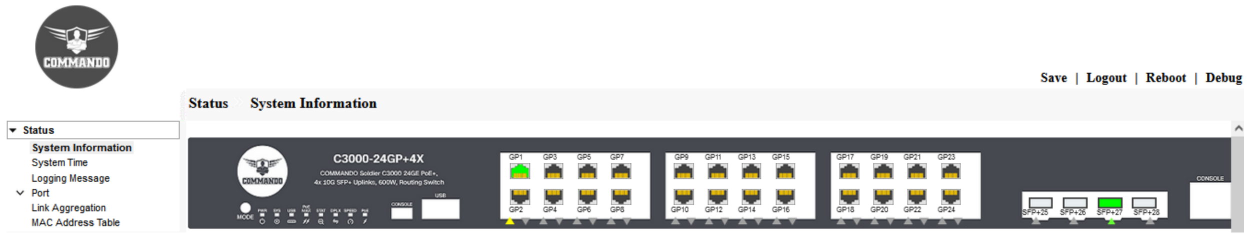


Fig 1.3 System Information page of C3000 Series Switches

1.2 Main Menu Description in Web GUI

The left-hand panel shows the configuration the configuration web pages tabs. All configuration web pages are hidden by the group head label. To expand the group head label, click the down arrow sign on the left side of main WEB page. Then this down arrow key can expand group head label to get specific Web pages for Switch to configure as per requirement of users.

In C3000 Series Switches SoldierOS comes with PoE+/PoE++ as Well as Non PoE models. COMMAMDO SoldierOS has 15 Group heads for C3000 PoE based switches. Lots of functions and protocols can be easily configured by Web GUI and very handy and easy to troubleshoot any networking issue.

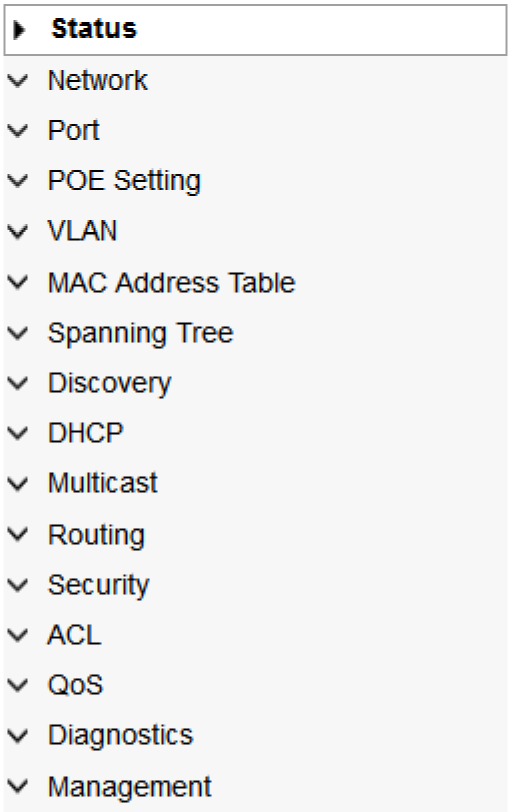


Fig 1.4 WEB Pages for C3000 Series Switches.

Quick Start Device Configuration

To simplify C3000 Series device configuration through quick navigation, the Getting Started page provides links to the most used pages.

Table 1.1 C3000 Series Switches SoldierOS Web Software Frameworks.

Group head label	Corresponding Web pages
Status	System Information System Time Logging Message Port Statistics Error Disabled Bandwidth Utilization Link Aggregation MAC Address Table
Network	DNS Hosts
Port	Port Setting Error Disabled Link Aggregation Group Port Setting LACP EEE Jumbo Frame Port Security

	Protected Port Storm Control
POE Setting	POE Port Setting POE Port Timer Setting Note: 1. Only Available in PoE/PoE+/Ultra PoE++ Switches. 2. Intelligent PoE/PoE+/Ultra PoE++ Scheduler is special feature of COMMANDO C3000 Series Switches.
VLAN	VLAN Create VLAN VLAN Configuration Membership Port Setting Voice VLAN Property Voice OUI Protocol VLAN Protocol Group Group Binding MAC VLAN MAC Group Group Binding

	Surveillance VLAN Property Surveillance OUI GVRP Property Membership Statistics
MAC Address Table	Dynamic Address Static Address Filtering Address Port Security Address
Spanning Tree	Property Port Setting MST Instance MST Port Setting Statistics
Discovery	LLDP Property Port Setting MED Network Policy MED Port Setting Packet View

	Local Information Neighbor Statistics
DHCP	Property IP Pool Setting VLAN IF Address Group Setting Client List Client Static Binding Table
Multicast	General Property Group Address Router Port Forward All Throttling Filtering Profile Filtering Binding IGMP Snooping Property Querier Statistics MLD Snooping Property

	Statistics **MVR** Property Port Setting Group Address
Routing	**IPv4 Management and Interfaces** IPv4 Interface IPv4 Routes ARP **IPv6 Management and Interfaces** IPv6 Interface IPv6 Addresses IPv6 Routes IPv6 Neighbors **RIP Routes Management** RIP Routes Setting **OSPF Routes Management** OSPF Routes Setting
Security	**RADIUS** **TACACS+** **AAA** Method List

	Login Authentication **Authentication Manager** Property Port Setting MAC-Based Local Account WEB-Based Local Account Sessions **DoS** Property Port Setting **Dynamic ARP Inspection** Property Statistics **DHCP Snooping** Property Statistics Option82 Property Option82 Circuit ID **IP Source Guard** Port Setting IMPV Binding Save Database

ACL	MAC ACL MAC ACE IPv4 ACL IPv4 ACE IPv6 ACL IPv6 ACE ACL Binding
QOS	General Property Queue Scheduling CoS Mapping DSCP Mapping IP Precedence Mapping Rate Limit Ingress / Egress Port Egress Queue
Diagnostics	Logging Property Remote Server Mirroring Ping Traceroute

	Copper Test **Fiber Module** **UDLD** Property Neighbor
Management	**User Account** **Management Access** Management VLAN Management Service Management ACL Management ACE **Firmware** Upgrade Active Image **Configuration** Upgrade Save Configuration **SNMP** View Group Community User

	Engine ID Trap Event Notification RMON Statistics History Event Alarm Restore Factory Default

1.3 Save, Logout, Reboot, Debug Buttons

1.3.1 Save

By clicking Save button will copy running-config to startup-config to save the current running configuration to the startup configuration file in Switch Memory. This means that if power failure or device OFF/ON configuration will not be lost and remained as per saved configuration.

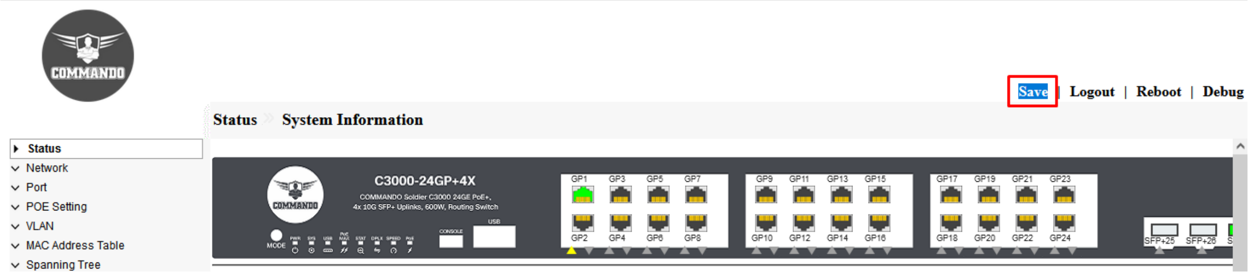
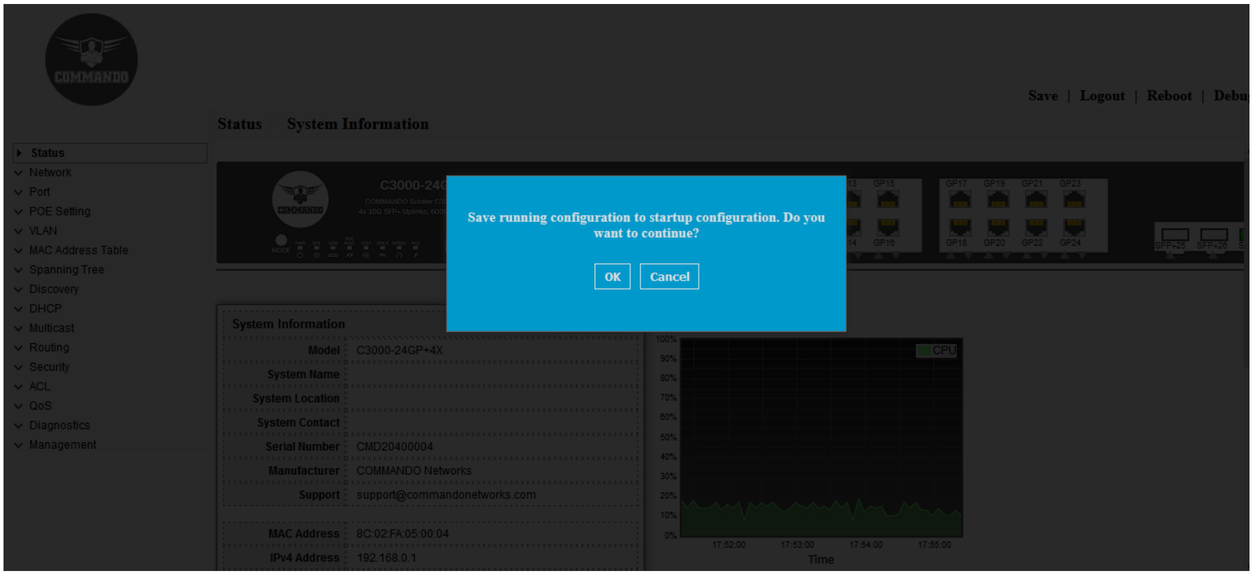


Fig 1.3.1 Save button



Save running configuration to startup configuration. Do you want to continue?

System Information

Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1

Fig 1.3.2 Applying Save button

1.3.2 Logout

Logging out means to end access to a COMMANDO Switch on a Web GUI. Logging out informs the COMMANDO Switch that the current user wishes to end the login session.

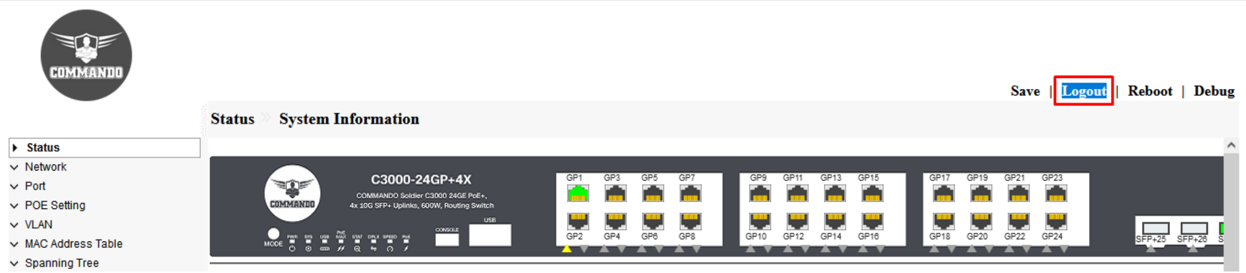
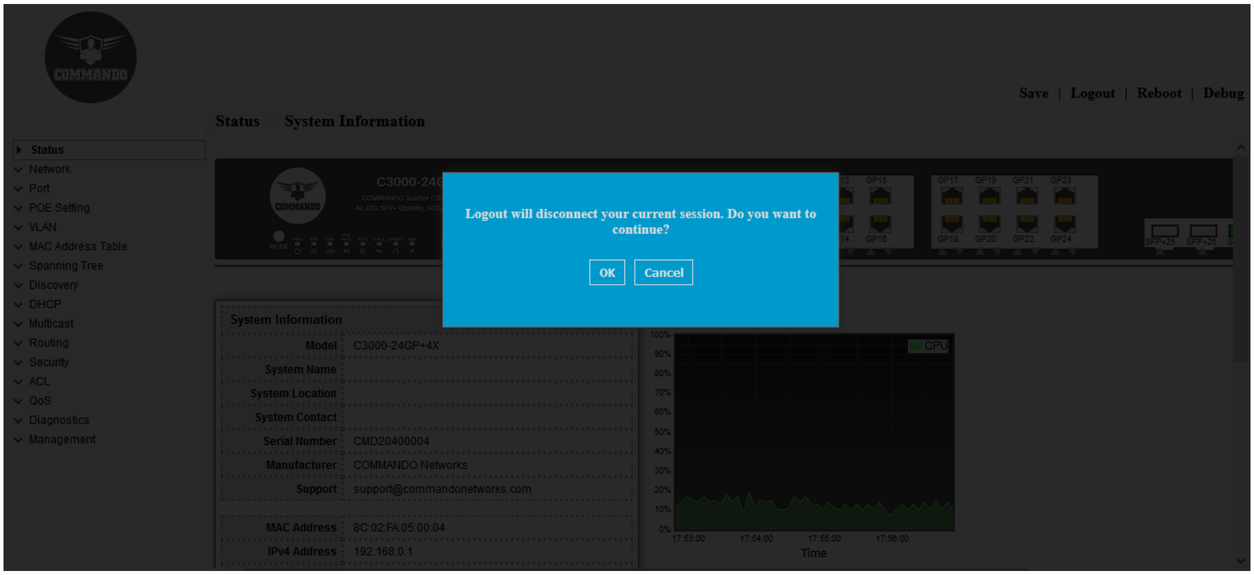

Save | Logout | Reboot | Debug
Status
System Information
Status
Network
Port
POE Setting
VLAN
MAC Address Table
Spanning Tree
C3000-24GP+4X
COMMANDO Soldier C3000 24GE PoE+, 4x 10G SFP+ Uplinks, 600W, Routing Switch
GP1 GP3 GP5 GP7 GP9 GP11 GP13 GP15 GP17 GP19 GP21 GP23
GP2 GP4 GP6 GP8 GP10 GP12 GP14 GP16 GP18 GP20 GP22 GP24
SFP+25 SFP+26

Fig 1.3.3 Logout button on WEBGUI



Logout will disconnect your current session. Do you want to continue?

System Information

Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1

Fig 1.3.4 Applying Logout button on Web GUI

1.3.3 Reboot

Reboot means boot again. COMMANDO Switch is force by this command to power OFF and immediately Power-On. This command forcefully restarting the Switch again.

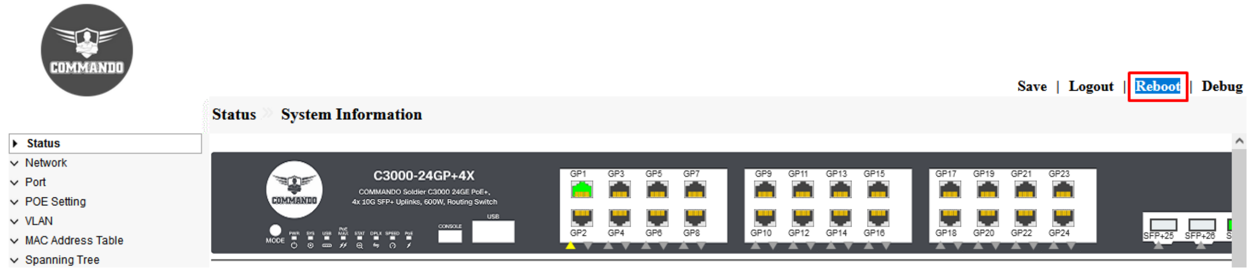
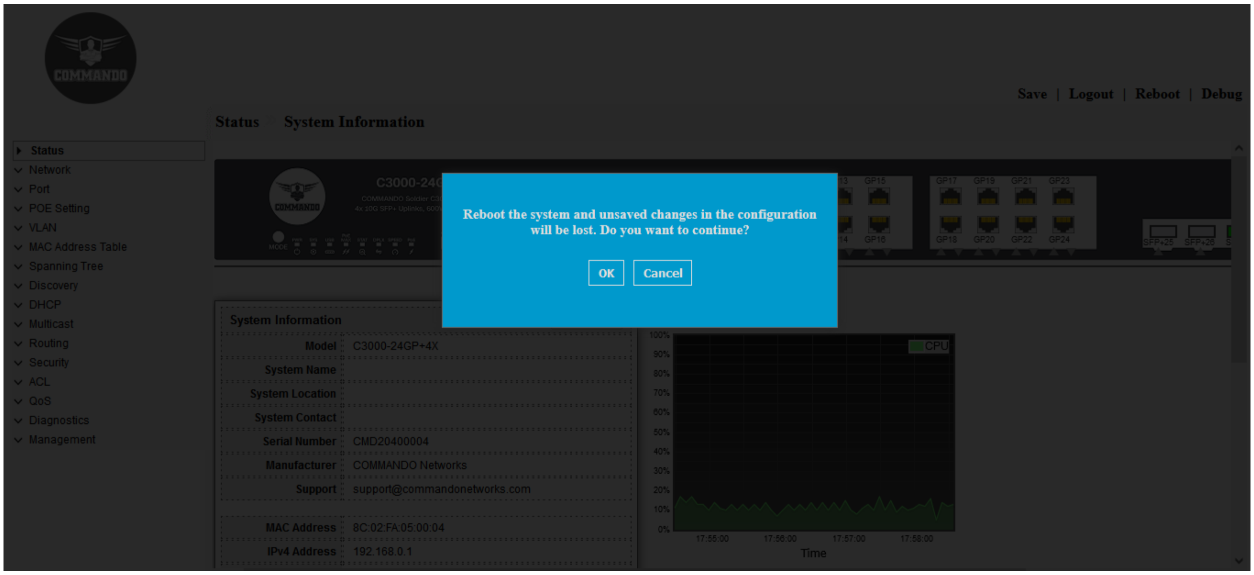


Fig 1.3.5 Reboot button on Web GUI



Reboot the system and unsaved changes in the configuration will be lost. Do you want to continue?

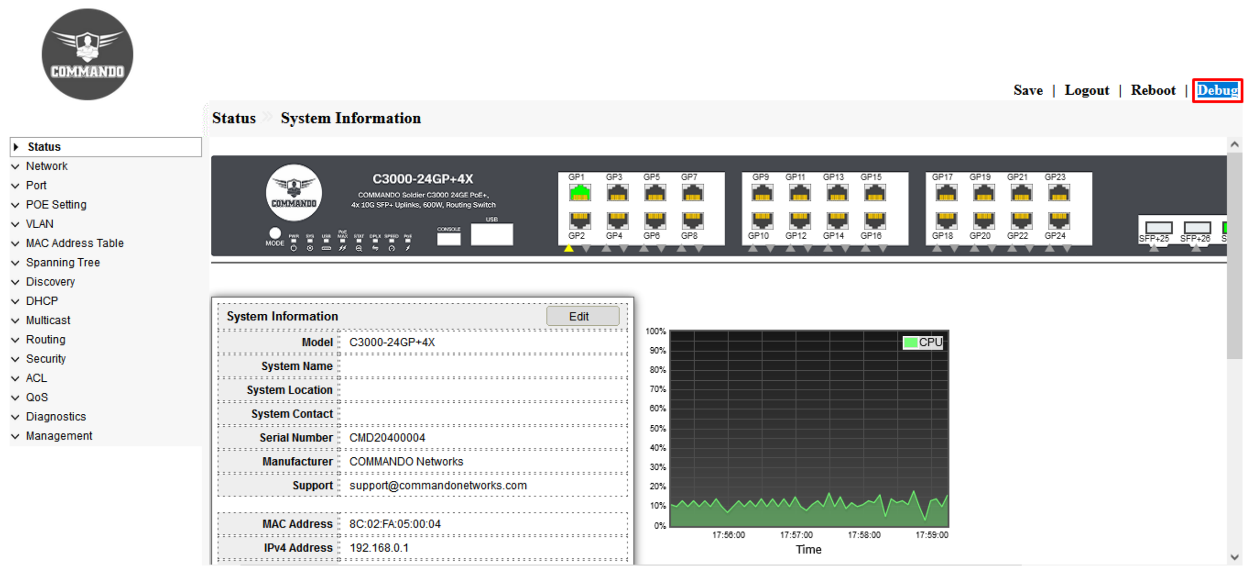
System Information

Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1

Fig 1.3.6 Applying Reboot button on Web GUI

1.3.4 Debug

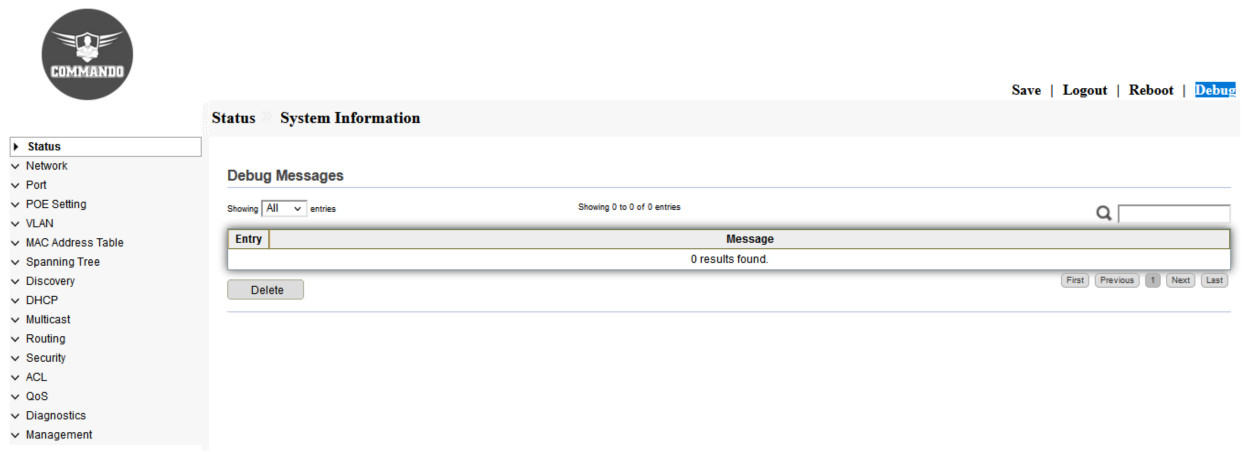
Debug is used to find and resolve bugs or defects. Debugging is the process of troubleshooting for detecting and removing of existing and potential issue in network.



System Information

Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1

Fig 1.3.6 Debug message button on Web GUI



Debug Messages

Showing All entries

Showing 0 to 0 of 0 entries

Entry	Message
0 results found.	

Fig 1.3.7 View Debug message on Web GUI

Chapter 2 COMMANDO C3000 SoldierOS WEB Status

Group Header: Status

After clicking **Status** down arrow keys four corresponding web pages tabs are opened.

System Information: This section describes how to view system information and configure various options on the device. This web page shows the Exact running status of device along with LED Indication like Power, System, connection and activity for all ports, UP/Down status of all ports as well as configuration for devices such as System Information, Model, System Name, System Location, System Contact, Serial Number, MAC Address, IPv4 Address, IPv6 Address, System OID, System Uptime, Current Time, Loader Version, Loader Date, Firmware Version, Firmware Date. This page also gives enabled status device management lines like Telnet, SSH, HTTP, HTTPS, SNMP.

System Time: System time options for configuring the system time, time zone, and Daylight Savings Time (DST).

Logging Message: You can enable or disable logging on the Log Settings page and select whether to aggregate log messages.

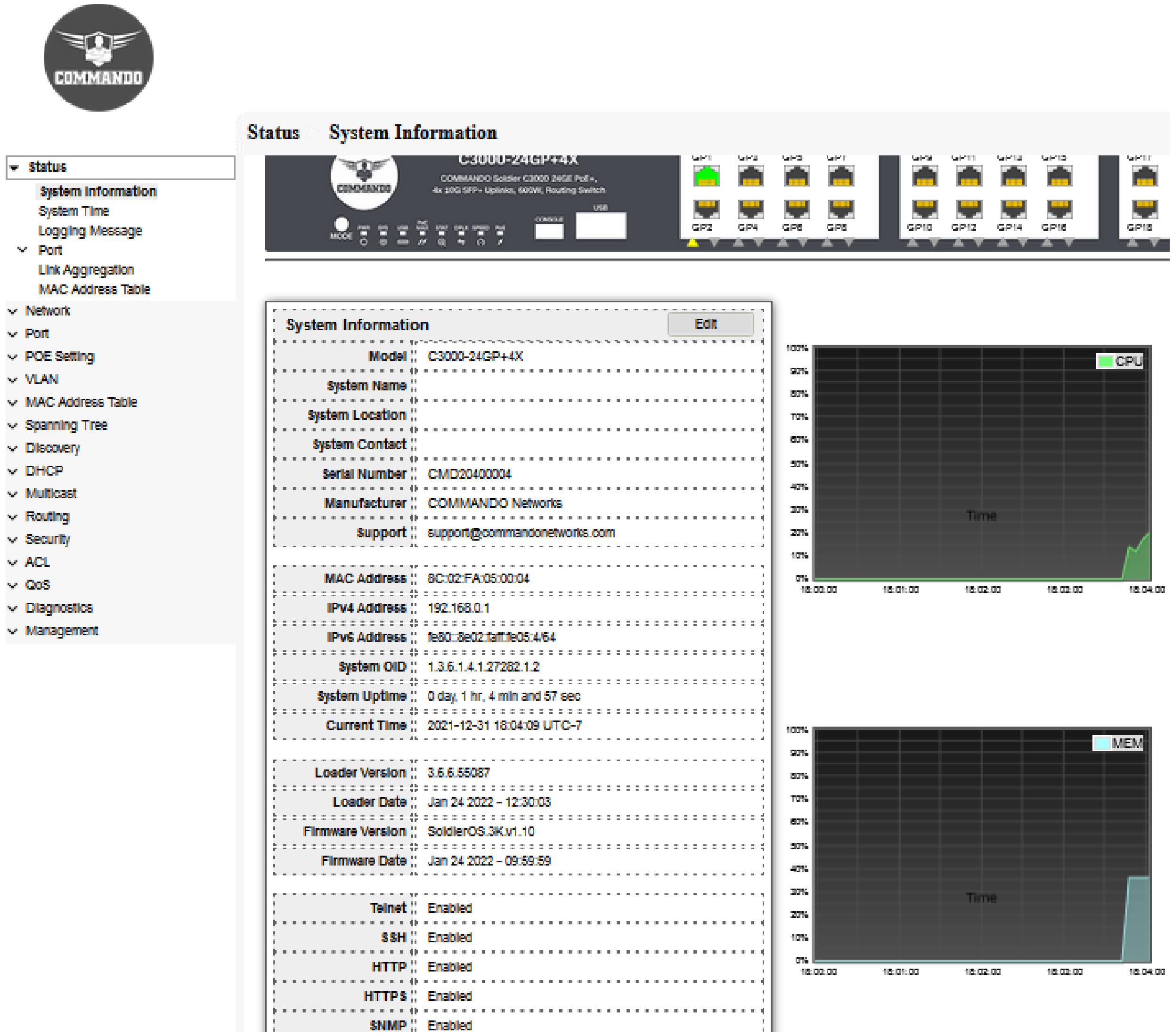
Port: You can view port statistics and reset the port counters.

Link Aggregation: Enable/disable the Link Aggregation Control (LAG) protocol and configure the potential member ports to the desired LAGs by using the LAG Management page. By default, all LAGs are empty.

MAC Address Table: There are two types of MAC addresses—static and dynamic. Depending on their type, MAC addresses are either stored in the Static Address table or in the Dynamic Address table, along with VLAN and port information. Static addresses are configured by the user, and therefore, they do not expire. These pages describe how to add MAC addresses to the system. It covers Configuring Static MAC Addresses, Managing Dynamic MAC Addresses.

2.1 System Information

This is the main display page of C3000 SoldierOS. This web page shows the Exact running status of device along with LED Indication like Power, System, connection and activity for all ports, UP/Down status of all ports as well as configuration for devices such as System Information, Model, System Name, System Location, System Contact, Serial Number, MAC Address, IPv4 Address, IPv6 Address, System OID, System Uptime, Current Time, Loader Version, Loader Date, Firmware Version, Firmware Date. This page also gives enabled status device management lines like Telnet, SSH, HTTP, HTTPS, SNMP.



System Information

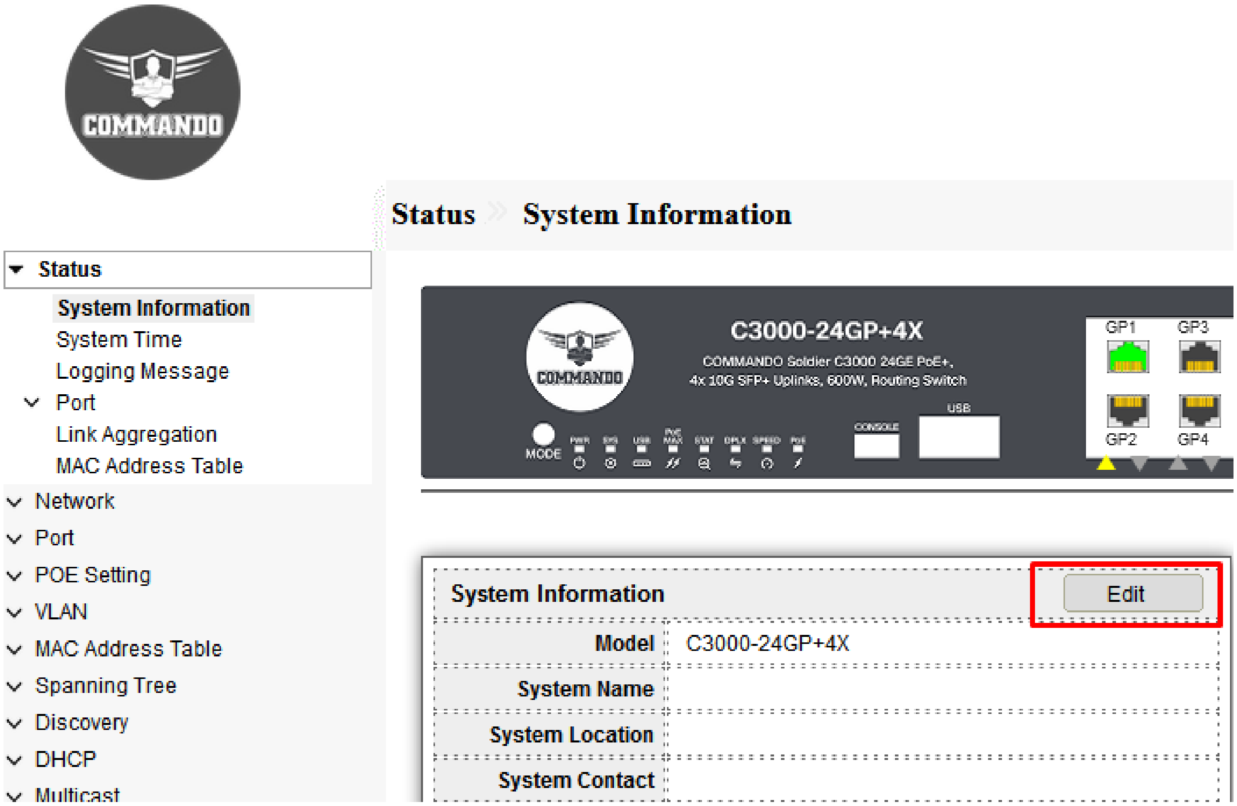
Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1
IPv6 Address	fe80::8e02:faff:fe05:4/64
System OID	1.3.6.1.4.1.27282.1.2
System Uptime	0 day, 1 hr, 4 min and 57 sec
Current Time	2021-12-31 18:04:09 UTC-7
Loader Version	3.6.6.55087
Loader Date	Jan 24 2022 - 12:30:03
Firmware Version	SoldierOS.3K.v1.10
Firmware Date	Jan 24 2022 - 09:59:59
Telnet	Enabled
SSH	Enabled
HTTP	Enabled
HTTPS	Enabled
SNMP	Enabled

Fig 2.1 System information Web page

2.1.1 Changing the System Name, Location and Contact

Following are the steps to change the Default System Name, Location and Contact.

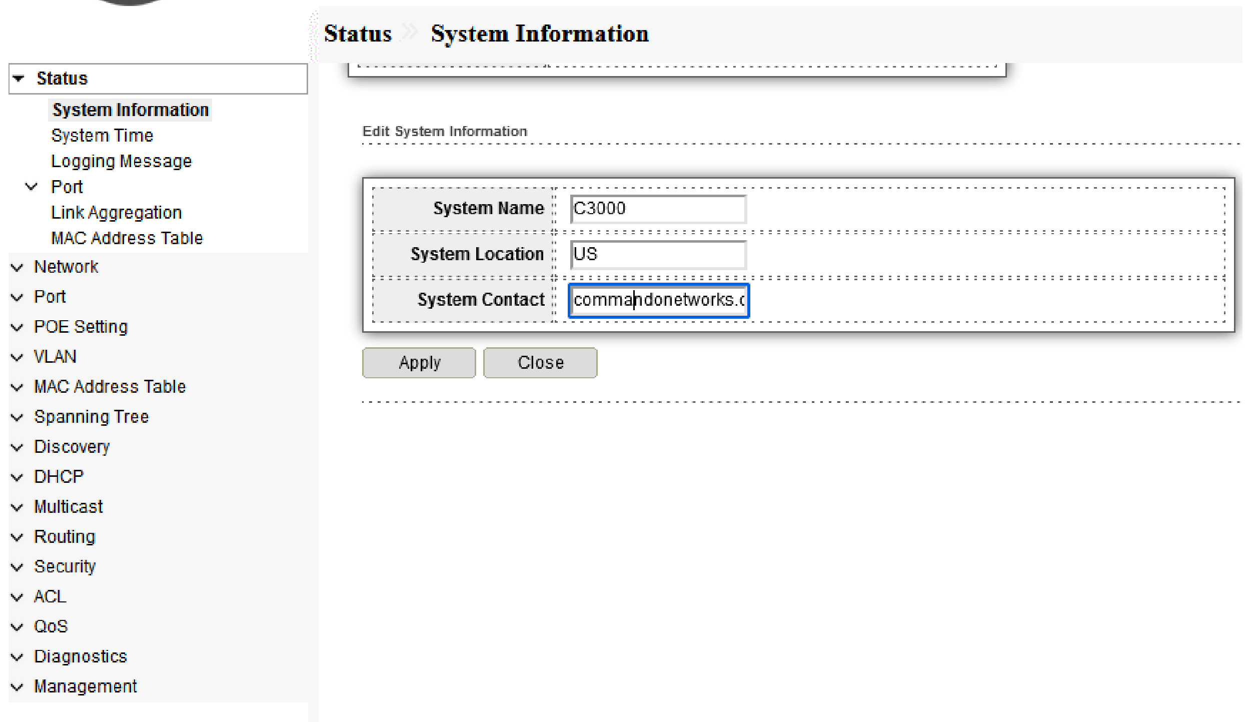
Status>>System Information>>Edit button



System Information	
Model	C3000-24GP+4X
System Name	
System Location	
System Contact	

Fig 2.1.1 Changing the System Name, System Location and System Contact

After clicking **Status>>System Information>>Edit button,** Modify the System Name, System Location and System Contact as per users' requirements.



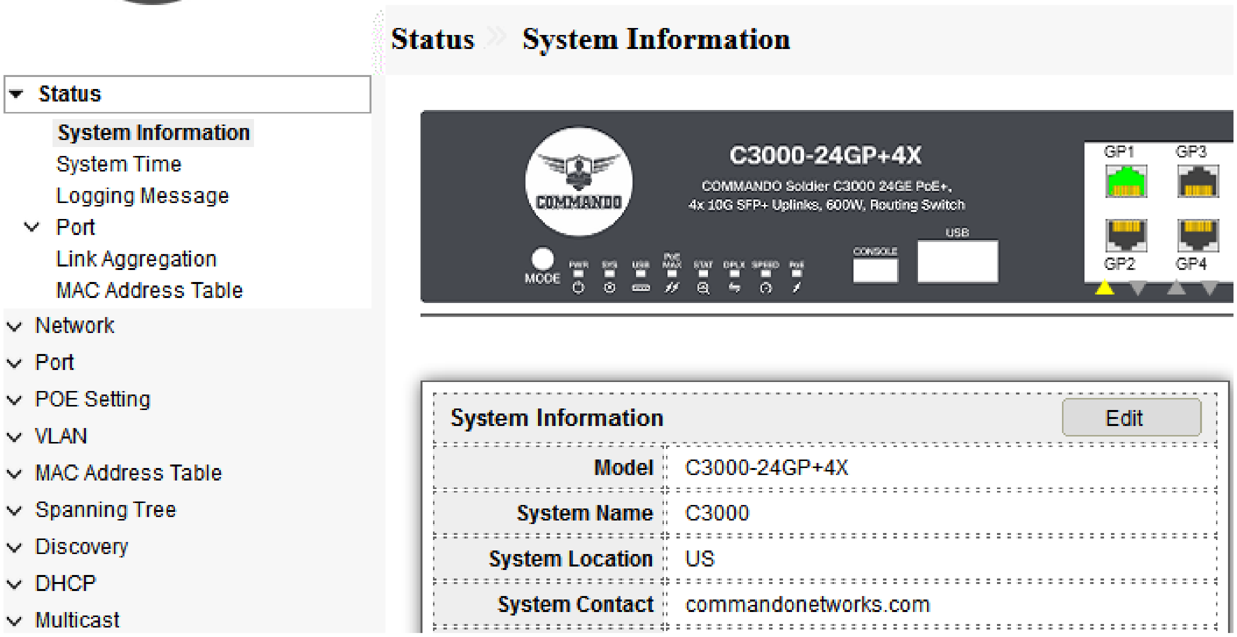
Status » System Information

Edit System Information

System Name	C3000
System Location	US
System Contact	commandonetworks.c

Fig 2.1.2 Changing System Name, System Location and System Contact

After changing System Name, System Location and System Contact click on **Apply** button. Then you can see the changed System Name, System Location and System Contact.



System Information

Model	C3000-24GP+4X
System Name	C3000
System Location	US
System Contact	commandonetworks.com

Fig 2.1.3 Viewing Changed System Name, System Location and System Contact

2.2 System Time

Synchronized system clock is critical because every aspect of managing, securing, planning, and debugging a network involves determining when events occur. Without synchronized clocks, accurately correlating log files between devices when tracking security breaches or network usage is impossible. Synchronized time also reduces confusion in shared file systems, as it is important for the modification times to be consistent, regardless of the machine on which the file systems reside. For these reasons, it is important that the time configured on all the devices on the network is accurate.

System time can be set manually by the user, dynamically from an SNTP server, or synchronized from the PC running the Web GUI. If an SNTP server is chosen, the manual time settings are overwritten when communications with the server are established. As part of the boot process, the device always configures the time, time zone, and DST. These parameters are obtained from the PC running the Web GUI, SNTP, values set manually, or if all else fails, from the factory defaults.

The following methods are available for setting the system time on the Switches

Manual—You must manually set the time.

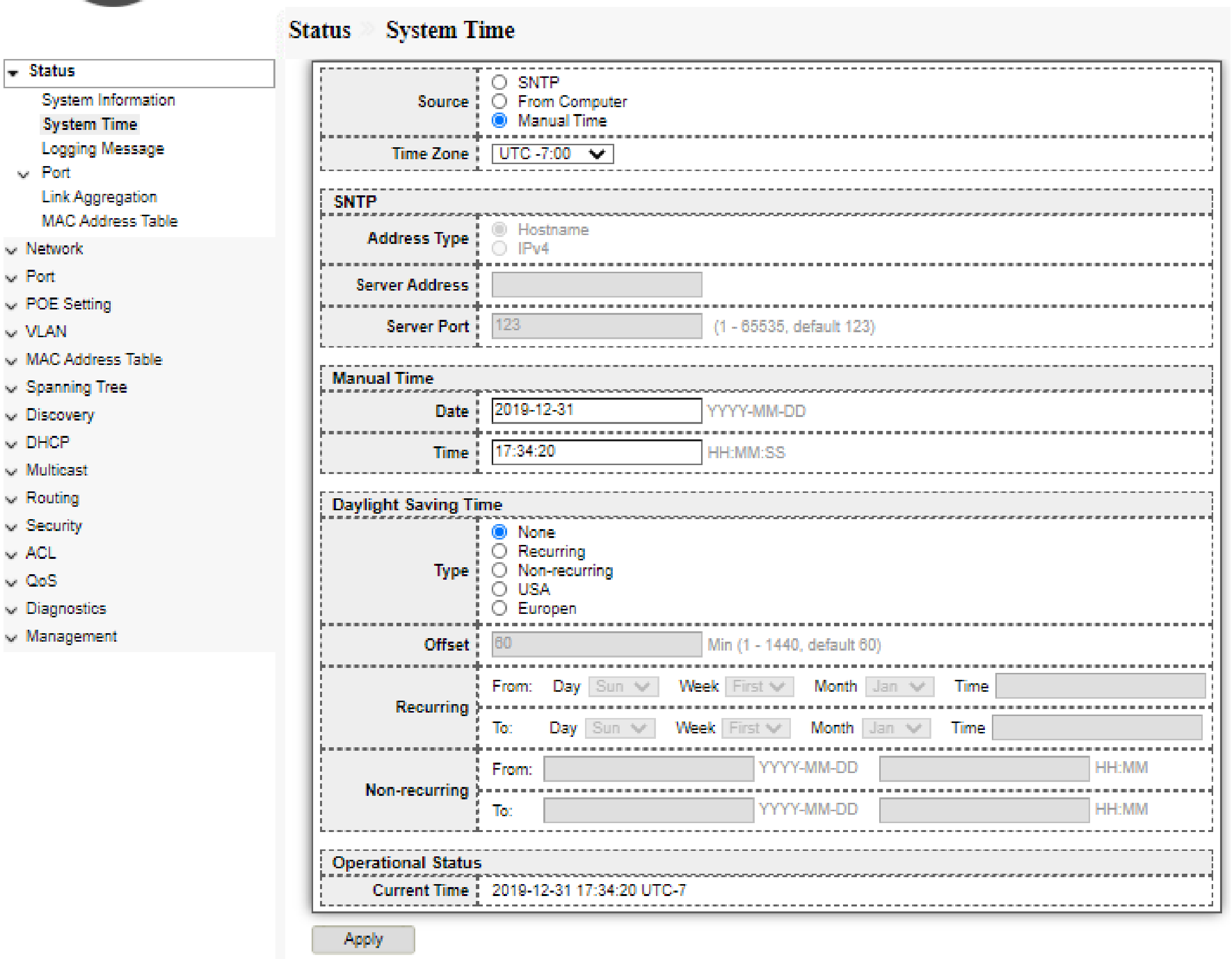
From PC—Time can be received from the PC by using browser information.

This method of setting time from PC works with both HTTP and HTTPS connections.

SNTP—Time can be received from SNTP time servers. SNTP ensures accurate network time synchronization of the device up to the millisecond by using an SNTP server for the clock source.

This page allow user to set time source, static time, time zone and daylight-saving settings. Time zone and daylight saving takes effect both static time or time from SNTP server.

To display System Time page, click **Status>> System Time**



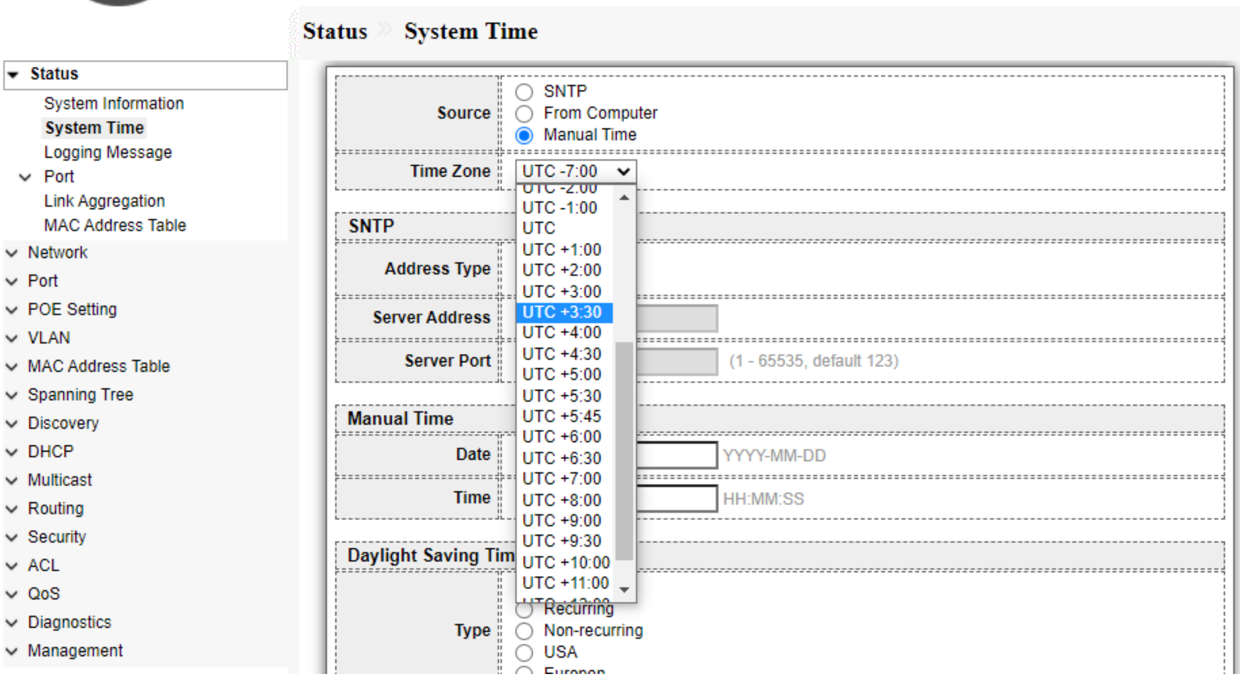
Status » System Time

Source	○ SNTP ○ From Computer ● Manual Time
Time Zone	UTC -7:00
SNTP	
Address Type	● Hostname ○ IPv4
Server Address	
Server Port	123 (1 - 65535, default 123)
Manual Time	
Date	2019-12-31 YYYY-MM-DD
Time	17:34:20 HH:MM:SS
Daylight Saving Time	
Type	● None ○ Recurring ○ Non-recurring ○ USA ○ Europen
Offset	60 Min (1 - 1440, default 60)
Recurring	From: Day Sun Week First Month Jan Time To: Day Sun Week First Month Jan Time
Non-recurring	From: YYYY-MM-DD HH:MM To: YYYY-MM-DD HH:MM
Operational Status	
Current Time	2019-12-31 17:34:20 UTC-7

Fig 2.2.1 Default System Time configuration page

Time Zone and Daylight Savings Time (DST)

A time zone is one of the areas into which the world is divided where the time is calculated as being a particular number of hours behind or ahead of GM. The main purpose of Daylight-Saving Time (called "Summertime" in many places in the world) is to make better use of daylight. We change our clocks during the summer months to move an hour of daylight from the morning to the evening.



Status » System Time

Source: ○ SNTP ○ From Computer ● Manual Time

Time Zone: UTC -7:00

SNTP

Address Type

Server Address

Server Port (1 - 65535, default 123)

Manual Time

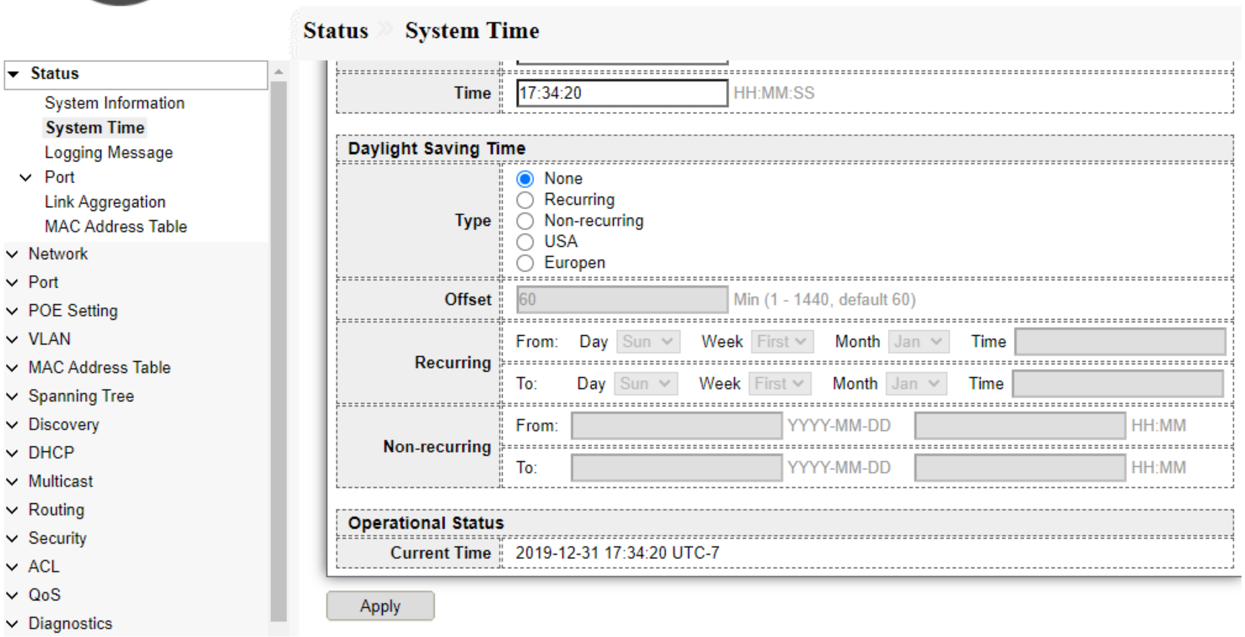
Date YYYY-MM-DD

Time HH:MM:SS

Daylight Saving Tim

Type: ○ Recurring ○ Non-recurring ○ USA ○ European

Fig 2.4.2 Timezone configuration page



Time	17:34:20 HH:MM:SS

Daylight Saving Time

Type	● None ○ Recurring ○ Non-recurring ○ USA ○ Europen
Offset	60 Min (1 - 1440, default 60)
Recurring	From: Day Sun Week First Month Jan Time To: Day Sun Week First Month Jan Time
Non-recurring	From: YYYY-MM-DD HH:MM To: YYYY-MM-DD HH:MM

Operational Status

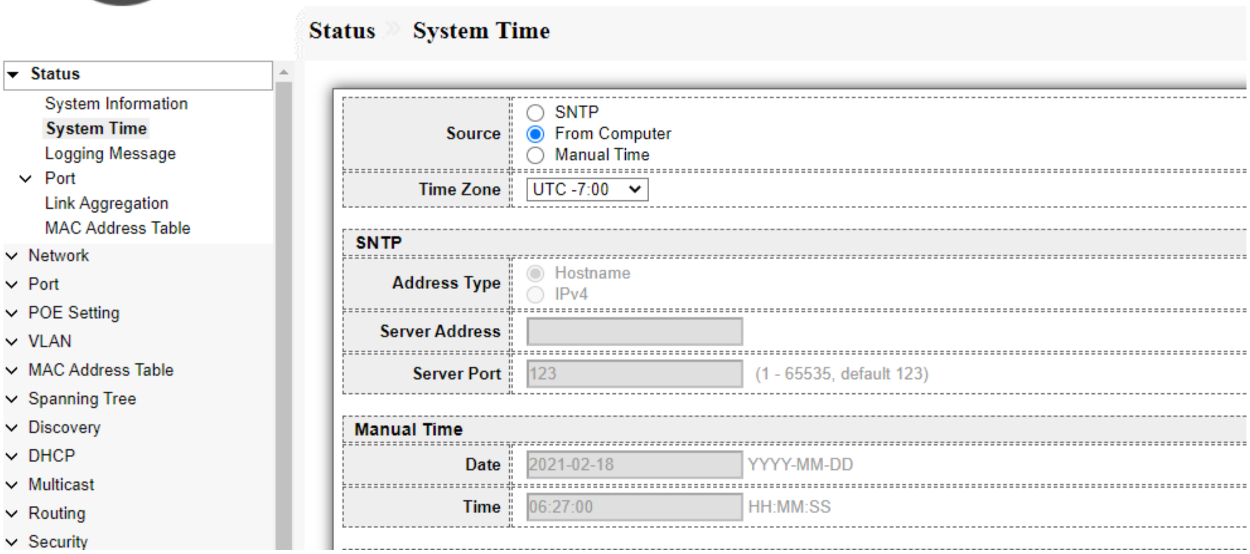
Current Time	2019-12-31 17:34:20 UTC-7

Fig 2.4.3 Daylight saving time configuration page

From Computer

This is the best way to configure the time setting in switch. C3000 Series Switches will take and sync with logging PC time automatically. This is a recommended setting to have proper time setting in switch. Just select proper time zone as per country or requirement.

To configure and view this recommended setting click on **Status>> System Time** and use source From Computer.



Status » System Time

Source: ○ SNTP ● From Computer ○ Manual Time

Time Zone: UTC -7:00

SNTP

Address Type: ● Hostname ○ IPv4

Server Address:

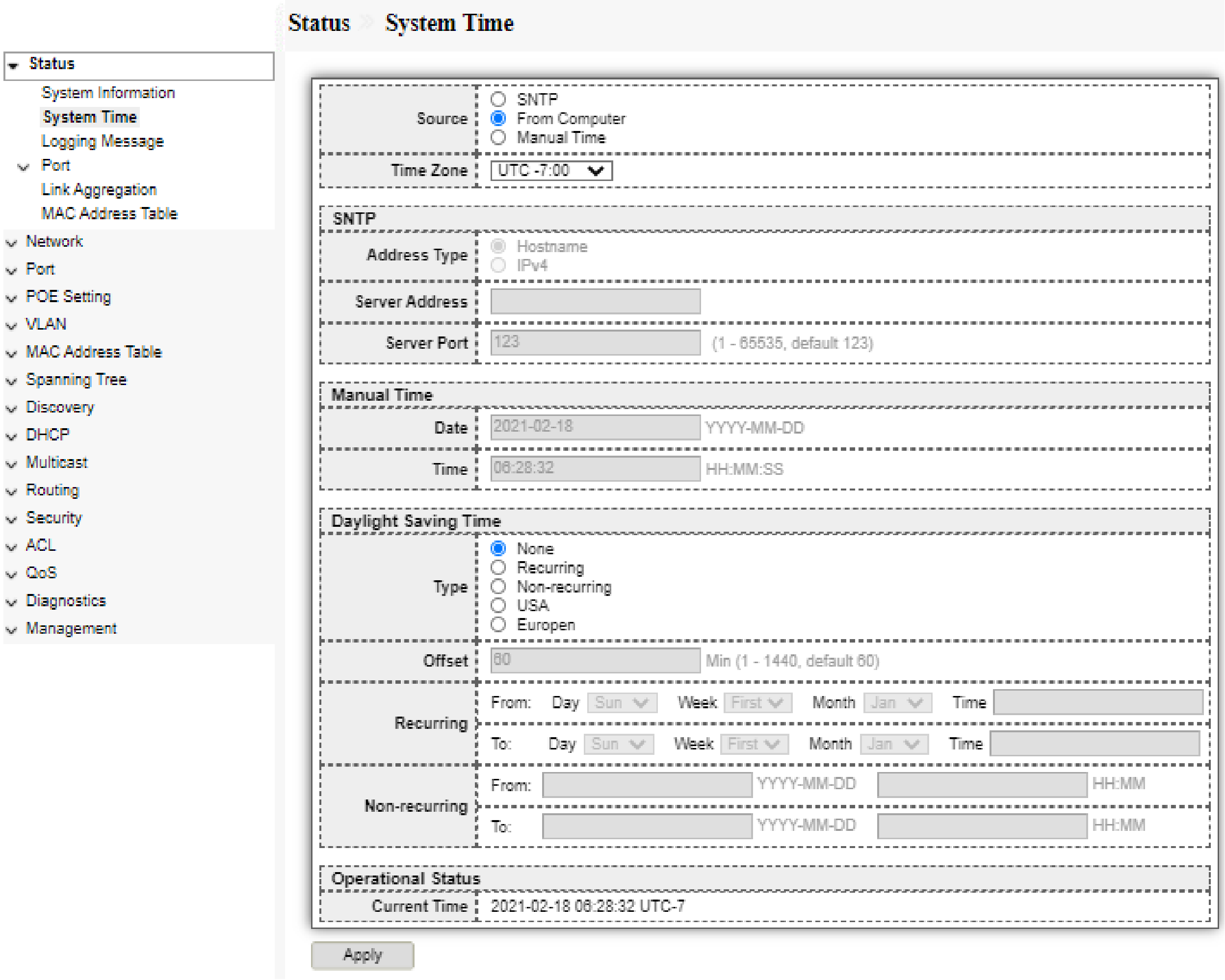
Server Port: 123 (1 - 65535, default 123)

Manual Time

Date: 2021-02-18 YYYY-MM-DD

Time: 06:27:00 HH:MM:SS

Fig 2.4.4 Time configuration from connected computer page



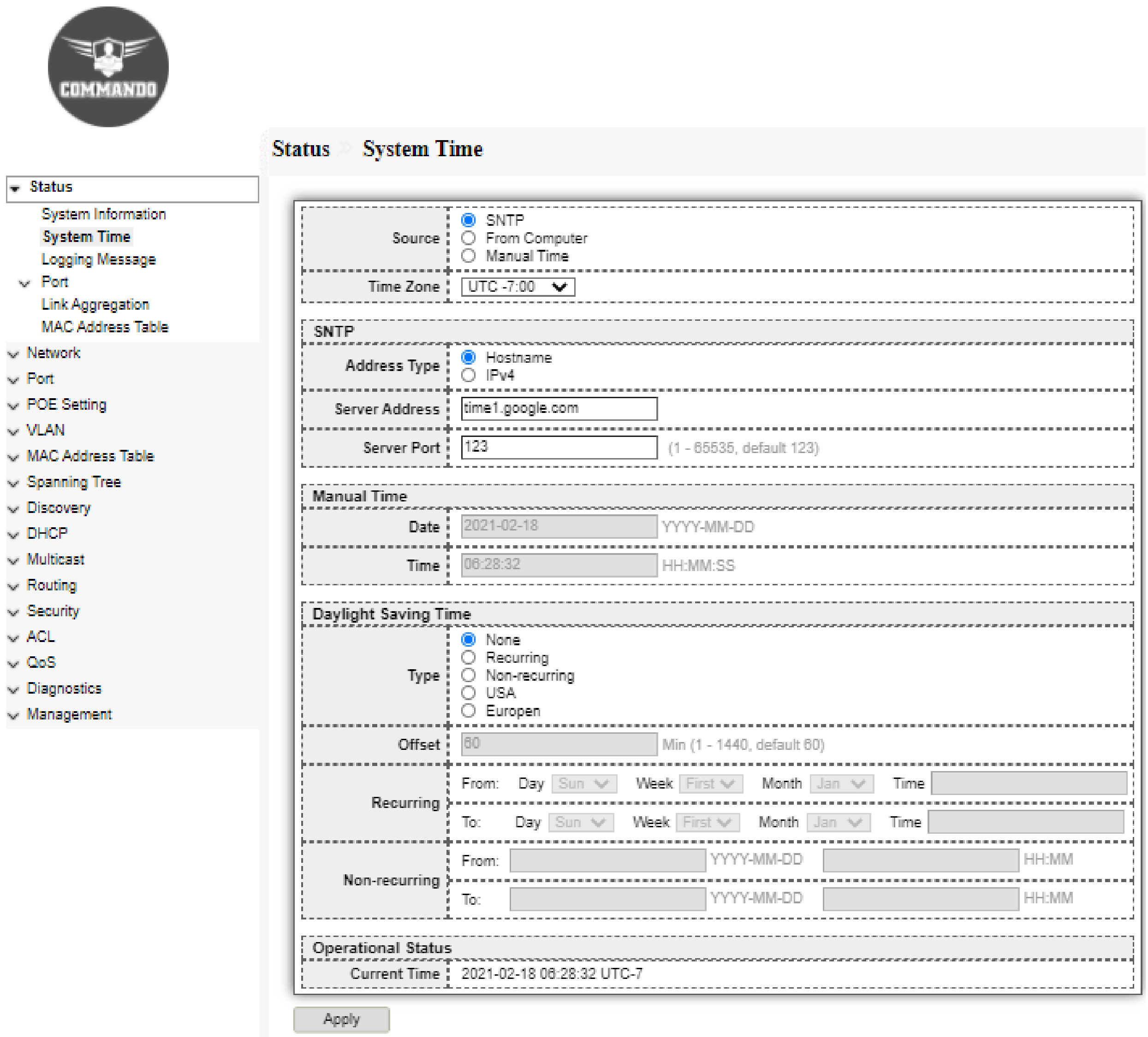
Status » System Time

Source	○ SNTP ● From Computer ○ Manual Time
Time Zone	UTC -7:00
SNTP	
Address Type	● Hostname ○ IPv4
Server Address	
Server Port	123 (1 - 65535, default 123)
Manual Time	
Date	2021-02-18 YYYY-MM-DD
Time	06:28:32 HH:MM:SS
Daylight Saving Time	
Type	● None ○ Recurring ○ Non-recurring ○ USA ○ Europen
Offset	60 Min (1 - 1440, default 60)
Recurring	From: Day Sun Week First Month Jan Time To: Day Sun Week First Month Jan Time
Non-recurring	From: YYYY-MM-DD HH:MM To: YYYY-MM-DD HH:MM
Operational Status	
Current Time	2021-02-18 06:28:32 UTC-7

Fig 2.4.5 Time configuration from connected computer page

SNTP

The simple network time protocol (SNTP) is a time synchronization protocol of the TCP/IP protocol family. It is based on the connectionless user datagram protocol (UDP) and can be used on all supporting devices to synchronize system time in IP networks (IPv4 and IPv6). Time can be received from SNTP time servers. SNTP ensures accurate network time synchronization of the device up to the millisecond by using an SNTP server for the clock source. You can also set local or public time server IP or Hostname if time server is locally available.

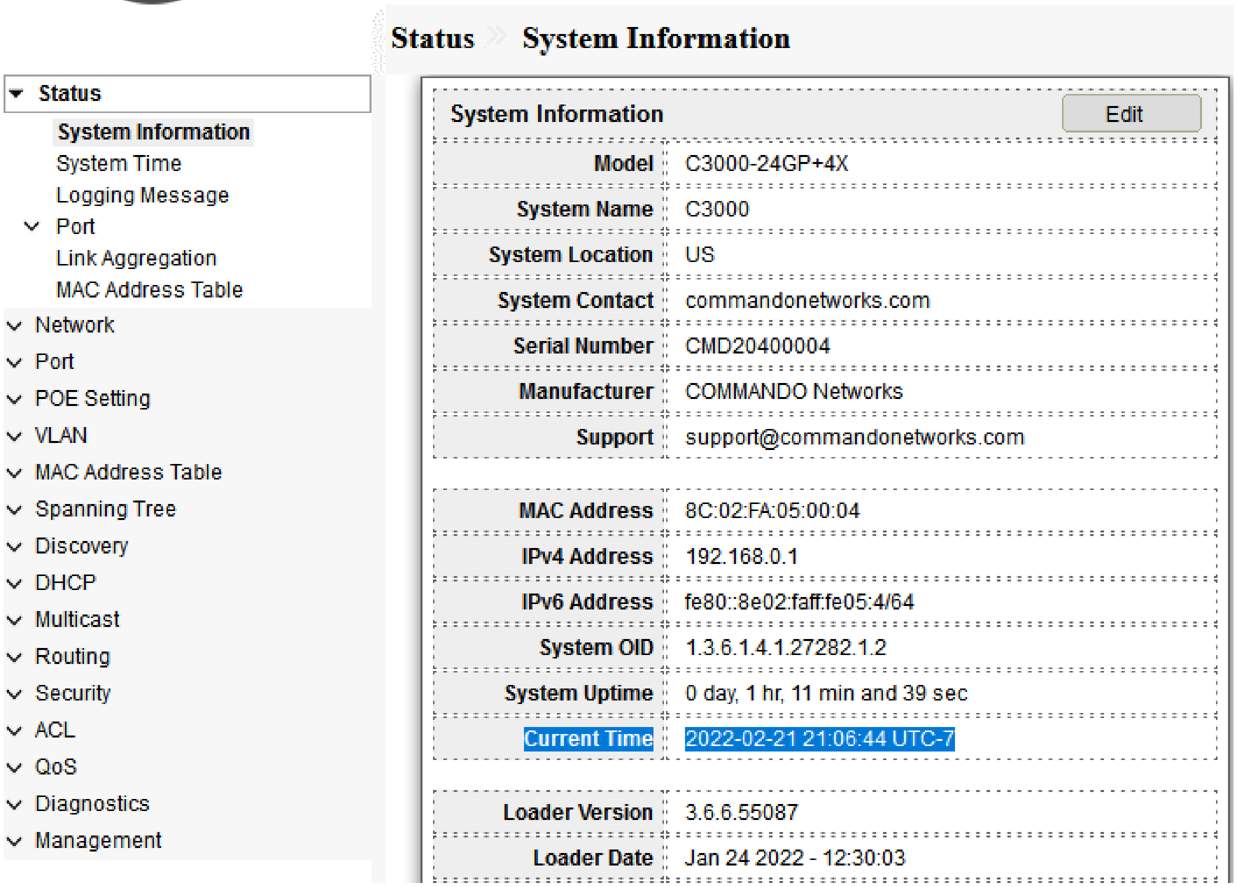


Status » System Time

Source	● SNTP ○ From Computer ○ Manual Time
Time Zone	UTC -7:00
SNTP	
Address Type	● Hostname ○ IPv4
Server Address	time1.google.com
Server Port	123 (1 - 65535, default 123)
Manual Time	
Date	2021-02-18 YYYY-MM-DD
Time	06:28:32 HH:MM:SS
Daylight Saving Time	
Type	● None ○ Recurring ○ Non-recurring ○ USA ○ Europen
Offset	60 Min (1 - 1440, default 60)
Recurring	From: Day Sun Week First Month Jan Time To: Day Sun Week First Month Jan Time
Non-recurring	From: YYYY-MM-DD HH:MM To: YYYY-MM-DD HH:MM
Operational Status	
Current Time	2021-02-18 06:28:32 UTC-7

Fig 2.4.6 SNTP Configuration page

After changing Time, you can verify the changed time from system information page.



Status » System Information

System Information

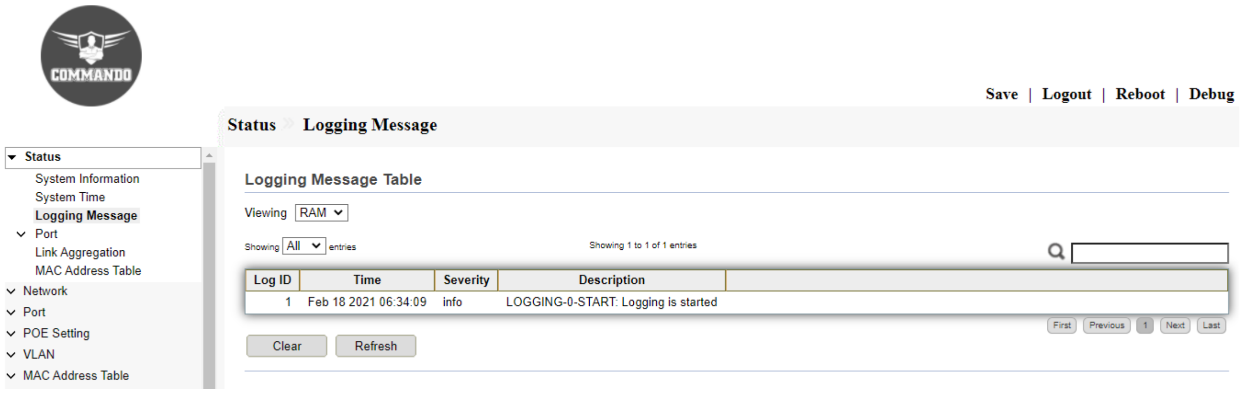
Model	C3000-24GP+4X
System Name	C3000
System Location	US
System Contact	commandonetworks.com
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1
IPv6 Address	fe80::8e02:faff:fe05:4/64
System OID	1.3.6.1.4.1.27282.1.2
System Uptime	0 day, 1 hr, 11 min and 39 sec
Current Time	2022-02-21 21:06:44 UTC-7
Loader Version	3.6.6.55087
Loader Date	Jan 24 2022 - 12:30:03

Fig 2.4.5 System Information page displaying current time.

2.3 Logging Message

This page shows the log messages Logging Message Table of RAM by System Log feature, which enables the device to generate multiple independent logs. Each log is a set of messages describing system events. System Log feature, which enables the device to generate multiple independent logs. Each log is a set of messages describing system events. By default, notification Log message sent to the console interface. Log written into a cyclical list of logged events in the RAM and erased when the device reboots. Log written to a cyclical log-file saved to the Flash memory and persists across reboots. To view the logging messages stored on the RAM, click **Status >> Logging Message** and use Viewing option RAM

Note: By default, RAM option will be selected.



Logging Message Table

Viewing: RAM

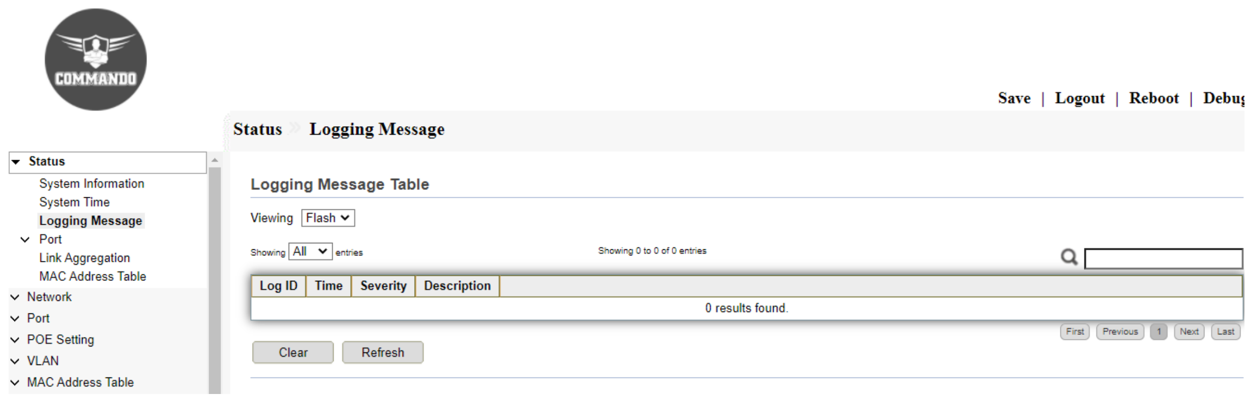
Showing All entries

Showing 1 to 1 of 1 entries

Log ID	Time	Severity	Description
1	Feb 18 2021 06:34:09	info	LOGGING-0-START: Logging is started

Fig 2.3.1 Logging Message Table of RAM

To view the logging messages stored on the Flash, click **Status >> Logging Message** and use Viewing option Flash.



Logging Message Table

Viewing: Flash

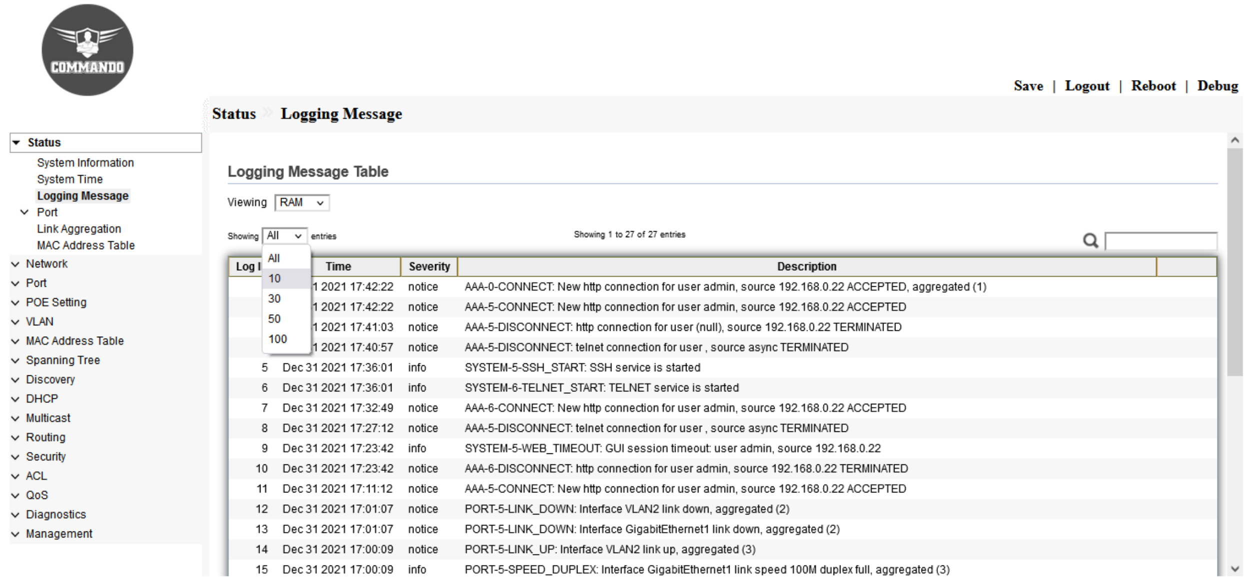
Showing All entries

Showing 0 to 0 of 0 entries

Log ID	Time	Severity	Description
0 results found.			

Fig 2.3.2 Logging Message Table of Flash

The number of entries to be shown for logging message table are shown



Status » Logging Message

Logging Message Table

Viewing RAM

Showing All entries (All, 10, 30, 50, 100)

Showing 1 to 27 of 27 entries

Log I	Time	Severity	Description
	1 2021 17:42:22	notice	AAA-0-CONNECT: New http connection for user admin, source 192.168.0.22 ACCEPTED, aggregated (1)
	1 2021 17:42:22	notice	AAA-5-CONNECT: New http connection for user admin, source 192.168.0.22 ACCEPTED
	1 2021 17:41:03	notice	AAA-5-DISCONNECT: http connection for user (null), source 192.168.0.22 TERMINATED
	1 2021 17:40:57	notice	AAA-5-DISCONNECT: telnet connection for user , source async TERMINATED
5	Dec 31 2021 17:36:01	info	SYSTEM-5-SSH_START: SSH service is started
6	Dec 31 2021 17:36:01	info	SYSTEM-6-TELNET_START: TELNET service is started
7	Dec 31 2021 17:32:49	notice	AAA-6-CONNECT: New http connection for user admin, source 192.168.0.22 ACCEPTED
8	Dec 31 2021 17:27:12	notice	AAA-5-DISCONNECT: telnet connection for user , source async TERMINATED
9	Dec 31 2021 17:23:42	info	SYSTEM-5-WEB_TIMEOUT: GUI session timeout: user admin, source 192.168.0.22
10	Dec 31 2021 17:23:42	notice	AAA-6-DISCONNECT: http connection for user admin, source 192.168.0.22 TERMINATED
11	Dec 31 2021 17:11:12	notice	AAA-5-CONNECT: New http connection for user admin, source 192.168.0.22 ACCEPTED
12	Dec 31 2021 17:01:07	notice	PORT-5-LINK_DOWN: Interface VLAN2 link down, aggregated (2)
13	Dec 31 2021 17:01:07	notice	PORT-5-LINK_DOWN: Interface GigabitEthernet1 link down, aggregated (2)
14	Dec 31 2021 17:00:09	notice	PORT-5-LINK_UP: Interface VLAN2 link up, aggregated (3)
15	Dec 31 2021 17:00:09	info	PORT-5-SPEED_DUPLEX: Interface GigabitEthernet1 link speed 100M duplex full, aggregated (3)

Fig 2.3.3 Logging Message Table of Entries selection

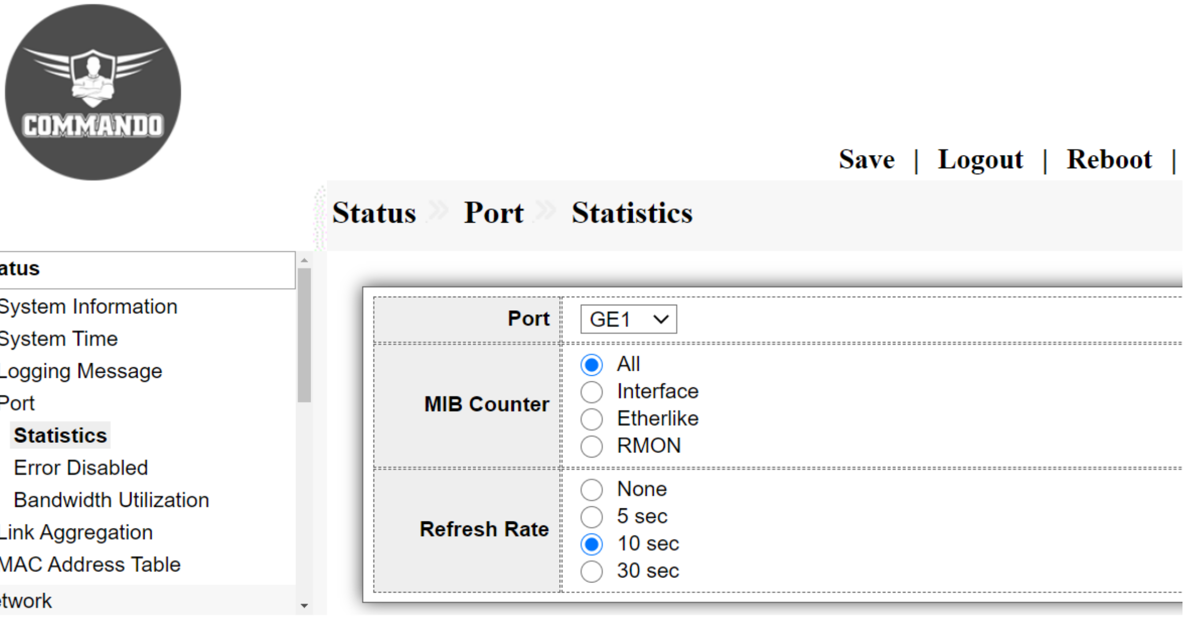
2.4 Port

A management information base (MIB) is a database used for managing the entities in a communication network. Most often associated with the Simple Network Management Protocol (SNMP), the term is also used more generically in contexts such as in OSI/ISO Network management model.

2.4.1 Port Statistics

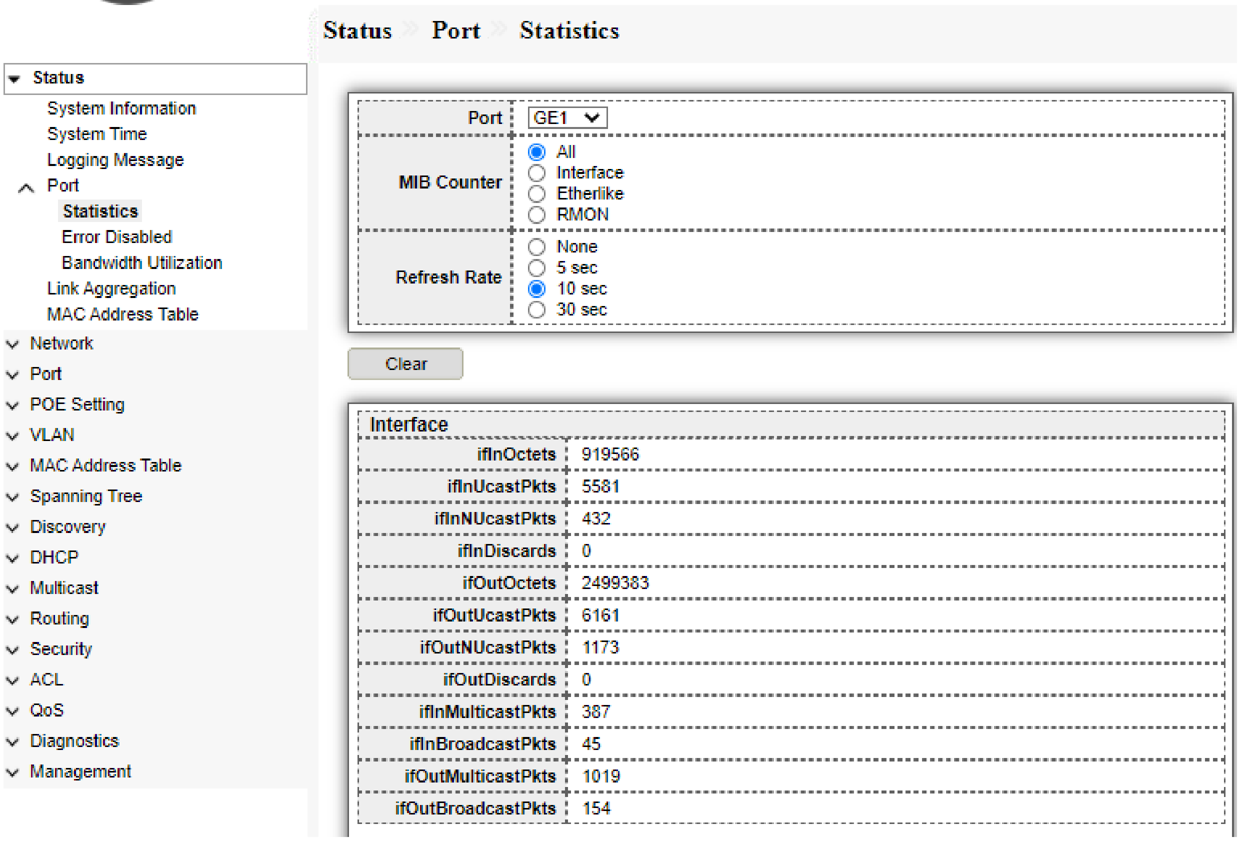
This page shows Port statistics like MIB Counter & Refresh rate for each port. By default, Port Gigabit Ethernet 1 is selected, and refresh rate is 10 seconds. The Port configuration page displays port summary and status information. To view particular port status, click **Status >> Port >> Statistics** and select Port.

Note: Default selection is GE1



Port	GE1
MIB Counter	● All ○ Interface ○ Etherlike ○ RMON
Refresh Rate	○ None ○ 5 sec ● 10 sec ○ 30 sec

Fig 2.4.1 Port selection for MIB Counter Statistics



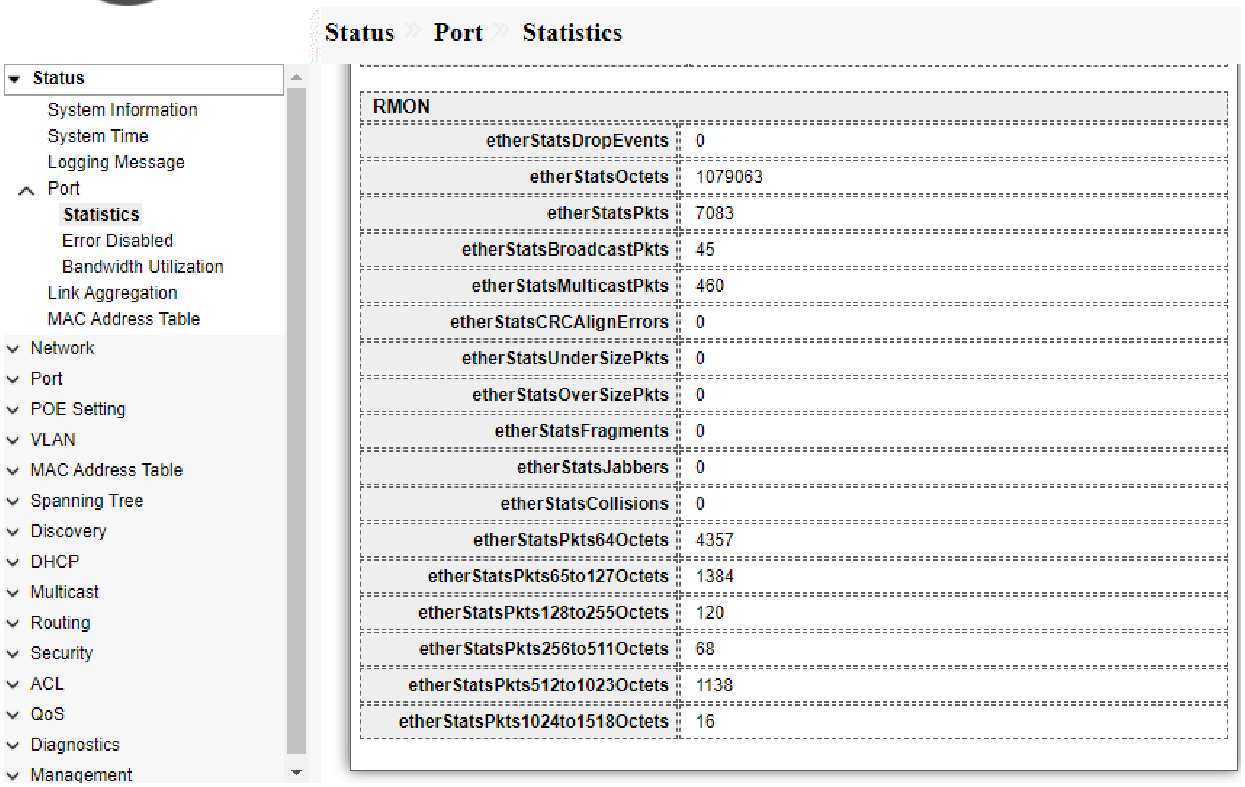
Status » Port » Statistics

Port	GE1
MIB Counter	● All ○ Interface ○ Etherlike ○ RMON
Refresh Rate	○ None ○ 5 sec ● 10 sec ○ 30 sec

Interface	
ifInOctets	919566
ifInUcastPkts	5581
ifInNUcastPkts	432
ifInDiscards	0
ifOutOctets	2499383
ifOutUcastPkts	6161
ifOutNUcastPkts	1173
ifOutDiscards	0
ifInMulticastPkts	387
ifInBroadcastPkts	45
ifOutMulticastPkts	1019
ifOutBroadcastPkts	154

Fig 2.4.2 Gigabit Ethernet 5 port selection for MIB Counter Statistics

The other common type of MIB used for polling statistics is a MIB counter. Interface MIB used to measure traffic on a network interface. The MIB will show you a running total number of the octets (bytes) of traffic that have went in/out of the interface.



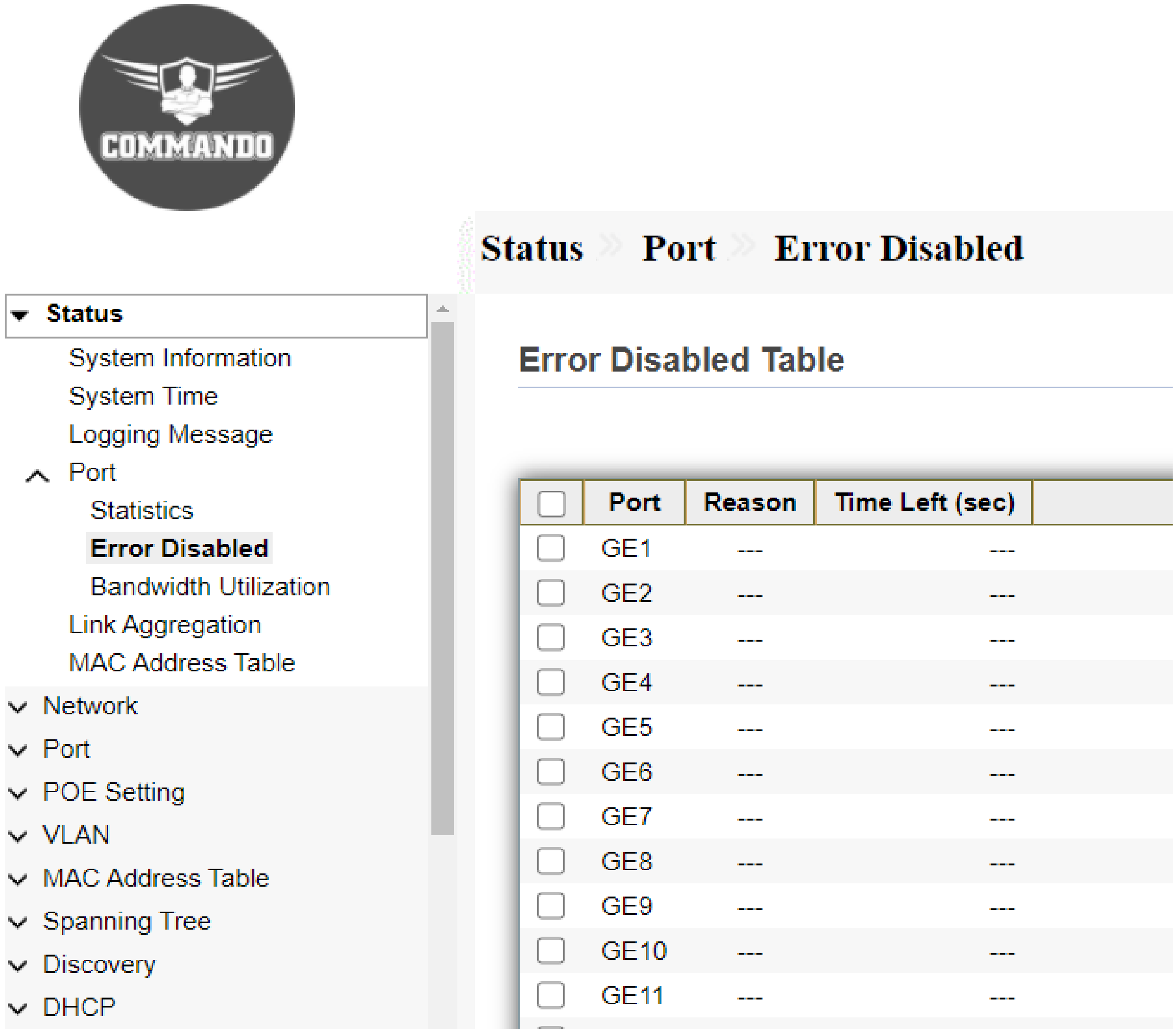
RMON	
etherStatsDropEvents	0
etherStatsOctets	1079063
etherStatsPkts	7083
etherStatsBroadcastPkts	45
etherStatsMulticastPkts	460
etherStatsCRCAlignErrors	0
etherStatsUnderSizePkts	0
etherStatsOverSizePkts	0
etherStatsFragments	0
etherStatsJabbers	0
etherStatsCollisions	0
etherStatsPkts64Octets	4357
etherStatsPkts65to127Octets	1384
etherStatsPkts128to255Octets	120
etherStatsPkts256to511Octets	68
etherStatsPkts512to1023Octets	1138
etherStatsPkts1024to1518Octets	16

Fig 2.4.3 RMON MIB Counter Statistics

2.4.2 Port Error Disabled

The ErrDisable feature is implemented to handle special situations where the switch detected excessive or late collisions on a port, port duplex misconfiguration, EtherChannel misconfiguration, Bridge Protocol Data Unit (BPDU) port-guard violation, UniDirectional Link Detection (UDLD), and other (miscellaneous) causes.

The error-disable function allows the switch to shut down/ Protect /Restrict a port when it encounters physical, driver or configuration problems. A port being error-disabled is not by itself a cause for alarm, but a symptom of a problem that must be resolved. To display the Error Disabled web page, click **Status >> Port >> Error Disabled.**



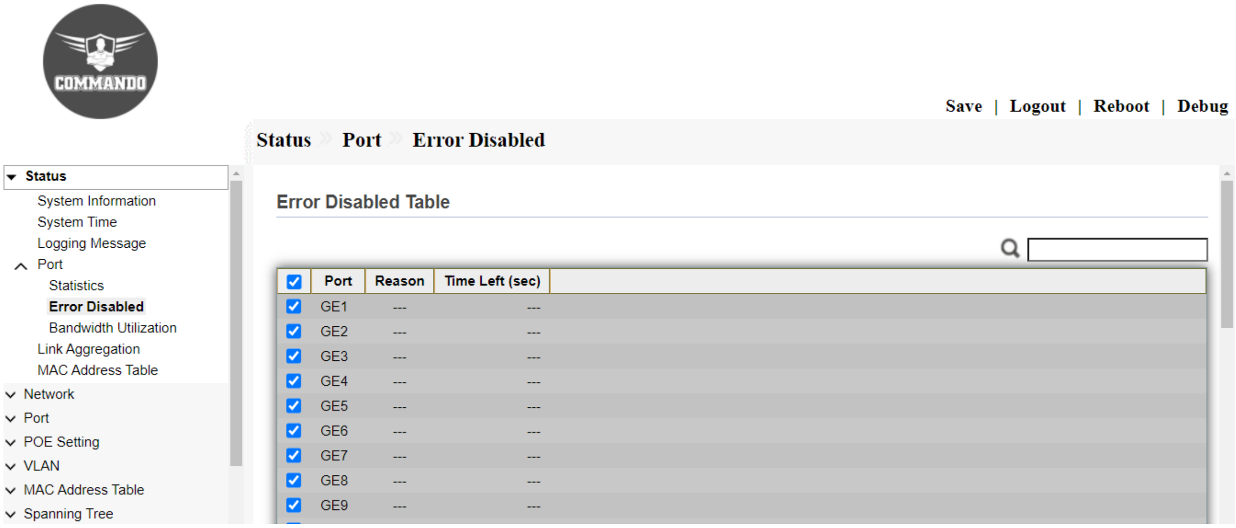
Error Disabled Table

☐	Port	Reason	Time Left (sec)
☐	GE1	---	---
☐	GE2	---	---
☐	GE3	---	---
☐	GE4	---	---
☐	GE5	---	---
☐	GE6	---	---
☐	GE7	---	---
☐	GE8	---	---
☐	GE9	---	---
☐	GE10	---	---
☐	GE11	---	---

Fig 2.4.4 Default Port Error disabled Table

Recovering form Error disabled state

To recover a port that is in an ErrDisable state, manual intervention is required, and the administrator must access the switch and configure the specific port with 'shutdown' followed by the 'no shutdown' command in CLI. This command sequence will enable the port again, however, if the problem persists expect to find the port in ErrDisable state again soon. In Web GUI can easily recover from error disable by selecting port and pressing recovery button.



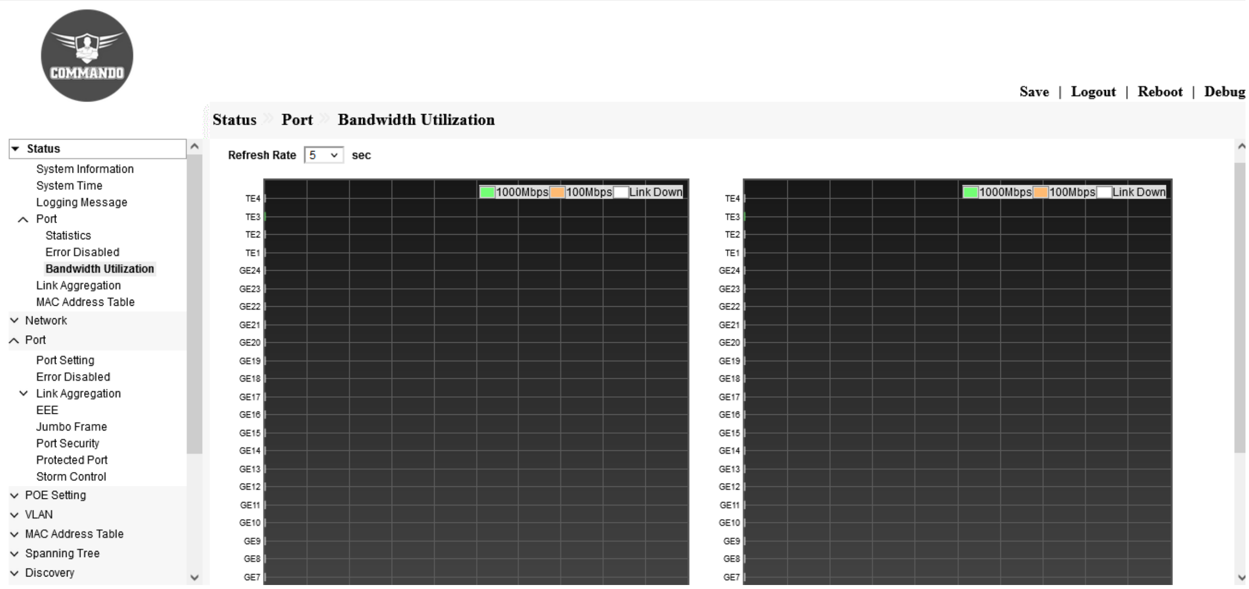
Error Disabled Table

☑	Port	Reason	Time Left (sec)
☑	GE1	---	---
☑	GE2	---	---
☑	GE3	---	---
☑	GE4	---	---
☑	GE5	---	---
☑	GE6	---	---
☑	GE7	---	---
☑	GE8	---	---
☑	GE9	---	---

Fig 2.4.5 Recovering form error disabled state.

2.4.3 Port Bandwidth Utilization

Bandwidth utilization for each port can be seen by this page and for the switch fabric itself. Easiest way to look at all ports, this shows how much bandwidth for each switch port interfaces are using. In other words, it helps you monitor bandwidth. This page allow user to look bandwidth utilization in real time. This page will refresh automatically by default in 5 second. To display Bandwidth Utilization web page, click **Status >> Port >> Bandwidth Utilization.**



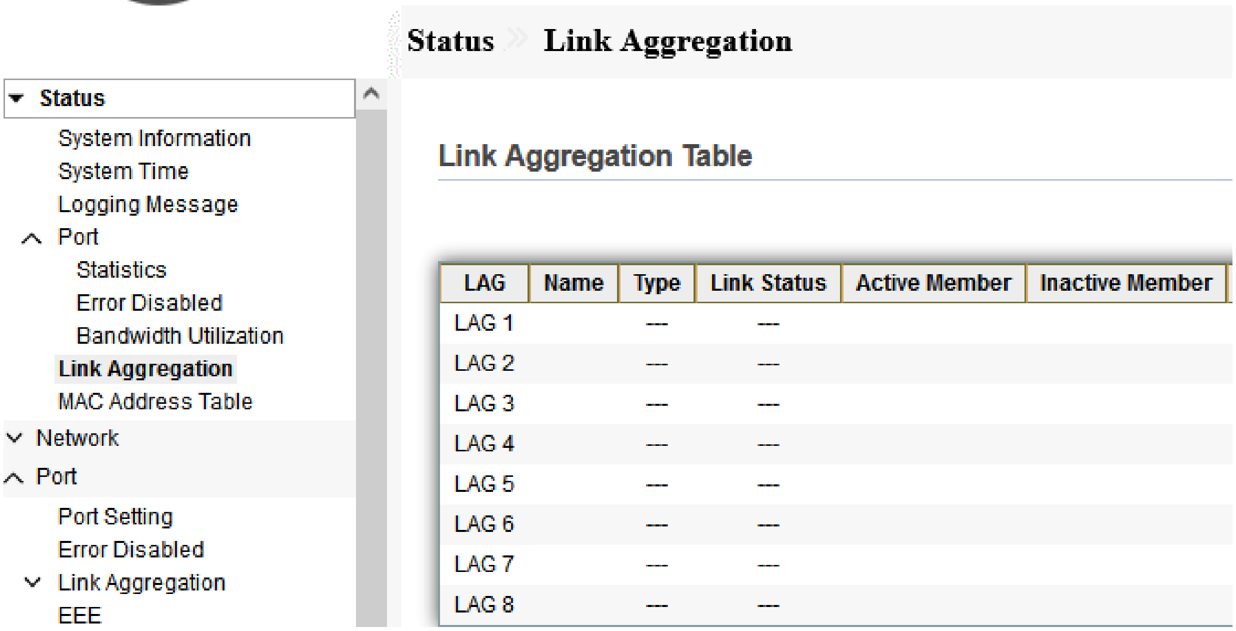
Refresh Rate 5 sec

Fig 2.4.6 Bandwidth utilization and refresh rate

2.5 Link Aggregation

Link aggregation is a way of bundling a bunch of individual Ethernet/ Fast Ethernet/ Gigabit Ethernet links together, so they act like a single logical link. The official IEEE standard for link aggregation used to be called 802.3ad.

Link aggregation groups (LAGs) allow you to combine multiple Ethernet links into a single logical link. Network devices treat the aggregation as if it were a single link, which increases fault tolerance and load sharing. Specify LAG membership before you enable the LAG. The switch supports up to eight LAGs. To display the Link Aggregation web page, click **Status >> Link Aggregation.**

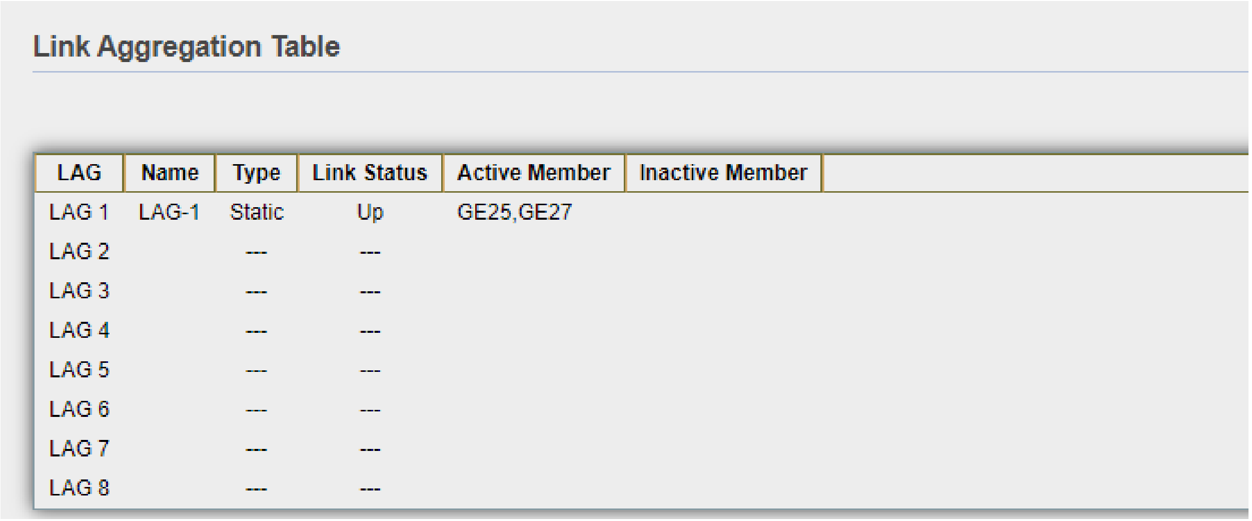


Status » Link Aggregation

Link Aggregation Table

LAG	Name	Type	Link Status	Active Member	Inactive Member
LAG 1		---	---		
LAG 2		---	---		
LAG 3		---	---		
LAG 4		---	---		
LAG 5		---	---		
LAG 6		---	---		
LAG 7		---	---		
LAG 8		---	---		

Fig 2.5.1 Default Link Aggregation table information.



Link Aggregation Table

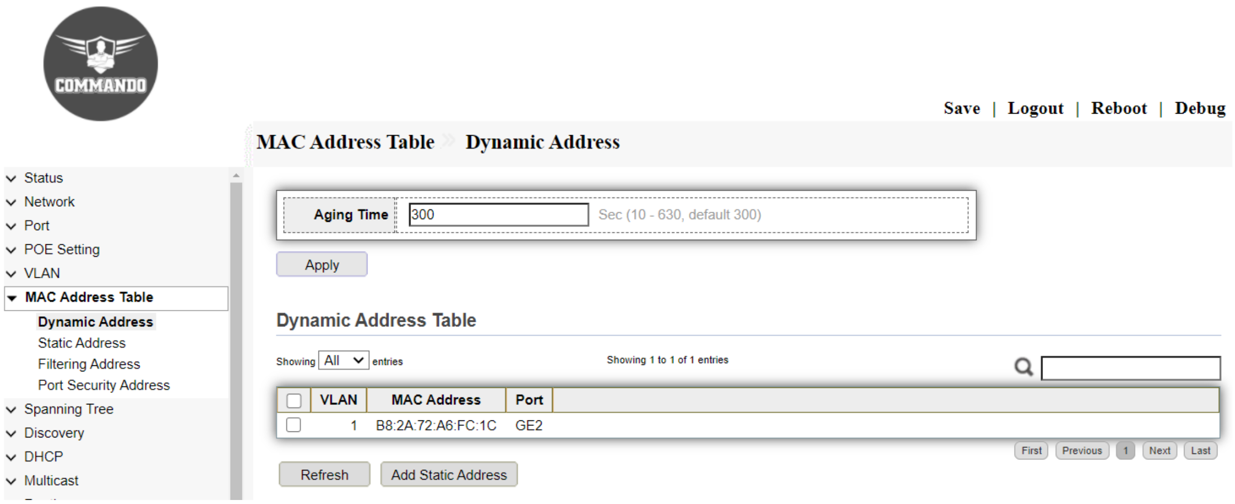
LAG	Name	Type	Link Status	Active Member	Inactive Member
LAG 1	LAG-1	Static	Up	GE25,GE27	
LAG 2		---	---		
LAG 3		---	---		
LAG 4		---	---		
LAG 5		---	---		
LAG 6		---	---		
LAG 7		---	---		
LAG 8		---	---		

Fig 2.5.2 Link Aggregation table information.

2.6 Mac Address Table

A MAC address table, sometimes called a Content Addressable Memory (CAM) table, is used on Ethernet switches to determine where to forward traffic on a LAN.

There are two types of MAC addresses—static and dynamic. Depending on their type, MAC addresses are either stored in the Static Address table or in the dynamic address table, along with VLAN and port information. Static addresses are configured by the user, and therefore, they do not expire. To display the MAC Address Table web page, click **Status >> MAC Address Table.**



Aging Time 300 Sec (10 - 630, default 300)

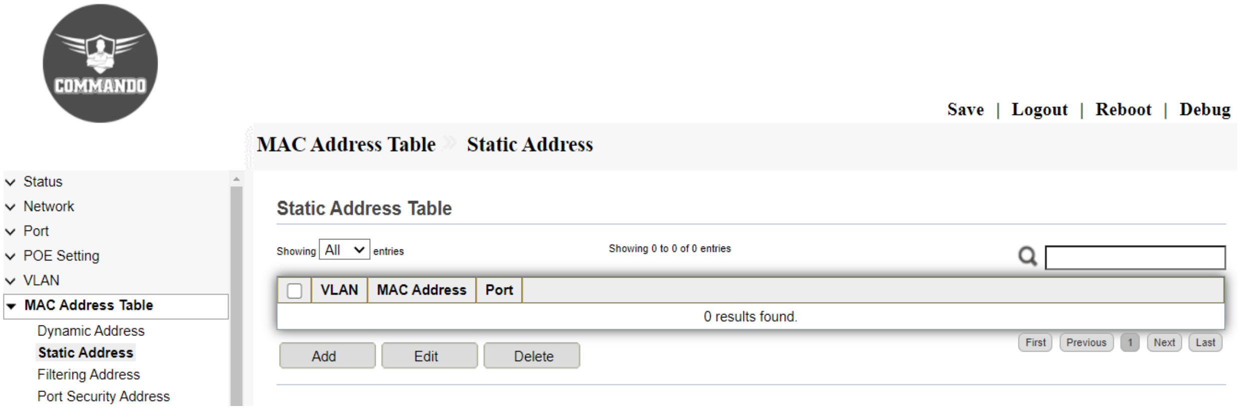
Dynamic Address Table

Showing All entries

Showing 1 to 1 of 1 entries

□	VLAN	MAC Address	Port
□	1	B8:2A:72:A6:FC:1C	GE2

Fig 2.6.1 Mac Address Table information



Static Address Table

Showing All entries

Showing 0 to 0 of 0 entries

□	VLAN	MAC Address	Port
0 results found.			

Fig 2.6.2 Default Static Mac Address Table information

Chapter 3 Network

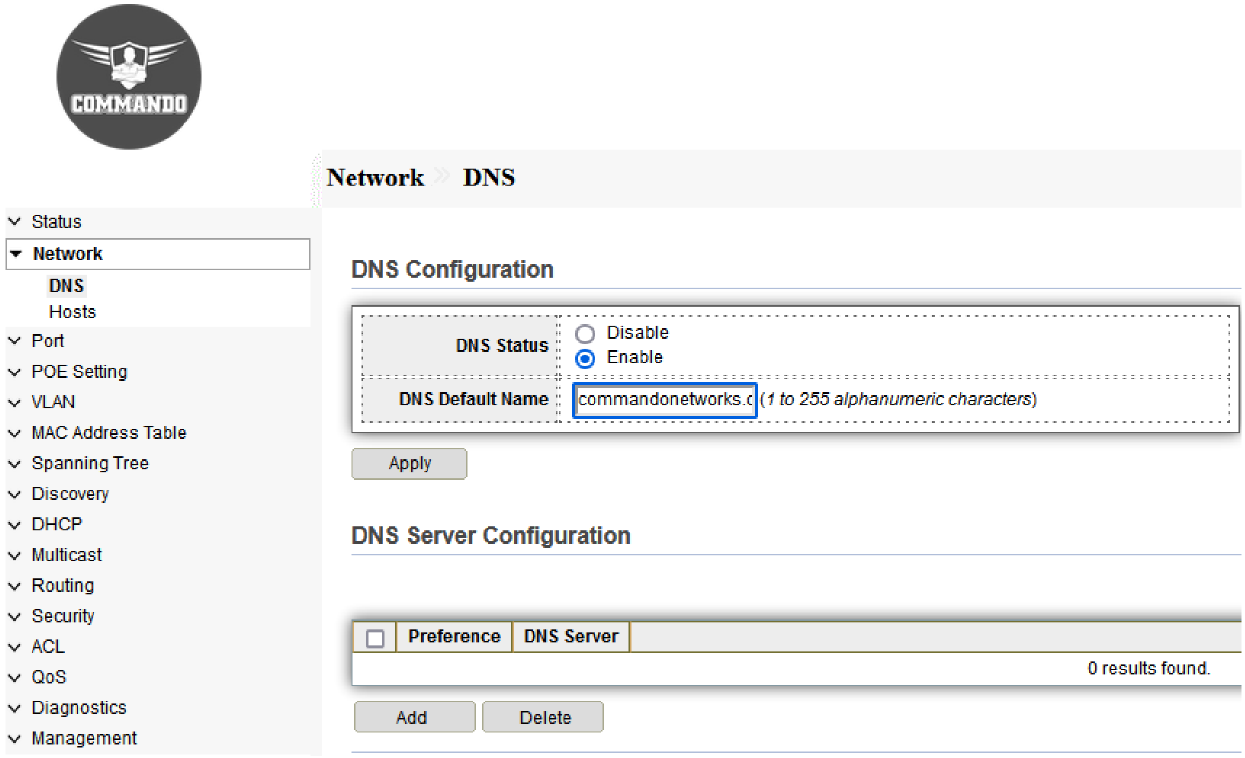
DNS: The Domain Name System (DNS) translates domain names into IP addresses for the purpose of locating and addressing hosts. As a DNS client, the Switch resolves domain names to IP addresses using one or more configured DNS servers.

Hosts: DNS Hosts, also known as host record in your domain's that makes the connection between your domain name and its matching IP address.

3.1 DNS

The Domain Name System (DNS) translates domain names into IP addresses for the purpose of locating and addressing hosts. As a DNS client, the device resolves domain names to IP addresses using one or more configured DNS servers.

To configure and view Domain Name System (DNS), click **Network >> DNS**



Network » DNS

DNS Configuration

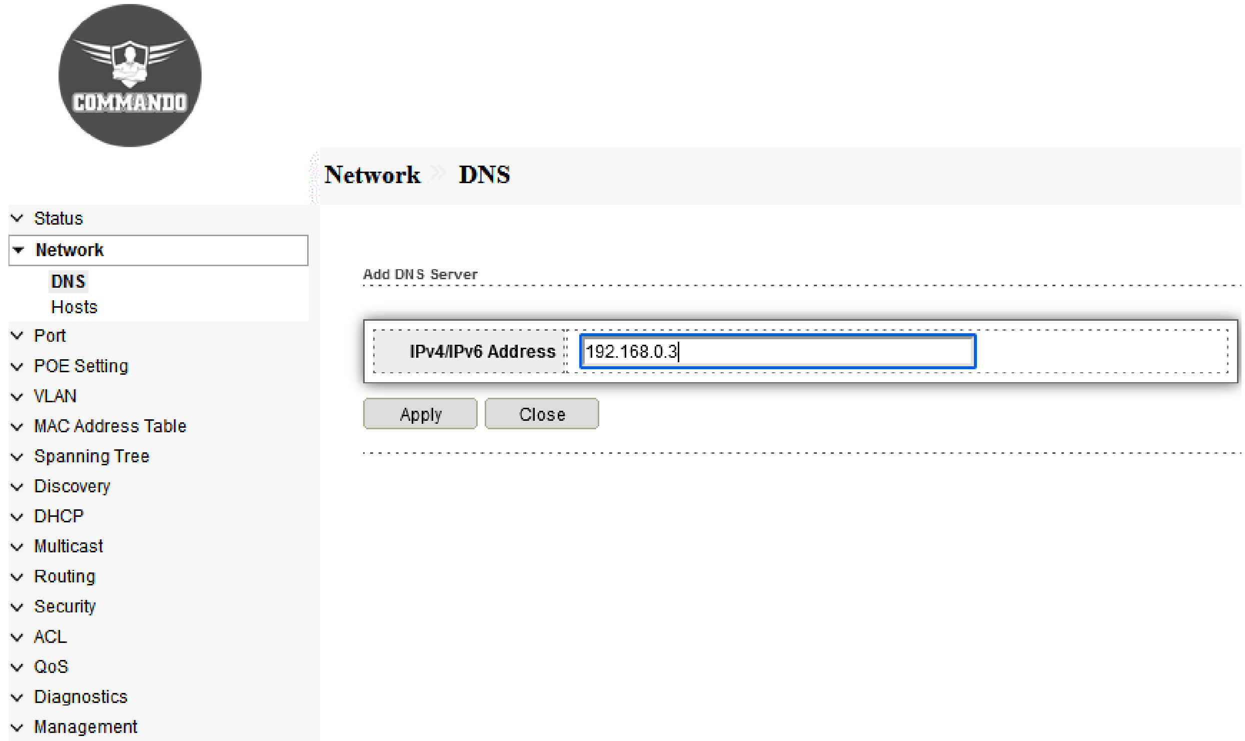
DNS Status	○ Disable ● Enable
DNS Default Name	commandonetworks.c (*1 to 255 alphanumeric characters*)

DNS Server Configuration

□	Preference	DNS Server

0 results found.

Fig 3.1.1 DNS configuration page

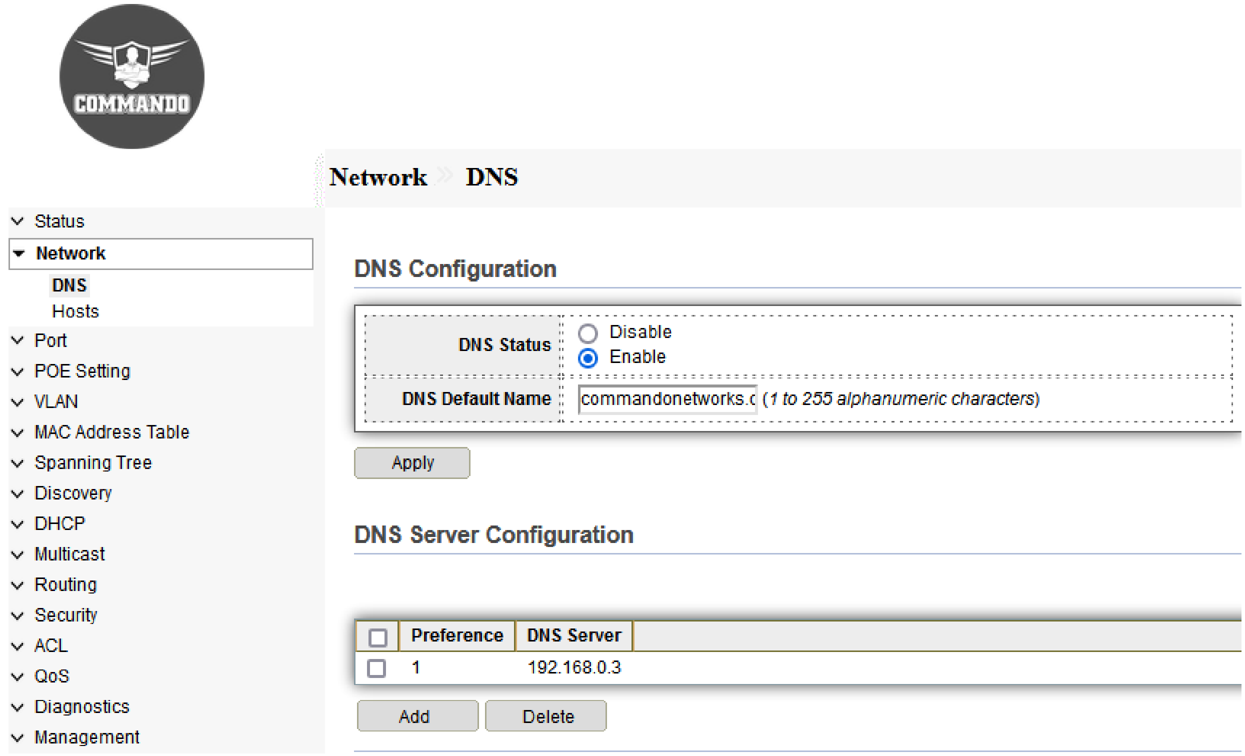


Network » DNS

Add DNS Server

IPv4/IPv6 Address	192.168.0.3

Fig 3.1.2 Add DNS Server page



Network » DNS

DNS Configuration

DNS Status	○ Disable ● Enable
DNS Default Name	commandonetworks.c (*1 to 255 alphanumeric characters*)

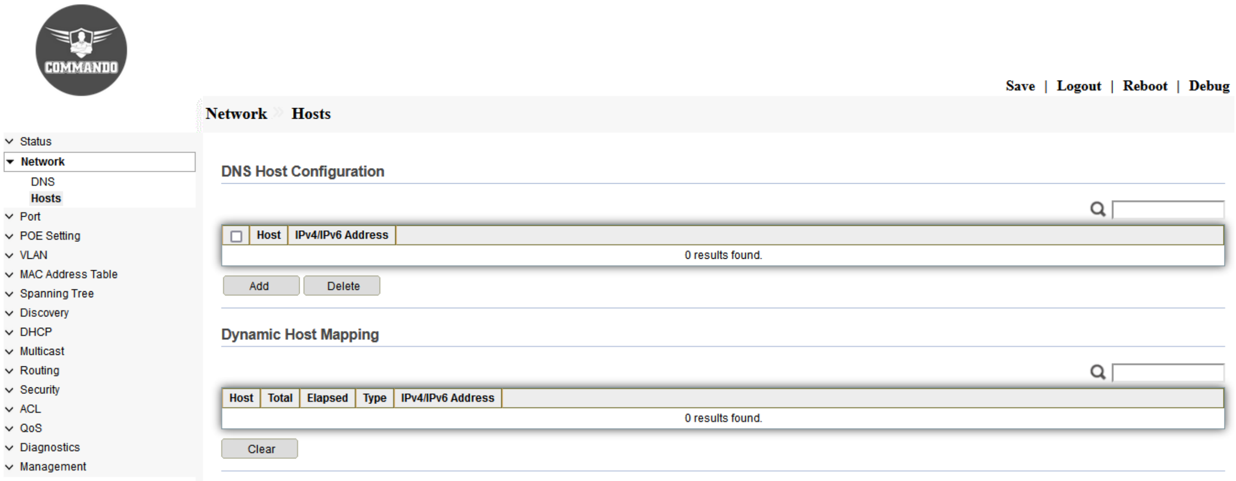
DNS Server Configuration

□	Preference	DNS Server
□	1	192.168.0.3

Fig 3.1.3 DNS Server configuration page

3.2 Hosts

The Domain Name System, more popular as DNS, is responsible for associating domain names, the user-friendly names of websites, with their corresponding real system names - IP addresses. These IP addresses are vital for bringing the website online and in the DNS system are known as A records. This page shows information about DNS Host Configuration. To configure and view Domain Name System (DNS) Host configuration, click **Network >>Hosts**



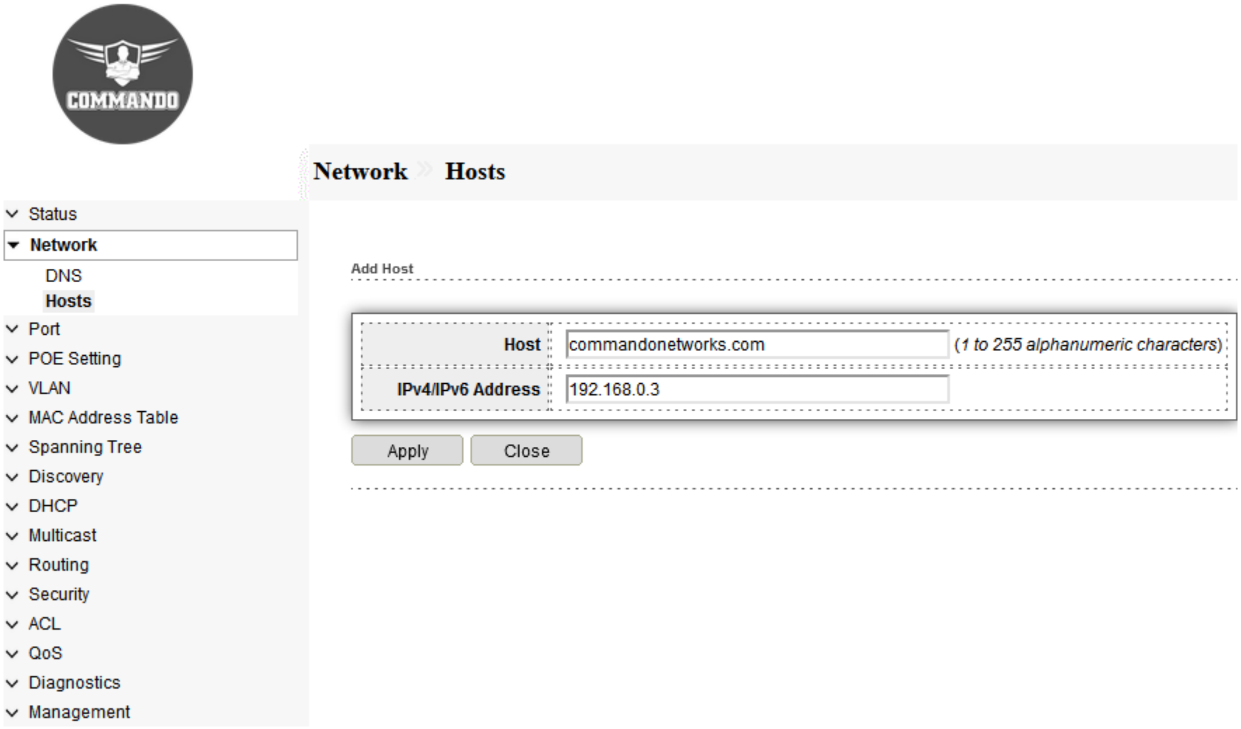
DNS Host Configuration

□	Host	IPv4/IPv6 Address
0 results found.		

Dynamic Host Mapping

Host	Total	Elapsed	Type	IPv4/IPv6 Address
0 results found.				

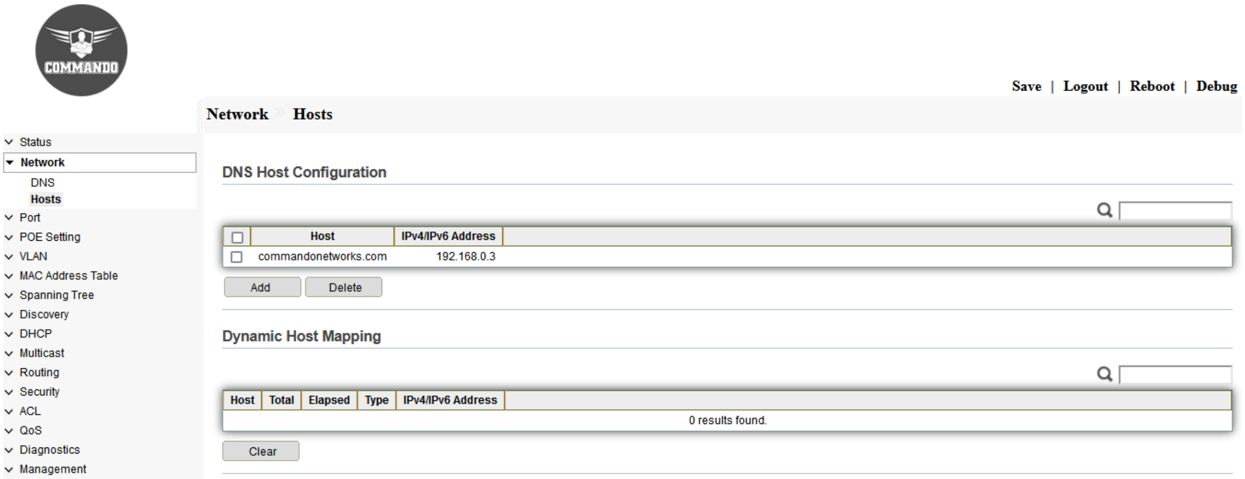
Fig 3.2.1 DNS Host blank configuration page



Add Host

Host	commandonetworks.com	*(1 to 255 alphanumeric characters)*
IPv4/IPv6 Address	192.168.0.3	

Fig 3.2.2 Add DNS Host and IP address configuration page



DNS Host Configuration

□	Host	IPv4/IPv6 Address
□	commandonetworks.com	192.168.0.3

Dynamic Host Mapping

Host	Total	Elapsed	Type	IPv4/IPv6 Address
0 results found.				

Fig 3.2.3 DNS Host configuration page

Chapter 4 Port

Port Setting: You can view the summary or detailed information on the switch ports using this page. To see the summary information on all ports on the switch. Port setting allows to configure all ports description, status, speed, duplex, flow control.

Error Disabled: This page enables automatically reactivating a port that has been shutdown / restrict /protect because of an error condition.

Link Aggregation: Link Aggregation Control Protocol (LACP) is part of the IEEE specification (802.3az) that enables you to bundle several physical ports together to form a single logical channel (LAG). LAGs multiply the bandwidth, increase port flexibility, and provide link redundancy between two devices.

Group: Select the LAG number. Traffic load balancing over the active member ports of a LAG is managed by MAC Addresses, IP and MAC Addresses.

Port Setting: You can view the summary or detailed information of LAG ports using this page.

LACP: Select to enable LACP on the selected LAG. Traffic load balancing over the active member ports of a LAG is managed by MAC Addresses, IP and MAC Addresses.

EEE: This page enables the IEEE 802.3az Energy Efficient Ethernet (EEE) function, cable length power saving, and link-up and link-down power saving.

Jumbo Frame: A jumbo frame is an Ethernet frame with a payload greater than the standard maximum transmission unit (MTU) of 1,500 bytes. Jumbo frames are used on local area networks that support at least 1 Gbps and can be as large as 10,000 bytes.

Port Security: Network security can be increased by limiting access on a port to users with specific MAC addresses. The MAC addresses can be either dynamically learned or statically configured. Port security monitors received and learned packets. Ports are limited to users with specific MAC addresses.

Protected Port: Protected Ports provide Layer 2 isolation between interfaces.

Storm Control: Storm protection enables you to limit the number of frames entering the Switch and you can select the types of frames that are counted towards this limit.

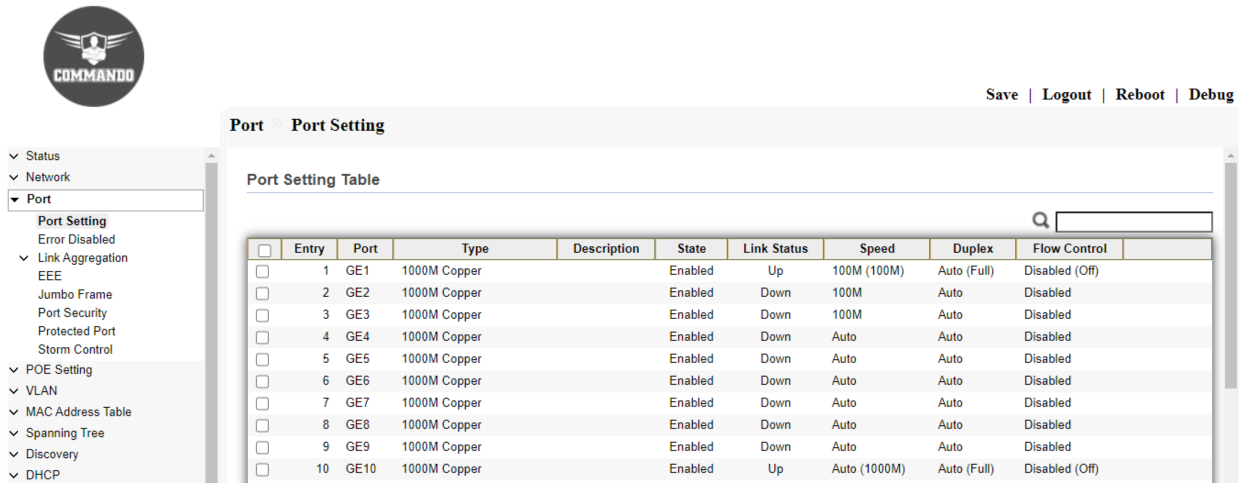
Mirroring: Port mirroring is used on a network device to send a copy of network packets seen on one switch port, multiple other ports, or on to network monitoring connection on another port on the switch.

4.1 Port Setting

This page shows Port statistics like Port State, Link Status, speed & Flow control for each port. Port setting allows multiple ports Description, status, speed, duplex, flow control selection pages.

The switch comes with default port settings that should allow you to connect to the Ethernet Ports without any necessary configuration. Should there be a need to change the name of the ports, Port State, negotiation settings or flow control settings, you can do this in the Port settings as shown below:

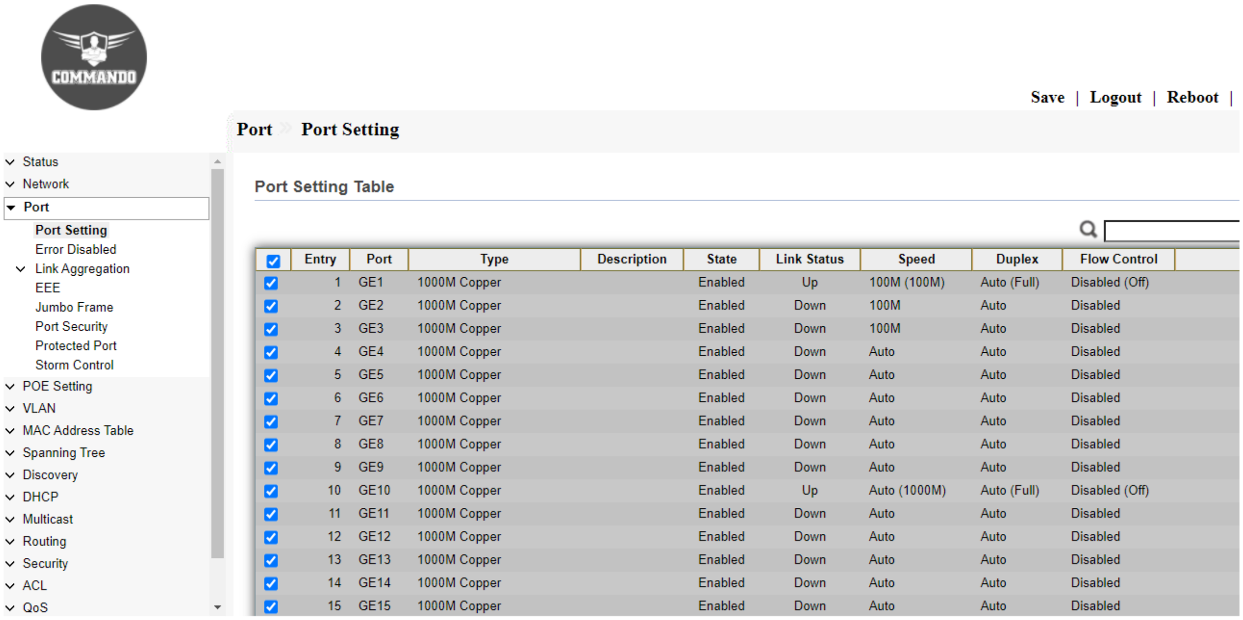
Select Port number, Click on Edit, Enter the Port description, Select/Deselect Port State to Enable or Disable it. Select the Port speed Auto to Manually from 10M/100M/1000M. This page shows port current status and allow user to edit port configurations. Select port entry and click “Edit” button to edit port configurations.
To display Port Setting web page, click **Port >> Port Setting**



Port Setting Table

□	Entry	Port	Type	Description	State	Link Status	Speed	Duplex	Flow Control
□	1	GE1	1000M Copper		Enabled	Up	100M (100M)	Auto (Full)	Disabled (Off)
□	2	GE2	1000M Copper		Enabled	Down	100M	Auto	Disabled
□	3	GE3	1000M Copper		Enabled	Down	100M	Auto	Disabled
□	4	GE4	1000M Copper		Enabled	Down	Auto	Auto	Disabled
□	5	GE5	1000M Copper		Enabled	Down	Auto	Auto	Disabled
□	6	GE6	1000M Copper		Enabled	Down	Auto	Auto	Disabled
□	7	GE7	1000M Copper		Enabled	Down	Auto	Auto	Disabled
□	8	GE8	1000M Copper		Enabled	Down	Auto	Auto	Disabled
□	9	GE9	1000M Copper		Enabled	Down	Auto	Auto	Disabled
□	10	GE10	1000M Copper		Enabled	Up	Auto (1000M)	Auto (Full)	Disabled (Off)

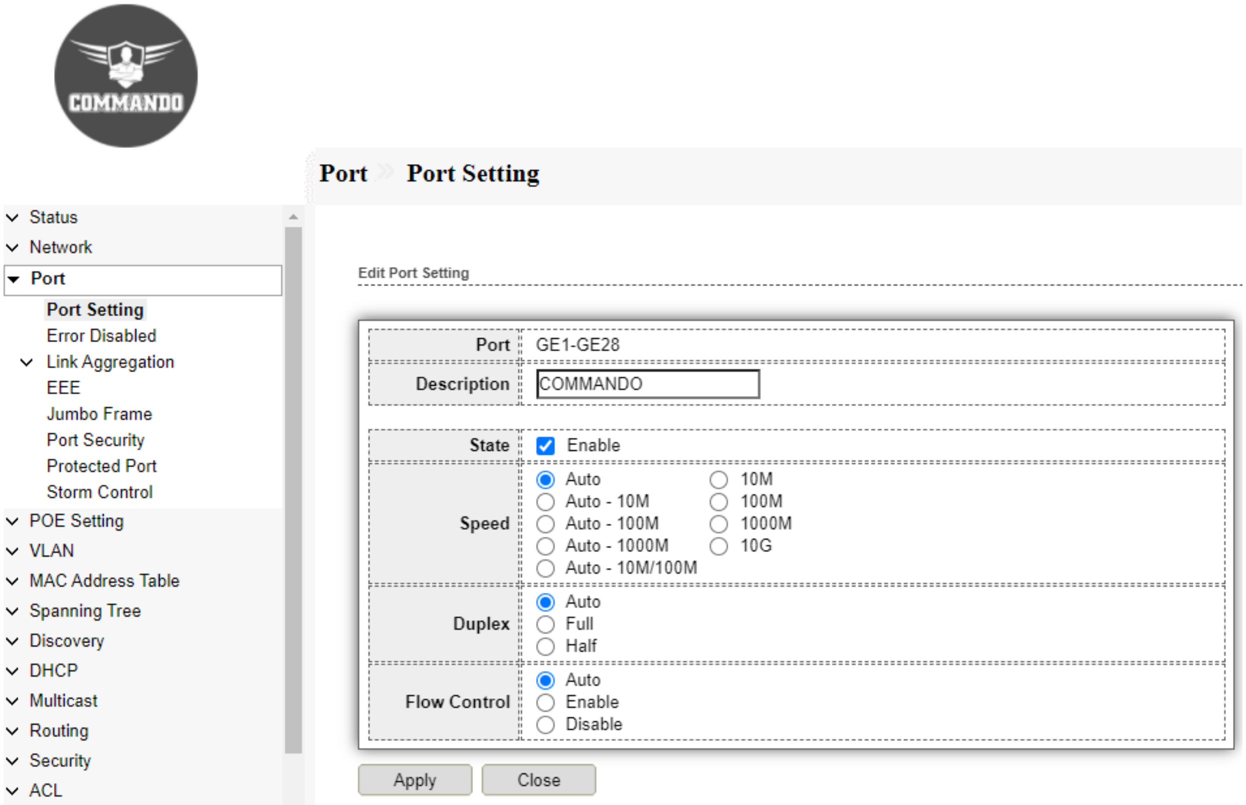
Fig 4.1.1 Port setting table page



Port Setting Table

☑	Entry	Port	Type	Description	State	Link Status	Speed	Duplex	Flow Control
☑	1	GE1	1000M Copper		Enabled	Up	100M (100M)	Auto (Full)	Disabled (Off)
☑	2	GE2	1000M Copper		Enabled	Down	100M	Auto	Disabled
☑	3	GE3	1000M Copper		Enabled	Down	100M	Auto	Disabled
☑	4	GE4	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	5	GE5	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	6	GE6	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	7	GE7	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	8	GE8	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	9	GE9	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	10	GE10	1000M Copper		Enabled	Up	Auto (1000M)	Auto (Full)	Disabled (Off)
☑	11	GE11	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	12	GE12	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	13	GE13	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	14	GE14	1000M Copper		Enabled	Down	Auto	Auto	Disabled
☑	15	GE15	1000M Copper		Enabled	Down	Auto	Auto	Disabled

Fig 4.1.2 Port setting multiple ports selection page.



Edit Port Setting

Port	GE1-GE28
Description	COMMANDO
State	☑ Enable
Speed	● Auto ○ 10M ○ Auto - 10M ○ 100M ○ Auto - 100M ○ 1000M ○ Auto - 1000M ○ 10G ○ Auto - 10M/100M
Duplex	● Auto ○ Full ○ Half
Flow Control	● Auto ○ Enable ○ Disable

Fig 4.1.3 Port setting multiple ports Description, status, speed, duplex, flow control selection page.

4.2 Error Disabled

When a port is in error-disabled state, it will shut down and no traffic is sent or received on that port. Automatic Recovery Interval to enable the error recovery
mechanism for the port security err-disable state by default is 300 seconds.

BPDU Guard: It enable the error recovery mechanism from BPDU guard error-disable state.

UDLD: It enable error recovery mechanism for the UDLD shutdown state.

Self Loop: If by mistake the ports on switches are connected by cables and self-loop is formed then recovery mechanism for the self-loop shutdown state.

Broadcast flood: A "Flood" is an uncontrolled broadcast, usually caused by a fault, such as when there is a loop in the physical network then recovery mechanism for the broadcast flood hanging state.

Unknown Multicast flood: Unknown multicast traffic is flooded to all Layer 2 ports then recovery mechanism for the Unknown Multicast flood hanging state.

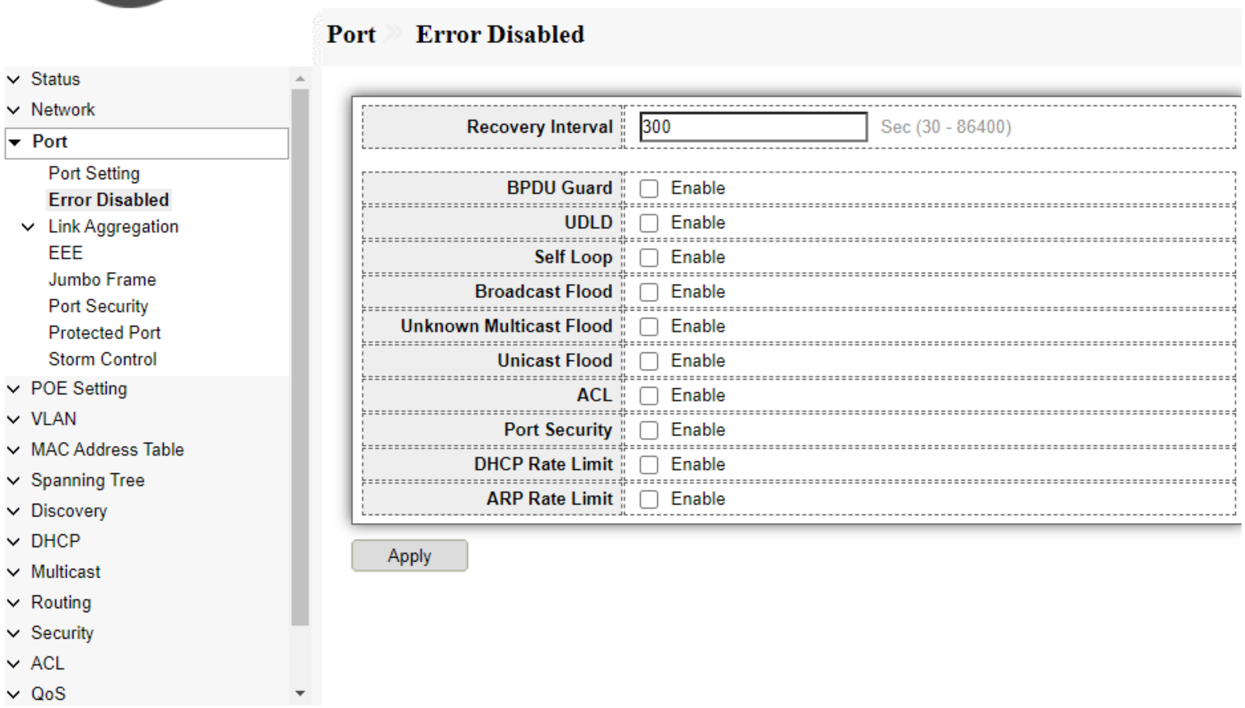
ACL: It enable. error recovery mechanism for the ACL deny error-disable state.

Port Security: It enable the error recovery mechanism for the port security err-disable state.

DHCP Rate Limit: By default, DHCP rate limit is disabled. The maximum rate of sending DHCP messages to the DHCP server can be enabled. Excess packets in a specified period are discarded.

ARP Rate limit: The ARP packet rate limit feature allows you to limit the rate of ARP packets delivered to the switch. An ARP attack detection-enabled device will send all received ARP packets to the Switch for inspection. Processing excessive ARP packets will make the Switch malfunction or even crash. This feature can prevent ARP packets rate.

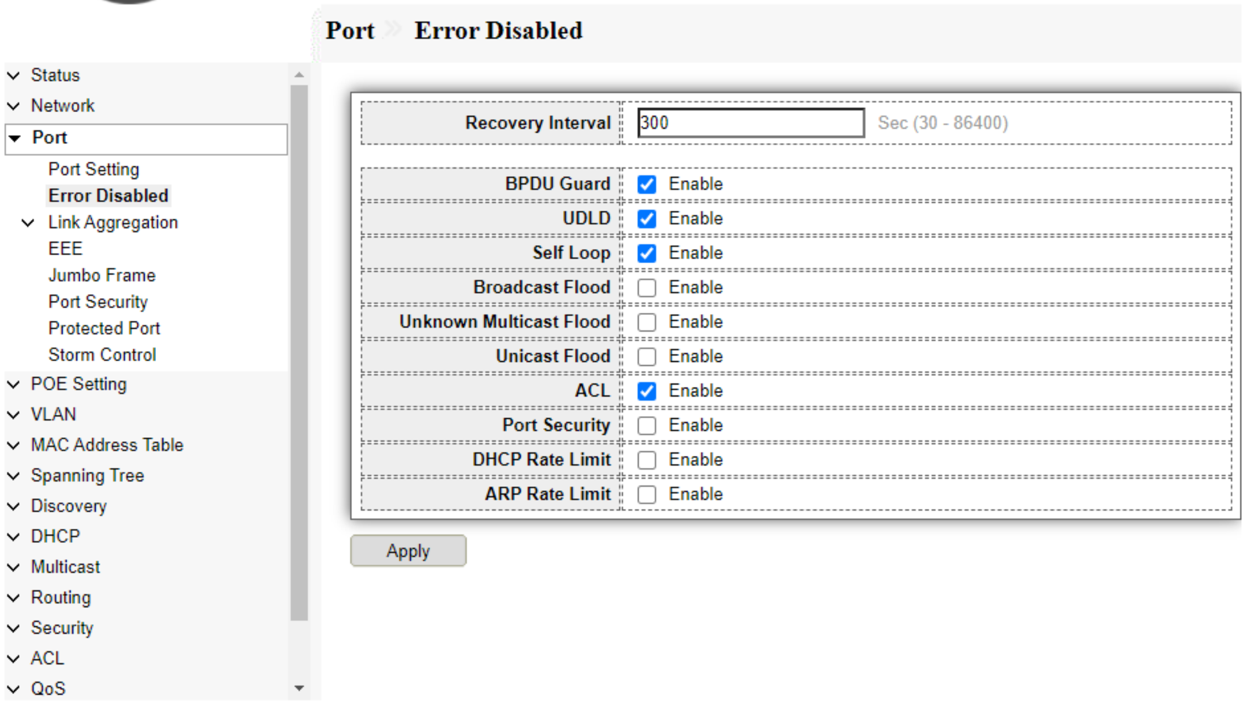
To configure and view Port Error disabled, click **Port >> Error Disabled**



Port » Error Disabled

Recovery Interval	300 Sec (30 - 86400)
BPDU Guard	□ Enable
UDLD	□ Enable
Self Loop	□ Enable
Broadcast Flood	□ Enable
Unknown Multicast Flood	□ Enable
Unicast Flood	□ Enable
ACL	□ Enable
Port Security	□ Enable
DHCP Rate Limit	□ Enable
ARP Rate Limit	□ Enable

Fig 4.2.1 Error disabled selection page.



Recovery Interval	300 Sec (30 - 86400)
BPDU Guard	☑ Enable
UDLD	☑ Enable
Self Loop	☑ Enable
Broadcast Flood	□ Enable
Unknown Multicast Flood	□ Enable
Unicast Flood	□ Enable
ACL	☑ Enable
Port Security	□ Enable
DHCP Rate Limit	□ Enable
ARP Rate Limit	□ Enable

Fig 4.2.2 Enabling various parameters in Error disabled selection page.

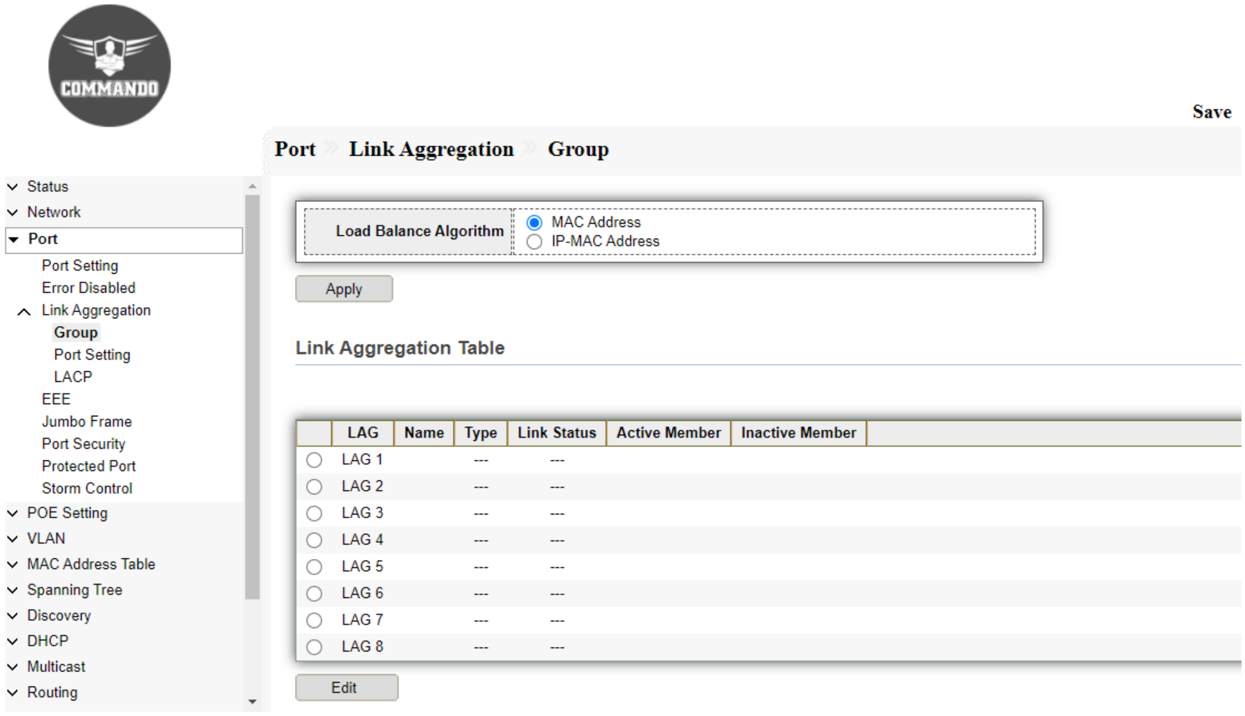
4.3 Link Aggregation

Link aggregation groups (LAGs) allow you to combine multiple Ethernet links into a single logical link. Network devices treat the aggregation as if it were a single link, which increases fault tolerance and load sharing. Specify LAG membership before you enable the LAG. The switch supports up to Eight static LAGs.
This page shows Link Aggregation configuration.

4.3.1 Group

Link aggregation group function allows you to aggregate multiple physical ports into one logic port to increase bandwidth. This switch supports up to 8 groups Link Aggregation & up to 8 ports as one group. This page is to configure link aggregation group load balance algorithm and select group member.

To view the Group menu, Click **Port >> Link Aggregation >> Group.**

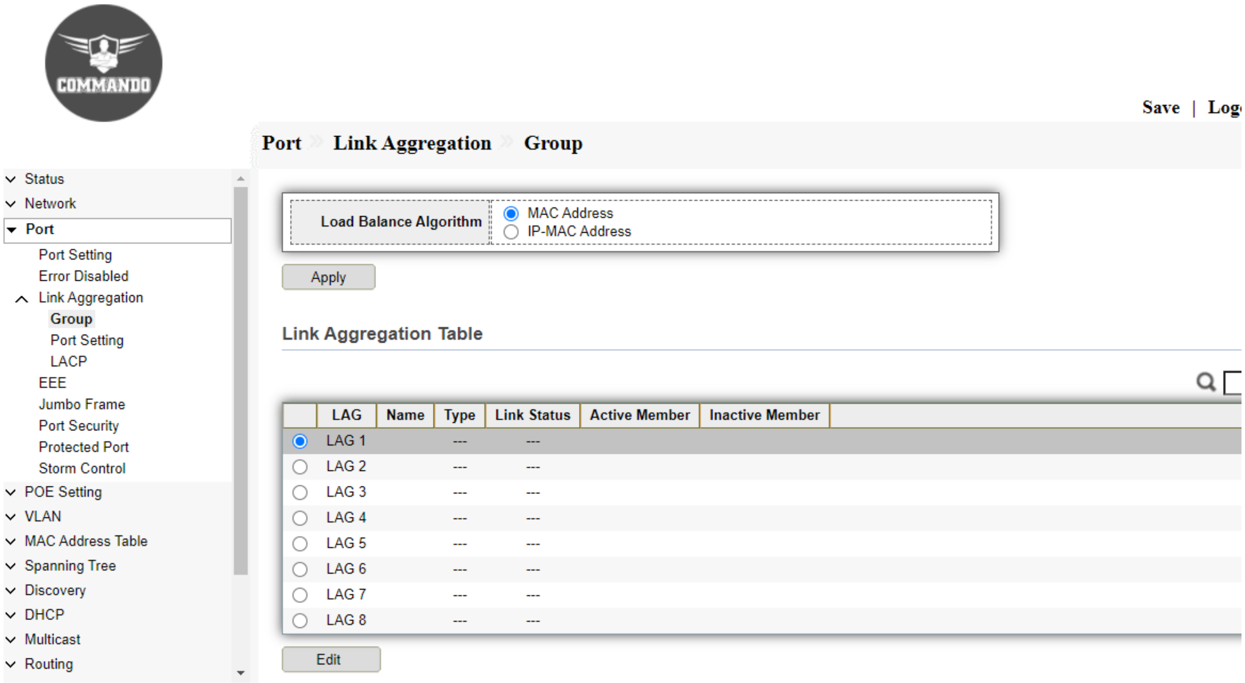


Load Balance Algorithm: ● MAC Address ○ IP-MAC Address

Link Aggregation Table

	LAG	Name	Type	Link Status	Active Member	Inactive Member
○	LAG 1		---	---		
○	LAG 2		---	---		
○	LAG 3		---	---		
○	LAG 4		---	---		
○	LAG 5		---	---		
○	LAG 6		---	---		
○	LAG 7		---	---		
○	LAG 8		---	---		

Fig 4.3.1 Link Aggregation group selection page.

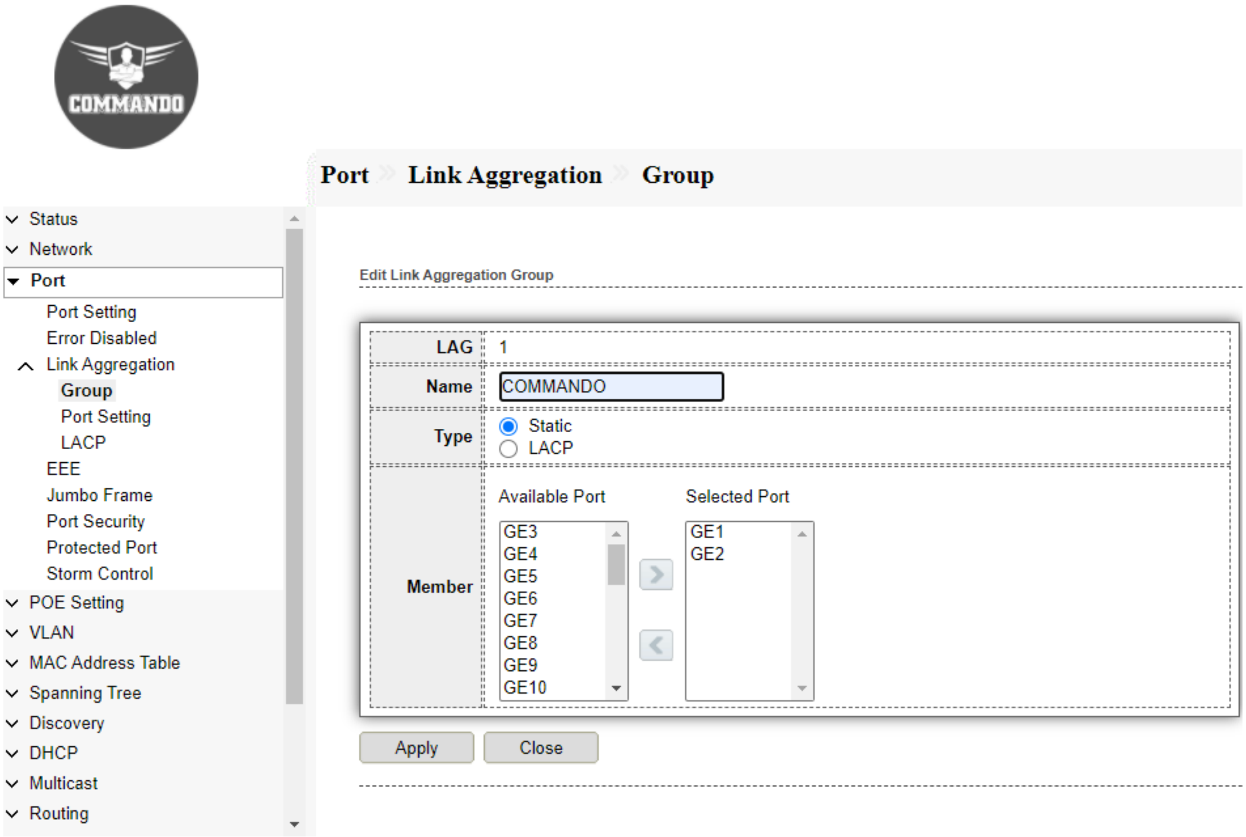


Load Balance Algorithm: ● MAC Address ○ IP-MAC Address

Link Aggregation Table

	LAG	Name	Type	Link Status	Active Member	Inactive Member
●	LAG 1		---	---		
○	LAG 2		---	---		
○	LAG 3		---	---		
○	LAG 4		---	---		
○	LAG 5		---	---		
○	LAG 6		---	---		
○	LAG 7		---	---		
○	LAG 8		---	---		

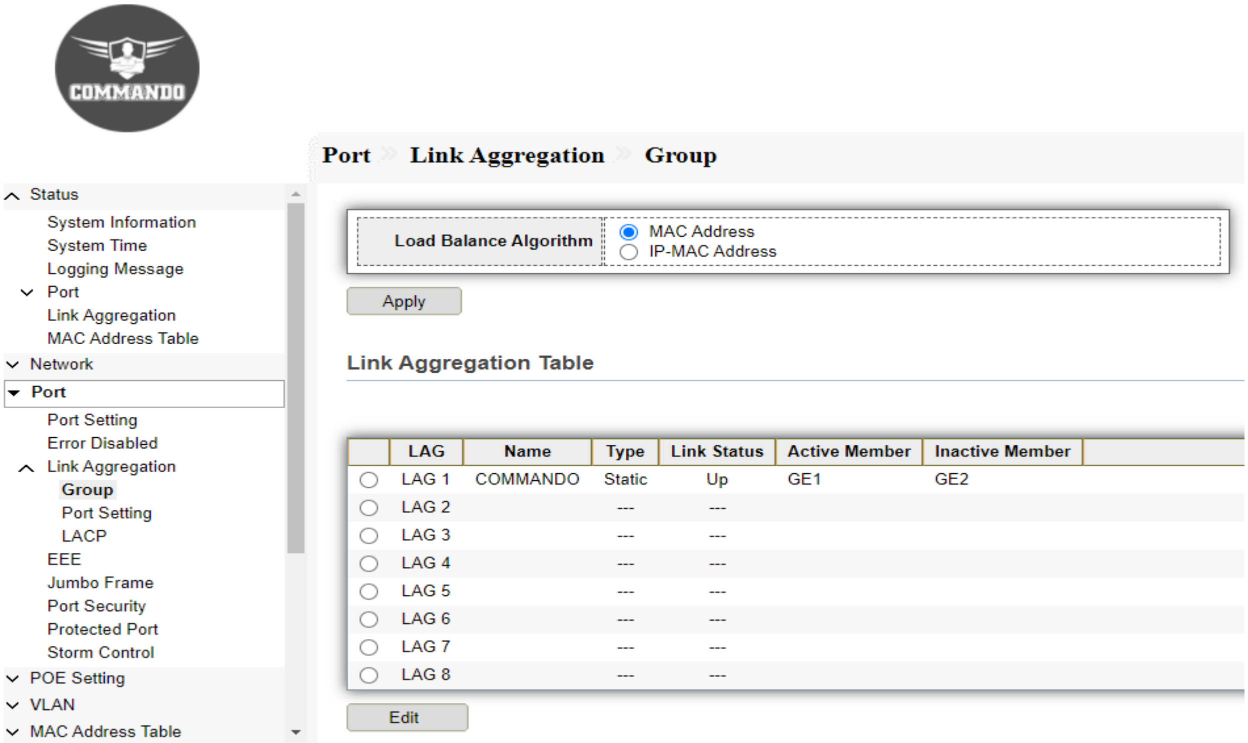
Fig 4.3.2 Link Aggregation LAG selection for editing page.



Edit Link Aggregation Group

LAG	1
Name	COMMANDO
Type	● Static ○ LACP
Member	Available Port: GE3, GE4, GE5, GE6, GE7, GE8, GE9, GE10 Selected Port: GE1, GE2

Fig 4.3.3 Link Aggregation Edit LAG page.

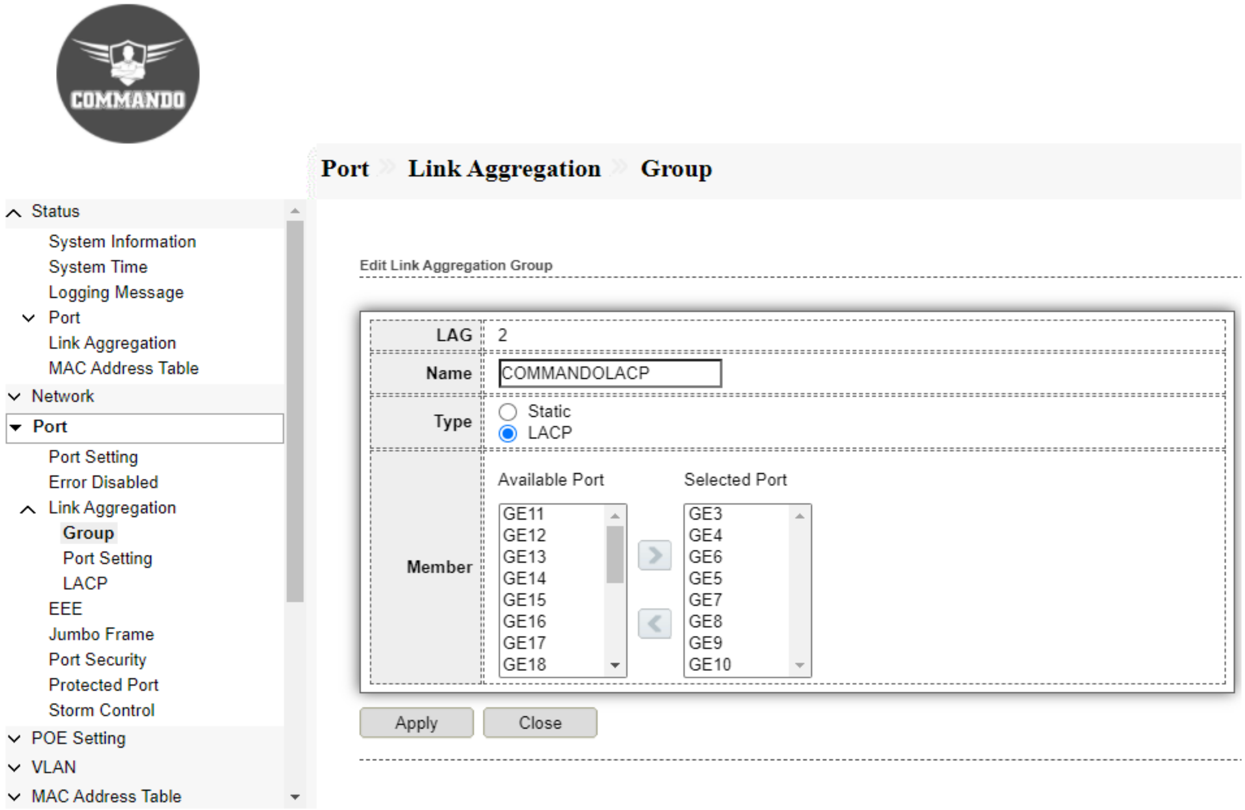


Load Balance Algorithm: ● MAC Address ○ IP-MAC Address

Link Aggregation Table

	LAG	Name	Type	Link Status	Active Member	Inactive Member
○	LAG 1	COMMANDO	Static	Up	GE1	GE2
○	LAG 2		---	---		
○	LAG 3		---	---		
○	LAG 4		---	---		
○	LAG 5		---	---		
○	LAG 6		---	---		
○	LAG 7		---	---		
○	LAG 8		---	---		

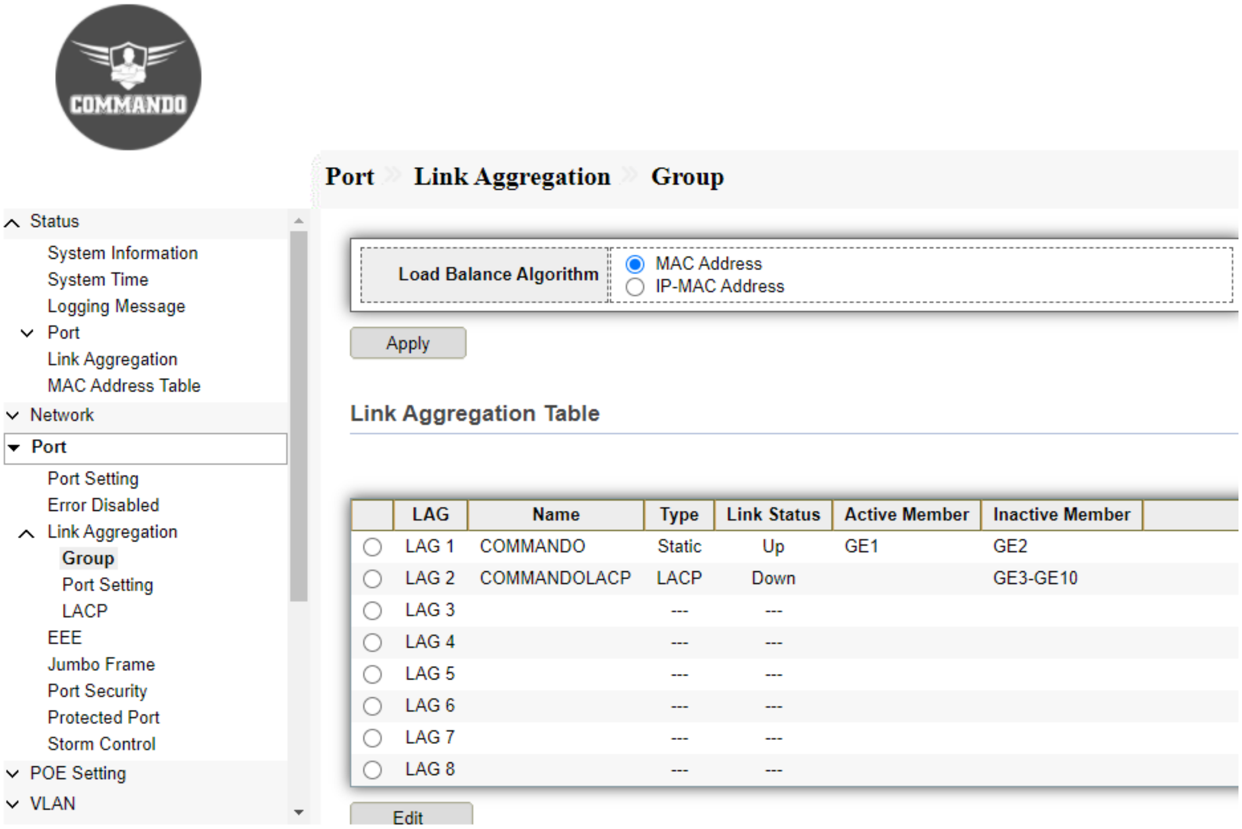
Fig 4.3.4 Link Aggregation Table page.



Edit Link Aggregation Group

LAG	2
Name	COMMANDOLACP
Type	○ Static ● LACP
Member	Available Port: GE11, GE12, GE13, GE14, GE15, GE16, GE17, GE18 Selected Port: GE3, GE4, GE6, GE5, GE7, GE8, GE9, GE10

Fig 4.3.5 LACP Edit LAG page.



Load Balance Algorithm: ● MAC Address ○ IP-MAC Address

Link Aggregation Table

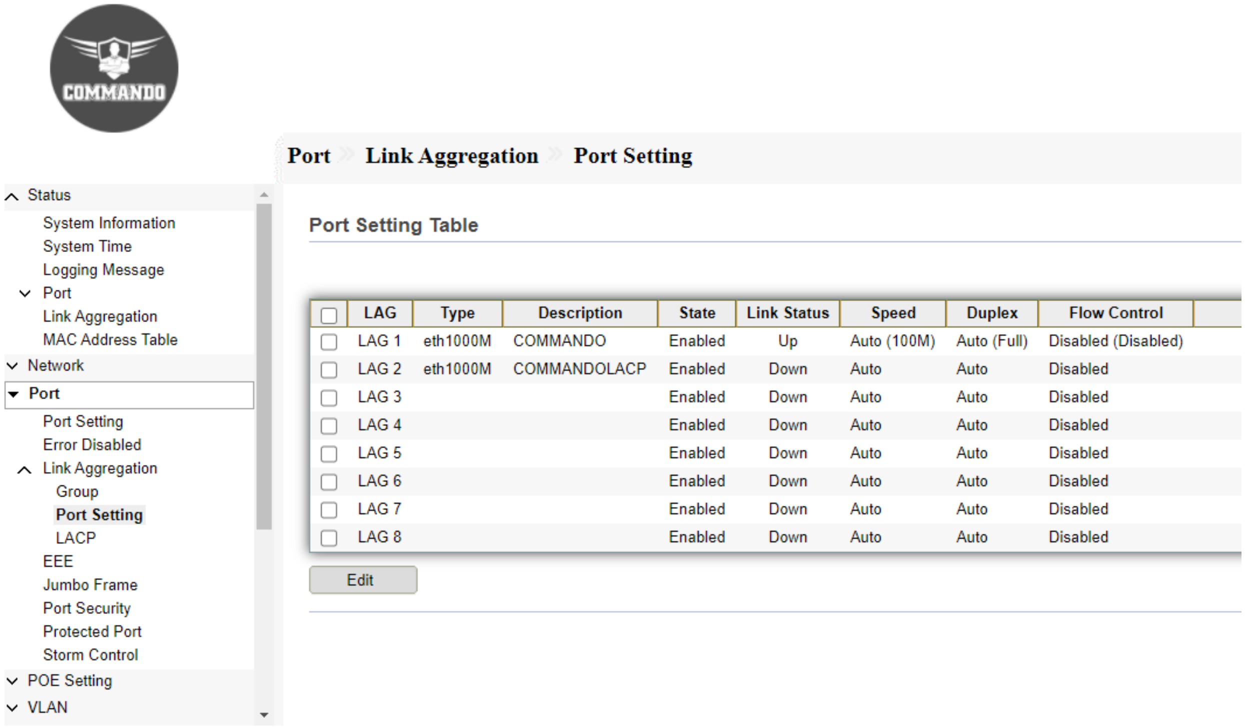
	LAG	Name	Type	Link Status	Active Member	Inactive Member
○	LAG 1	COMMANDO	Static	Up	GE1	GE2
○	LAG 2	COMMANDOLACP	LACP	Down		GE3-GE10
○	LAG 3		---	---		
○	LAG 4		---	---		
○	LAG 5		---	---		
○	LAG 6		---	---		
○	LAG 7		---	---		
○	LAG 8		---	---		

Fig 4.3.6 Link Aggregation group configuration page

4.3.2 Port Setting

This page shows Port Setting Table of LAG like Type, Description, State, Link Status, Speed, Duplex & Flow control. This page shows LAG port current status and allow user to edit LAG port configurations. Select LAG entry and click Edit button to edit LAG port configurations.

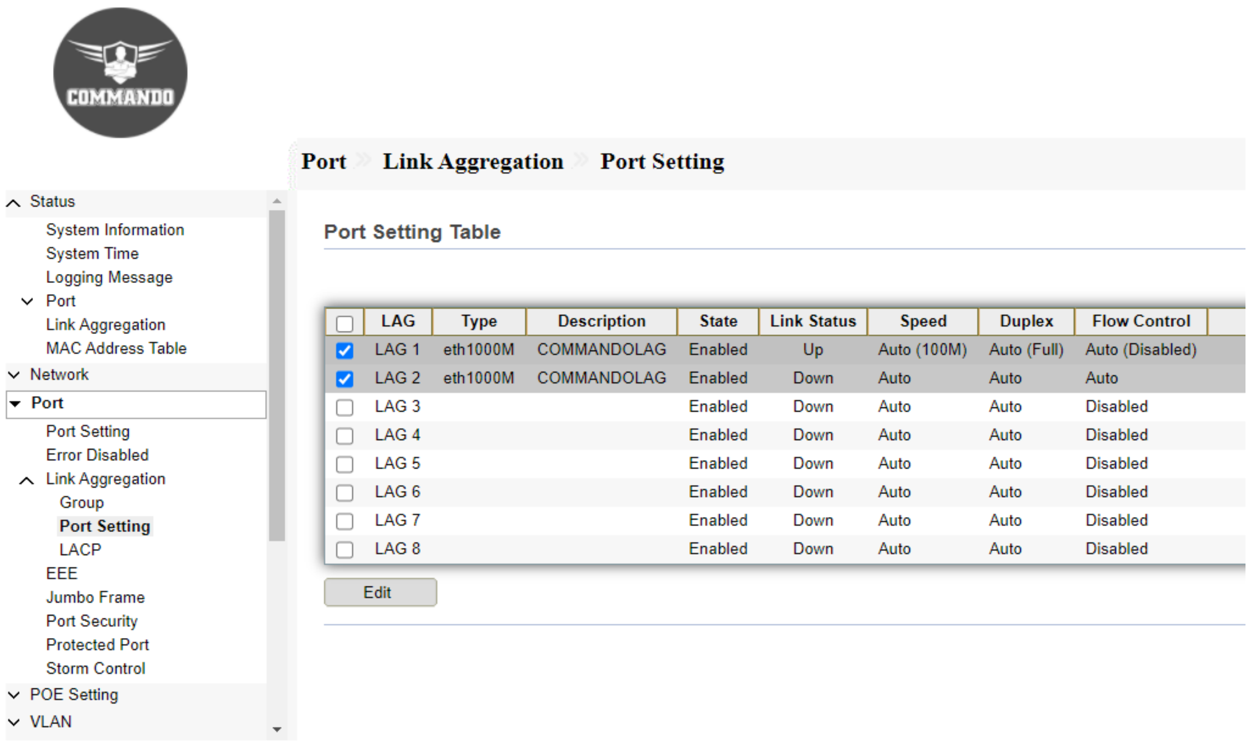
To display LAG Port Setting web page, click **Port >> Link Aggregation >> Port Setting.**



Port Setting Table

□	LAG	Type	Description	State	Link Status	Speed	Duplex	Flow Control
□	LAG 1	eth1000M	COMMANDO	Enabled	Up	Auto (100M)	Auto (Full)	Disabled (Disabled)
□	LAG 2	eth1000M	COMMANDOLACP	Enabled	Down	Auto	Auto	Disabled
□	LAG 3			Enabled	Down	Auto	Auto	Disabled
□	LAG 4			Enabled	Down	Auto	Auto	Disabled
□	LAG 5			Enabled	Down	Auto	Auto	Disabled
□	LAG 6			Enabled	Down	Auto	Auto	Disabled
□	LAG 7			Enabled	Down	Auto	Auto	Disabled
□	LAG 8			Enabled	Down	Auto	Auto	Disabled

Fig 4.3.7 Link Aggregation port setting table page

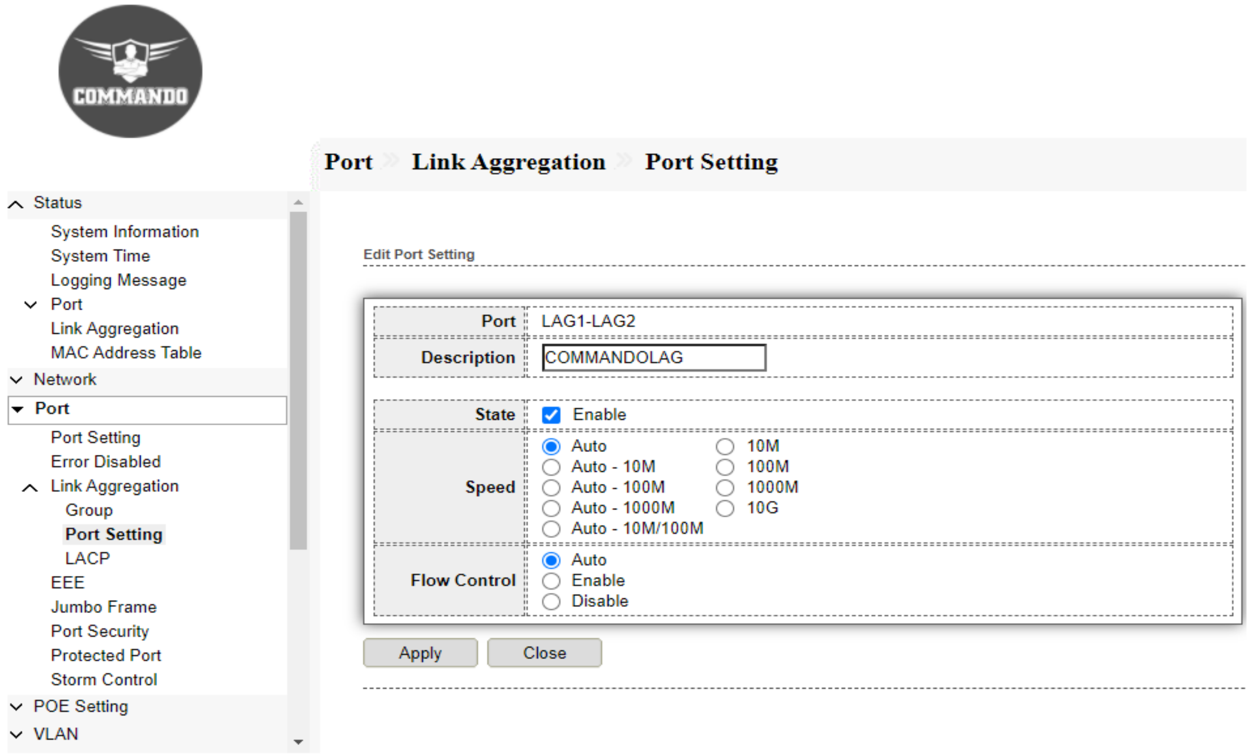


Port » Link Aggregation » Port Setting

Port Setting Table

□	LAG	Type	Description	State	Link Status	Speed	Duplex	Flow Control
☑	LAG 1	eth1000M	COMMANDOLAG	Enabled	Up	Auto (100M)	Auto (Full)	Auto (Disabled)
☑	LAG 2	eth1000M	COMMANDOLAG	Enabled	Down	Auto	Auto	Auto
□	LAG 3			Enabled	Down	Auto	Auto	Disabled
□	LAG 4			Enabled	Down	Auto	Auto	Disabled
□	LAG 5			Enabled	Down	Auto	Auto	Disabled
□	LAG 6			Enabled	Down	Auto	Auto	Disabled
□	LAG 7			Enabled	Down	Auto	Auto	Disabled
□	LAG 8			Enabled	Down	Auto	Auto	Disabled

Fig 4.3.8 Link Aggregation selecting port page

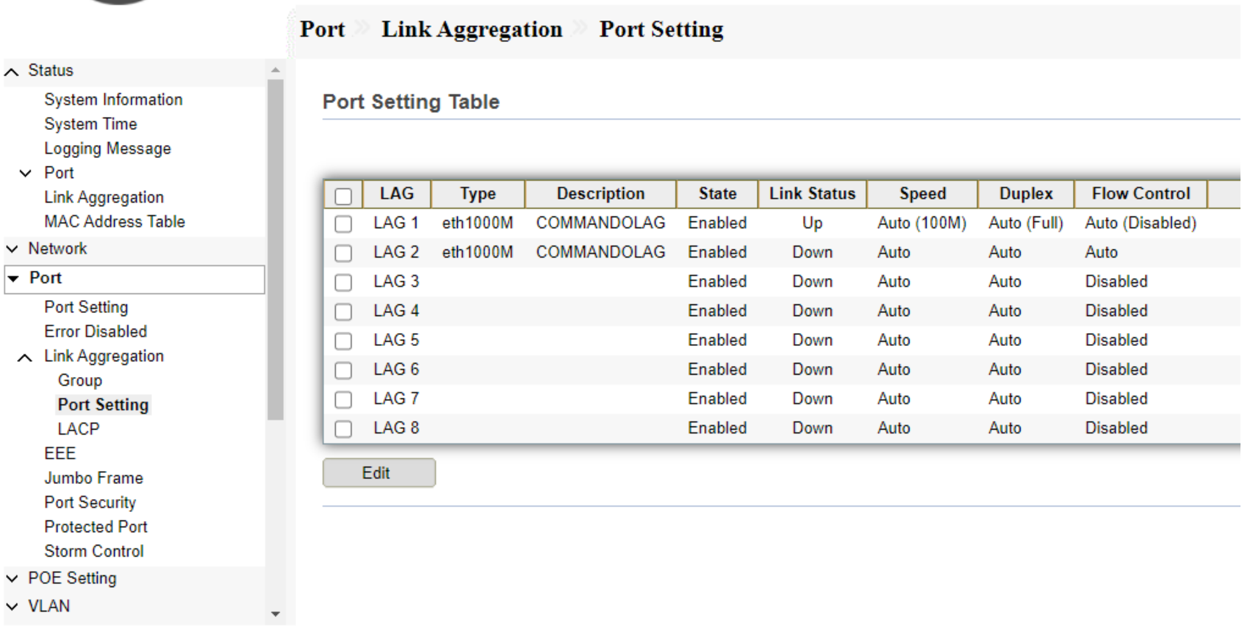


Port » Link Aggregation » Port Setting

Edit Port Setting

Port	LAG1-LAG2
Description	COMMANDOLAG
State	☑ Enable
Speed	● Auto ○ Auto - 10M ○ Auto - 100M ○ Auto - 1000M ○ Auto - 10M/100M ○ 10M ○ 100M ○ 1000M ○ 10G
Flow Control	● Auto ○ Enable ○ Disable

Fig 4.3.9 Link Aggregation port setting LAG1-LAG2 and flow control page



Port Setting Table

□	LAG	Type	Description	State	Link Status	Speed	Duplex	Flow Control
□	LAG 1	eth1000M	COMMANDOLAG	Enabled	Up	Auto (100M)	Auto (Full)	Auto (Disabled)
□	LAG 2	eth1000M	COMMANDOLAG	Enabled	Down	Auto	Auto	Auto
□	LAG 3			Enabled	Down	Auto	Auto	Disabled
□	LAG 4			Enabled	Down	Auto	Auto	Disabled
□	LAG 5			Enabled	Down	Auto	Auto	Disabled
□	LAG 6			Enabled	Down	Auto	Auto	Disabled
□	LAG 7			Enabled	Down	Auto	Auto	Disabled
□	LAG 8			Enabled	Down	Auto	Auto	Disabled

Fig 4.3.10 Link Aggregation port setting table for LAG1-LAG2 page

4.3.3 LACP

Link Aggregation Control Protocol (LACP) is part of the IEEE specification (802.3az) that enables you to bundle several physical ports together to form a single logical channel (LAG). The Link Aggregation Control Protocol (LACP) provides a method to control the bundling of several physical ports together to form a single logical channel. LAGs multiply the bandwidth, increase port flexibility, and provide link redundancy between two devices.

Two types of LAGs are supported:

Static LAG: A LAG is static if the LACP is disabled on it. The group of ports

assigned to a static LAG are always active members.

Dynamic LAG: In Dynamic LAG LACP is enabled on it. The group of ports assigned to dynamic LAG determines which ports are active member ports. The non-active ports are standby ports ready to replace any failing active member ports.

Load Balancing Traffic forwarded to a LAG is load-balanced across the active member ports, thus achieving an effective bandwidth close to the aggregate bandwidth of all the active member ports of the LAG.

Traffic load balancing over the active member ports of a LAG is managed by a hash-based distribution function that distributes Unicast and Multicast traffic based on Layer 2 or Layer 3 packet header information.

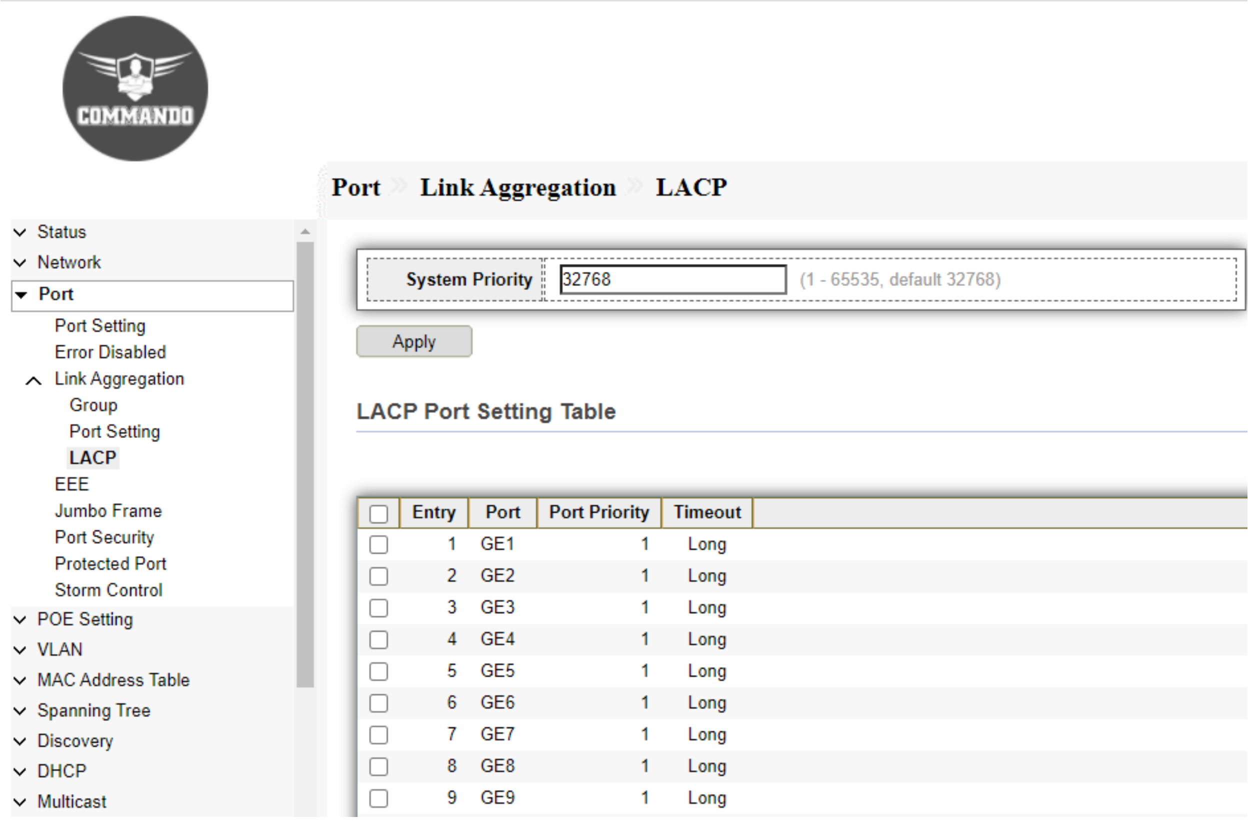
The device supports two modes of load balancing:

MAC Addresses: Based on the Destination and Source MAC addresses of all packets. IP and MAC Addresses: Based on the Destination and Source IP addresses for IP packets, and Destination and Source MAC addresses for non-IP packets.

Timeout: The Timeout controls the period between BPDU transmissions. Long will transmit LACP packets each second, while Short will wait for 30 seconds before sending a LACP packet.

Port Priority: It controls the priority of the ports. If the LACP partner wants to form a larger group than is supported by this device, then this parameter will control which ports will be active & which ports will in backup role. Lower the number means greater the priority. By default, system priority for LACP is 32768.

LAG is treated by the system as a single logical port. In particular, the LAG has port attributes like a regular port, such as state and speed. The device supports 8 LAGs with up to 8 ports in a LAG group. Link Aggregation Control Protocol (LACP) provides a standardized means for exchanging information between Switches connected by multiple links that require high-speed redundant links. This page allow user to configure LACP global and port configurations. Select ports and click Edit button to edit port configuration. To display the LACP Setting page , click **Port >> Link Aggregation >> LACP.**

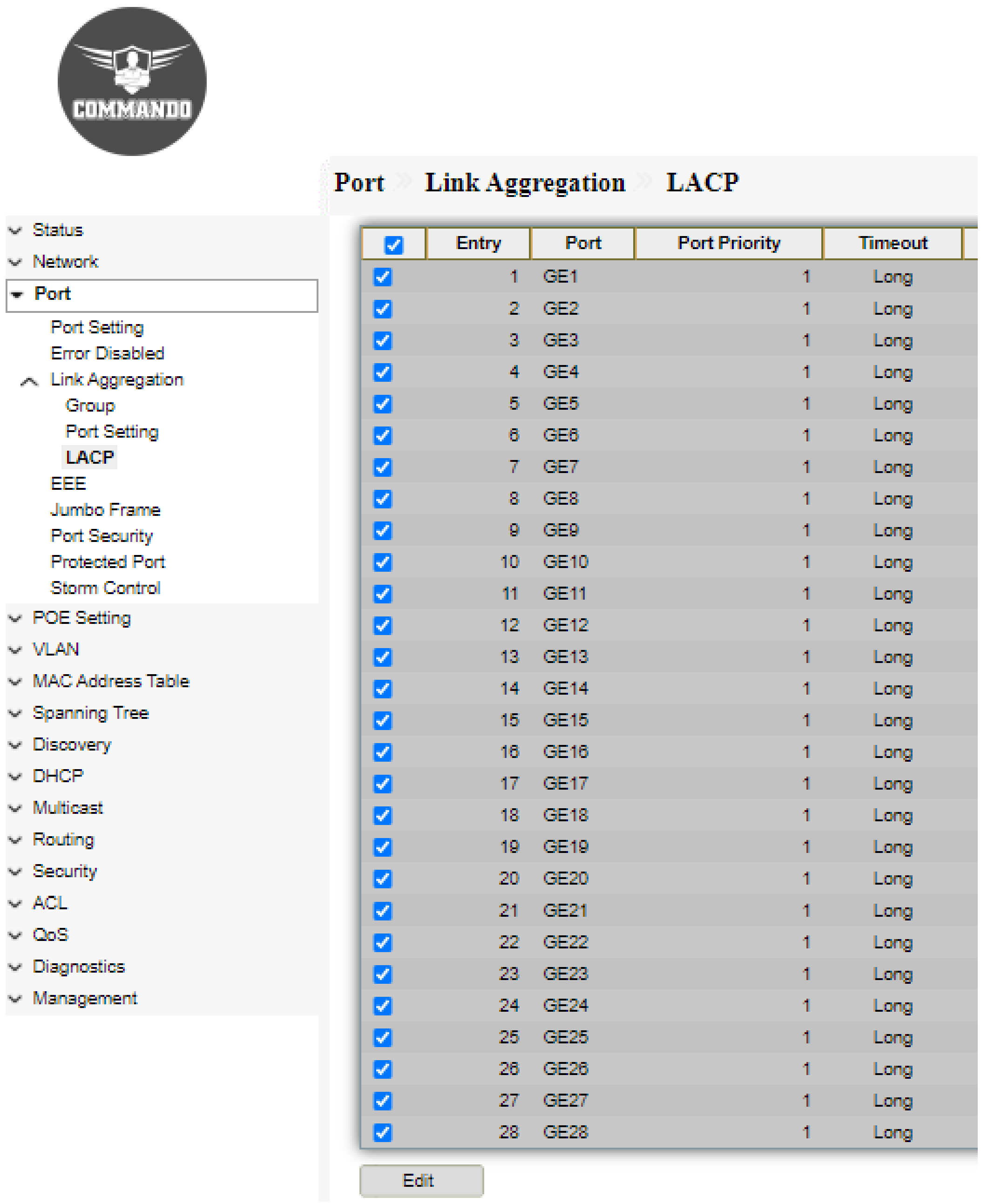


System Priority: 32768 (1 - 65535, default 32768)

LACP Port Setting Table

☐	Entry	Port	Port Priority	Timeout
☐	1	GE1	1	Long
☐	2	GE2	1	Long
☐	3	GE3	1	Long
☐	4	GE4	1	Long
☐	5	GE5	1	Long
☐	6	GE6	1	Long
☐	7	GE7	1	Long
☐	8	GE8	1	Long
☐	9	GE9	1	Long

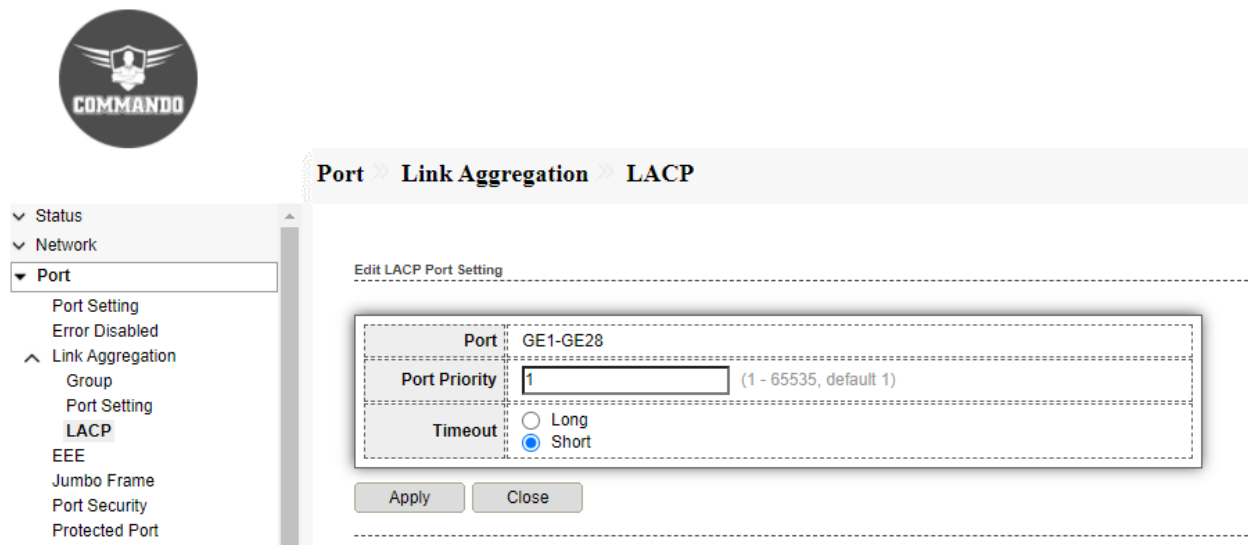
Fig 4.3.6 Link Aggregation LACP Port Setting Table page



Port » Link Aggregation » LACP

☑	Entry	Port	Port Priority	Timeout
☑	1	GE1	1	Long
☑	2	GE2	1	Long
☑	3	GE3	1	Long
☑	4	GE4	1	Long
☑	5	GE5	1	Long
☑	6	GE6	1	Long
☑	7	GE7	1	Long
☑	8	GE8	1	Long
☑	9	GE9	1	Long
☑	10	GE10	1	Long
☑	11	GE11	1	Long
☑	12	GE12	1	Long
☑	13	GE13	1	Long
☑	14	GE14	1	Long
☑	15	GE15	1	Long
☑	16	GE16	1	Long
☑	17	GE17	1	Long
☑	18	GE18	1	Long
☑	19	GE19	1	Long
☑	20	GE20	1	Long
☑	21	GE21	1	Long
☑	22	GE22	1	Long
☑	23	GE23	1	Long
☑	24	GE24	1	Long
☑	25	GE25	1	Long
☑	26	GE26	1	Long
☑	27	GE27	1	Long
☑	28	GE28	1	Long

Fig 4.3.7 Link Aggregation LACP Port Setting port selection page

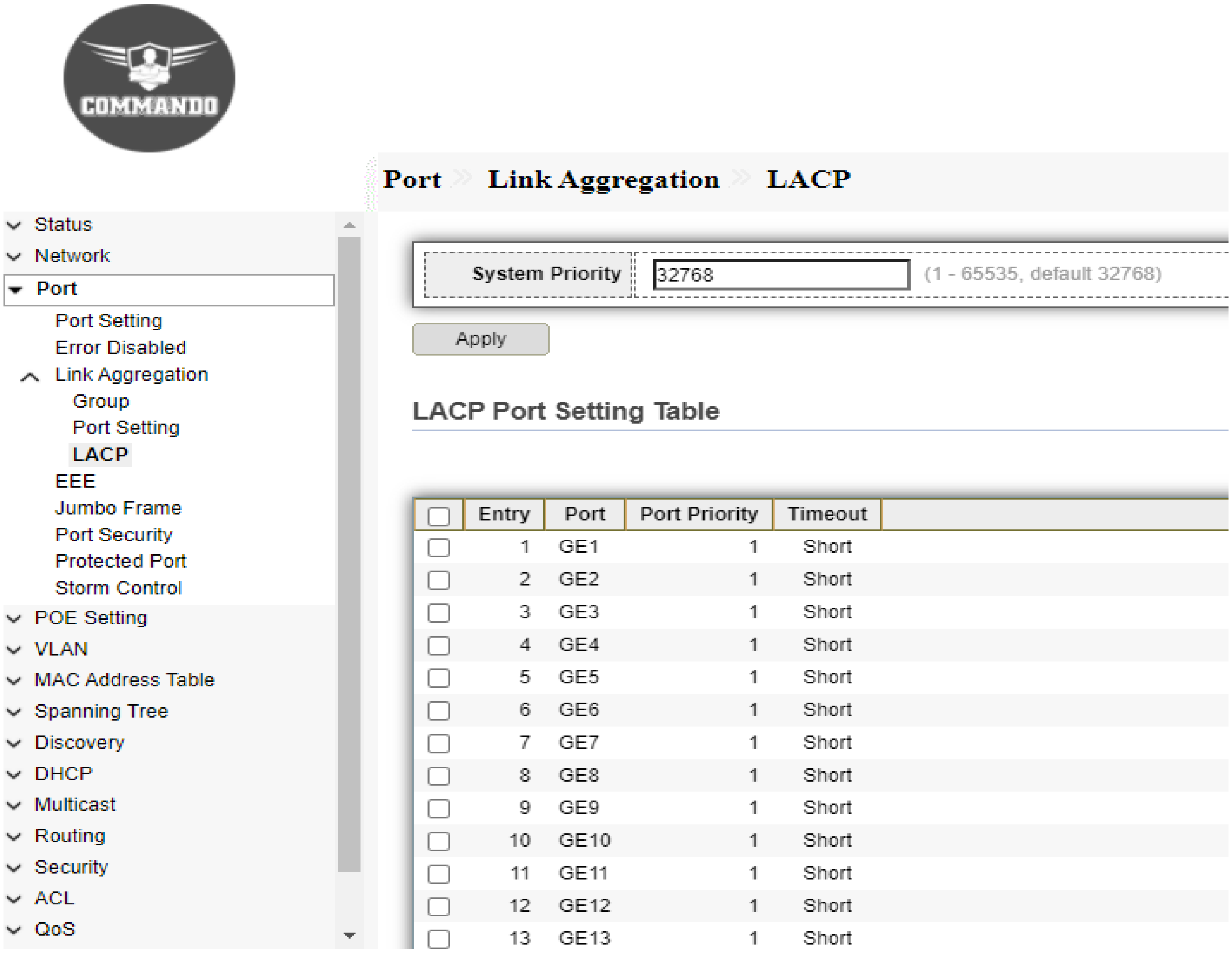


Port » Link Aggregation » LACP

Edit LACP Port Setting

Port	GE1-GE28
Port Priority	1 (1 - 65535, default 1)
Timeout	○ Long ● Short

Fig 4.3.8 Edit LACP Port Setting page



Port » Link Aggregation » LACP

System Priority	32768 (1 - 65535, default 32768)

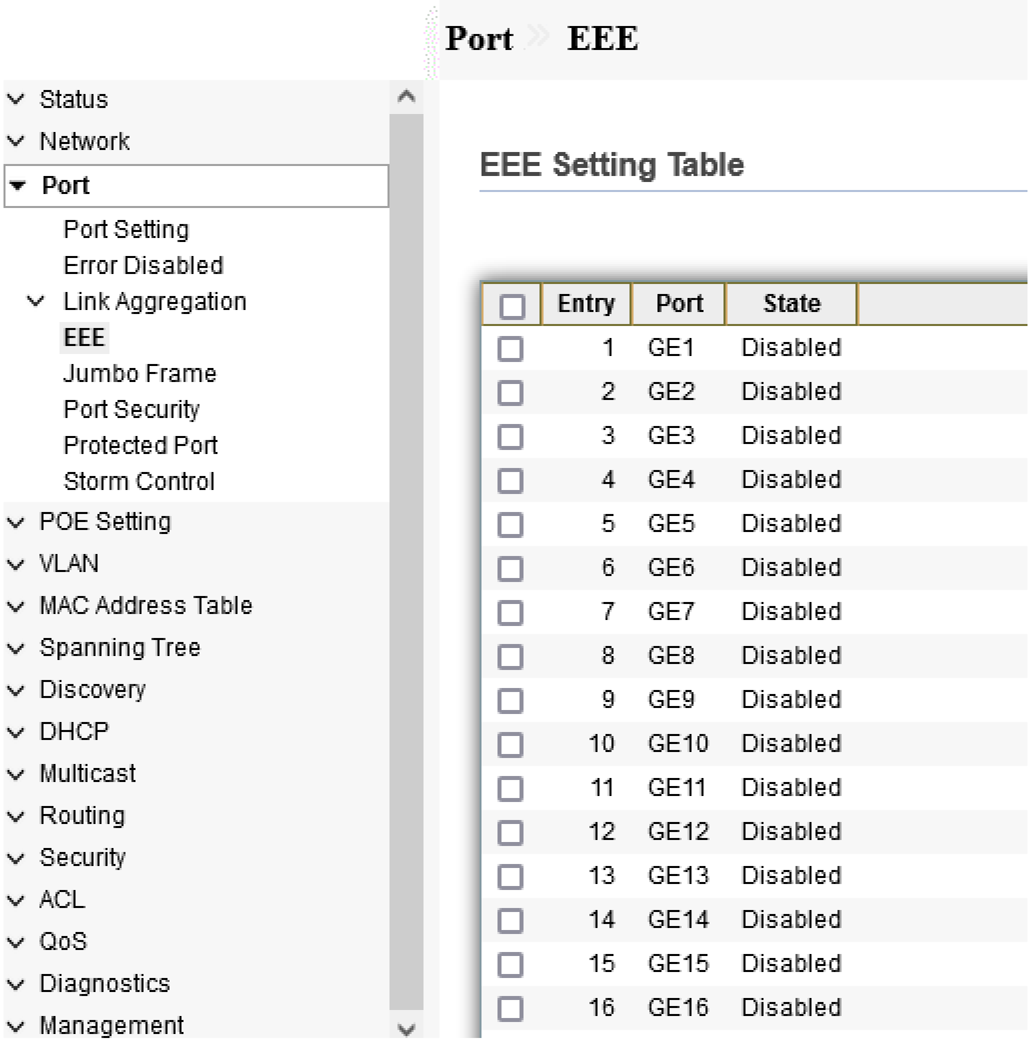
LACP Port Setting Table

□	Entry	Port	Port Priority	Timeout
□	1	GE1	1	Short
□	2	GE2	1	Short
□	3	GE3	1	Short
□	4	GE4	1	Short
□	5	GE5	1	Short
□	6	GE6	1	Short
□	7	GE7	1	Short
□	8	GE8	1	Short
□	9	GE9	1	Short
□	10	GE10	1	Short
□	11	GE11	1	Short
□	12	GE12	1	Short
□	13	GE13	1	Short

Fig 4.3.9 LACP Port Setting Table page

4.4 EEE

802.3az EEE is designed to save power when there is no traffic on the link. IEEE 802.3az Energy Efficient Ethernet (EEE) function, cable length power saving, and link-up and link-down power saving. It Combines the Energy Efficient Ethernet (EEE) 802.3 MAC sublayer with the 10/100/1000BASE-TX physical layers to support operation in Low Power and save power during periods of low link utilization. Short Cable Power Saving dynamically detects and adjusts power that is required for the detected cable length. Link-Down Power Saving reduces the power consumption considerably when the network cable is disconnected. When the network cable is reconnected, the switch detects an incoming signal and restores normal power. This page shows Port setting for EEE, i.e. (Energy Efficient Ethernet) is a technology that reduces switch power consumption during periods of low network traffic. By default, EEE is disabled on C3000 Series Switch and after enabling EEE on Switch it required 50sec time required for EEE activation. This page allow user to configure Energy Efficient Ethernet settings. To configure the EEE, click Port >> EEE.

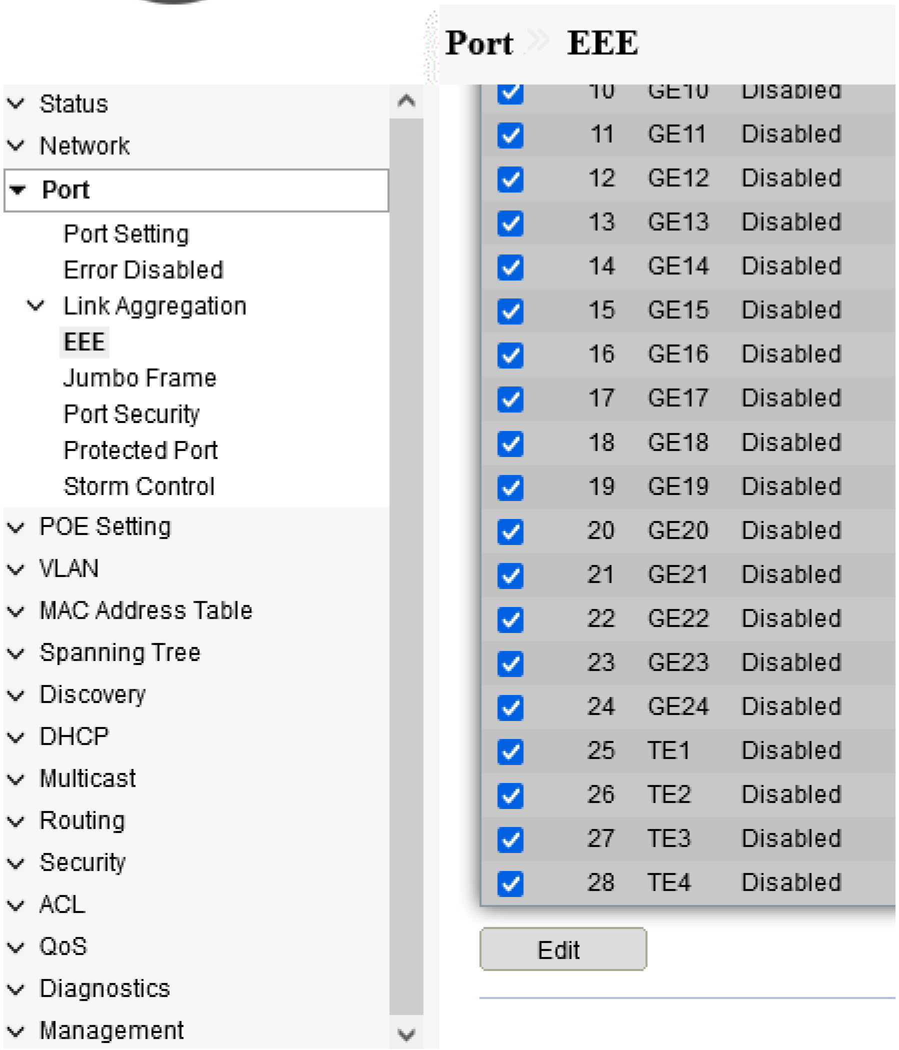


Port » EEE

EEE Setting Table

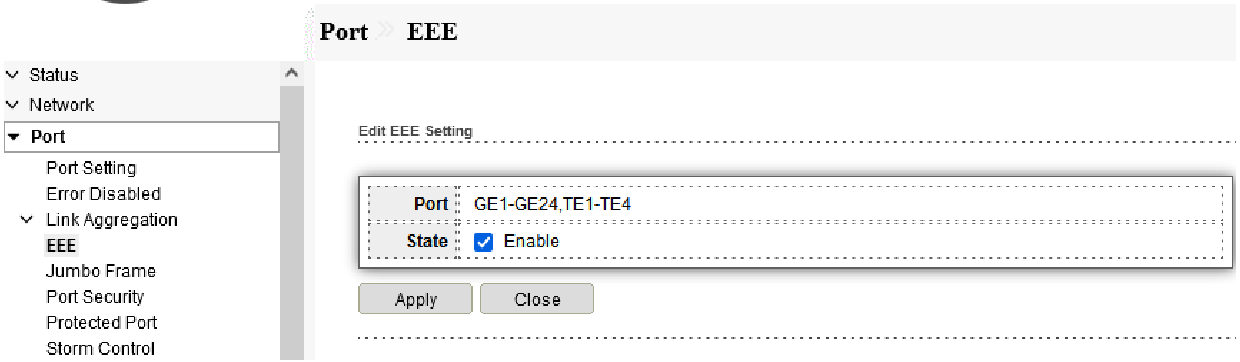
□	Entry	Port	State
□	1	GE1	Disabled
□	2	GE2	Disabled
□	3	GE3	Disabled
□	4	GE4	Disabled
□	5	GE5	Disabled
□	6	GE6	Disabled
□	7	GE7	Disabled
□	8	GE8	Disabled
□	9	GE9	Disabled
□	10	GE10	Disabled
□	11	GE11	Disabled
□	12	GE12	Disabled
□	13	GE13	Disabled
□	14	GE14	Disabled
□	15	GE15	Disabled
□	16	GE16	Disabled

Fig 4.4.1 Port EEE Setting Table port selection page



☑	10	GE10	Disabled
☑	11	GE11	Disabled
☑	12	GE12	Disabled
☑	13	GE13	Disabled
☑	14	GE14	Disabled
☑	15	GE15	Disabled
☑	16	GE16	Disabled
☑	17	GE17	Disabled
☑	18	GE18	Disabled
☑	19	GE19	Disabled
☑	20	GE20	Disabled
☑	21	GE21	Disabled
☑	22	GE22	Disabled
☑	23	GE23	Disabled
☑	24	GE24	Disabled
☑	25	TE1	Disabled
☑	26	TE2	Disabled
☑	27	TE3	Disabled
☑	28	TE4	Disabled

Fig 4.4.2 Port EEE Setting Table all ports selection page

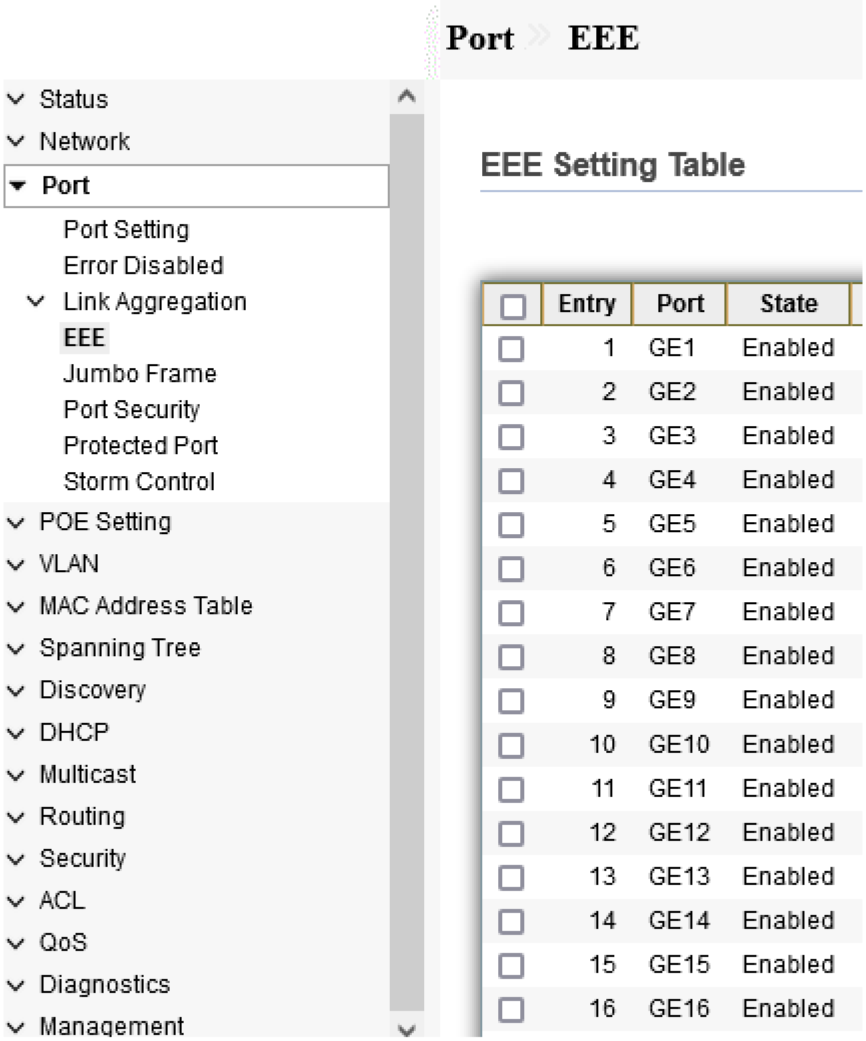


Port » EEE

Edit EEE Setting

Port	GE1-GE24,TE1-TE4
State	☑ Enable

Fig 4.4.3 Port EEE Setting port application page



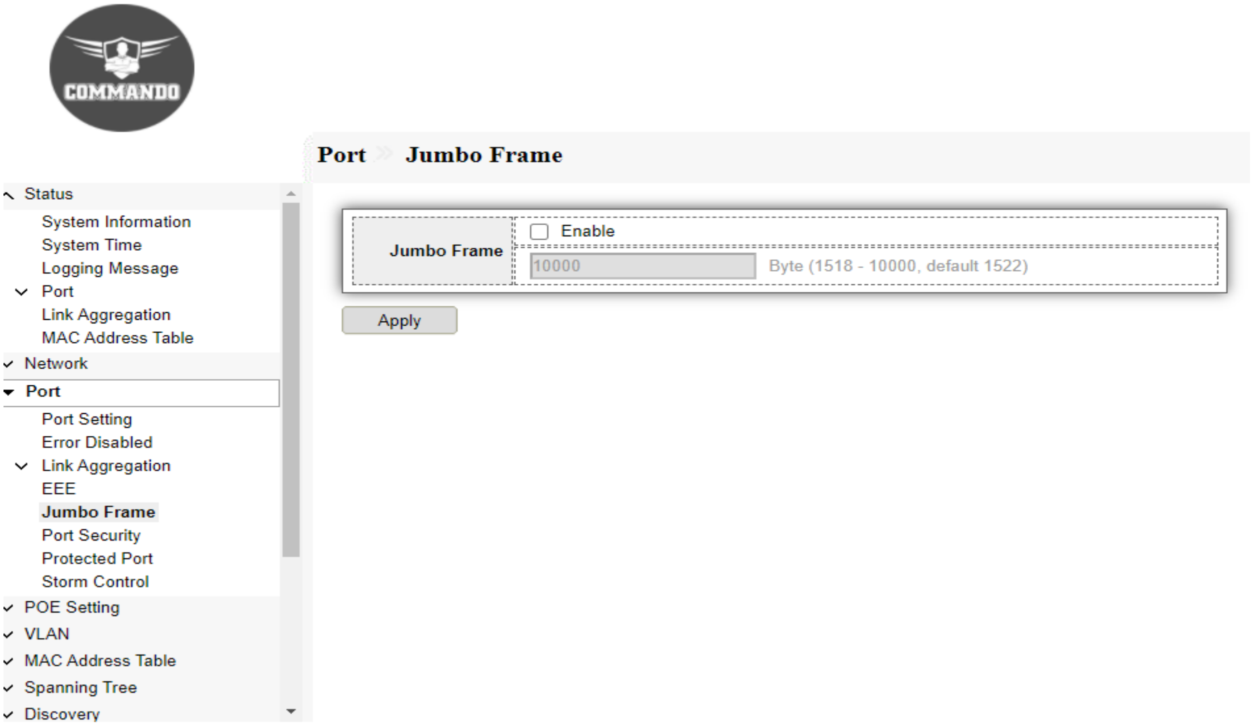
EEE Setting Table

□	Entry	Port	State
□	1	GE1	Enabled
□	2	GE2	Enabled
□	3	GE3	Enabled
□	4	GE4	Enabled
□	5	GE5	Enabled
□	6	GE6	Enabled
□	7	GE7	Enabled
□	8	GE8	Enabled
□	9	GE9	Enabled
□	10	GE10	Enabled
□	11	GE11	Enabled
□	12	GE12	Enabled
□	13	GE13	Enabled
□	14	GE14	Enabled
□	15	GE15	Enabled
□	16	GE16	Enabled

Fig 4.4.4 Port EEE Setting Table after Enabled Port page

4.5 Jumbo Frame

Jumbo frames are frames larger than the standard Ethernet frame size of 1518 bytes, which includes the Layer 2 header and Frame Check Sequence (FCS). In other words, jumbo frames refer to Ethernet packets of up to 10000 bytes in size. This page shows the maximum transmission unit (MTU) size of packet that the switch can receive/transmit. User can change the MTU configuration in this page. By default, Jumbo frames are disabled. This page allow user to configure switch jumbo frame size . To Configure Jumbo Frame, click **Port >> Jumbo Frame.**

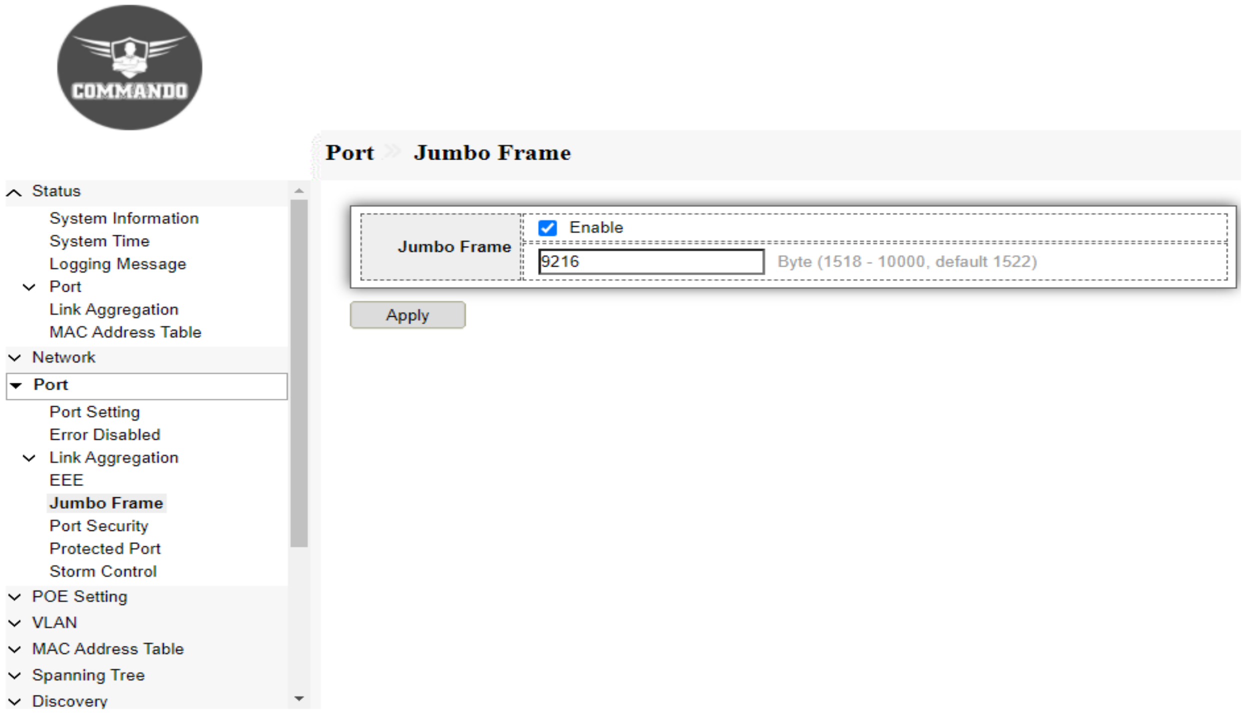


Port » Jumbo Frame

Jumbo Frame □ Enable

10000 Byte (1518 - 10000, default 1522)

Fig 4.5.1 Jumbo frame enable page



Port » Jumbo Frame

Jumbo Frame	☑ Enable
	9216 Byte (1518 - 10000, default 1522)

Fig 4.5.2 Jumbo Frame Enable for 9216 bytes page

4.6 Port Security

Port security monitors received and learned packets. Access to locked ports is limited to users with specific MAC addresses. Violation Action is when a device with an unauthorized MAC address attempts to use the port, the port will be administratively disabled and must be manually re-enabled.

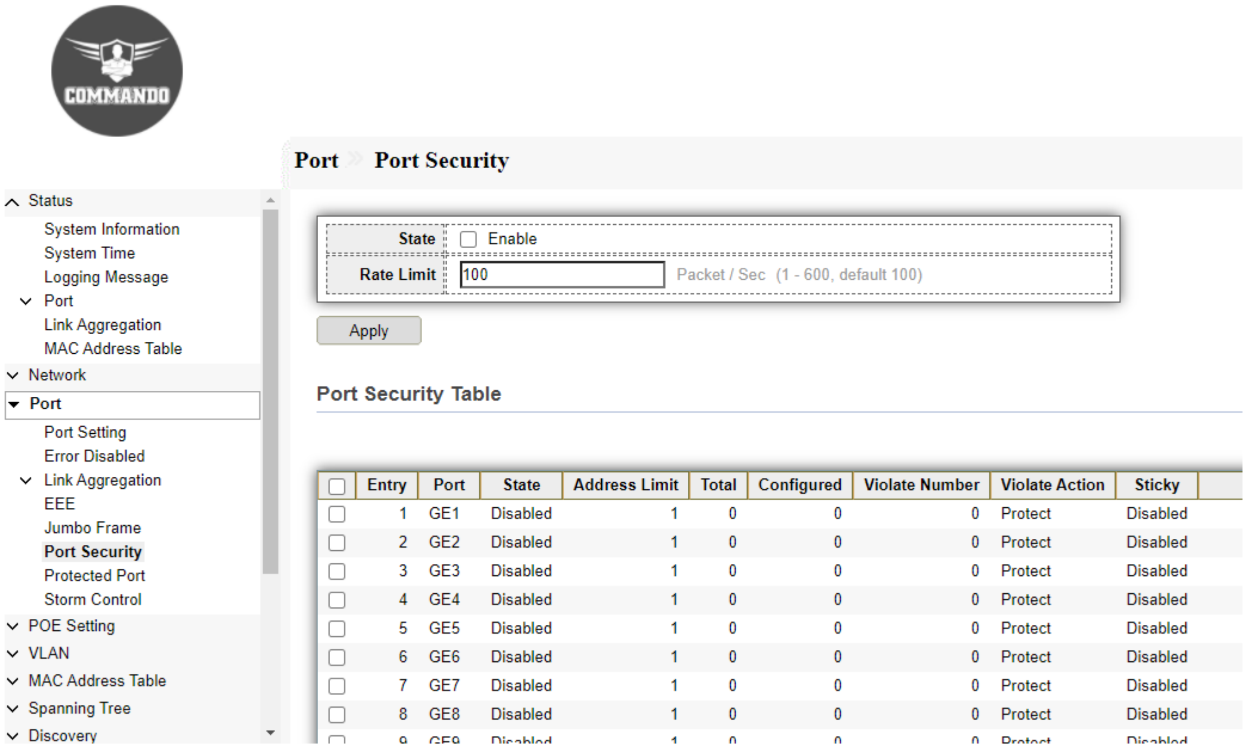
Protect: Drops packets with unknown source MAC addresses until secure MAC addresses is learned.

Restrict: A port security violation restricts packet after Security Violation. This result into increase in counter and causes an SNMP Notification to be generated.

Shutdown: Discards packets from any unlearned source and shuts down the port. The port remains shut down until reactivated, or until the device is rebooted.

Sticky: You can Enable/Disable MAC addresses to be sticky. These can be dynamically learned or manually configured, stored in the address table, and added to the running configuration. If these addresses are saved in the configuration file, the interface does not need to dynamically relearn MAC address when the switch restarts.

This page allow user to configure port security settings for each interface. When port security is enabled on interface, Violation action will be performed per limitation. To Configure Port Security, click **Port>> Port Security**



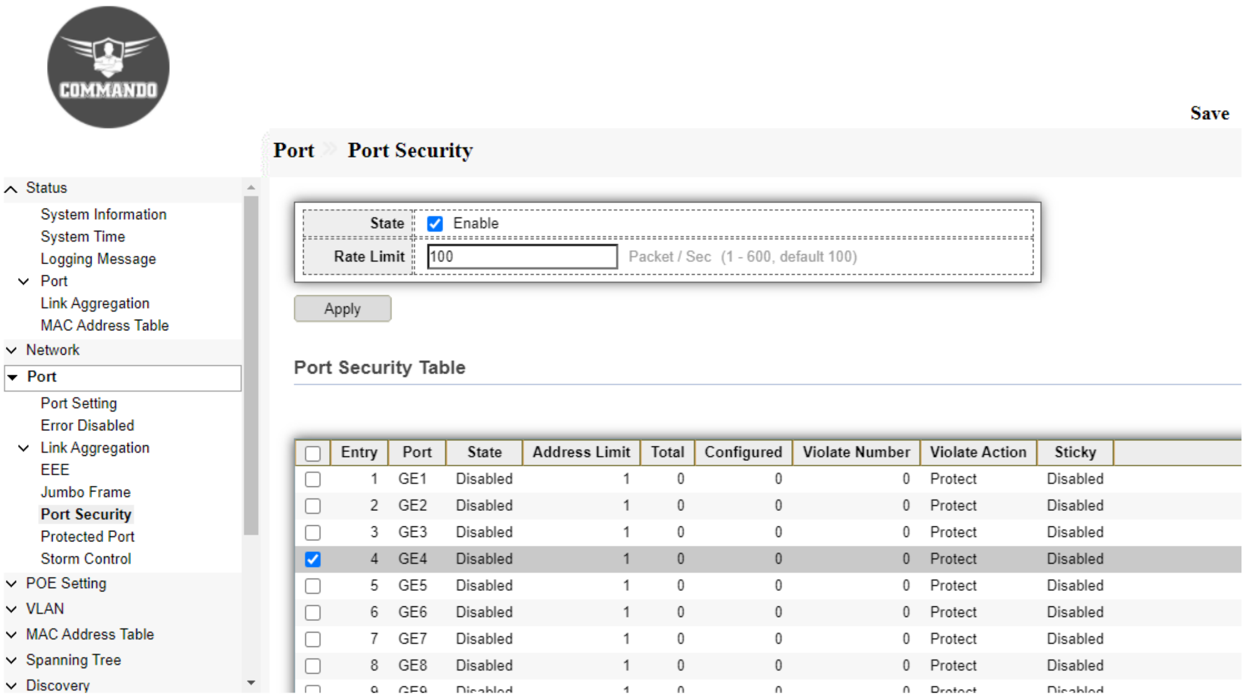
Port » Port Security

State	□ Enable
Rate Limit	100 Packet / Sec (1 - 600, default 100)

Port Security Table

□	Entry	Port	State	Address Limit	Total	Configured	Violate Number	Violate Action	Sticky
□	1	GE1	Disabled	1	0	0	0	Protect	Disabled
□	2	GE2	Disabled	1	0	0	0	Protect	Disabled
□	3	GE3	Disabled	1	0	0	0	Protect	Disabled
□	4	GE4	Disabled	1	0	0	0	Protect	Disabled
□	5	GE5	Disabled	1	0	0	0	Protect	Disabled
□	6	GE6	Disabled	1	0	0	0	Protect	Disabled
□	7	GE7	Disabled	1	0	0	0	Protect	Disabled
□	8	GE8	Disabled	1	0	0	0	Protect	Disabled
□	9	GE9	Disabled	1	0	0	0	Protect	Disabled

Fig 4.6.1 Default Port Security Table page



Port » Port Security

State	☑ Enable
Rate Limit	100 Packet / Sec (1 - 600, default 100)

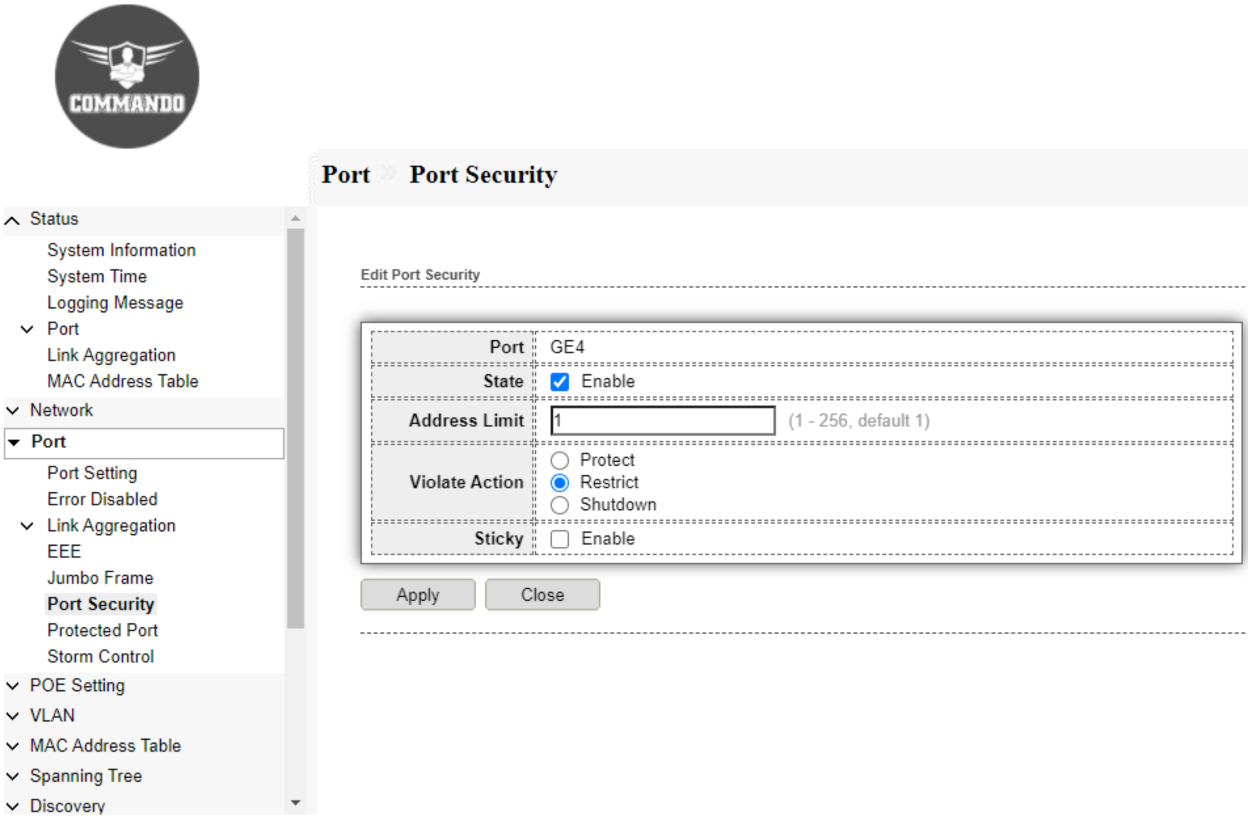
Port Security Table

□	Entry	Port	State	Address Limit	Total	Configured	Violate Number	Violate Action	Sticky
□	1	GE1	Disabled	1	0	0	0	Protect	Disabled
□	2	GE2	Disabled	1	0	0	0	Protect	Disabled
□	3	GE3	Disabled	1	0	0	0	Protect	Disabled
☑	4	GE4	Disabled	1	0	0	0	Protect	Disabled
□	5	GE5	Disabled	1	0	0	0	Protect	Disabled
□	6	GE6	Disabled	1	0	0	0	Protect	Disabled
□	7	GE7	Disabled	1	0	0	0	Protect	Disabled
□	8	GE8	Disabled	1	0	0	0	Protect	Disabled
□	9	GE9	Disabled	1	0	0	0	Protect	Disabled

Fig 4.6.2 Selecting Port Security GE4 page

Port Security Configuration:

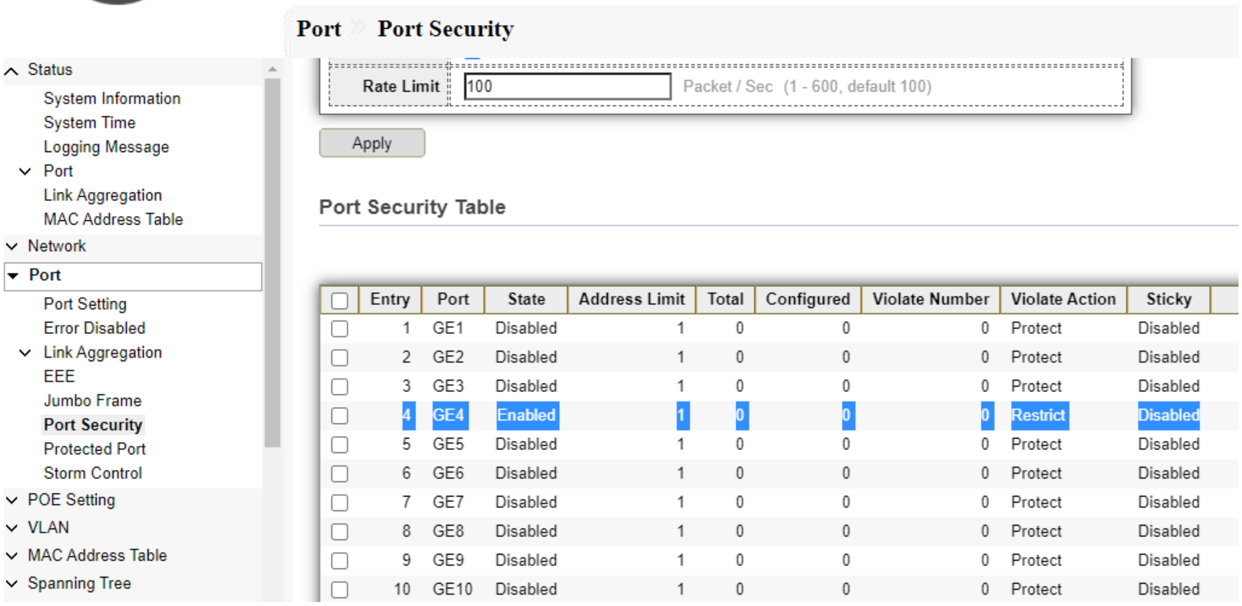
Click on “Port Security” from menu, then Select Port number from Table click on “Edit”. Then Select/Deselect “State” to enable/Disable, Select the Violet Action “Protect or Restrict or Shutdown”, Select\Deselect “Sticky” option & Click on “Apply”.



Edit Port Security

Port	GE4
State	☑ Enable
Address Limit	1 (1 - 256, default 1)
Violate Action	○ Protect ● Restrict ○ Shutdown
Sticky	□ Enable

Fig 4.6.3 Edit Port security for GE4 interface page



Port » Port Security

Rate Limit: 100 Packet / Sec (1 - 600, default 100)

Port Security Table

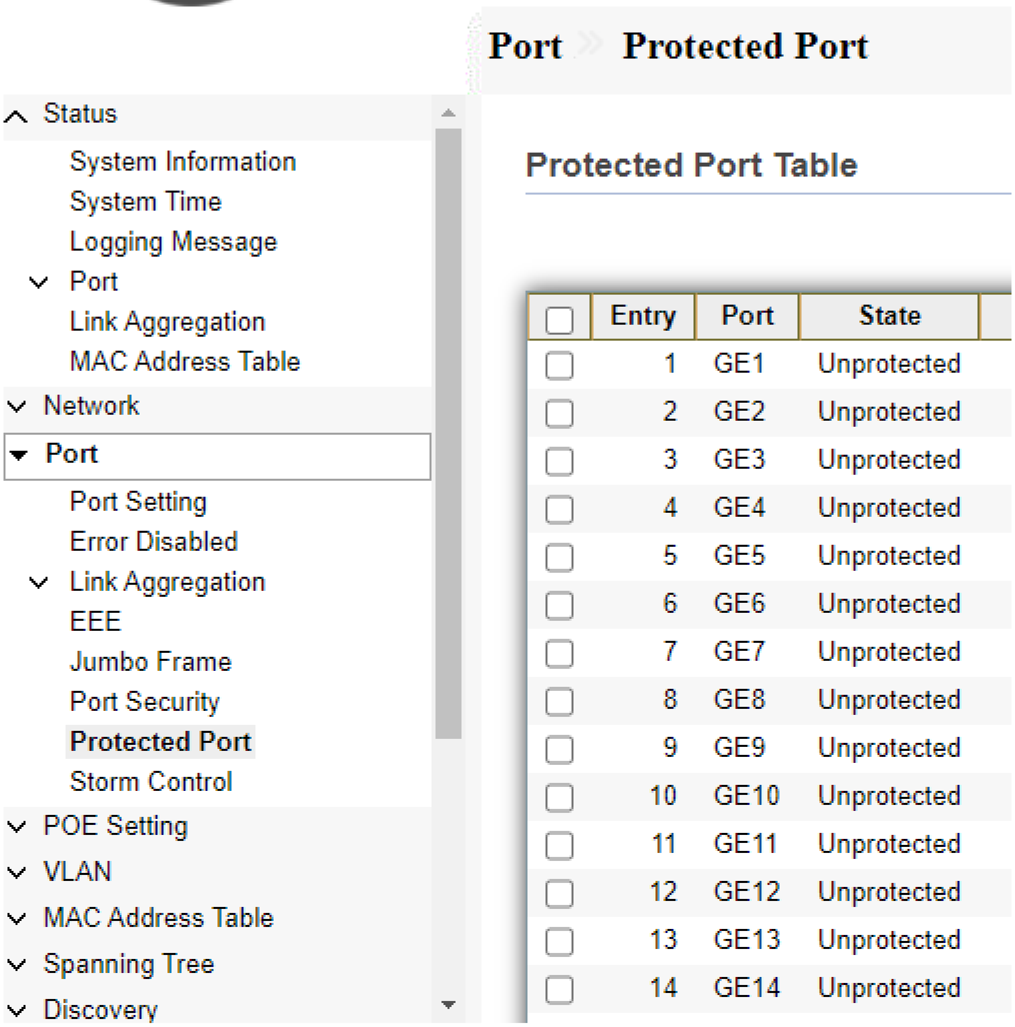
□	Entry	Port	State	Address Limit	Total	Configured	Violate Number	Violate Action	Sticky
□	1	GE1	Disabled	1	0	0	0	Protect	Disabled
□	2	GE2	Disabled	1	0	0	0	Protect	Disabled
□	3	GE3	Disabled	1	0	0	0	Protect	Disabled
□	4	GE4	Enabled	1	0	0	0	Restrict	Disabled
□	5	GE5	Disabled	1	0	0	0	Protect	Disabled
□	6	GE6	Disabled	1	0	0	0	Protect	Disabled
□	7	GE7	Disabled	1	0	0	0	Protect	Disabled
□	8	GE8	Disabled	1	0	0	0	Protect	Disabled
□	9	GE9	Disabled	1	0	0	0	Protect	Disabled
□	10	GE10	Disabled	1	0	0	0	Protect	Disabled

Fig 4.6.4 Port security for GE4 port interface page

4.7 Protected Port

Protected Ports provide Layer 2 isolation between interfaces ports and LAGs that share the same VLAN. Packets received from protected ports can be forwarded only to unprotected egress ports. Port protection is not subject to VLAN membership. Devices connected to protected ports are not allowed to communicate with each other, even if they are members of the same VLAN.

This shows Protected Port function to make port to be protected. Protected port is only allowed to communicate with unprotected port. In other words, protected port is not allowed to communicate with another protected port. To Configure Protected Port, click **Security >> Protected Port.**

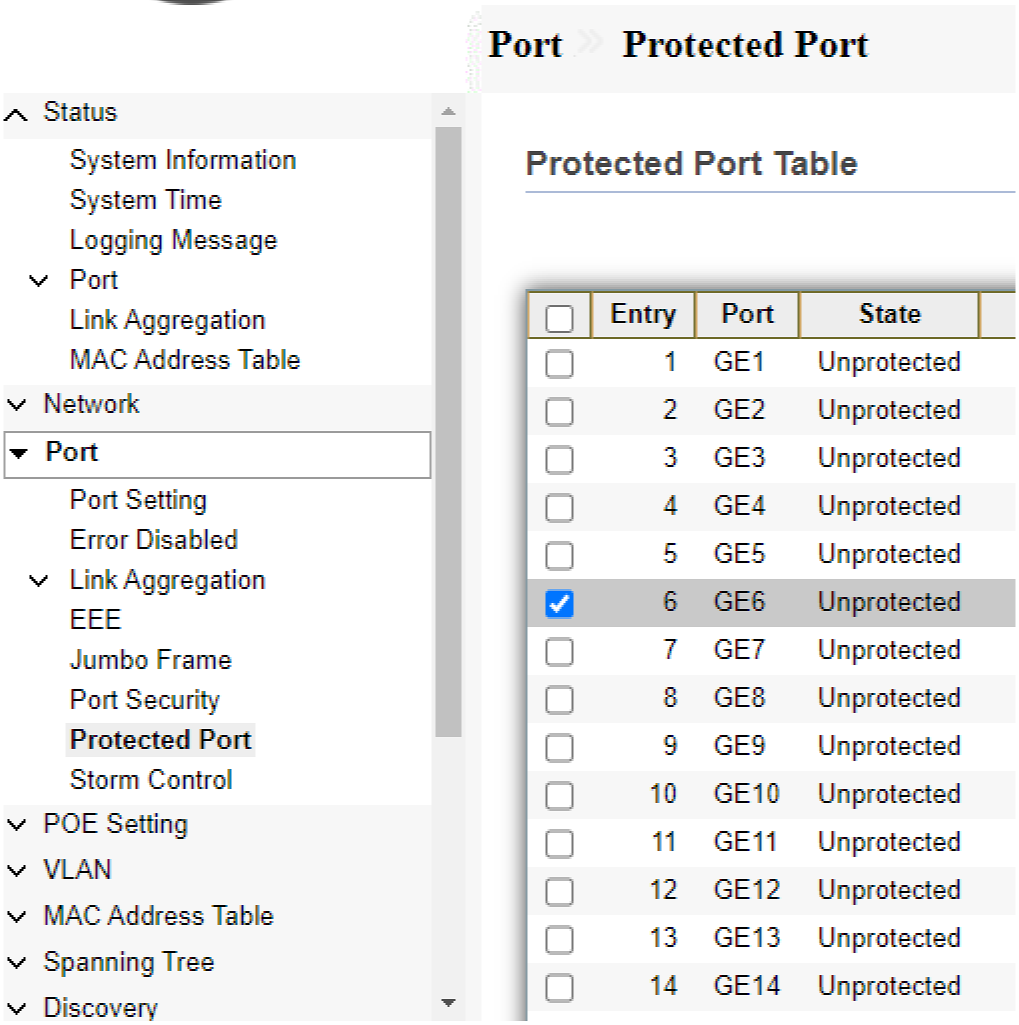


Port » Protected Port

Protected Port Table

□	Entry	Port	State
□	1	GE1	Unprotected
□	2	GE2	Unprotected
□	3	GE3	Unprotected
□	4	GE4	Unprotected
□	5	GE5	Unprotected
□	6	GE6	Unprotected
□	7	GE7	Unprotected
□	8	GE8	Unprotected
□	9	GE9	Unprotected
□	10	GE10	Unprotected
□	11	GE11	Unprotected
□	12	GE12	Unprotected
□	13	GE13	Unprotected
□	14	GE14	Unprotected

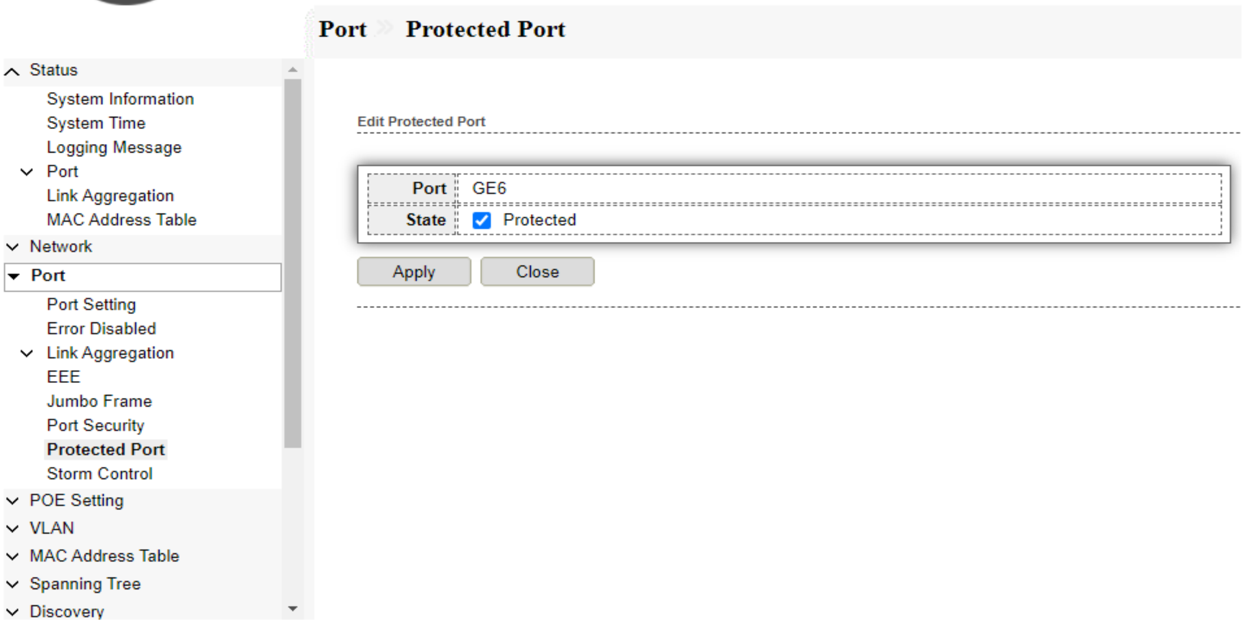
Fig 4.7.1 Protected Port Table page



Protected Port Table

☐	Entry	Port	State
☐	1	GE1	Unprotected
☐	2	GE2	Unprotected
☐	3	GE3	Unprotected
☐	4	GE4	Unprotected
☐	5	GE5	Unprotected
☑	6	GE6	Unprotected
☐	7	GE7	Unprotected
☐	8	GE8	Unprotected
☐	9	GE9	Unprotected
☐	10	GE10	Unprotected
☐	11	GE11	Unprotected
☐	12	GE12	Unprotected
☐	13	GE13	Unprotected
☐	14	GE14	Unprotected

Fig 4.7.2 Selection of GE6 port for Protected page

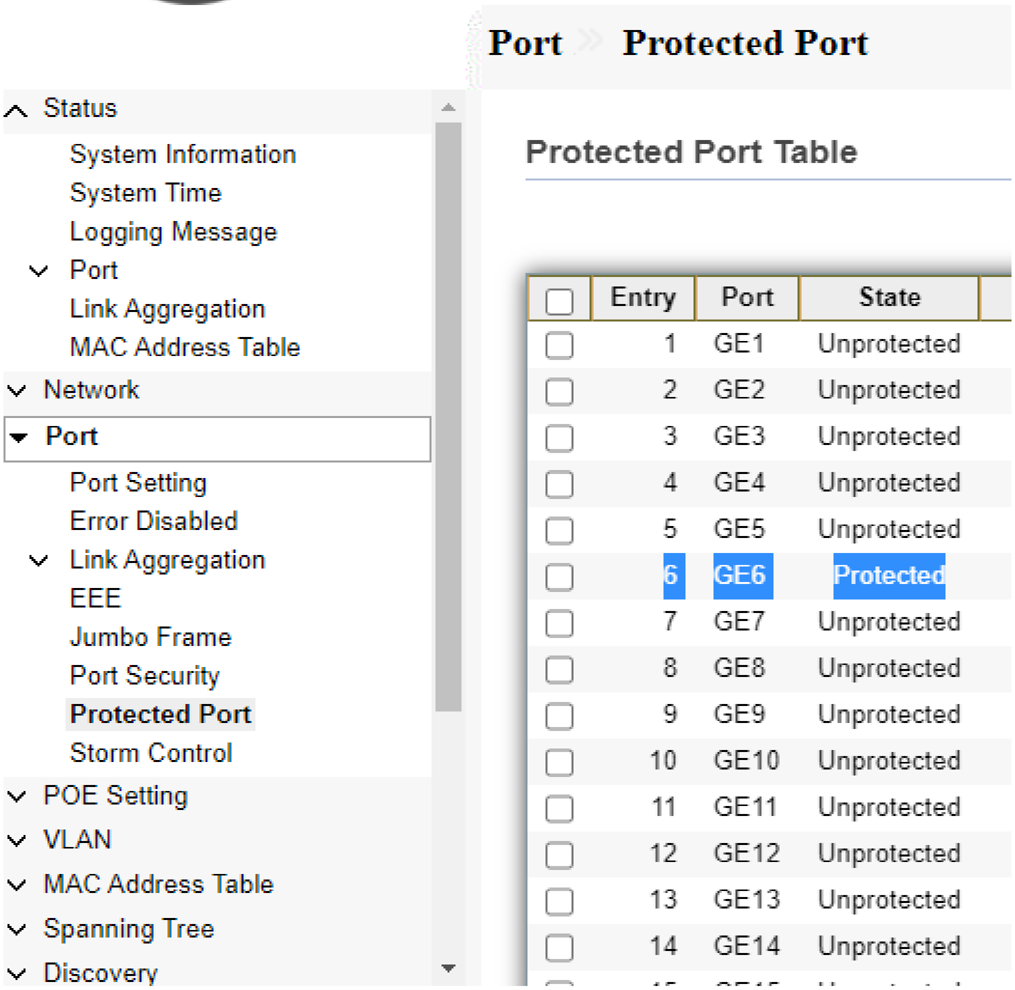


Port » Protected Port

Edit Protected Port

Port	GE6
State	☑ Protected

Fig 4.7.3 Enable GE6 port for Protected Port configuration page



Port » Protected Port

Protected Port Table

□	Entry	Port	State
□	1	GE1	Unprotected
□	2	GE2	Unprotected
□	3	GE3	Unprotected
□	4	GE4	Unprotected
□	5	GE5	Unprotected
□	6	GE6	Protected
□	7	GE7	Unprotected
□	8	GE8	Unprotected
□	9	GE9	Unprotected
□	10	GE10	Unprotected
□	11	GE11	Unprotected
□	12	GE12	Unprotected
□	13	GE13	Unprotected
□	14	GE14	Unprotected

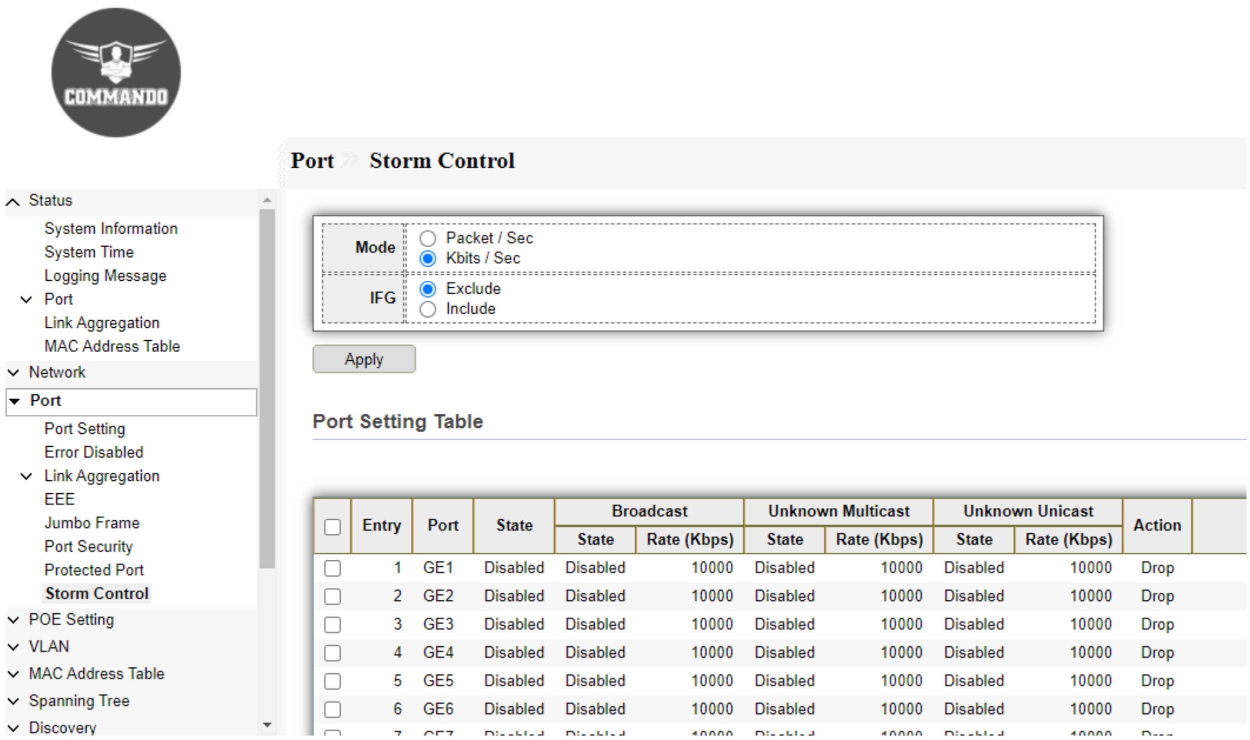
Fig 4.7.4 Protected Port Table after enabling GE1 page

4.8 Storm Control

When Broadcast, Multicast, or Unknown Unicast frames are received, they are duplicated, and a copy is sent to all possible egress ports. This means that in practice they are sent to all ports belonging to the relevant VLAN. In this way, one ingress frame is turned into many, creating the potential for a traffic storm.

Storm protection enables you to limit the number of frames entering the device and to define the types of frames that are counted towards this limit. By default, storm control is disabled. Broadcast storm control is a feature in which the switch intentionally ceases to forward all broadcast traffic if the bandwidth consumed by incoming broadcast frames exceeds a designated threshold.

If a particular type of ingress traffic (unicast, broadcast and multicast) is more than the rising threshold configured on a switch, the interface goes to blocked state for that particular traffic. Storm control prevents traffic on a LAN from being disrupted by a broadcast, multicast, or unicast storm on a port. To configure Storm Control global setting, click **Security >> Storm Control.**



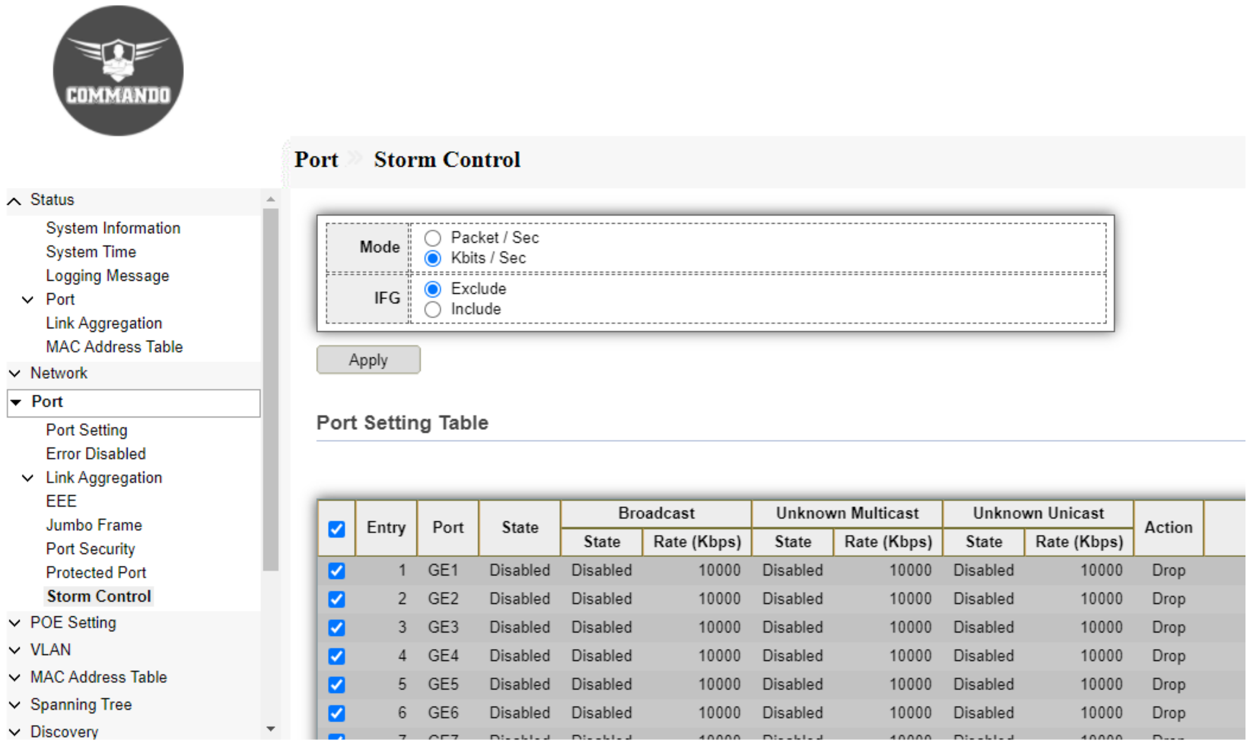
Port » **Storm Control**

Mode	○ Packet / Sec ● Kbits / Sec
IFG	● Exclude ○ Include

Port Setting Table

□	Entry	Port	State	Broadcast		Unknown Multicast		Unknown Unicast		Action
				State	Rate (Kbps)	State	Rate (Kbps)	State	Rate (Kbps)	
□	1	GE1	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
□	2	GE2	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
□	3	GE3	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
□	4	GE4	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
□	5	GE5	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
□	6	GE6	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
□	7	GE7	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop

Fig 4.8.1 Default Storm control port setting table page



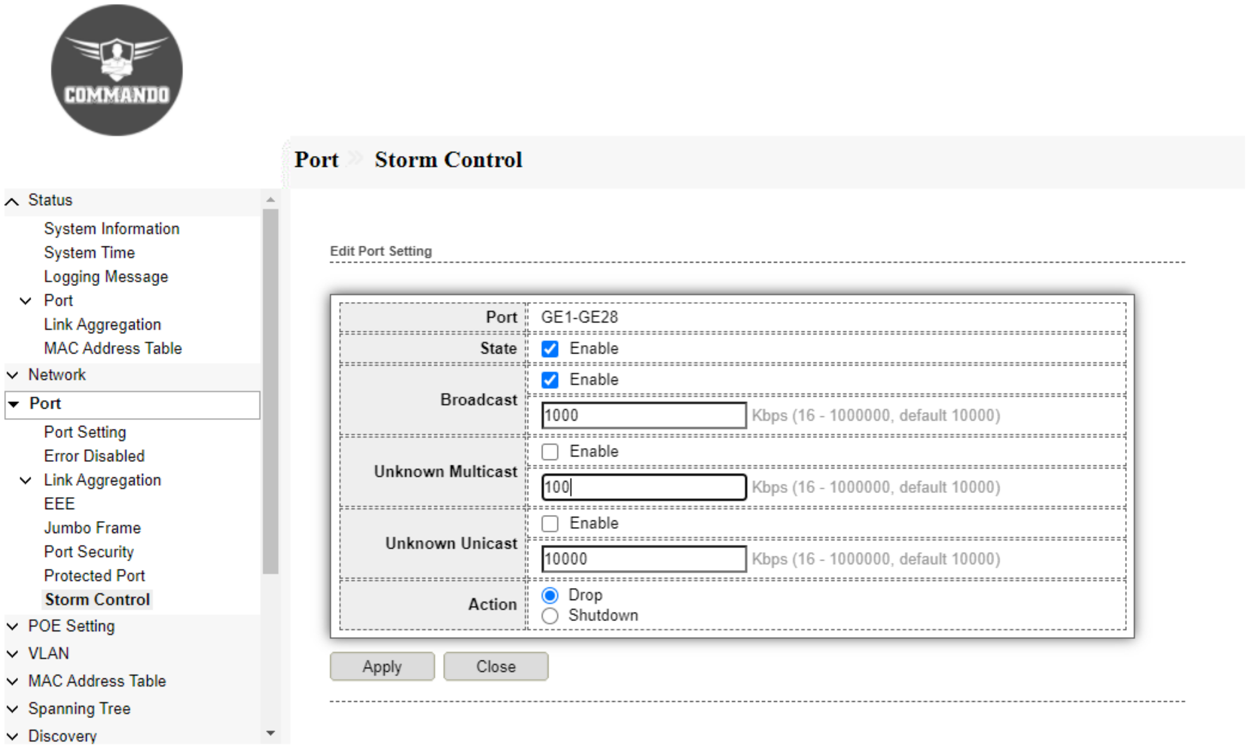
Port » Storm Control

Mode	○ Packet / Sec ● Kbits / Sec
IFG	● Exclude ○ Include

Port Setting Table

☑	Entry	Port	State	Broadcast		Unknown Multicast		Unknown Unicast		Action
				State	Rate (Kbps)	State	Rate (Kbps)	State	Rate (Kbps)	
☑	1	GE1	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
☑	2	GE2	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
☑	3	GE3	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
☑	4	GE4	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
☑	5	GE5	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
☑	6	GE6	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop
☑	7	GE7	Disabled	Disabled	10000	Disabled	10000	Disabled	10000	Drop

Fig 4.8.2 Storm control Selecting port setting page

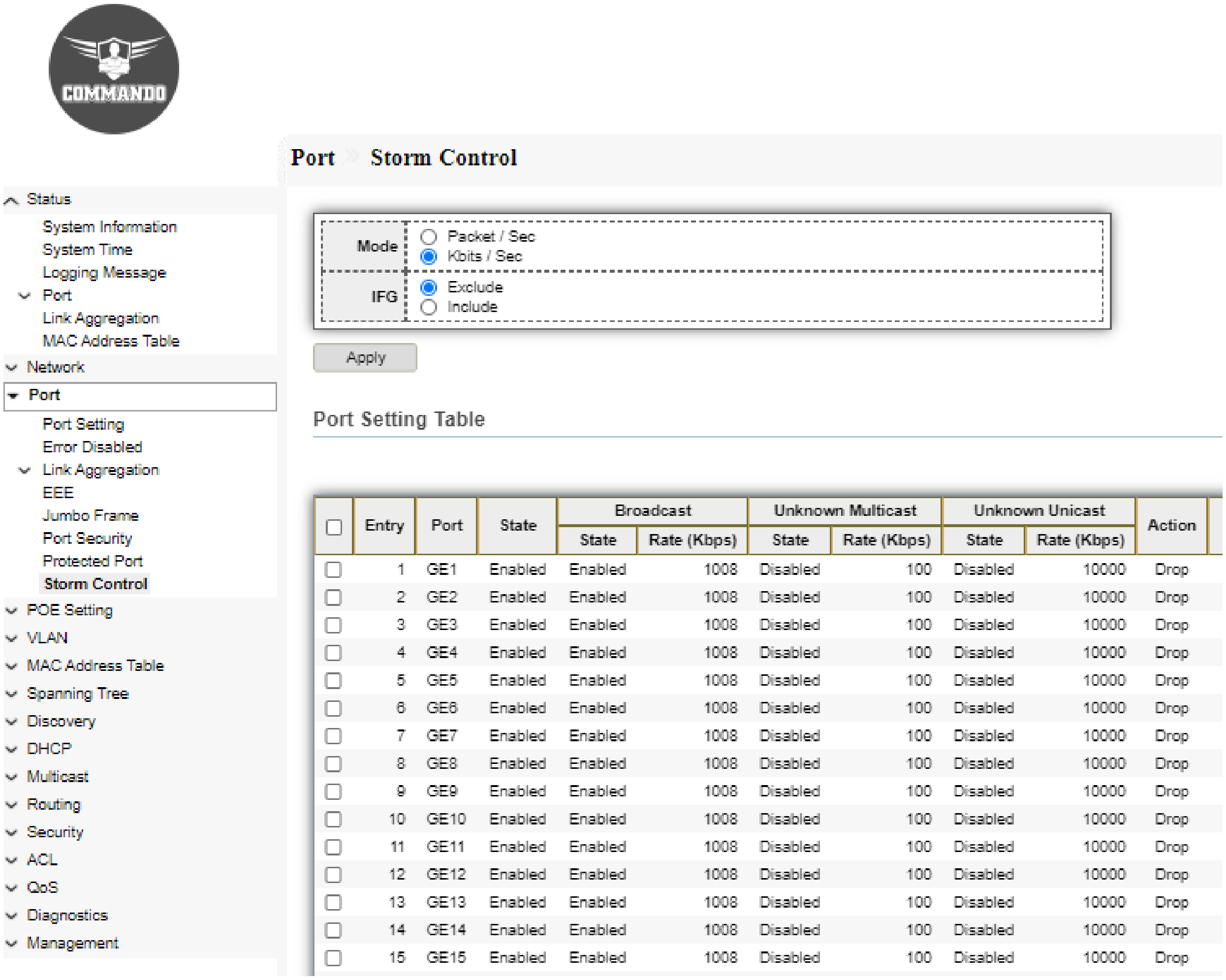


Port » Storm Control

Edit Port Setting

Port	GE1-GE28
State	☑ Enable
Broadcast	☑ Enable 1000 Kbps (16 - 1000000, default 10000)
Unknown Multicast	□ Enable 100 Kbps (16 - 1000000, default 10000)
Unknown Unicast	□ Enable 10000 Kbps (16 - 1000000, default 10000)
Action	● Drop ○ Shutdown

Fig 4.8.3 Storm control Edit port setting page



Port » Storm Control

Mode	○ Packet / Sec ● Kbits / Sec
IFG	● Exclude ○ Include

Port Setting Table

□	Entry	Port	State	Broadcast		Unknown Multicast		Unknown Unicast		Action
				State	Rate (Kbps)	State	Rate (Kbps)	State	Rate (Kbps)	
□	1	GE1	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	2	GE2	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	3	GE3	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	4	GE4	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	5	GE5	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	6	GE6	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	7	GE7	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	8	GE8	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	9	GE9	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	10	GE10	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	11	GE11	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	12	GE12	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	13	GE13	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	14	GE14	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop
□	15	GE15	Enabled	Enabled	1008	Disabled	100	Disabled	10000	Drop

Fig 4.8.4 Storm control port setting selection page

Chapter 5 VLAN

VLAN: A VLAN is simply an administratively defined subset of switch ports that are in the same broadcast domain.

Create VLAN: You can create a VLANs. Each VLAN must be configured with a unique VID (VLAN ID) with a value from 2 to 4094.

VLAN Configuration: VLAN configuration lets you assign ports on the switch to a VLAN with an ID number in the range of 1–4094. By default, all ports are members of VLAN 1.

Membership: After you create a new VLAN ID, use the VLAN membership option to add ports to the VLAN.

Port Setting: For setting ports for mode like Hybrid, Access, Trunk, Tunnel and PVID (1-4094).

Voice VLAN: The voice VLAN feature can help ensure that the sound quality of an IP phone is safeguarded from deteriorating when the data traffic on the port is high.

Property: You can select one VLAN as the voice VLAN, select the Class of Service (CoS) for voice traffic, and enable or disable the voice VLAN for specific ports that carry traffic from IP phones.

Voice OUI: Automatic assignment of traffic to Voice VLAN is done using the Organizationally Unique Identifier (OUI) MAC Address. The first three bytes in a MAC address contain the manufacturer ID (Organizationally Unique Identifiers - OUI) and the last three bytes contain a unique station ID.

Protocol VLAN: A protocol based VLAN processes traffic based on protocol. You can use a protocol based VLAN to define filtering criteria for untagged packets. If you do not change the port configuration or configure a protocol based VLAN, the switch assigns untagged packets to VLAN 1.

Protocol Group: 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 the VLAN that is configured in the Protocol-Based Groups page.

Group Binding: To add group binding for available ports after selection to particular VLAN for a specific group ID.

MAC VLAN: You define a MAC to VLAN mapping by configuring an entry in the MAC to VLAN table. An entry is specified using a source MAC address and the appropriate VLAN ID. The MAC to VLAN configurations are shared across all ports of the device

MAC Group: When a frame is received from a VLAN that is configured to forward, based on MAC group addresses

Group Binding--> Group Id can map the MAC addresses.

Surveillance VLAN: Surveillance VLAN function ensures the quality of real-time video for monitoring and control without compromising the transmission of conventional network data. This is a special feature of C3000 series Switches.

Property -->VLAN configuration for CCTV is very important to protect the IP cameras against unauthorized access and to separate the security camera system from other computers and devices that are connected to the IP network.

Surveillance OUI: IP surveillance cameras of multiple manufacture having different OUI. You can add a specific manufacturer with the OUI. Surveillance cameras will transmit their data on a Surveillance VLAN.

GVRP: The GVRP page displays information regarding GARP VLAN Registration Protocol (GVRP) frames that were sent or received from a port. GVRP is a standards-based Layer 2 network protocol, for automatic configuration of VLAN information on switches.

Property--> GARP VLAN Registration Protocol (GVRP) is required for automatic distribution of VLAN membership information among VLAN-aware bridges. GVRP helps VLAN-aware bridges to automatically learn VLANs to bridge ports mapping. Individual configuration of each switch and VLAN membership registration is not required.

Membership--> GVRP-compliant switches use GARP to register and de-register attribute values, such as VLAN IDs, with each other.

Statistics--> This page shows information for VLAN Configuration like VLAN creation, to assign VLAN Membership, assign per port VLAN configurations.

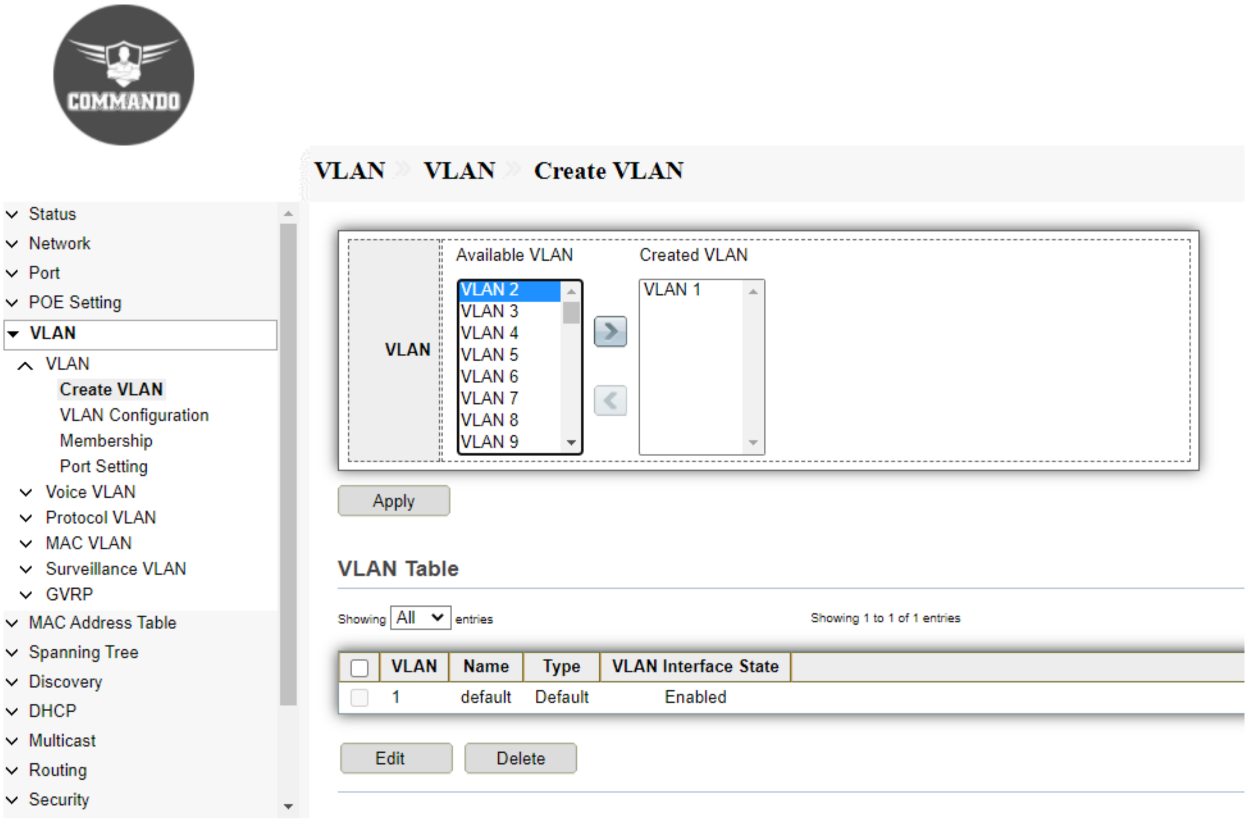
5.1 VLAN

VLAN (Virtual Local Area Network) logically divide one LAN (Local Area Network) into a plurality of subsets, and each subset will form their own broadcast area network. In short, VLAN is a communication technology that logically divide one physical LAN into multiple broadcast area network (multiple VLAN). Hosts within a VLAN can communicate directly but VLAN groups can not directly communicate with each other. So, it will limit the broadcast packets within a VLAN since it cannot directly access between VLAN groups, thus it improves network security.

5.1.1 Create VLAN

This page allows user to add or delete VLAN ID entries. Each VLAN entry has a unique name, user can edit VLAN name in edit page.

To Create VLAN, click **VLAN >> VLAN >> Create VLAN**



VLAN Table

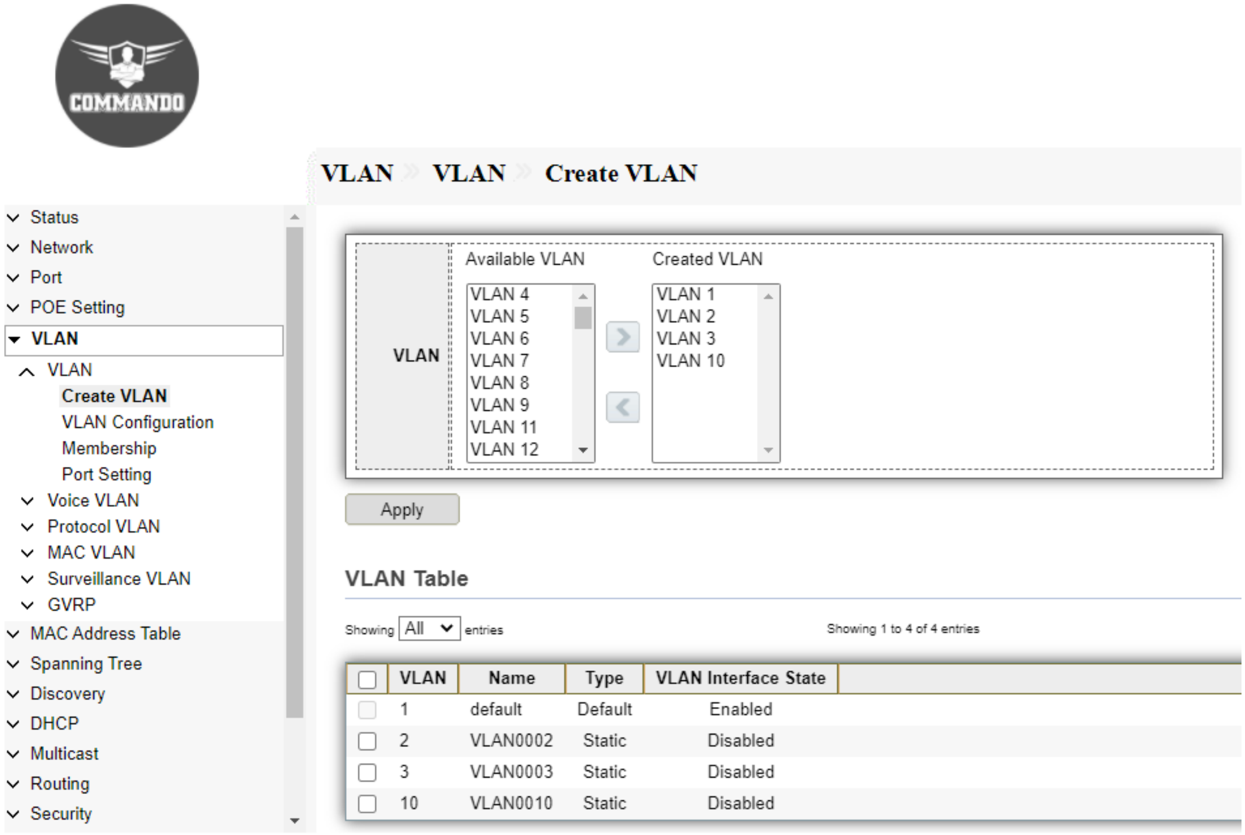
Showing All entries   Showing 1 to 1 of 1 entries

☐	VLAN	Name	Type	VLAN Interface State
☐	1	default	Default	Enabled

Fig 5.1.1 Create VLAN Default Page

VLAN Creation:

- Click on “Create VLAN” from menu, select the “Available VLAN” from the list, then Press “>” button & select required VLAN click on “Apply”.
- To change default name of VLAN, Select the VLAN ID & click on “Edit “from VLAN Table, Enter the Name for VLAN & Click on “Apply”.



Available VLAN: VLAN 4, VLAN 5, VLAN 6, VLAN 7, VLAN 8, VLAN 9, VLAN 11, VLAN 12

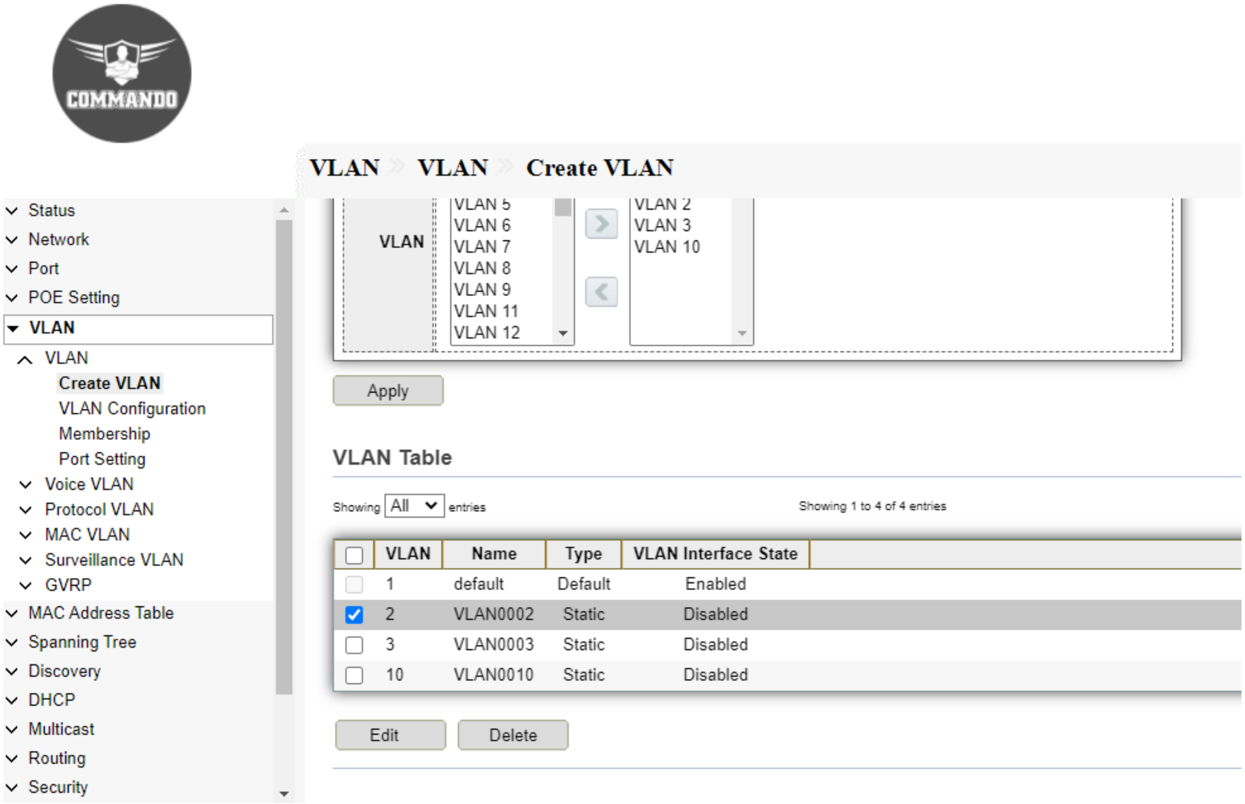
Created VLAN: VLAN 1, VLAN 2, VLAN 3, VLAN 10

Showing All entries

Showing 1 to 4 of 4 entries

□	VLAN	Name	Type	VLAN Interface State
□	1	default	Default	Enabled
□	2	VLAN0002	Static	Disabled
□	3	VLAN0003	Static	Disabled
□	10	VLAN0010	Static	Disabled

Fig 5.1.2 VLAN Page after VLAN creation

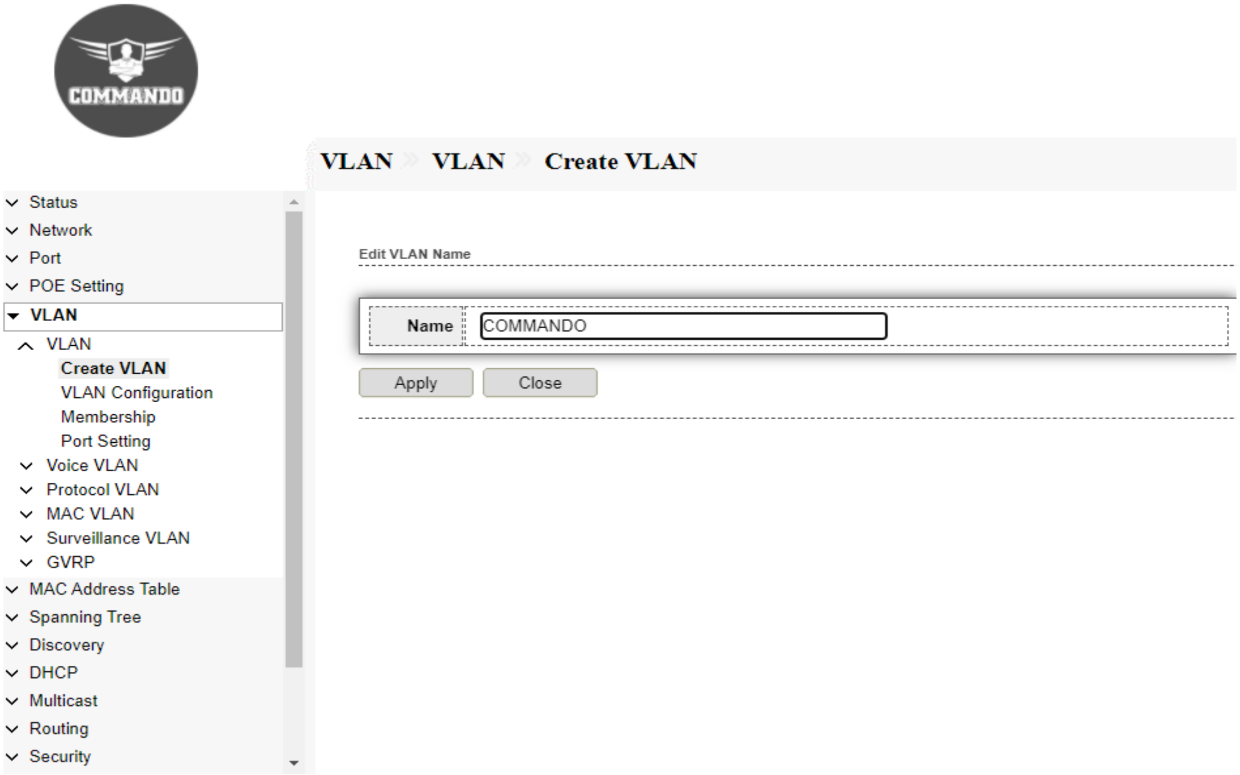


VLAN Table

Showing All entries Showing 1 to 4 of 4 entries

□	VLAN	Name	Type	VLAN Interface State
□	1	default	Default	Enabled
☑	2	VLAN0002	Static	Disabled
□	3	VLAN0003	Static	Disabled
□	10	VLAN0010	Static	Disabled

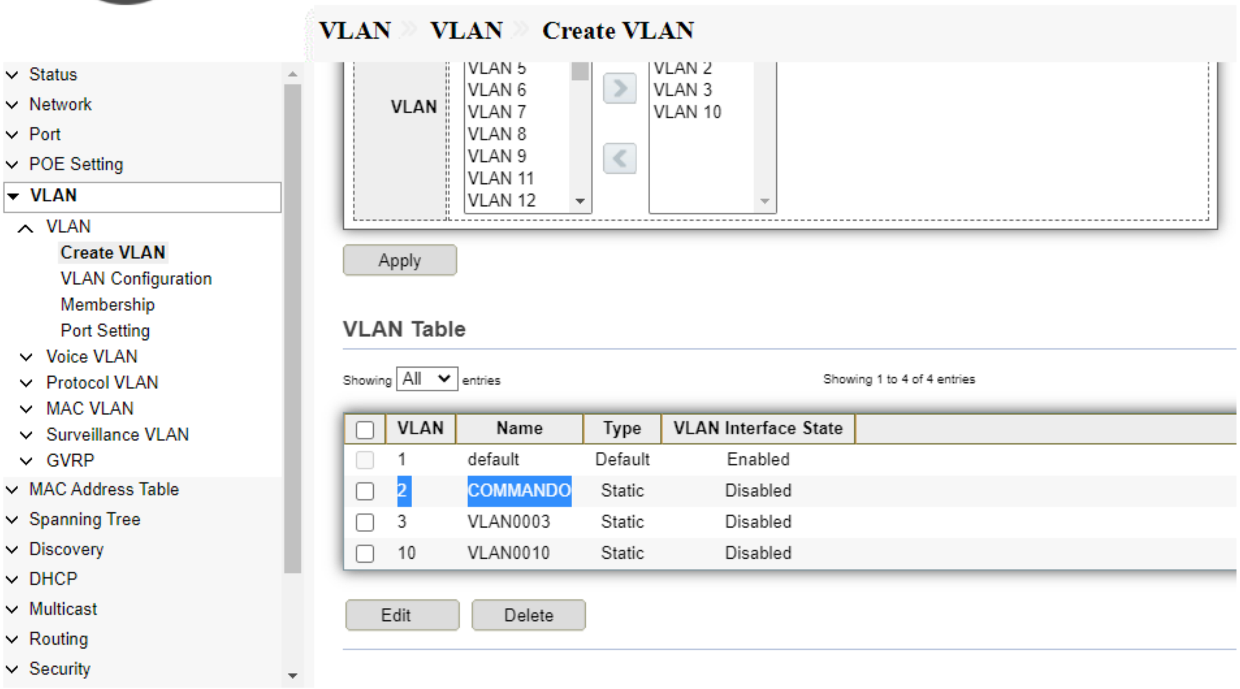
Fig 5.1.3 VLAN Default name after VLAN creation



Edit VLAN Name

Name: COMMANDO

Fig 5.1.4 Edit VLAN name after VLAN creation



VLAN Table

Showing All entries — Showing 1 to 4 of 4 entries

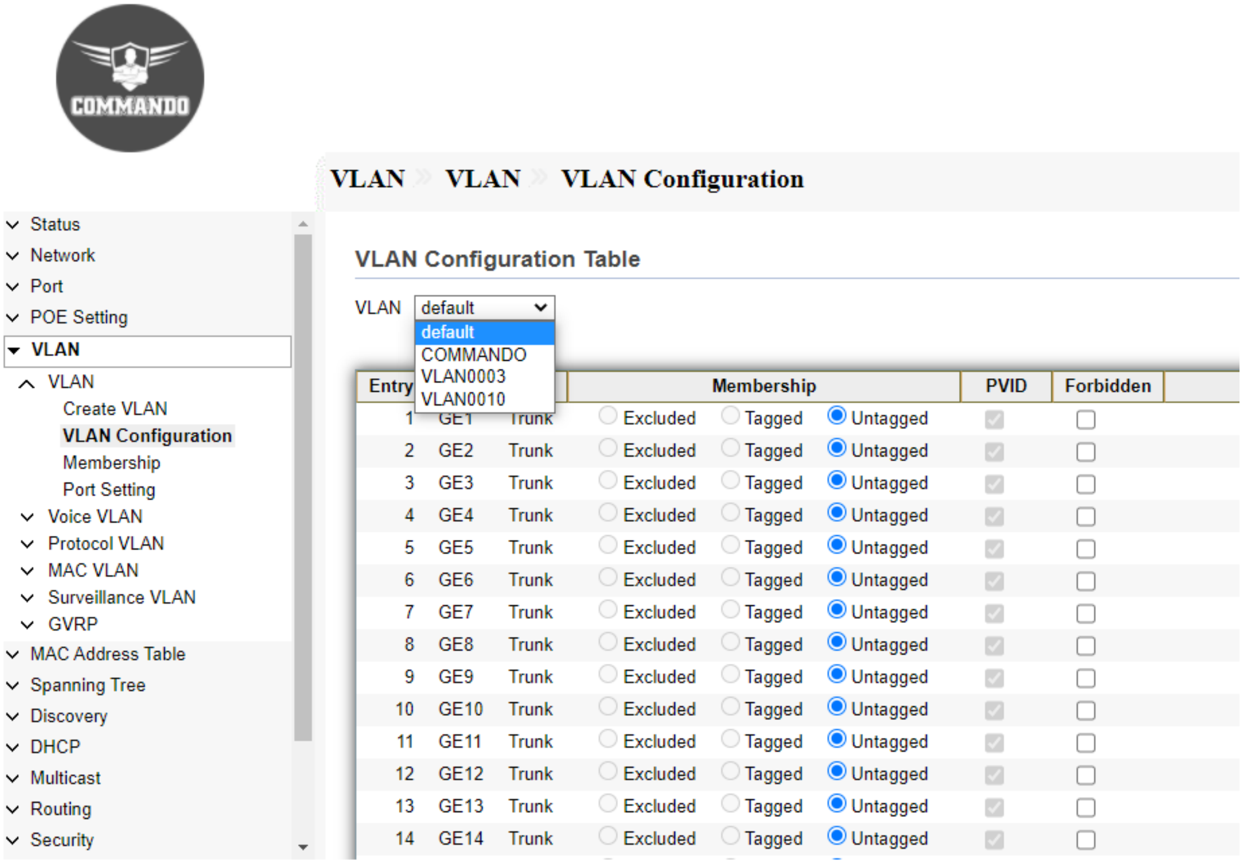
□	VLAN	Name	Type	VLAN Interface State
□	1	default	Default	Enabled
□	2	COMMANDO	Static	Disabled
□	3	VLAN0003	Static	Disabled
□	10	VLAN0010	Static	Disabled

Fig 5.1.5 VLAN Table after VLAN name change page

5.1.2 VLAN Configuration

This page allow user to configure the membership for each port of selected VLAN.

For VLAN Configuration, click **VLAN >> VLAN Configuration.** Click on “Create VLAN” from menu, Select “VLAN” name from Drop down & Select “Untagged” option on the Ports which required to add to the VLAN, then Click on “Apply”.



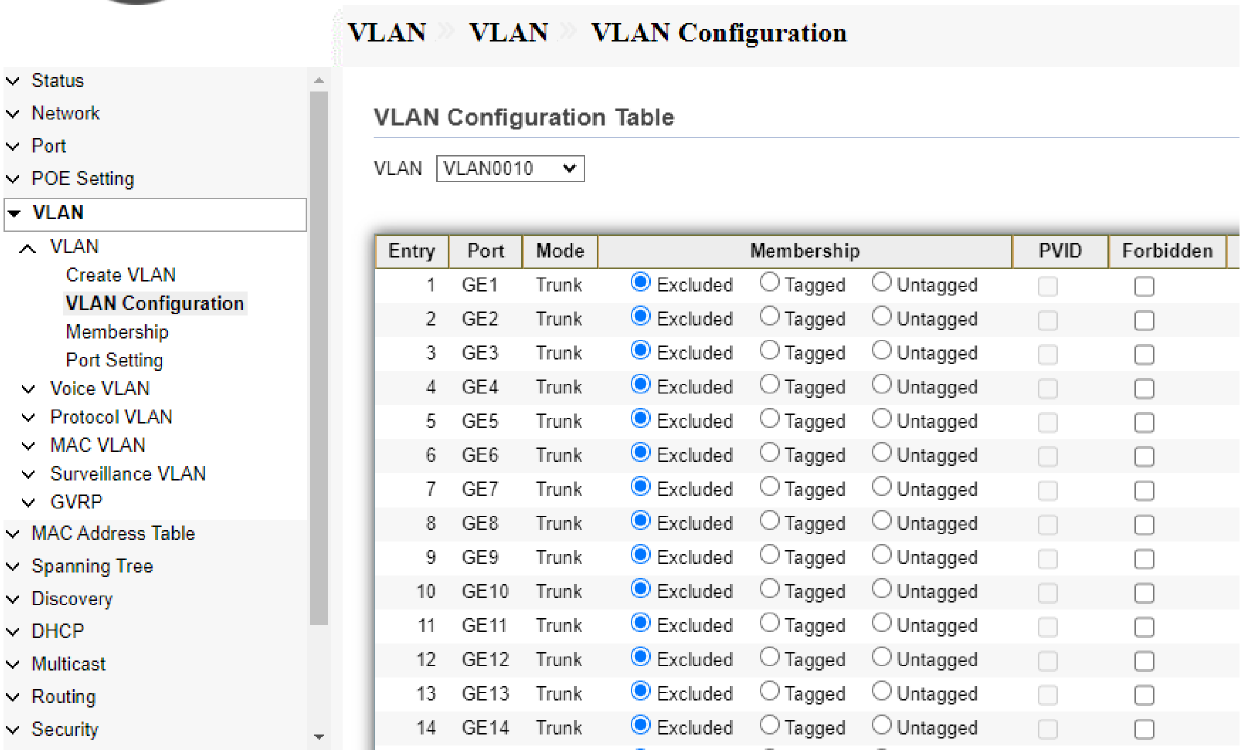
VLAN » VLAN » VLAN Configuration

VLAN Configuration Table

VLAN: default
- default
- COMMANDO
- VLAN0003
- VLAN0010

Entry			Membership			PVID	Forbidden
1	GE1	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
2	GE2	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
3	GE3	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
4	GE4	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
5	GE5	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
6	GE6	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
7	GE7	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
8	GE8	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
9	GE9	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
10	GE10	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
11	GE11	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
12	GE12	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
13	GE13	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□
14	GE14	Trunk	○ Excluded	○ Tagged	● Untagged	☑	□

Fig 5.1.6 VLAN configuration table page



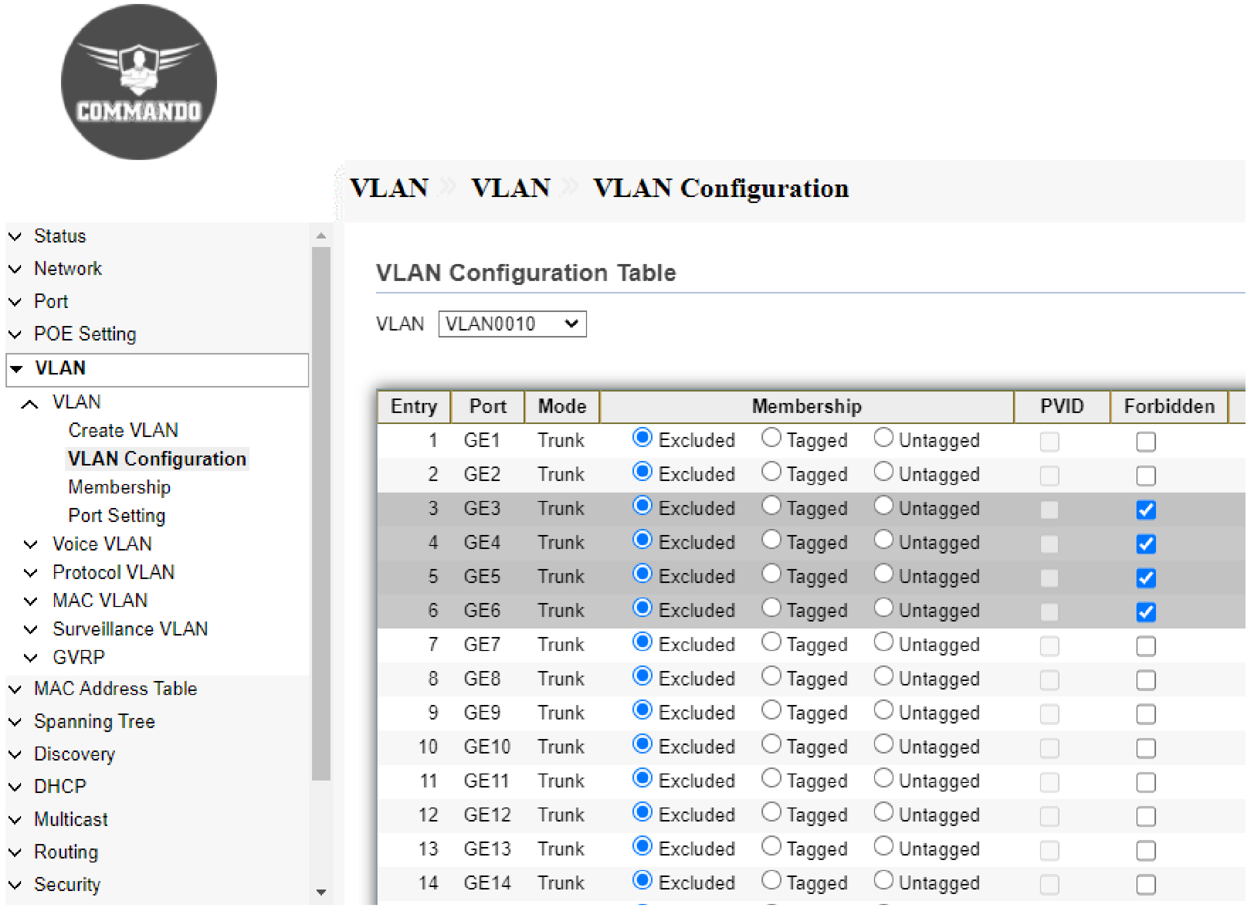
VLAN » VLAN » VLAN Configuration

VLAN Configuration Table

VLAN VLAN0010

Entry	Port	Mode	Membership			PVID	Forbidden
1	GE1	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
2	GE2	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
3	GE3	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
4	GE4	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
5	GE5	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
6	GE6	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
7	GE7	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
8	GE8	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
9	GE9	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
10	GE10	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
11	GE11	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
12	GE12	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
13	GE13	Trunk	● Excluded	○ Tagged	○ Untagged	□	□
14	GE14	Trunk	● Excluded	○ Tagged	○ Untagged	□	□

Fig 5.1.7 VLAN Selection tap on VLAN configuration table page



VLAN » VLAN » VLAN Configuration

VLAN Configuration Table

VLAN: VLAN0010

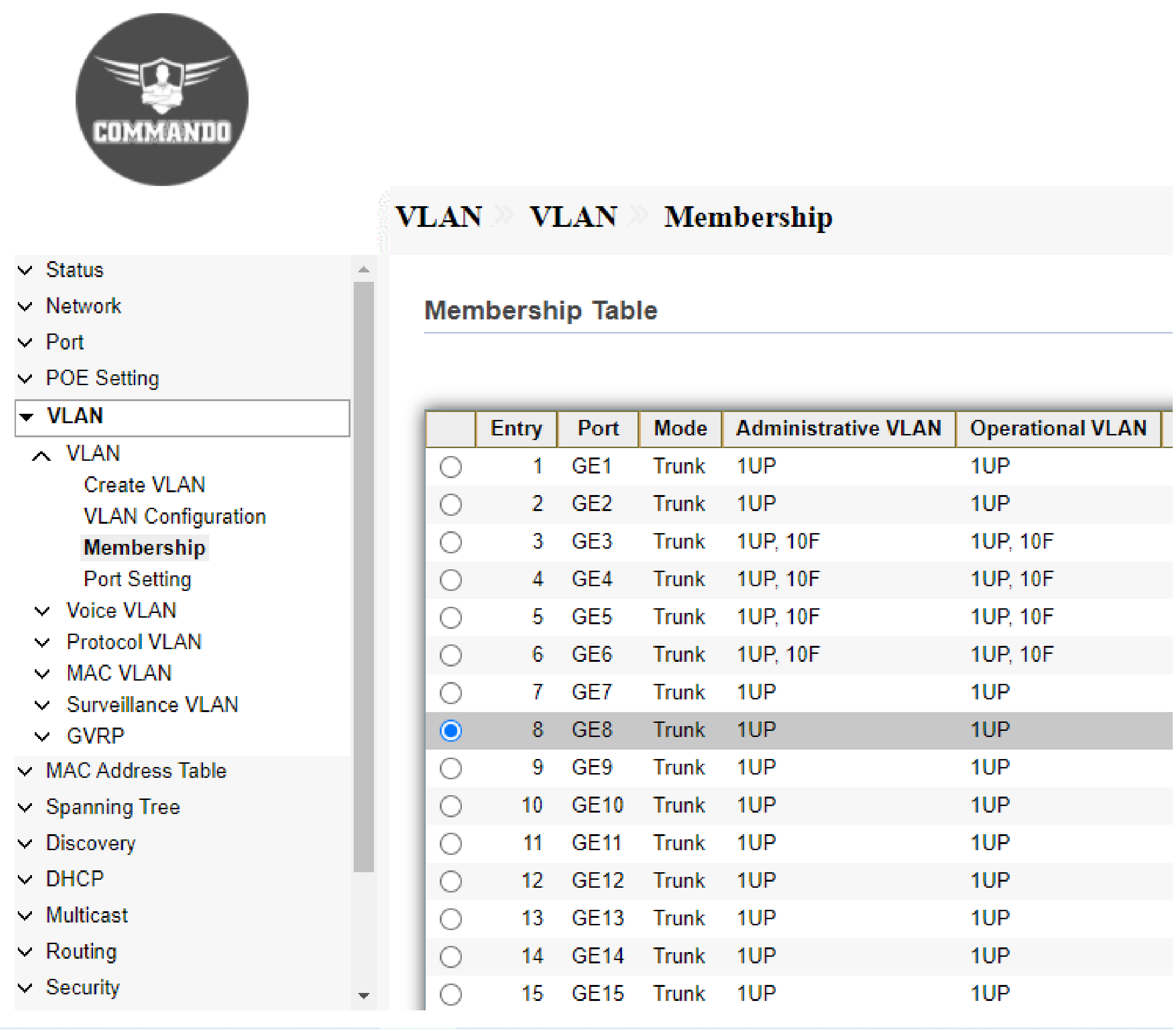
Entry	Port	Mode	Membership	PVID	Forbidden
1	GE1	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
2	GE2	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
3	GE3	Trunk	● Excluded ○ Tagged ○ Untagged	□	☑
4	GE4	Trunk	● Excluded ○ Tagged ○ Untagged	□	☑
5	GE5	Trunk	● Excluded ○ Tagged ○ Untagged	□	☑
6	GE6	Trunk	● Excluded ○ Tagged ○ Untagged	□	☑
7	GE7	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
8	GE8	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
9	GE9	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
10	GE10	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
11	GE11	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
12	GE12	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
13	GE13	Trunk	● Excluded ○ Tagged ○ Untagged	□	□
14	GE14	Trunk	● Excluded ○ Tagged ○ Untagged	□	□

Fig 5.1.8 VLAN configuration for Ports selection page

5.1.3 Membership

This page allow user to view membership information for each port and edit membership for specified interface.

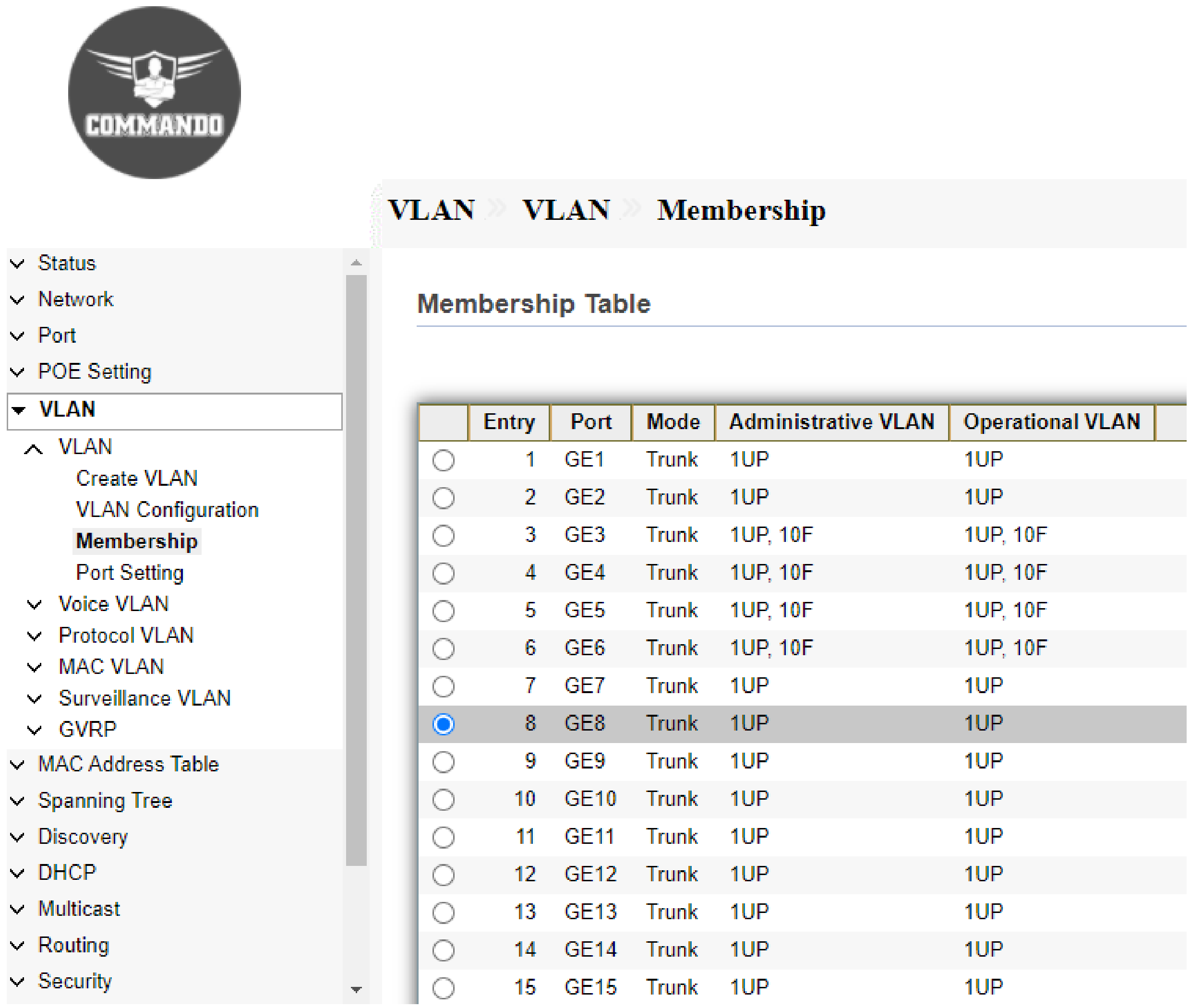
For VLAN Membership page, click **VLAN >> Membership**



Membership Table

	Entry	Port	Mode	Administrative VLAN	Operational VLAN
○	1	GE1	Trunk	1UP	1UP
○	2	GE2	Trunk	1UP	1UP
○	3	GE3	Trunk	1UP, 10F	1UP, 10F
○	4	GE4	Trunk	1UP, 10F	1UP, 10F
○	5	GE5	Trunk	1UP, 10F	1UP, 10F
○	6	GE6	Trunk	1UP, 10F	1UP, 10F
○	7	GE7	Trunk	1UP	1UP
●	8	GE8	Trunk	1UP	1UP
○	9	GE9	Trunk	1UP	1UP
○	10	GE10	Trunk	1UP	1UP
○	11	GE11	Trunk	1UP	1UP
○	12	GE12	Trunk	1UP	1UP
○	13	GE13	Trunk	1UP	1UP
○	14	GE14	Trunk	1UP	1UP
○	15	GE15	Trunk	1UP	1UP

Fig 5.1.9 VLAN Membership table age

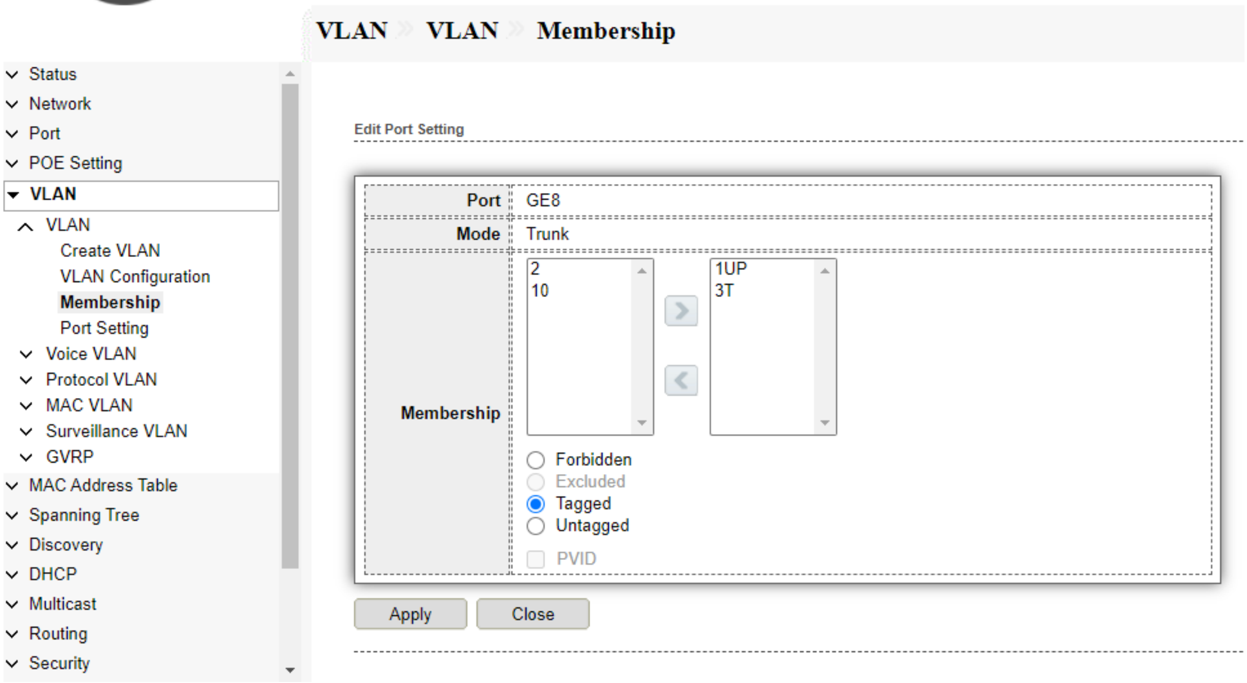


VLAN » VLAN » Membership

Membership Table

	Entry	Port	Mode	Administrative VLAN	Operational VLAN
○	1	GE1	Trunk	1UP	1UP
○	2	GE2	Trunk	1UP	1UP
○	3	GE3	Trunk	1UP, 10F	1UP, 10F
○	4	GE4	Trunk	1UP, 10F	1UP, 10F
○	5	GE5	Trunk	1UP, 10F	1UP, 10F
○	6	GE6	Trunk	1UP, 10F	1UP, 10F
○	7	GE7	Trunk	1UP	1UP
●	8	GE8	Trunk	1UP	1UP
○	9	GE9	Trunk	1UP	1UP
○	10	GE10	Trunk	1UP	1UP
○	11	GE11	Trunk	1UP	1UP
○	12	GE12	Trunk	1UP	1UP
○	13	GE13	Trunk	1UP	1UP
○	14	GE14	Trunk	1UP	1UP
○	15	GE15	Trunk	1UP	1UP

Fig 5.1.10 VLAN membership to be changed for selected port GE8 page

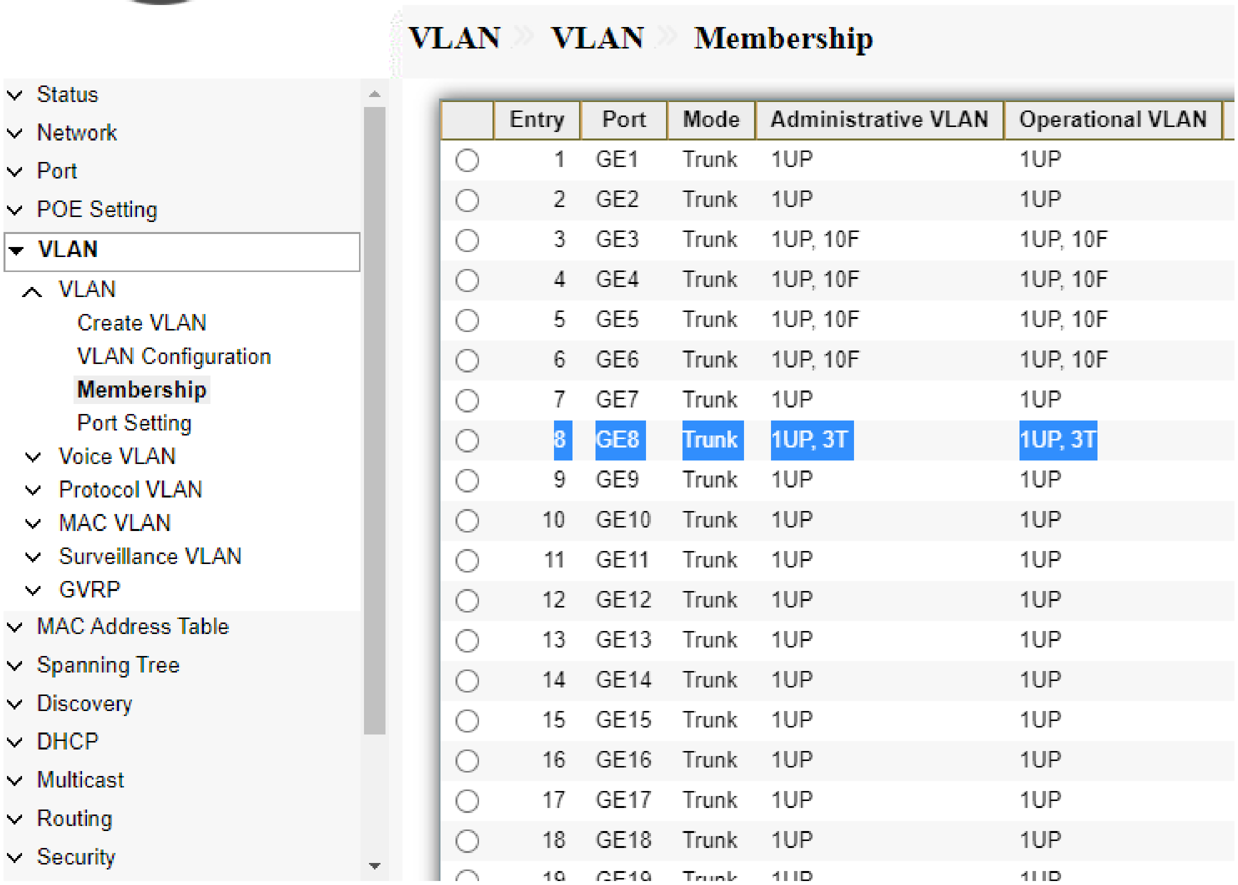


VLAN » VLAN » Membership

Edit Port Setting

Port	GE8
Mode	Trunk
Membership	2 10 1UP 3T ○ Forbidden ○ Excluded ● Tagged ○ Untagged □ PVID

Fig 5.1.11 Edit VLAN membership for selected port GE8 page



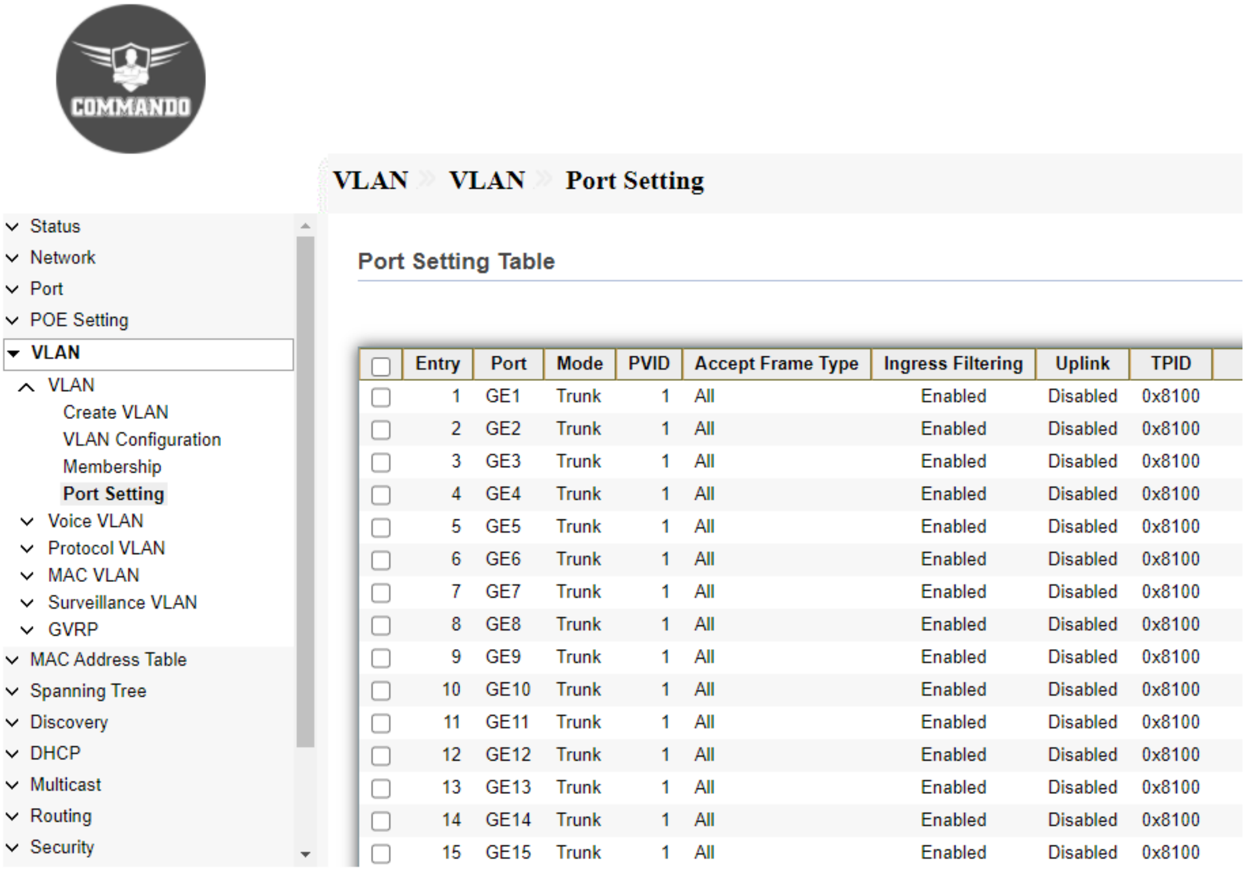
	Entry	Port	Mode	Administrative VLAN	Operational VLAN
○	1	GE1	Trunk	1UP	1UP
○	2	GE2	Trunk	1UP	1UP
○	3	GE3	Trunk	1UP, 10F	1UP, 10F
○	4	GE4	Trunk	1UP, 10F	1UP, 10F
○	5	GE5	Trunk	1UP, 10F	1UP, 10F
○	6	GE6	Trunk	1UP, 10F	1UP, 10F
○	7	GE7	Trunk	1UP	1UP
○	8	GE8	Trunk	1UP, 3T	1UP, 3T
○	9	GE9	Trunk	1UP	1UP
○	10	GE10	Trunk	1UP	1UP
○	11	GE11	Trunk	1UP	1UP
○	12	GE12	Trunk	1UP	1UP
○	13	GE13	Trunk	1UP	1UP
○	14	GE14	Trunk	1UP	1UP
○	15	GE15	Trunk	1UP	1UP
○	16	GE16	Trunk	1UP	1UP
○	17	GE17	Trunk	1UP	1UP
○	18	GE18	Trunk	1UP	1UP
○	19	GE19	Trunk	1UP	1UP

Fig 5.1.12 VLAN 3 membership for Port GE8 table page

5.1.4 Port Setting

This page allow user to configure ports VLAN settings. The attributes depend on different VLAN port mode.

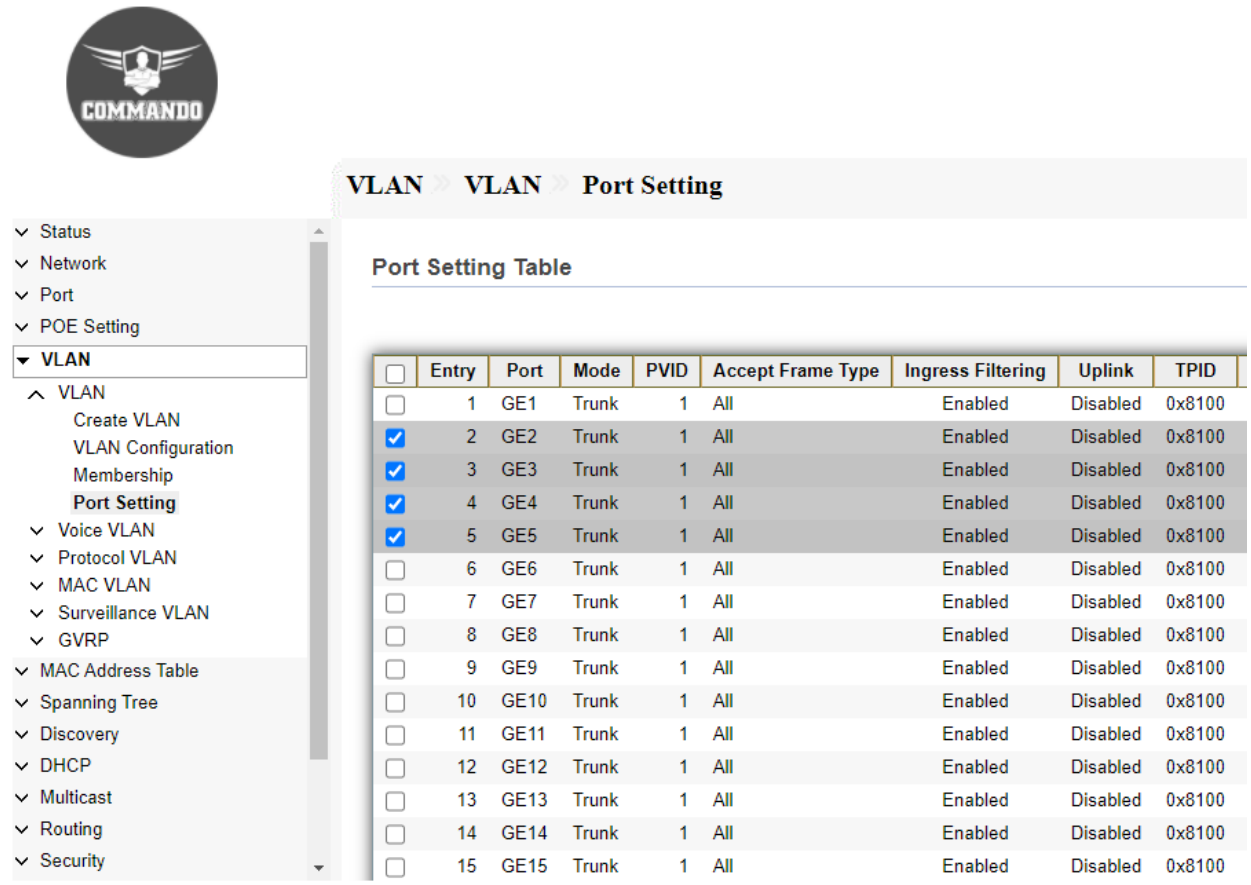
For Port Setting page, click **VLAN >> Port Setting**



Port Setting Table

□	Entry	Port	Mode	PVID	Accept Frame Type	Ingress Filtering	Uplink	TPID
□	1	GE1	Trunk	1	All	Enabled	Disabled	0x8100
□	2	GE2	Trunk	1	All	Enabled	Disabled	0x8100
□	3	GE3	Trunk	1	All	Enabled	Disabled	0x8100
□	4	GE4	Trunk	1	All	Enabled	Disabled	0x8100
□	5	GE5	Trunk	1	All	Enabled	Disabled	0x8100
□	6	GE6	Trunk	1	All	Enabled	Disabled	0x8100
□	7	GE7	Trunk	1	All	Enabled	Disabled	0x8100
□	8	GE8	Trunk	1	All	Enabled	Disabled	0x8100
□	9	GE9	Trunk	1	All	Enabled	Disabled	0x8100
□	10	GE10	Trunk	1	All	Enabled	Disabled	0x8100
□	11	GE11	Trunk	1	All	Enabled	Disabled	0x8100
□	12	GE12	Trunk	1	All	Enabled	Disabled	0x8100
□	13	GE13	Trunk	1	All	Enabled	Disabled	0x8100
□	14	GE14	Trunk	1	All	Enabled	Disabled	0x8100
□	15	GE15	Trunk	1	All	Enabled	Disabled	0x8100

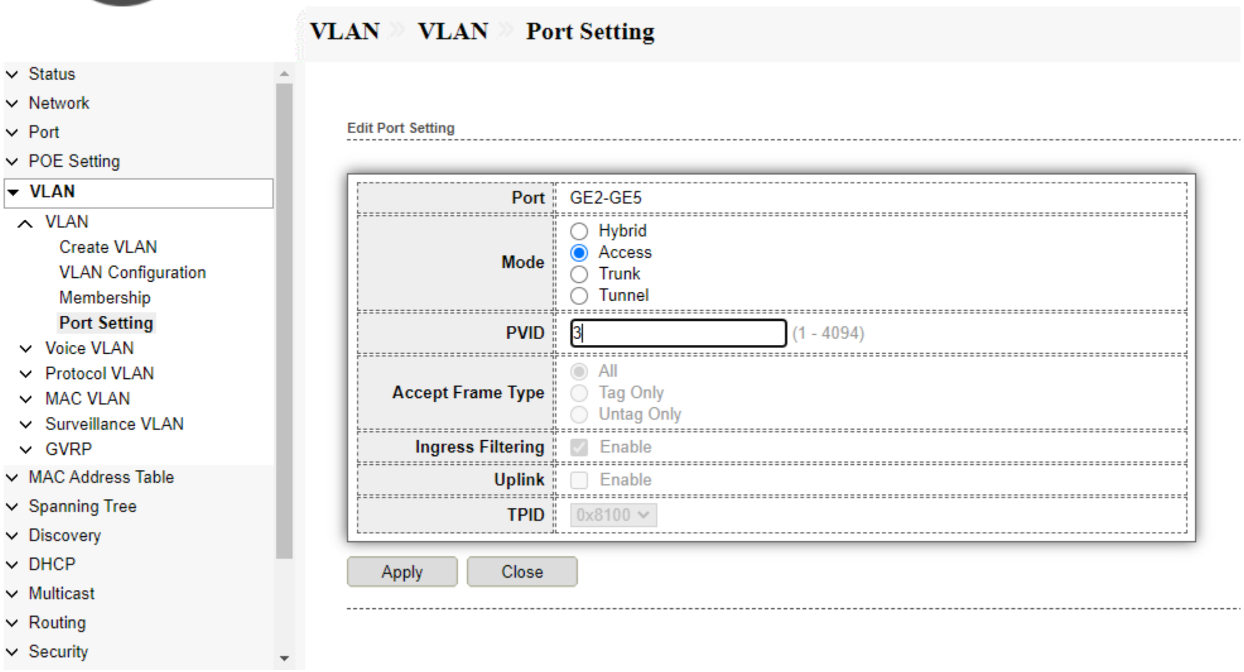
Fig 5.1.13 VLAN port setting table page



Port Setting Table

☐	Entry	Port	Mode	PVID	Accept Frame Type	Ingress Filtering	Uplink	TPID
☐	1	GE1	Trunk	1	All	Enabled	Disabled	0x8100
☑	2	GE2	Trunk	1	All	Enabled	Disabled	0x8100
☑	3	GE3	Trunk	1	All	Enabled	Disabled	0x8100
☑	4	GE4	Trunk	1	All	Enabled	Disabled	0x8100
☑	5	GE5	Trunk	1	All	Enabled	Disabled	0x8100
☐	6	GE6	Trunk	1	All	Enabled	Disabled	0x8100
☐	7	GE7	Trunk	1	All	Enabled	Disabled	0x8100
☐	8	GE8	Trunk	1	All	Enabled	Disabled	0x8100
☐	9	GE9	Trunk	1	All	Enabled	Disabled	0x8100
☐	10	GE10	Trunk	1	All	Enabled	Disabled	0x8100
☐	11	GE11	Trunk	1	All	Enabled	Disabled	0x8100
☐	12	GE12	Trunk	1	All	Enabled	Disabled	0x8100
☐	13	GE13	Trunk	1	All	Enabled	Disabled	0x8100
☐	14	GE14	Trunk	1	All	Enabled	Disabled	0x8100
☐	15	GE15	Trunk	1	All	Enabled	Disabled	0x8100

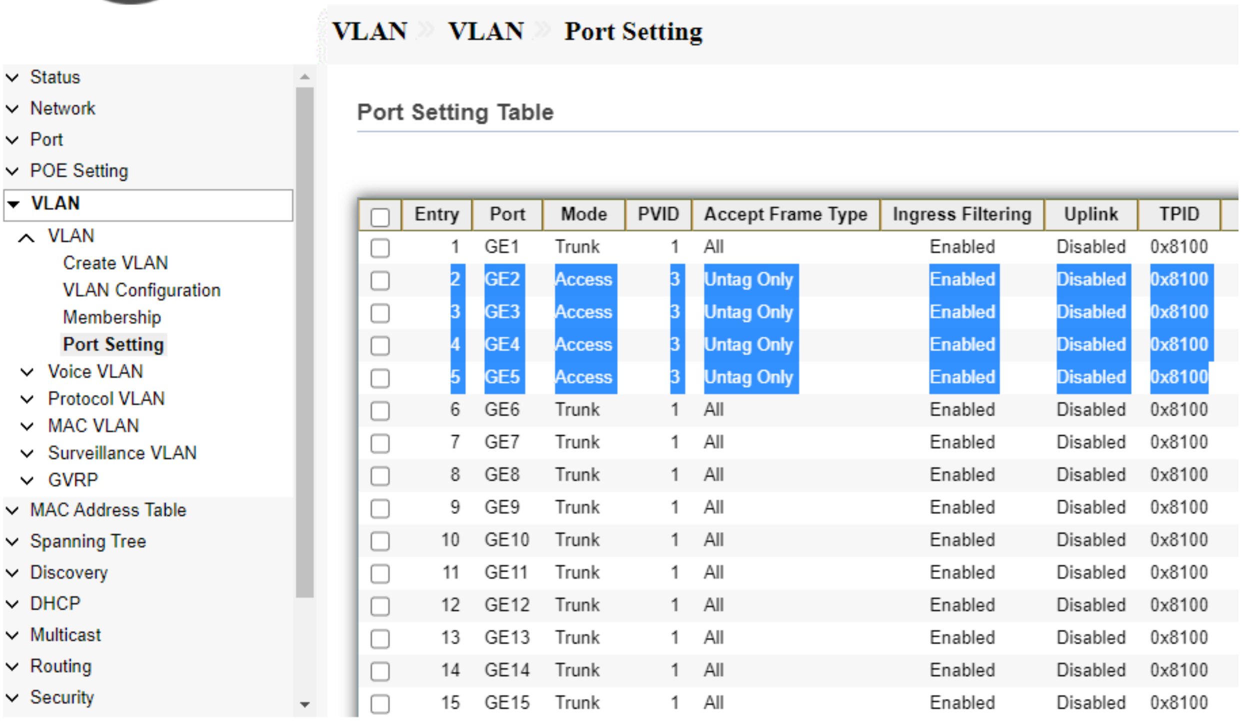
Fig 5.1.14 VLAN port setting for selected port page



Edit Port Setting

Port	GE2-GE5
Mode	○ Hybrid ● Access ○ Trunk ○ Tunnel
PVID	3 (1 - 4094)
Accept Frame Type	● All ○ Tag Only ○ Untag Only
Ingress Filtering	☑ Enable
Uplink	□ Enable
TPID	0x8100

Fig 5.1.15 Edit port setting for selected ports page



Port Setting Table

□	Entry	Port	Mode	PVID	Accept Frame Type	Ingress Filtering	Uplink	TPID
□	1	GE1	Trunk	1	All	Enabled	Disabled	0x8100
□	2	GE2	Access	3	Untag Only	Enabled	Disabled	0x8100
□	3	GE3	Access	3	Untag Only	Enabled	Disabled	0x8100
□	4	GE4	Access	3	Untag Only	Enabled	Disabled	0x8100
□	5	GE5	Access	3	Untag Only	Enabled	Disabled	0x8100
□	6	GE6	Trunk	1	All	Enabled	Disabled	0x8100
□	7	GE7	Trunk	1	All	Enabled	Disabled	0x8100
□	8	GE8	Trunk	1	All	Enabled	Disabled	0x8100
□	9	GE9	Trunk	1	All	Enabled	Disabled	0x8100
□	10	GE10	Trunk	1	All	Enabled	Disabled	0x8100
□	11	GE11	Trunk	1	All	Enabled	Disabled	0x8100
□	12	GE12	Trunk	1	All	Enabled	Disabled	0x8100
□	13	GE13	Trunk	1	All	Enabled	Disabled	0x8100
□	14	GE14	Trunk	1	All	Enabled	Disabled	0x8100
□	15	GE15	Trunk	1	All	Enabled	Disabled	0x8100

Fig 5.1.16 After Editing port setting for selected ports page

5.2 Voice VLAN

In a LAN, voice devices, such as IP phones, VoIP endpoints, and voice systems are placed into the same VLAN. This VLAN is referred as the voice VLAN. Voice VLAN allows you to easily prioritize IP voice traffic through the switch. This page shows the configuration to enable the functional Voice VLAN on the device.

Voice VLAN can propagate the CoS/802.1p and DSCP settings by using LLDP▯MED Network policies. The LLDP-MED is set by default to response with the Voice QoS setting if an appliance sends LLDP-MED packets. MED-supported devices must send their voice traffic with the same CoS/802.1p and DSCP values, as received with the LLDP-MED response.

You can disable the automatic update between Voice VLAN and LLDP-MED and use his own network policies. Working with the OUI mode, the device can additionally configure the mapping and remarking (CoS/802.1p) of the voice traffic based on the OUI. By default, all interfaces are CoS/802.1p trusted. The device applies the quality of service based on the CoS/802.1p value found in the voice stream. In Auto Voice VLAN, you can override the value of the voice streams using advanced QoS. For Telephony OUI voice streams, you can override the quality of service and optionally remark the 802.1p of the voice streams by specifying the desired CoS/802.1p values and using the remarking option under Telephony OUI.

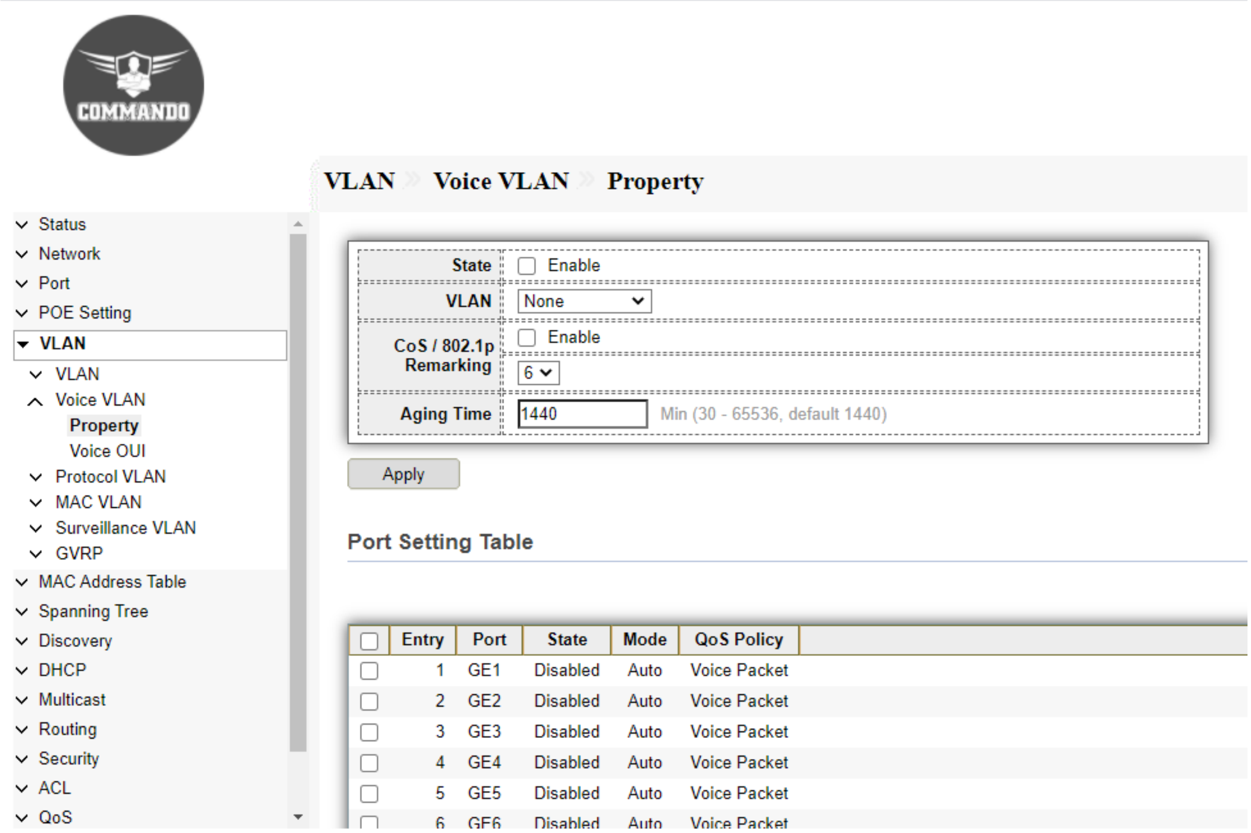
5.2.1 Property

Voice VLAN Configuration:

Click on “Voice VLAN”, then “Property” from menu, Select/Deselect “State” to Enable/Disable, then select “VLAN” name from dropdown, Select “CoS/802.1p Remarking” & Click on “Apply”.

Configuration object and description:

CoS/802.1p: Select a CoS/802.1p value that to be used by LLDP-MED as a voice network policy. This page allow user to configure global and per interface settings of voice VLAN. For Voice VLAN Property, click **VLAN>> Voice VLAN>> Property.**



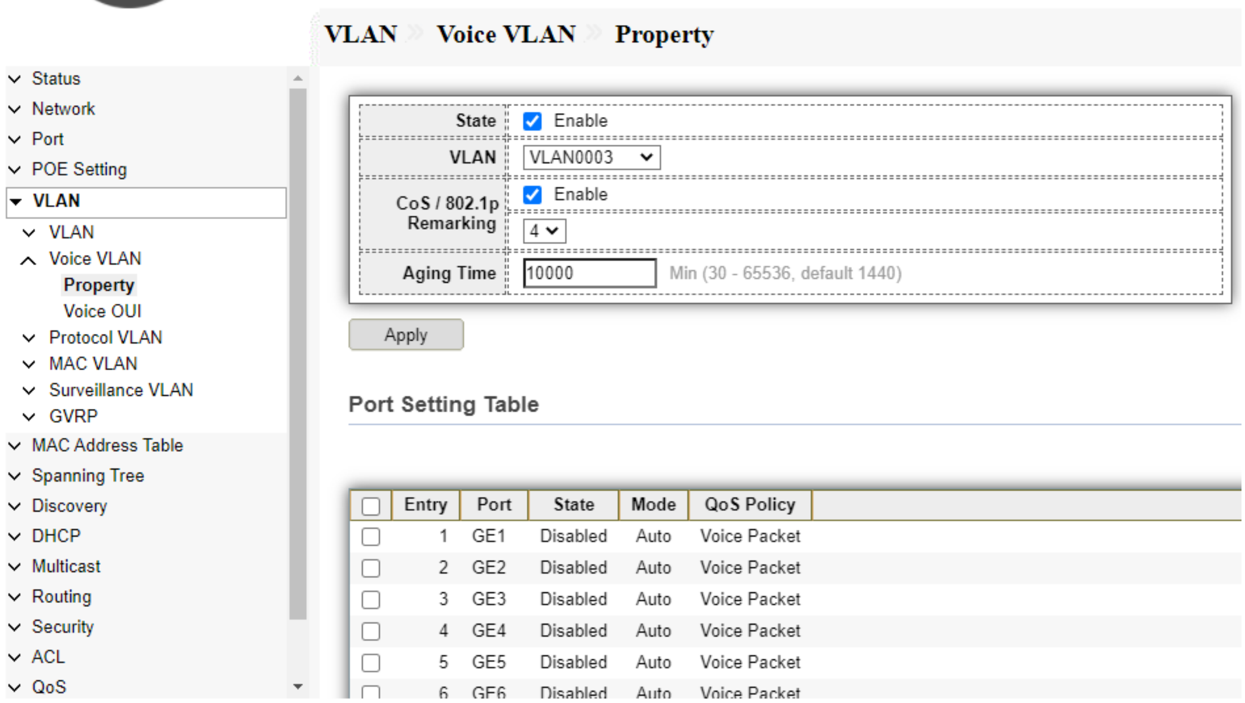
VLAN » Voice VLAN » Property

State	□ Enable
VLAN	None
CoS / 802.1p Remarking	□ Enable 6
Aging Time	1440 Min (30 - 65536, default 1440)

Port Setting Table

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Voice Packet
□	2	GE2	Disabled	Auto	Voice Packet
□	3	GE3	Disabled	Auto	Voice Packet
□	4	GE4	Disabled	Auto	Voice Packet
□	5	GE5	Disabled	Auto	Voice Packet
□	6	GE6	Disabled	Auto	Voice Packet

Fig 5.2.1 Default Voice VLAN state setting table page

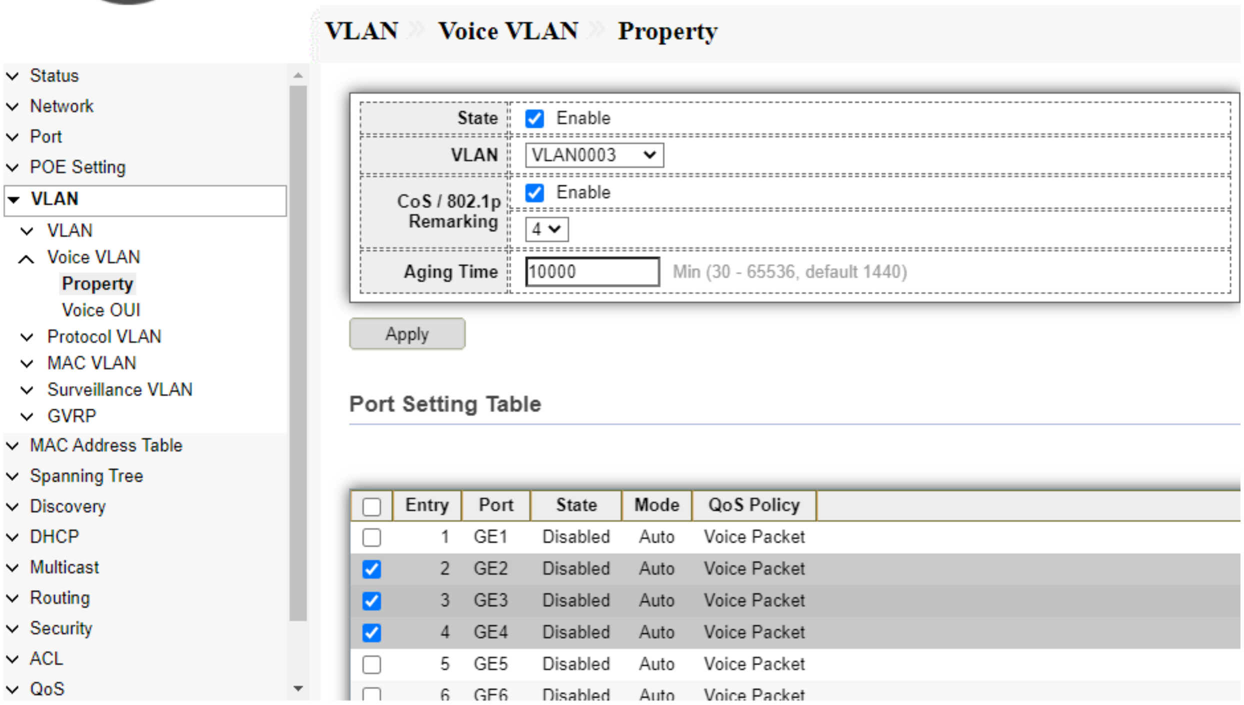


State	☑ Enable
VLAN	VLAN0003
CoS / 802.1p Remarking	☑ Enable 4
Aging Time	10000 Min (30 - 65536, default 1440)

Port Setting Table

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Voice Packet
□	2	GE2	Disabled	Auto	Voice Packet
□	3	GE3	Disabled	Auto	Voice Packet
□	4	GE4	Disabled	Auto	Voice Packet
□	5	GE5	Disabled	Auto	Voice Packet
□	6	GE6	Disabled	Auto	Voice Packet

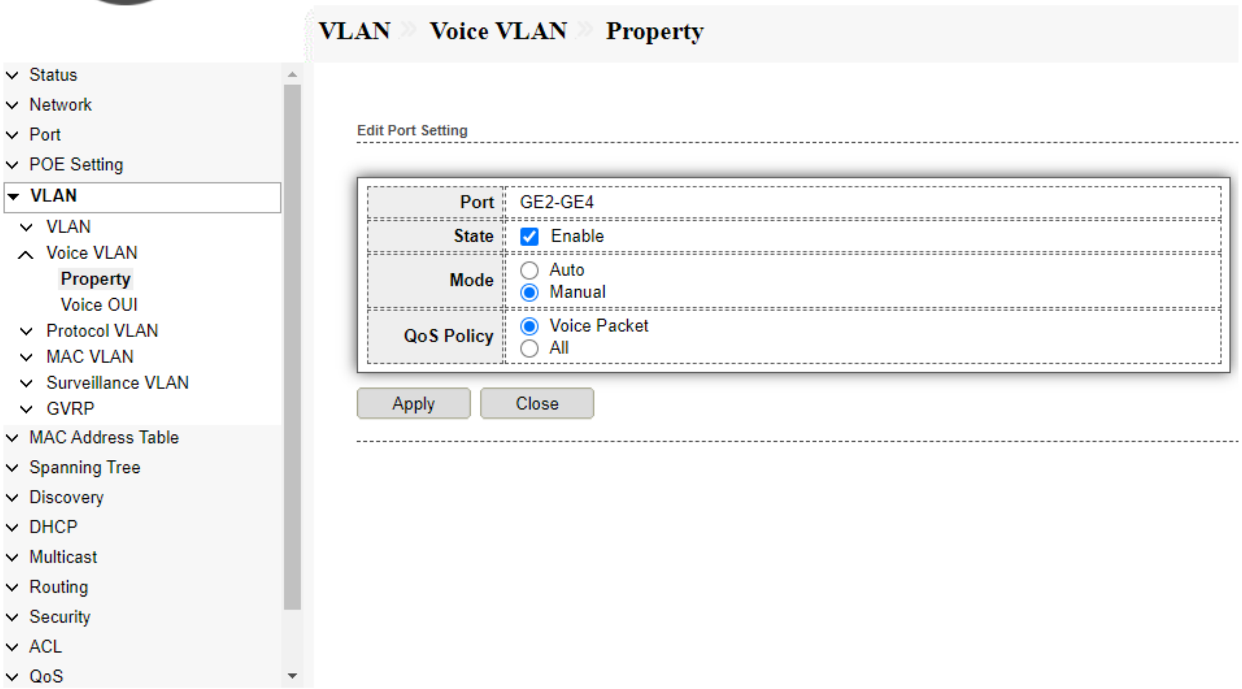
Fig 5.2.2 Change Voice VLAN setting CoS/802.1p Remarking page



State	☑ Enable
VLAN	VLAN0003
CoS / 802.1p Remarking	☑ Enable 4
Aging Time	10000 Min (30 - 65536, default 1440)

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Voice Packet
☑	2	GE2	Disabled	Auto	Voice Packet
☑	3	GE3	Disabled	Auto	Voice Packet
☑	4	GE4	Disabled	Auto	Voice Packet
□	5	GE5	Disabled	Auto	Voice Packet
□	6	GE6	Disabled	Auto	Voice Packet

Fig 5.2.3 Voice VLAN setting CoS/802.1p Remarking page

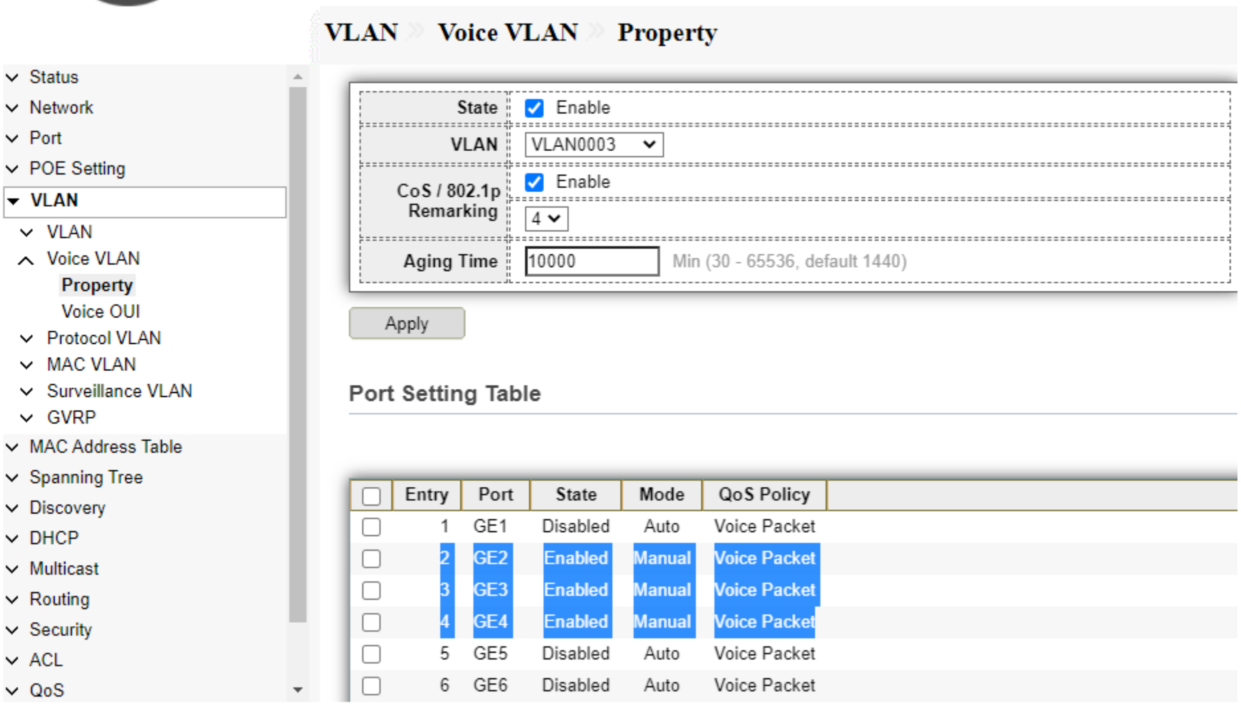


VLAN » Voice VLAN » Property

Edit Port Setting

Port	GE2-GE4
State	☑ Enable
Mode	○ Auto ● Manual
QoS Policy	● Voice Packet ○ All

Fig 5.2.4 Voice VLAN Edit port setting page



State	☑ Enable
VLAN	VLAN0003
CoS / 802.1p Remarking	☑ Enable 4
Aging Time	10000 Min (30 - 65536, default 1440)

Port Setting Table

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Voice Packet
□	2	GE2	Enabled	Manual	Voice Packet
□	3	GE3	Enabled	Manual	Voice Packet
□	4	GE4	Enabled	Manual	Voice Packet
□	5	GE5	Disabled	Auto	Voice Packet
□	6	GE6	Disabled	Auto	Voice Packet

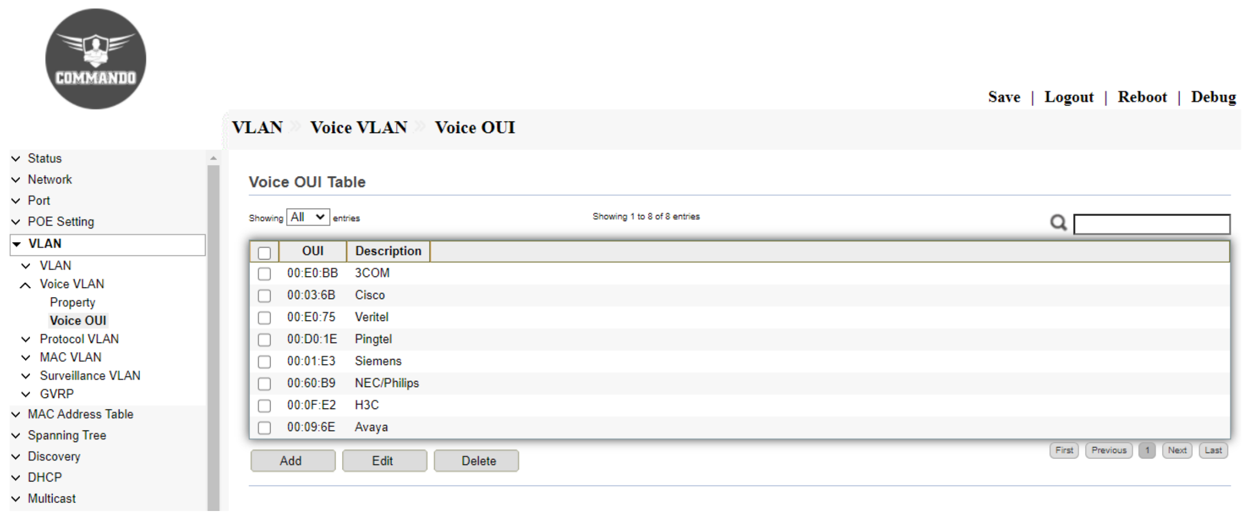
Fig 5.2.5 Voice VLAN Port setting table page

5.2.2 Voice OUI

Voice OUIs are assigned by the Institute of Electrical and Electronics Engineers, Incorporated (IEEE) Registration Authority. Since the number of IP phone manufacturers is limited and well-known, the known OUI values cause the relevant frames, and the port on which they are seen, to be automatically assigned to a Voice VLAN. Organizationally Unique Identifiers (OUI) are the first three bytes of a MAC Address, while the last three bytes contain a unique station ID. You can add a specific manufacturer with the OUI. Once the OUI is added, all traffic received on voice VLAN ports from the specific IP phone with a listed OUI is forwarded on the voice VLAN. Unlike the telephony OUI mode that detects voice devices based on telephony OUI, Auto Voice VLAN mode depends on auto smart port to dynamically add the ports to the voice VLAN.

This page allow user to add, edit or delete OUI MAC addresses. Default has 8 predefined OUI MAC address. This page shows the configuration to enable the functional OUI Voice VLAN on the interfaces.

For Voice OUI, click **VLAN >> Voice VLAN >> Voice OUI.**



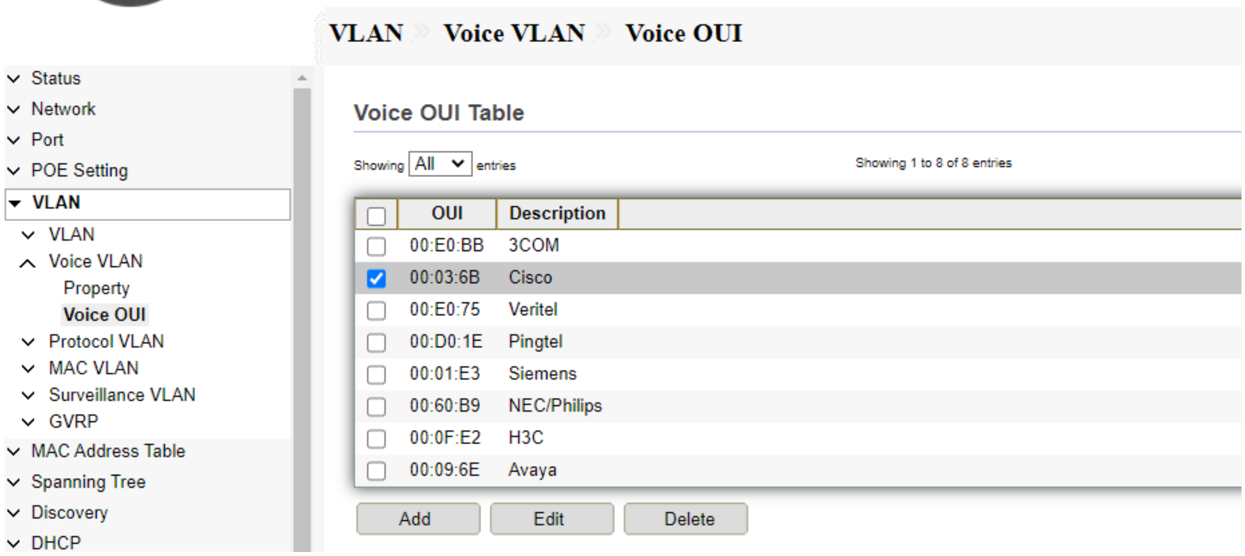
Voice OUI Table

Showing All entries

Showing 1 to 8 of 8 entries

□	OUI	Description
□	00:E0:BB	3COM
□	00:03:6B	Cisco
□	00:E0:75	Veritel
□	00:D0:1E	Pingtel
□	00:01:E3	Siemens
□	00:60:B9	NEC/Philips
□	00:0F:E2	H3C
□	00:09:6E	Avaya

Fig 5.2.6 Voice VLAN Voice OUI Table page



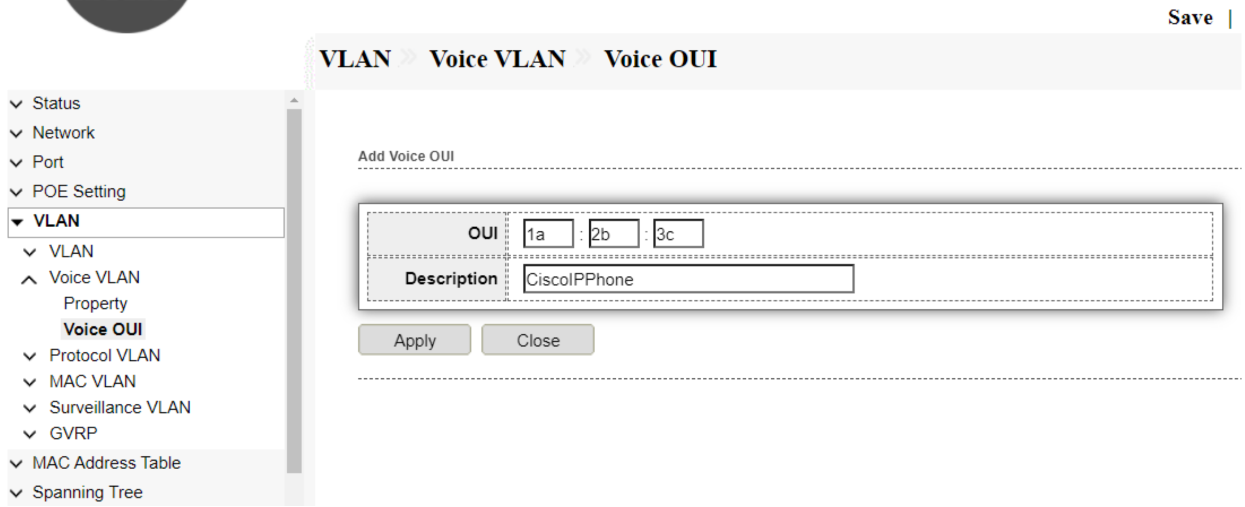
Voice OUI Table

Showing All entries

Showing 1 to 8 of 8 entries

□	OUI	Description
□	00:E0:BB	3COM
☑	00:03:6B	Cisco
□	00:E0:75	Veritel
□	00:D0:1E	Pingtel
□	00:01:E3	Siemens
□	00:60:B9	NEC/Philips
□	00:0F:E2	H3C
□	00:09:6E	Avaya

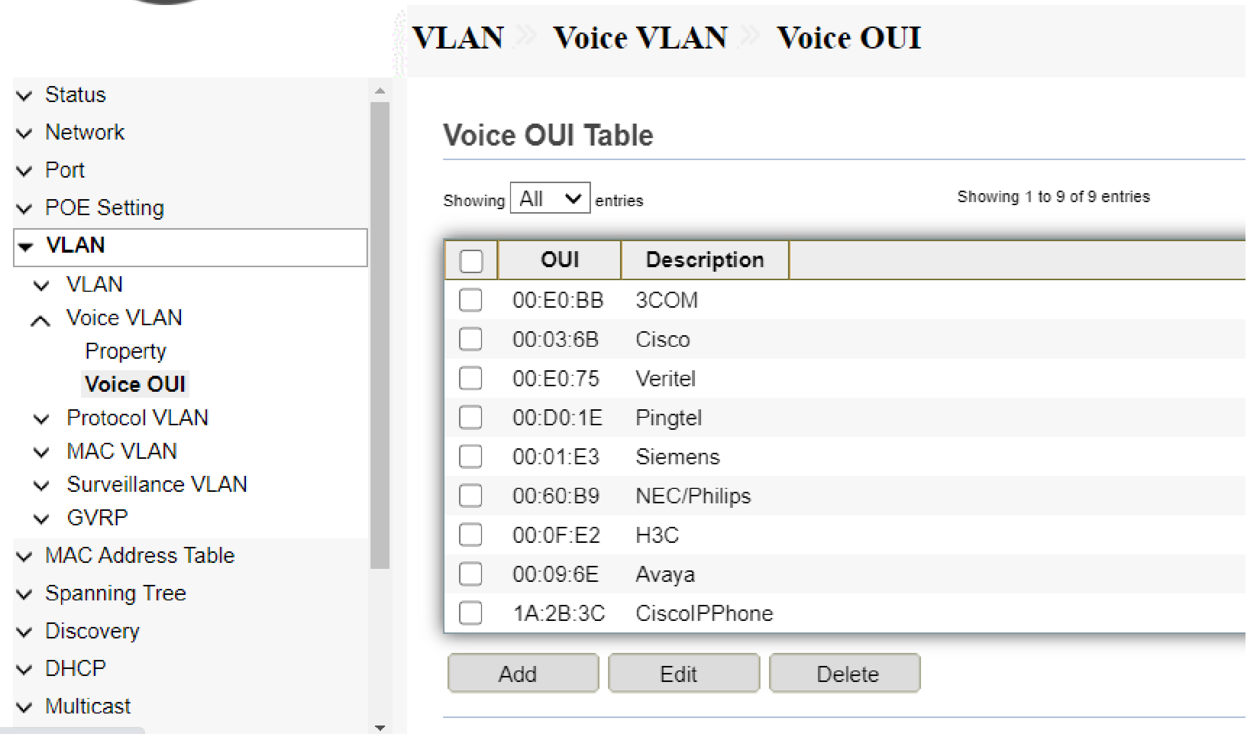
Fig 5.2.7 Selecting Voice VLAN Voice OUI page



Add Voice OUI

OUI	1a : 2b : 3c
Description	CiscoIPPhone

Fig 5.2.8 Voice VLAN Add Voice OUI page



Voice OUI Table

Showing All entries   Showing 1 to 9 of 9 entries

□	OUI	Description
□	00:E0:BB	3COM
□	00:03:6B	Cisco
□	00:E0:75	Veritel
□	00:D0:1E	Pingtel
□	00:01:E3	Siemens
□	00:60:B9	NEC/Philips
□	00:0F:E2	H3C
□	00:09:6E	Avaya
□	1A:2B:3C	CiscoIPPhone

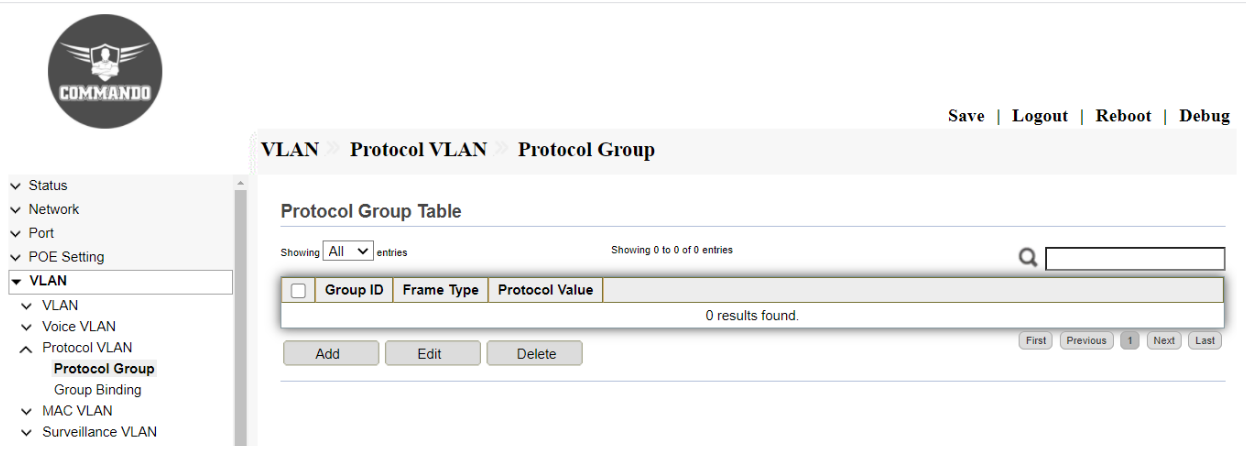
Fig 5.2.9 Voice VLAN Voice OUI Table page

5.3 Protocol VLAN

A protocol based VLAN processes traffic based on protocol. You can use a protocol based VLAN to define filtering criteria for untagged packets. The protocol VLAN defines the protocol profile, which comprises the frame encapsulation and protocol type. One port can be configured with several protocol profiles. When the protocol VLAN is enabled on the port, the protocol profile is configured on the port.

5.3.1 Protocol Group

It shows the configuration to add protocol VLAN group with specified prototype and value. This page allow user to add or edit groups settings of protocol VLAN. For Protocol Group, click **VLAN >> Protocol VLAN >> Protocol Group.**



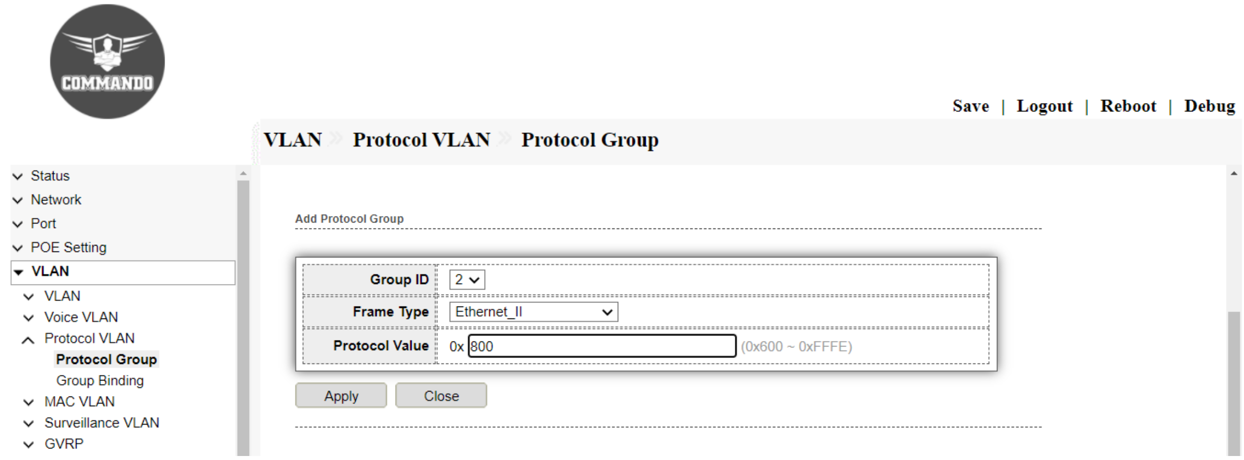
Protocol Group Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Group ID	Frame Type	Protocol Value
0 results found.			

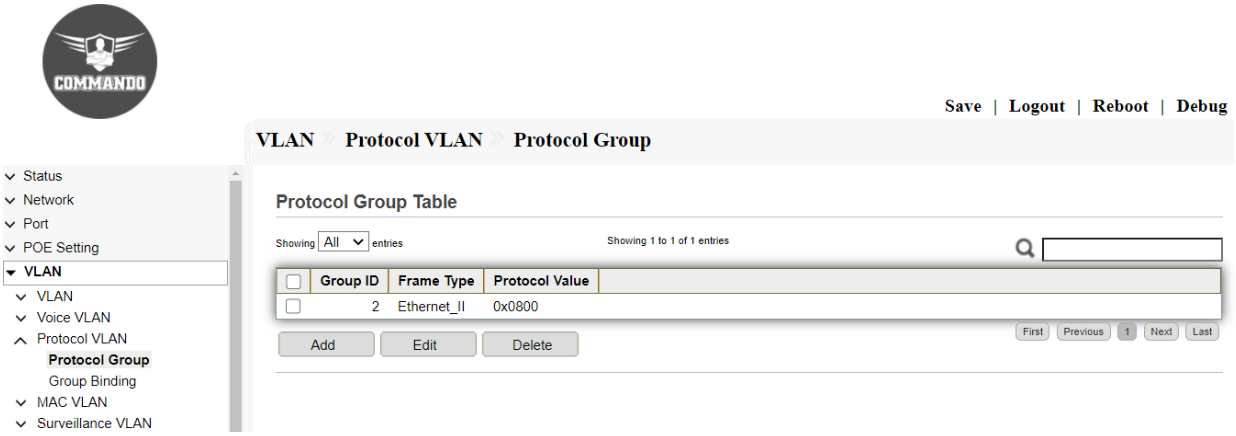
Fig 5.3.1 Default Protocol VLAN Protocol Group Table page



Add Protocol Group

Group ID	2
Frame Type	Ethernet_II
Protocol Value	0x 800 (0x600 ~ 0xFFFE)

Fig 5.3.2 Add Protocol group page



Protocol Group Table

Showing All entries

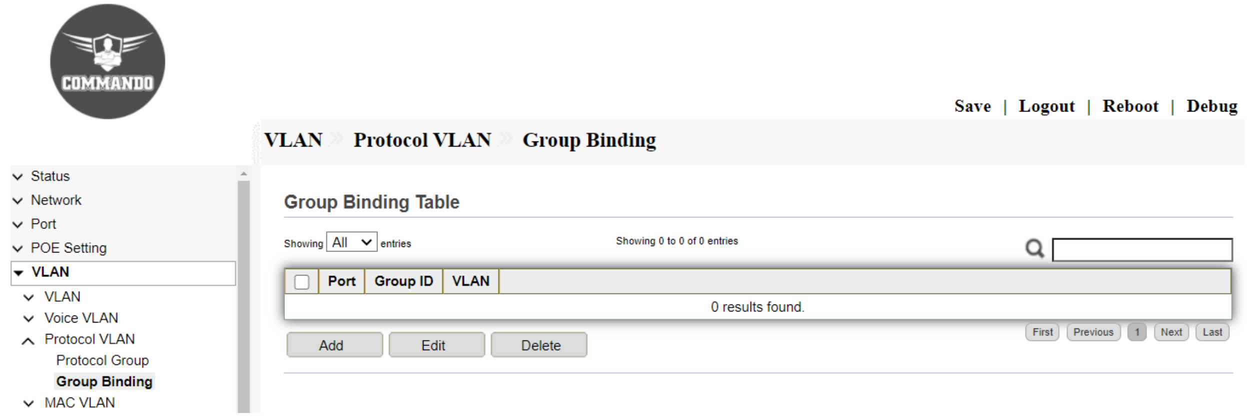
Showing 1 to 1 of 1 entries

□	Group ID	Frame Type	Protocol Value
□	2	Ethernet_II	0x0800

Fig 5.3.3 Protocol group table page

5.3.2 Group Binding

This page allow user to bind protocol VLAN group to each port with VLAN ID. For Group Binding, click **VLAN>> Protocol VLAN >> Group Binding.**

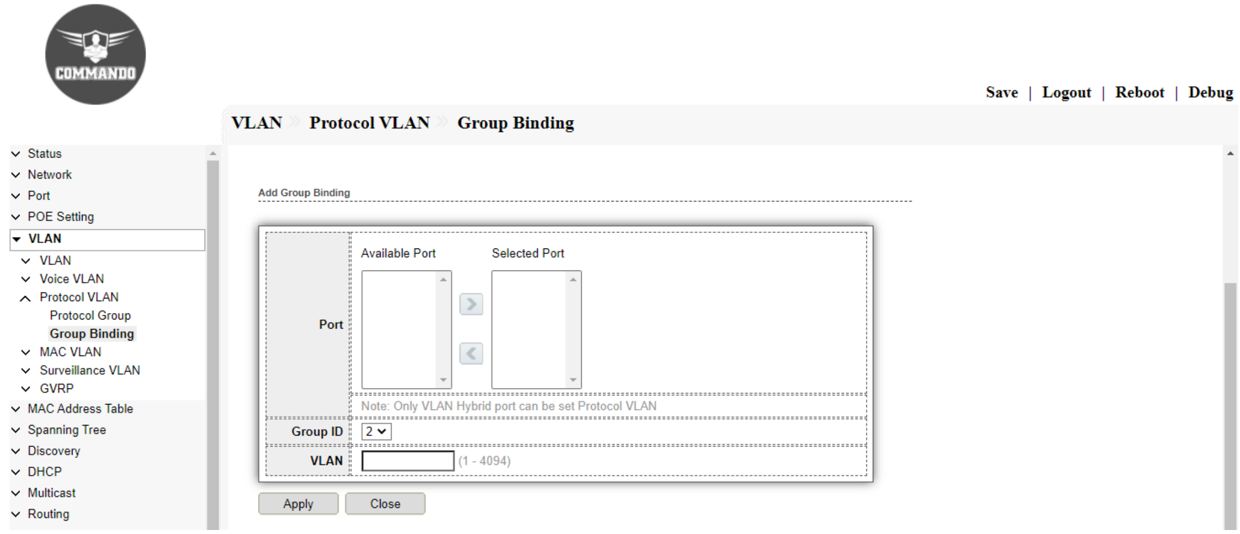


Group Binding Table

Showing All entries   Showing 0 to 0 of 0 entries

□	Port	Group ID	VLAN
0 results found.			

Fig 5.3.5 Default Group Binding Table page



Add Group Binding

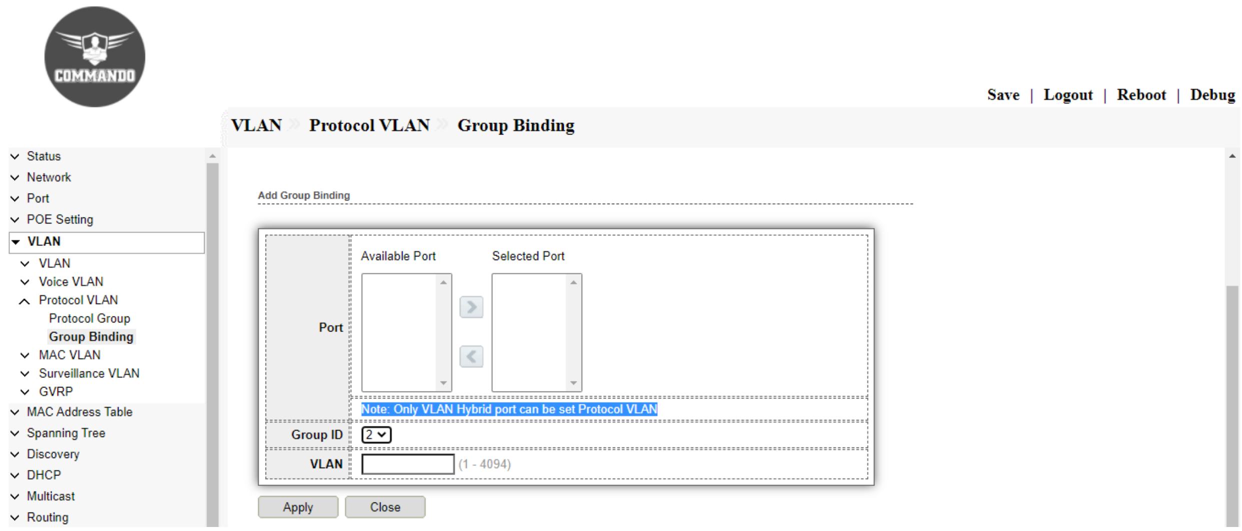
Port: Available Port / Selected Port

Note: Only VLAN Hybrid port can be set Protocol VLAN

Group ID: 2

VLAN: (1 - 4094)

Fig 5.3.6 Add Group Binding page



Note: Only VLAN Hybrid port can be set Protocol VLAN

Group ID: 2

VLAN: (1 - 4094)

Fig 5.3.7 Group Binding for hybrid port page

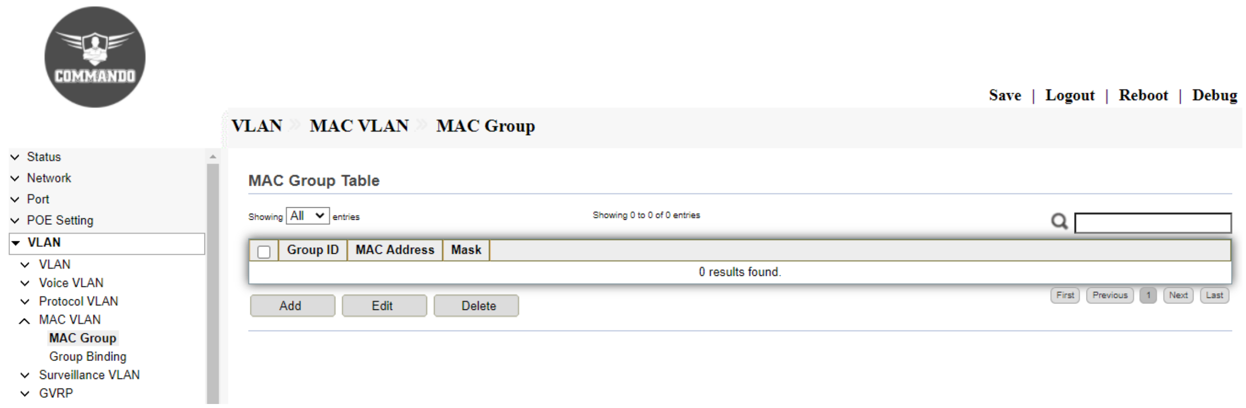
5.4 MAC VLAN

The MAC-based VLAN classification enables packets to be classified according to their source MAC address. MAC-based VLAN is to divide VLAN ID to the packet according to the source MAC address of the untag packet received by the port.

5.4.1 MAC Group

This page allow user to add or edit groups settings of MAC VLAN.

For MAC page , click **VLAN >> MAC VLAN >> MAC Group.**



MAC Group Table

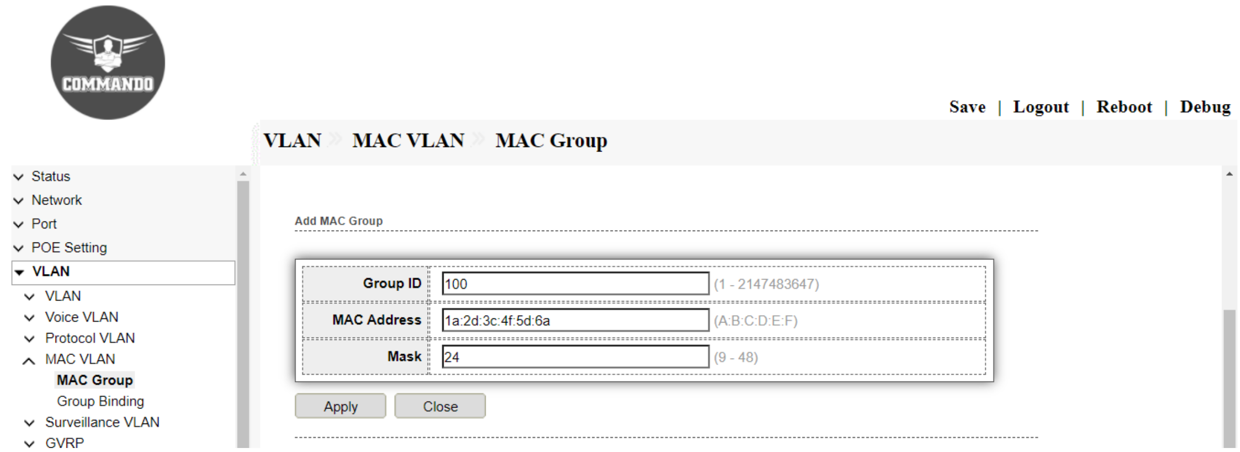
Showing All entries

Showing 0 to 0 of 0 entries

□	Group ID	MAC Address	Mask
		0 results found.	

Fig 5.4.1 Default MAC Group Table page

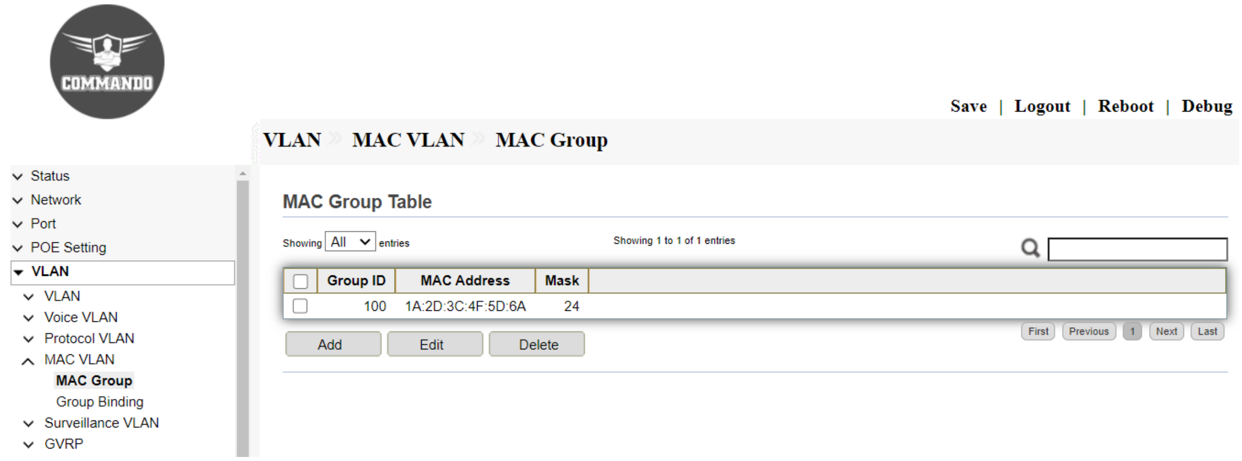
Click on “MAC Group” from menu, Click on “Add”, then select “Group ID”, “MAC Address” and “Mask” value and Click on “Apply”.



Add MAC Group

Group ID	100	(1 - 2147483647)
MAC Address	1a:2d:3c:4f:5d:6a	(A:B:C:D:E:F)
Mask	24	(9 - 48)

Fig 5.4.2 Add MAC Group ID page



MAC Group Table

Showing All entries

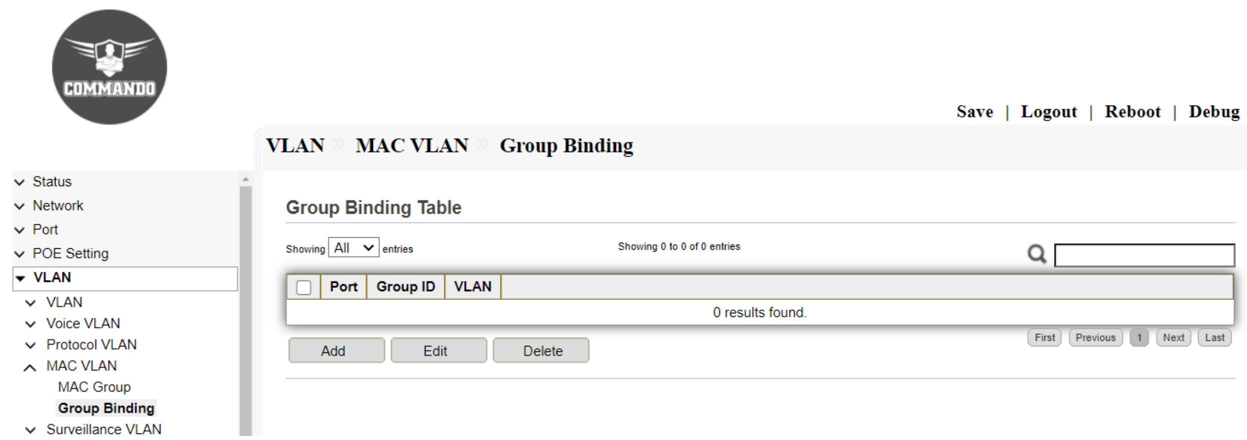
Showing 1 to 1 of 1 entries

□	Group ID	MAC Address	Mask
□	100	1A:2D:3C:4F:5D:6A	24

Fig 5.4.3 Mac Group table page

5.4.2 Group Binding

This page creates MAC-based VLAN groups and map them to a specific interface (Ports/LAG).



Group Binding Table

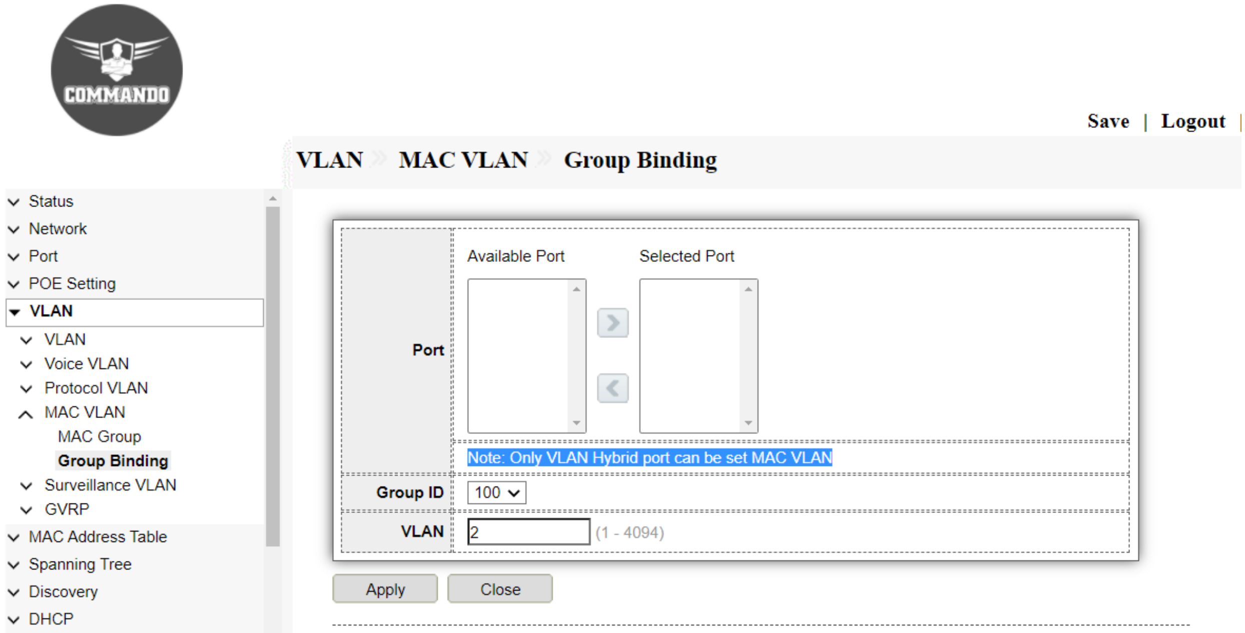
Showing All entries

Showing 0 to 0 of 0 entries

□	Port	Group ID	VLAN

0 results found.

Fig 5.4.4 Blank Group binding table page



Port

Note: Only VLAN Hybrid port can be set MAC VLAN

Group ID: 100

VLAN: 2 (1 - 4094)

Fig 5.4.5 Blank Group binding for hybrid ports page

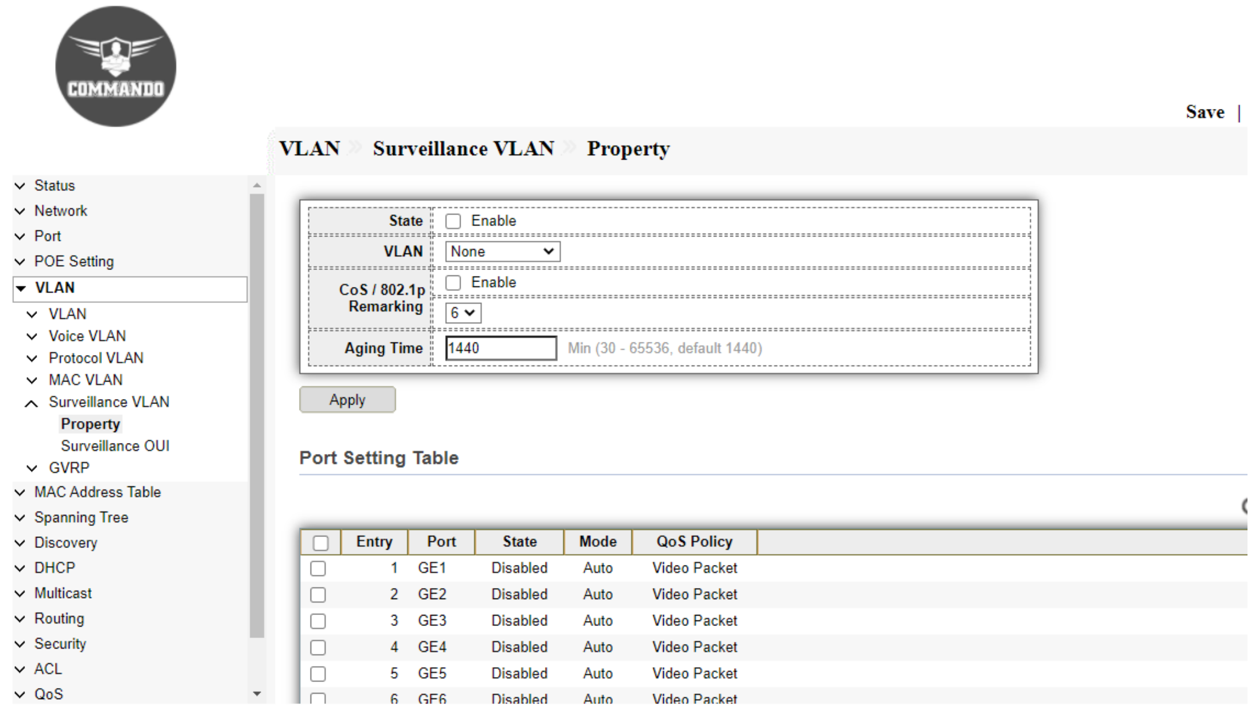
5.5 Surveillance VLAN

Surveillance VLAN is a feature that allows you to automatically place the video traffic from IP cameras to a surveillance VLAN to enhance the IP surveillance service. With a higher priority and individual VLAN, the quality and the security of surveillance traffic are guaranteed. VLAN configuration for CCTV or Surveillance cameras are very important to protect the IP cameras against unauthorized access and to separate the security camera system from other computers and devices that are connected to the IP network. C3000 series switches supports Surveillance VLAN feature. The surveillance devices can be put in Surveillance VLAN which segmenting their traffic from the rest of the network. The ensures security of the data, but also gives the traffic a higher priority through the switch, reducing the chances of the video freezing or being delayed on live streams. This page shows configuration to enable the functional Surveillance VLAN on the device. By default, Surveillance VLAN are disabled and by default setting of CoS / 802.1p remarking of 6.

To configure and view Surveillance VLAN, click **VLAN>>Surveillance VLAN.**

5.5.1 Property

To configure Surveillance VLAN property and view surveillance VLAN port setting, click **VLAN>>Surveillance VLAN>>Property.**



VLAN » Surveillance VLAN » Property

State	□ Enable
VLAN	None
CoS / 802.1p Remarking	□ Enable
	6
Aging Time	1440 Min (30 - 65536, default 1440)

Apply

Port Setting Table

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Video Packet
□	2	GE2	Disabled	Auto	Video Packet
□	3	GE3	Disabled	Auto	Video Packet
□	4	GE4	Disabled	Auto	Video Packet
□	5	GE5	Disabled	Auto	Video Packet
□	6	GE6	Disabled	Auto	Video Packet

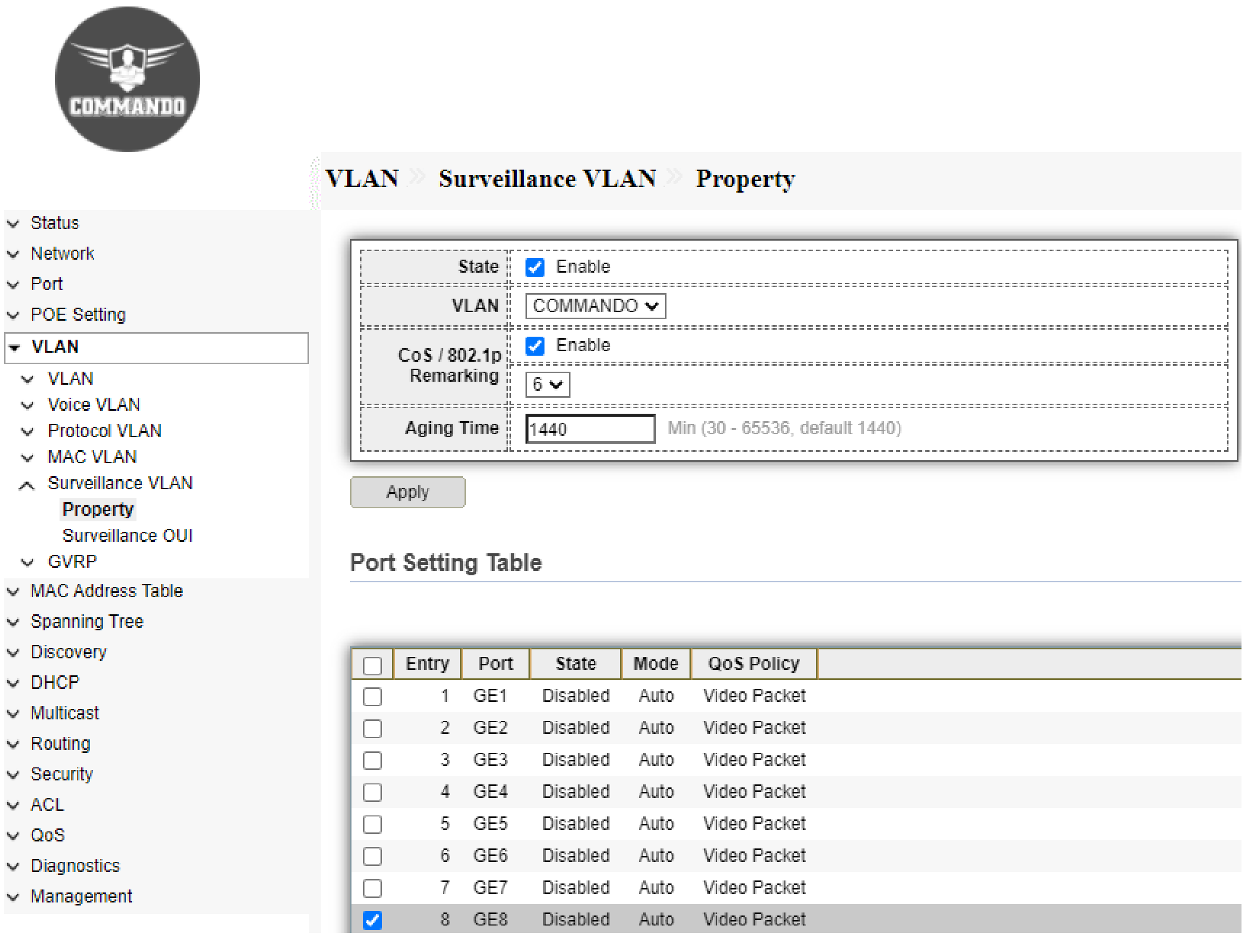
Fig 5.5.1 Surveillance VLAN Property page

Surveillance VLAN Configuration:

Click on “Surveillance VLAN”, then “Property” from menu, Select/Deselect “State” to Enable/Disable, then select “VLAN” name from dropdown, Select “CoS/802.1p Remarking” & Click on “Apply”.

Configuration object and description:

CoS/802.1p: Select a CoS/802.1p value that to be used by LLDP-MED as a voice network policy.



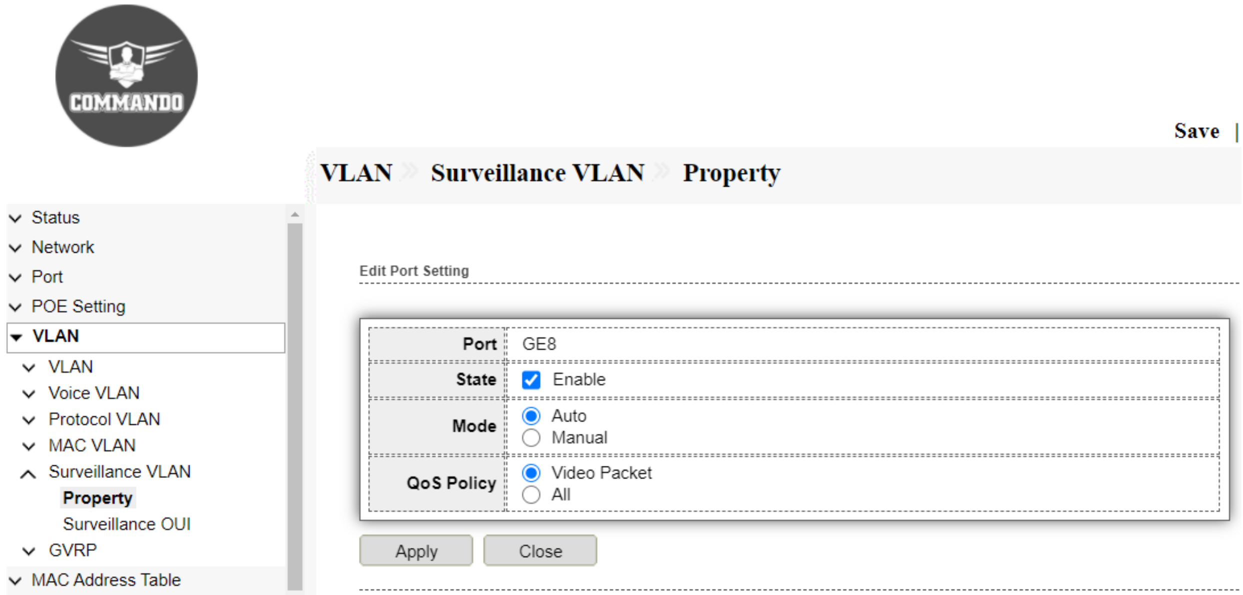
VLAN » Surveillance VLAN » Property

State	☑ Enable
VLAN	COMMANDO
CoS / 802.1p Remarking	☑ Enable 6
Aging Time	1440 Min (30 - 65536, default 1440)

Port Setting Table

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Video Packet
□	2	GE2	Disabled	Auto	Video Packet
□	3	GE3	Disabled	Auto	Video Packet
□	4	GE4	Disabled	Auto	Video Packet
□	5	GE5	Disabled	Auto	Video Packet
□	6	GE6	Disabled	Auto	Video Packet
□	7	GE7	Disabled	Auto	Video Packet
☑	8	GE8	Disabled	Auto	Video Packet

Fig 5.5.2 Surveillance VLAN port setting page for selected GE4 port

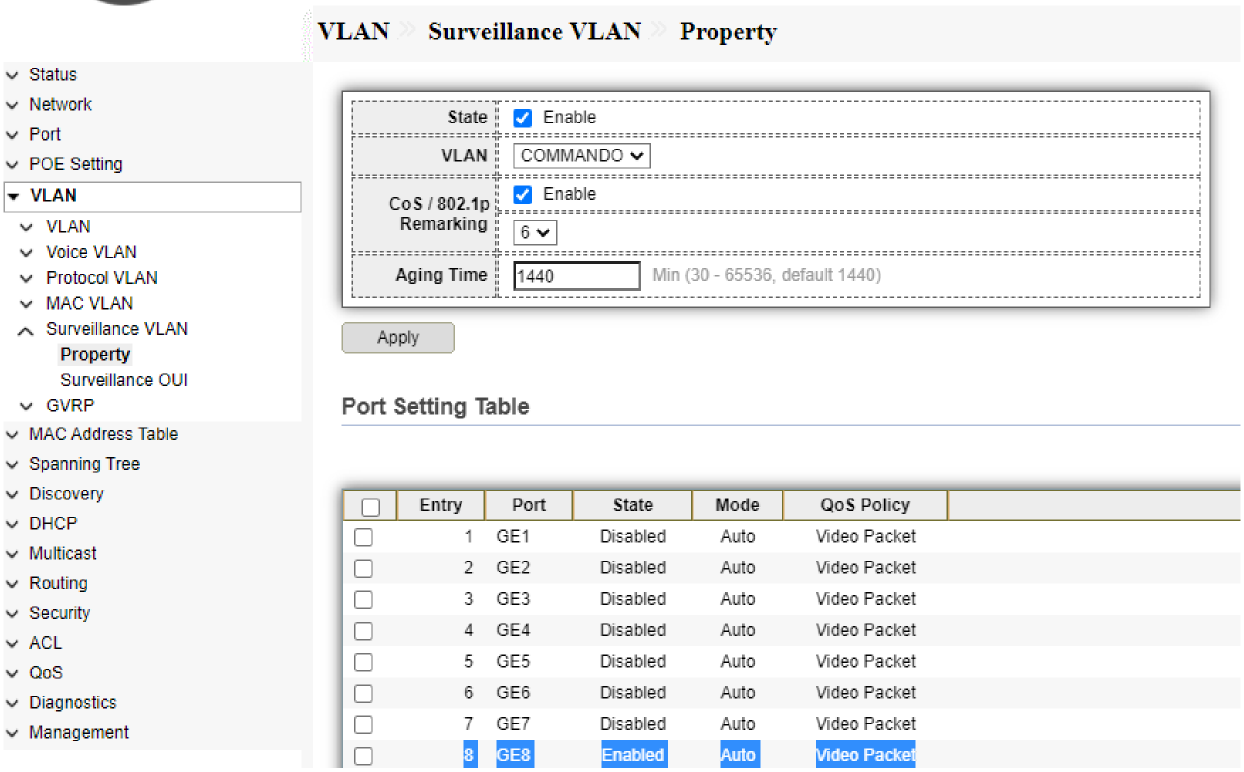


VLAN » Surveillance VLAN » Property

Edit Port Setting

Port	GE8
State	☑ Enable
Mode	● Auto ○ Manual
QoS Policy	● Video Packet ○ All

Fig 5.5.3 Surveillance VLAN Edit port setting for GE8 port page



State	☑ Enable
VLAN	COMMANDO
CoS / 802.1p Remarking	☑ Enable 6
Aging Time	1440 Min (30 - 65536, default 1440)

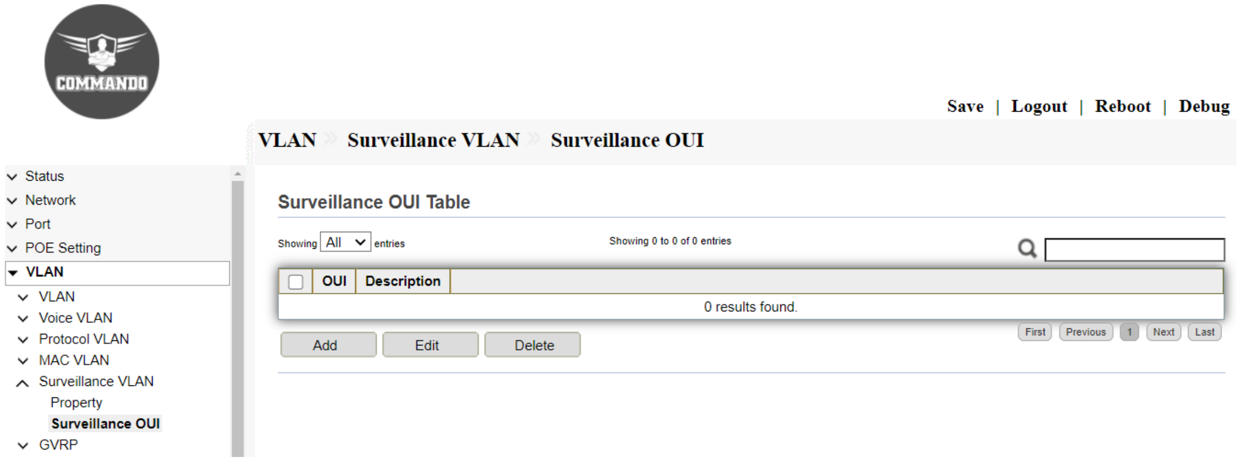
Port Setting Table

□	Entry	Port	State	Mode	QoS Policy
□	1	GE1	Disabled	Auto	Video Packet
□	2	GE2	Disabled	Auto	Video Packet
□	3	GE3	Disabled	Auto	Video Packet
□	4	GE4	Disabled	Auto	Video Packet
□	5	GE5	Disabled	Auto	Video Packet
□	6	GE6	Disabled	Auto	Video Packet
□	7	GE7	Disabled	Auto	Video Packet
□	8	GE8	Enabled	Auto	Video Packet

Fig 5.5.4 Surveillance VLAN Port setting table GE8 port enabled for Video packet

5.5.2 Surveillance OUI

The first six digits of a MAC are called the OUI, and each manufacturer is assigned one or more unique identifiers. For example, these are the OUIs of some common cameras manufacturers. Analog cameras (whether SD or HD), by definition of being analog, do not have or need IP addresses since they have no network interface. However, analog cameras are generally connected to recorders or encoders that do have network interfaces and therefore use IP addresses. To configure and view Surveillance OUI, click **VLAN>>Surveillance VLAN>>Surveillance OUI.**



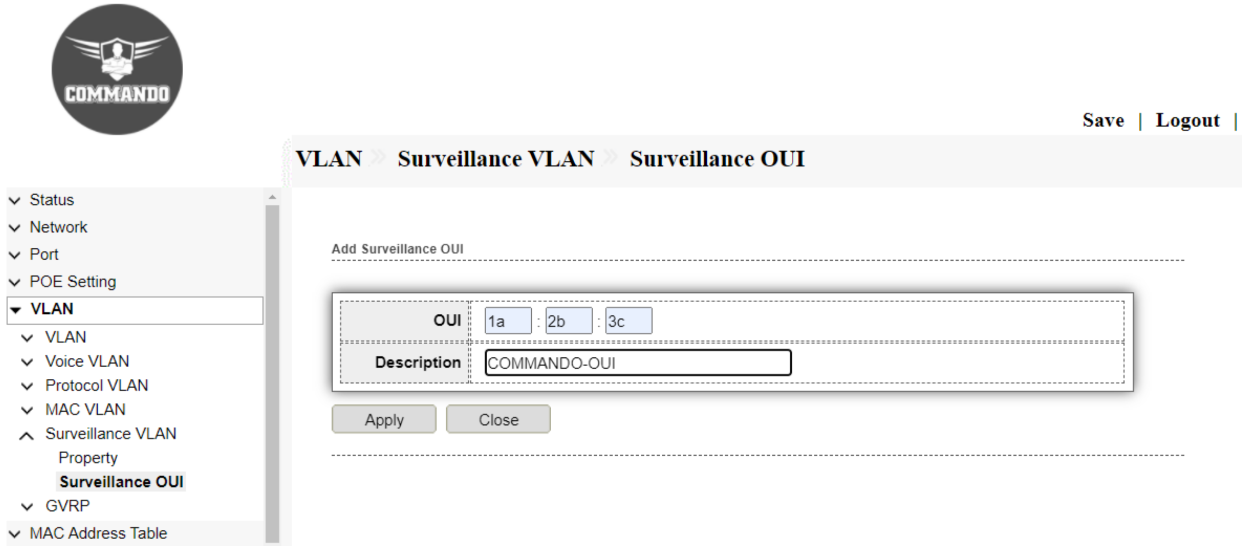
Surveillance OUI Table

Showing All entries

Showing 0 to 0 of 0 entries

□	OUI	Description
0 results found.		

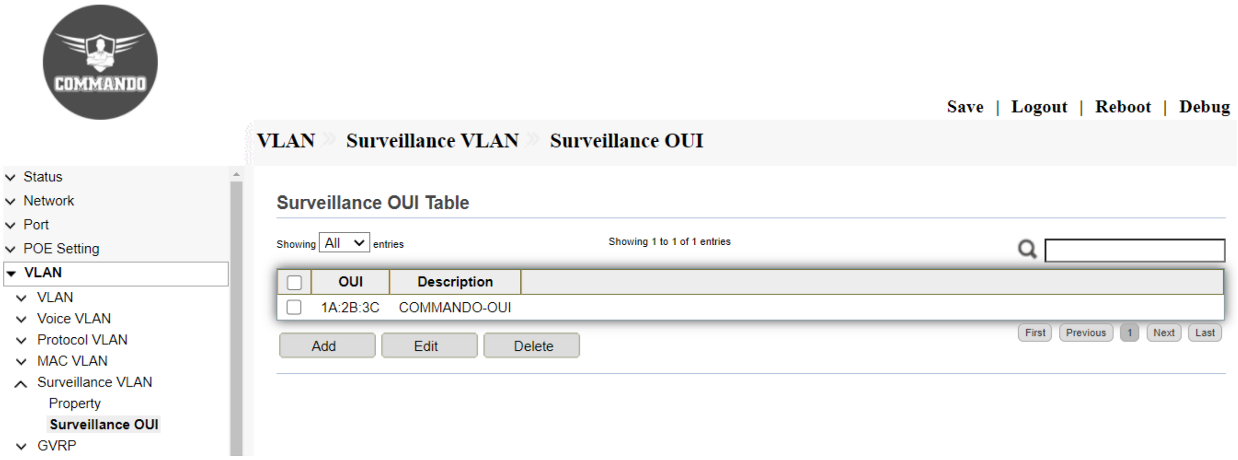
Fig 5.5.5 Surveillance OUI Table page



Add Surveillance OUI

OUI	1a : 2b : 3c
Description	COMMANDO-OUI

Fig 5.5.6 Add Surveillance OUI page



Surveillance OUI Table

Showing All entries

Showing 1 to 1 of 1 entries

□	OUI	Description
□	1A:2B:3C	COMMANDO-OUI

Fig 5.5.7 Surveillance OUI Table page

5.6 GVRP

The GVRP is an IEEE 802.1Q-compliant method for facilitating automatic (dynamic) VLAN membership configuration. GVRP-enabled switches can exchange VLAN configuration information with other GVRP-enabled switches. Policy rules or other network management methods can determine who is admitted to a VLAN. Adjacent VLAN-aware devices can exchange VLAN information with each other by using the Generic VLAN Registration Protocol (GVRP). GVRP is based on the Generic Attribute Registration Protocol (GARP) and propagates VLAN information throughout a bridged network. Since GVRP requires support for tagging, the port must be configured in Trunk mode. GVRP—VLAN was dynamically created through Generic VLAN Registration Protocol (GVRP). VLANs on a device can be created statically or dynamically, based on the GVRP information exchanged by devices. A VLAN can be static or dynamic (from GVRP). GVRP must be activated globally as well as on each port. When it is activated, it transmits and receives GARP Packet Data Units (GPDUs). VLANs that are defined but not active are not propagated. To propagate the VLAN, it must be up on at least one port. By default, GVRP is disabled globally and on ports. This page shows GVRP configuration. Disable GVRP will clear all learned dynamic VLAN entry and do not learn dynamic VLAN anymore.

To configure and view Generic VLAN Registration Protocol (GVRP), click **VLAN>>GVRP.**

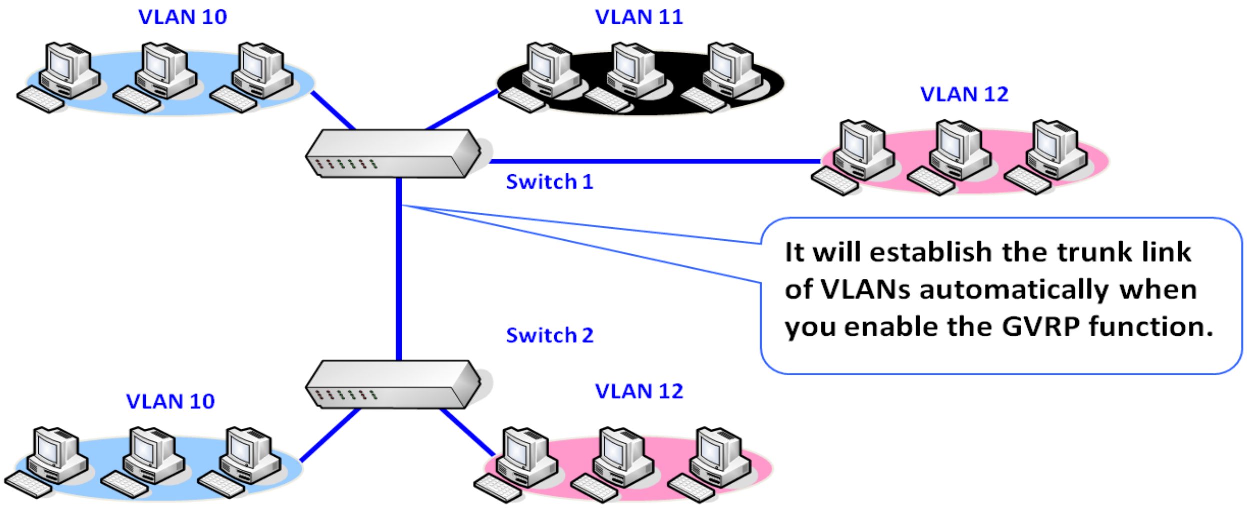
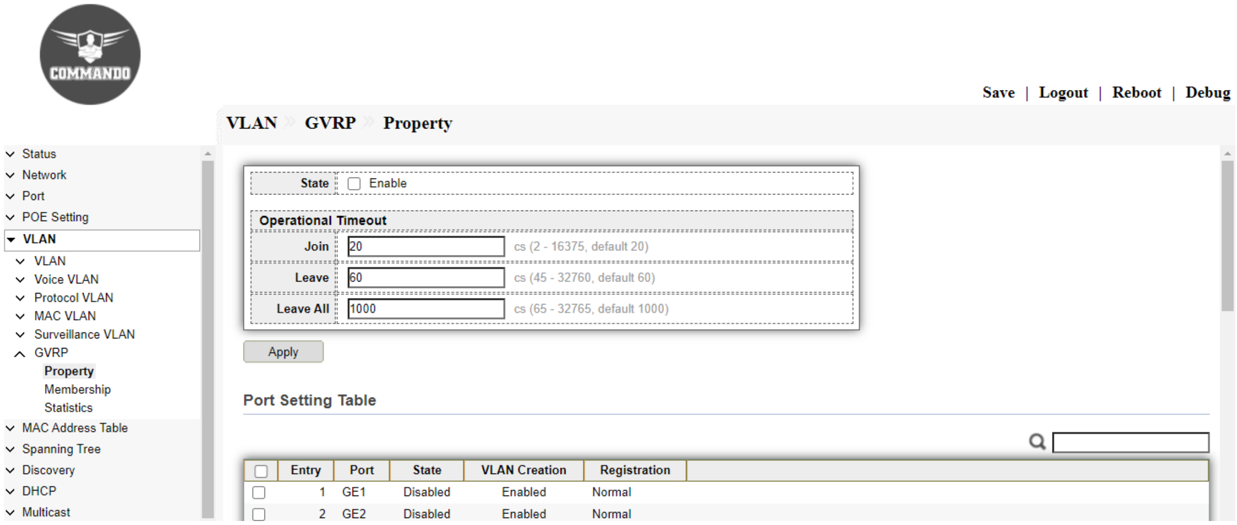

VLAN 10
VLAN 11
VLAN 12
Switch 1
It will establish the trunk link of VLANs automatically when you enable the GVRP function.
Switch 2
VLAN 10
VLAN 12

Fig 5.6.1 GVRP Function.

5.6.1 Property

By default, GVRP is disabled in COMMANDO C3000 Series Switches. To Enable, configure GVRP Property and view GVRP Port setting, click **VLAN>>GVRP>>Property.**



State □ Enable

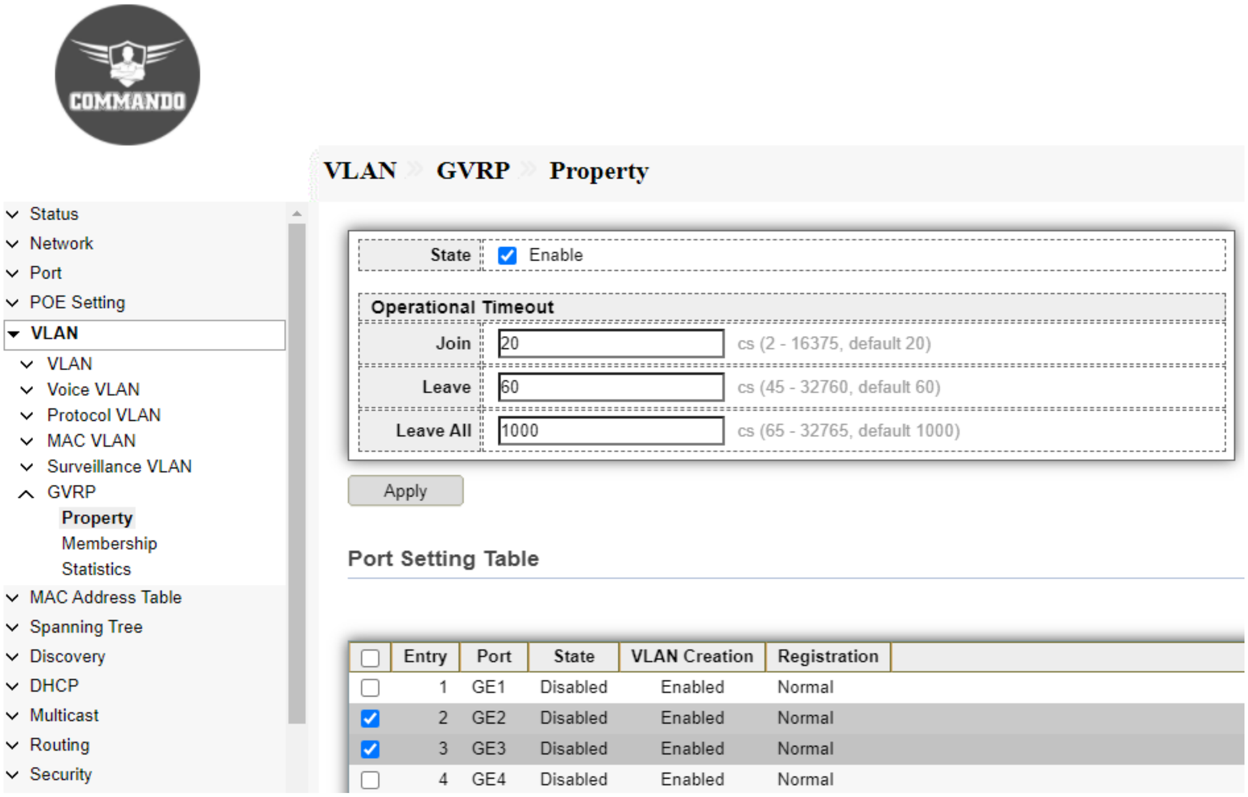
Operational Timeout

Join	20	cs (2 - 16375, default 20)
Leave	60	cs (45 - 32760, default 60)
Leave All	1000	cs (65 - 32765, default 1000)

Port Setting Table

□	Entry	Port	State	VLAN Creation	Registration
□	1	GE1	Disabled	Enabled	Normal
□	2	GE2	Disabled	Enabled	Normal

Fig 5.6.1 Default GVRP Property page



State ☑ Enable

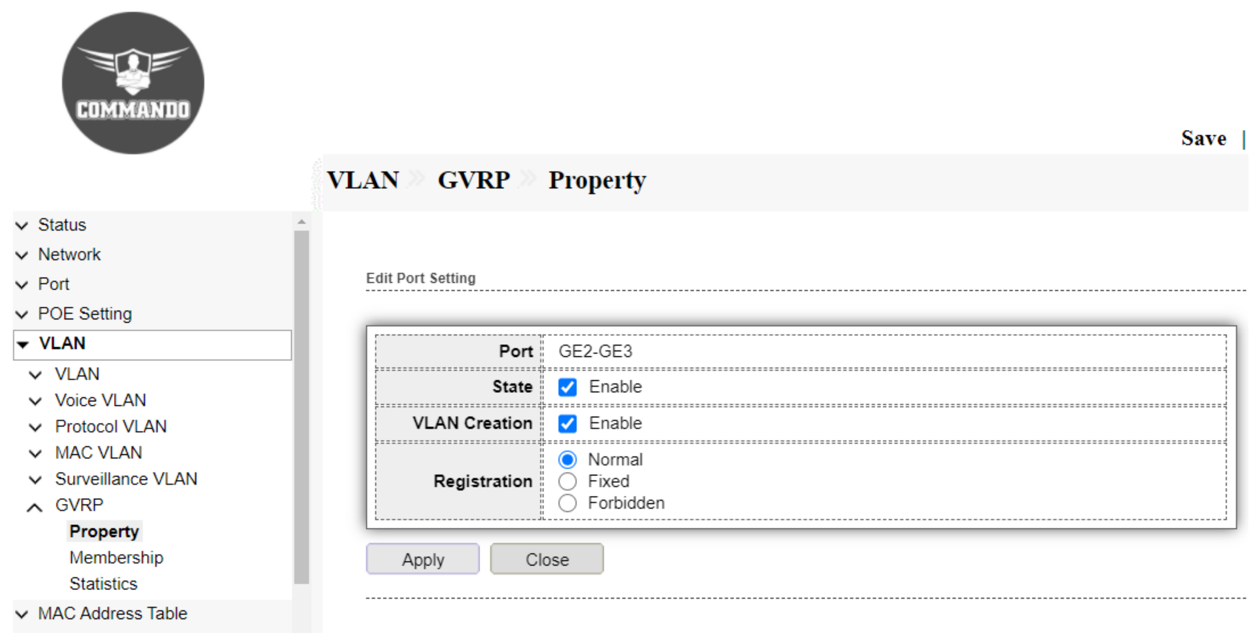
Operational Timeout

Join	20	cs (2 - 16375, default 20)
Leave	60	cs (45 - 32760, default 60)
Leave All	1000	cs (65 - 32765, default 1000)

Port Setting Table

□	Entry	Port	State	VLAN Creation	Registration
□	1	GE1	Disabled	Enabled	Normal
☑	2	GE2	Disabled	Enabled	Normal
☑	3	GE3	Disabled	Enabled	Normal
□	4	GE4	Disabled	Enabled	Normal

Fig 5.6.2 GVRP Property Port setting table selecting GE2 and GE3 ports page



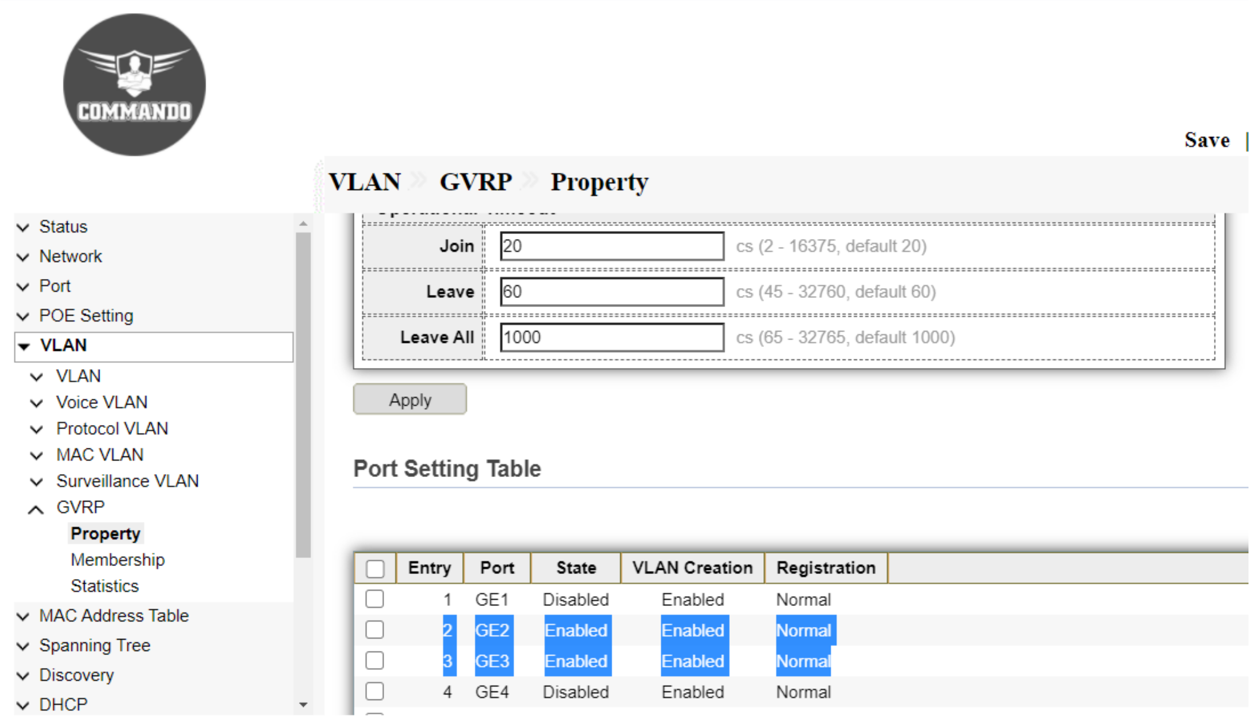
VLAN » GVRP » Property

Edit Port Setting

Port	GE2-GE3
State	☑ Enable
VLAN Creation	☑ Enable
Registration	● Normal ○ Fixed ○ Forbidden

Apply Close

Fig 5.6.3 GVRP Property Edit Port setting for GE2 and GE3 ports page



VLAN » GVRP » Property

Join	20	cs (2 - 16375, default 20)
Leave	60	cs (45 - 32760, default 60)
Leave All	1000	cs (65 - 32765, default 1000)

Apply

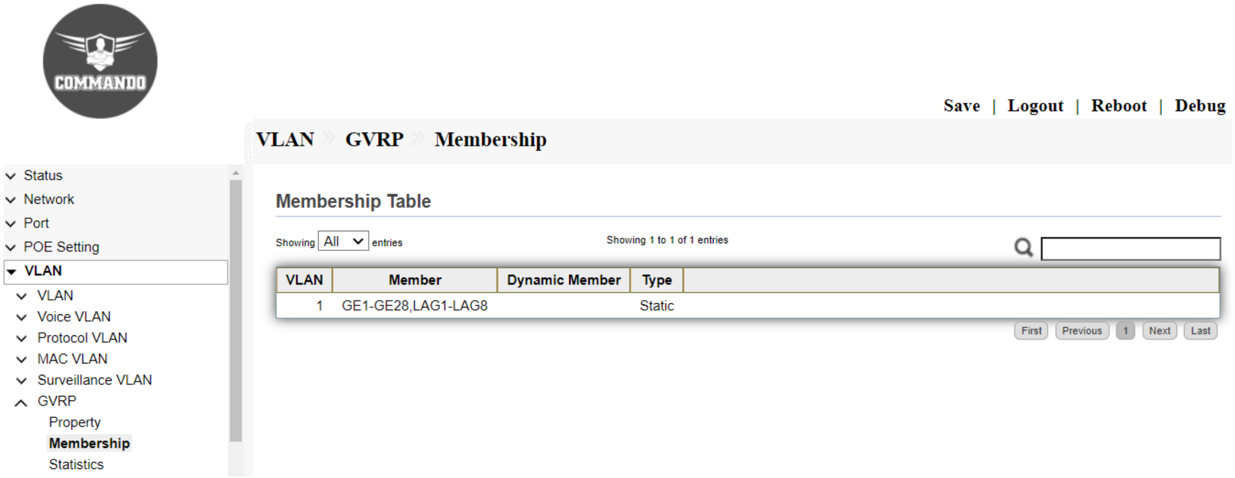
Port Setting Table

□	Entry	Port	State	VLAN Creation	Registration
□	1	GE1	Disabled	Enabled	Normal
□	2	GE2	Enabled	Enabled	Normal
□	3	GE3	Enabled	Enabled	Normal
□	4	GE4	Disabled	Enabled	Normal

Fig 5.6.4 GVRP Property Port setting table after enabled GE2 and GE3 ports page

5.6.2 Membership

GARP VLAN Registration Protocol (GVRP) is required for automatic distribution of VLAN membership information among VLAN-aware bridges. GVRP propagates VLAN membership throughout a network. GVRP allows end stations and switches to issue and revoke declarations relating to VLAN. GVRP provides dynamic registration of VLAN membership; therefore, members can be added or removed from a VLAN at any time.
To view GVRP Membership, click **VLAN>>GVRP>>Membership.**



Membership Table

Showing All entries

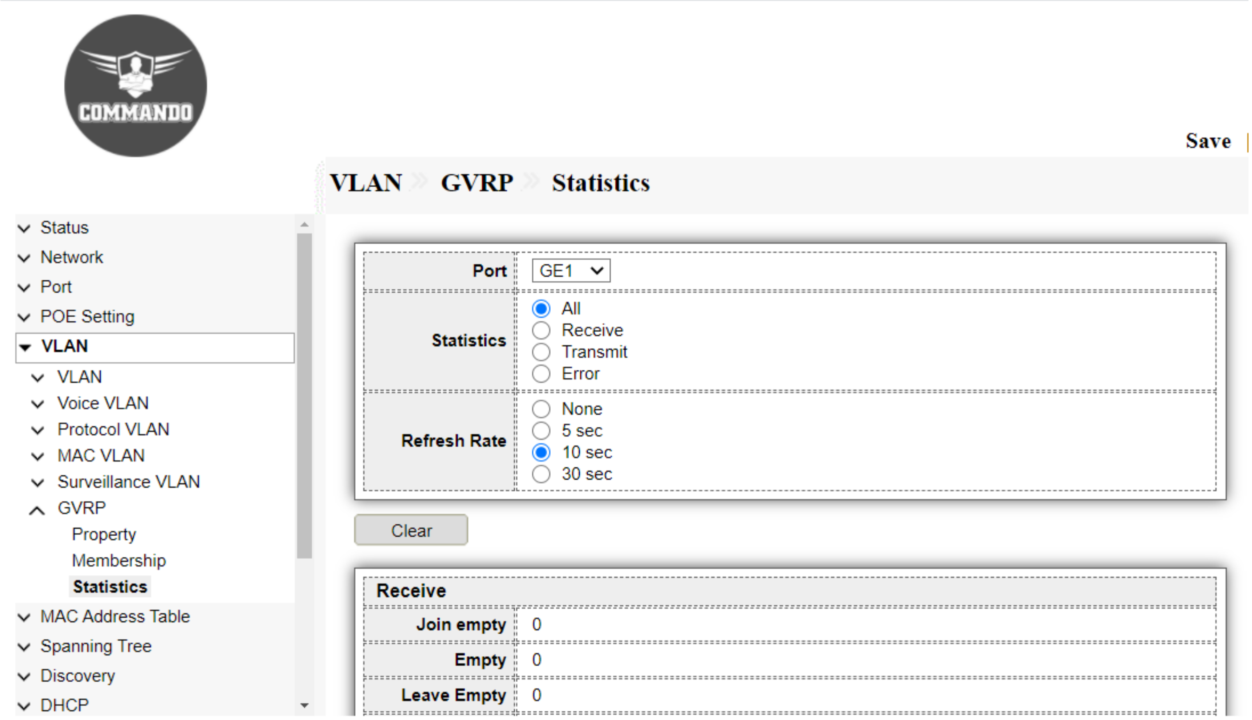
Showing 1 to 1 of 1 entries

VLAN	Member	Dynamic Member	Type
1	GE1-GE28,LAG1-LAG8		Static

Fig 5.6.5 GVRP Membership Default page

5.6.3 Statistics

The GVRP statistics include those GARP packets sent or received that are exchanging VLAN information by using GVRP. To view GVRP statistics, click **VLAN>>GVRP>>statistics.**

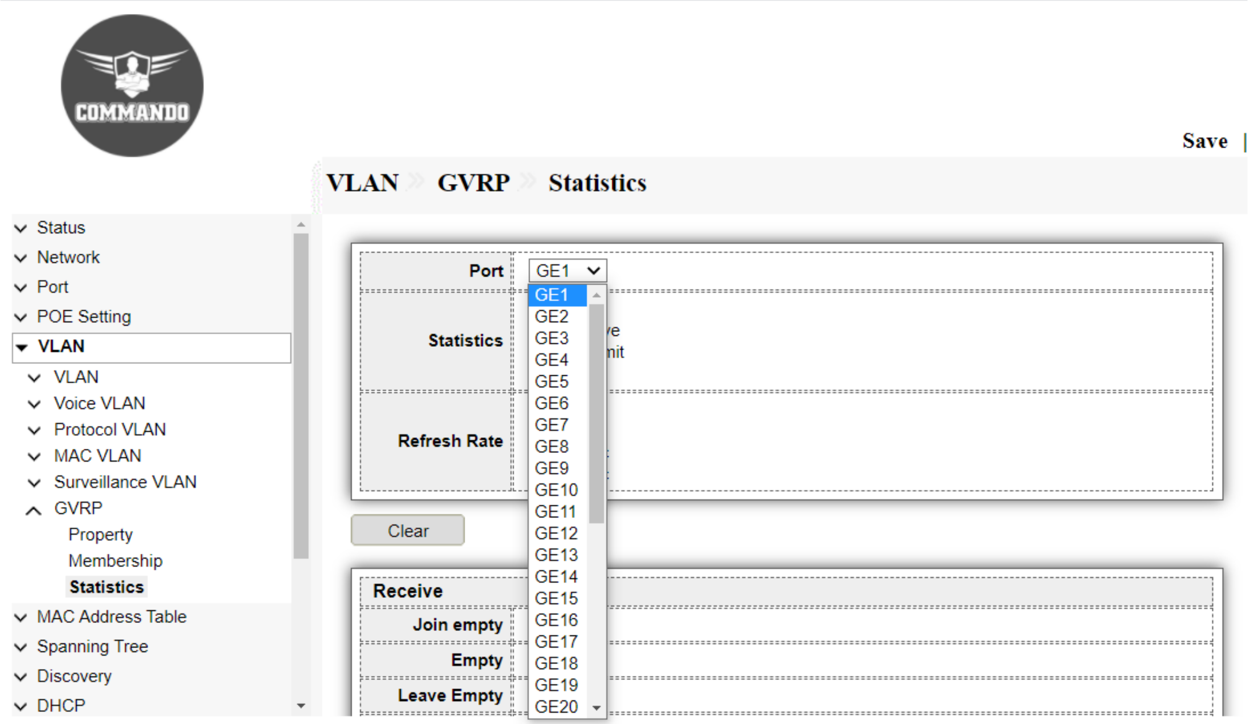


VLAN » GVRP » Statistics

Port	GE1
Statistics	● All ○ Receive ○ Transmit ○ Error
Refresh Rate	○ None ○ 5 sec ● 10 sec ○ 30 sec

Receive	
Join empty	0
Empty	0
Leave Empty	0

Fig 5.6.7 Default GVRP statistics page



VLAN » GVRP » Statistics

Port	GE1
Statistics	
Refresh Rate	

Receive	
Join empty	
Empty	
Leave Empty	

Fig 5.6.8 GVRP statistics for particular port page

Chapter 6 MAC Address Table

Dynamic Address: In C3000 series switch, the data link layer device, maintains a MAC address table to forward frames to the destination port. The MAC address table entry on the switch is created either statically or dynamically. The Dynamic Address Table contains all of the MAC addresses that are obtained from the incoming traffic to the switch.

Static Address: Static MAC addresses are entered manually into the MAC address table.

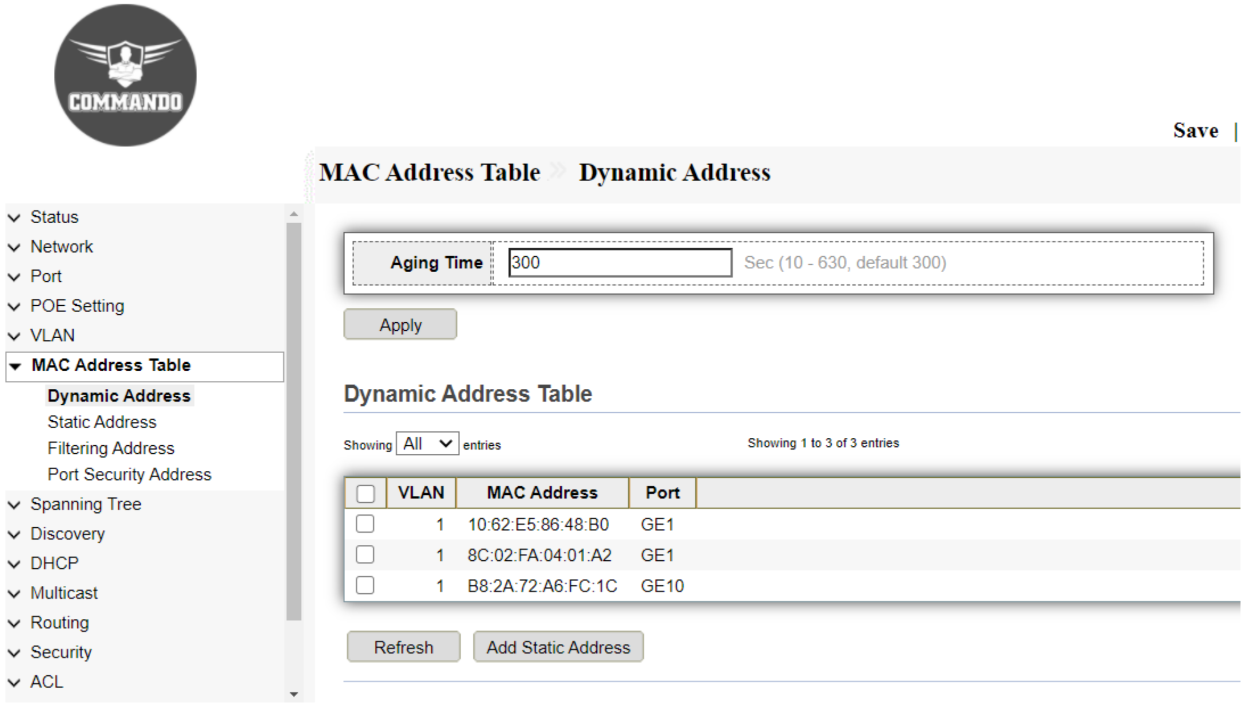
Filtering Address: MAC address filtering allows you to define a list of devices and only allow those devices on your LAN network.

Port Security Address: By using port security, a network administrator can associate specific MAC addresses with the interface.

6.1 Dynamic Address

Dynamic MAC addresses are entered into the table when the switch receives a frame whose source address is not listed in the MAC address table. The switch builds the table dynamically by referencing the source address of frames it receives.

This page shows details to add & clear the dynamic (learned) MAC, static entries from the MAC address table, the specific interface, or the specific VLAN. To view Dynamic Address, click **MAC Address Table >> Dynamic Address.**



MAC Address Table » Dynamic Address

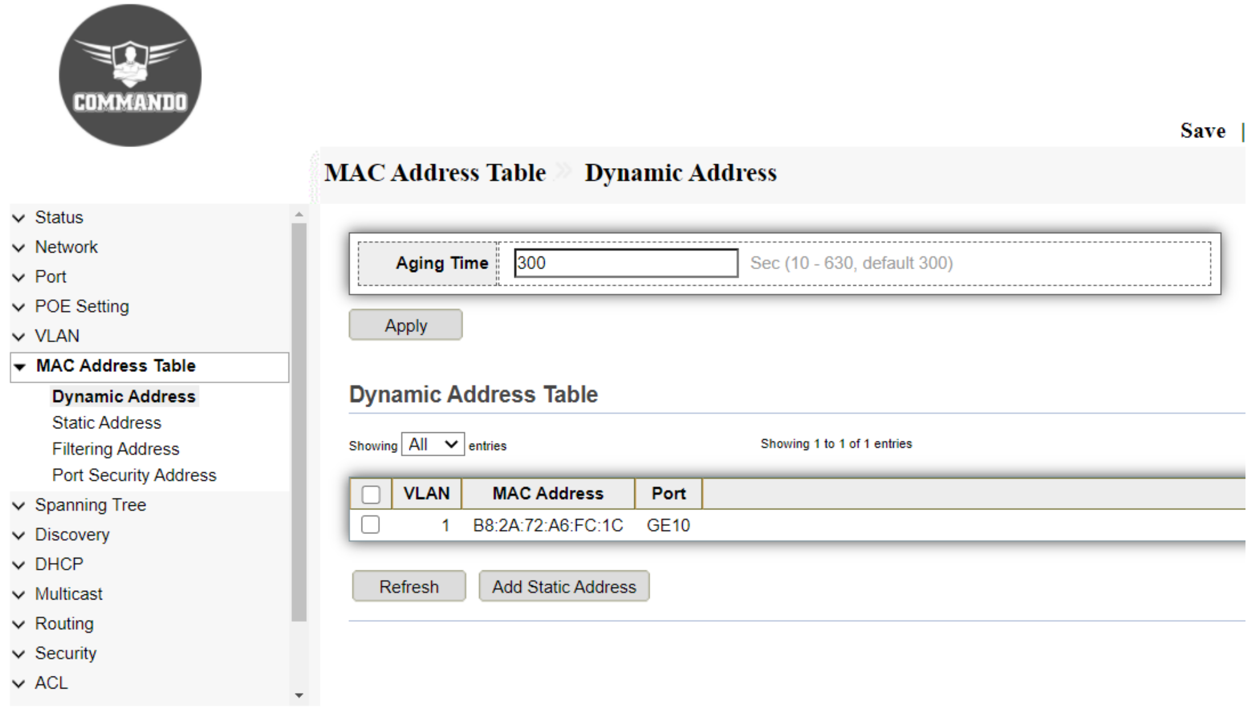
Aging Time: 300 Sec (10 - 630, default 300)

Dynamic Address Table

Showing All entries — Showing 1 to 3 of 3 entries

□	VLAN	MAC Address	Port
□	1	10:62:E5:86:48:B0	GE1
□	1	8C:02:FA:04:01:A2	GE1
□	1	B8:2A:72:A6:FC:1C	GE10

Fig 6.1.1 Dynamic MAC address table page



MAC Address Table » Dynamic Address

Aging Time: 300 Sec (10 - 630, default 300)

Dynamic Address Table

Showing All entries

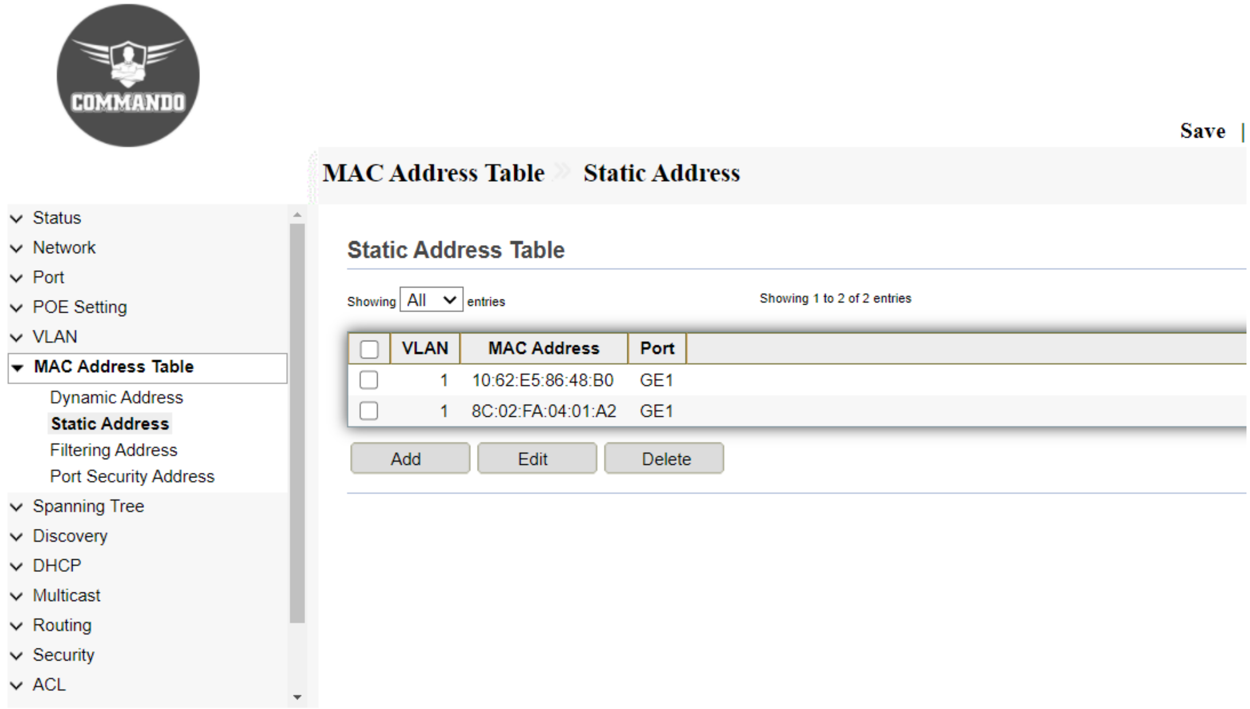
Showing 1 to 1 of 1 entries

□	VLAN	MAC Address	Port
□	1	B8:2A:72:A6:FC:1C	GE10

Fig 6.1.2 Add Static address from Dynamic MAC address table page

6.2 Static Address

Static MAC addresses are created manually. C3000 series switch cannot distinguish packets from authorized and unauthorized users when it learns source MAC addresses of packets to maintain the MAC address table. Therefore, if an unauthorized user uses the MAC address of an attacker as the source MAC address of attack packets and connects to another interface of the switch, the switch will learn an incorrect MAC address entry. As a result, packets destined for the authorized user are forwarded to the unauthorized user. To improve security, you can create static MAC address entries to bind MAC addresses of authorized users to specified interfaces. This prevents unauthorized users from intercepting data of authorized users. A static MAC address entry will not be aged out. After being created, a static MAC address entry will not be lost after a system restart if configuration is saved and can only be deleted manually. The VLAN bound to a static MAC address entry must already exist and be assigned to the interface bound to the entry. The MAC address in a static MAC address entry must be a unicast MAC address, and cannot be a multicast or broadcast MAC address. To configure and view the Static Address, click **MAC Address Table >> Static Address.**



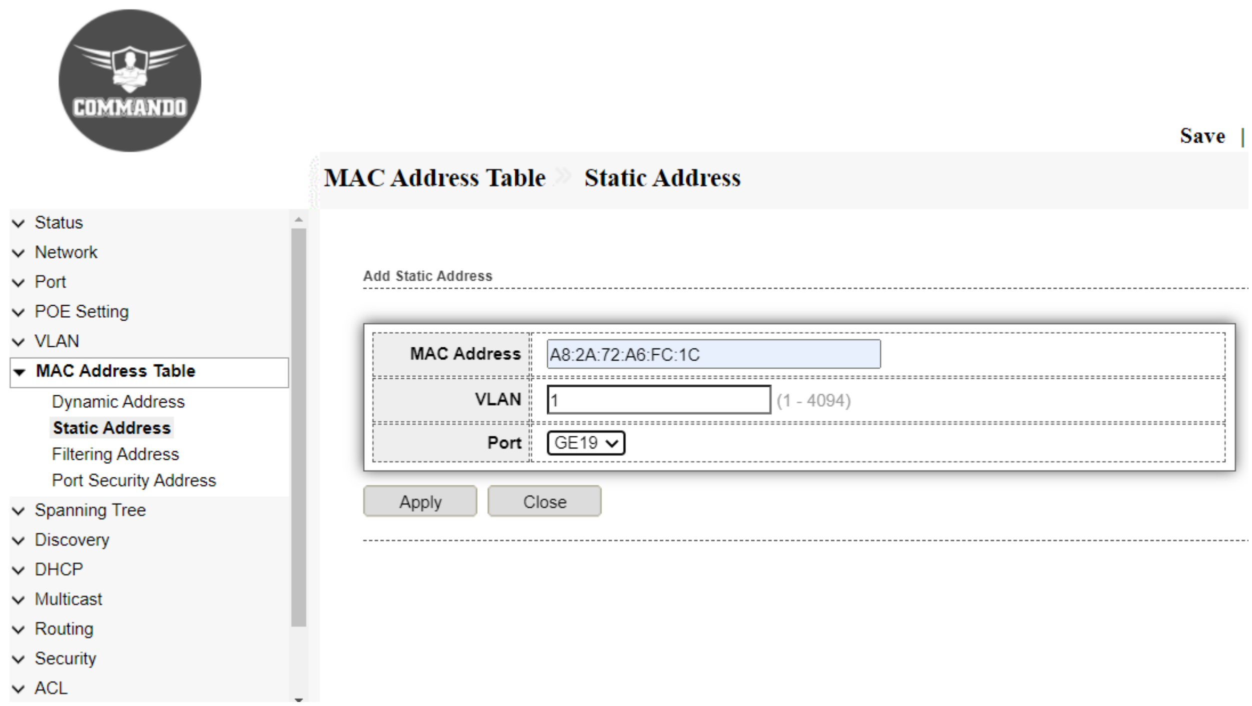
Static Address Table

Showing All entries

Showing 1 to 2 of 2 entries

□	VLAN	MAC Address	Port
□	1	10:62:E5:86:48:B0	GE1
□	1	8C:02:FA:04:01:A2	GE1

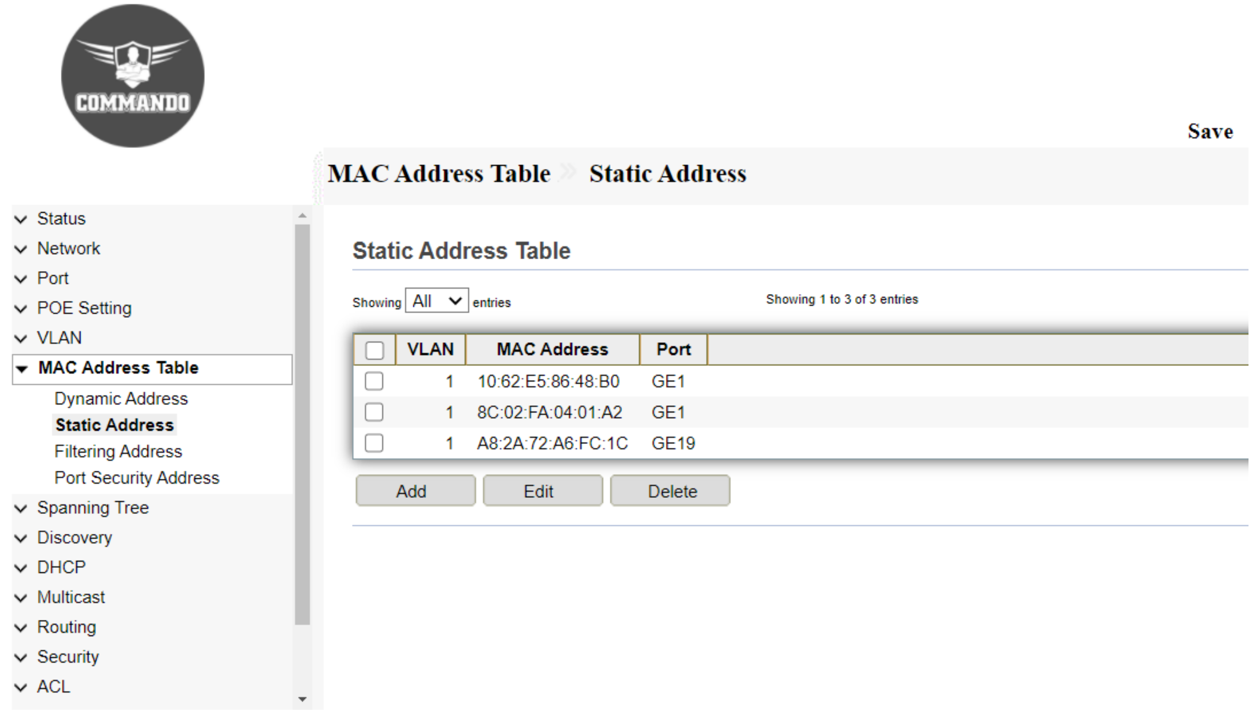
Fig 6.2.1 Default Static MAC address table default page



Add Static Address

MAC Address	A8:2A:72:A6:FC:1C
VLAN	1 (1 - 4094)
Port	GE19

Fig 6.2.2 Add Static MAC address to specified VLAN and port page



Static Address Table

Showing All entries

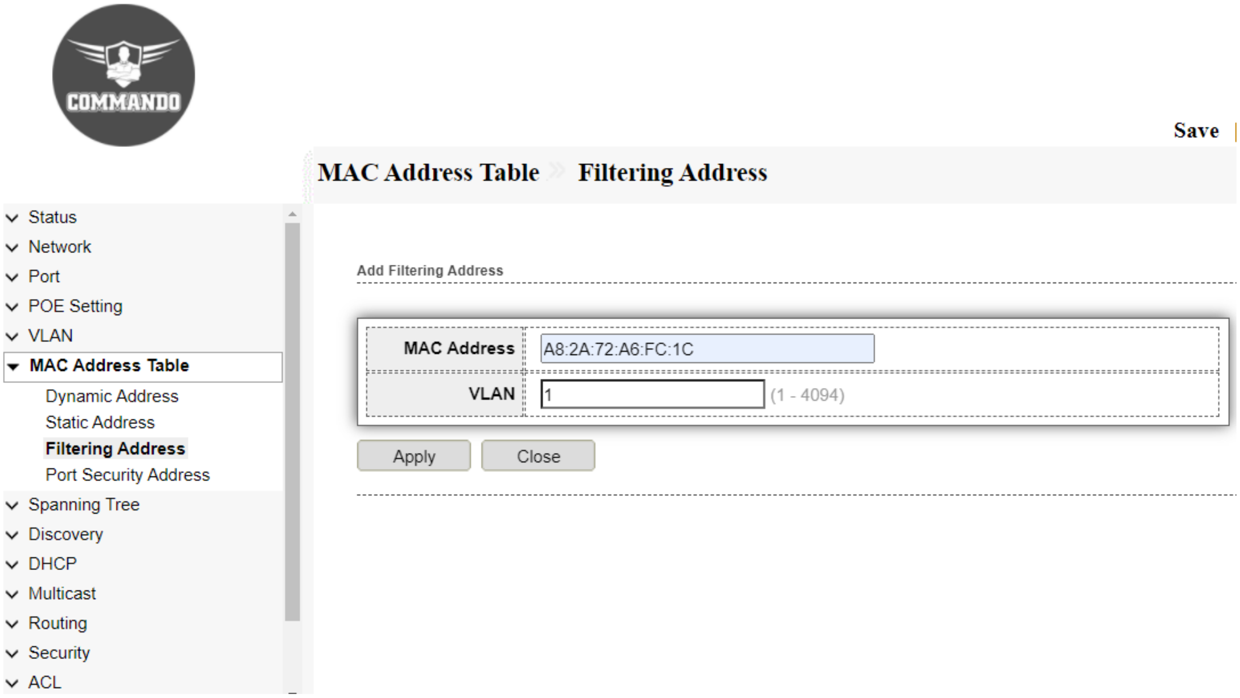
Showing 1 to 3 of 3 entries

□	VLAN	MAC Address	Port
□	1	10:62:E5:86:48:B0	GE1
□	1	8C:02:FA:04:01:A2	GE1
□	1	A8:2A:72:A6:FC:1C	GE19

Fig 6.2.3 Static MAC address table After adding MAC address page

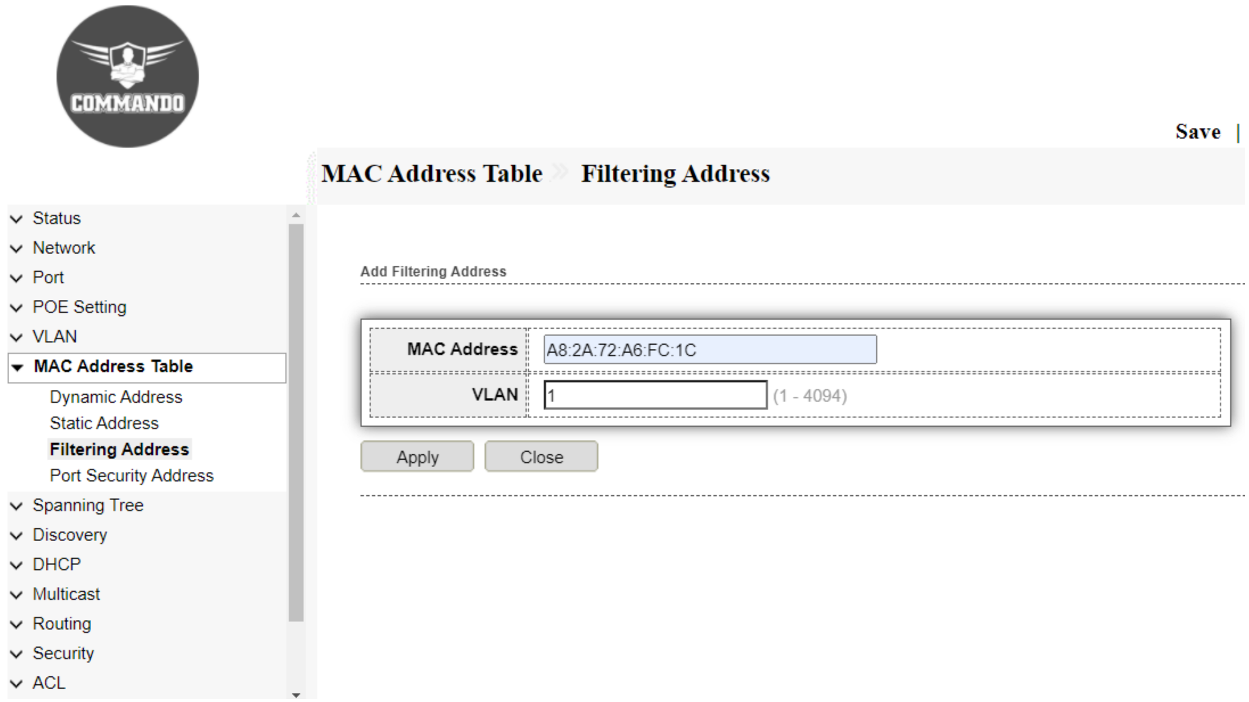
6.3 Filtering Address

MAC address filtering allows you to define a list of devices and only allow those devices on your LAN. MAC address filtering to prevent unauthorized network access. By MAC address filtering, you can allow only permitted devices to access the network. To configure and view the Filtering Address , click **MAC Address Table >> Filtering Address.**



MAC Address	A8:2A:72:A6:FC:1C
VLAN	1 (1 - 4094)

Fig 6.3.1 Filtering address table default page



Add Filtering Address

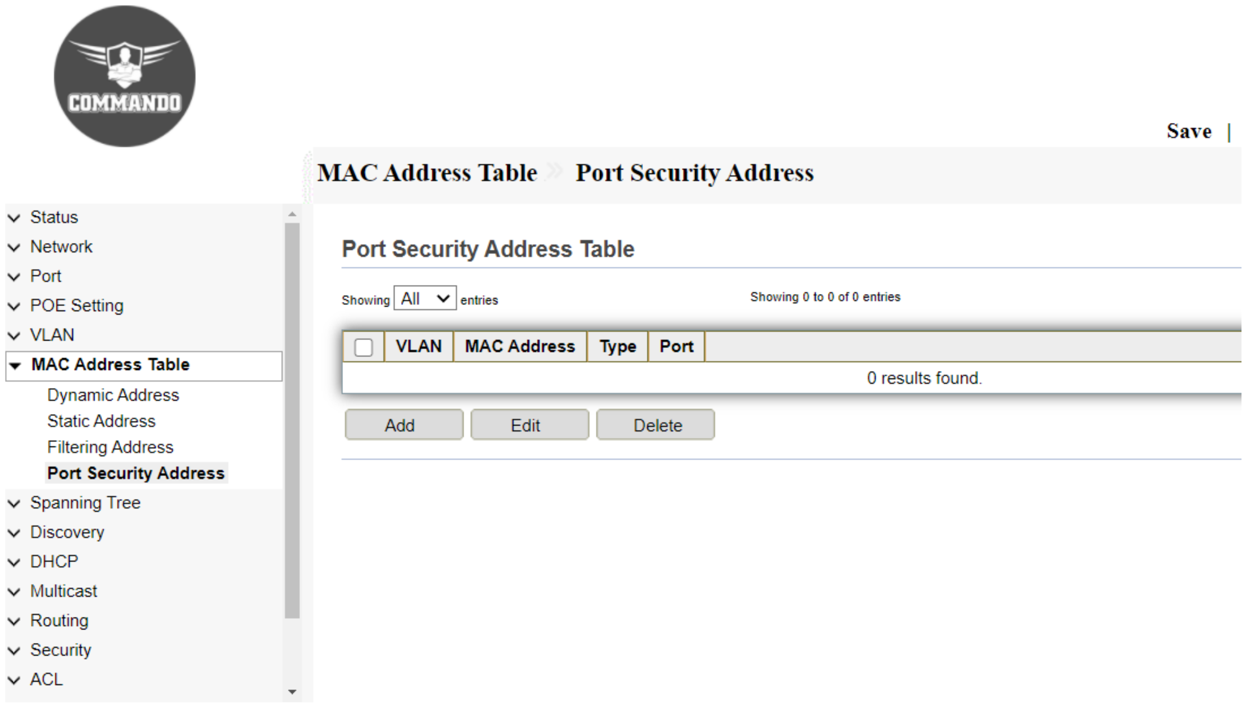
MAC Address	A8:2A:72:A6:FC:1C
VLAN	1 (1 - 4094)

Fig 6.3.2 Add Filtering MAC address to Specified VLAN page

6.4 Port Security Address

Network security can be increased by limiting access on a port to users with specific MAC addresses. The MAC addresses can be either dynamically learned or statically configured.

Port security is a layer two traffic control feature by using port security, user can limit the number of MAC address on a port. You can use the port security feature to restrict input to an interface by limiting and identifying MAC addresses of the workstations that are allowed. By using port security, a network administrator can associate specific MAC addresses with the interface, which can prevent an attacker to connect his device. To configure and view the Port Security Address, click **MAC Address Table >> Port Security Address.**



MAC Address Table » Port Security Address

Port Security Address Table

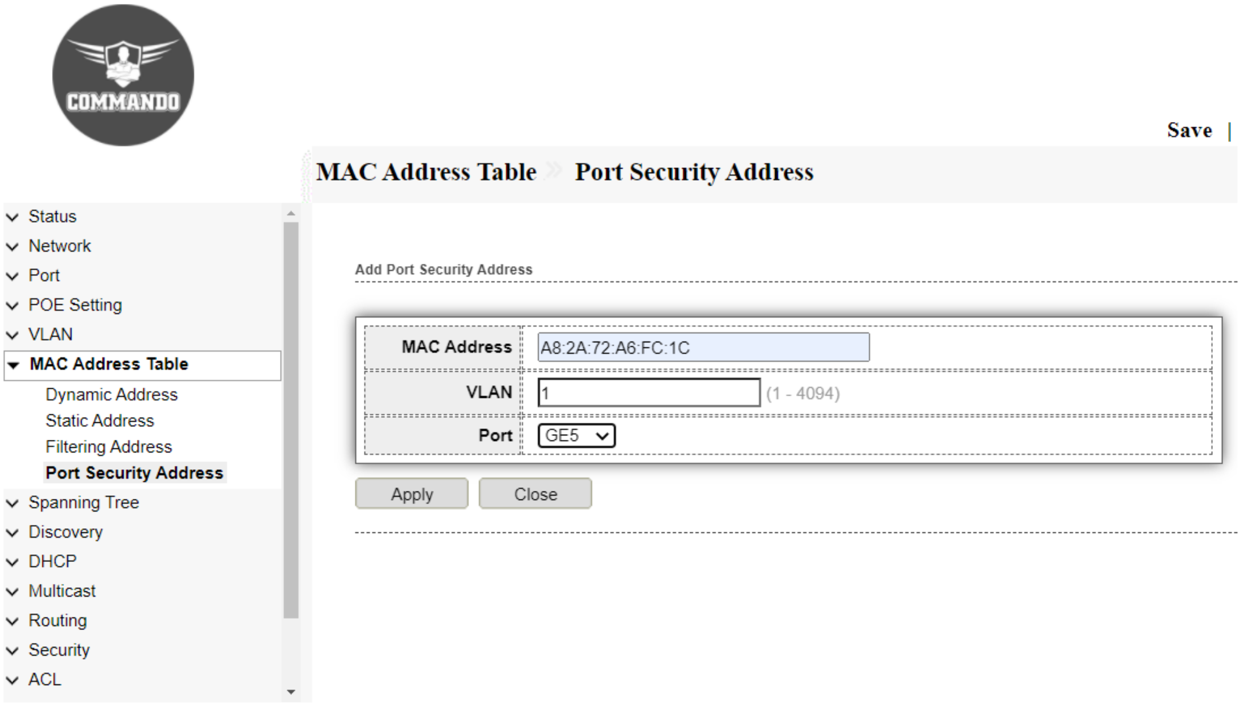
Showing All entries

Showing 0 to 0 of 0 entries

□	VLAN	MAC Address	Type	Port

0 results found.

Fig 6.4.1 Port Security address table default page



MAC Address Table » Port Security Address

Add Port Security Address

MAC Address	A8:2A:72:A6:FC:1C
VLAN	1 (1 - 4094)
Port	GE5

Fig 6.4.2 Add Port Security MAC address page

Chapter 7 Spanning Tree

Property: STP protects a Layer 2 Broadcast domain from Broadcast storms by selectively setting links to standby mode to prevent loops. In standby mode, these links temporarily stop transferring user data. After the topology changes so that the data transfer is made possible, the links are automatically re-activated.

Port Setting: By default, IEEE costs used to assign default path

costs to the STP ports. The default path cost assigned to an interface varies

according to the selected method. Short range 1 through 65,535 for port path costs.

Long the range 1 through 200,000,000 for port path costs.

MST Instance: Multiple Spanning Tree Protocol (MSTP) is used to separate the STP port state between various domains (on different VLANs).

MST Port Setting: The global MSTP configures a separate Spanning Tree for each VLAN group and blocks all but one of the possible alternate paths within each spanning tree instance.

Statistics: This option displays the STP port statistics counters in the switch.

Spanning tree protects a Layer 2 Broadcast domain from Broadcast storms by selectively setting links to standby mode to prevent loops. In standby mode, these links temporarily stop transferring user data. After the topology changes so that the data transfer is made possible, the links are automatically re-activated. STP/RSTP/MSTP to learn the topology of network and application on switch default Spanning tree setting in C3000 series switches is RSTP.

7.1 Property

Ethernet networks are susceptible to broadcast storms if loops are introduced by links. However, an Ethernet network needs to include loops because they provide redundant paths in case of a link failure. Spanning-tree protocols address both issues because they provide link redundancy while simultaneously preventing undesirable loops.

Spanning-tree protocols intelligently avoid loops in a network by creating a loop free tree topology (spanning tree) of the entire LAN network with only one available path between the tree root and a leaf. All other paths are forced into a standby or disable or redundant state. The tree root is a switch within the network elected by the STA (spanning-tree algorithm) to use when computing the best path between bridges throughout the network and the root bridge. Frames travel through the network to their destination– a leaf. A tree branch is a network segment, or link, between bridges. Switches that forward frames through an STP spanning tree are called designated bridges.

Spanning Tree Operation modes:

STP: The Spanning Tree Protocol (STP) is responsible for identifying links in the network and shutting down the redundant ones, preventing possible network loops. In order to do so, all switches in the network exchange BPDU messages between them to agree upon the root bridge. The Spanning Tree Protocol (STP) is a network protocol that builds a loop-free logical topology for Ethernet networks. The basic function of STP is to prevent bridge loops and the broadcast radiation that results from them. Spanning tree also allows a network design to include backup links providing fault tolerance if an active link fails. Provides a single path between any two end stations, avoiding and eliminating loops.

Rapid STP (RSTP): Rapid Spanning Tree Protocol (RSTP) as 802.1w. RSTP provides significantly faster recovery in response to network changes or failures, introducing new convergence behaviors and bridge port roles to do this. RSTP was designed to be backwards-compatible with standard STP. Detects network topology to provide faster convergence of the spanning tree.

Multiple STP (MSTP): IEEE 802.1s MSTP (Multiple Spanning Tree Protocol) makes it possible for VLAN switching devices to use multiple Spanning Trees, allowing traffic belonging to different VLANs to flow over potentially different paths within the LAN. It builds upon the advancements of RSTP with its decreased time for network re- spans.

It detects Layer 2 loops and attempts to mitigate them by preventing the involved port from transmitting traffic. Since loops exist on a per-Layer 2-domain basis, a situation can occur where there is a loop in VLAN A and no loop in VLAN B. If both VLANs are on Port X, and STP wants to mitigate the loop, it stops traffic on the entire port, including VLAN B traffic.

Spanning Tree Property:

BPDU Handling: Select how Bridge Protocol Data Unit (BPDU) packets are managed when STP is disabled on the port or the device. BPDUs are used to transmit spanning tree information.

Filtering: Filters BPDU packets when Spanning Tree is disabled on an interface.

Flooding: Floods BPDU packets when Spanning Tree is disabled on an interface.

Path Cost Default Values: selects the method used to assign default path costs to the STP ports. The default path cost assigned to an interface varies according to the selected method.

Short: Specifies the range 1 through 65,535 for port path costs.

Long: Specifies the range 1 through 200,000,000 for port path costs.

Note: By default, C3000 Series switches use Long port path cost.

Spanning Tree Configuration:

To configure and view the Spanning Tree, click **Spanning Tree >> Property.**

Note: By default, RSTP is enabled on C3000 Series switch.

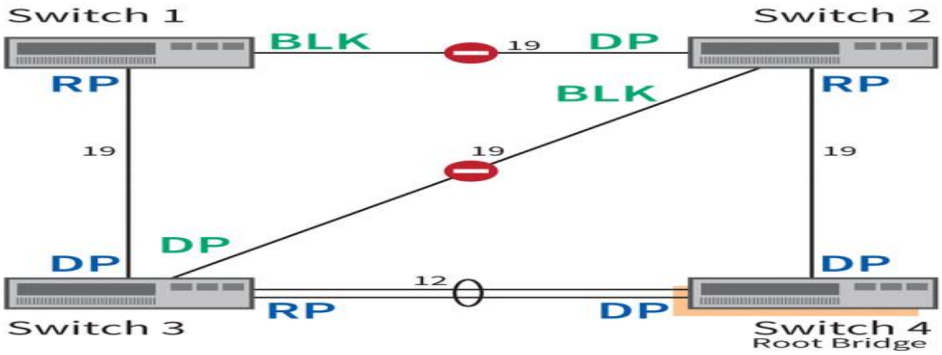
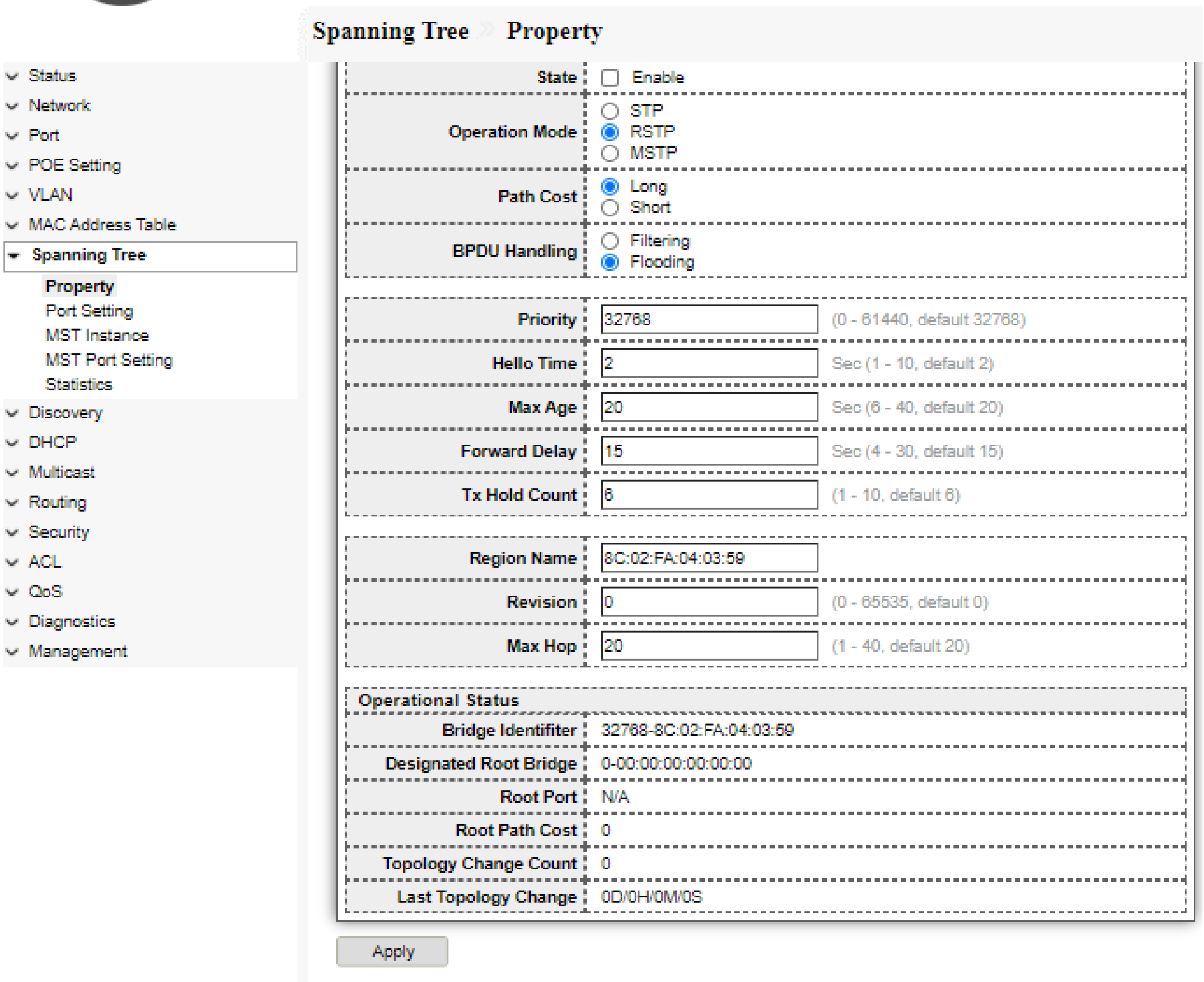


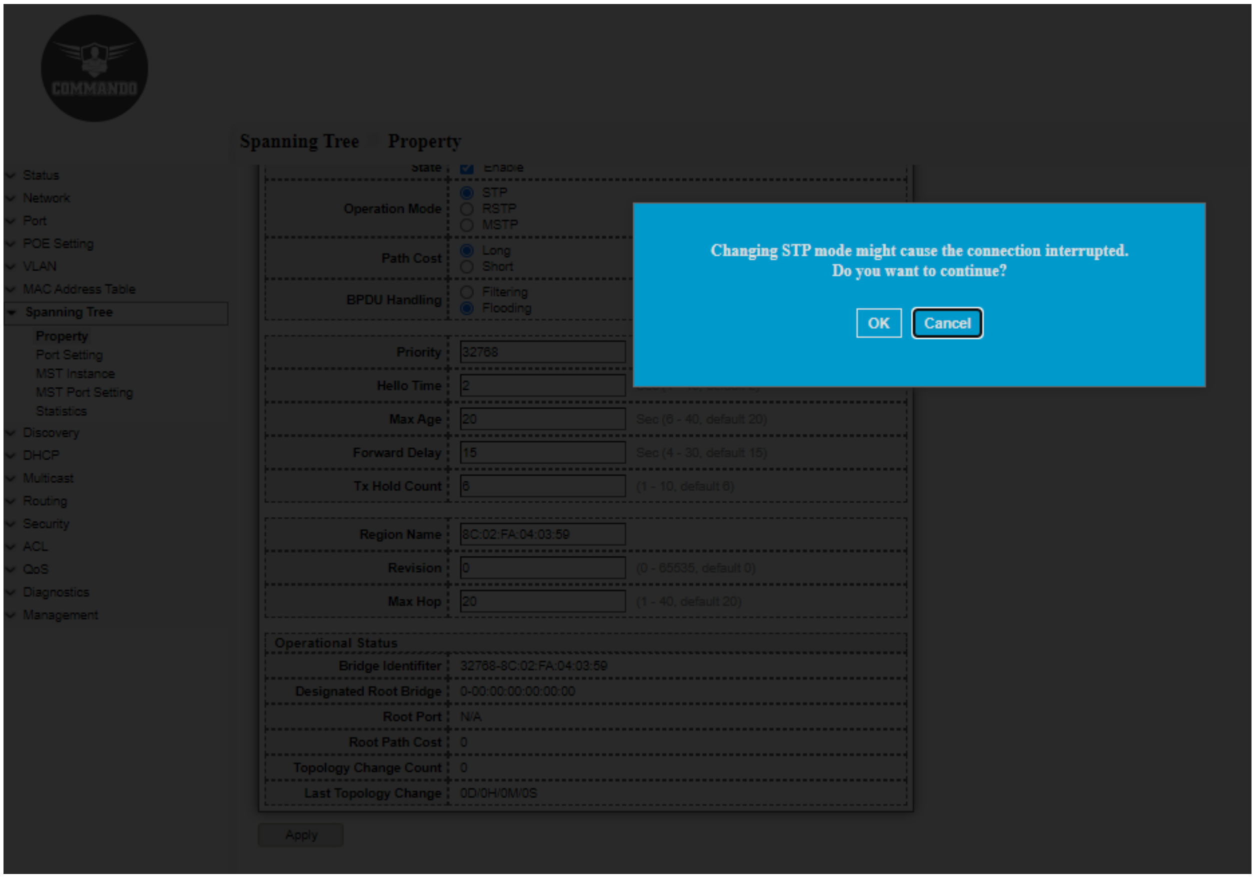
Fig 7.1.1 Spanning Tree enabled network Changed topology .



State	□ Enable	
Operation Mode	○ STP ● RSTP ○ MSTP	
Path Cost	● Long ○ Short	
BPDU Handling	○ Filtering ● Flooding	
Priority	32768	(0 - 61440, default 32768)
Hello Time	2	Sec (1 - 10, default 2)
Max Age	20	Sec (6 - 40, default 20)
Forward Delay	15	Sec (4 - 30, default 15)
Tx Hold Count	6	(1 - 10, default 6)
Region Name	8C:02:FA:04:03:59	
Revision	0	(0 - 65535, default 0)
Max Hop	20	(1 - 40, default 20)

Operational Status	
Bridge Identifiter	32768-8C:02:FA:04:03:59
Designated Root Bridge	0-00:00:00:00:00:00
Root Port	N/A
Root Path Cost	0
Topology Change Count	0
Last Topology Change	0D/0H/0M/0S

Fig 7.1.2 Default Spanning Tree property page



Spanning Tree Property

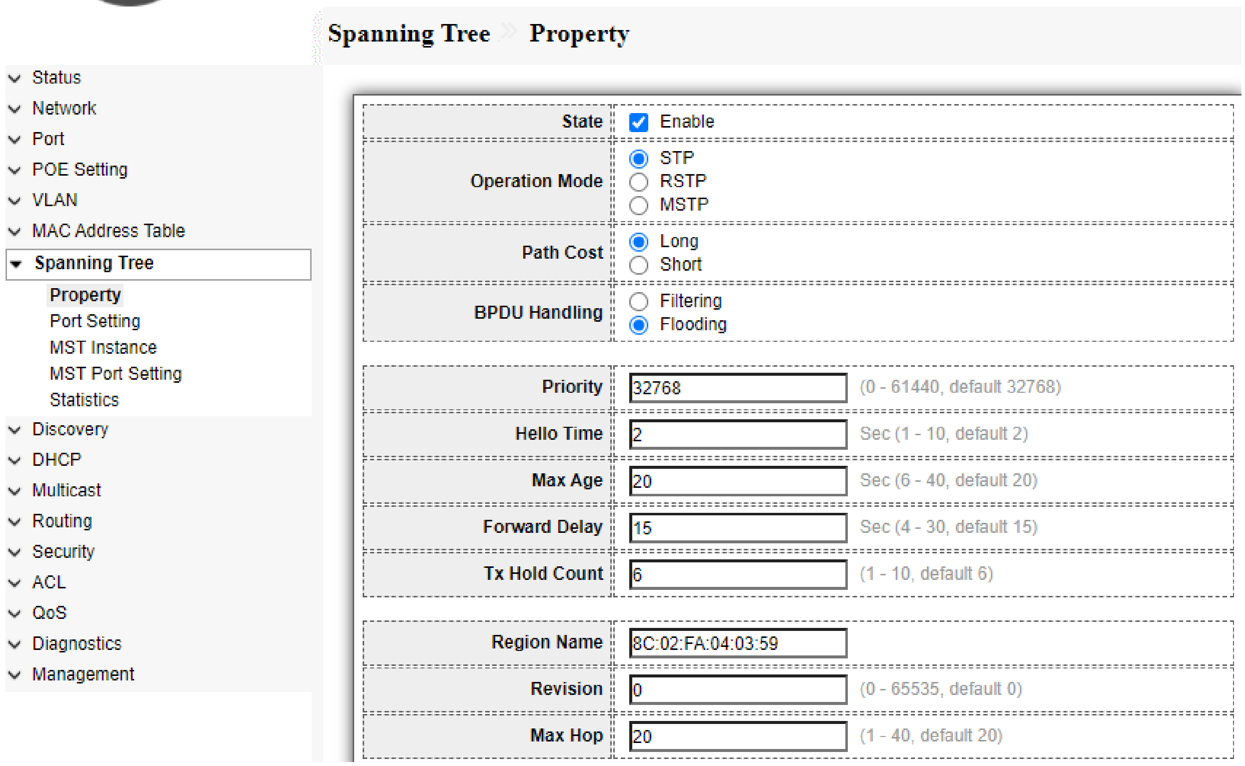
State	☑ Enable
Operation Mode	● STP ○ RSTP ○ MSTP
Path Cost	● Long ○ Short
BPDU Handling	○ Filtering ● Flooding
Priority	32768
Hello Time	2
Max Age	20 Sec (6 - 40, default 20)
Forward Delay	15 Sec (4 - 30, default 15)
Tx Hold Count	6 (1 - 10, default 6)
Region Name	8C:02:FA:04:03:59
Revision	0 (0 - 65535, default 0)
Max Hop	20 (1 - 40, default 20)

Operational Status

Bridge Identifiter	32768-8C:02:FA:04:03:59
Designated Root Bridge	0-00:00:00:00:00:00
Root Port	N/A
Root Path Cost	0
Topology Change Count	0
Last Topology Change	0D/0H/0M/0S

Changing STP mode might cause the connection interrupted.
Do you want to continue?

Fig 7.1.3 Change Spanning Tree mode property page



Spanning Tree » Property

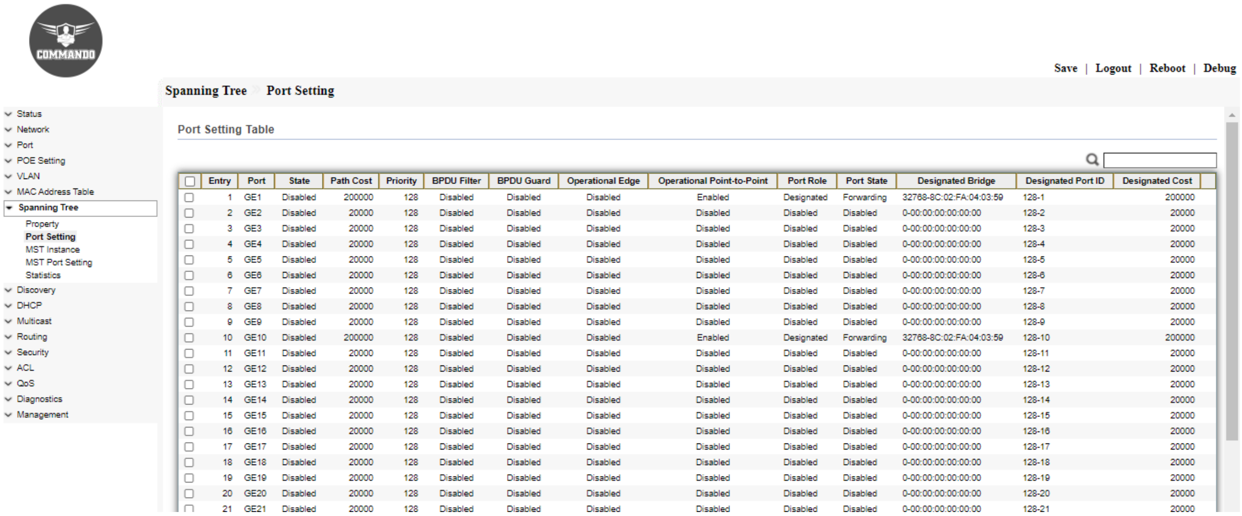
State	☑ Enable
Operation Mode	● STP ○ RSTP ○ MSTP
Path Cost	● Long ○ Short
BPDU Handling	○ Filtering ● Flooding
Priority	32768 (0 - 61440, default 32768)
Hello Time	2 Sec (1 - 10, default 2)
Max Age	20 Sec (6 - 40, default 20)
Forward Delay	15 Sec (4 - 30, default 15)
Tx Hold Count	6 (1 - 10, default 6)
Region Name	8C:02:FA:04:03:59
Revision	0 (0 - 65535, default 0)
Max Hop	20 (1 - 40, default 20)

Fig 7.1.4 Change Spanning Tree mode page

7.2 Port Setting

The STP/RSTP/MSTP Port Settings page enables you to configure STP/RSTP/MSTP on a per-port basis, and to view the information learned by the protocol, such as the designated bridge.

To configure and view the STP port settings, click **Spanning Tree >> Port Setting.**

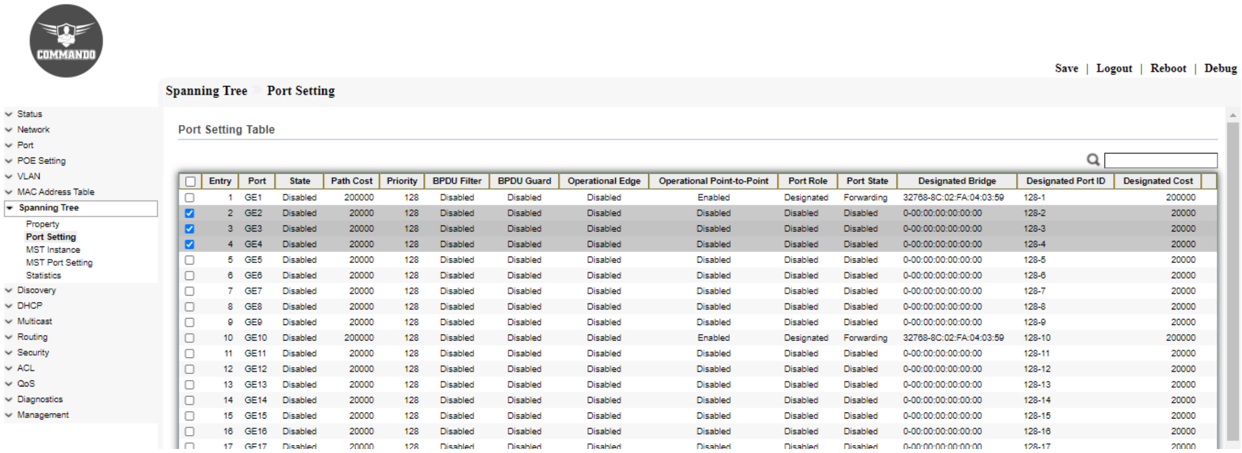


Spanning Tree » Port Setting

Port Setting Table

□	Entry	Port	State	Path Cost	Priority	BPDU Filter	BPDU Guard	Operational Edge	Operational Point-to-Point	Port Role	Port State	Designated Bridge	Designated Port ID	Designated Cost
□	1	GE1	Disabled	200000	128	Disabled	Disabled	Disabled	Enabled	Designated	Forwarding	32768-8C:02:FA:04:03:59	128-1	200000
□	2	GE2	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-2	20000
□	3	GE3	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-3	20000
□	4	GE4	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-4	20000
□	5	GE5	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-5	20000
□	6	GE6	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-6	20000
□	7	GE7	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-7	20000
□	8	GE8	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-8	20000
□	9	GE9	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-9	20000
□	10	GE10	Disabled	200000	128	Disabled	Disabled	Disabled	Enabled	Designated	Forwarding	32768-8C:02:FA:04:03:59	128-10	200000
□	11	GE11	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-11	20000
□	12	GE12	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-12	20000
□	13	GE13	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-13	20000
□	14	GE14	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-14	20000
□	15	GE15	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-15	20000
□	16	GE16	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-16	20000
□	17	GE17	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-17	20000
□	18	GE18	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-18	20000
□	19	GE19	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-19	20000
□	20	GE20	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-20	20000
□	21	GE21	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-21	20000

Fig 7.2.1 Spanning tree port setting page

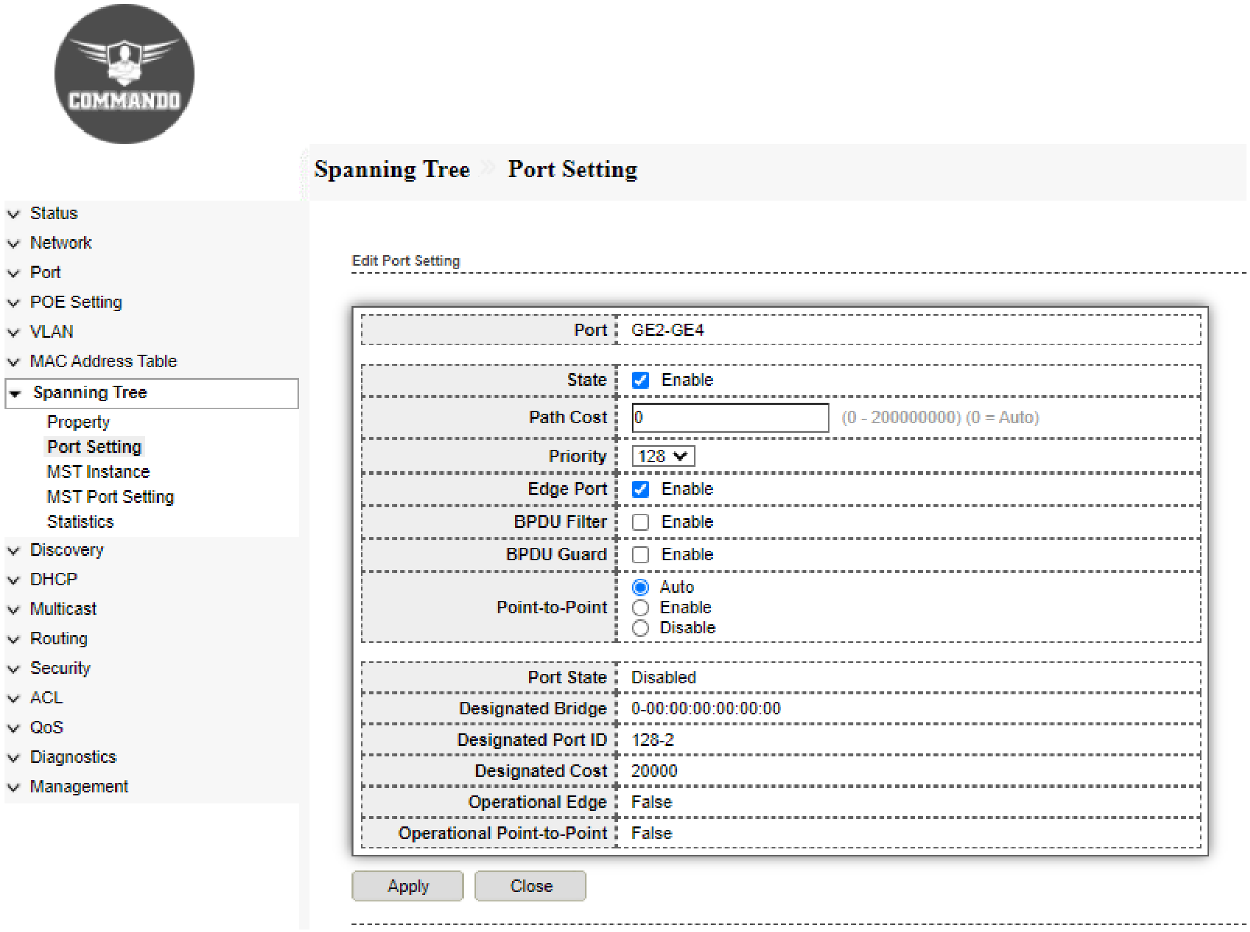


Spanning Tree » Port Setting

Port Setting Table

□	Entry	Port	State	Path Cost	Priority	BPDU Filter	BPDU Guard	Operational Edge	Operational Point-to-Point	Port Role	Port State	Designated Bridge	Designated Port ID	Designated Cost
□	1	GE1	Disabled	200000	128	Disabled	Disabled	Disabled	Enabled	Designated	Forwarding	32768-8C:02:FA:04:03:59	128-1	200000
☑	2	GE2	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-2	20000
☑	3	GE3	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-3	20000
☑	4	GE4	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-4	20000
□	5	GE5	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-5	20000
□	6	GE6	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-6	20000
□	7	GE7	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-7	20000
□	8	GE8	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-8	20000
□	9	GE9	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-9	20000
□	10	GE10	Disabled	200000	128	Disabled	Disabled	Disabled	Enabled	Designated	Forwarding	32768-8C:02:FA:04:03:59	128-10	200000
□	11	GE11	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-11	20000
□	12	GE12	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-12	20000
□	13	GE13	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-13	20000
□	14	GE14	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-14	20000
□	15	GE15	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-15	20000
□	16	GE16	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-16	20000
□	17	GE17	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-17	20000

Fig 7.2.2 Selecting port for Setting all Spanning Tree Parameters page

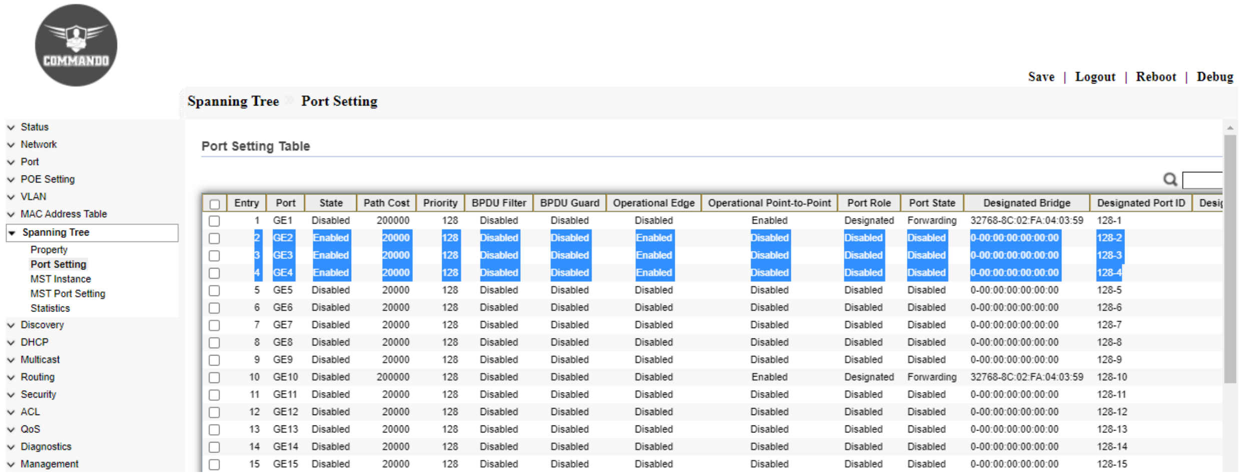


Spanning Tree » Port Setting

Edit Port Setting

Port	GE2-GE4
State	☑ Enable
Path Cost	0 (0 - 200000000) (0 = Auto)
Priority	128
Edge Port	☑ Enable
BPDU Filter	□ Enable
BPDU Guard	□ Enable
Point-to-Point	● Auto ○ Enable ○ Disable
Port State	Disabled
Designated Bridge	0-00:00:00:00:00:00
Designated Port ID	128-2
Designated Cost	20000
Operational Edge	False
Operational Point-to-Point	False

Fig 7.2.3 Setting ports for Spanning Tree Parameters page



Spanning Tree » Port Setting

Port Setting Table

□	Entry	Port	State	Path Cost	Priority	BPDU Filter	BPDU Guard	Operational Edge	Operational Point-to-Point	Port Role	Port State	Designated Bridge	Designated Port ID	Desi
□	1	GE1	Disabled	200000	128	Disabled	Disabled	Disabled	Enabled	Designated	Forwarding	32768-8C:02:FA:04:03:59	128-1	
□	2	GE2	Enabled	20000	128	Disabled	Disabled	Enabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-2	
□	3	GE3	Enabled	20000	128	Disabled	Disabled	Enabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-3	
□	4	GE4	Enabled	20000	128	Disabled	Disabled	Enabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-4	
□	5	GE5	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-5	
□	6	GE6	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-6	
□	7	GE7	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-7	
□	8	GE8	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-8	
□	9	GE9	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-9	
□	10	GE10	Disabled	200000	128	Disabled	Disabled	Disabled	Enabled	Designated	Forwarding	32768-8C:02:FA:04:03:59	128-10	
□	11	GE11	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-11	
□	12	GE12	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-12	
□	13	GE13	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-13	
□	14	GE14	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-14	
□	15	GE15	Disabled	20000	128	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	0-00:00:00:00:00:00	128-15	

Fig 7.2.4 Spanning tree Port setting Table page

7.3 MST Instance

MSTP supports multiple instances on a single physical interface. MSTP is an extension of RSTP that maps multiple independent spanning-tree instances onto one physical topology. Each spanning-tree instance (STI) includes one or more VLANs. Unlike in STP and RSTP configurations, a port might belong to multiple VLANs and be dynamically blocked in one spanning-tree instance but forwarding in another. This behavior significantly improves network resource utilization by load-balancing across the network and maintaining switch CPU loads at moderate levels. MSTP also leverages the fast reconvergence time of RSTP when a network, switch, or port failure occurs within a spanning-tree instance.

MSTP creates a common and internal spanning tree (CIST) to interconnect and manage all MSTP regions and even individual devices that run RSTP or STP, which are recognized as distinct spanning-tree regions by MSTP. The CIST views each MSTP region as a virtual bridge, regardless of the actual number of devices participating in the MSTP region and enables multiple spanning-tree instances (MSTIs) to link to other regions. The CIST is a single topology that connects all switches (STP, RSTP, and MSTP devices) through an active topology, ensuring connectivity between LANs and devices within a bridged network. This functionality provided by MSTP enables you to better utilize network resources while remaining backward-compatible with older network devices. Multiple Spanning Tree Protocol (MSTP) is used to separate the STP port state between various domains (on different VLANs).

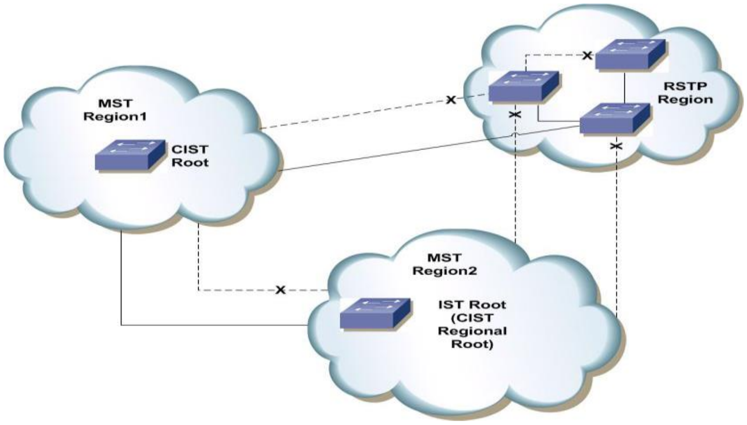
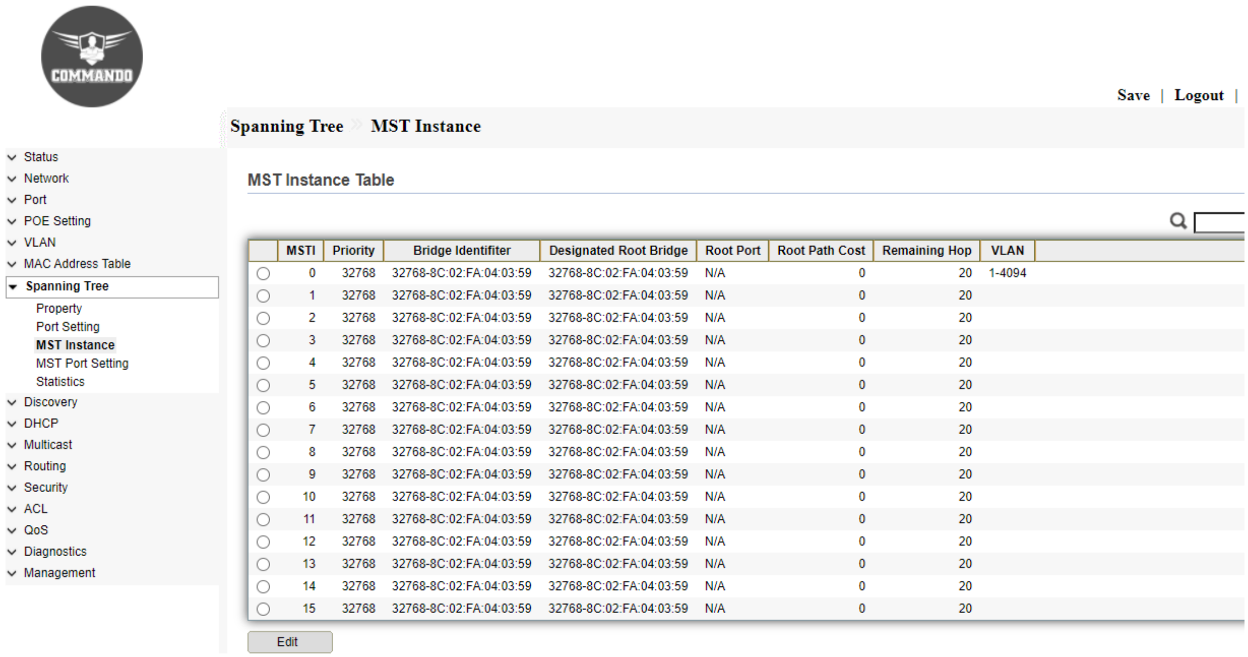


Fig 7.3.1 MST Enabled Network Topology change

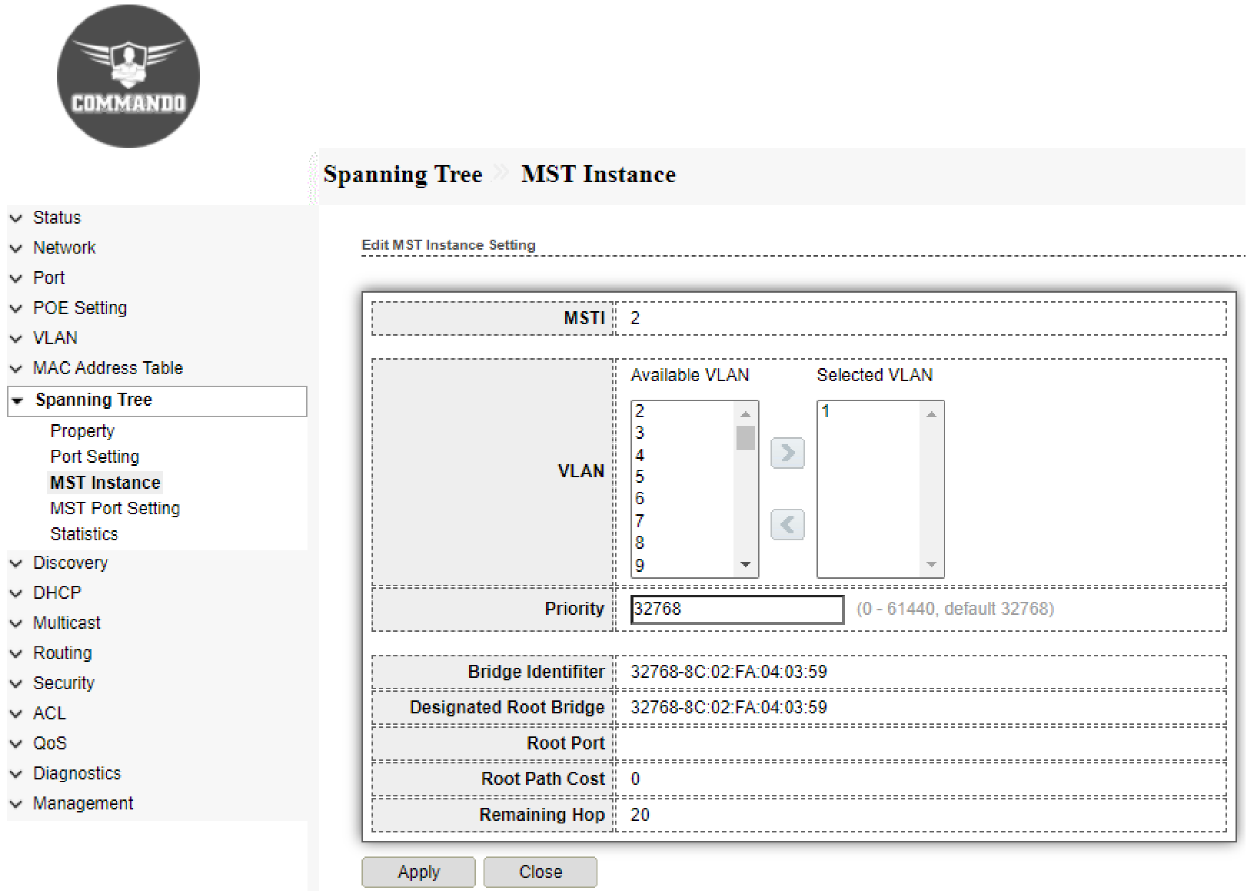
To configure and view MST instance setting, click **Spanning Tree >> MST Instance.**



MST Instance Table

	MSTI	Priority	Bridge Identifiter	Designated Root Bridge	Root Port	Root Path Cost	Remaining Hop	VLAN
○	0	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	1-4094
○	1	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	2	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	3	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	4	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	5	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	6	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	7	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	8	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	9	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	10	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	11	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	12	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	13	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	14	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	15	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	

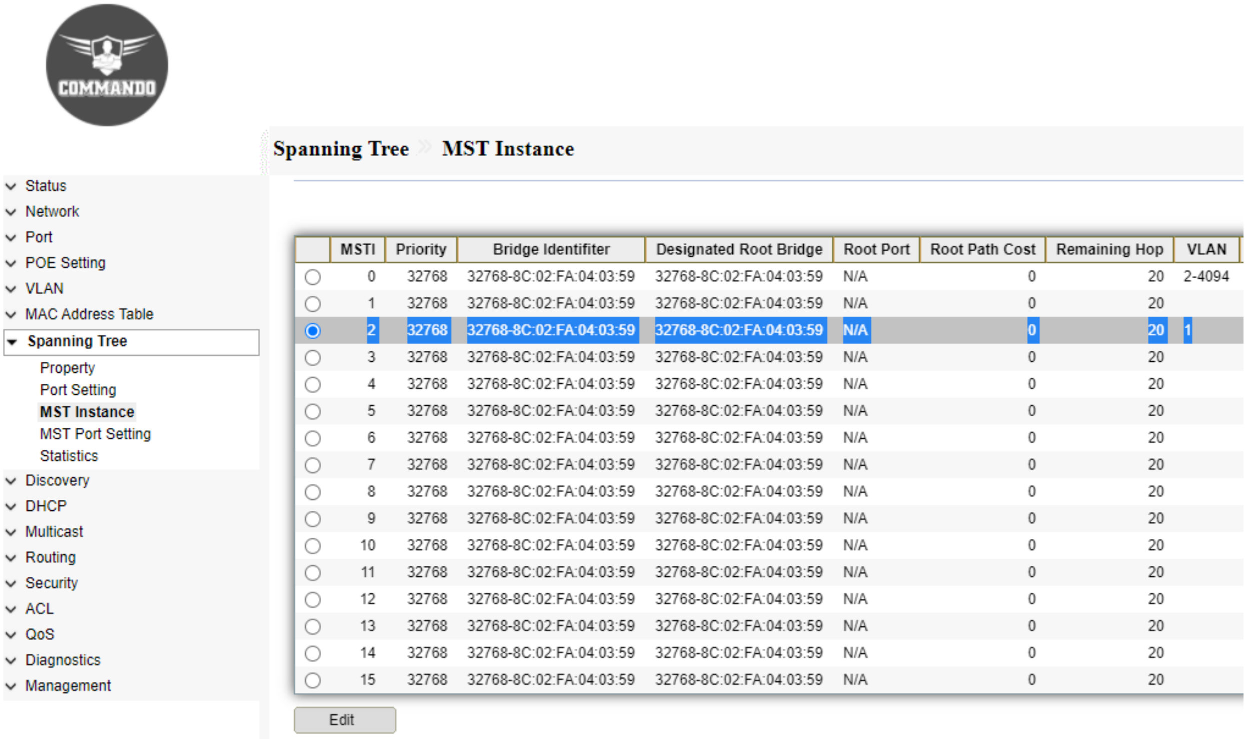
Fig 7.3.2 Spanning tree MST instance Table page



Edit MST Instance Setting

MSTI	2
VLAN	Available VLAN: 2, 3, 4, 5, 6, 7, 8, 9 Selected VLAN: 1
Priority	32768 (0 - 61440, default 32768)
Bridge Identifiter	32768-8C:02:FA:04:03:59
Designated Root Bridge	32768-8C:02:FA:04:03:59
Root Port	
Root Path Cost	0
Remaining Hop	20

Fig 7.3.3 Spanning tree MST interface setting page



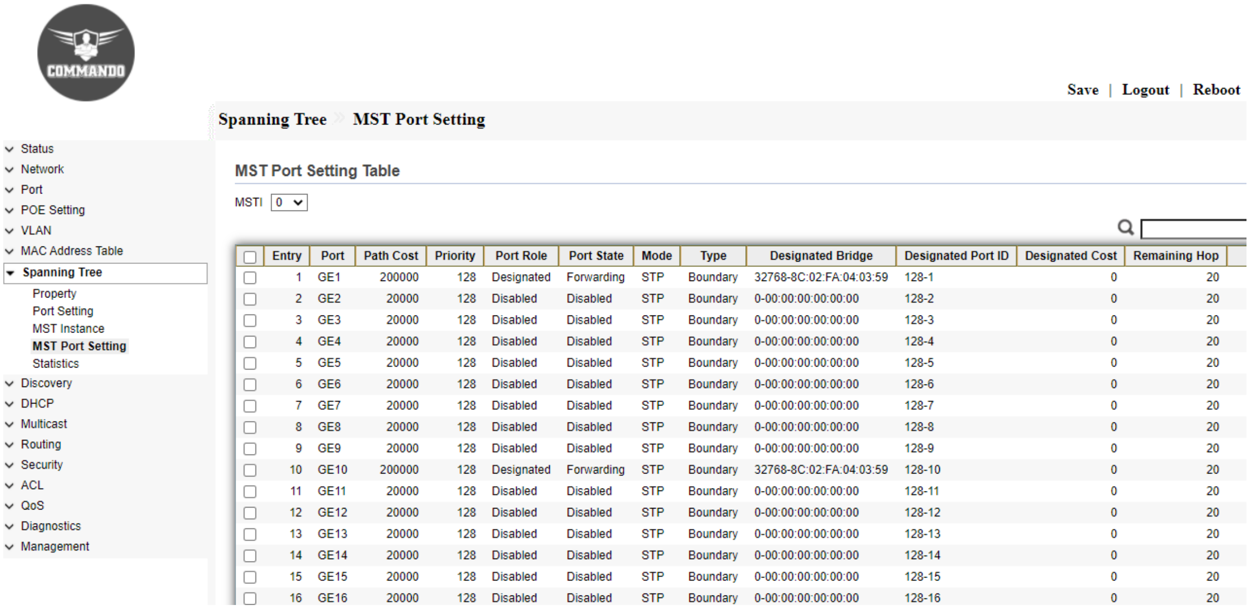
Spanning Tree » MST Instance

	MSTI	Priority	Bridge Identifiter	Designated Root Bridge	Root Port	Root Path Cost	Remaining Hop	VLAN
○	0	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	2-4094
○	1	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
●	2	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	1
○	3	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	4	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	5	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	6	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	7	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	8	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	9	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	10	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	11	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	12	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	13	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	14	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	
○	15	32768	32768-8C:02:FA:04:03:59	32768-8C:02:FA:04:03:59	N/A	0	20	

Fig 7.3.4 Spanning tree MST Instance page

7.4 MST Port Setting

The MST Port Settings page enables you to configure MST on a per-port basis, and to view the information learned by the protocol, such as the designated bridge. To configure MST port setting, click **Spanning Tree >> MST Port Setting.**

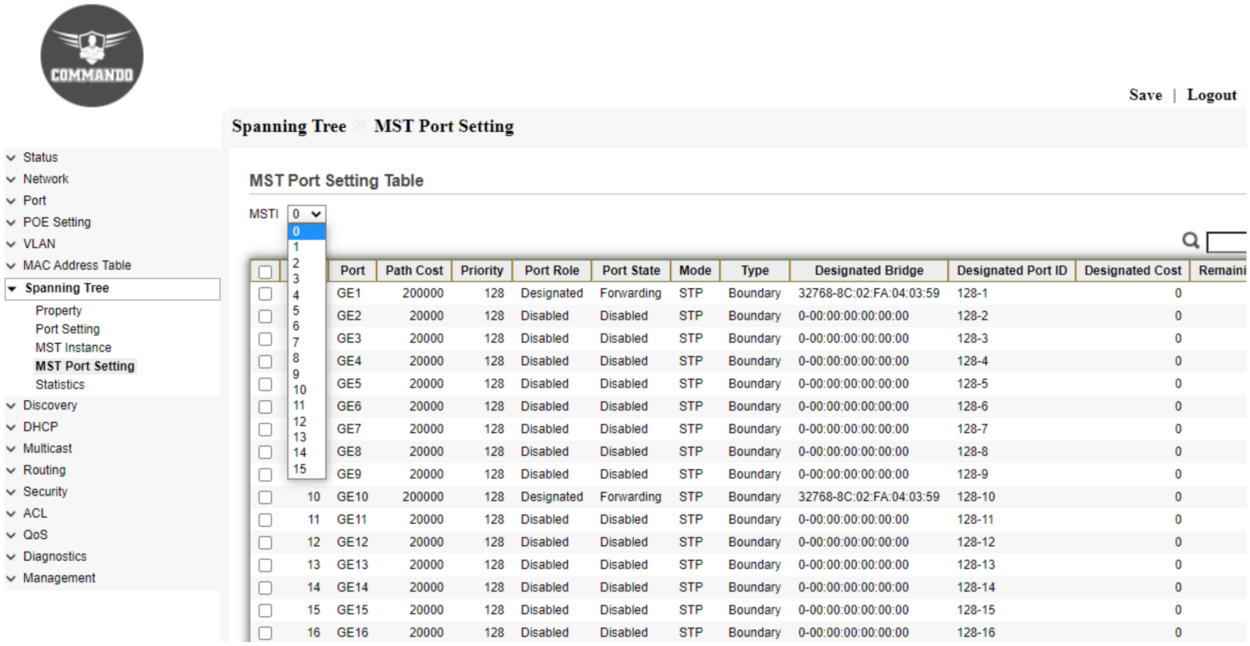


MST Port Setting Table

MSTI 0

□	Entry	Port	Path Cost	Priority	Port Role	Port State	Mode	Type	Designated Bridge	Designated Port ID	Designated Cost	Remaining Hop
□	1	GE1	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-1	0	20
□	2	GE2	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-2	0	20
□	3	GE3	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-3	0	20
□	4	GE4	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-4	0	20
□	5	GE5	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-5	0	20
□	6	GE6	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-6	0	20
□	7	GE7	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-7	0	20
□	8	GE8	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-8	0	20
□	9	GE9	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-9	0	20
□	10	GE10	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-10	0	20
□	11	GE11	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-11	0	20
□	12	GE12	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-12	0	20
□	13	GE13	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-13	0	20
□	14	GE14	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-14	0	20
□	15	GE15	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-15	0	20
□	16	GE16	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-16	0	20

Fig 7.4.1 Spanning tree MST port setting table page

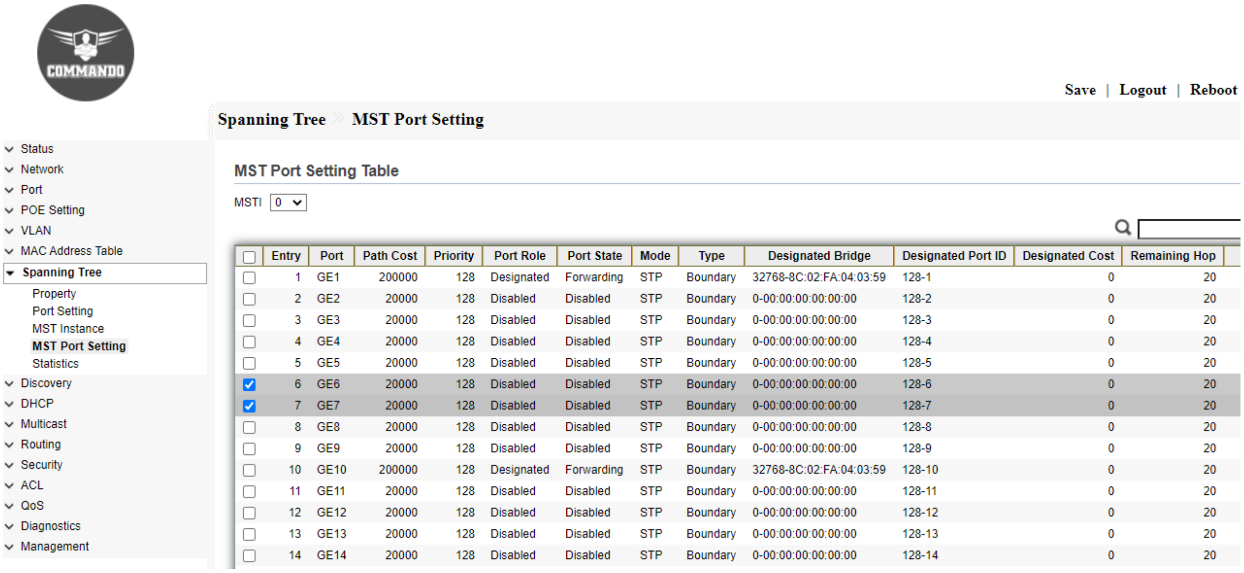


MST Port Setting Table

MSTI 0

□		Port	Path Cost	Priority	Port Role	Port State	Mode	Type	Designated Bridge	Designated Port ID	Designated Cost	Remaini
□		GE1	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-1	0	
□		GE2	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-2	0	
□		GE3	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-3	0	
□		GE4	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-4	0	
□		GE5	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-5	0	
□		GE6	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-6	0	
□		GE7	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-7	0	
□		GE8	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-8	0	
□		GE9	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-9	0	
□	10	GE10	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-10	0	
□	11	GE11	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-11	0	
□	12	GE12	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-12	0	
□	13	GE13	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-13	0	
□	14	GE14	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-14	0	
□	15	GE15	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-15	0	
□	16	GE16	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-16	0	

Fig 7.4.2 Spanning tree MST Instant selection page

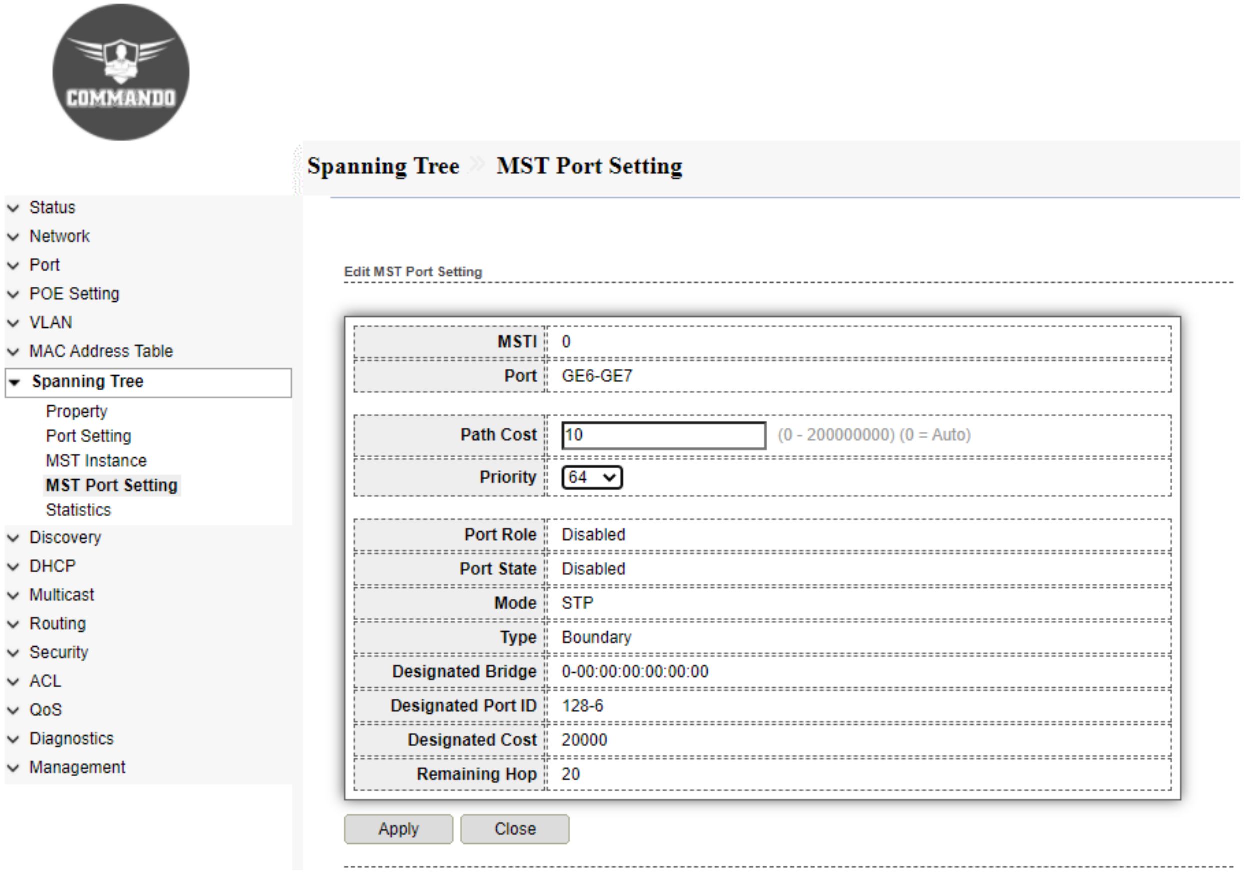


MST Port Setting Table

MSTI 0

□	Entry	Port	Path Cost	Priority	Port Role	Port State	Mode	Type	Designated Bridge	Designated Port ID	Designated Cost	Remaining Hop
□	1	GE1	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-1	0	20
□	2	GE2	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-2	0	20
□	3	GE3	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-3	0	20
□	4	GE4	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-4	0	20
□	5	GE5	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-5	0	20
☑	6	GE6	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-6	0	20
☑	7	GE7	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-7	0	20
□	8	GE8	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-8	0	20
□	9	GE9	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-9	0	20
□	10	GE10	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-10	0	20
□	11	GE11	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-11	0	20
□	12	GE12	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-12	0	20
□	13	GE13	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-13	0	20
□	14	GE14	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-14	0	20

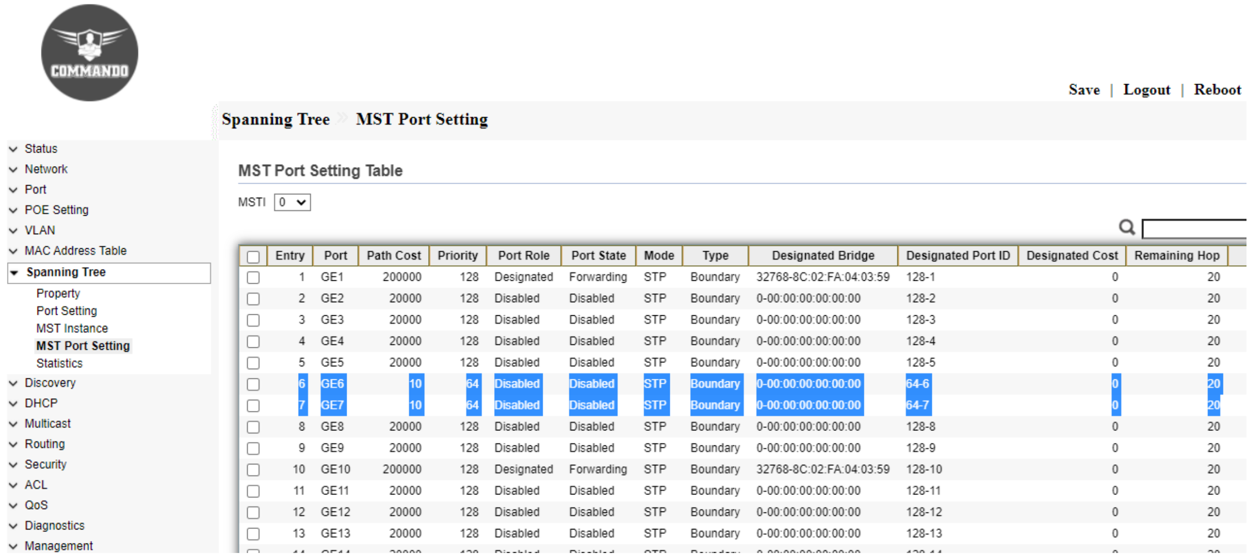
Fig 7.4.3 Spanning tree MST port selection page



Edit MST Port Setting

MSTI	0
Port	GE6-GE7
Path Cost	10 (0 - 200000000) (0 = Auto)
Priority	64
Port Role	Disabled
Port State	Disabled
Mode	STP
Type	Boundary
Designated Bridge	0-00:00:00:00:00:00
Designated Port ID	128-6
Designated Cost	20000
Remaining Hop	20

Fig 7.4.4 Edit MST port setting for selected port page



MST Port Setting Table

MSTI 0

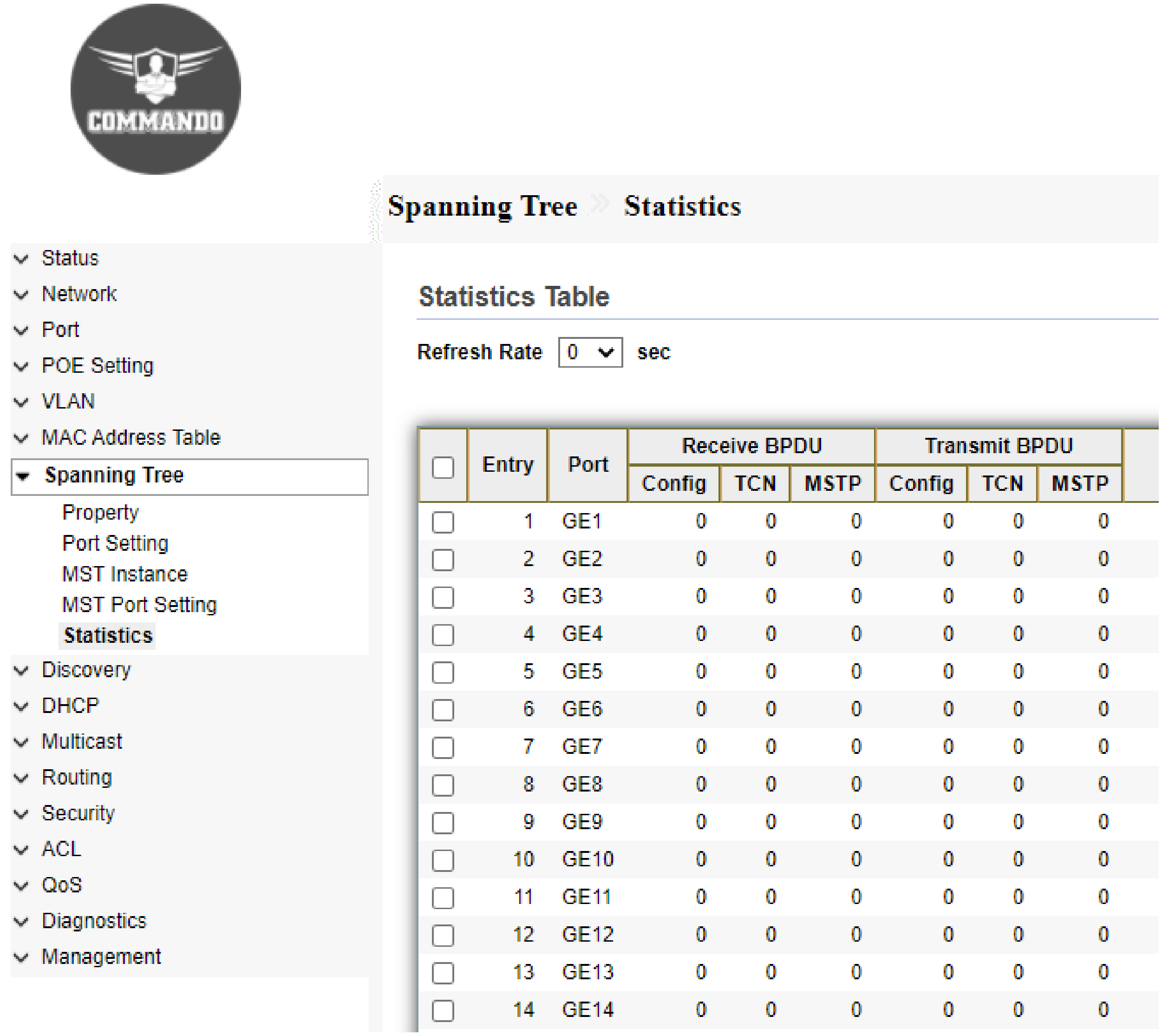
□	Entry	Port	Path Cost	Priority	Port Role	Port State	Mode	Type	Designated Bridge	Designated Port ID	Designated Cost	Remaining Hop
□	1	GE1	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-1	0	20
□	2	GE2	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-2	0	20
□	3	GE3	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-3	0	20
□	4	GE4	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-4	0	20
□	5	GE5	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-5	0	20
□	6	GE6	10	64	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	64-6	0	20
□	7	GE7	10	64	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	64-7	0	20
□	8	GE8	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-8	0	20
□	9	GE9	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-9	0	20
□	10	GE10	200000	128	Designated	Forwarding	STP	Boundary	32768-8C:02:FA:04:03:59	128-10	0	20
□	11	GE11	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-11	0	20
□	12	GE12	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-12	0	20
□	13	GE13	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-13	0	20
□	14	GE14	20000	128	Disabled	Disabled	STP	Boundary	0-00:00:00:00:00:00	128-14	0	20

Fig 7.4.5 MST port setting table page

7.5 Statistics

Display the total number of spanning tree BPDUs transmitted, received, processed, and dropped.

To View and clear Spanning Tree statistics, click **Spanning Tree >> Statistics.**

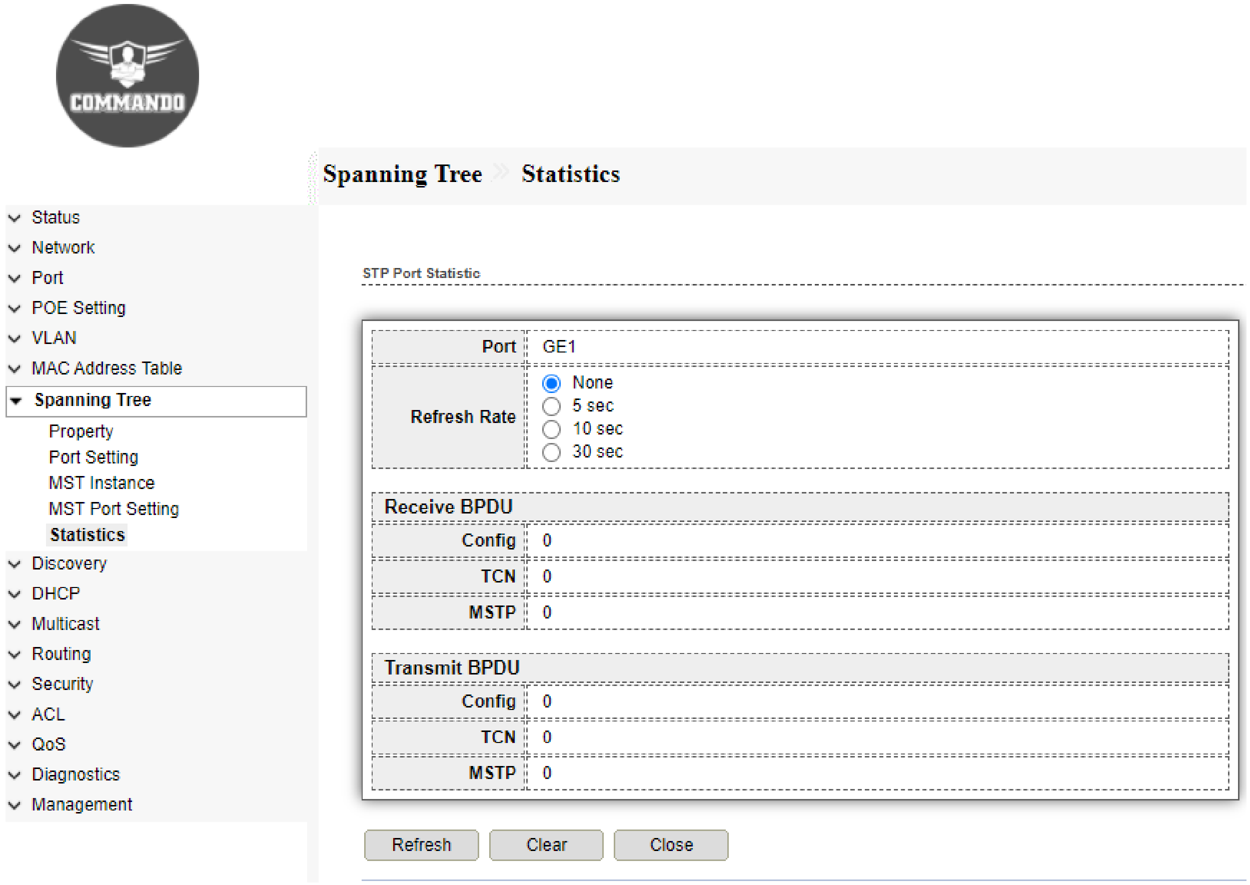


Statistics Table

Refresh Rate 0 sec

□	Entry	Port	Receive BPDU			Transmit BPDU		
			Config	TCN	MSTP	Config	TCN	MSTP
□	1	GE1	0	0	0	0	0	0
□	2	GE2	0	0	0	0	0	0
□	3	GE3	0	0	0	0	0	0
□	4	GE4	0	0	0	0	0	0
□	5	GE5	0	0	0	0	0	0
□	6	GE6	0	0	0	0	0	0
□	7	GE7	0	0	0	0	0	0
□	8	GE8	0	0	0	0	0	0
□	9	GE9	0	0	0	0	0	0
□	10	GE10	0	0	0	0	0	0
□	11	GE11	0	0	0	0	0	0
□	12	GE12	0	0	0	0	0	0
□	13	GE13	0	0	0	0	0	0
□	14	GE14	0	0	0	0	0	0

Fig 7.5.1 Spanning tree statistics table page



STP Port Statistic

Port	GE1
Refresh Rate	● None ○ 5 sec ○ 10 sec ○ 30 sec
Receive BPDU	
Config	0
TCN	0
MSTP	0
Transmit BPDU	
Config	0
TCN	0
MSTP	0

Fig 7.5.2 Spanning tree Port Statistic page

Chapter 8 Discovery

LLDP: The Link Layer Discovery Protocol (LLDP) is a vendor-neutral link layer protocol used by network devices for advertising their identity, capabilities, and neighbors on a local area network.

Property: Link Layer Discovery Protocol (LLDP) is a layer 2 neighbor discovery protocol that allows devices to advertise device information to their directly connected peers/neighbors. It is best practice to enable LLDP globally to standardize network topology across all devices if you have a multi-vendor network.

Port Setting: Configuring the LLDP Port Settings allows you to activate LLDP and SNMP notification per port and enter the Type-Length Values (TLVs) that are sent in the LLDP Protocol Data Unit (PDU).

MED Network Policy: An LLDP MED network policy is a related set of configuration settings for a specific real-time application such as voice or video. The media endpoint device should send its traffic as specified in the network policy that it receives. Network policies are associated with ports on the LLDP MED Port Settings page.

MED Port Setting: The LLDP MED Port Settings page enables the selection of LLDP-MED Type-Length Values (TLVs) and/or the network policies that are to be included in the outgoing LLDP advertisement for each interface. LLDP TLVs are used to describe individual pieces of information that the protocols transfer.

Packet View: LLDP packet view information displayed.

Local Information: This page displays the local information advertisements (TLVs) that will be transmitted by the LLDP agent.

Neighbor: The LLDP Neighbor Information page contains information that was received from neighboring devices.

Statistics: The LLDP Statistics page displays LLDP statistical information per port.

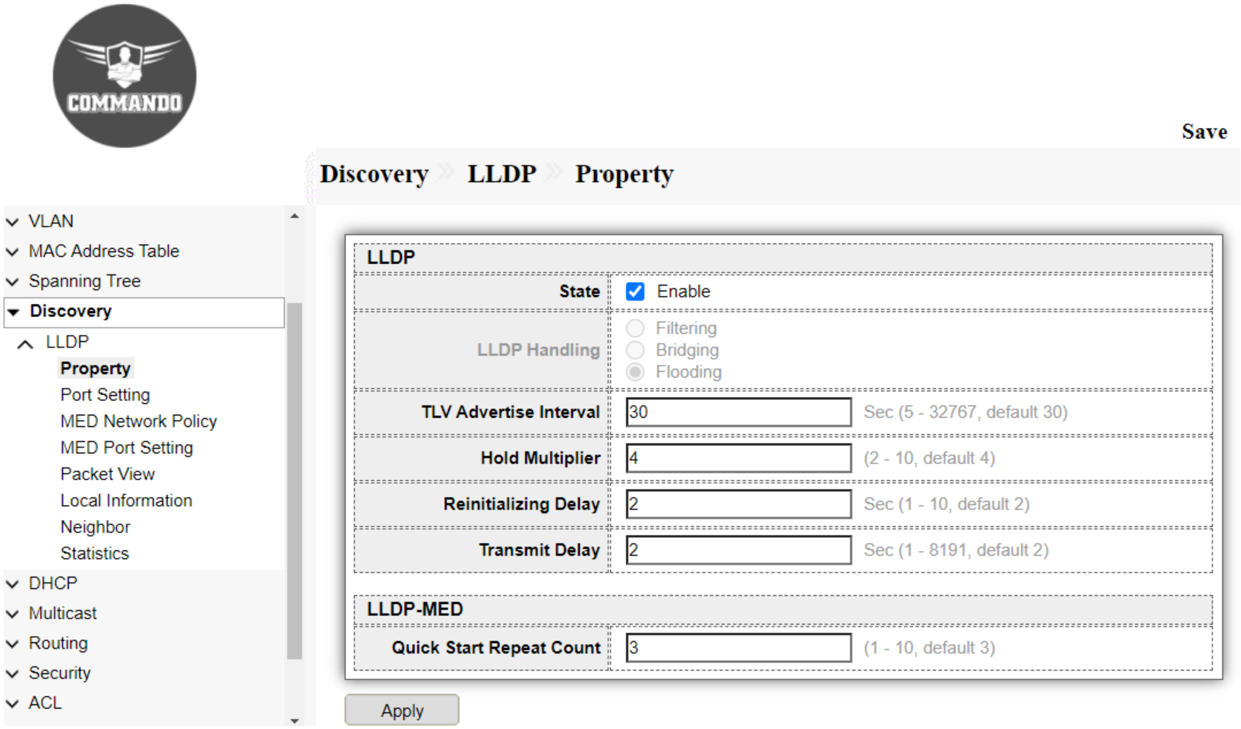
8.1 LLDP

LLDP is a protocol that enables network managers to troubleshoot and enhance network management in multi-vendor environments. LLDP standardizes methods for network devices to advertise themselves to other systems, and to store discovered information.

8.1.1 LLDP Property

The LLDP protocol has an extension called LLDP Media Endpoint Discovery (LLDP-MED), which provides and accepts information from media endpoint devices such as VoIP phones and video phones Property.

To configure LLDP Property, click **Discovery >> LLDP >> Property.**



LLDP

State	☑ Enable	
LLDP Handling	○ Filtering ○ Bridging ● Flooding	
TLV Advertise Interval	30	Sec (5 - 32767, default 30)
Hold Multiplier	4	(2 - 10, default 4)
Reinitializing Delay	2	Sec (1 - 10, default 2)
Transmit Delay	2	Sec (1 - 8191, default 2)

LLDP-MED

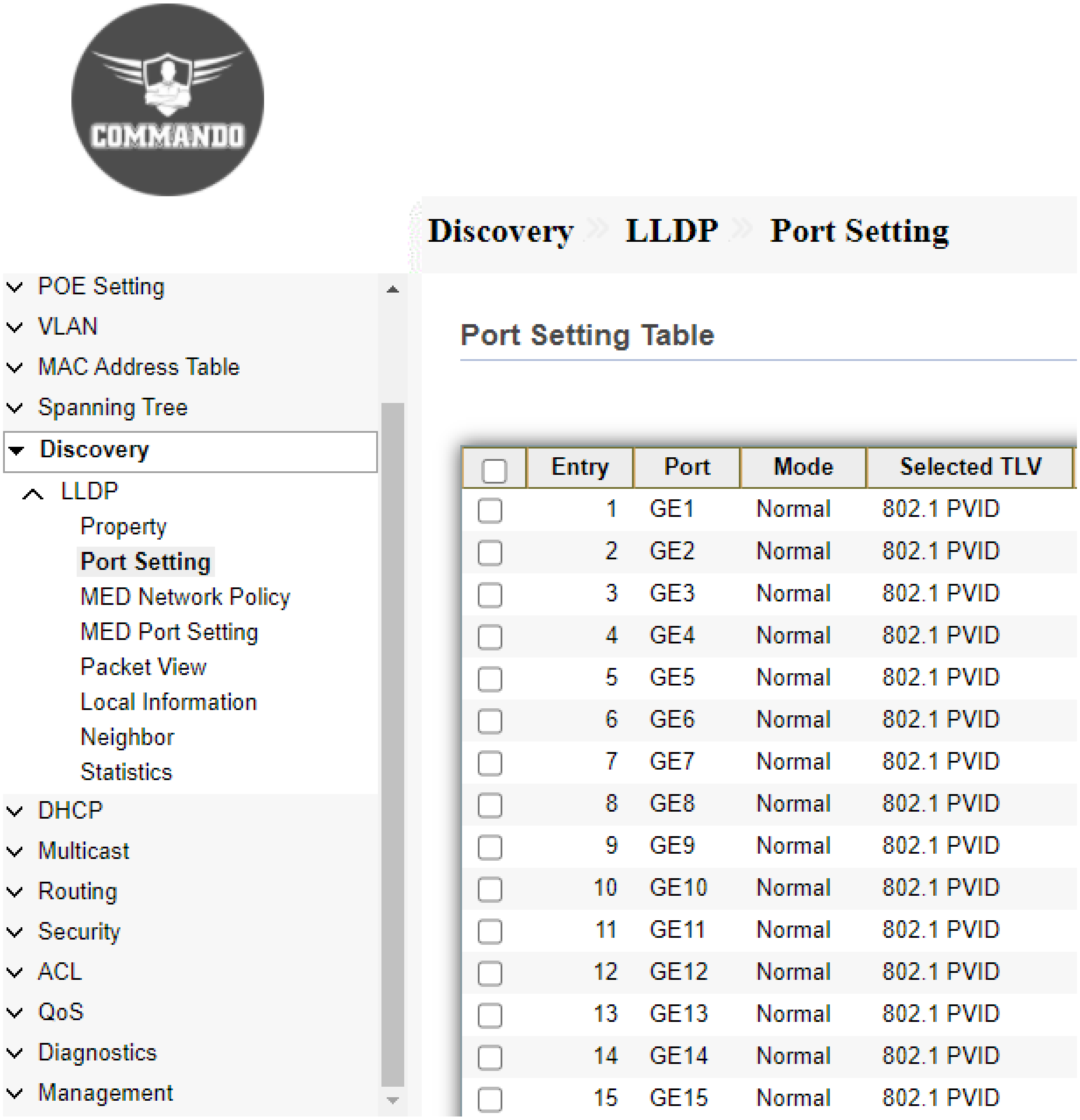
Quick Start Repeat Count	3	(1 - 10, default 3)

Fig 8.1.1 LLDP property page

8.2 Port Setting

The Port Settings page enables activating LLDP and SNMP notification per port and entering the TLVs that are sent in the LLDP PDU. The LLDP-MED TLVs to be advertised can be selected in the LLDP MED Port Settings page, and the management address TLV of the device may be configured.

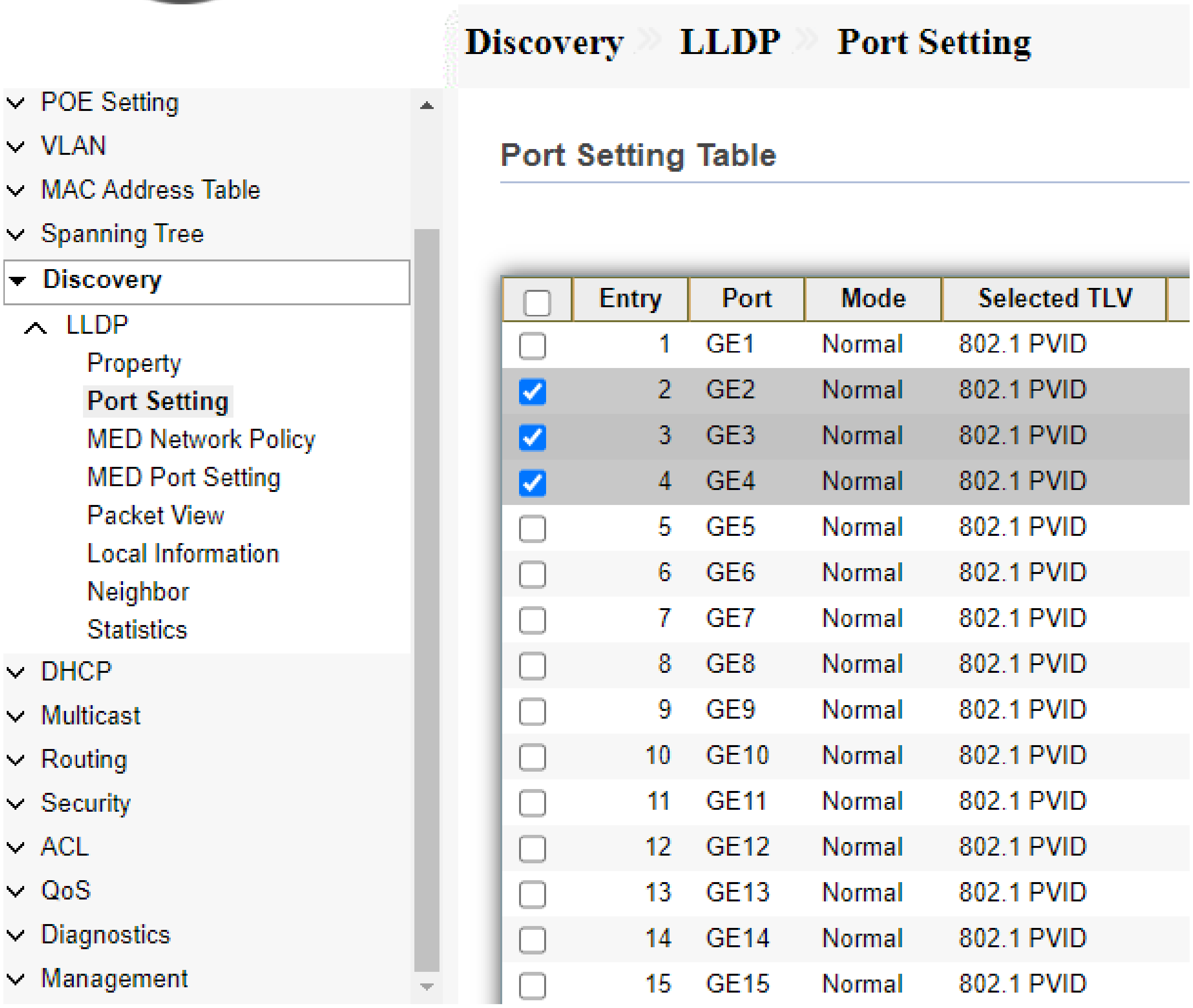
To configure LLDP Port Setting, click **Discovery > LLDP > Port Setting**



Port Setting Table

□	Entry	Port	Mode	Selected TLV
□	1	GE1	Normal	802.1 PVID
□	2	GE2	Normal	802.1 PVID
□	3	GE3	Normal	802.1 PVID
□	4	GE4	Normal	802.1 PVID
□	5	GE5	Normal	802.1 PVID
□	6	GE6	Normal	802.1 PVID
□	7	GE7	Normal	802.1 PVID
□	8	GE8	Normal	802.1 PVID
□	9	GE9	Normal	802.1 PVID
□	10	GE10	Normal	802.1 PVID
□	11	GE11	Normal	802.1 PVID
□	12	GE12	Normal	802.1 PVID
□	13	GE13	Normal	802.1 PVID
□	14	GE14	Normal	802.1 PVID
□	15	GE15	Normal	802.1 PVID

Fig 8.2.1 Default LLDP port setting table page

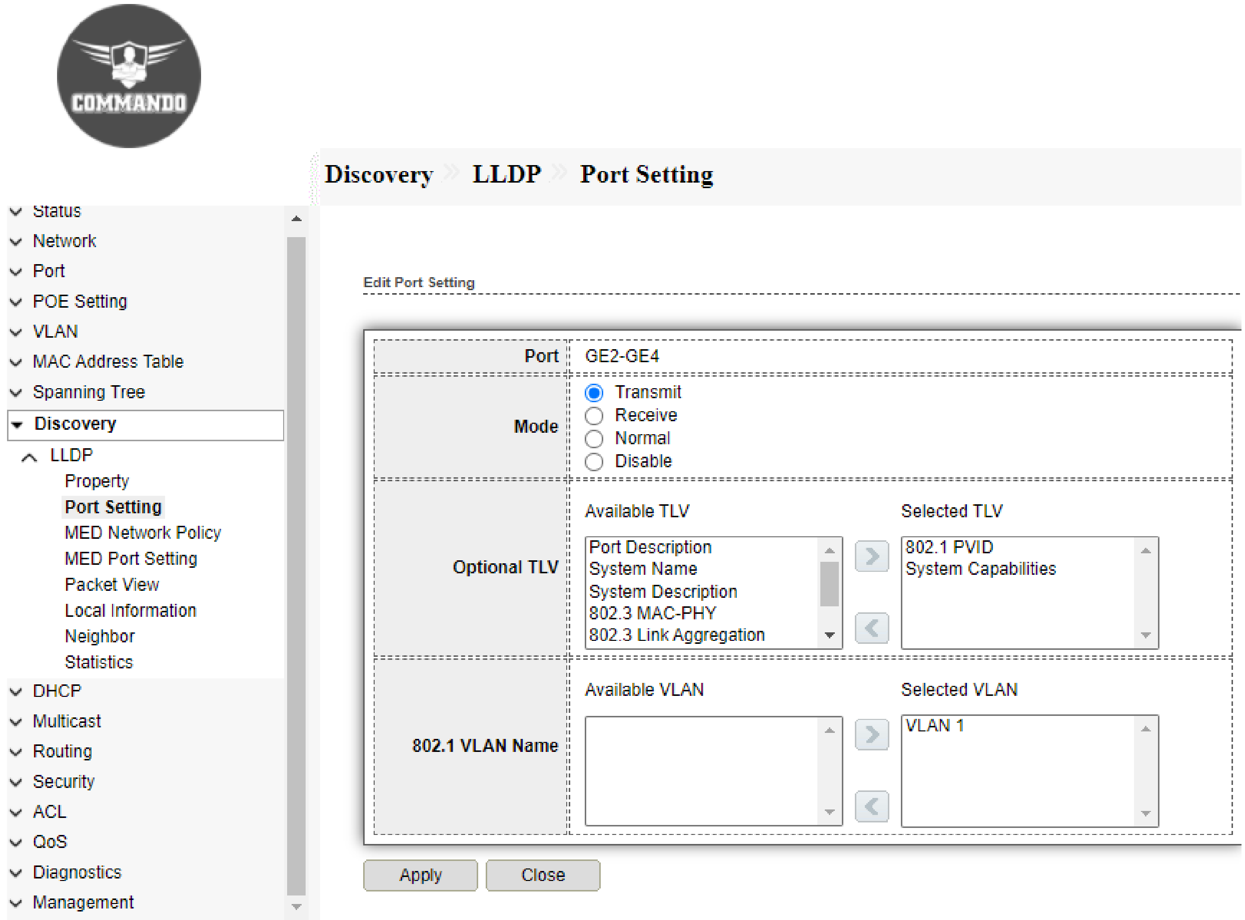


Discovery » LLDP » Port Setting

Port Setting Table

☐	Entry	Port	Mode	Selected TLV
☐	1	GE1	Normal	802.1 PVID
☑	2	GE2	Normal	802.1 PVID
☑	3	GE3	Normal	802.1 PVID
☑	4	GE4	Normal	802.1 PVID
☐	5	GE5	Normal	802.1 PVID
☐	6	GE6	Normal	802.1 PVID
☐	7	GE7	Normal	802.1 PVID
☐	8	GE8	Normal	802.1 PVID
☐	9	GE9	Normal	802.1 PVID
☐	10	GE10	Normal	802.1 PVID
☐	11	GE11	Normal	802.1 PVID
☐	12	GE12	Normal	802.1 PVID
☐	13	GE13	Normal	802.1 PVID
☐	14	GE14	Normal	802.1 PVID
☐	15	GE15	Normal	802.1 PVID

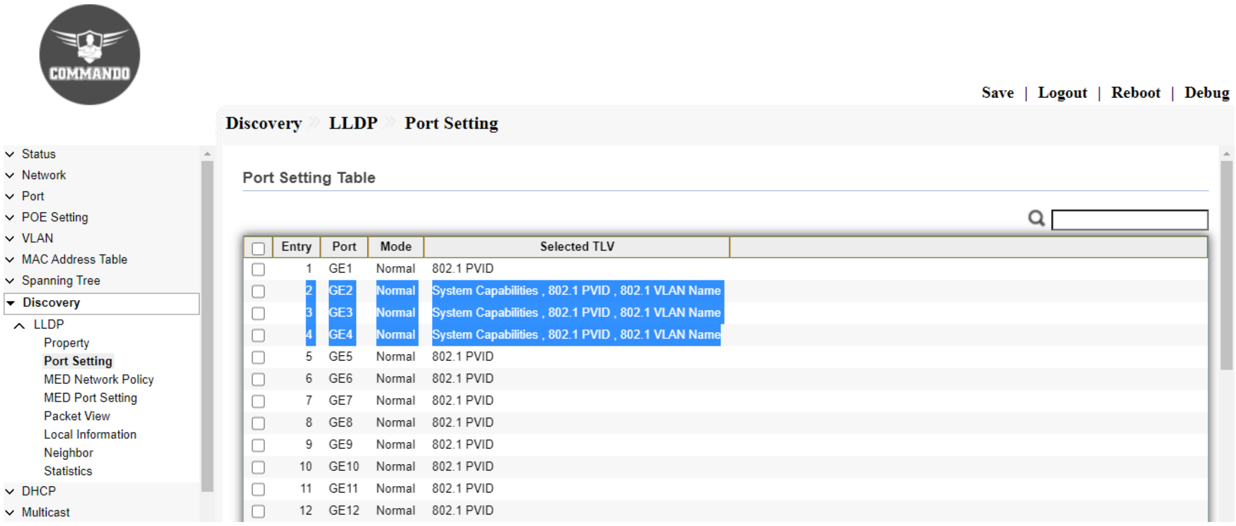
Fig 8.2.2 LLDP port setting selection of GE2, GE3 and GE4 page



Edit Port Setting

Port	GE2-GE4
Mode	● Transmit ○ Receive ○ Normal ○ Disable
Optional TLV	Available TLV: Port Description, System Name, System Description, 802.3 MAC-PHY, 802.3 Link Aggregation Selected TLV: 802.1 PVID, System Capabilities
802.1 VLAN Name	Available VLAN: Selected VLAN: VLAN 1

Fig 8.2.3 Edit LLDP port setting of GE2, GE3 and GE4 page



Port Setting Table

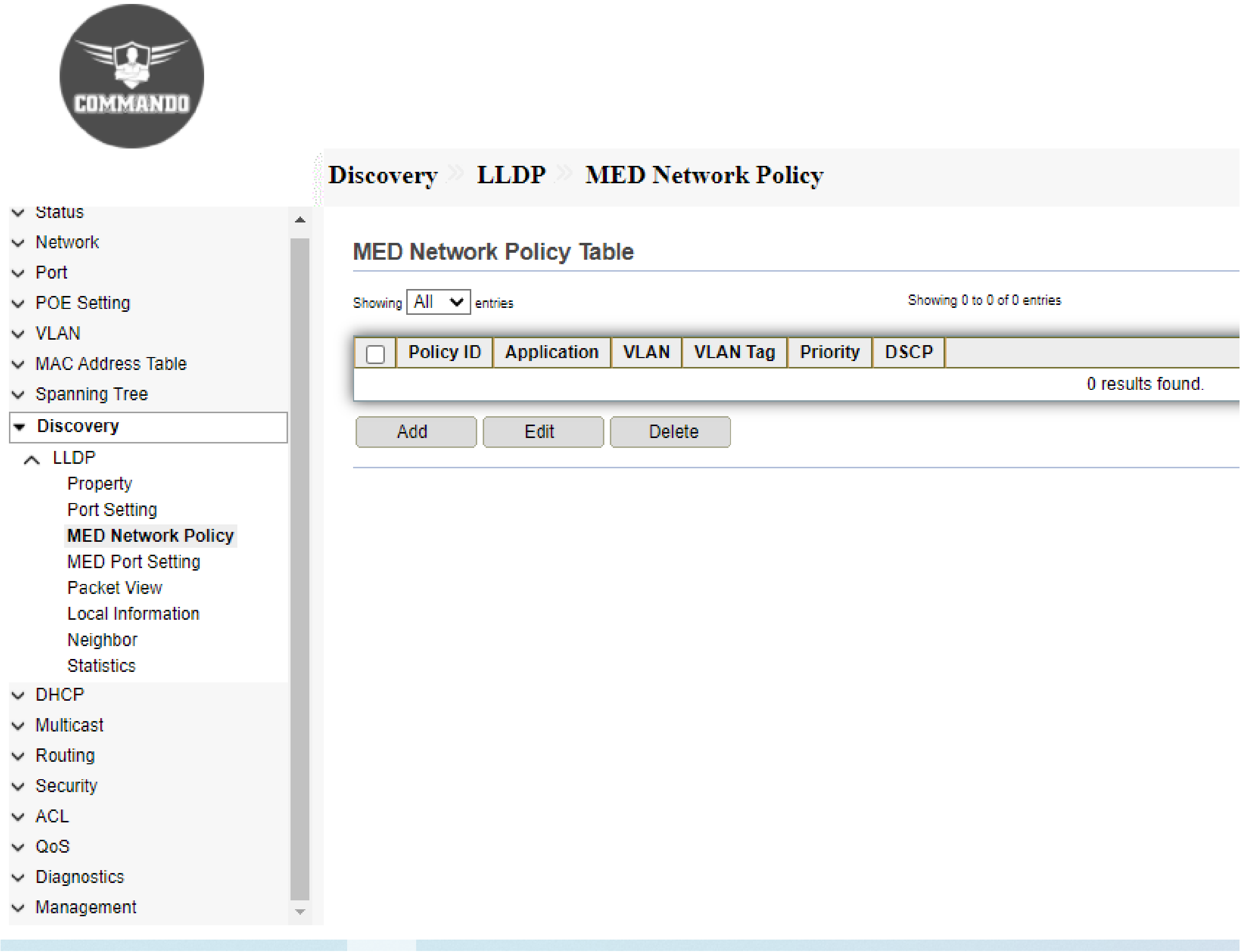
□	Entry	Port	Mode	Selected TLV
□	1	GE1	Normal	802.1 PVID
□	2	GE2	Normal	System Capabilities , 802.1 PVID , 802.1 VLAN Name
□	3	GE3	Normal	System Capabilities , 802.1 PVID , 802.1 VLAN Name
□	4	GE4	Normal	System Capabilities , 802.1 PVID , 802.1 VLAN Name
□	5	GE5	Normal	802.1 PVID
□	6	GE6	Normal	802.1 PVID
□	7	GE7	Normal	802.1 PVID
□	8	GE8	Normal	802.1 PVID
□	9	GE9	Normal	802.1 PVID
□	10	GE10	Normal	802.1 PVID
□	11	GE11	Normal	802.1 PVID
□	12	GE12	Normal	802.1 PVID

Fig 8.2.4 LLDP port setting table after Editing page

8.3 MED Network Policy

Enables the advertisement and discovery of network polices for real-time applications such as voice and/or video. LLDP Media Endpoint Discovery (LLDP-MED) is an extension of LLDP that provides the following additional capabilities to support media endpoint devices. Network Policy Number—Select the number of the policy to be created.

To Configure LLDP MED Network Policy, click **Discovery >> LLDP >> MED Network Policy.**



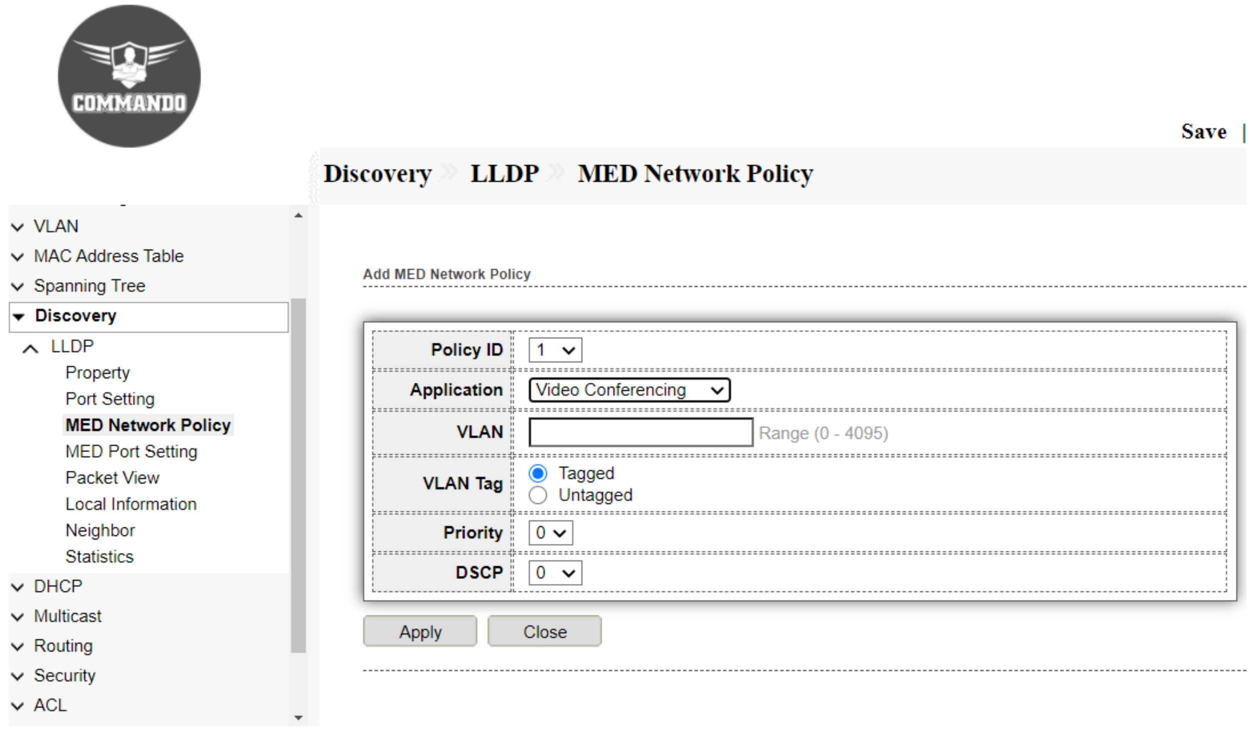
MED Network Policy Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Policy ID	Application	VLAN	VLAN Tag	Priority	DSCP
0 results found.						

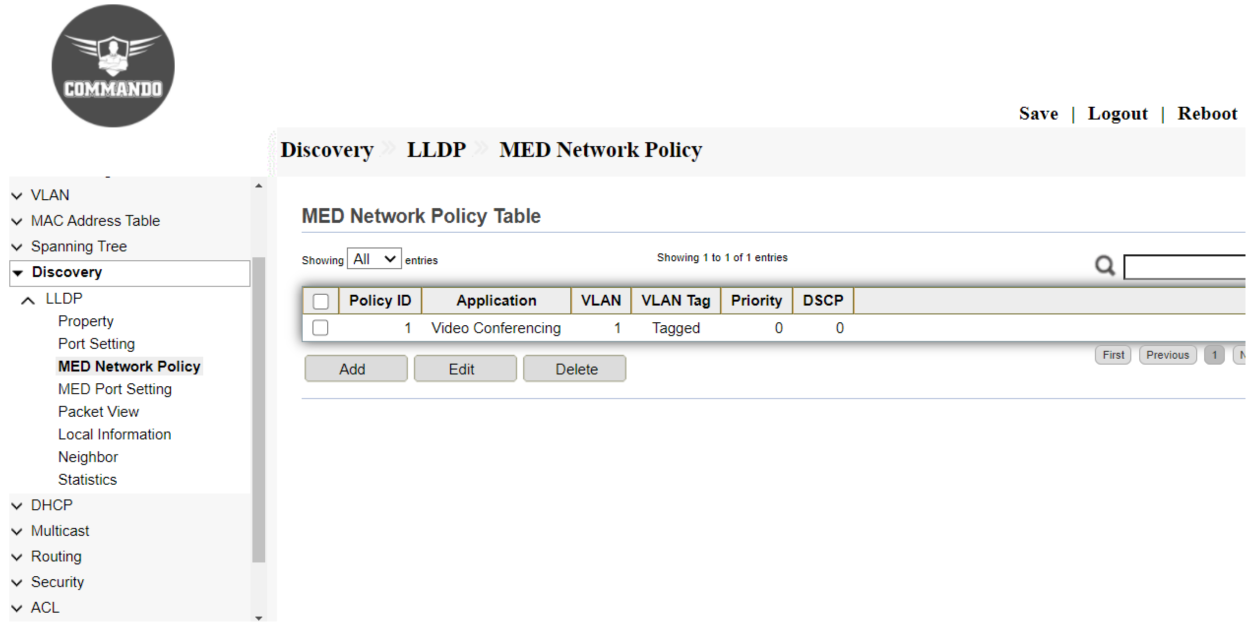
Fig 8.3.1 LLDP MED Network Policy ID page



Add MED Network Policy

Policy ID	1
Application	Video Conferencing
VLAN	Range (0 - 4095)
VLAN Tag	● Tagged ○ Untagged
Priority	0
DSCP	0

Fig 8.3.2 LLDP Add MED Network Policy page



MED Network Policy Table

Showing All entries

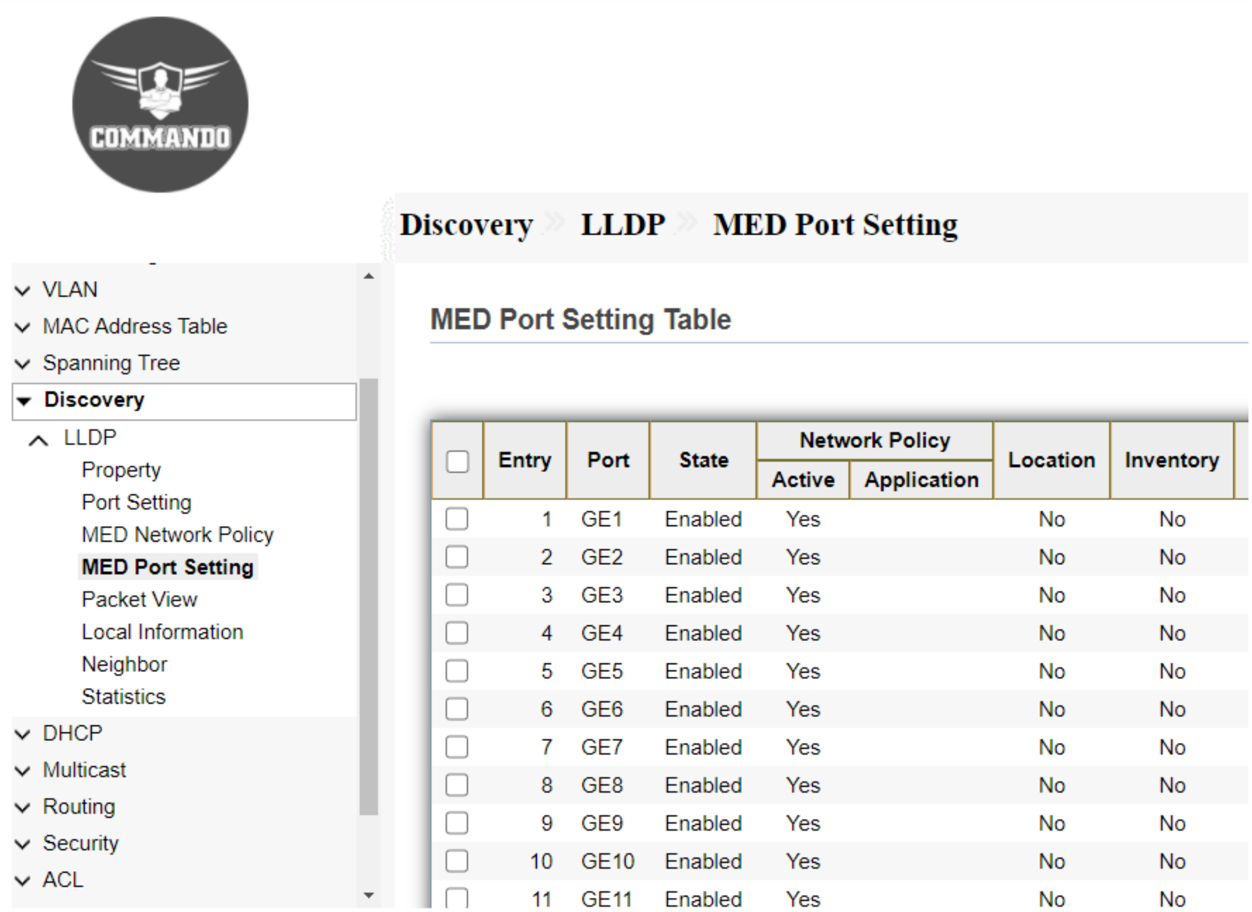
Showing 1 to 1 of 1 entries

□	Policy ID	Application	VLAN	VLAN Tag	Priority	DSCP
□	1	Video Conferencing	1	Tagged	0	0

Fig 8.3.3 LLDP MED Network Policy Table after setting for Policy ID 4 page

8.4 MED Port Setting

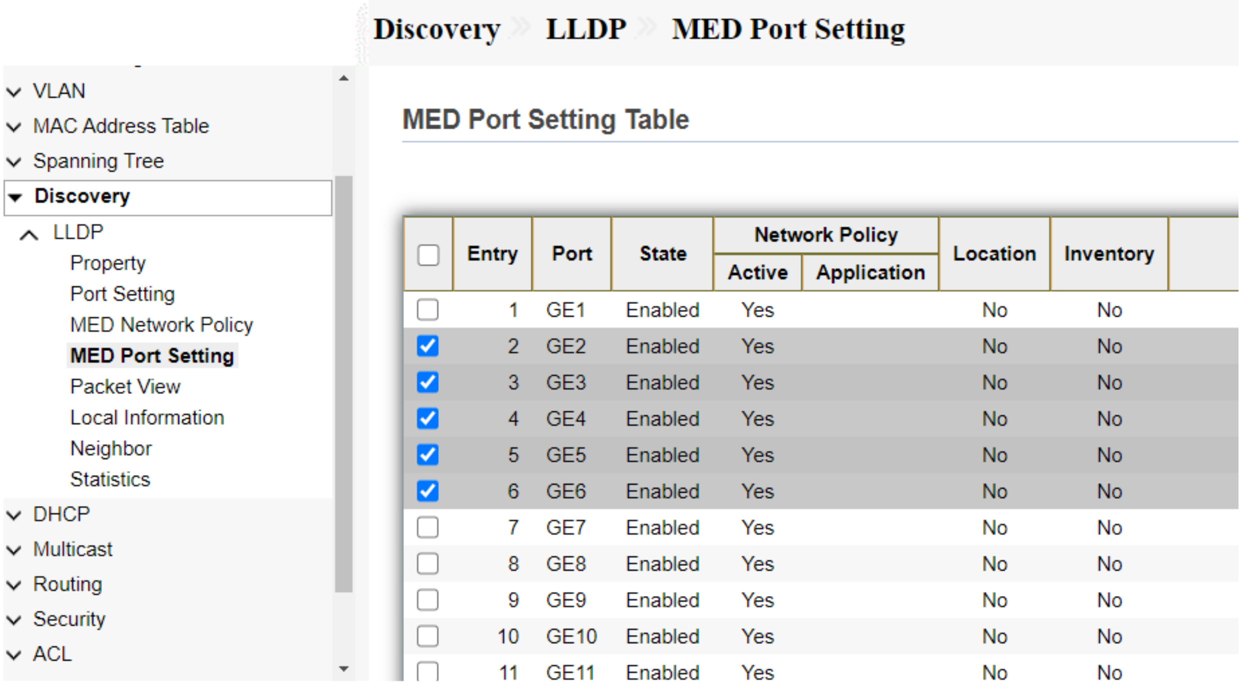
The LLDP MED Port Settings page enables the selection of the LLDP-MED TLVs and/or the network policies to be included in the outgoing LLDP advertisement for the desired interfaces. The LLDP MED Port Settings page enables the selection of the LLDP-MED TLVs and/or the network policies to be included in the outgoing LLDP advertisement for the desired interfaces. Network policies are configured using the LLDP MED Network Policy page. To Configure LLDP MED Port Setting, click **Discovery >> LLDP >> MED Port Setting.**



MED Port Setting Table

□	Entry	Port	State	Network Policy		Location	Inventory
				Active	Application		
□	1	GE1	Enabled	Yes		No	No
□	2	GE2	Enabled	Yes		No	No
□	3	GE3	Enabled	Yes		No	No
□	4	GE4	Enabled	Yes		No	No
□	5	GE5	Enabled	Yes		No	No
□	6	GE6	Enabled	Yes		No	No
□	7	GE7	Enabled	Yes		No	No
□	8	GE8	Enabled	Yes		No	No
□	9	GE9	Enabled	Yes		No	No
□	10	GE10	Enabled	Yes		No	No
□	11	GE11	Enabled	Yes		No	No

Fig 8.4.1 LLDP MED port setting table page

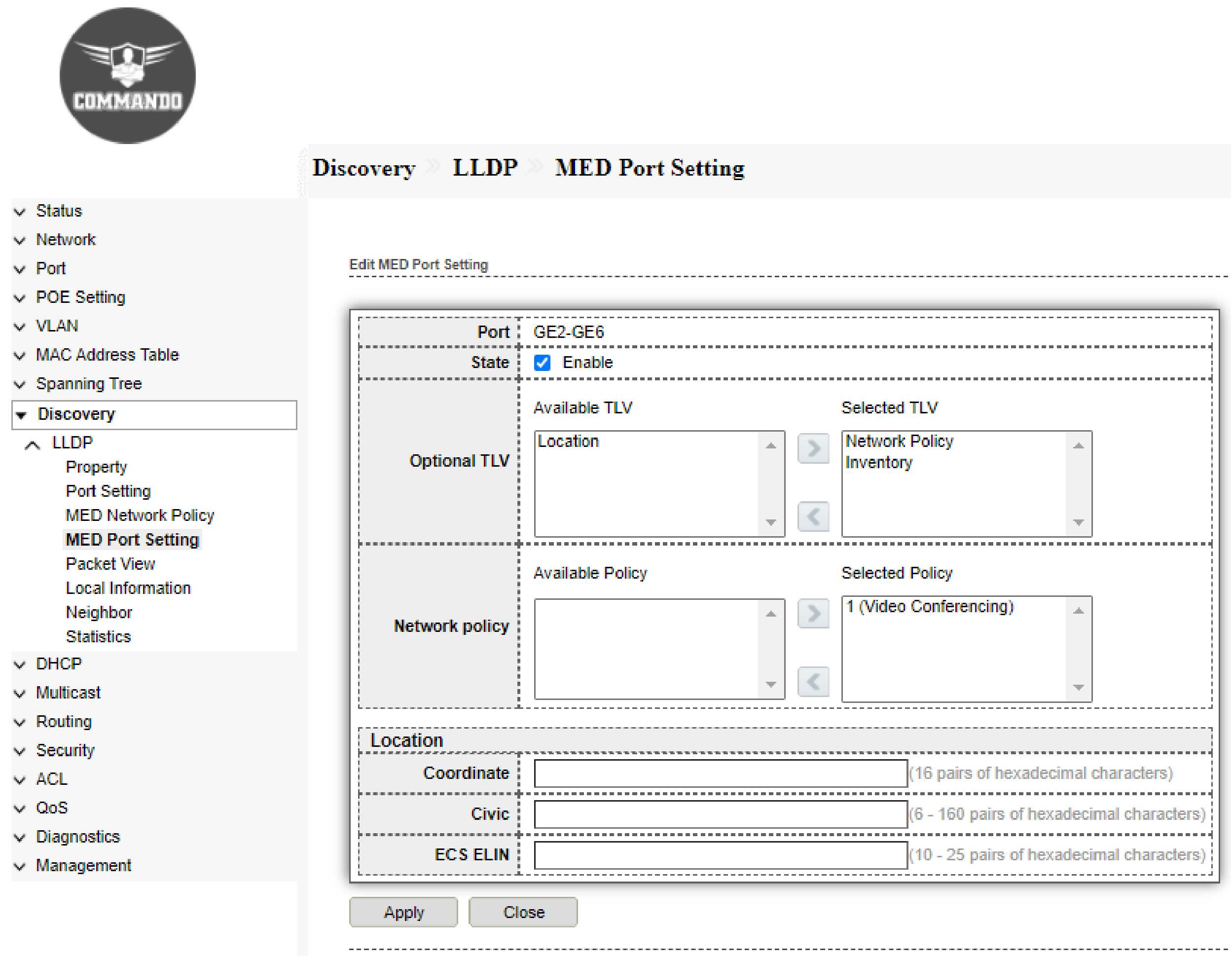


Discovery » LLDP » MED Port Setting

MED Port Setting Table

□	Entry	Port	State	Network Policy		Location	Inventory
				Active	Application		
□	1	GE1	Enabled	Yes		No	No
☑	2	GE2	Enabled	Yes		No	No
☑	3	GE3	Enabled	Yes		No	No
☑	4	GE4	Enabled	Yes		No	No
☑	5	GE5	Enabled	Yes		No	No
☑	6	GE6	Enabled	Yes		No	No
□	7	GE7	Enabled	Yes		No	No
□	8	GE8	Enabled	Yes		No	No
□	9	GE9	Enabled	Yes		No	No
□	10	GE10	Enabled	Yes		No	No
□	11	GE11	Enabled	Yes		No	No

Fig 8.4.2 LLDP MED port setting for ports page



Discovery » LLDP » MED Port Setting

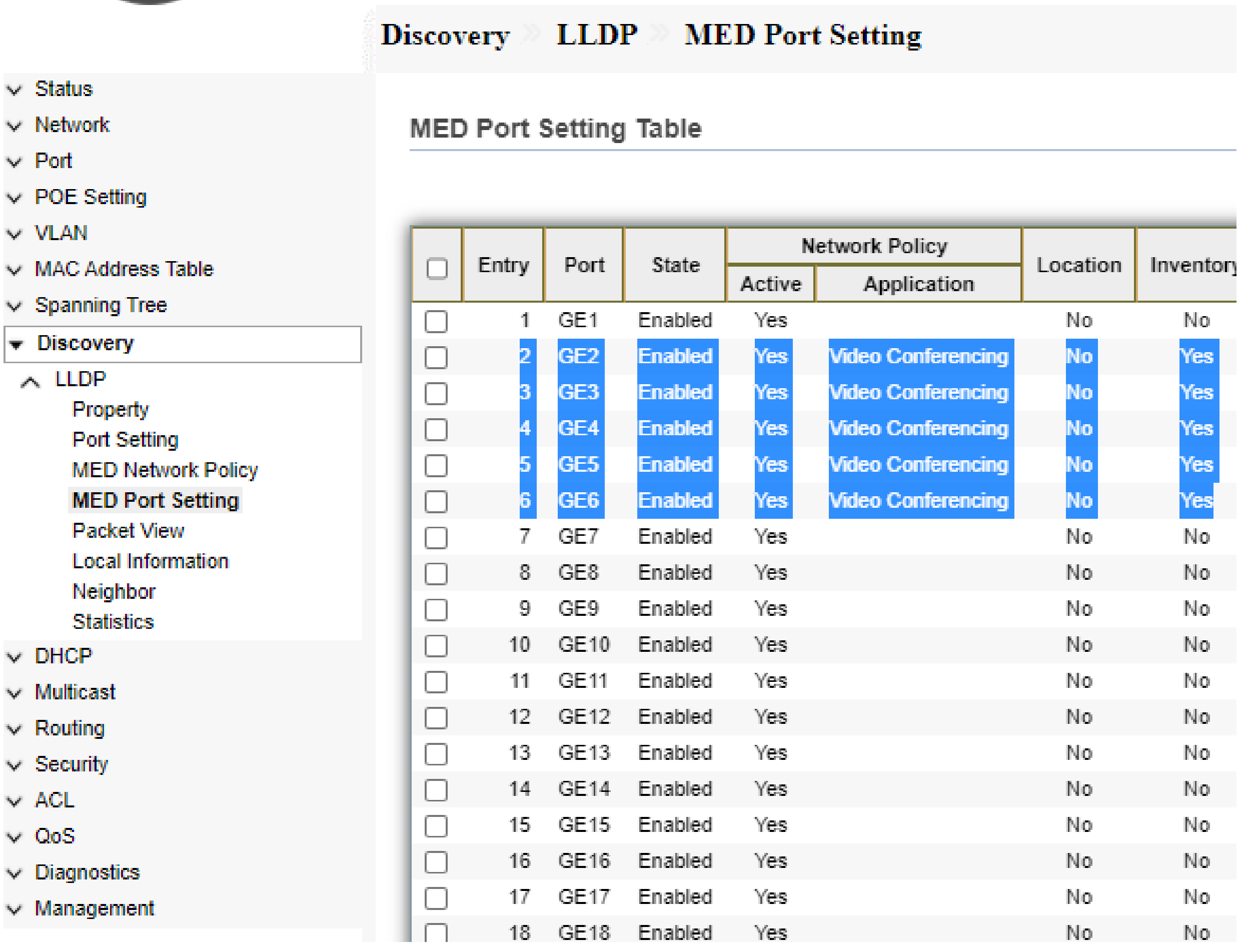
Edit MED Port Setting

Port	GE2-GE6
State	☑ Enable
Optional TLV	Available TLV: Location Selected TLV: Network Policy, Inventory
Network policy	Available Policy: Selected Policy: 1 (Video Conferencing)

Location

Coordinate		(16 pairs of hexadecimal characters)
Civic		(6 - 160 pairs of hexadecimal characters)
ECS ELIN		(10 - 25 pairs of hexadecimal characters)

Fig 8.4.3 Edit LLDP MED port setting for selected ports page



Discovery » LLDP » MED Port Setting

MED Port Setting Table

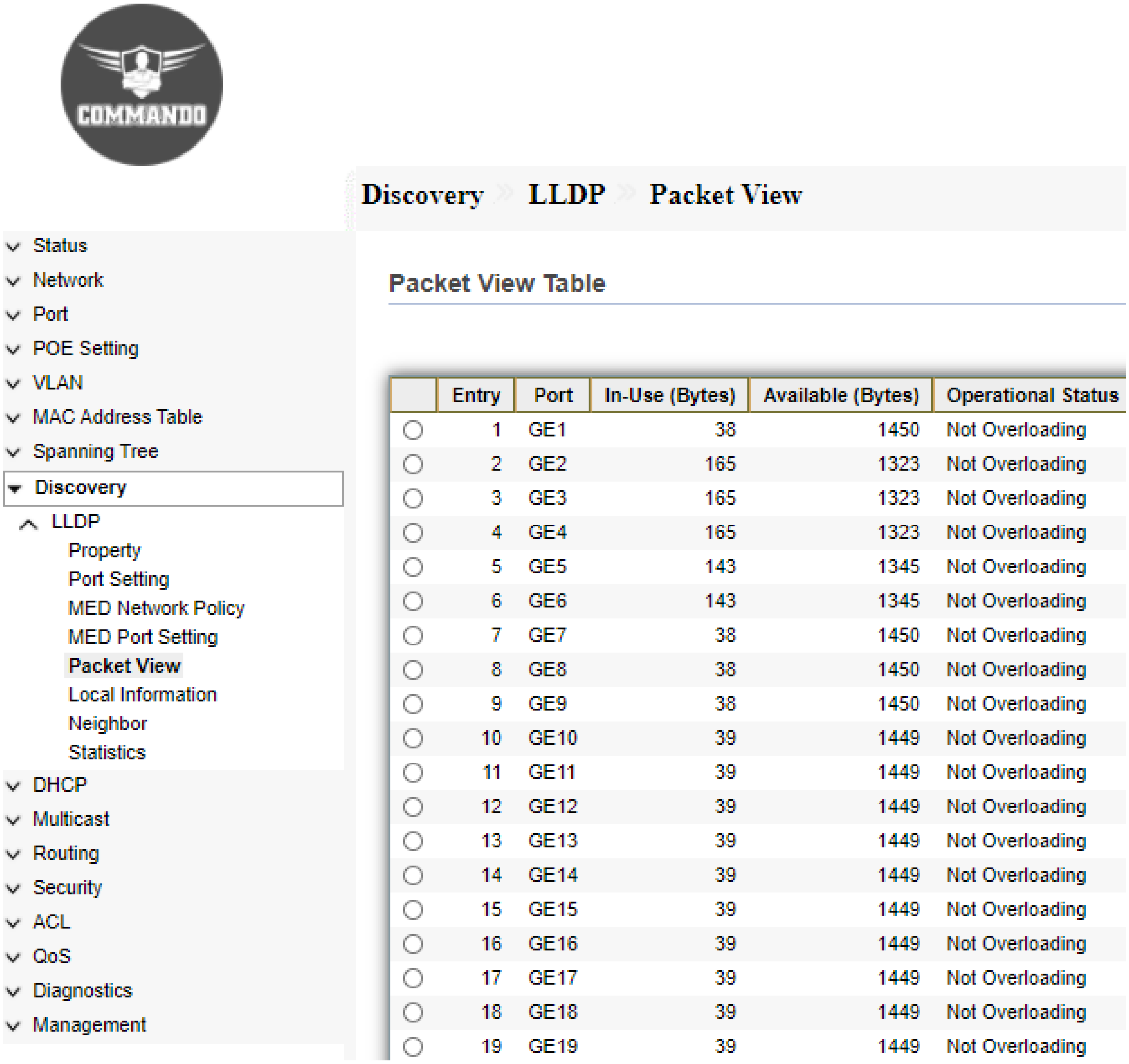
□	Entry	Port	State	Network Policy		Location	Inventory
				Active	Application		
□	1	GE1	Enabled	Yes		No	No
□	2	GE2	Enabled	Yes	Video Conferencing	No	Yes
□	3	GE3	Enabled	Yes	Video Conferencing	No	Yes
□	4	GE4	Enabled	Yes	Video Conferencing	No	Yes
□	5	GE5	Enabled	Yes	Video Conferencing	No	Yes
□	6	GE6	Enabled	Yes	Video Conferencing	No	Yes
□	7	GE7	Enabled	Yes		No	No
□	8	GE8	Enabled	Yes		No	No
□	9	GE9	Enabled	Yes		No	No
□	10	GE10	Enabled	Yes		No	No
□	11	GE11	Enabled	Yes		No	No
□	12	GE12	Enabled	Yes		No	No
□	13	GE13	Enabled	Yes		No	No
□	14	GE14	Enabled	Yes		No	No
□	15	GE15	Enabled	Yes		No	No
□	16	GE16	Enabled	Yes		No	No
□	17	GE17	Enabled	Yes		No	No
□	18	GE18	Enabled	Yes		No	No

Fig 8.4.4 LLDP MED port setting Table page

8.5 Packet View

LLDP packets are send every 30 seconds that defines messages, encapsulated in Ethernet frames for the purpose of giving devices a means of announcing basic device information to other devices on the LAN. You can view connecting devices that are sending LLDP packets from this location. It is helpful with initial connectivity on trouble shooting.

To View LLDP Overloading, click **Discovery >> LLDP >> Packet View.**

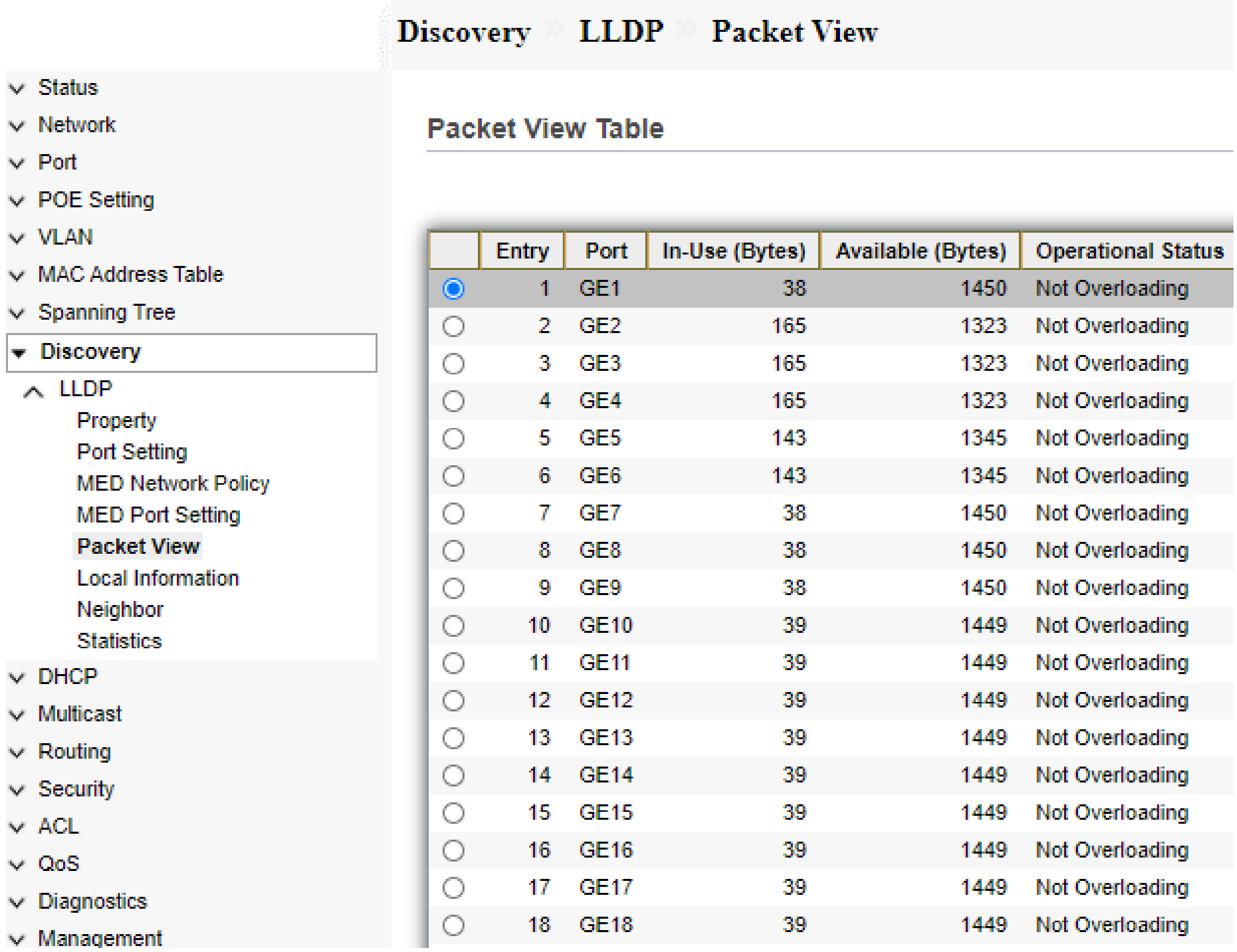


Discovery » LLDP » Packet View

Packet View Table

	Entry	Port	In-Use (Bytes)	Available (Bytes)	Operational Status
○	1	GE1	38	1450	Not Overloading
○	2	GE2	165	1323	Not Overloading
○	3	GE3	165	1323	Not Overloading
○	4	GE4	165	1323	Not Overloading
○	5	GE5	143	1345	Not Overloading
○	6	GE6	143	1345	Not Overloading
○	7	GE7	38	1450	Not Overloading
○	8	GE8	38	1450	Not Overloading
○	9	GE9	38	1450	Not Overloading
○	10	GE10	39	1449	Not Overloading
○	11	GE11	39	1449	Not Overloading
○	12	GE12	39	1449	Not Overloading
○	13	GE13	39	1449	Not Overloading
○	14	GE14	39	1449	Not Overloading
○	15	GE15	39	1449	Not Overloading
○	16	GE16	39	1449	Not Overloading
○	17	GE17	39	1449	Not Overloading
○	18	GE18	39	1449	Not Overloading
○	19	GE19	39	1449	Not Overloading

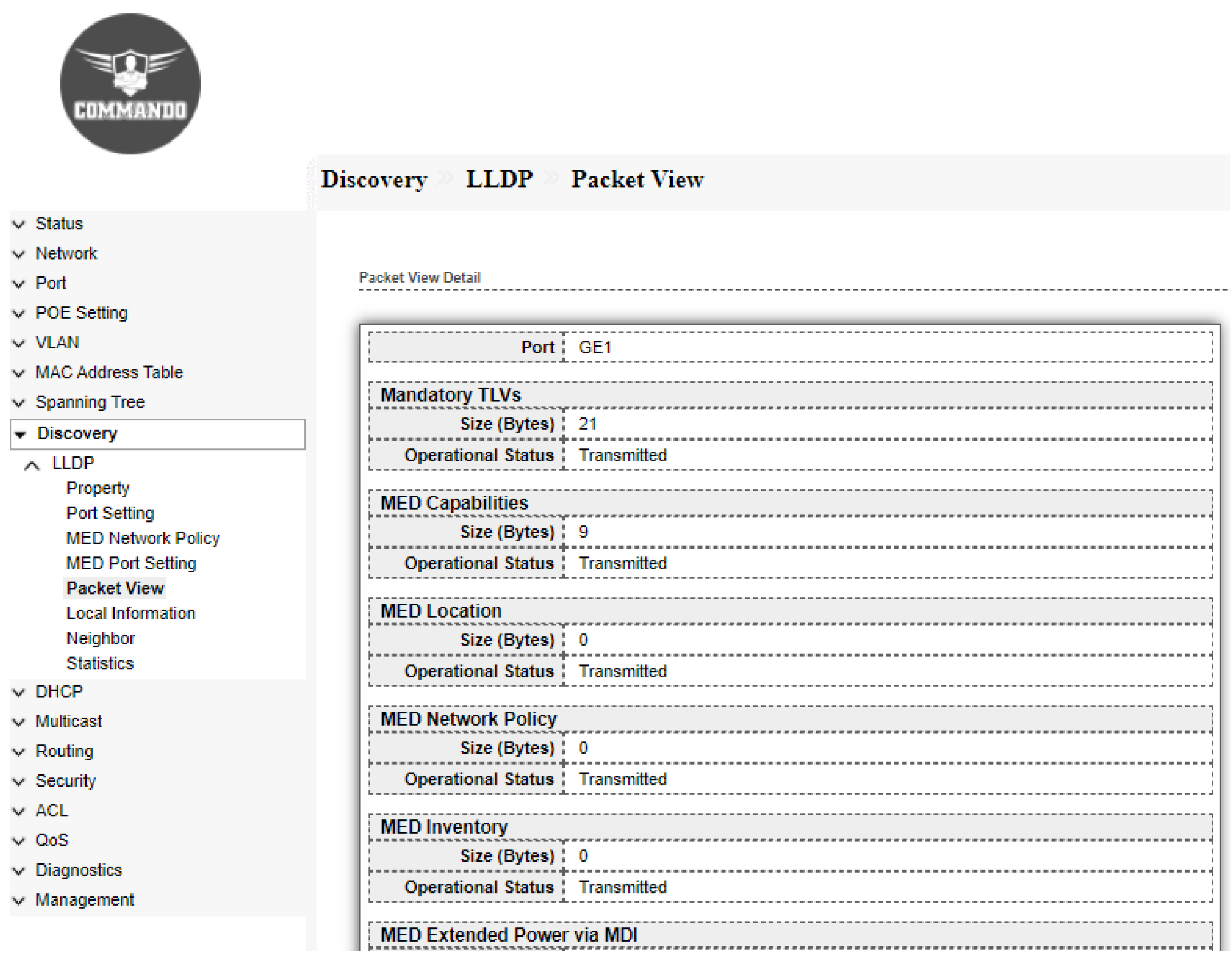
Fig 8.5.1 Default LLDP Packet view Table page



Packet View Table

	Entry	Port	In-Use (Bytes)	Available (Bytes)	Operational Status
●	1	GE1	38	1450	Not Overloading
○	2	GE2	165	1323	Not Overloading
○	3	GE3	165	1323	Not Overloading
○	4	GE4	165	1323	Not Overloading
○	5	GE5	143	1345	Not Overloading
○	6	GE6	143	1345	Not Overloading
○	7	GE7	38	1450	Not Overloading
○	8	GE8	38	1450	Not Overloading
○	9	GE9	38	1450	Not Overloading
○	10	GE10	39	1449	Not Overloading
○	11	GE11	39	1449	Not Overloading
○	12	GE12	39	1449	Not Overloading
○	13	GE13	39	1449	Not Overloading
○	14	GE14	39	1449	Not Overloading
○	15	GE15	39	1449	Not Overloading
○	16	GE16	39	1449	Not Overloading
○	17	GE17	39	1449	Not Overloading
○	18	GE18	39	1449	Not Overloading

Fig 8.5.2 LLDP Packet view Table selecting GE1 port page



Discovery » LLDP » Packet View

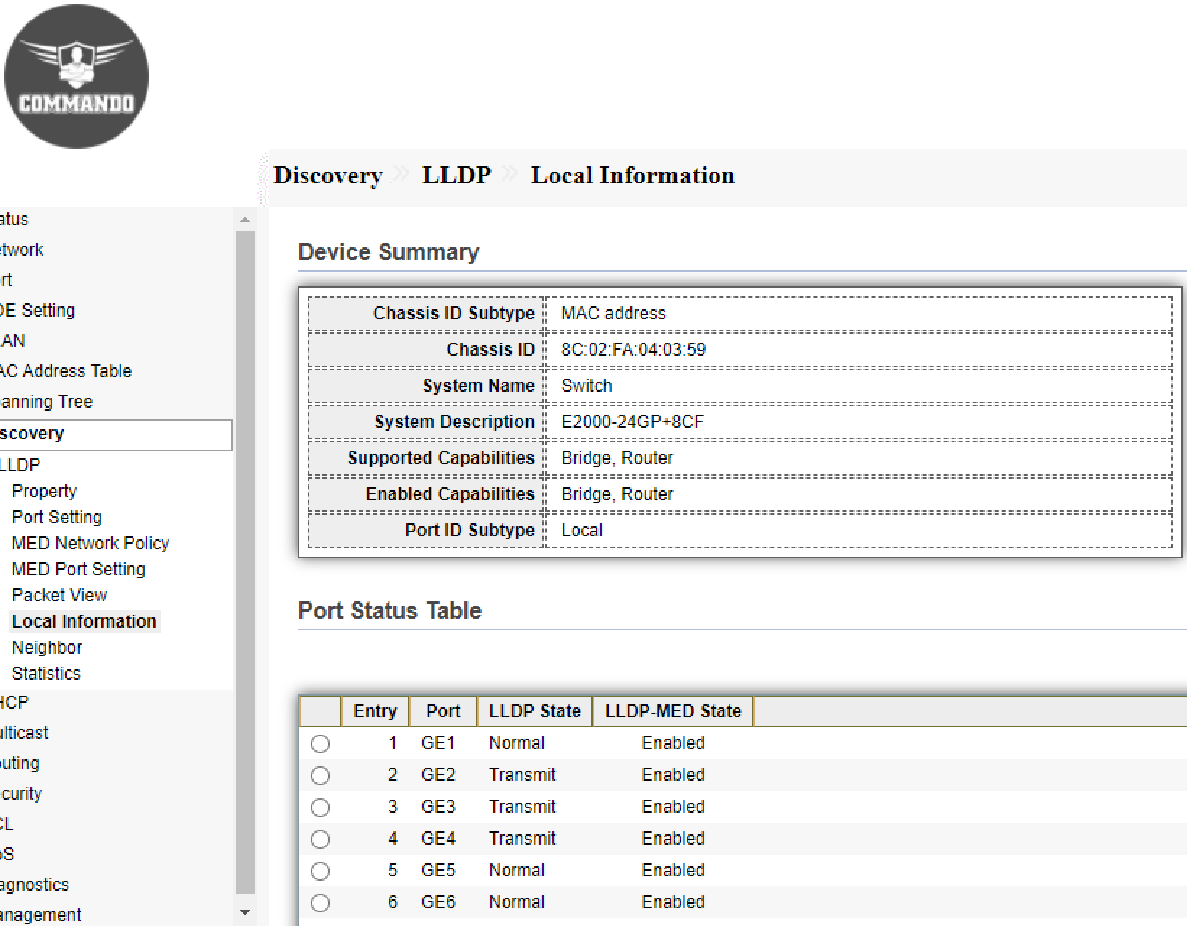
Packet View Detail

Port	GE1
Mandatory TLVs	
Size (Bytes)	21
Operational Status	Transmitted
MED Capabilities	
Size (Bytes)	9
Operational Status	Transmitted
MED Location	
Size (Bytes)	0
Operational Status	Transmitted
MED Network Policy	
Size (Bytes)	0
Operational Status	Transmitted
MED Inventory	
Size (Bytes)	0
Operational Status	Transmitted
MED Extended Power via MDI	

Fig 8.5.3 LLDP Packet view detail for GE1 port page

8.6 Local Information

It displays the information contained in the LLDP TLVs to be sent about the local system. To view and displays LLDP local port status advertised on a port. To View LLDP Local Device, click **Discovery >> LLDP >> Local Information.**



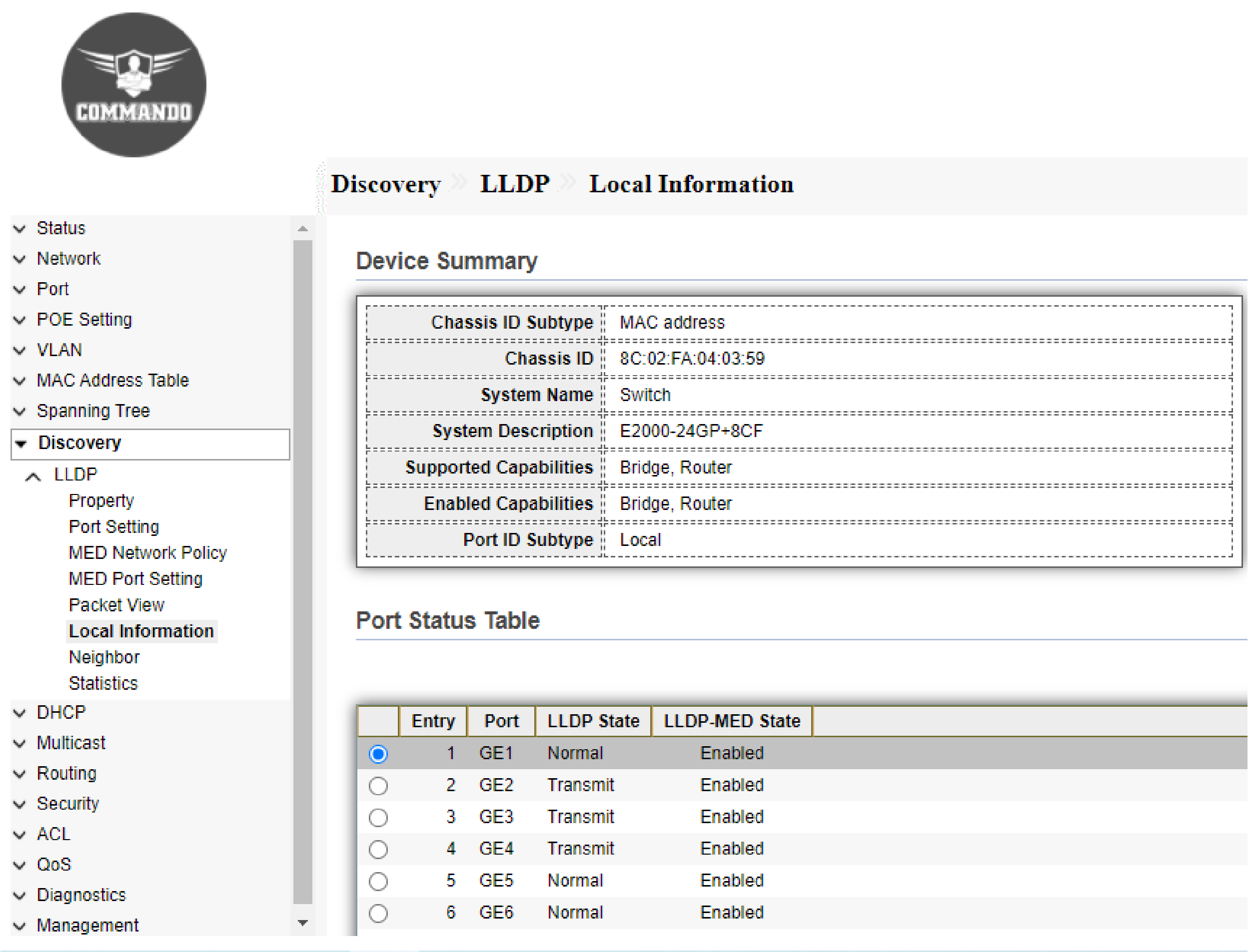
Device Summary

Chassis ID Subtype	MAC address
Chassis ID	8C:02:FA:04:03:59
System Name	Switch
System Description	E2000-24GP+8CF
Supported Capabilities	Bridge, Router
Enabled Capabilities	Bridge, Router
Port ID Subtype	Local

Port Status Table

	Entry	Port	LLDP State	LLDP-MED State
○	1	GE1	Normal	Enabled
○	2	GE2	Transmit	Enabled
○	3	GE3	Transmit	Enabled
○	4	GE4	Transmit	Enabled
○	5	GE5	Normal	Enabled
○	6	GE6	Normal	Enabled

Fig 8.6.1 LLDP Local Information device summary page



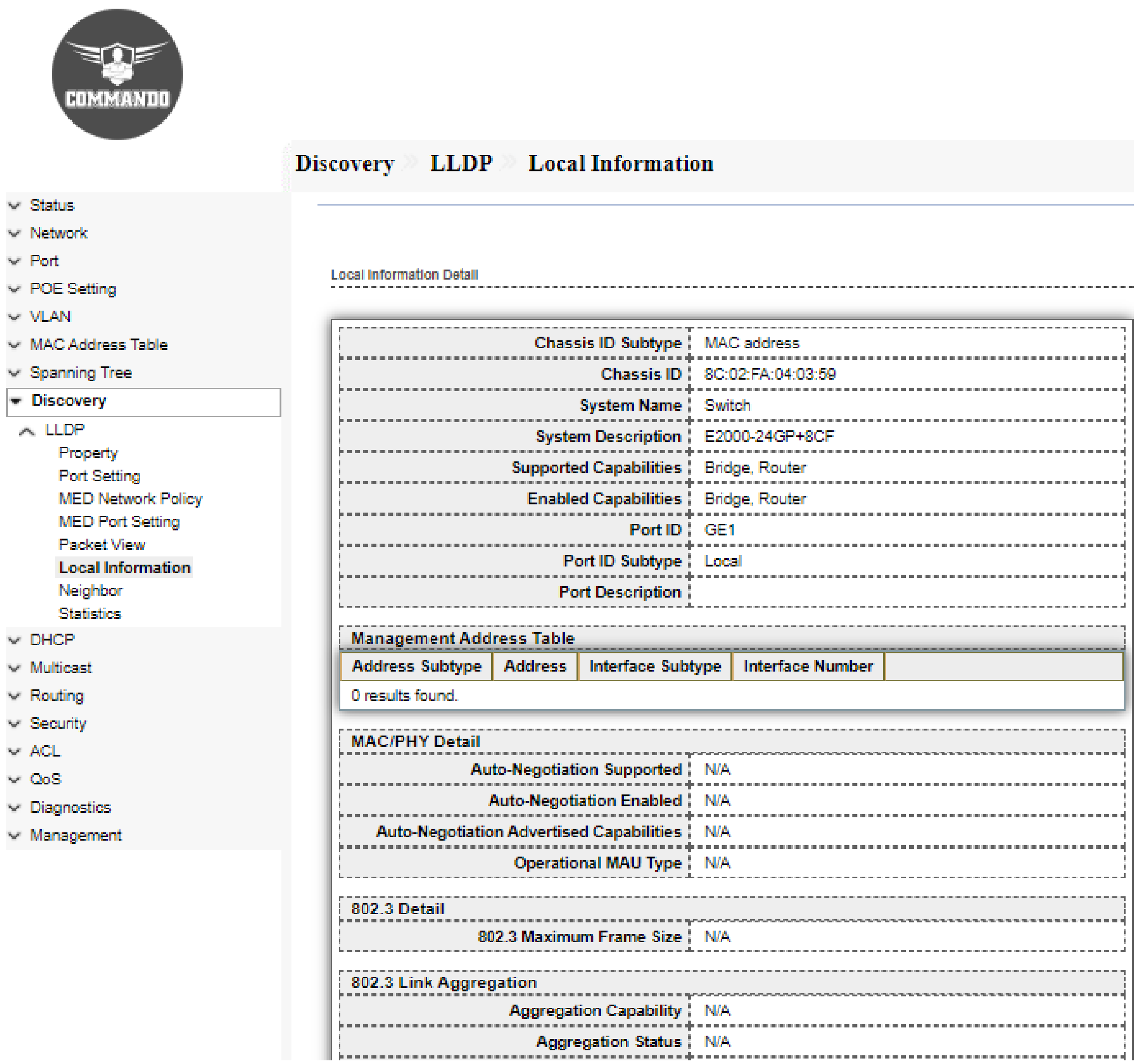
Device Summary

Chassis ID Subtype	MAC address
Chassis ID	8C:02:FA:04:03:59
System Name	Switch
System Description	E2000-24GP+8CF
Supported Capabilities	Bridge, Router
Enabled Capabilities	Bridge, Router
Port ID Subtype	Local

Port Status Table

	Entry	Port	LLDP State	LLDP-MED State
●	1	GE1	Normal	Enabled
○	2	GE2	Transmit	Enabled
○	3	GE3	Transmit	Enabled
○	4	GE4	Transmit	Enabled
○	5	GE5	Normal	Enabled
○	6	GE6	Normal	Enabled

Fig 8.6.2 LLDP Local Information Selecting port GE1 page



Discovery » LLDP » Local Information

Local Information Detail

Chassis ID Subtype	MAC address
Chassis ID	8C:02:FA:04:03:59
System Name	Switch
System Description	E2000-24GP+8CF
Supported Capabilities	Bridge, Router
Enabled Capabilities	Bridge, Router
Port ID	GE1
Port ID Subtype	Local
Port Description	

Management Address Table

Address Subtype	Address	Interface Subtype	Interface Number
0 results found.			

MAC/PHY Detail

Auto-Negotiation Supported	N/A
Auto-Negotiation Enabled	N/A
Auto-Negotiation Advertised Capabilities	N/A
Operational MAU Type	N/A

802.3 Detail

802.3 Maximum Frame Size	N/A

802.3 Link Aggregation

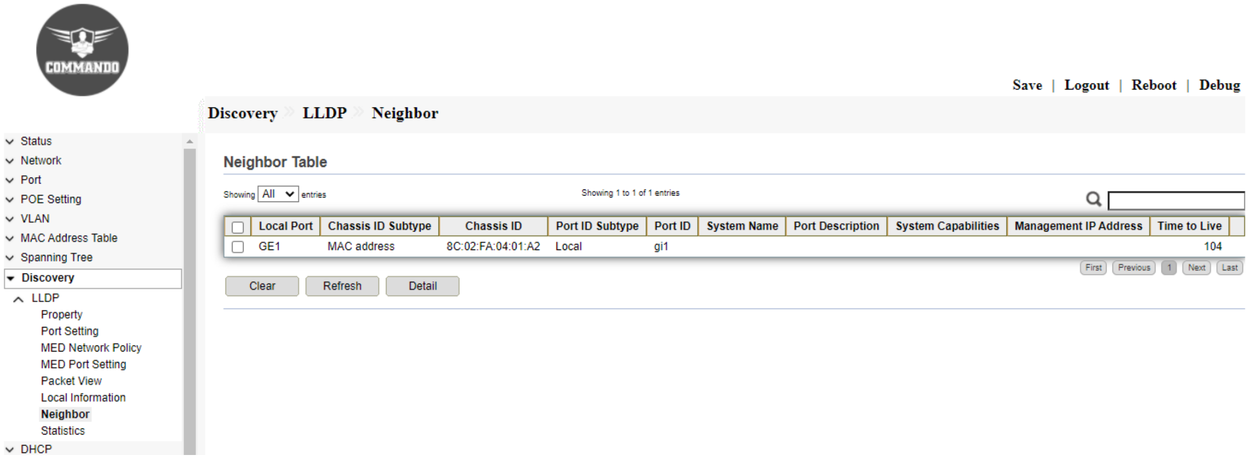
Aggregation Capability	N/A
Aggregation Status	N/A

Fig 8.6.3 LLDP Local Information details for port GE1 page

8.7 Neighbor

The LLDP Neighbors Information page contains information that was received from neighboring devices. The neighbor information table is populated as advertisements from the neighbors arrive on the ports. Use the LLDP Neighbor page to view LLDP neighbors' information.

To view LLDP Remote Device, click **Discovery >> LLDP >> Neighbor.**



Neighbor Table

Showing All entries

Showing 1 to 1 of 1 entries

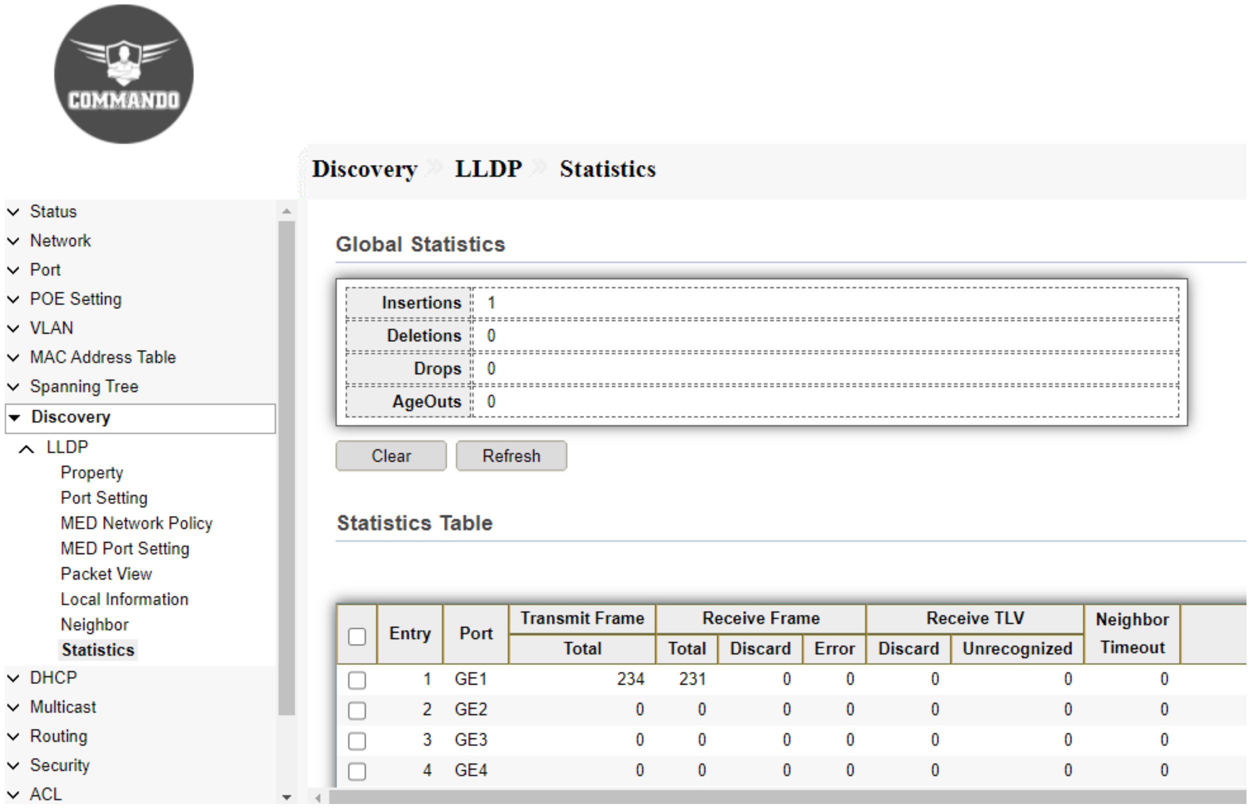
□	Local Port	Chassis ID Subtype	Chassis ID	Port ID Subtype	Port ID	System Name	Port Description	System Capabilities	Management IP Address	Time to Live
□	GE1	MAC address	8C:02:FA:04:01:A2	Local	gi1					104

Fig 8.7.1 LLDP Neighbors table default page

8.8 Statistics

The LLDP Statistics page displays LLDP statistical information per port. The Link Layer Discovery Protocol (LLDP) Statistics page displays summary and per-port information for LLDP frames transmitted and received on the switch.

To view LLDP Statistics status, click **Discovery >> LLDP >> Statistics.**



Global Statistics

Insertions	1
Deletions	0
Drops	0
AgeOuts	0

Statistics Table

□	Entry	Port	Transmit Frame	Receive Frame			Receive TLV		Neighbor
			Total	Total	Discard	Error	Discard	Unrecognized	Timeout
□	1	GE1	234	231	0	0	0	0	0
□	2	GE2	0	0	0	0	0	0	0
□	3	GE3	0	0	0	0	0	0	0
□	4	GE4	0	0	0	0	0	0	0

Fig 8.8.1 LLDP Global statistics page

Chapter 9 DHCP

DHCP (Dynamic Host Configuration Protocol) is widely used to automatically assign IP addresses and other network configuration parameters to network devices, enhancing the utilization of IP address.

DHCP Server

DHCP Server is used to dynamically assign IP addresses, default gateway and other parameters to DHCP clients. DHCP (dynamic host configuration protocol) allows a server to assign an IP address to a computer from a preselected range of numbers configured for a particular network.

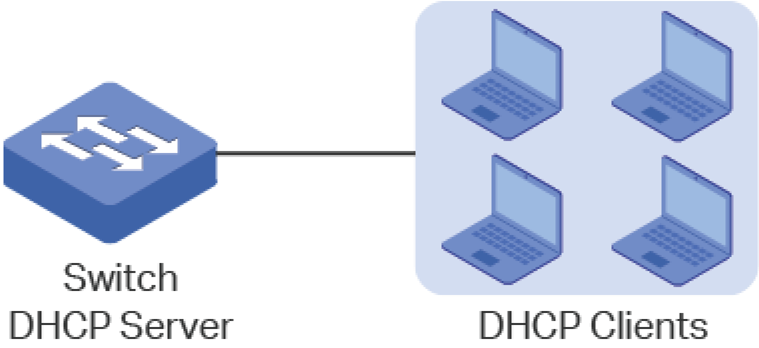


Fig 9.1 DHCP Server and Clients

DHCP Relay

DHCP Relay is used to process and forward DHCP packets between different subnets or VLANs. DHCP clients broadcast DHCP request packets to require for IP addresses. Without this function, clients cannot obtain IP addresses from a DHCP server in the different LAN because the broadcast packets can be transmitted only in the same LAN. DHCP Relay includes three features: Option 82, DHCP Interface Relay and DHCP VLAN Relay.

DHCP Option 82: Option 82 is called the DHCP Relay Agent Information Option.
When enabled, the DHCP relay agent can inform the DHCP server of some specified information of clients by inserting an Option 82 payload to DHCP request packets before forwarding them to the DHCP server, so that the DHCP server can distribute the

IP addresses or other parameters to clients based on the payload. In this way, Option 82 prevents DHCP client requests from untrusted sources. Besides, it allows the DHCP server to assign IP addresses of different address pools to clients in different groups.

Property: Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to automate the process of configuring IP address, gateways and other IP related things automatically to connected hosts.

IP Pool Setting: You can customize the DHCP pool subnet and address range to provide simultaneous access to a greater number of clients.

VLAN IF Address Group Setting: For Configuring a Layer 3 VLAN interface.

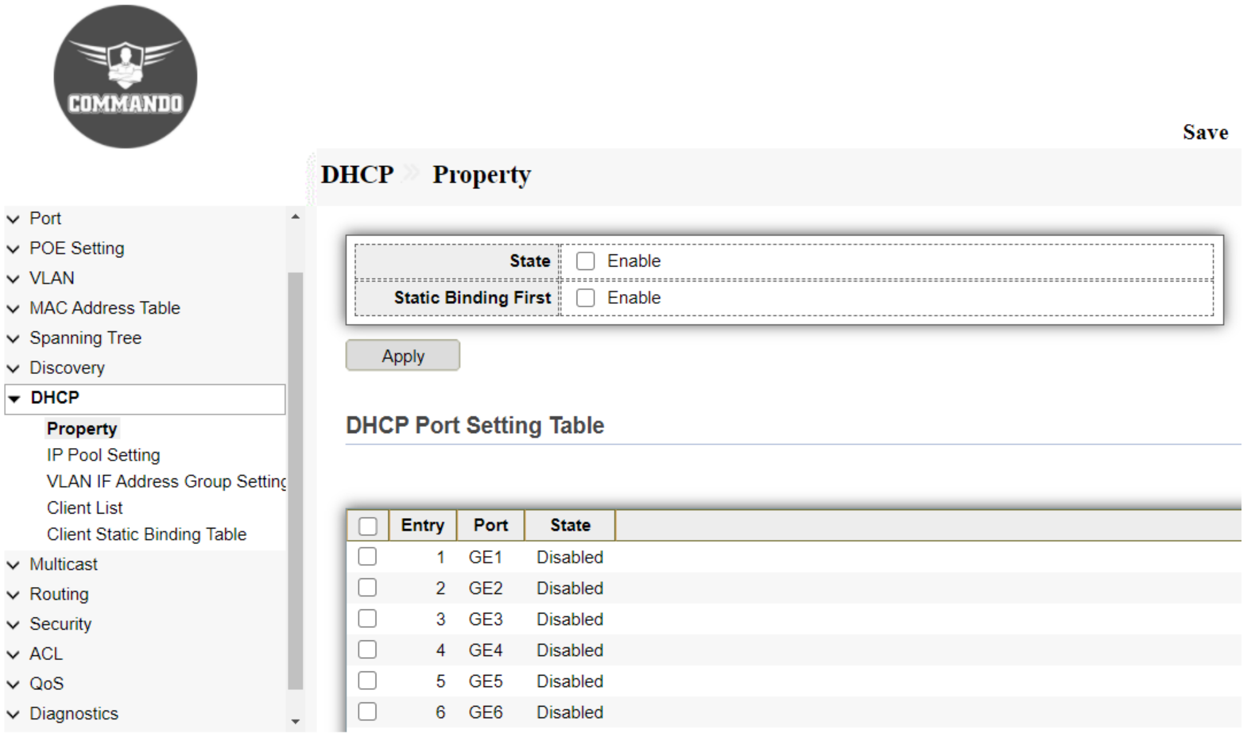
Client List: DHCP server to dynamically choose IP addresses from the IP Pools and assign them permanently to clients. To view clients this page is used.

Client Static Binding Table: Configuring the DHCP Server and the Static-Binding. The following table describes the static binding options. Display the address bindings in the client table on the extended Dynamic Host Configuration Protocol (DHCP) local server.

9.1 Property

DHCP property page allows you to enable DHCP which is by default disabled.

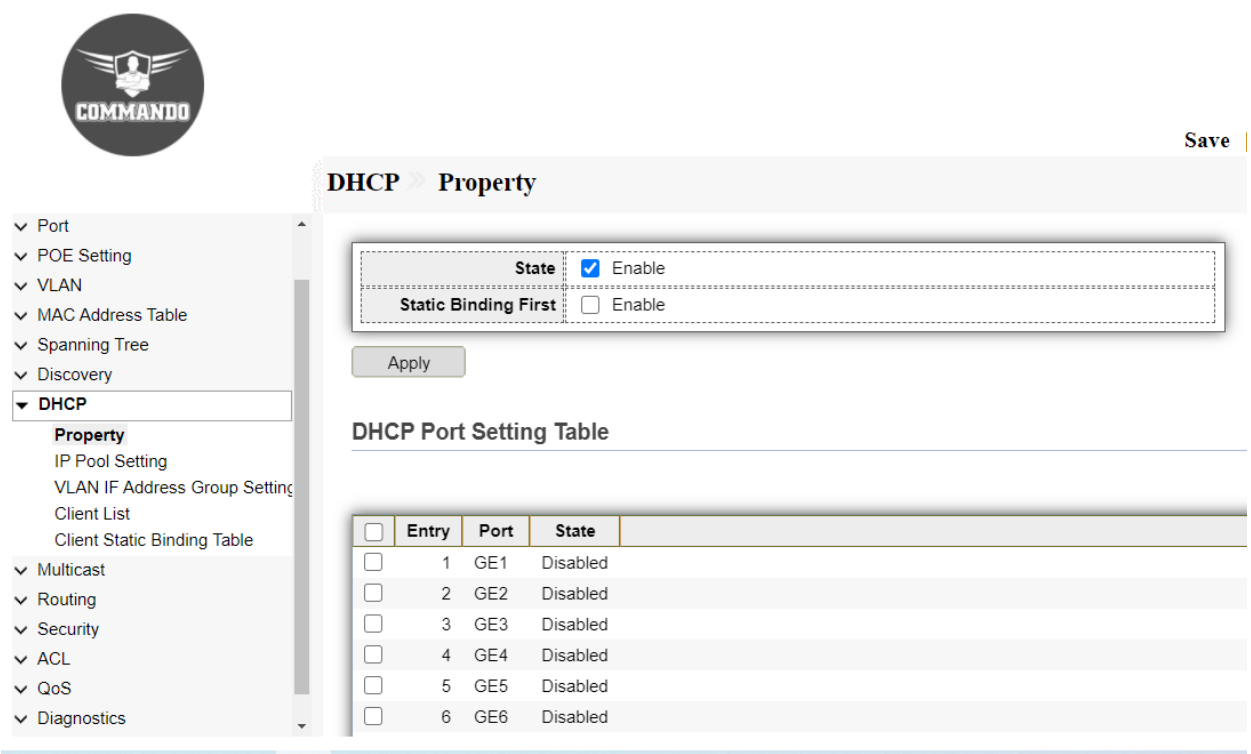
To configure and view DHCP property, click **DHCP >> Property.**



State	□ Enable
Static Binding First	□ Enable

□	Entry	Port	State
□	1	GE1	Disabled
□	2	GE2	Disabled
□	3	GE3	Disabled
□	4	GE4	Disabled
□	5	GE5	Disabled
□	6	GE6	Disabled

Fig 9.1.1 Default DHCP Property page



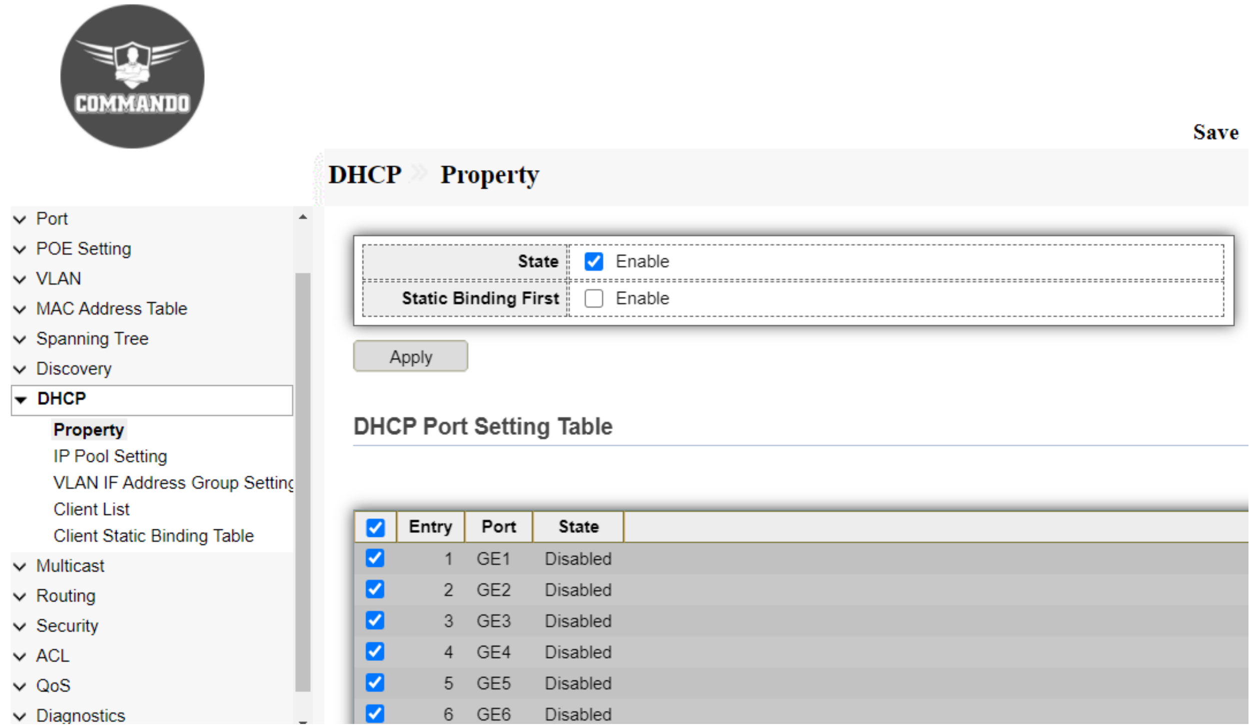
DHCP » Property

State	☑ Enable
Static Binding First	□ Enable

DHCP Port Setting Table

□	Entry	Port	State
□	1	GE1	Disabled
□	2	GE2	Disabled
□	3	GE3	Disabled
□	4	GE4	Disabled
□	5	GE5	Disabled
□	6	GE6	Disabled

Fig 9.1.2 Enable DHCP Property page



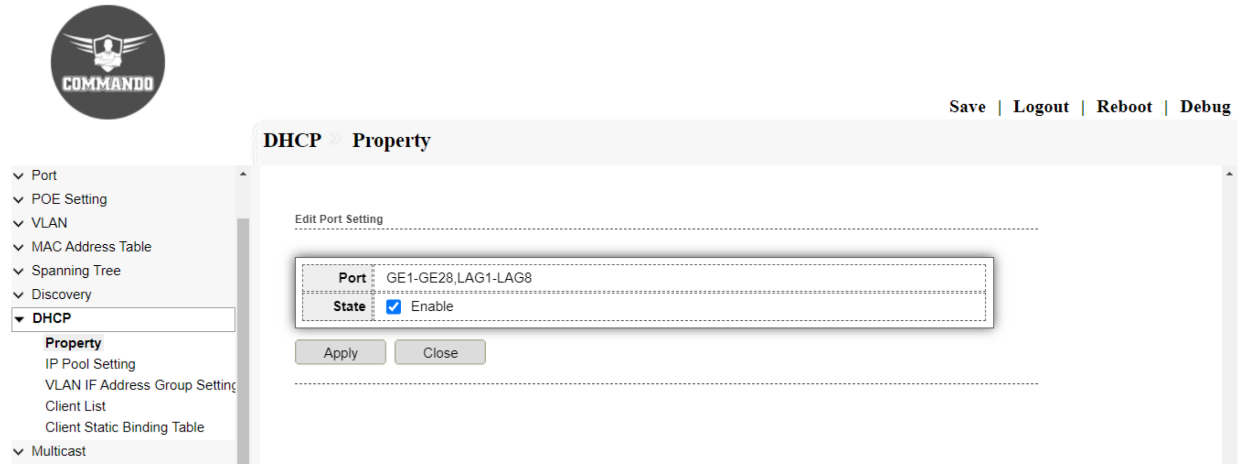
DHCP » Property

State	☑ Enable
Static Binding First	□ Enable

DHCP Port Setting Table

☑	Entry	Port	State
☑	1	GE1	Disabled
☑	2	GE2	Disabled
☑	3	GE3	Disabled
☑	4	GE4	Disabled
☑	5	GE5	Disabled
☑	6	GE6	Disabled

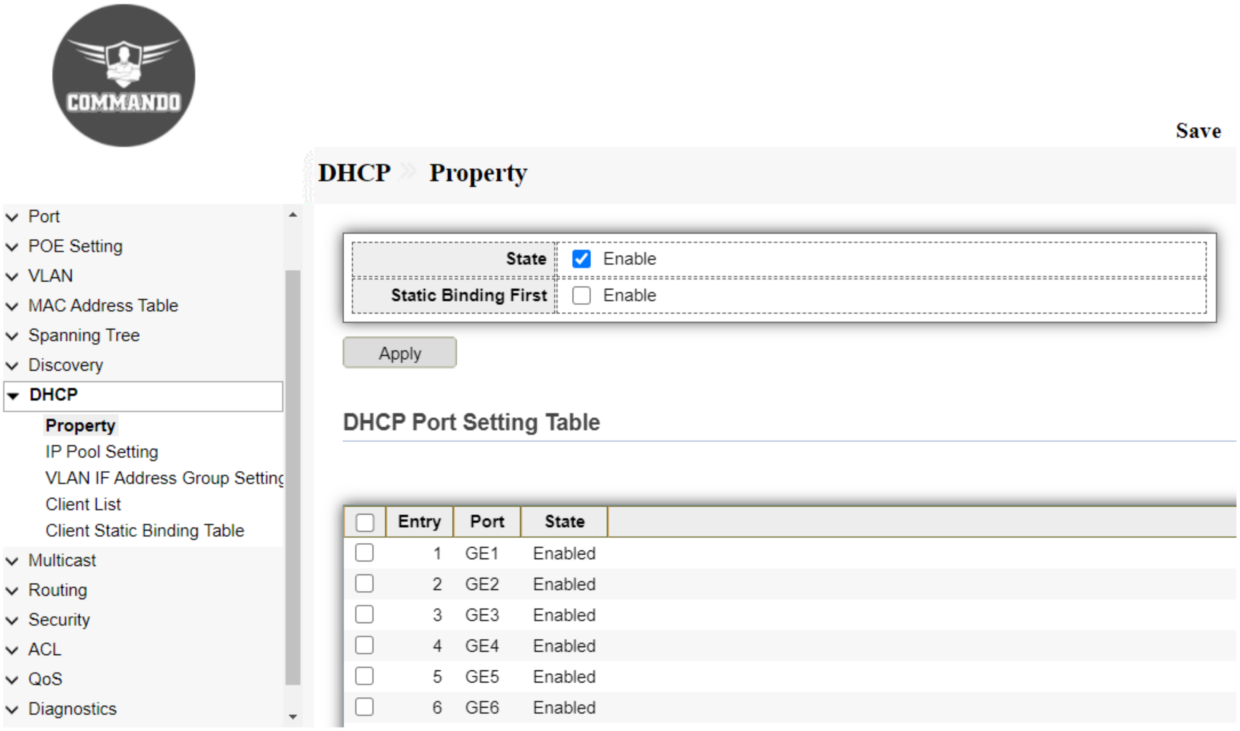
Fig 9.1.3 Selecting ports on DHCP Property page



Edit Port Setting

Port	GE1-GE28,LAG1-LAG8
State	☑ Enable

Fig 9.1.4 Edit ports setting DHCP Property page



State	☑ Enable
Static Binding First	□ Enable

DHCP Port Setting Table

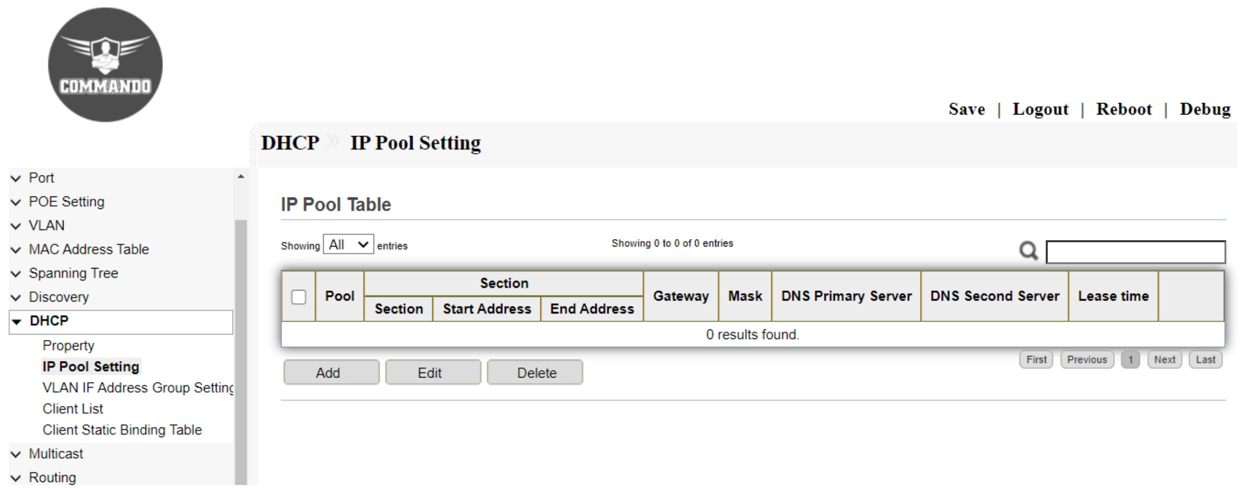
□	Entry	Port	State
□	1	GE1	Enabled
□	2	GE2	Enabled
□	3	GE3	Enabled
□	4	GE4	Enabled
□	5	GE5	Enabled
□	6	GE6	Enabled

Fig 9.1.5 DHCP port setting table after enabling page

9.2 IP Pool Setting

With IP Pool setting can set Start IP address and End address and gateway of pool along with mask. DNS Primary and secondary server along with DHCP leased time can also be set. By default, lease time is 1day before renewal of IP.

To configure and view IP Pool Setting, click **DHCP >> IP Pool Setting.**



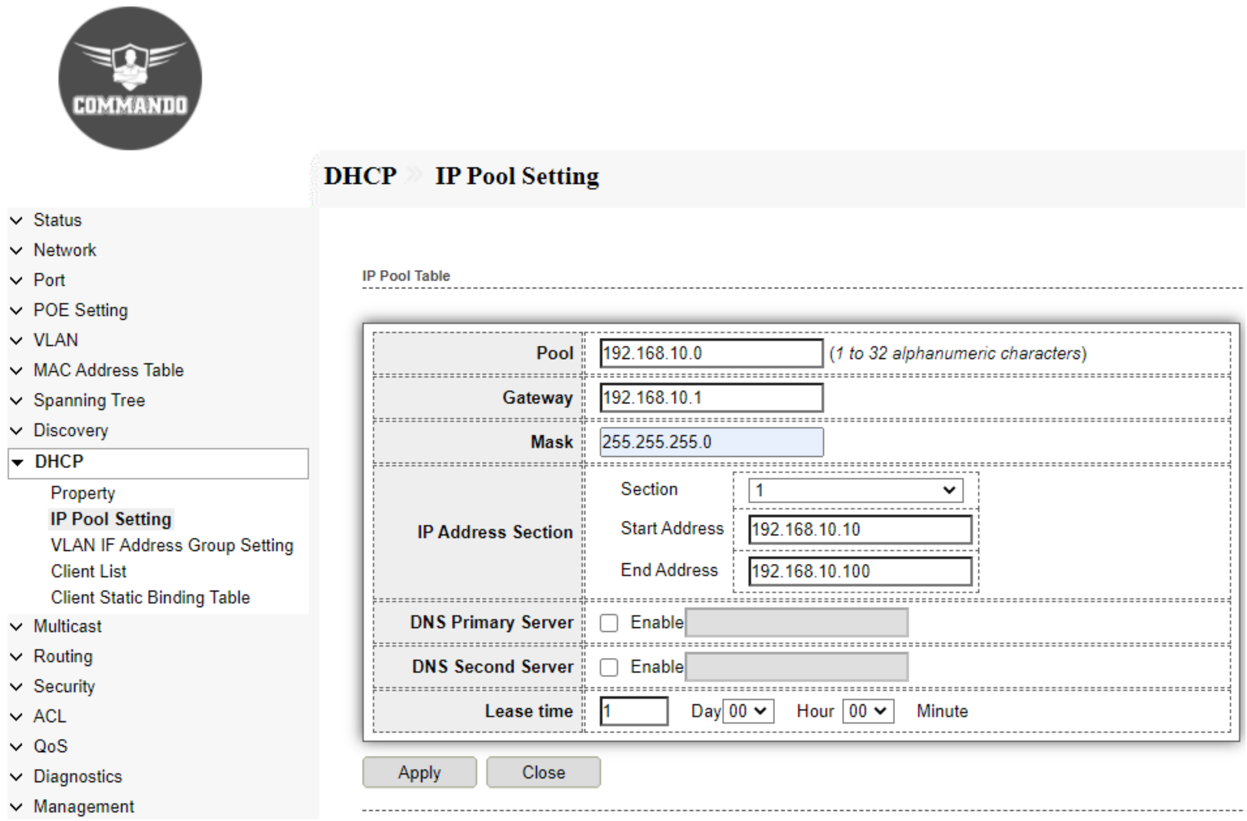
IP Pool Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Pool	Section			Gateway	Mask	DNS Primary Server	DNS Second Server	Lease time	
		Section	Start Address	End Address						
0 results found.										

Fig 9.2.1 Default DHCP IP Pool setting page

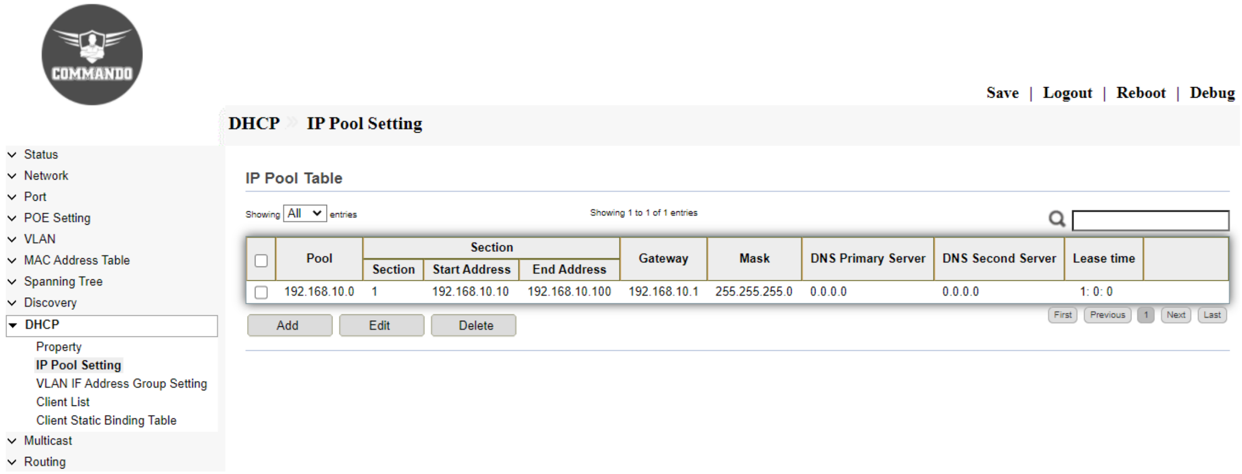


DHCP » IP Pool Setting

IP Pool Table

Pool	192.168.10.0 (*1 to 32 alphanumeric characters*)
Gateway	192.168.10.1
Mask	255.255.255.0
IP Address Section	Section: 1 Start Address: 192.168.10.10 End Address: 192.168.10.100
DNS Primary Server	□ Enable
DNS Second Server	□ Enable
Lease time	1 Day 00 Hour 00 Minute

Fig 9.2.2 Edit DHCP IP Pool setting page



DHCP » IP Pool Setting

IP Pool Table

Showing All entries

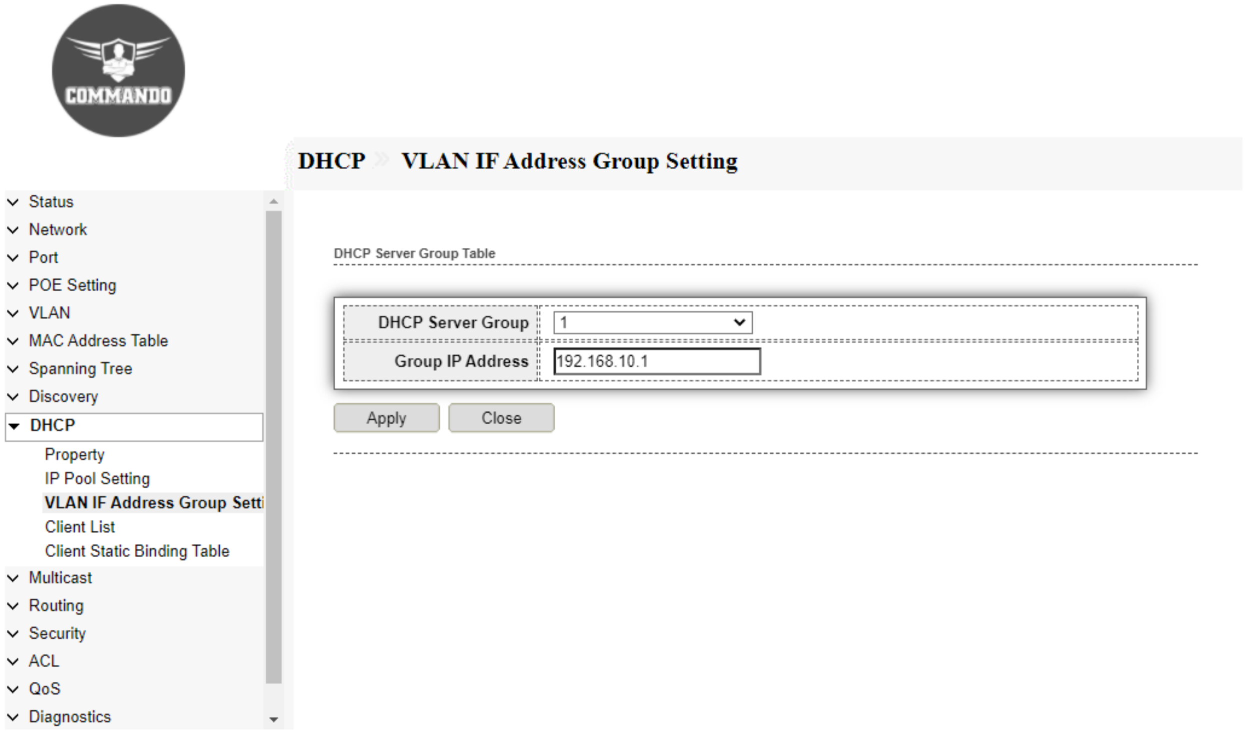
Showing 1 to 1 of 1 entries

□	Pool	Section			Gateway	Mask	DNS Primary Server	DNS Second Server	Lease time	
		Section	Start Address	End Address						
□	192.168.10.0	1	192.168.10.10	192.168.10.100	192.168.10.1	255.255.255.0	0.0.0.0	0.0.0.0	1: 0: 0	

Fig 9.2.3 DHCP IP Pool Table after setting page

9.3 VLAN IF Address Group Setting

VLAN interface can be bind with group IP address. To configure and view VLAN IF Address Group Setting, click **DHCP >> VLAN IF Address Group Setting.**

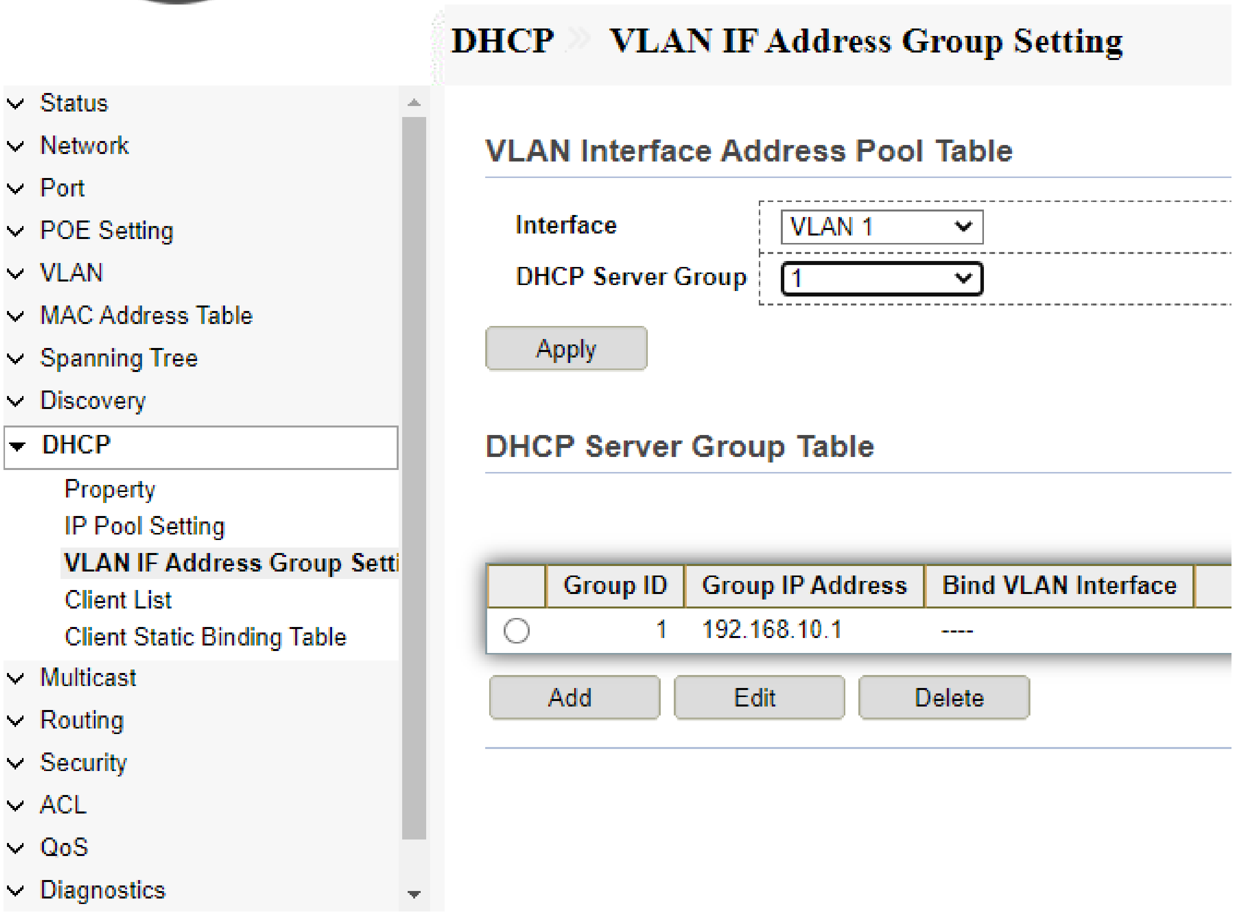


DHCP » VLAN IF Address Group Setting

DHCP Server Group Table

DHCP Server Group	1
Group IP Address	192.168.10.1

Fig 9.3.1 DHCP VLAN Interface address pool and Server group table page.



DHCP » VLAN IF Address Group Setting

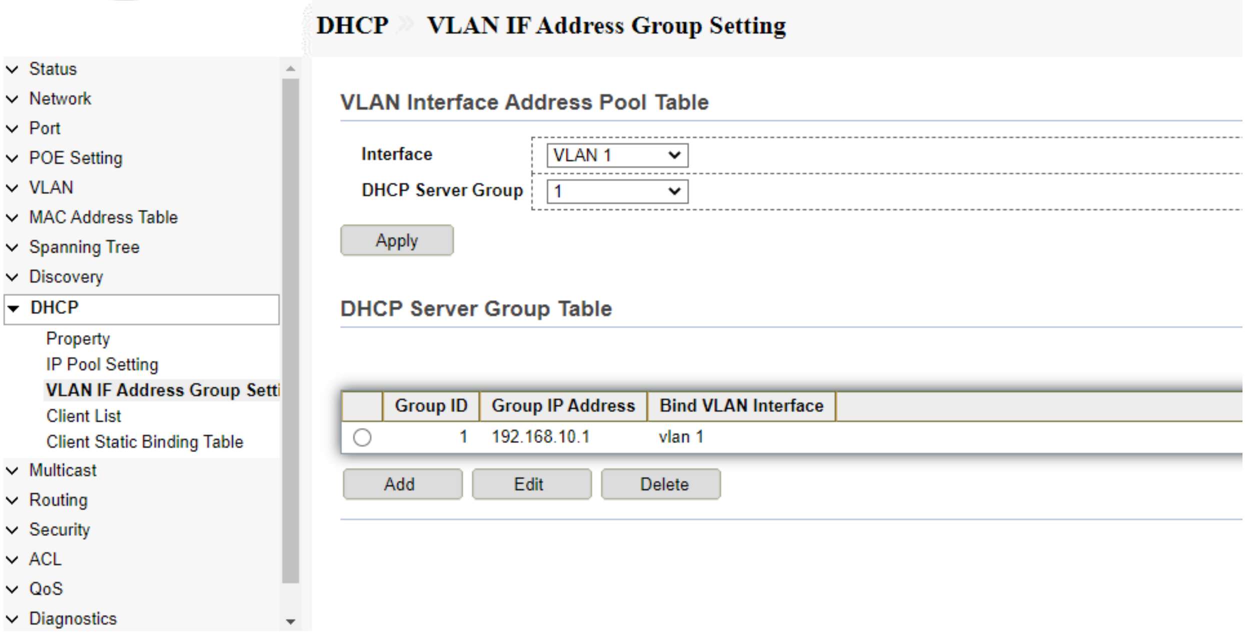
VLAN Interface Address Pool Table

Interface	VLAN 1
DHCP Server Group	1

DHCP Server Group Table

	Group ID	Group IP Address	Bind VLAN Interface
○	1	192.168.10.1	----

Fig 9.3.2 DHCP Binding VLAN Interface to DHCP server group IP address page.



DHCP » VLAN IF Address Group Setting

VLAN Interface Address Pool Table

Interface: VLAN 1

DHCP Server Group: 1

DHCP Server Group Table

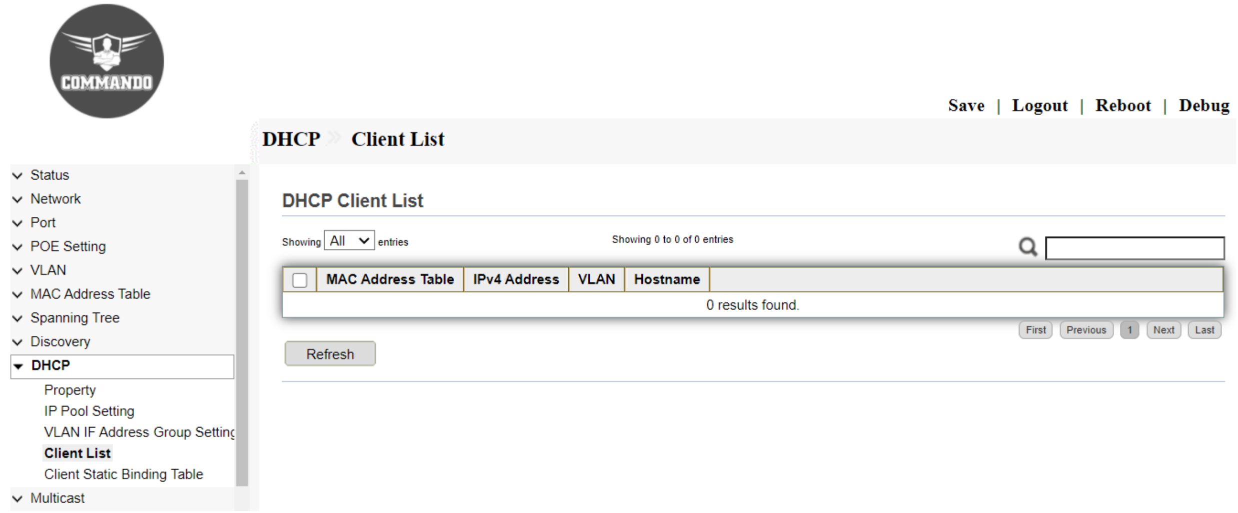
	Group ID	Group IP Address	Bind VLAN Interface
○	1	192.168.10.1	vlan 1

Fig 9.3.3 DHCP Binding VLAN Interface to DHCP server group

9.4 Client List

The DHCP Client Table allows you to check the devices that are connected to your network. After creating DHCP server group and binding with VLAN, the members of VLANs are automatically provide IP address. These assigned IP address to client can be seen with DHCP client List.

To view DHCP Client list, click **DHCP >> Client list.**



DHCP Client List

Showing All entries

Showing 0 to 0 of 0 entries

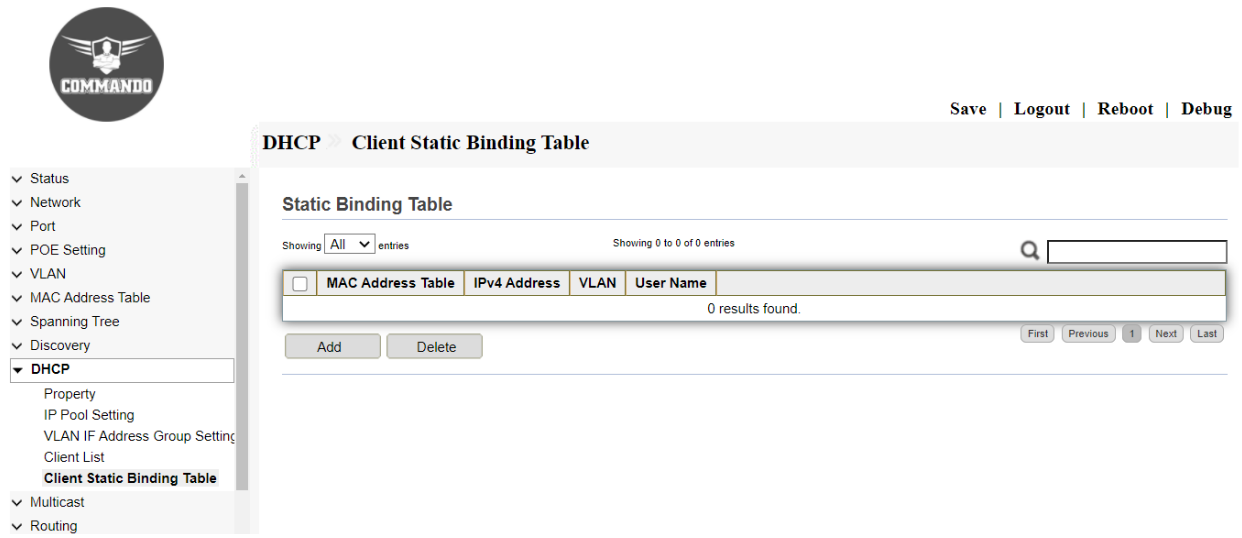
□	MAC Address Table	IPv4 Address	VLAN	Hostname
0 results found.				

Fig 9.4.1 DHCP Client list page.

9.5 Client Static Binding Table

The DHCP static binding feature enables assignment of static IP addresses without creating numerous host pools with manual bindings with MAC addresses. A static binding is a mapping between a fixed IP address and the client's MAC address. Client can be bound with static IP address and by particular name also can be assigned to clients.

To configure and view DHCP Client Static Binding, click **DHCP >> Client Static Binding Table.**



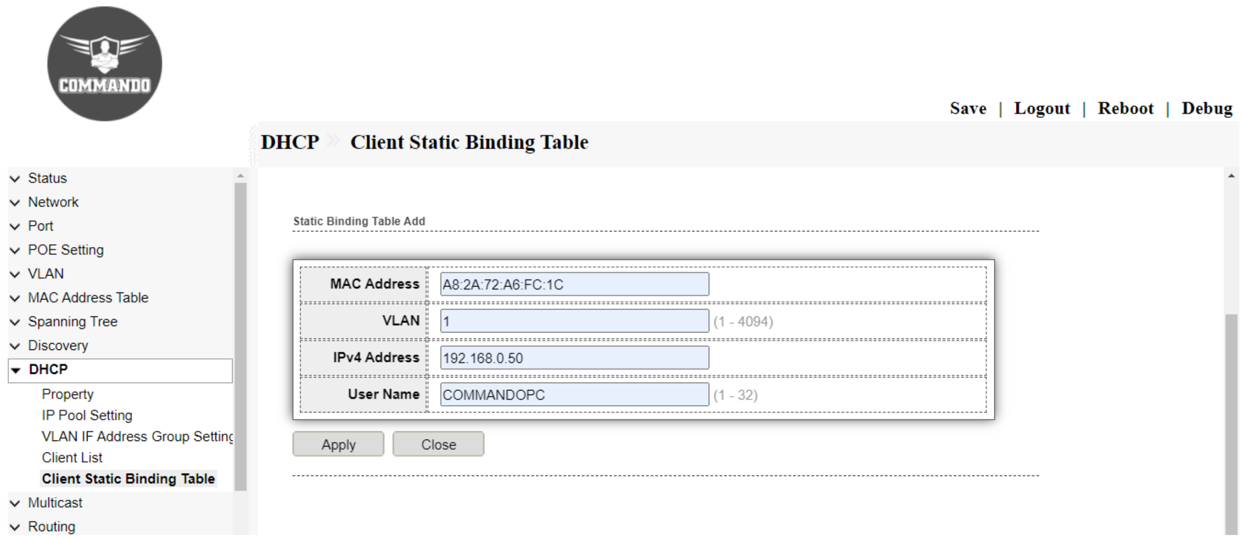
DHCP » Client Static Binding Table

Static Binding Table

Showing All entries Showing 0 to 0 of 0 entries

□	MAC Address Table	IPv4 Address	VLAN	User Name
0 results found.				

Fig 9.5.1 Default DHCP Client Binding Table page.

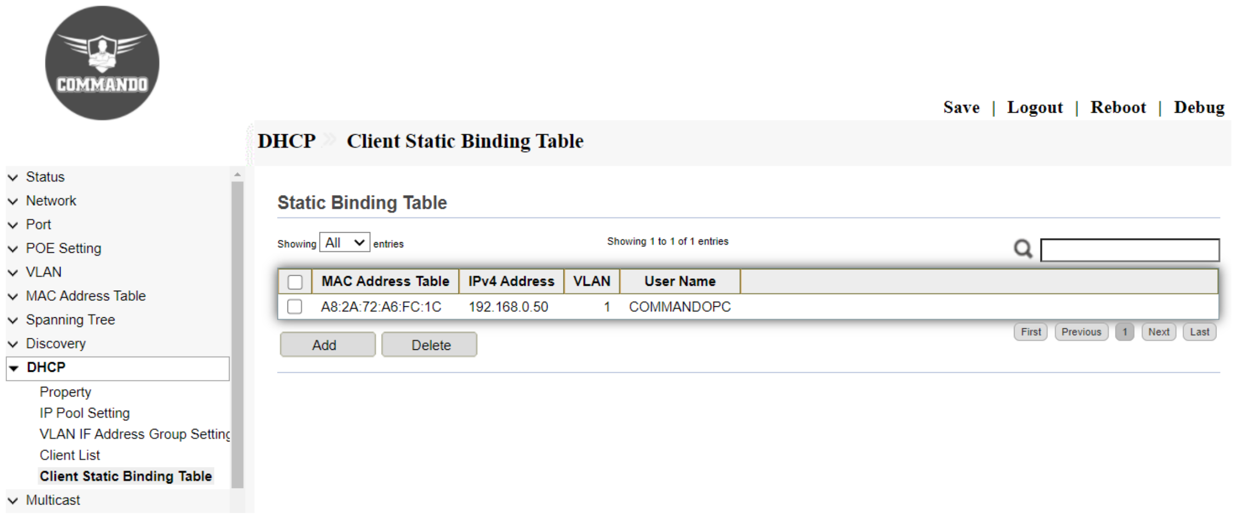


DHCP » Client Static Binding Table

Static Binding Table Add

MAC Address	A8:2A:72:A6:FC:1C	
VLAN	1	(1 - 4094)
IPv4 Address	192.168.0.50	
User Name	COMMANDOPC	(1 - 32)

Fig 9.5.2 DHCP Client add static binding page.



Static Binding Table

Showing All entries

Showing 1 to 1 of 1 entries

□	MAC Address Table	IPv4 Address	VLAN	User Name
□	A8:2A:72:A6:FC:1C	192.168.0.50	1	COMMANDOPC

Fig 9.5.3 DHCP Client Static Binding Table page.

Chapter 10 Multicast

General: Multicast is group communication where data transmission is addressed to a group of devices simultaneously. Multicast can be one-to-many or many-to-many distribution.

Property: Multicast packets are replicated in the network at the point where paths diverge. Multicast includes Internet Group Management Protocol, Protocol Independent Multicast and Multicast VLAN Registration.

Group Address: RFC 2365 provides limited guidelines on how the multicast address space can be divided and used privately by enterprises. The terminology "Administratively Scoped IPv4 multicast space" relates to the group address range of 239.0.0.0 to 239.255.255.255.

Router Port: A Multicast router (Mrouter) port is a port that connects to a Multicast router. The device includes the Multicast router port(s) numbers when it forwards the Multicast streams and IGMP/MLD registration messages.

Forward All: The Multicast Forward All page allows you to choose which interfaces receive multicast streams in which VLANs.

Throttling: This page displays the IGMP throttling configurations for all interfaces on the switch or for a specified interface.

Filtering Profile: A Multicast filter profile permits or denies a range of Multicast groups to be learned when the join group.

Filtering Binding: Multicast filtering to receive only messages to multicast addresses assigned to its own host at the link layer level. The filter is set when the host joins a multicast group.

IGMP Snooping: IGMP snooping is the process of listening to Internet Group Management Protocol (IGMP) network traffic to control delivery of IP multicast.

Property: Internet Group Management Protocol (IGMP) snooping allows the switch to forward multicast traffic intelligently. you can block even more multicast traffic and reduce your risk of a denial of service (DoS) attack, you can choose to block multicast traffic from unknown addresses.

Querier: The IGMP/MLD Snooping Querier is used to support a Layer 2 Multicast domain of snooping switches in the absence of a Multicast router.

Statistics: This page shows summary of IGMP statistics: Membership Query—Number of membership queries sent and received. Group Leave—Number of groups leave messages sent or received. Mtrace Response—Number of Mtrace response messages sent or received.

MLD Snooping: Multicast Listener Discovery (MLD) snooping constrains the flooding of IPv6 multicast traffic on VLANs.

Property: MLD snooping runs on a Layer 2 device as an IPv6 multicast constraining mechanism to improve multicast forwarding efficiency. It creates Layer 2 multicast forwarding entries from MLD messages that are exchanged.

Statistics: Display information about MLD snooping statistics.

MVR: Multicast VLAN Registration (MVR) is designed for distribution of multicast traffic on a dedicated multicast VLAN across segregated access networks, while allowing subscribers who are on different VLANs to join and leave the multicast groups carried in the Multicast VLAN. Multicast VLAN registration (MVR) enables more efficient distribution of IPTV multicast streams across an Ethernet ring-based Layer 2 network.

Property: When you configure MVR, you create a multicast VLAN (MVLAN) that becomes the only VLAN over which IPTV multicast traffic flows throughout the Layer 2 network. Devices with MVR enabled selectively forward IPTV multicast traffic from interfaces on the MVLAN (source interfaces) to hosts that are connected to interfaces that are not part of the MVLAN that you designate as MVR receiver ports.

Port Setting: MVR Port Setting, Port configuration, status, statistics, mirroring, security. MVR Function can provide different VLAN users to receive MVR Mode VLAN.

Group Address: MVR is not enabled by default on devices that support MVR. You explicitly configure an MVLAN and assign a range of multicast group addresses to it. That VLAN carries MVLAN traffic for the configured multicast groups. You then configure other VLANs to be MVR receiver VLANs that receive multicast streams from the MVLAN.

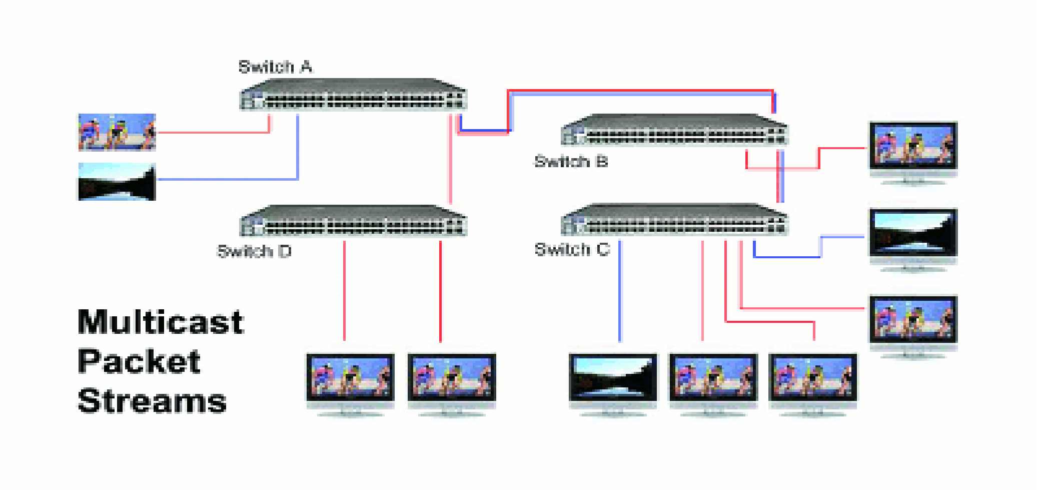


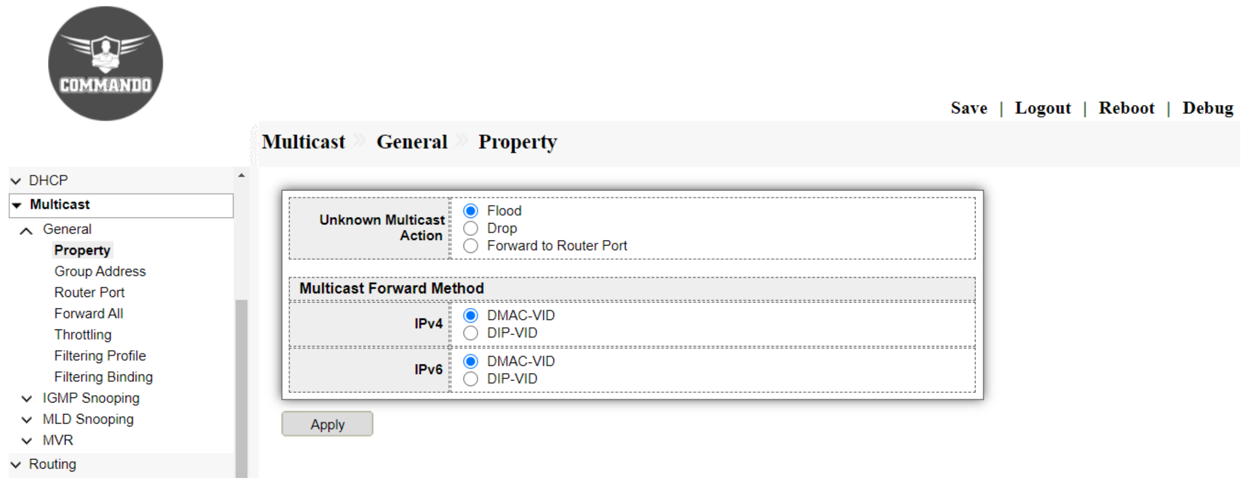
Fig 10.1.1 Multicast Packet Streams page

10.1 General

In computer networking, multicast is group communication where data transmission is addressed to a group of destination computers simultaneously. Multicast can be one-to-many or many-to-many distribution.

10.1.1 Property

The Properties page enables you to configure the Bridge Multicast filtering status. By default, all Multicast frames are flooded to all ports of the VLAN. To selectively forward only to relevant ports and filter (drop) the Multicast on the rest of the ports, enable Bridge Multicast filtering status in the Properties page. If filtering is enabled, Multicast frames are forwarded to a subset of the ports in the relevant VLAN as defined in the Multicast Forwarding Data Base. Multicast filtering is enforced on all traffic. By default, such traffic is flooded to all relevant ports, but you can limit forwarding to a smaller subset. To view and configure multicast general property, click **Multicast >> General >> Property.**



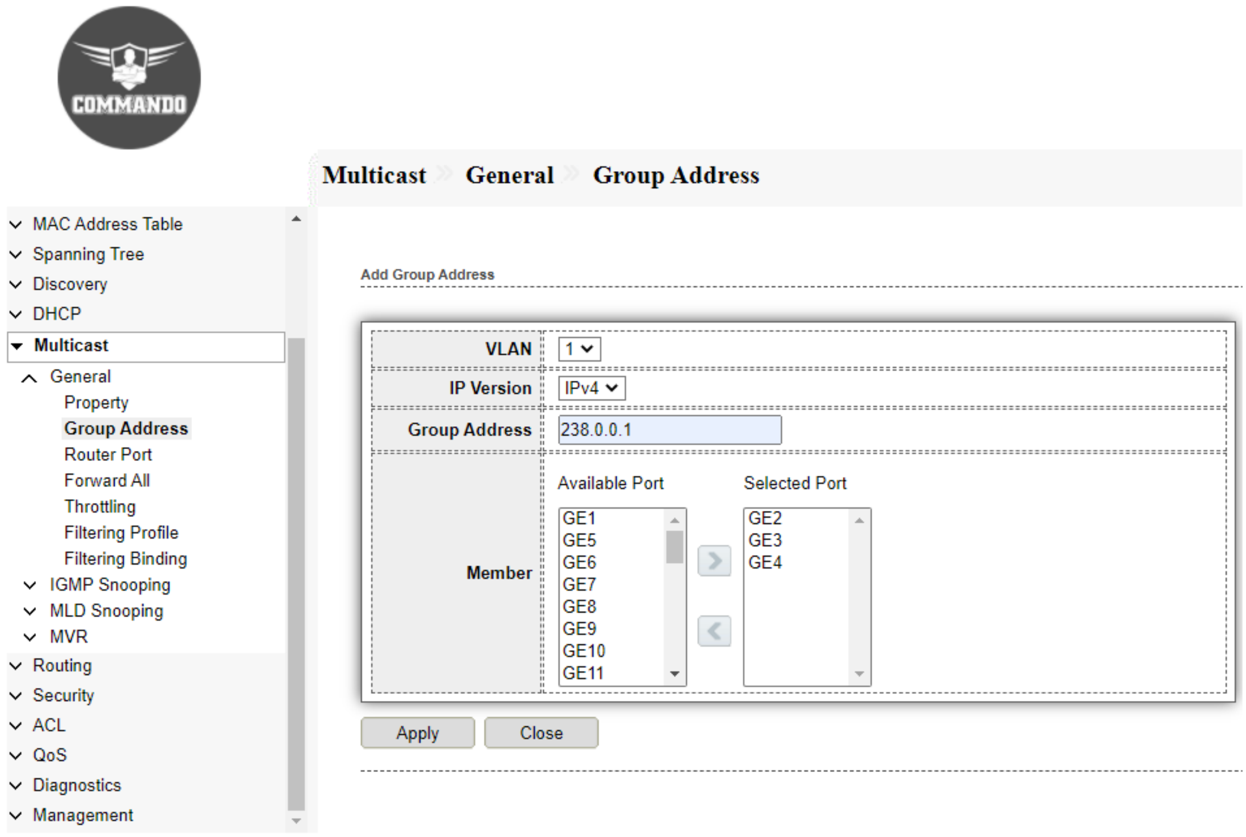
Unknown Multicast Action	● Flood ○ Drop ○ Forward to Router Port
Multicast Forward Method	
IPv4	● DMAC-VID ○ DIP-VID
IPv6	● DMAC-VID ○ DIP-VID

Fig 10.1.1 Multicast general property page

10.1.2 Group Address

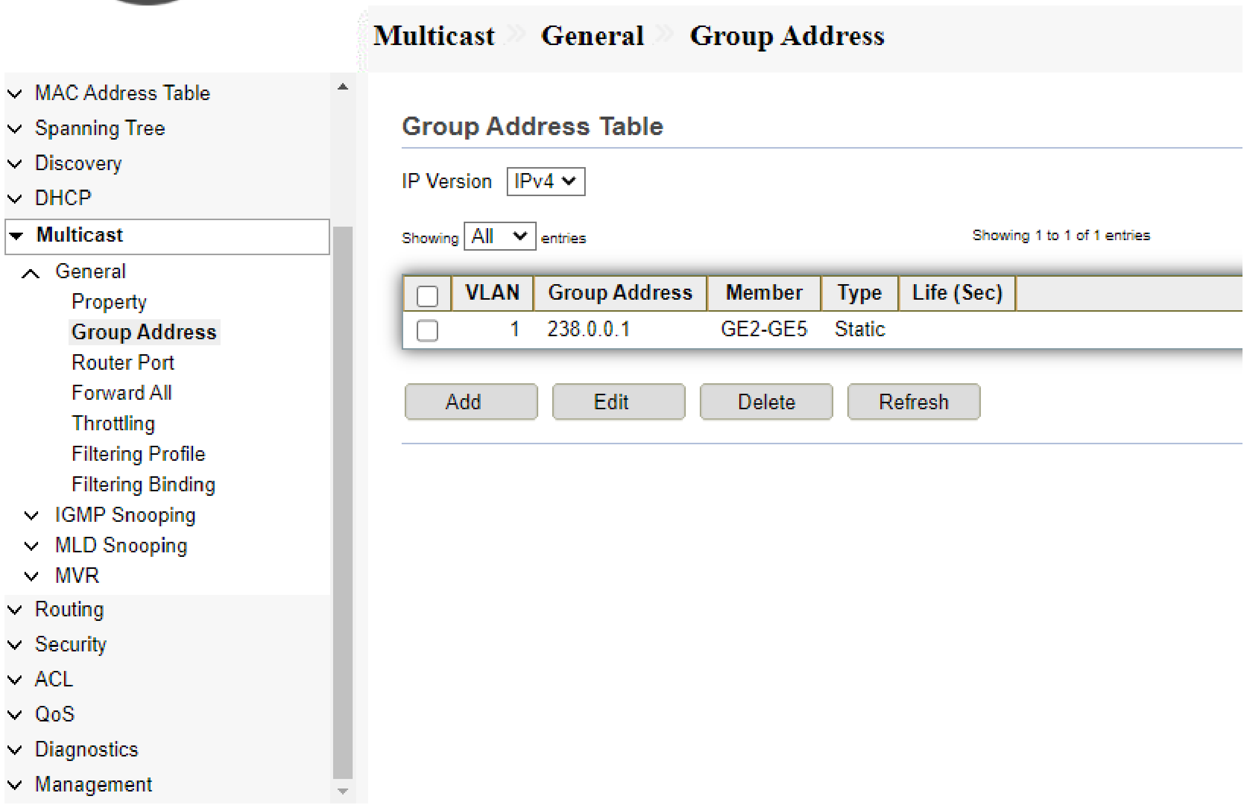
IP multicast is a method of sending Internet Protocol (IP) datagrams to a group of interested receivers in a single transmission. It is the IP-specific form of multicast and is used for streaming media and other network applications. Full range of multicast addresses is from 224.0.0.0 to 239.255.255.255. Since multicast addresses represent a group of IP devices. This page allow user to browse all multicast groups that dynamic learned or statically added.

To view and configure Multicast General Group, click **Multicast >> General >> Group Address.**



VLAN	1
IP Version	IPv4
Group Address	238.0.0.1
Member	Available Port: GE1, GE5, GE6, GE7, GE8, GE9, GE10, GE11 Selected Port: GE2, GE3, GE4

Fig 10.1.2 Multicast default group address table page



Group Address Table

IP Version: IPv4

Showing All entries

Showing 1 to 1 of 1 entries

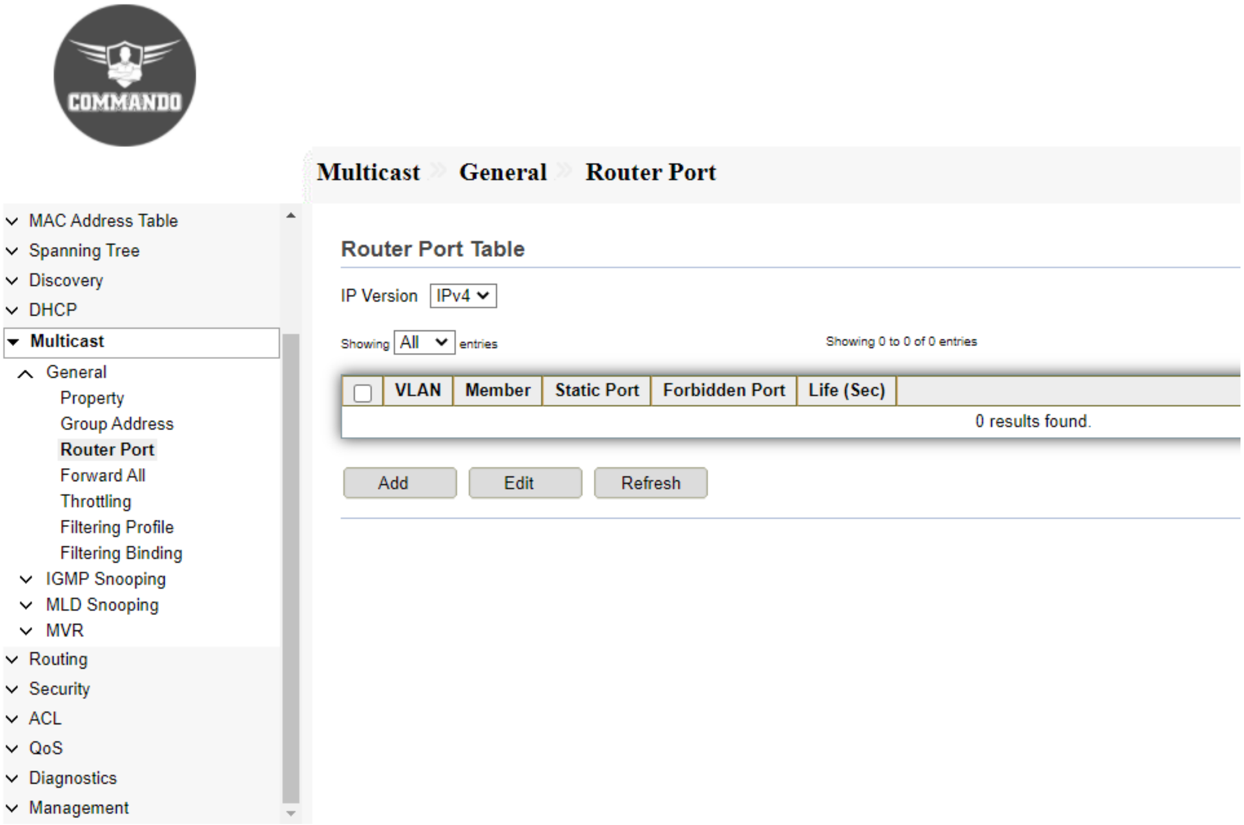
□	VLAN	Group Address	Member	Type	Life (Sec)
□	1	238.0.0.1	GE2-GE5	Static	

Fig 10.1.3 Multicast group address table page

10.1.3 Router Port

A Multicast router (Mrouter) port is a port that connects to a Multicast router. The device includes the Multicast router port(s) numbers when it forwards the Multicast streams and IGMP/MLD registration messages. Router port is a port on snooping switch that is connecting to the IGMP querier. This page allow user to browse all router port information. The static and forbidden router port can set by user.

To configure and view multicast router port table web page, click **Multicast >> General >> Router Port.**



Router Port Table

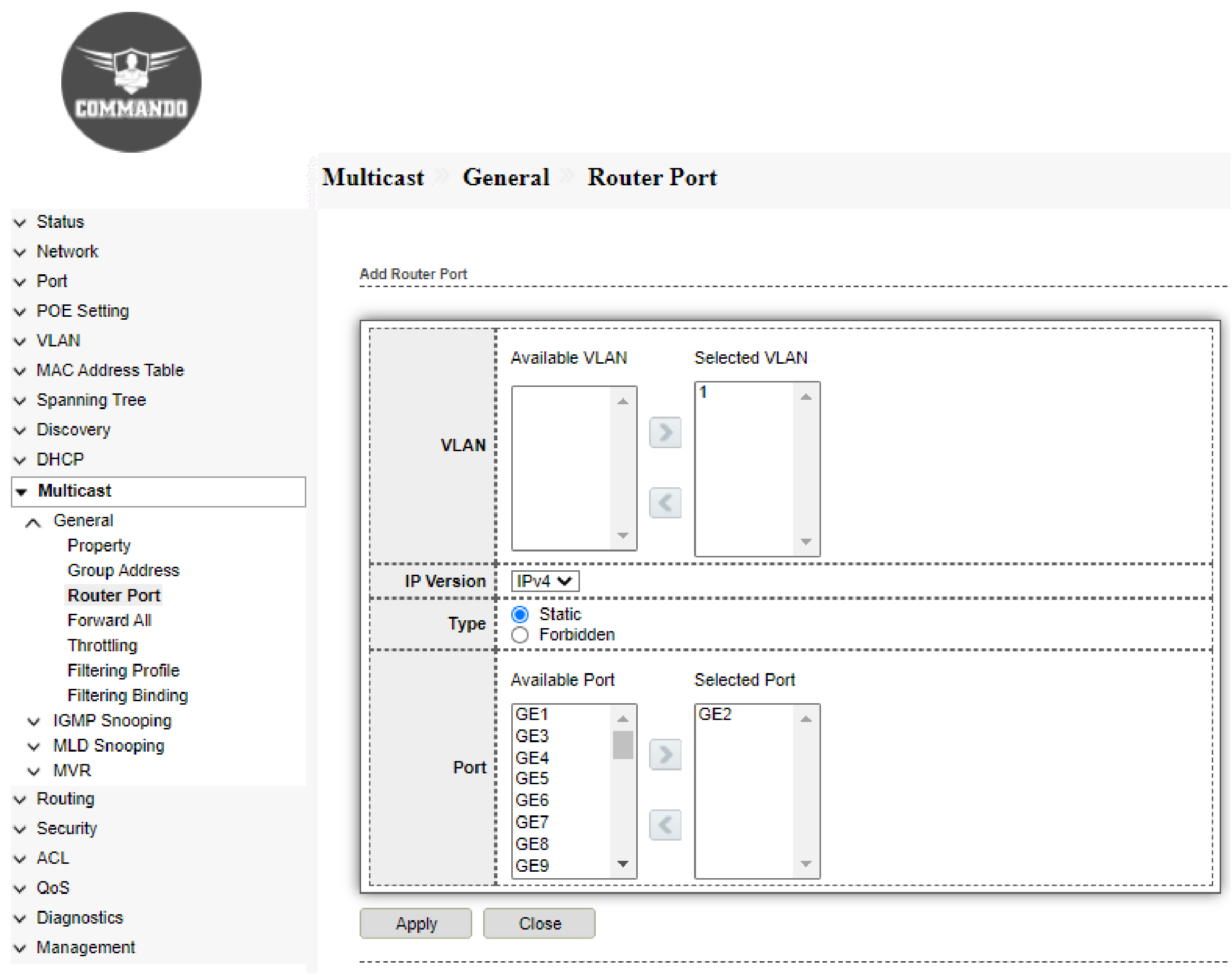
IP Version IPv4

Showing All entries

Showing 0 to 0 of 0 entries

□	VLAN	Member	Static Port	Forbidden Port	Life (Sec)
0 results found.					

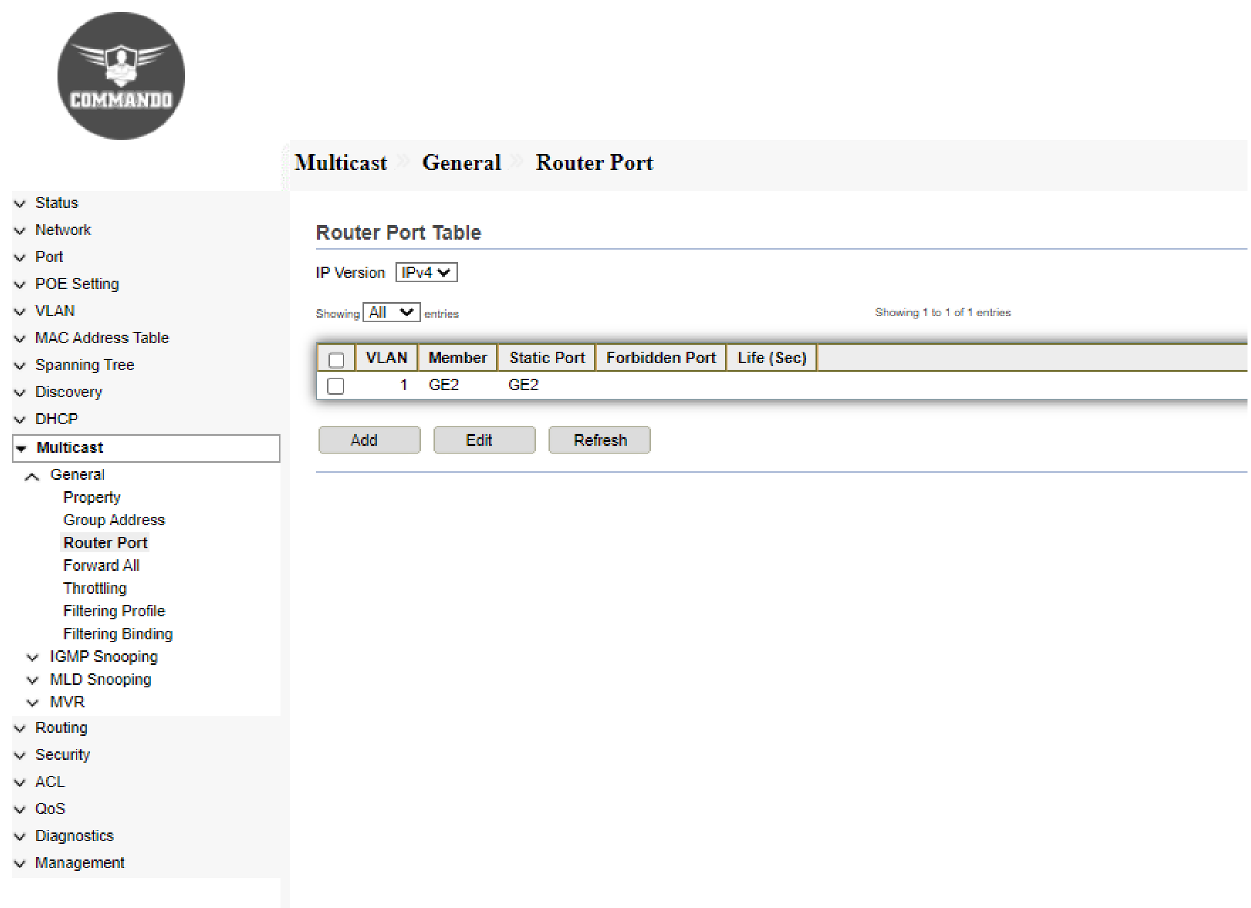
Fig 10.1.5 Multicast default router port table page



Add Router Port

VLAN	Available VLAN: Selected VLAN: 1
IP Version	IPv4
Type	● Static ○ Forbidden
Port	Available Port: GE1, GE3, GE4, GE5, GE6, GE7, GE8, GE9 Selected Port: GE2

Fig 10.1.6 Multicast router port selection page



Router Port Table

IP Version IPv4

Showing All entries

Showing 1 to 1 of 1 entries

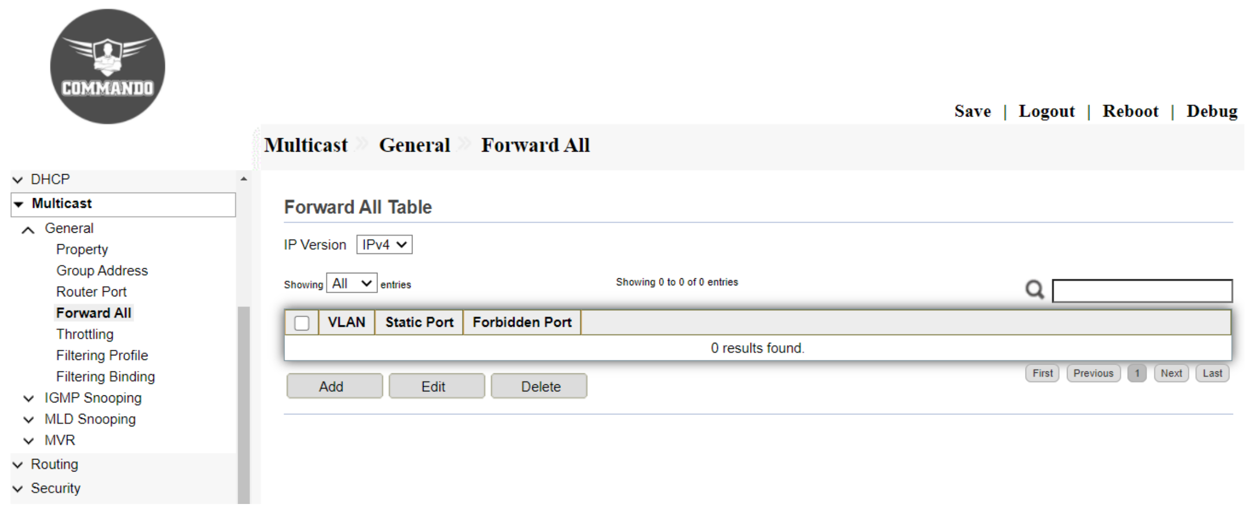
□	VLAN	Member	Static Port	Forbidden Port	Life (Sec)
□	1	GE2	GE2		

Fig 10.1.7 Multicast router port table by selecting GE5 and GE7 port page

10.1.4 Forward All

The Multicast Forward All page allows you to choose which interfaces receive multicast streams in which VLANs.

To view and configure multicast Forward All web page, click **Multicast >> General >> Forward All.**



Forward All Table

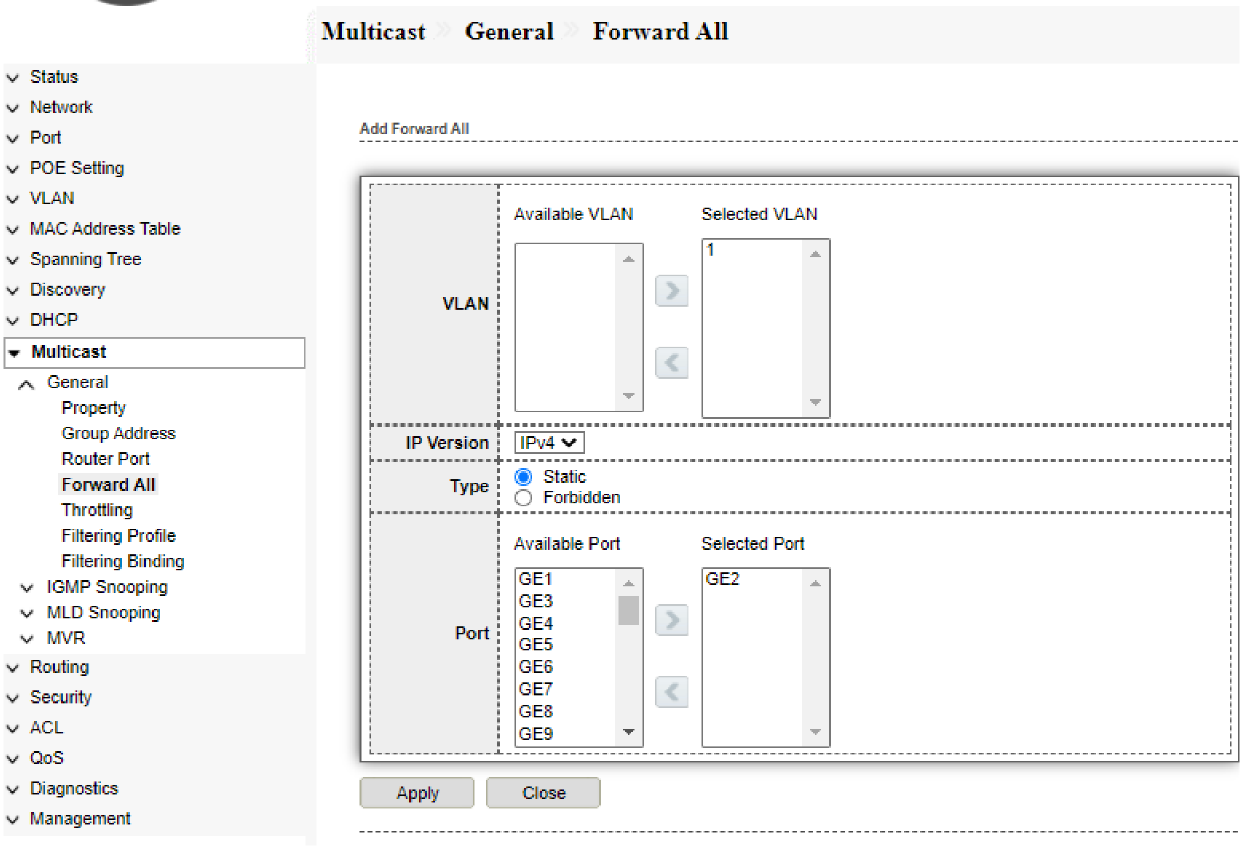
IP Version IPv4

Showing All entries

Showing 0 to 0 of 0 entries

□	VLAN	Static Port	Forbidden Port
0 results found.			

Fig 10.1.8 Multicast default forward all table page



Multicast » General » Forward All

Add Forward All

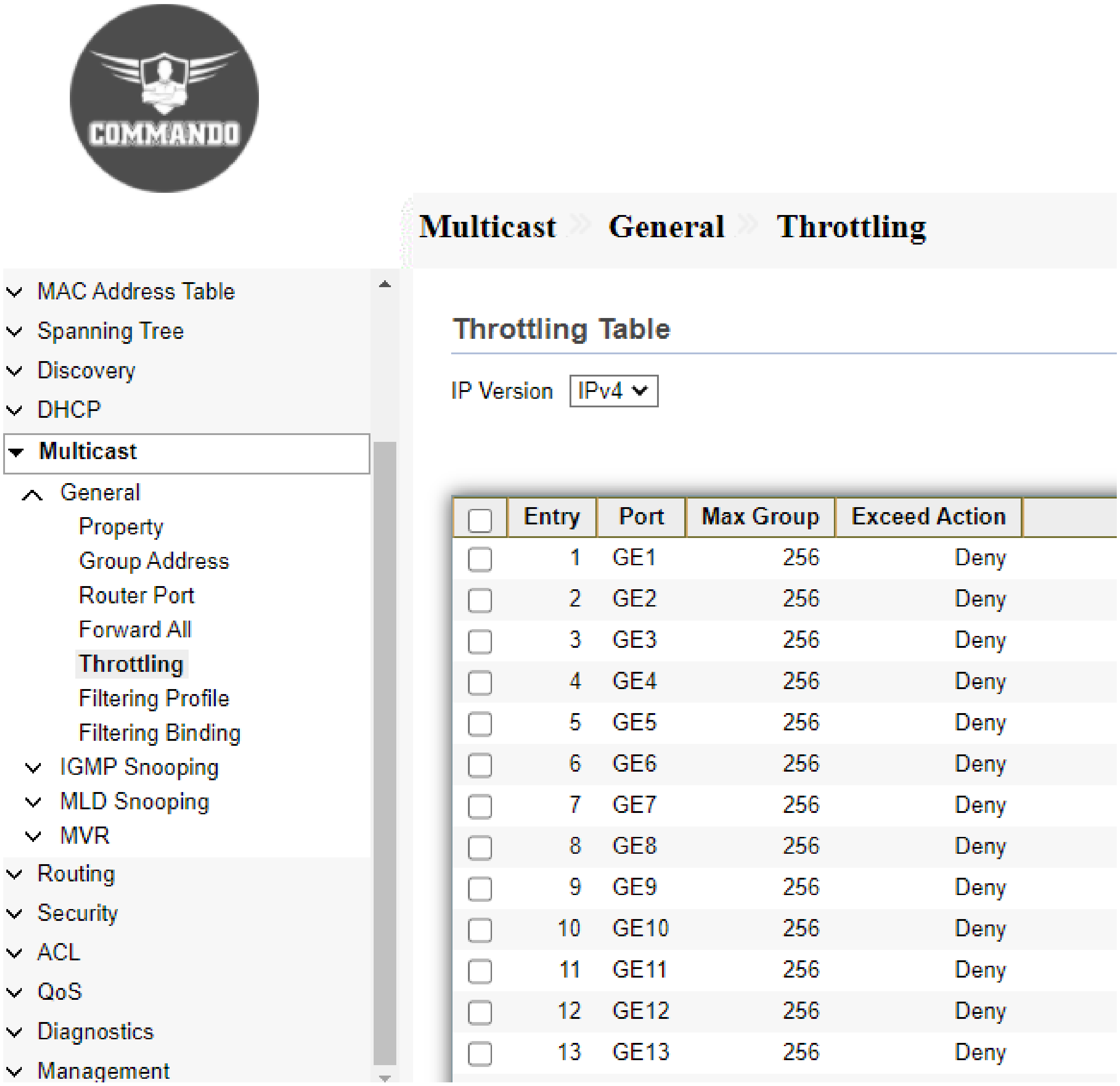
VLAN	Available VLAN: Selected VLAN: 1
IP Version	IPv4
Type	● Static ○ Forbidden
Port	Available Port: GE1, GE3, GE4, GE5, GE6, GE7, GE8, GE9 Selected Port: GE2

Fig 10.1.9 Multicast default forward all table page

10.1.5 Throttling

With the throttling feature, you can set the maximum number of groups that a Layer 2 interface can join. This page allow user to configure port can learned max group number and if port group number arrived max group number action

To view and configure multicast max-group number and action, click **Multicast >> General >> Throttling.**

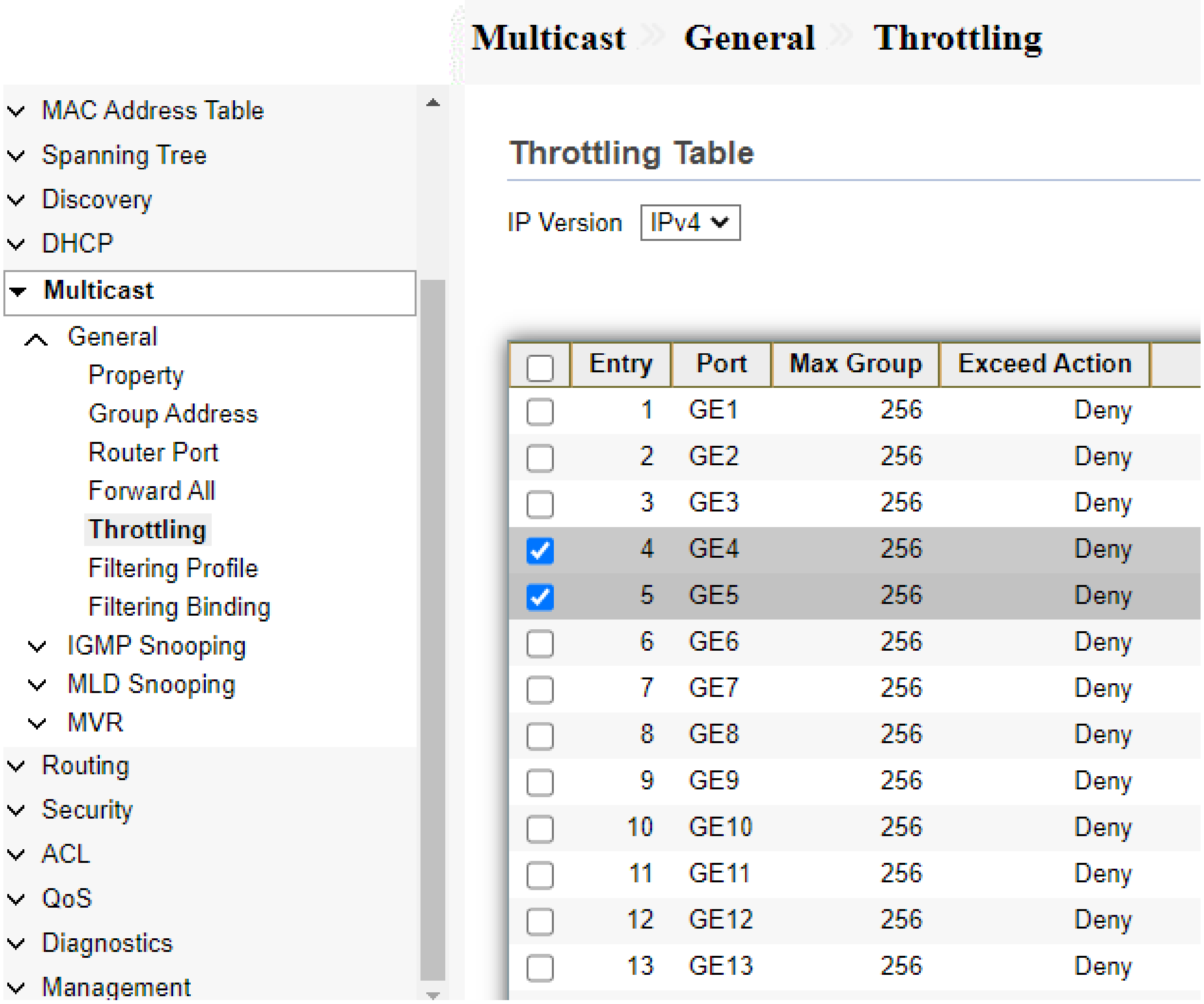


Throttling Table

IP Version: IPv4

□	Entry	Port	Max Group	Exceed Action
□	1	GE1	256	Deny
□	2	GE2	256	Deny
□	3	GE3	256	Deny
□	4	GE4	256	Deny
□	5	GE5	256	Deny
□	6	GE6	256	Deny
□	7	GE7	256	Deny
□	8	GE8	256	Deny
□	9	GE9	256	Deny
□	10	GE10	256	Deny
□	11	GE11	256	Deny
□	12	GE12	256	Deny
□	13	GE13	256	Deny

Fig 10.1.10 Multicast Default throttling table page



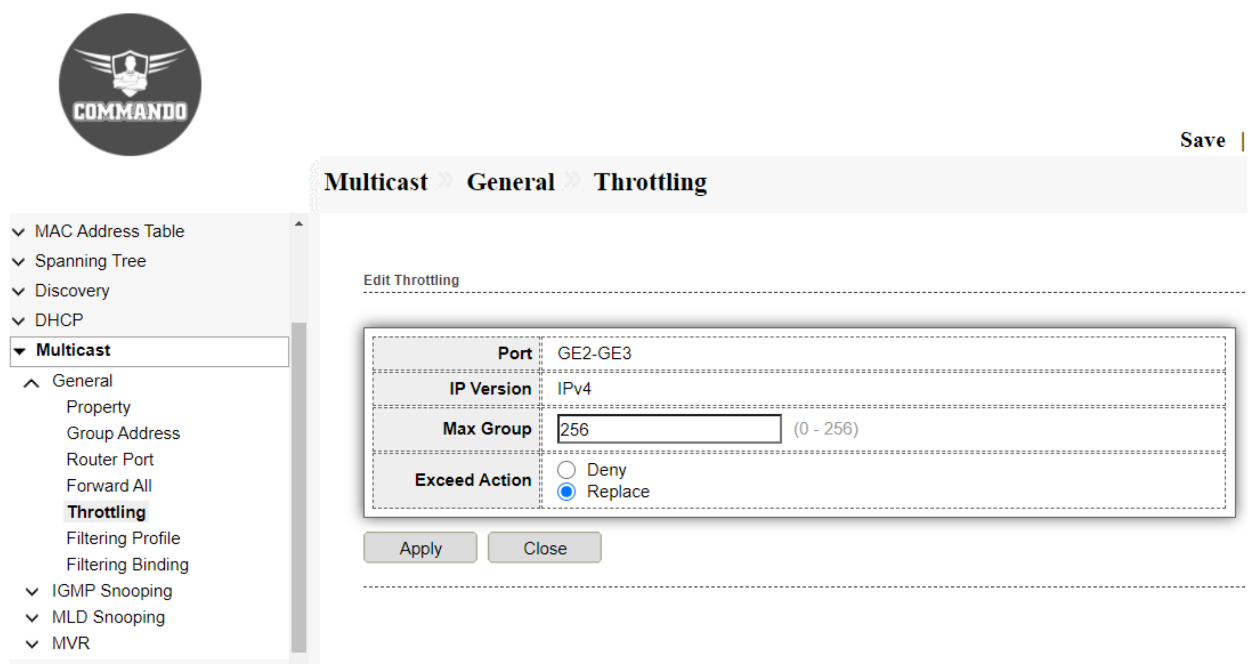
Multicast » General » Throttling

Throttling Table

IP Version: IPv4

□	Entry	Port	Max Group	Exceed Action
□	1	GE1	256	Deny
□	2	GE2	256	Deny
□	3	GE3	256	Deny
☑	4	GE4	256	Deny
☑	5	GE5	256	Deny
□	6	GE6	256	Deny
□	7	GE7	256	Deny
□	8	GE8	256	Deny
□	9	GE9	256	Deny
□	10	GE10	256	Deny
□	11	GE11	256	Deny
□	12	GE12	256	Deny
□	13	GE13	256	Deny

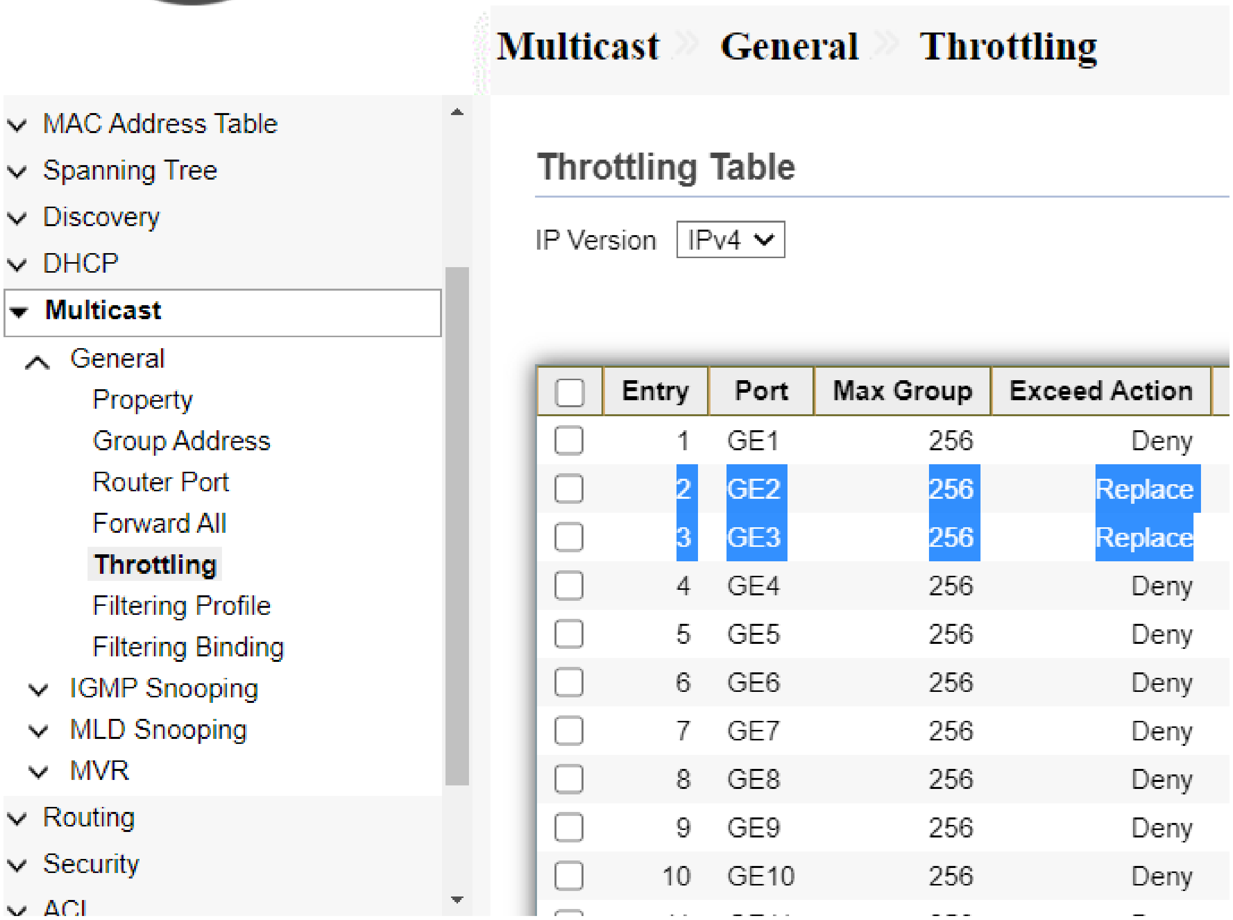
Fig 10.1.11 Multicast Selecting port for throttling page



Edit Throttling

Port	GE2-GE3
IP Version	IPv4
Max Group	256 (0 - 256)
Exceed Action	○ Deny ● Replace

Fig 10.1.12 Edit Multicast throttling page



Multicast » General » Throttling

Throttling Table

IP Version: IPv4

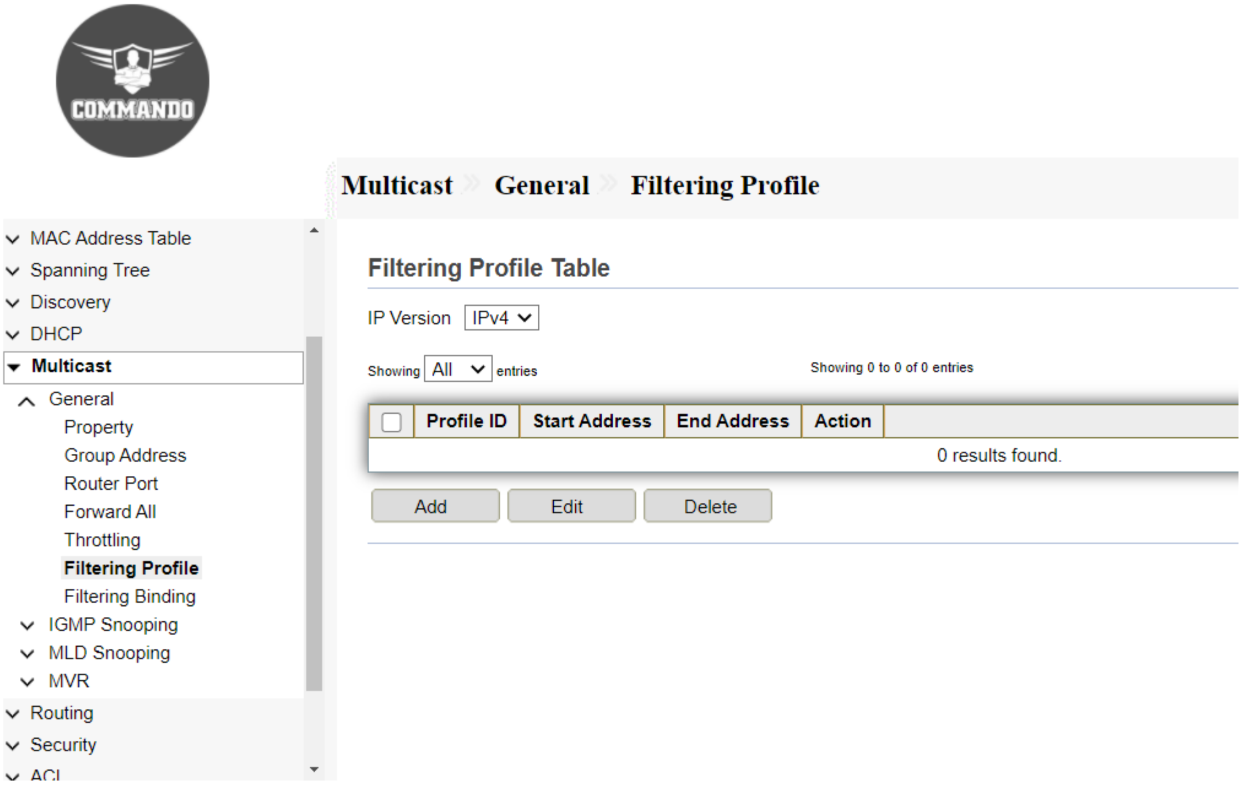
□	Entry	Port	Max Group	Exceed Action
□	1	GE1	256	Deny
□	2	GE2	256	Replace
□	3	GE3	256	Replace
□	4	GE4	256	Deny
□	5	GE5	256	Deny
□	6	GE6	256	Deny
□	7	GE7	256	Deny
□	8	GE8	256	Deny
□	9	GE9	256	Deny
□	10	GE10	256	Deny

Fig 10.1.13 Multicast throttling Table page

10.1.6 Filtering Profile

Multicast Filtering allows you to control the set of multicast groups to which a host can belong. You can filter multicast joins on a per-port basis by configuring IP multicast profiles (IGMP profiles or MLD profiles) and associating them with individual switch ports. This page allow user to add, edit or delete profile for IGMP or MLD snooping.

To view and configure Multicast Profile, click **Multicast >> General >> Filtering Profile.**



Filtering Profile Table

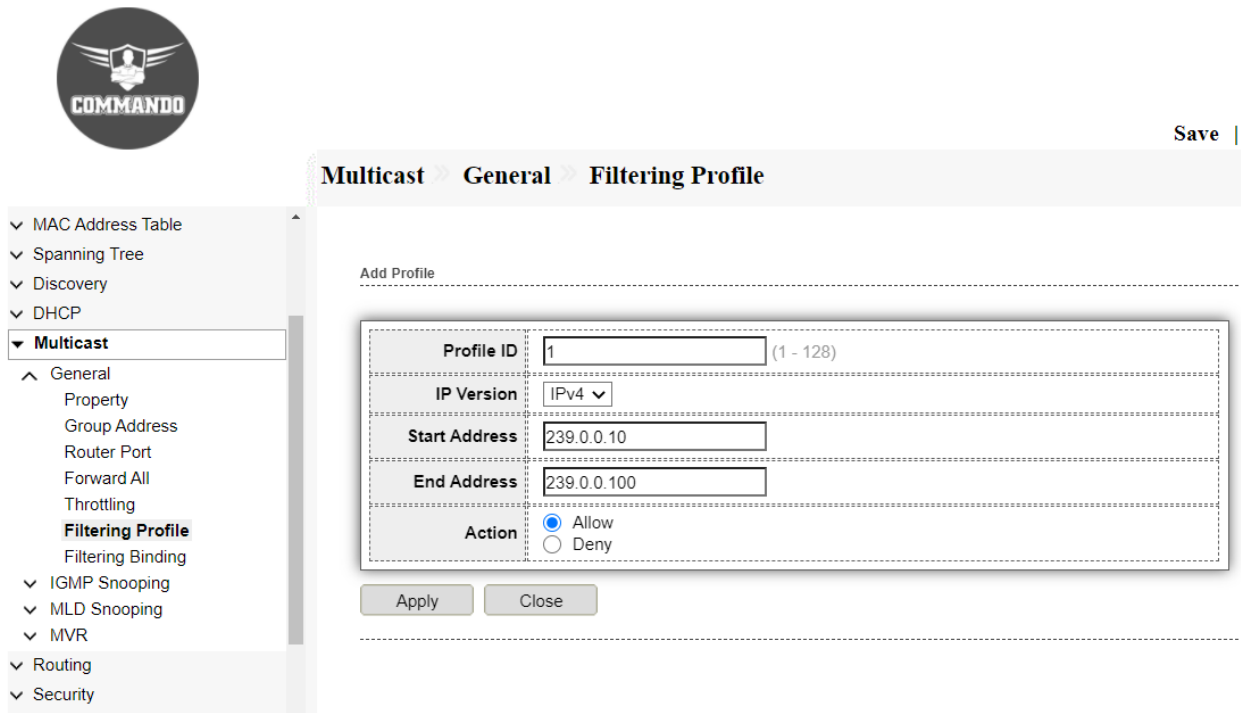
IP Version IPv4

Showing All entries

Showing 0 to 0 of 0 entries

□	Profile ID	Start Address	End Address	Action
0 results found.				

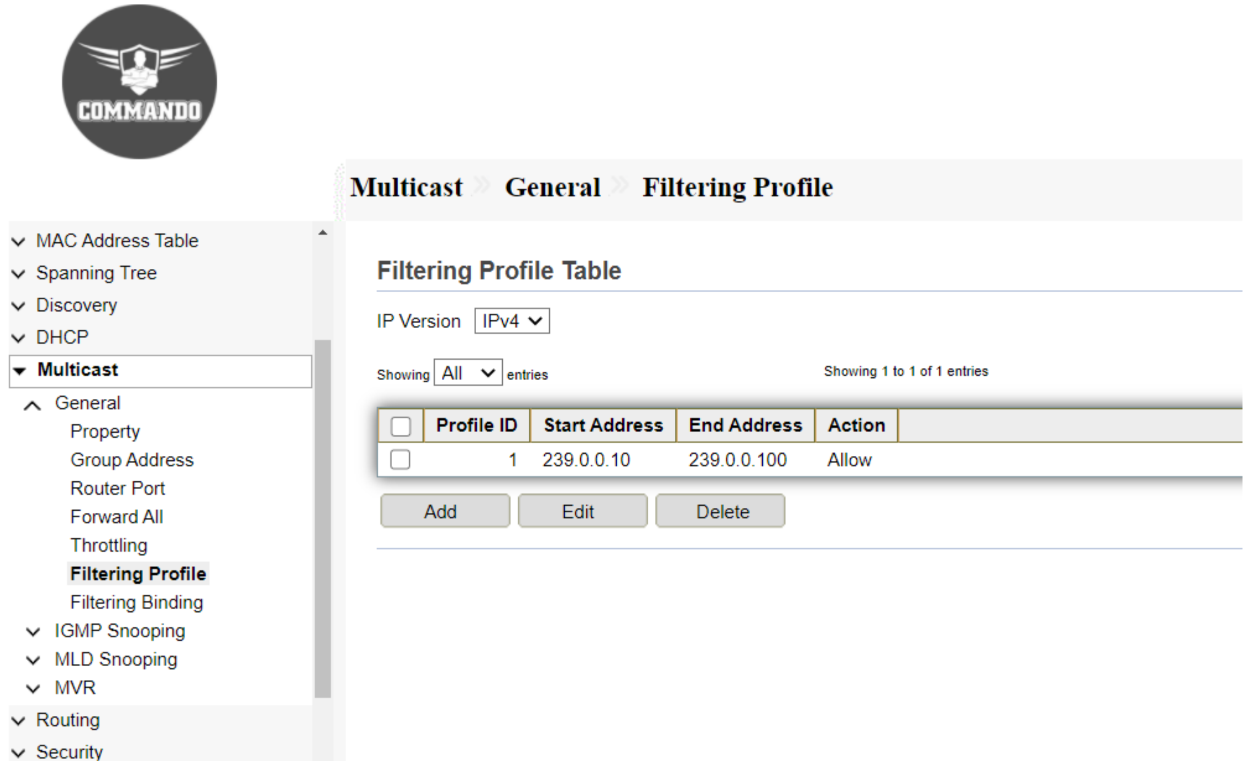
Fig 10.1.13 Multicast default filtering profile table page



Add Profile

Profile ID	1 (1 - 128)
IP Version	IPv4
Start Address	239.0.0.10
End Address	239.0.0.100
Action	● Allow ○ Deny

Fig 10.1.14 Multicast Add filtering profile page



Filtering Profile Table

IP Version IPv4

Showing All entries

Showing 1 to 1 of 1 entries

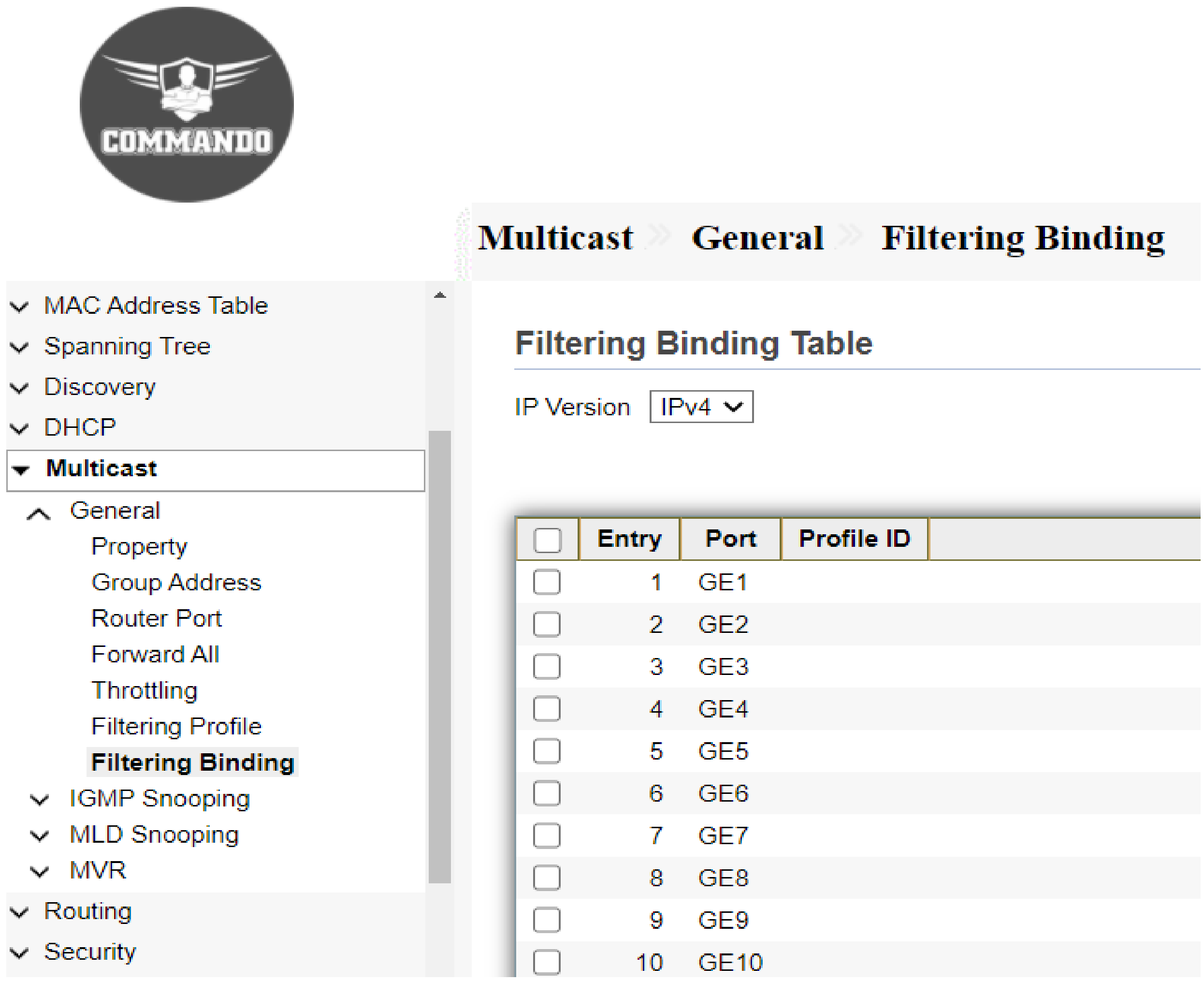
□	Profile ID	Start Address	End Address	Action
□	1	239.0.0.10	239.0.0.100	Allow

Fig 10.1.15 Multicast filtering profile table page

10.1.7 Filtering Binding

With the functions for managing multicast groups, the switch can only allow specific member ports to join specific multicast groups or disallow specific member ports to join specific multicast groups. You can achieve this filtering function by creating a profile and binding it to the corresponding member port. You can bind the created IGMP profile or MLD profile to ports and configure the number of multicast groups a port can join and the overflow action. This page allow user to bind/remove profile for each port.

To view and configure Multicast port filter binding profile, click **Multicast >> General >> Filtering Binding.**

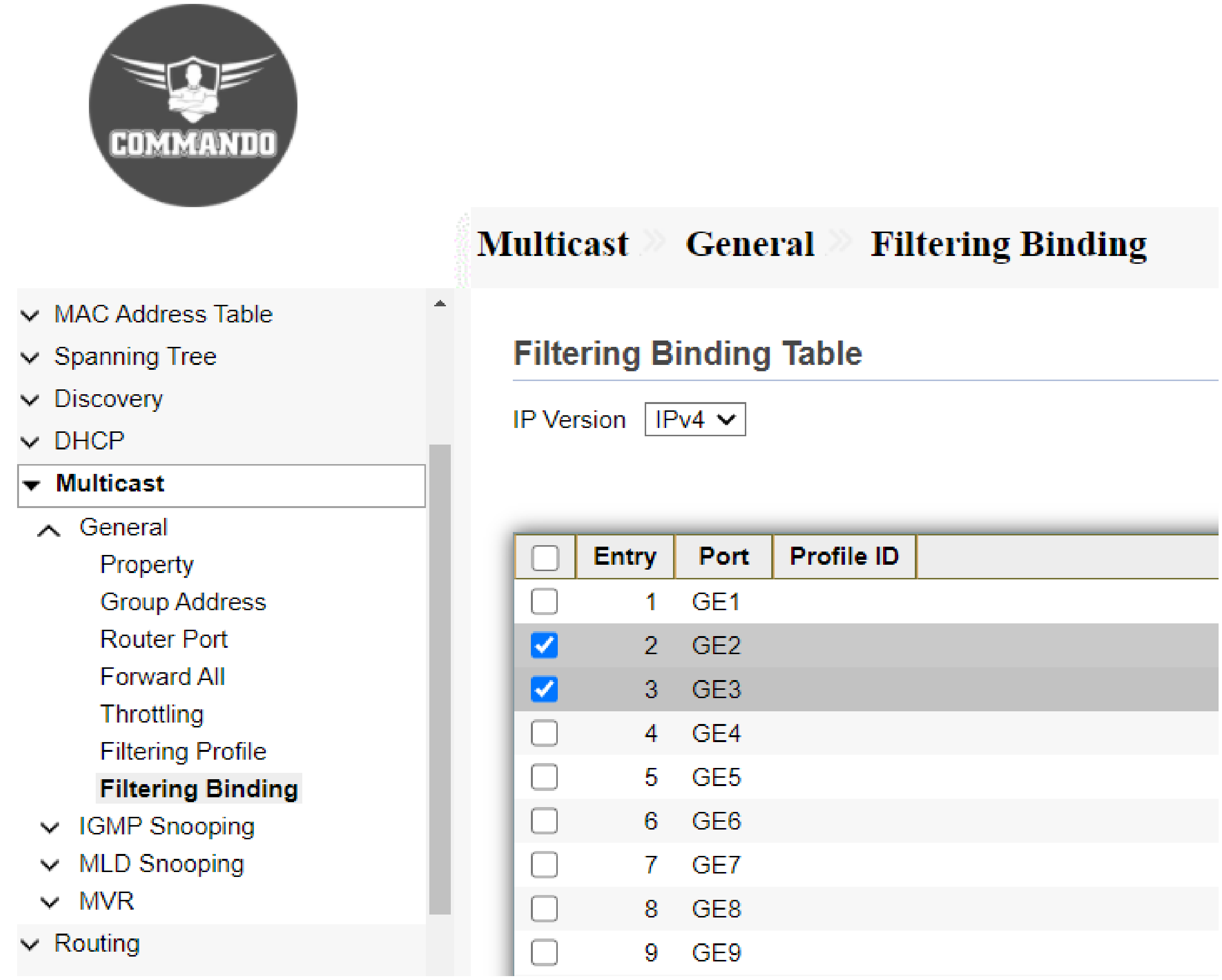


Filtering Binding Table

IP Version IPv4

□	Entry	Port	Profile ID
□	1	GE1	
□	2	GE2	
□	3	GE3	
□	4	GE4	
□	5	GE5	
□	6	GE6	
□	7	GE7	
□	8	GE8	
□	9	GE9	
□	10	GE10	

Fig 10.1.16 Multicast default filtering binding table page

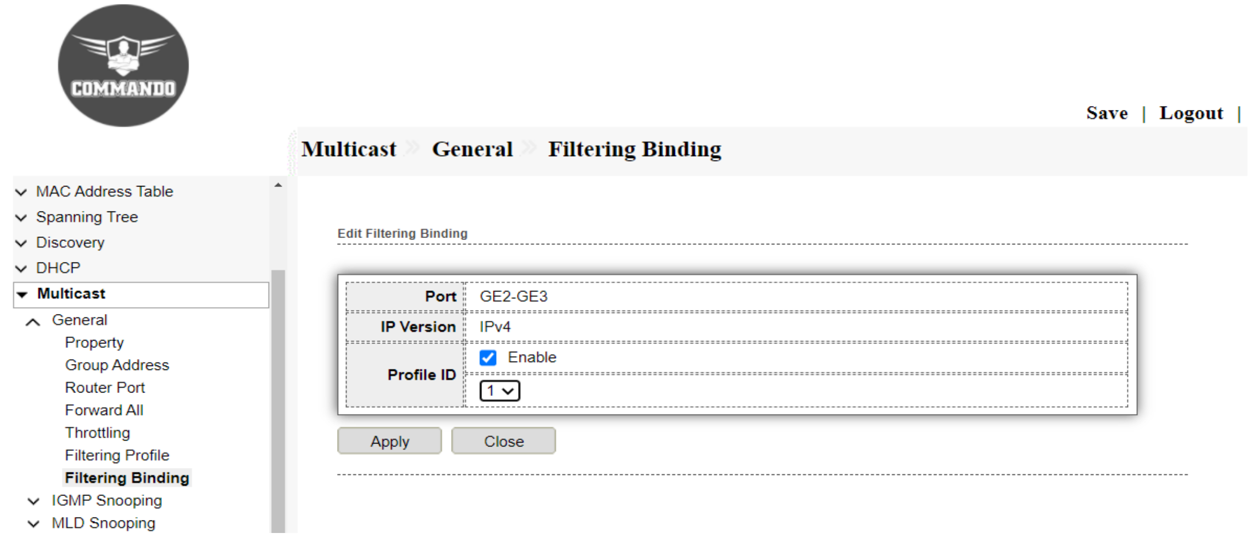


Filtering Binding Table

IP Version: IPv4

☐	Entry	Port	Profile ID
☐	1	GE1	
☑	2	GE2	
☑	3	GE3	
☐	4	GE4	
☐	5	GE5	
☐	6	GE6	
☐	7	GE7	
☐	8	GE8	
☐	9	GE9	

Fig 10.1.17 Multicast filtering Binding Port selection page



Edit Filtering Binding

Port	GE2-GE3
IP Version	IPv4
Profile ID	☑ Enable 1

Fig 10.1.18 Multicast Edit filtering Binding page

10.2 IGMP Snooping

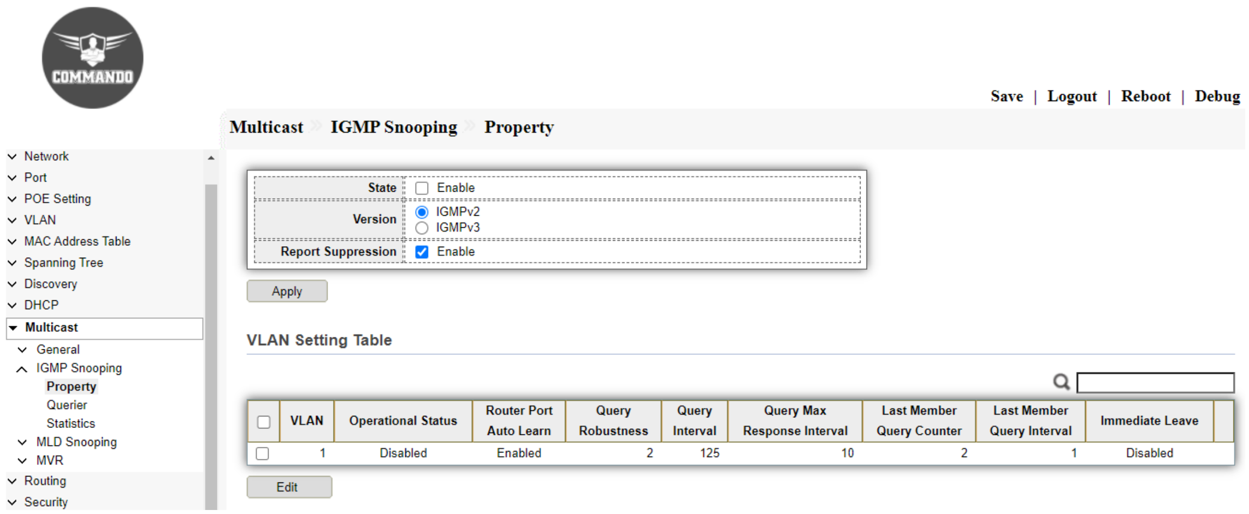
IGMP Snooping transmits data on demand on data link layer by analyzing IGMP packets between the IGMP querier and the users, to build and maintain Layer 2 multicast forwarding table. This page shows configuration about IGMP Snooping. The feature allows a network switch to listen in on the IGMP conversation between hosts and routers. By listening to these conversations, the switch maintains a map of which links need which IP multicast stream.

10.2.1 Property

This page allow user to configure global settings of IGMP snooping and configure specific VLAN settings of IGMP Snooping.

To view and configure IGMP Snooping global setting and VLAN Setting, click

Multicast >> IGMP Snooping >> Property.

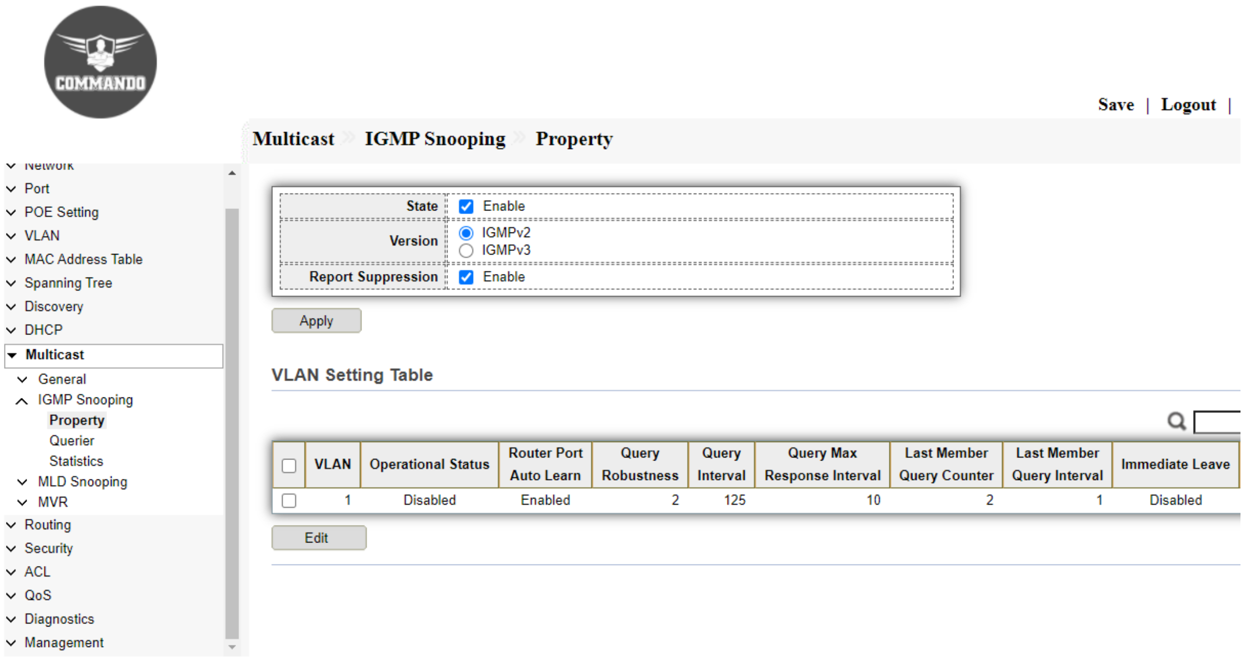


State	□ Enable
Version	● IGMPv2 ○ IGMPv3
Report Suppression	☑ Enable

VLAN Setting Table

□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
□	1	Disabled	Enabled	2	125	10	2	1	Disabled

Fig 10.2.1 Default IGMP snooping property page

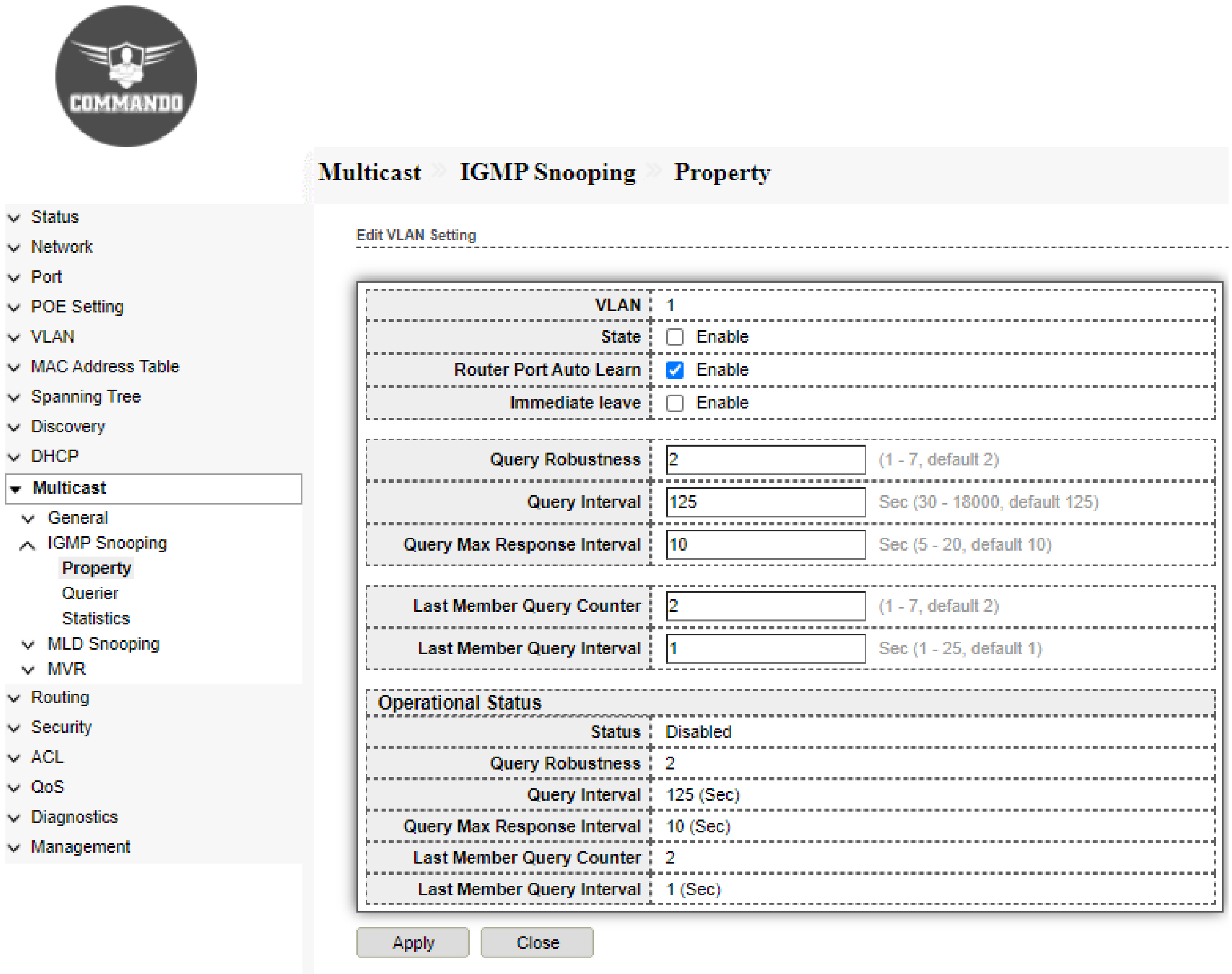


State	☑ Enable
Version	● IGMPv2 ○ IGMPv3
Report Suppression	☑ Enable

VLAN Setting Table

□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
□	1	Disabled	Enabled	2	125	10	2	1	Disabled

Fig 10.2.2 IGMP snooping property VLAN setting page



Multicast » IGMP Snooping » Property

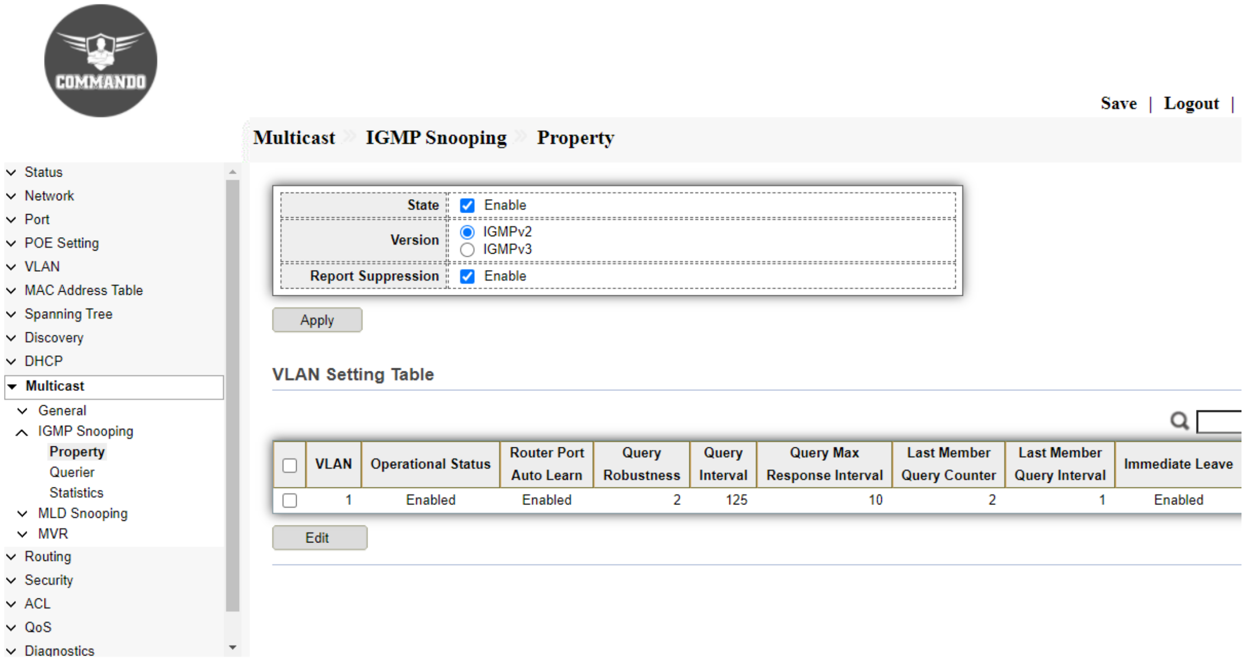
Edit VLAN Setting

VLAN	1
State	□ Enable
Router Port Auto Learn	☑ Enable
Immediate leave	□ Enable
Query Robustness	2 (1 - 7, default 2)
Query Interval	125 Sec (30 - 18000, default 125)
Query Max Response Interval	10 Sec (5 - 20, default 10)
Last Member Query Counter	2 (1 - 7, default 2)
Last Member Query Interval	1 Sec (1 - 25, default 1)

Operational Status

Status	Disabled
Query Robustness	2
Query Interval	125 (Sec)
Query Max Response Interval	10 (Sec)
Last Member Query Counter	2
Last Member Query Interval	1 (Sec)

Fig 10.2.3 IGMP snooping Edit VLAN setting page



Multicast » IGMP Snooping » Property

State	☑ Enable
Version	● IGMPv2 ○ IGMPv3
Report Suppression	☑ Enable

VLAN Setting Table

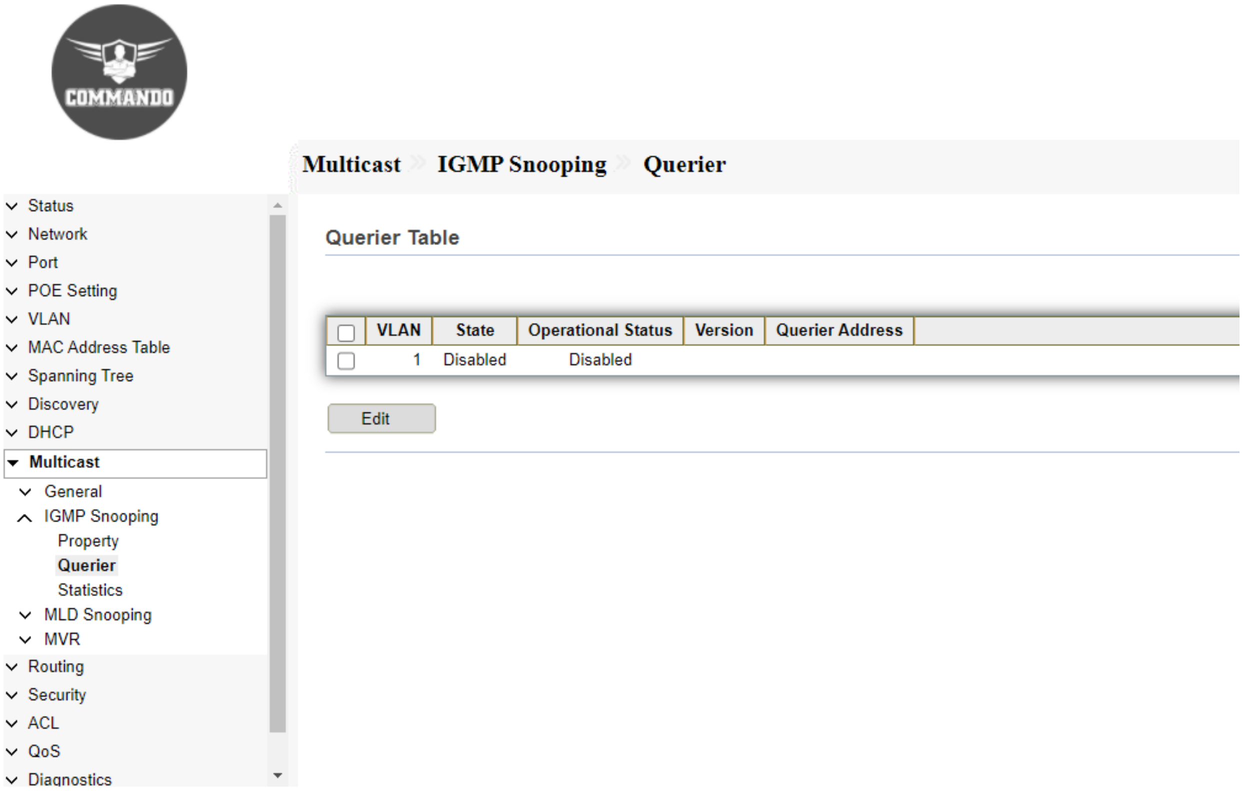
□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
□	1	Enabled	Enabled	2	125	10	2	1	Enabled

Fig 10.2.4 IGMP snooping property page

10.2.2 Querier

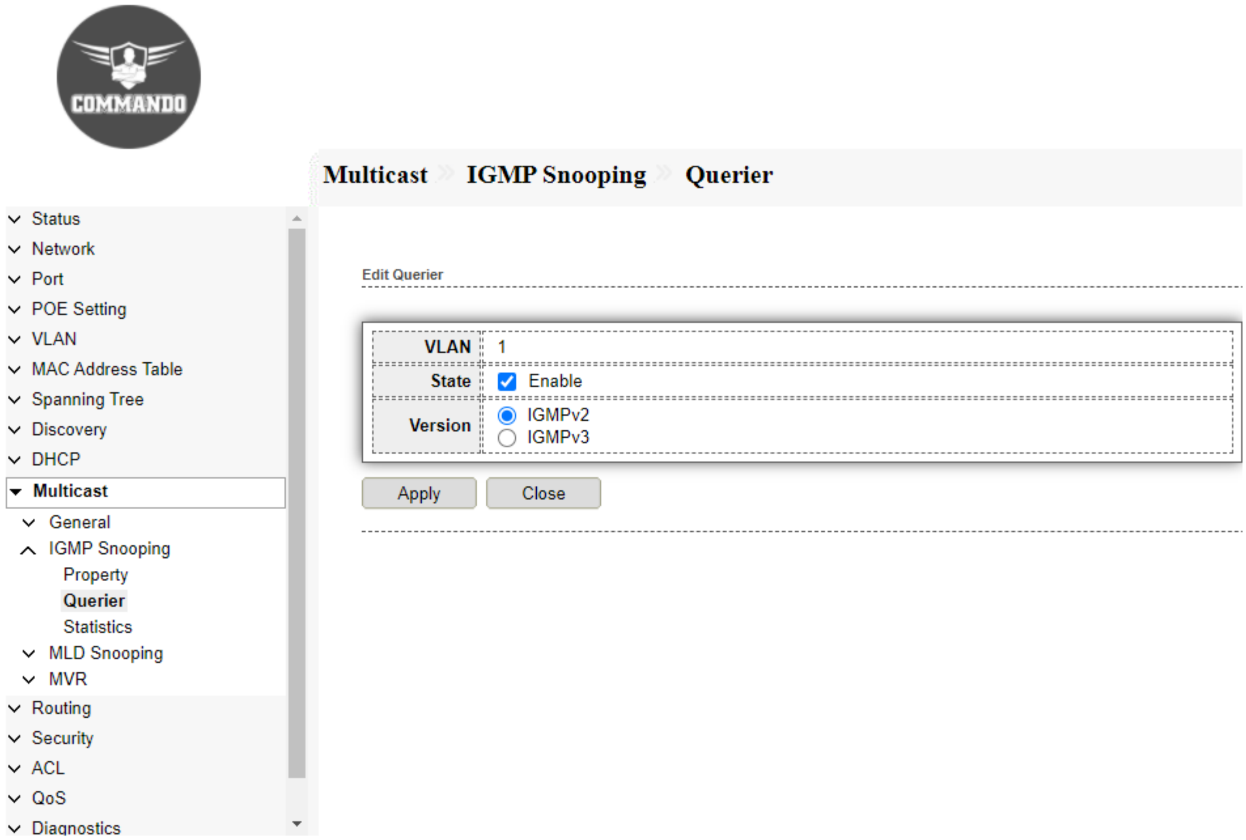
IGMP Snooping Querier periodically sends a general query on the network to solicit membership information and sends group-specific queries when it receives leave messages from hosts. This page allow user to configure querier settings on specific VLAN of IGMP Snooping.

To view and configure IGMP Snooping Querier Setting web page, click **Multicast >> IGMP Snooping >> Querier.**



□	VLAN	State	Operational Status	Version	Querier Address
□	1	Disabled	Disabled		

Fig 10.2.5 Default IGMP snooping Querier table page

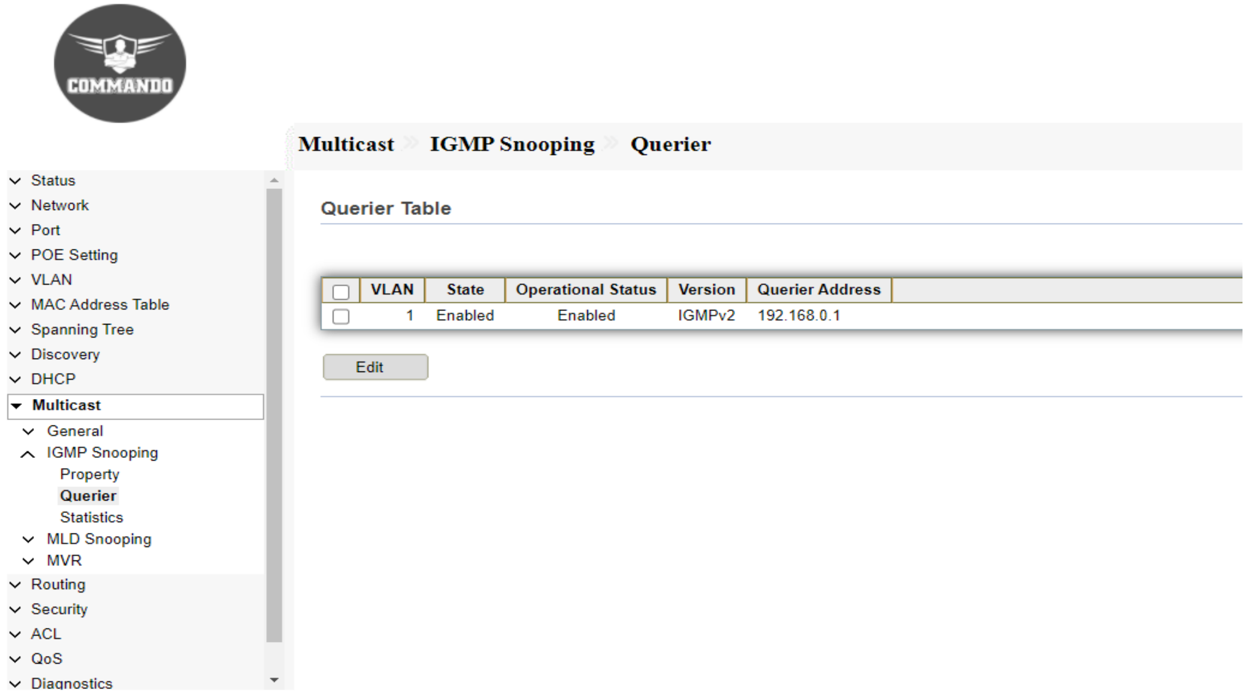


Multicast » IGMP Snooping » Querier

Edit Querier

VLAN	1
State	☑ Enable
Version	● IGMPv2 ○ IGMPv3

Fig 10.2.6 IGMP snooping Selecting VLAN Querier page



Multicast » IGMP Snooping » Querier

Querier Table

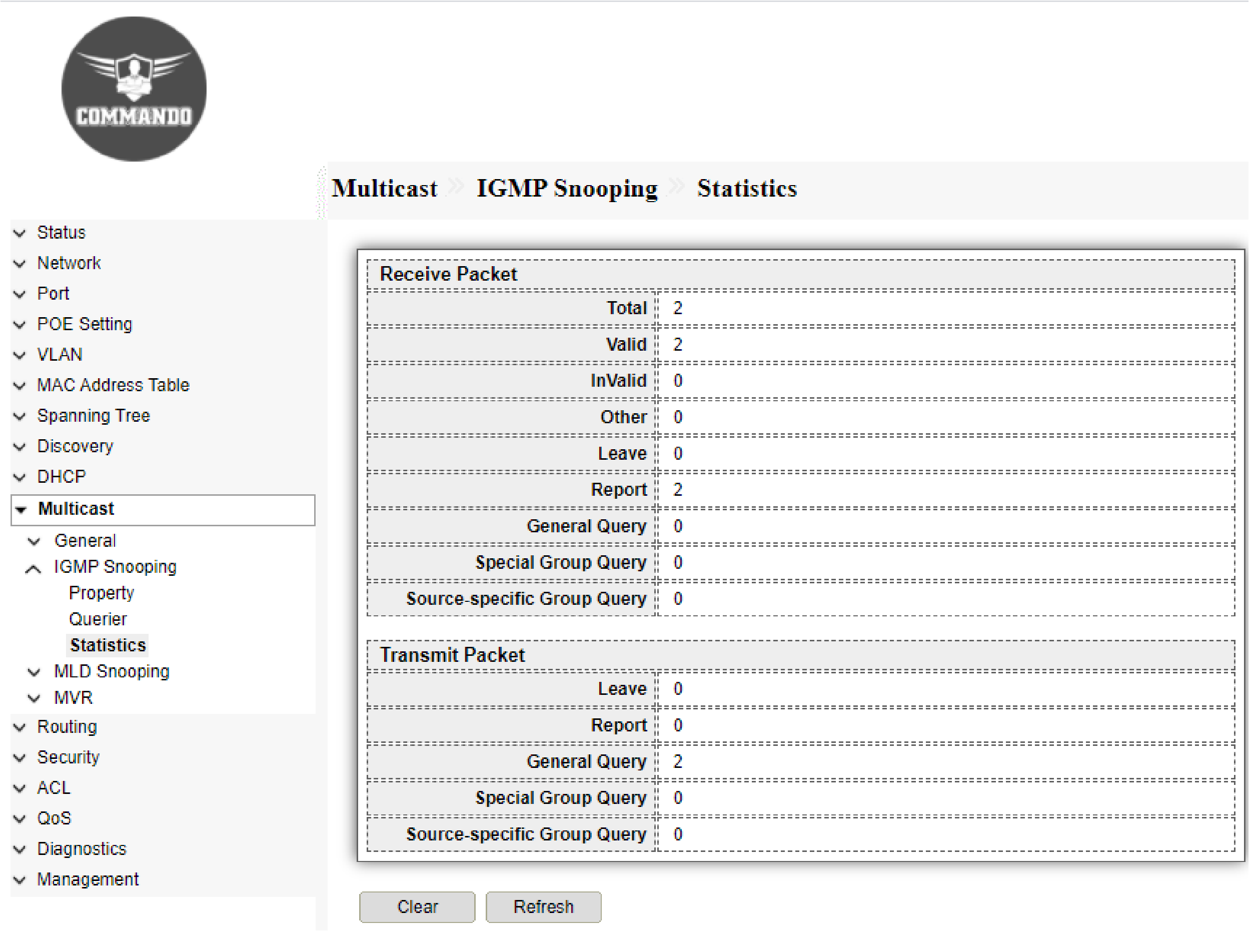
□	VLAN	State	Operational Status	Version	Querier Address
□	1	Enabled	Enabled	IGMPv2	192.168.0.1

Fig 10.2.7 IGMP snooping Querier page

10.2.3 Statistics

IGMP statistics of receive and transmit packets. IGMP global statistics provides membership reports, membership queries transmitted and received, and unknown messages.

To view IGMP Snooping Statistics, click **Multicast >> IGMP Snooping >> Statistics.**



Receive Packet	
Total	2
Valid	2
InValid	0
Other	0
Leave	0
Report	2
General Query	0
Special Group Query	0
Source-specific Group Query	0

Transmit Packet	
Leave	0
Report	0
General Query	2
Special Group Query	0
Source-specific Group Query	0

Fig 10.2.9 IGMP snooping statistics page

10.3 MLD Snooping

Multicast Listener Discovery (MLD) snooping constrains the flooding of IPv6 multicast traffic on VLANs. MLD snooping performs the same function as IGMP snooping with the only difference being that MLD snooping is for IPv6 and IGMP snooping for IPv4 environments. This page shows configuration of ipv6 MLD snooping to enable MLD snooping function. Disable will clear all ipv6 MLD snooping dynamic group and dynamic router port and make the static ipv6 MLD group invalid. No more dynamic group and router port by MLD message will be learned.

The COMMANDO C3000 series switch supports two versions of MLD snooping:

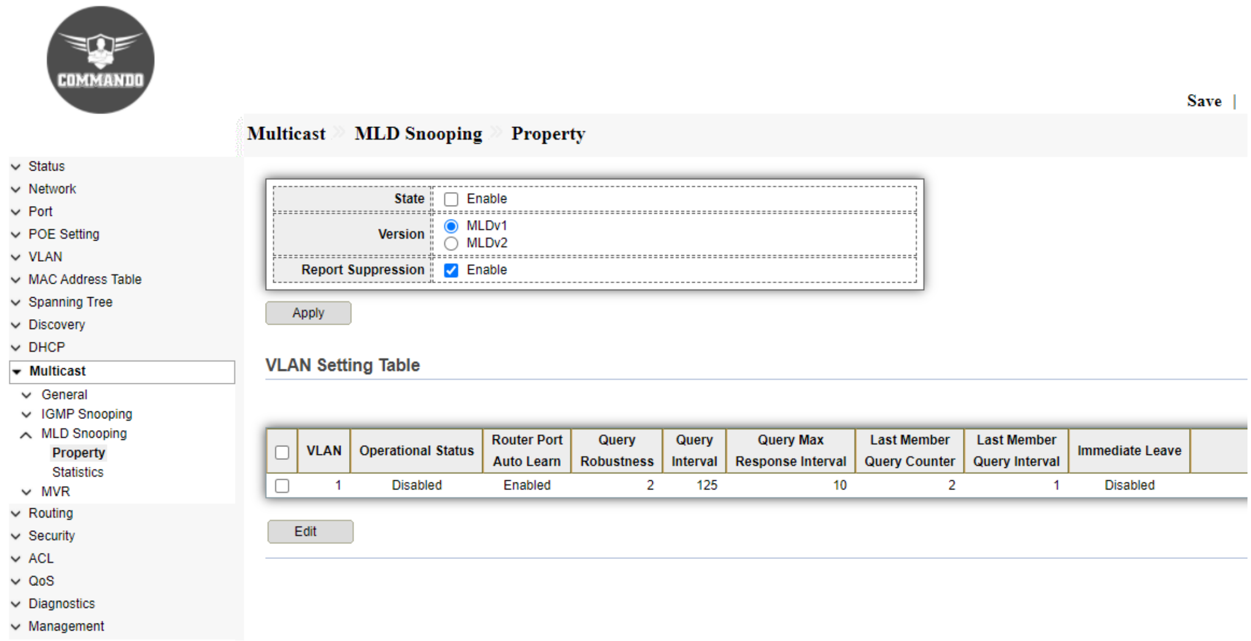
MLDv1 snooping detects MLDv1 control packets and sets up traffic bridging based on IPv6 destination Multicast addresses.

MLDv2 uses control packets to forward traffic based on source IPv6 address and destination IPv6 Multicast address.

10.3.1 Property

This page allow user to configure global settings of MLD snooping and configure specific VLAN settings of MLD Snooping.

To view and configure MLD Snooping global setting, click **Multicast >> MLD Snooping >> Property.**



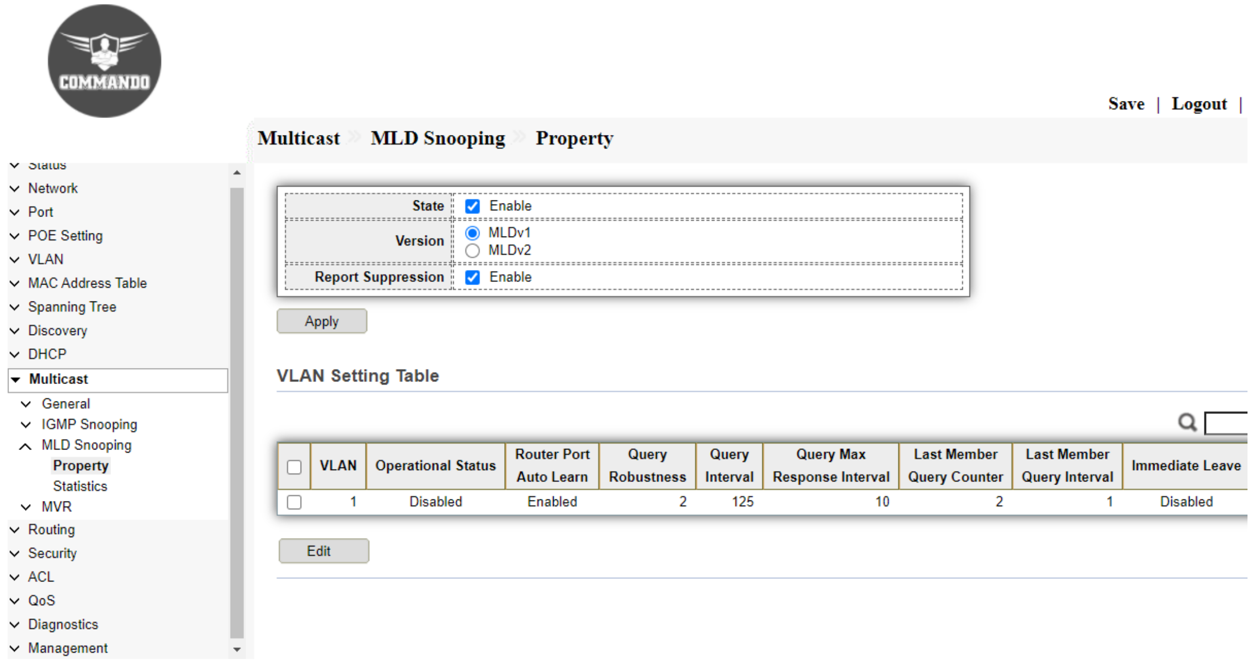
Multicast » MLD Snooping » Property

State	□ Enable
Version	● MLDv1 ○ MLDv2
Report Suppression	☑ Enable

VLAN Setting Table

□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
□	1	Disabled	Enabled	2	125	10	2	1	Disabled

Fig 10.3.1 Multicast MLD Snooping default property page



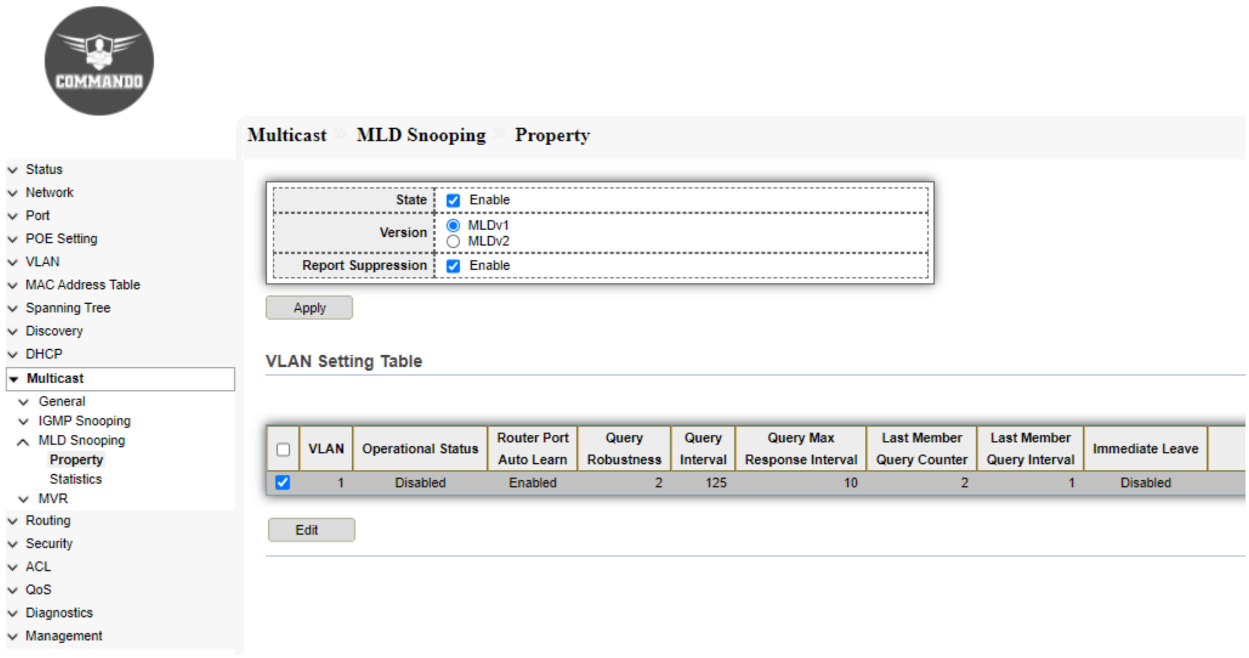
Multicast » MLD Snooping » Property

State	☑ Enable
Version	● MLDv1 ○ MLDv2
Report Suppression	☑ Enable

VLAN Setting Table

□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
□	1	Disabled	Enabled	2	125	10	2	1	Disabled

Fig 10.3.2 Enabling MLD Snooping property page



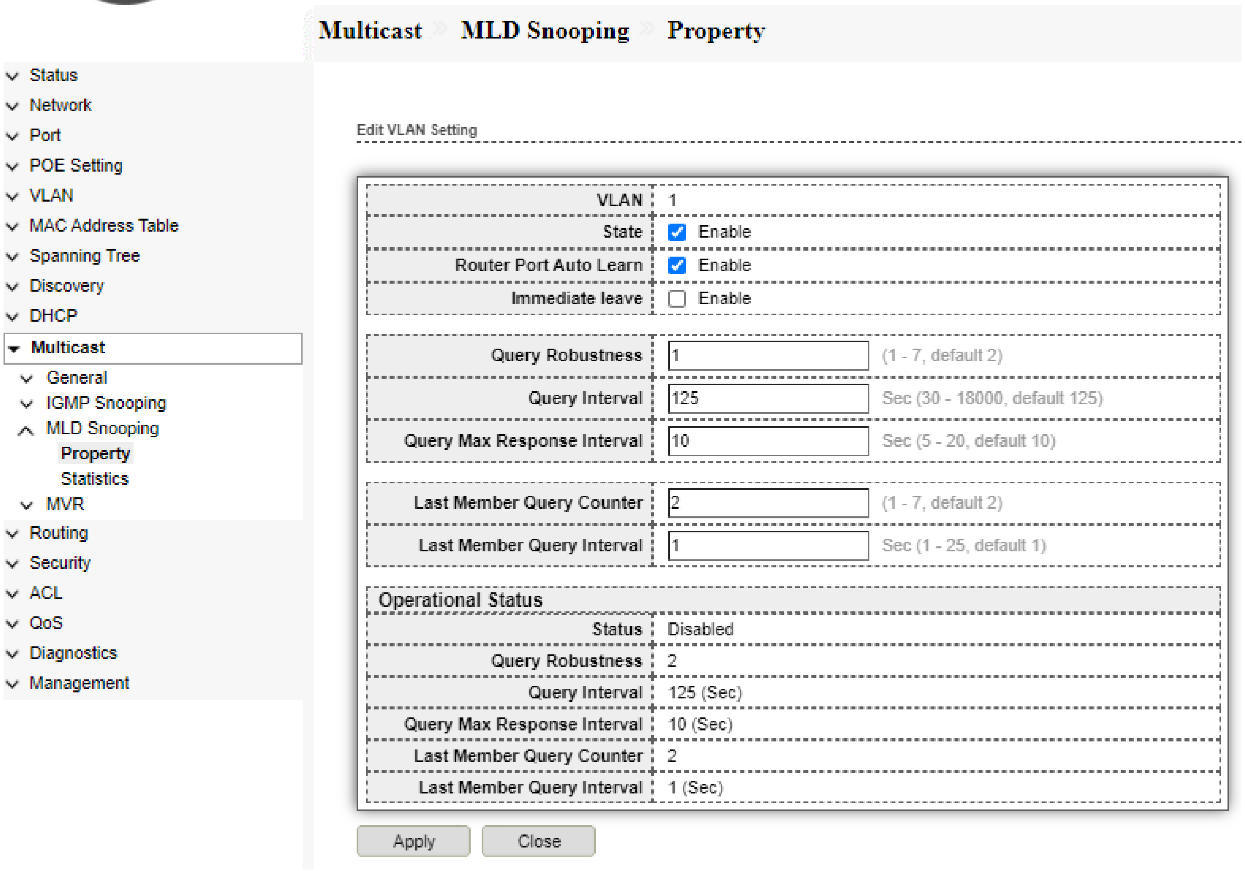
Multicast » MLD Snooping » Property

State	☑ Enable
Version	● MLDv1 ○ MLDv2
Report Suppression	☑ Enable

VLAN Setting Table

□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
☑	1	Disabled	Enabled	2	125	10	2	1	Disabled

Fig 10.3.3 Selecting VLAN for MLD Snooping property page



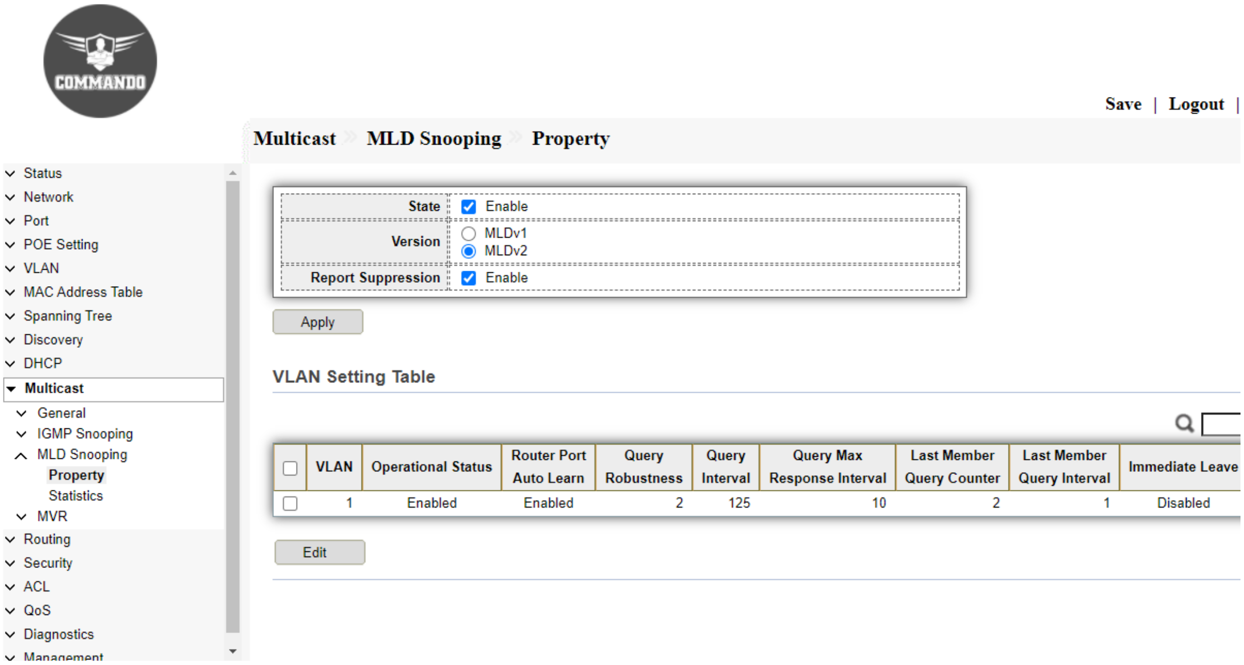
Edit VLAN Setting

VLAN	1	
State	☑ Enable	
Router Port Auto Learn	☑ Enable	
Immediate leave	□ Enable	
Query Robustness	1	(1 - 7, default 2)
Query Interval	125	Sec (30 - 18000, default 125)
Query Max Response Interval	10	Sec (5 - 20, default 10)
Last Member Query Counter	2	(1 - 7, default 2)
Last Member Query Interval	1	Sec (1 - 25, default 1)

Operational Status

Status	Disabled
Query Robustness	2
Query Interval	125 (Sec)
Query Max Response Interval	10 (Sec)
Last Member Query Counter	2
Last Member Query Interval	1 (Sec)

Fig 10.3.4 Edit VLAN Setting for MLD Snooping page



State	☑ Enable
Version	○ MLDv1 ● MLDv2
Report Suppression	☑ Enable

VLAN Setting Table

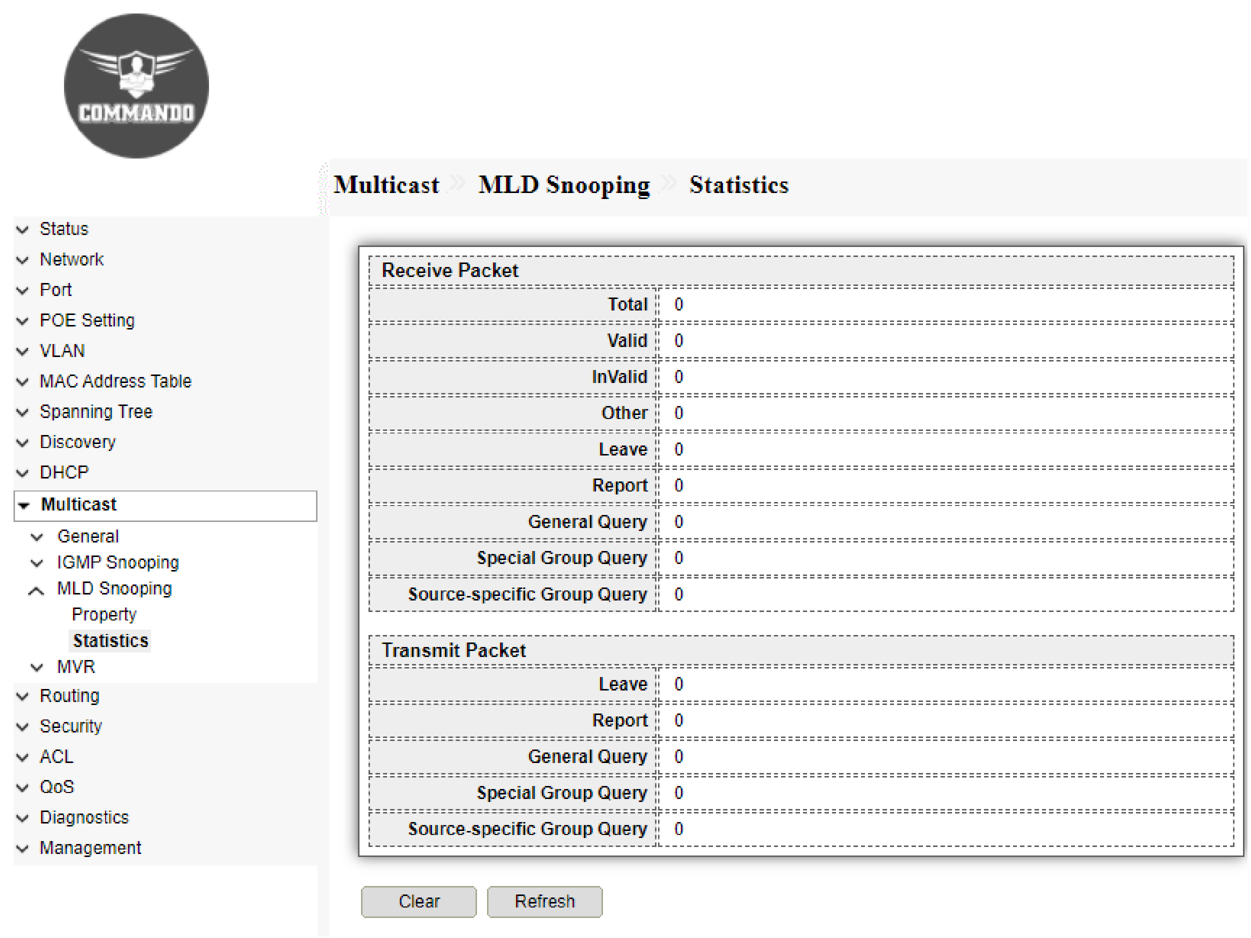
□	VLAN	Operational Status	Router Port Auto Learn	Query Robustness	Query Interval	Query Max Response Interval	Last Member Query Counter	Last Member Query Interval	Immediate Leave
□	1	Enabled	Enabled	2	125	10	2	1	Disabled

Fig 10.3.5 Multicast MLD Snooping property page

10.3.2 Statistics

This page is used to display statistics for the MLD messages, and IPv6 PIM hello messages learned through MLD snooping. We can View the statistics of the various MLD packets that have been received or transmitted.

To view MLD Snooping Statistics, click **Multicast >> MLD Snooping >> Statistics.**



Receive Packet	
Total	0
Valid	0
InValid	0
Other	0
Leave	0
Report	0
General Query	0
Special Group Query	0
Source-specific Group Query	0

Transmit Packet	
Leave	0
Report	0
General Query	0
Special Group Query	0
Source-specific Group Query	0

Fig 10.3.6 Multicast MLD Snooping statistics page

10.4 MVR

Multicast VLAN Registration (MVR) allows a single multicast VLAN to be shared for multicast member ports in different VLANs in IPv4 network. In IGMP Snooping, if member ports are in different VLANs, a copy of the multicast streams is sent to each VLAN that has member ports. While MVR provides a dedicated multicast VLAN to forward multicast traffic over the Layer 2 network, to avoid duplication of multicast streams for clients in different VLANs. Clients can dynamically join or leave the multicast VLAN without interfering with their relationships in other VLANs. MVR provides the ability to continuously send multicast streams in the multicast VLAN, but to isolate the streams from the subscriber VLANs for bandwidth and security reasons.

10.4.1 Property

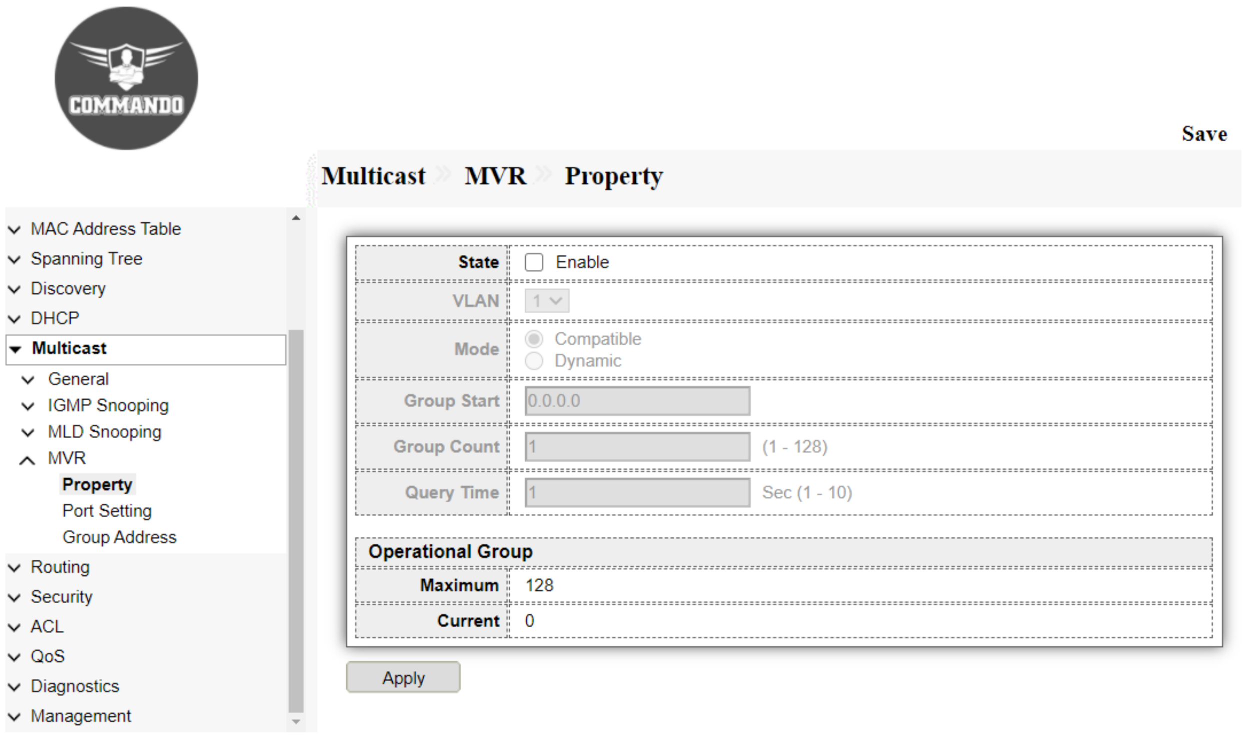
Clients can dynamically join or leave the multicast VLAN without interfering with their relationships in other VLANs.

There are two types of MVR modes:

Compatible Mode: In compatible mode, the MVR switch does not forward report or leave messages from the hosts to the IGMP querier. So, the IGMP querier cannot learn the multicast groups membership information from the MVR switch. You must statically configure the IGMP querier to transmit all the required multicast streams to the MVR switch via the multicast VLAN.

Dynamic Mode: In dynamic mode, after receiving report or leave messages from the hosts, the MVR switch will forward them to the IGMP querier via the multicast VLAN (with appropriate translation of the VLAN ID). So, the IGMP querier can learn the multicast groups membership information through the report and leave messages and transmit the multicast streams to the MVR switch via the multicast VLAN according to the multicast forwarding table.

To view and configure multicast MVR property, click **Multicast >> MVR >>Property.**



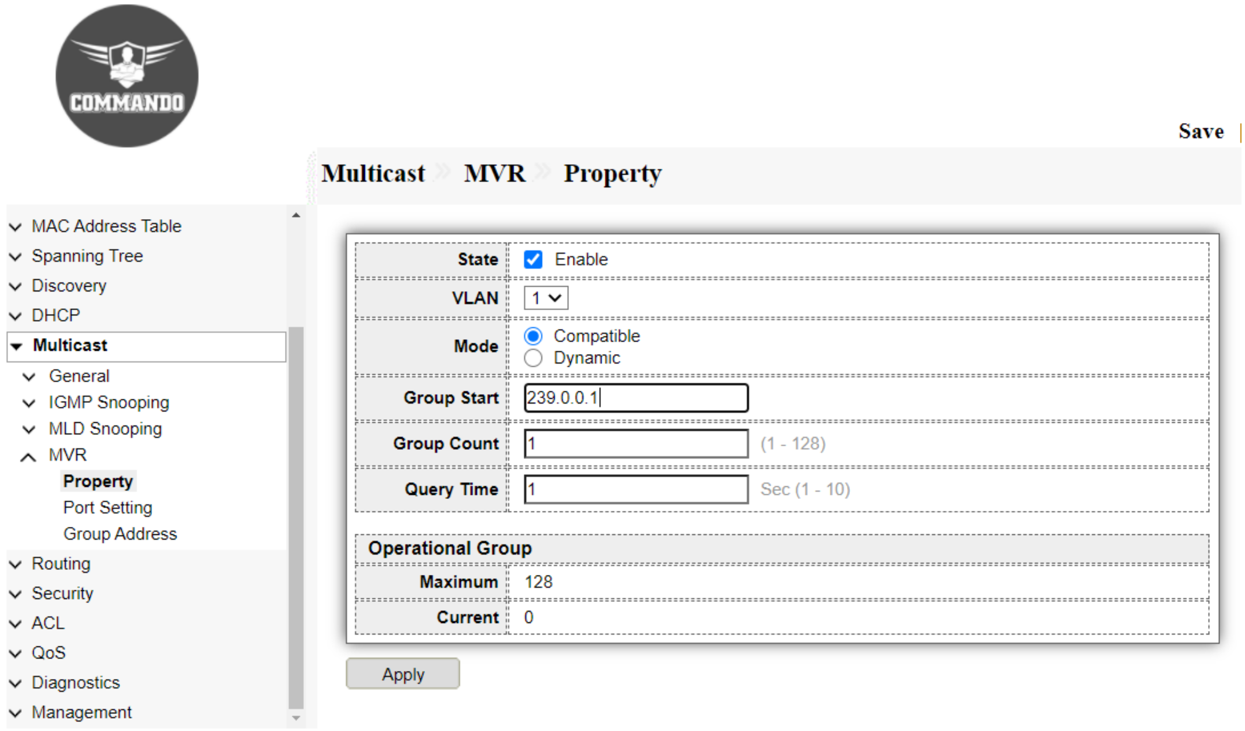
Multicast » MVR » Property

State	□ Enable
VLAN	1
Mode	● Compatible ○ Dynamic
Group Start	0.0.0.0
Group Count	1 (1 - 128)
Query Time	1 Sec (1 - 10)

Operational Group

Maximum	128
Current	0

Fig 10.4.1 Default MVR Property page



Multicast » MVR » Property

State	☑ Enable
VLAN	1
Mode	● Compatible ○ Dynamic
Group Start	239.0.0.1
Group Count	1 (1 - 128)
Query Time	1 Sec (1 - 10)

Operational Group

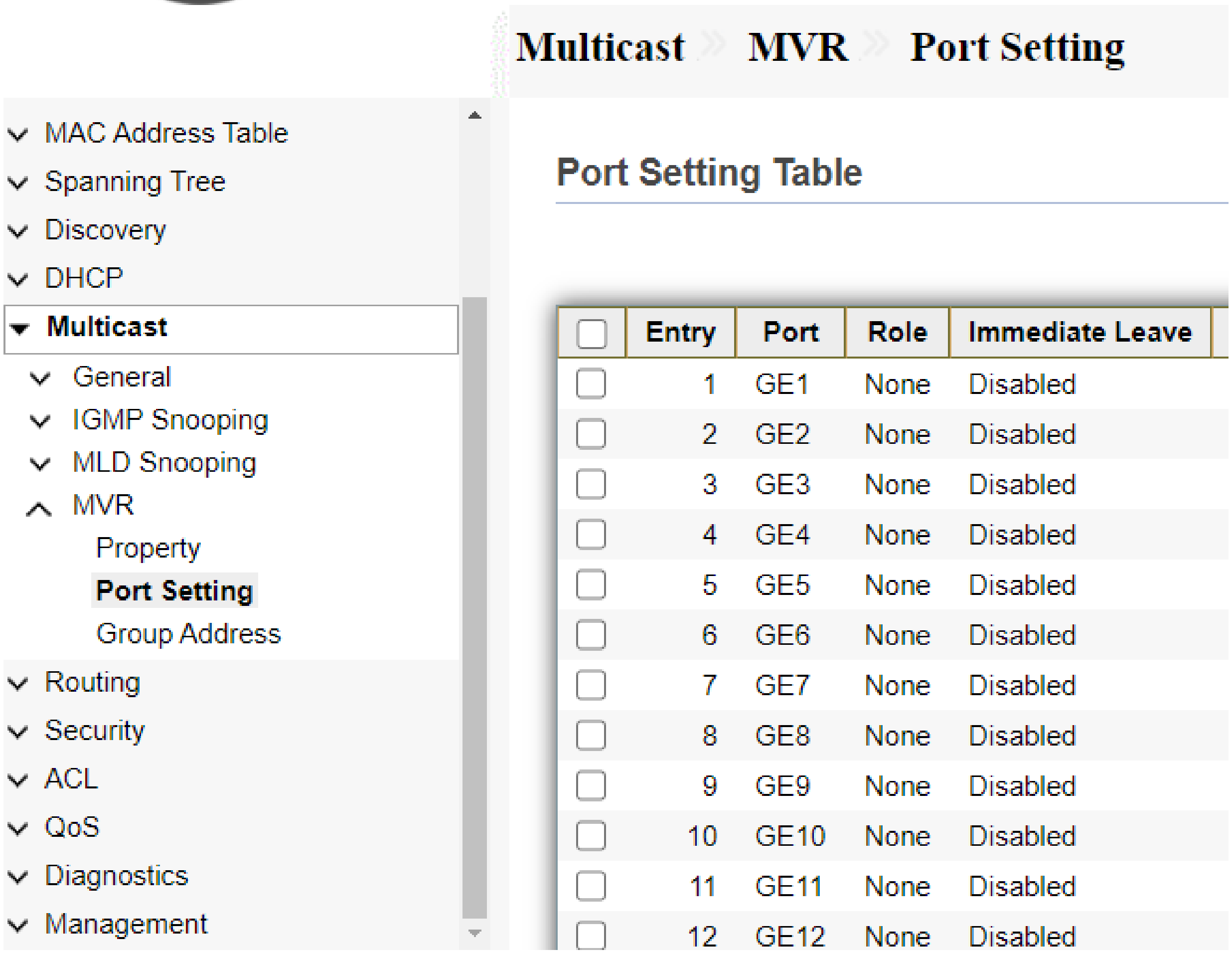
Maximum	128
Current	0

Fig 10.4.2 Setting MVR Property page

10.4.2 Port Setting

This page allow user to configure port role and port immediate leave.

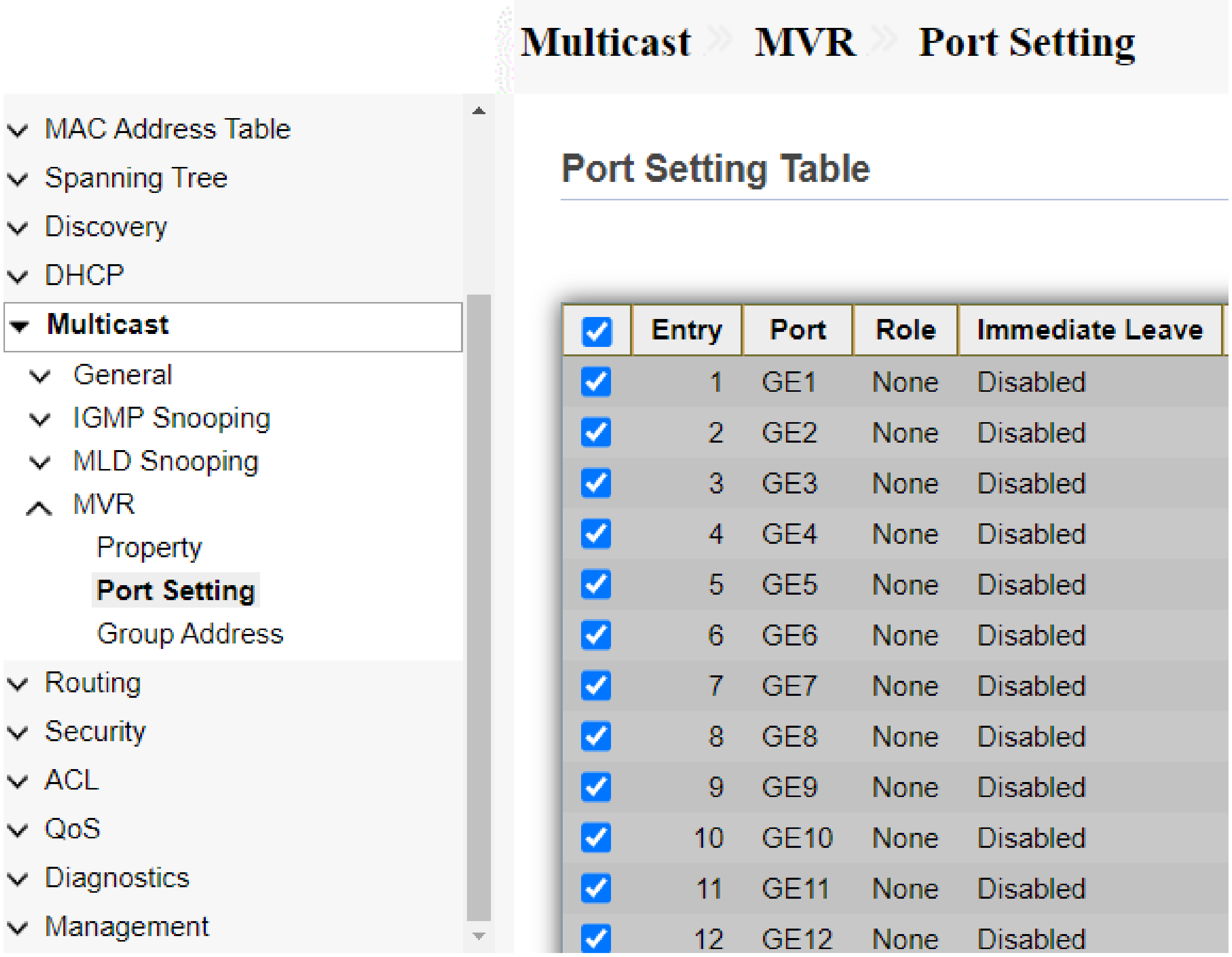
To view and configure MVR port role and immediate leave state, click **Multicast >> MVR >> Port Setting.**



Port Setting Table

☐	Entry	Port	Role	Immediate Leave
☐	1	GE1	None	Disabled
☐	2	GE2	None	Disabled
☐	3	GE3	None	Disabled
☐	4	GE4	None	Disabled
☐	5	GE5	None	Disabled
☐	6	GE6	None	Disabled
☐	7	GE7	None	Disabled
☐	8	GE8	None	Disabled
☐	9	GE9	None	Disabled
☐	10	GE10	None	Disabled
☐	11	GE11	None	Disabled
☐	12	GE12	None	Disabled

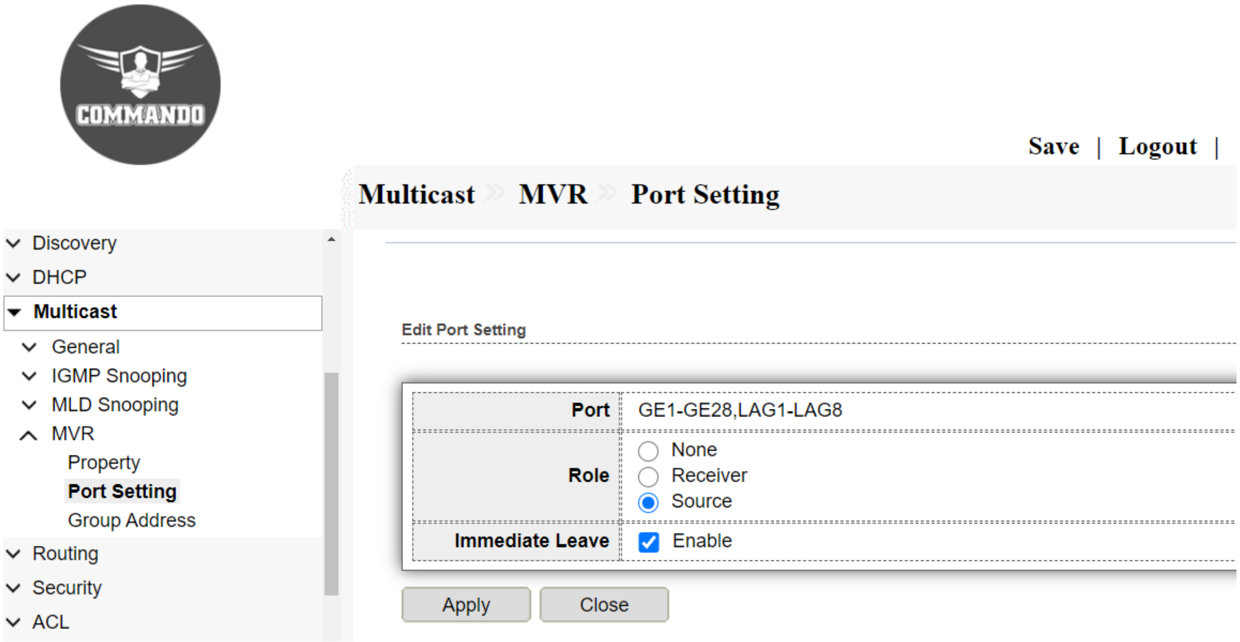
Fig 10.4.3 Multicast MVR Port Setting page



Port Setting Table

☑	Entry	Port	Role	Immediate Leave
☑	1	GE1	None	Disabled
☑	2	GE2	None	Disabled
☑	3	GE3	None	Disabled
☑	4	GE4	None	Disabled
☑	5	GE5	None	Disabled
☑	6	GE6	None	Disabled
☑	7	GE7	None	Disabled
☑	8	GE8	None	Disabled
☑	9	GE9	None	Disabled
☑	10	GE10	None	Disabled
☑	11	GE11	None	Disabled
☑	12	GE12	None	Disabled

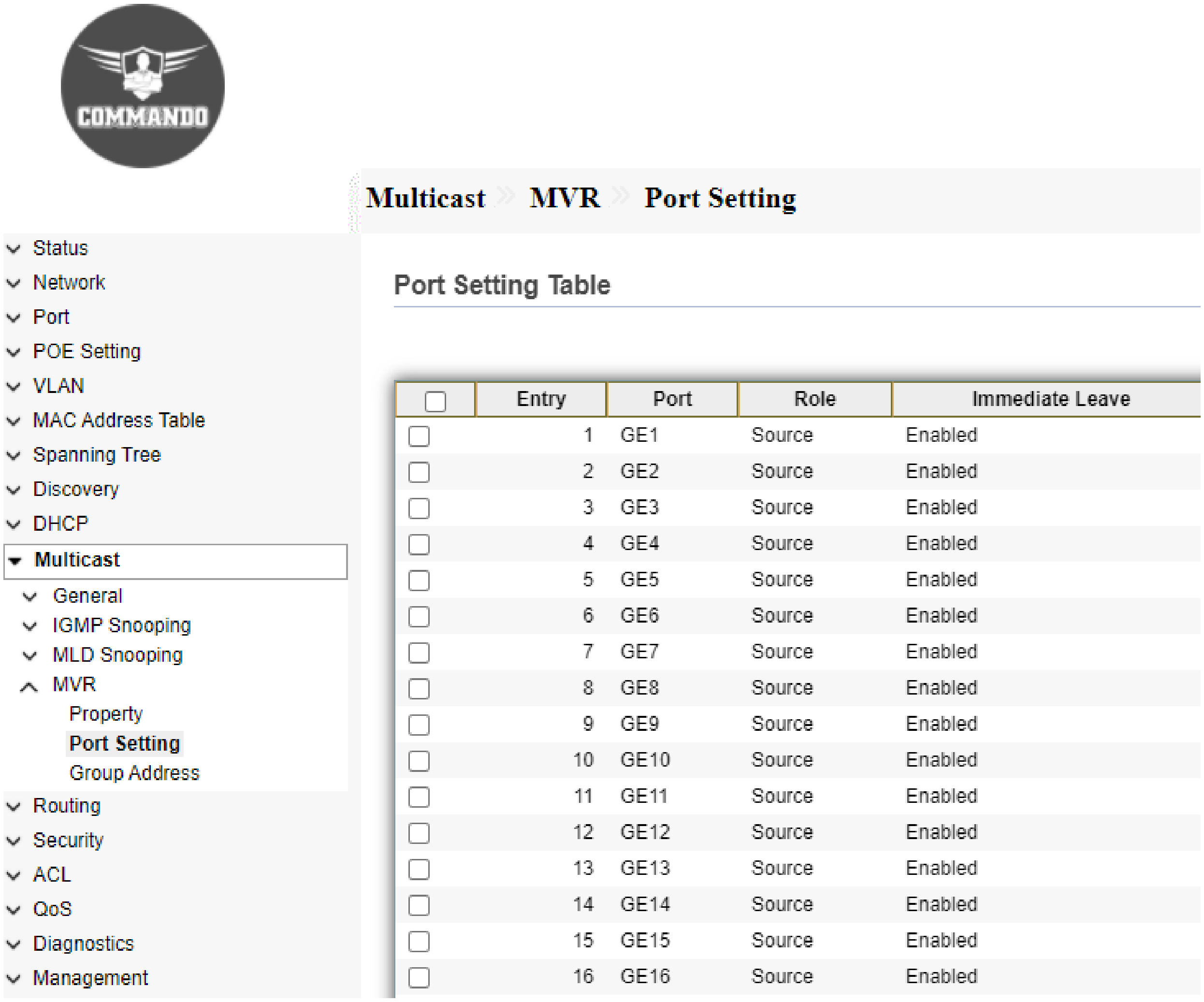
Fig 10.4.4 Multicast MVR Port Selection page



Edit Port Setting

Port	GE1-GE28,LAG1-LAG8
Role	○ None ○ Receiver ● Source
Immediate Leave	☑ Enable

Fig 10.4.5 Multicast MVR Edit port setting page



Port Setting Table

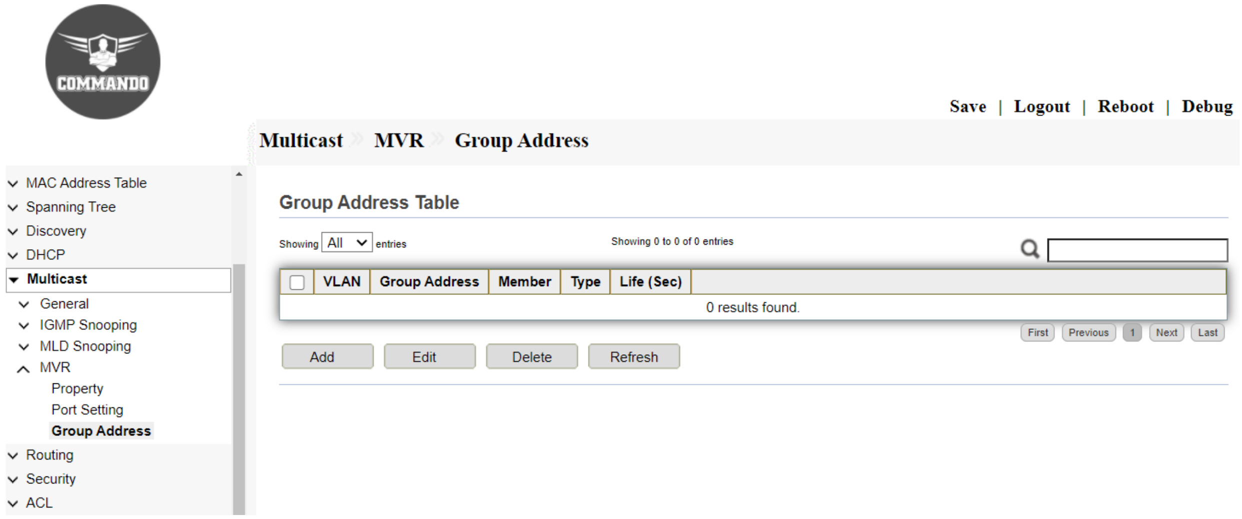
□	Entry	Port	Role	Immediate Leave
□	1	GE1	Source	Enabled
□	2	GE2	Source	Enabled
□	3	GE3	Source	Enabled
□	4	GE4	Source	Enabled
□	5	GE5	Source	Enabled
□	6	GE6	Source	Enabled
□	7	GE7	Source	Enabled
□	8	GE8	Source	Enabled
□	9	GE9	Source	Enabled
□	10	GE10	Source	Enabled
□	11	GE11	Source	Enabled
□	12	GE12	Source	Enabled
□	13	GE13	Source	Enabled
□	14	GE14	Source	Enabled
□	15	GE15	Source	Enabled
□	16	GE16	Source	Enabled

Fig 10.4.6 Multicast MVR Port setting Table page

9.4.3 Group Address

You explicitly configure an MVLAN assign a range of multicast group addresses to it. That VLAN carries MVLAN traffic for the configured multicast groups.

To view and configure Multicast MVR Group Table, click **Multicast >> MVR >> Group Address.**

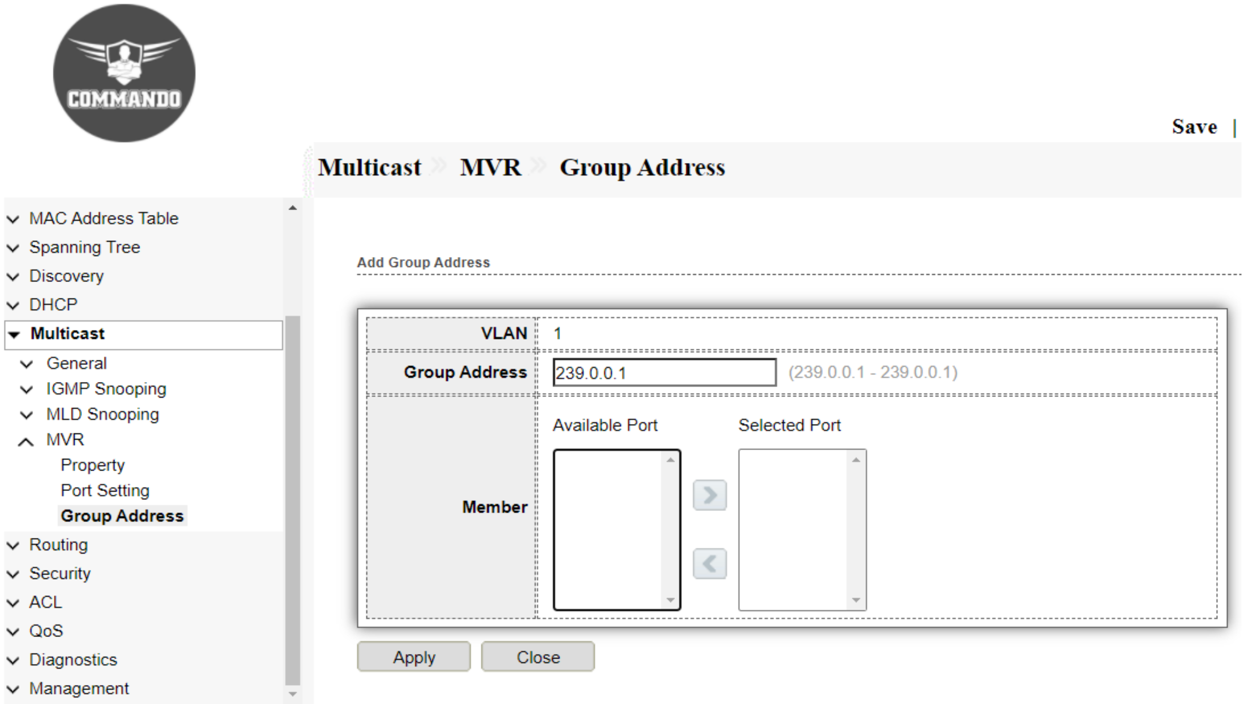


Group Address Table

Showing All entries   Showing 0 to 0 of 0 entries

□	VLAN	Group Address	Member	Type	Life (Sec)
0 results found.					

Fig 10.4.7 Multicast MVR default group address Table page



Add Group Address

VLAN	1
Group Address	239.0.0.1 (239.0.0.1 - 239.0.0.1)
Member	Available Port / Selected Port

Fig 10.4.8 Multicast MVR Add group address page

Chapter 11 Routing

IPv4 Management and Interfaces: The IP address is configured under a logical interface, known as the management domain or VLAN. Usually, the default VLAN 1 acts like the switch's own NIC for connecting into a LAN to send IP packets.

IPv4 Interface: The IPv4 Interface page is used to configure IP addresses for device management. This IP address can be configured on a VLAN, loopback interface.

IPv4 Routes: IPv4 Routes deliver packets to destination network IPv4 addresses by forwarding them to interfaces of next hop addresses specified by the routing table.

ARP: The Address Resolution Protocol (ARP) is a communication protocol used for discovering the link layer address, such as a MAC address, associated with a given internet layer address, typically an IPv4 address.

IPv6 Management and Interfaces: An IPv6 interface can be configured on a port, LAG, VLAN, loopback interface or tunnel.

IPv6 Interface: IPv6 addresses are assigned to interfaces, not nodes.

IPv6 Addresses: IPv6 address is represented as eight groups of four hexadecimal digits, each group representing 16 bits (two octets, a group sometimes also called a hextet). The groups are separated by colons (:)

IPv6 Routes: IPv6 Routes deliver packets to destination network IPv6 addresses by forwarding them to interfaces of next hop addresses specified by the routing table.

IPv6 Neighbors: This page shows Routing configuration like the interface VLAN configuration to config IP interface on the device. IP address in VLAN interface mode to configure the device's IP address.

RIP Routes Management: RIP Routes deliver packets to destination network by forwarding them on basis of hop count as a routing metric.

RIP Routes Setting: Rip Routing can be enabled along with Network ID and subnet mask can be set.

OSPF Routes Management: OSPF uses the shortest path first (SPF) algorithm to determine routes that should be added to the routing table. OSPF routers maintain a map of the internetwork called the link state database.

OSPF Routes Setting: OSPF Routing can be enable along with Area Id, Network ID and Mask.

11.1 IPv4 Management and Interfaces

To manage the device by using the web-based configuration utility, the IPv4 device management IP address by default is 192.168.0.1 is access IP. You can set VLAN IP address and can create loopback interfaces.

Types of Interfaces in C3000 Switch

Trunk interface:

When a trunk interface connects to a device such as an AP/Switches that can receive and send tagged and untagged frames simultaneously, you need to configure the default VLAN for the trunk interface so that the trunk interface can add the VLAN tag to untagged frames.

Hybrid interface:

When a hybrid interface connects to an AP/hub/host/Switch/server that sends untagged frames to the switch, you need to configure the default VLAN for the hybrid interface so that the hybrid interface can add the VLAN tag to untagged frames. Frames sent by a switch all carry VLAN tags. Sometimes VLAN tags need to be removed from frames sent by a hybrid interface. A trunk interface allows untagged packets from only one VLAN, so the interface must be configured as hybrid.

Tunnel Interface:

A tunnel interface is a doorway to a VPN tunnel. VPN traffic enters and exits a VPN tunnel through a tunnel interface. When you bind a tunnel interface to a VPN tunnel, you can use that tunnel interface to route VPN traffic to a specific destination.

Access Interface:

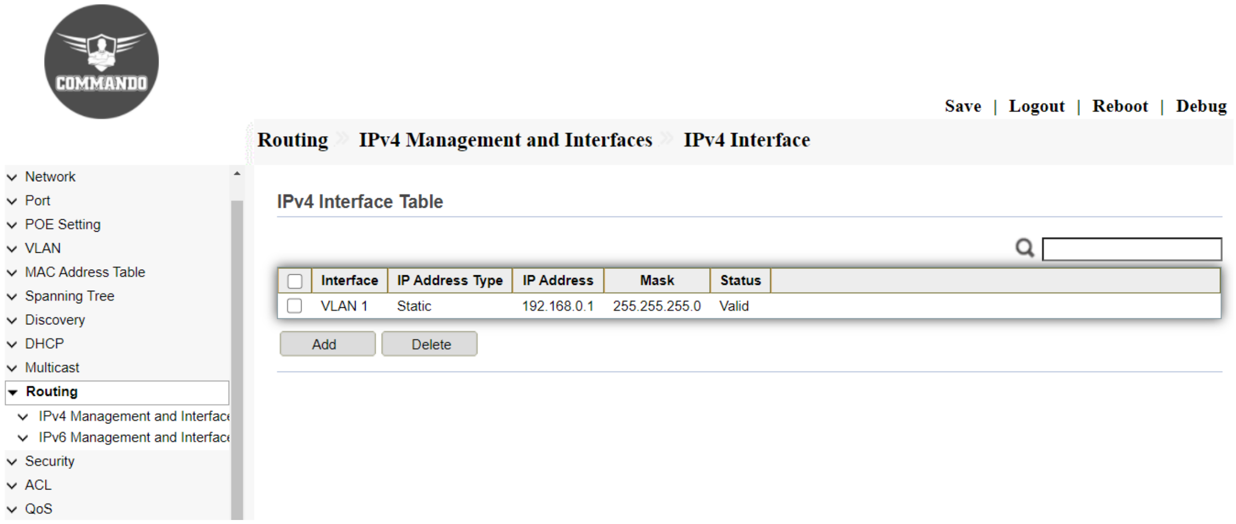
An access interface generally connects to a PC/Host or server that cannot identify VLAN tags or is used when VLANs do not need to be differentiated. Access interfaces can only receive and send untagged frames and can add only a unique VLAN tag to untagged frames.

11.1.1 IPv4 Interface

To manage the device by using the web-based configuration utility, the IPv4 device management IP address by default is 192.168.0.1. The device IP address can be manually configured also.

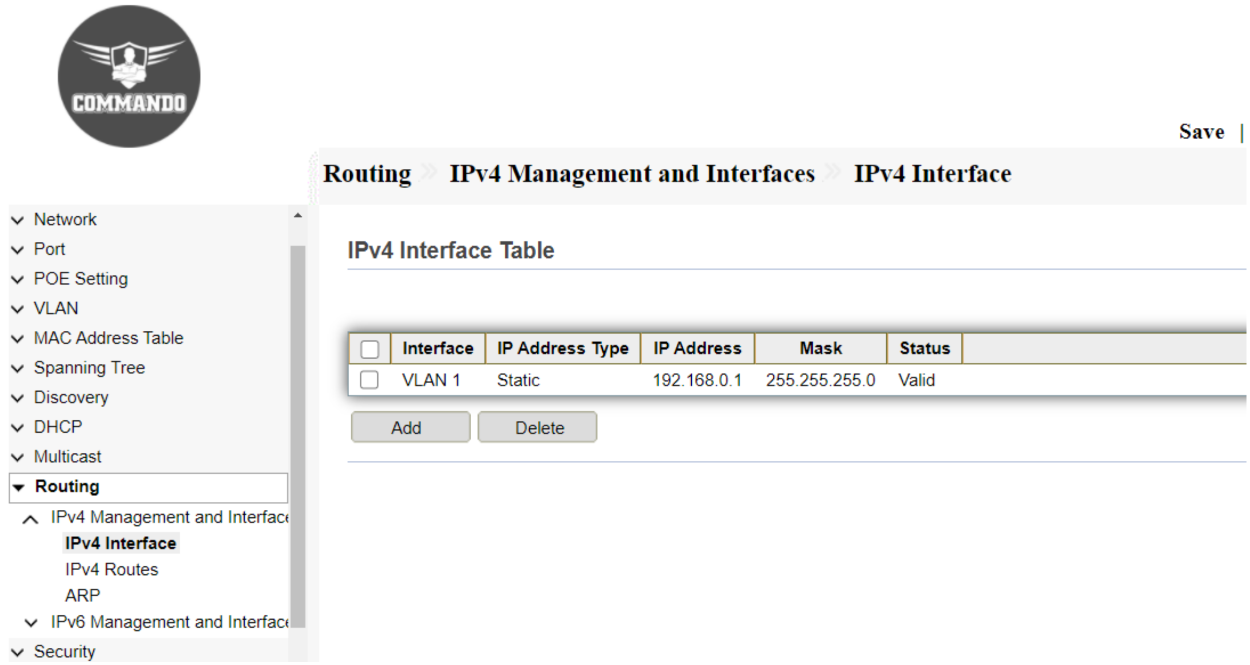
The IPv4 Interface page is used to configure IP addresses for device management. This IP address can be configured on VLAN, loopback interface.

To configure and view IPV4 interface, click **Routing >> IPv4 Management and Interfaces >> IPv4 Interface.**


COMMANDO
Save | Logout | Reboot | Debug
Routing » IPv4 Management and Interfaces » IPv4 Interface
Network
Port
POE Setting
VLAN
MAC Address Table
Spanning Tree
Discovery
DHCP
Multicast
Routing
IPv4 Management and Interface
IPv6 Management and Interface
Security
ACL
QoS
IPv4 Interface Table
Add
Delete

□	Interface	IP Address Type	IP Address	Mask	Status
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid

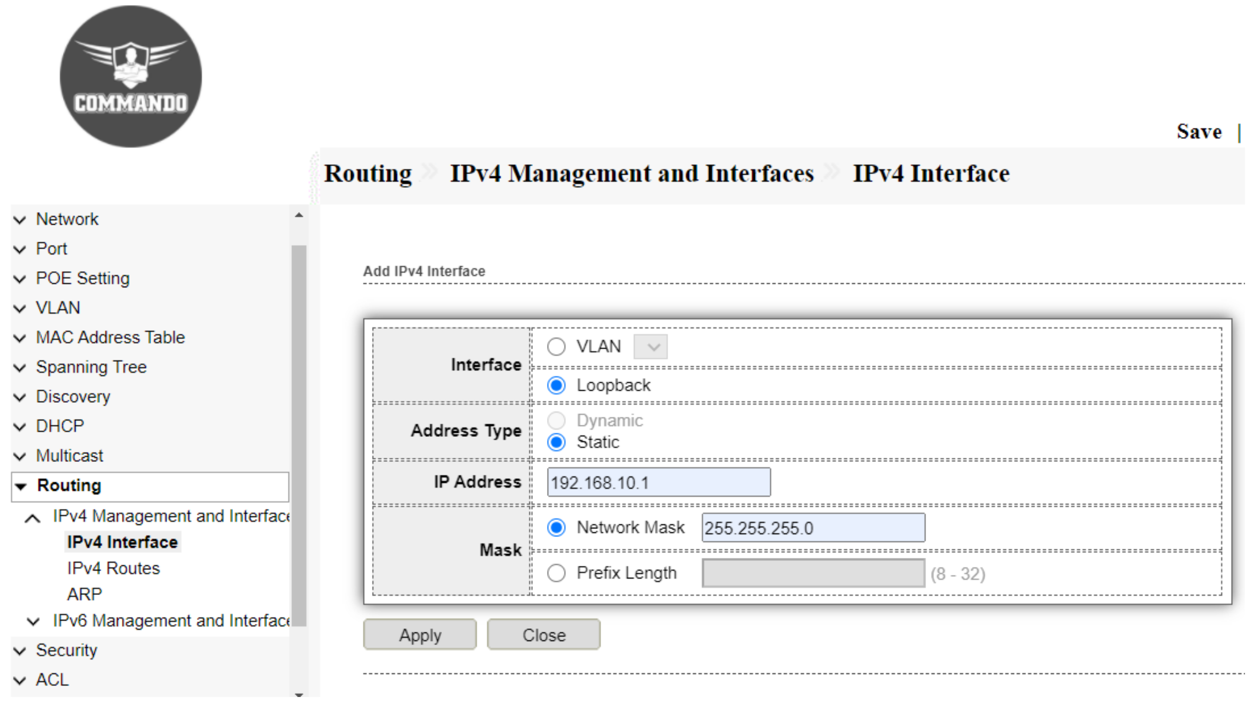
Fig 11.1.1 Default IPv4 interface table page



IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid

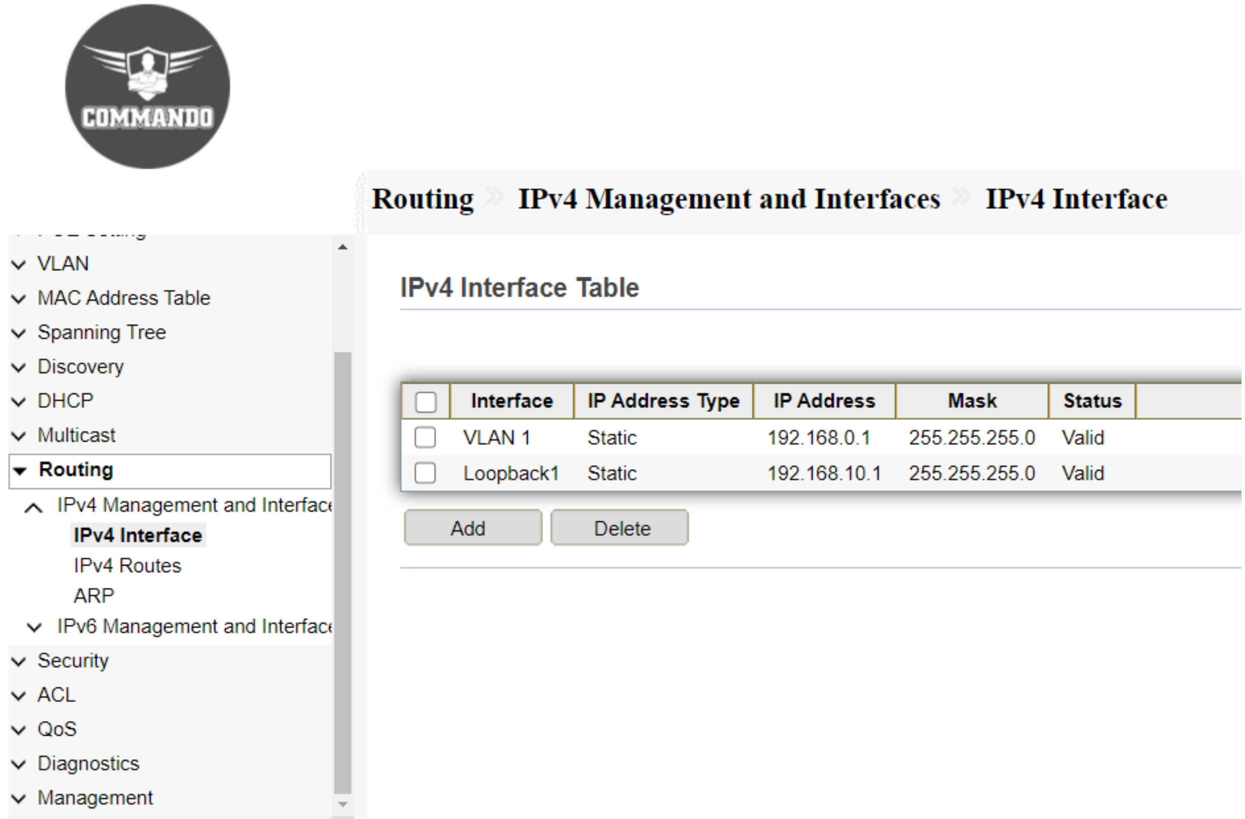
Fig 11.1.2 IPv4 interface configuration page



Add IPv4 Interface

Interface	○ VLAN ● Loopback
Address Type	○ Dynamic ● Static
IP Address	192.168.10.1
Mask	● Network Mask 255.255.255.0 ○ Prefix Length (8 - 32)

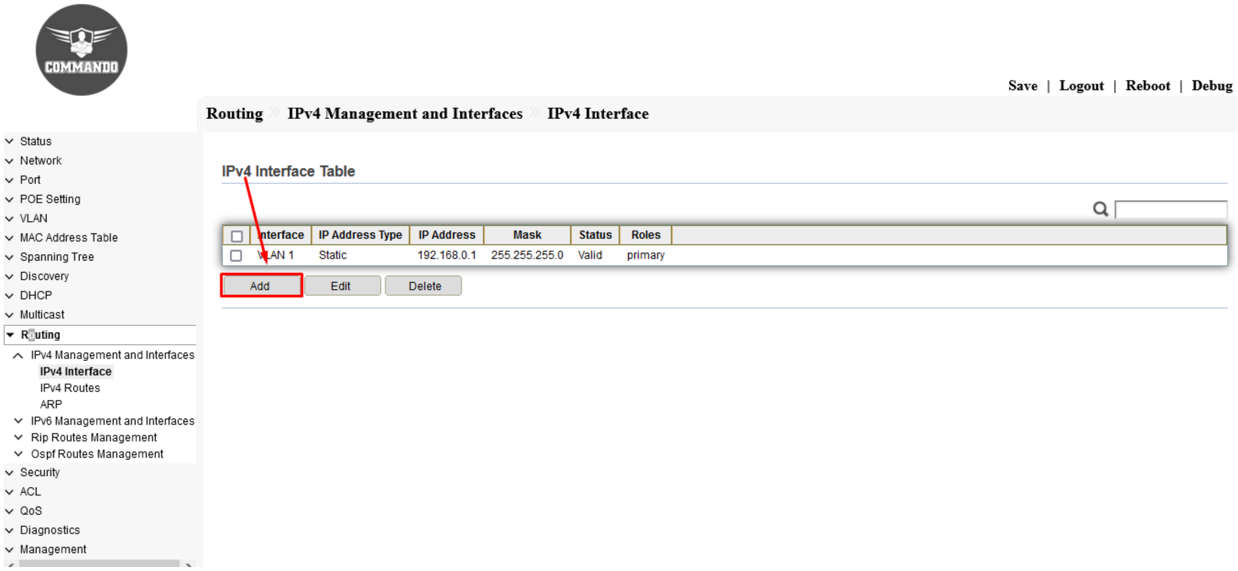
Fig 11.1.3 Creating IPv4 loopback interface configuration page



IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid
□	Loopback1	Static	192.168.10.1	255.255.255.0	Valid

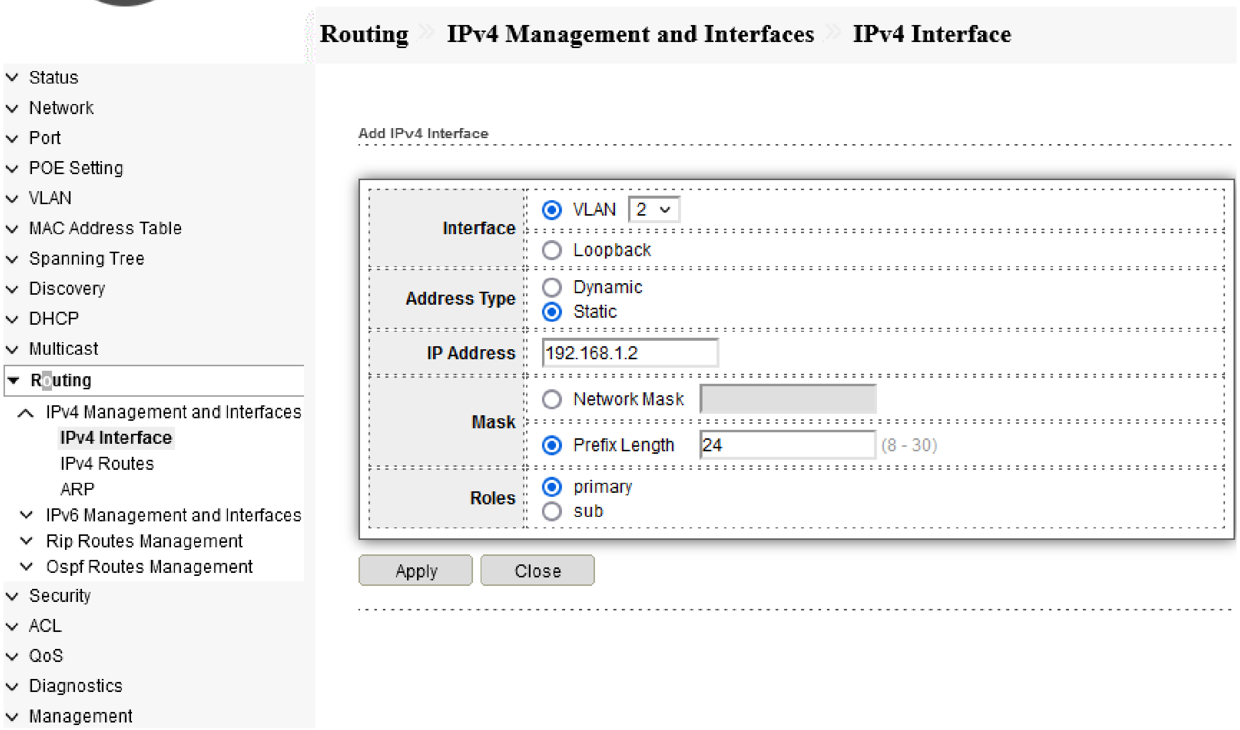
Fig 11.1.4 IPv4 interface table page



IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary

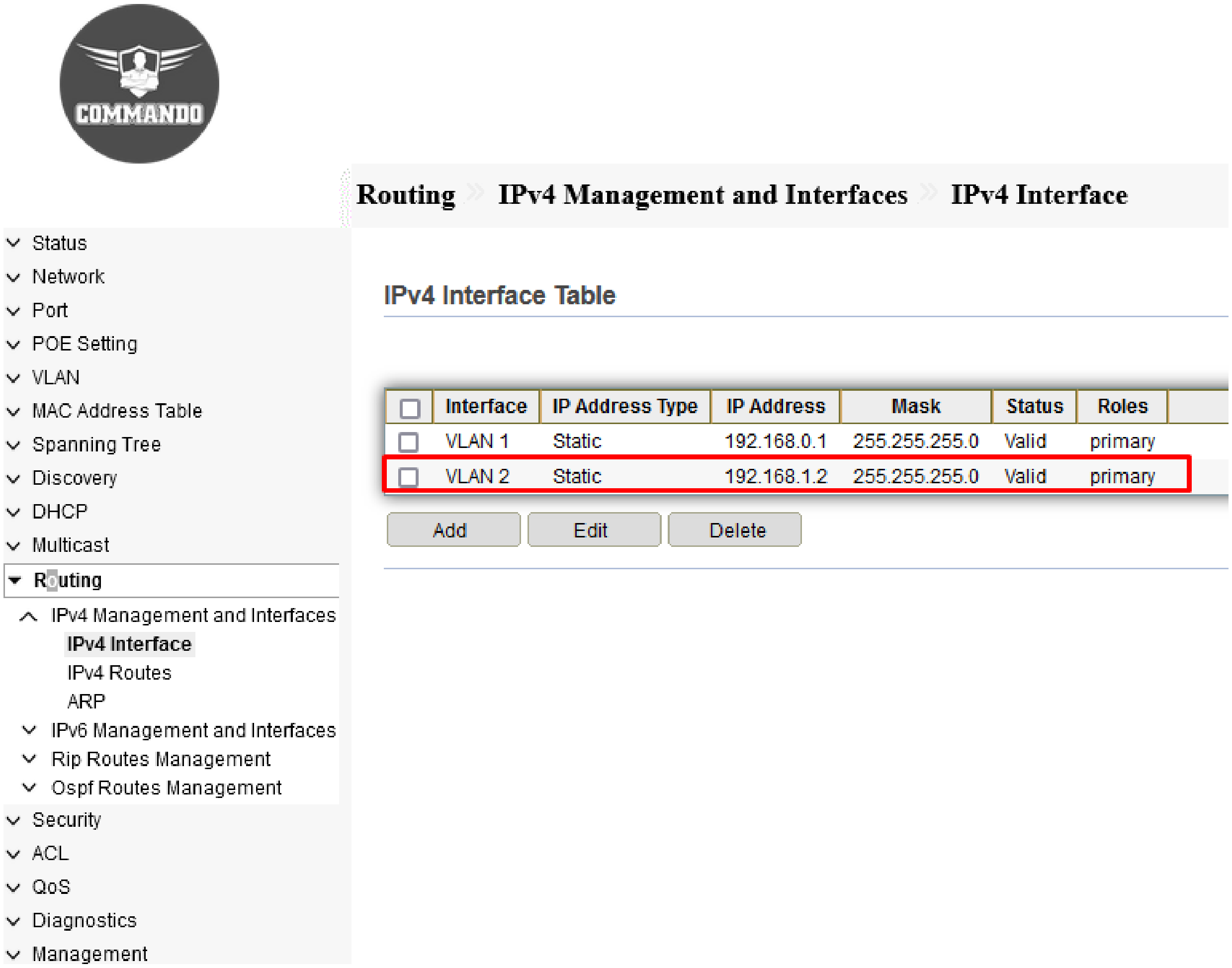
Fig 11.1.5 Add IPv4 interface page



Add IPv4 Interface

Interface	● VLAN 2 ○ Loopback
Address Type	○ Dynamic ● Static
IP Address	192.168.1.2
Mask	○ Network Mask ● Prefix Length 24 (8 - 30)
Roles	● primary ○ sub

Fig 11.1.6 Add IPv4 address for VLAN 2 page



IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary
□	VLAN 2	Static	192.168.1.2	255.255.255.0	Valid	primary

Fig 11.1.7 IPv4 address for VLAN 2 page

11.2.1 IPv4 Routes

Static IPv4 Routes: A static IPv4 route is a pre-determined path that network information must follow to reach a specific host or network.

Destination: To Specify the destination IPv4 address of the packets.

Subnet Mask: To Specify the subnet mask of the destination IPv4 address.

Next Hop: To Specify the IPv4 gateway address to which the packet should be sent next.

Distance: Specify the administrative distance, which is the trust rating of a routing entry. A higher value means a lower trust rating. Among the routes to the same destination, the route with the lowest distance value will be recorded in the IPv4 routing table. The valid value ranges from 1 to 255 and the default value is 1.

Default IPv4 Routes: The default route is a special type of static route, which specifies a path that the device should use if the destination address is not included in any other routes. Therefore, a default route can solve this problem, if no route to the destination is specified, the device will send the packets to a specific device, that is, the default gateway. Then the default gateway will forward the packets to the destination. A default route consists of three parts mainly Destination, Subnet Mask and Next Hop (Gateway). The destination and subnet mask are both the fixed value 0.0.0.0, which means arbitrary destination IP addresses that are not matched by other route entries.

Routing table: Routing table is used for a Layer 3 device (in this configuration guide, it means the switch) to forward packets to the correct destination. When the switch receives packets of which the source IP address and destination IP address are in different subnets, it will check the routing table, find the correct outgoing interface then forward the packets. The routing table mainly contains two types of routing entries: Dynamic routing entries and Static routing entries.

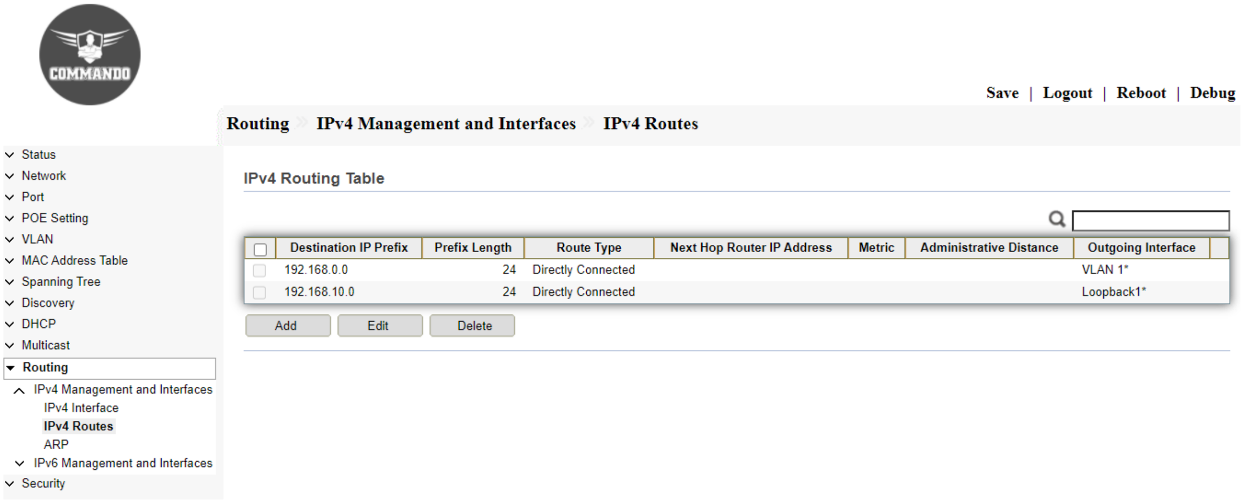
Dynamic routing entries: Dynamic routing entries are automatically generated by the switch for connected networks. The switch use dynamic routing protocols to automatically calculate the best route to forward packets.

Static routing entries: Static routing entries are manually added non-aging routing entries. In a simple network with a small number of devices, you only need to configure static routes to ensure that the devices from different subnets can communicate with each other. On a complex large-scale network, static routes ensure stable connectivity for important applications because the static routes remain unchanged even when the topology changes.

To reduce costs, generally most enterprises use L2+/L3 switches to connect internal devices and an egress router/L3 Switch to connect to an ISP network for access the ISP network, the Layer 3 switch and egress router need to interwork at Layer 3. Most Layer 3 switches do not support routed interfaces or IP based interfaces or support limited routed interfaces. Generally, a VLAN interface is used as a Layer 3 interface to communicate with other Layer 3 interface of the router/ L3 switch and then static route or a dynamic routing protocol is configured to implement Layer 3 connectivity between the L3 switch and egress router/ other L3 Switch.

Interface based VLAN assignment is the simplest and most effective method which is deployed in C3000 Switch. VLANs are assigned based on interfaces. After an interface is added to a VLAN, the interface can forward packets from the VLAN. Ethernet interfaces are classified into access, trunk, and hybrid interfaces according to the connected interfaces to the Ethernet interfaces and number of VLANs from which untagged frames are permitted to access interface. The C3000 switch processes only tagged frames and an access interface connected to devices only receive and send untagged frames, so the access interface needs to add a VLAN tag to received frames. That is, you must configure the default VLAN for the access interface. After the default VLAN is configured, the access interface joins the VLAN. An access interface needs to process only untagged frames. If a user connects a switching device to a user side interface without permission, the user side interface may receive tagged frames. You can configure the user side interface to discard tagged frames, preventing unauthorized access.

The C3000 Series switch supports IPv4 static routing and IPv6 static routing configuration. To configure and view IPV4 interface, click **Routing >> IPv4 Management and Interfaces >> IPv4 Routes.** This page enables configuring and viewing IPv4 static routes on the device. When routing traffic, the next hop is decided on according to the longest prefix match. A destination IPv4 address may match multiple routes in the IPv4 Static Route Table.



IPv4 Routing Table

□	Destination IP Prefix	Prefix Length	Route Type	Next Hop Router IP Address	Metric	Administrative Distance	Outgoing Interface
□	192.168.0.0	24	Directly Connected				VLAN 1*
□	192.168.10.0	24	Directly Connected				Loopback1*

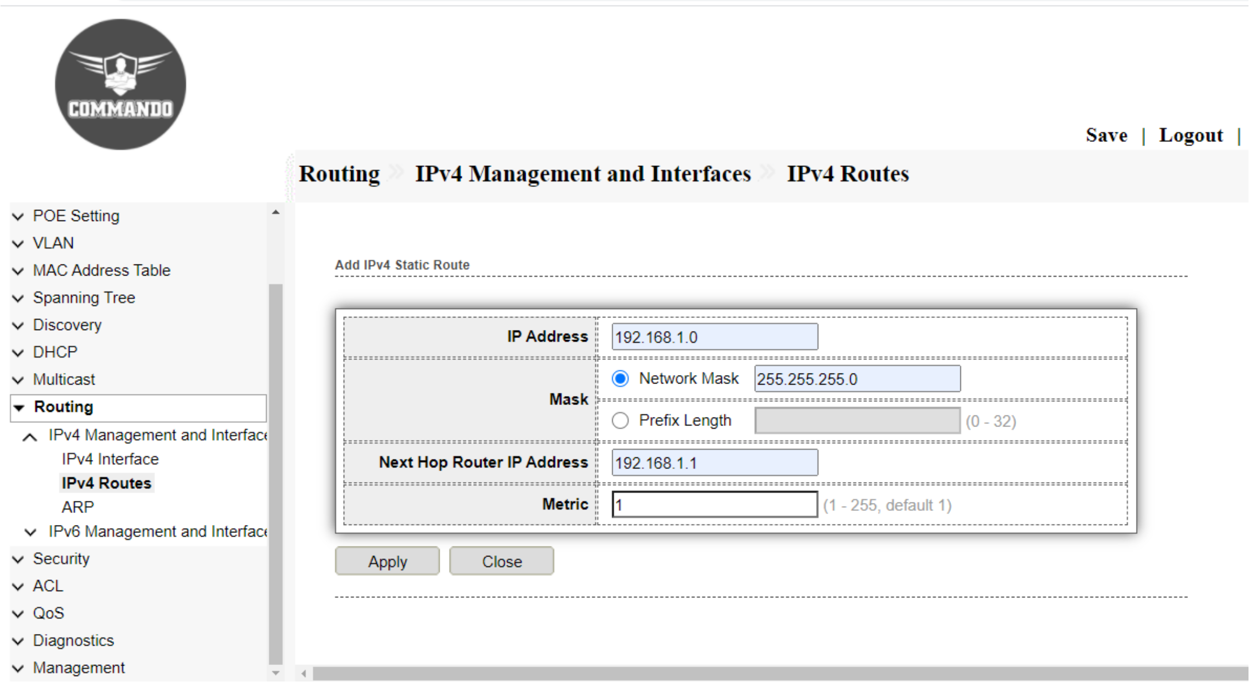
Fig 11.2.1 Default IPv4 Routing Table as per created Layer 3 interface page

Static IPv4 Routes Configuration:

Click on “IPv4 Management and Interfaces”, then “IPv4 Routes” from menu, Click on “Add”, then enter “IP Address”, “Mask”, “Next Hop Router IP Address” & “Metric” value and Click on “Apply”.

Configuration object and description:

Next Hop Router IP Address: Enter the next hop IP address or destination link IP address to reach that particular network.



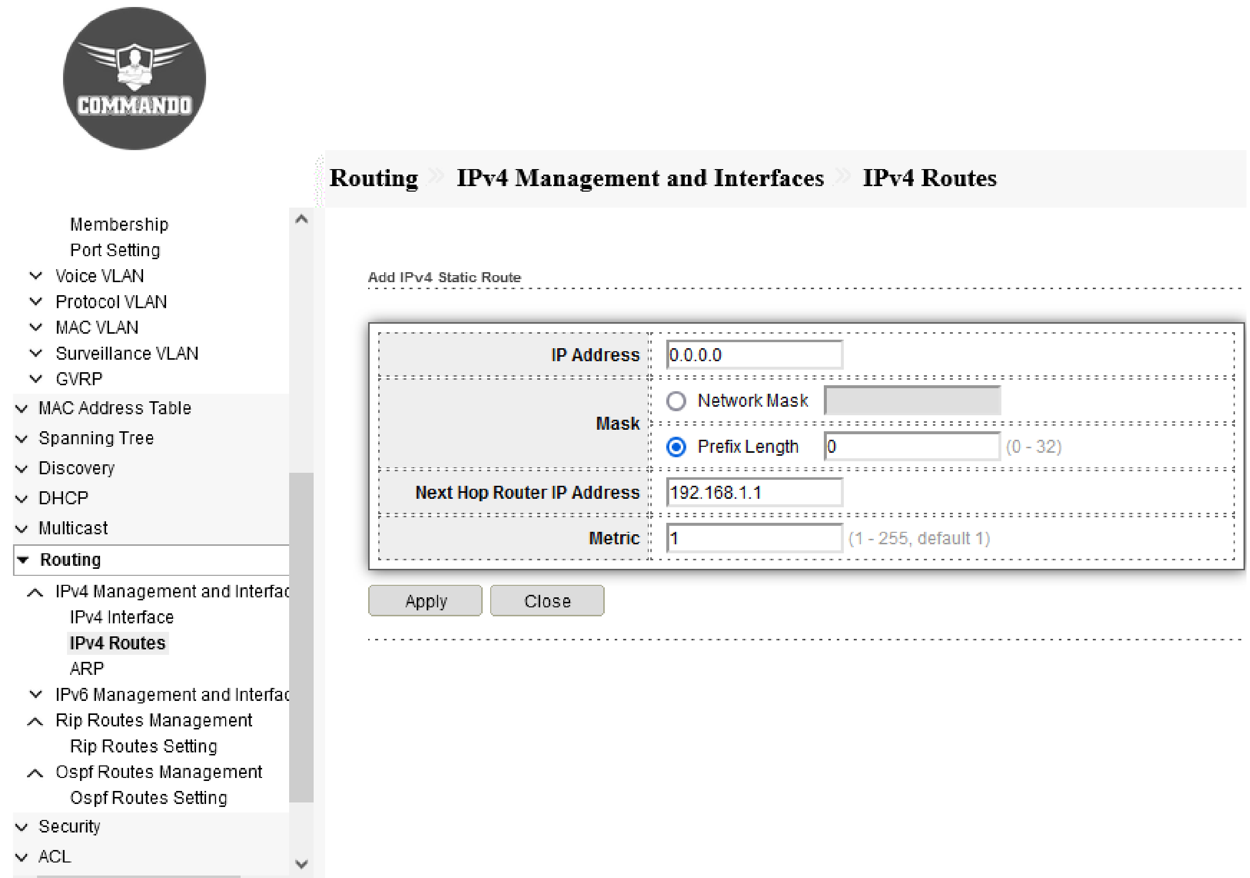
Add IPv4 Static Route

IP Address	192.168.1.0	
Mask	● Network Mask	255.255.255.0
	○ Prefix Length	(0 - 32)
Next Hop Router IP Address	192.168.1.1	
Metric	1	(1 - 255, default 1)

Fig 11.2.2 Add IPv4 Static route page

Default IPv4 Routes Configuration:

Keep Network and mask all zero with Next hop IP as preferred and can set metric also.

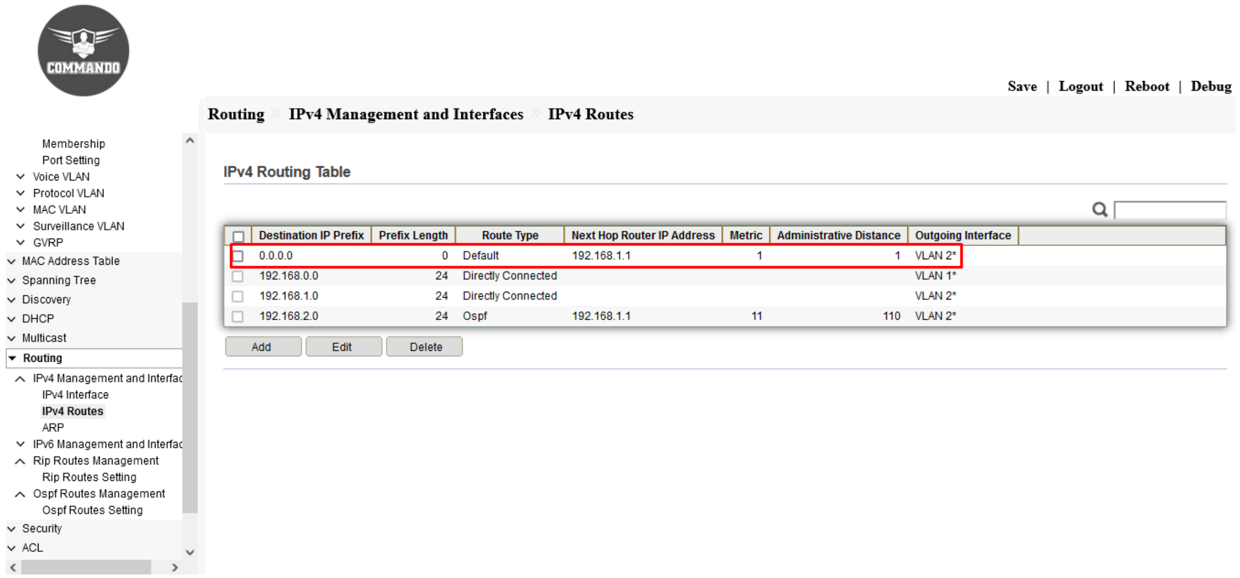


Routing » IPv4 Management and Interfaces » IPv4 Routes

Add IPv4 Static Route

IP Address	0.0.0.0
Mask	○ Network Mask
	● Prefix Length 0 (0 - 32)
Next Hop Router IP Address	192.168.1.1
Metric	1 (1 - 255, default 1)

Fig 11.2.3 Add IPv4 Default route page



Routing » IPv4 Management and Interfaces » IPv4 Routes

IPv4 Routing Table

□	Destination IP Prefix	Prefix Length	Route Type	Next Hop Router IP Address	Metric	Administrative Distance	Outgoing Interface
□	0.0.0.0	0	Default	192.168.1.1	1	1	VLAN 2*
□	192.168.0.0	24	Directly Connected				VLAN 1*
□	192.168.1.0	24	Directly Connected				VLAN 2*
□	192.168.2.0	24	Ospf	192.168.1.1	11	110	VLAN 2*

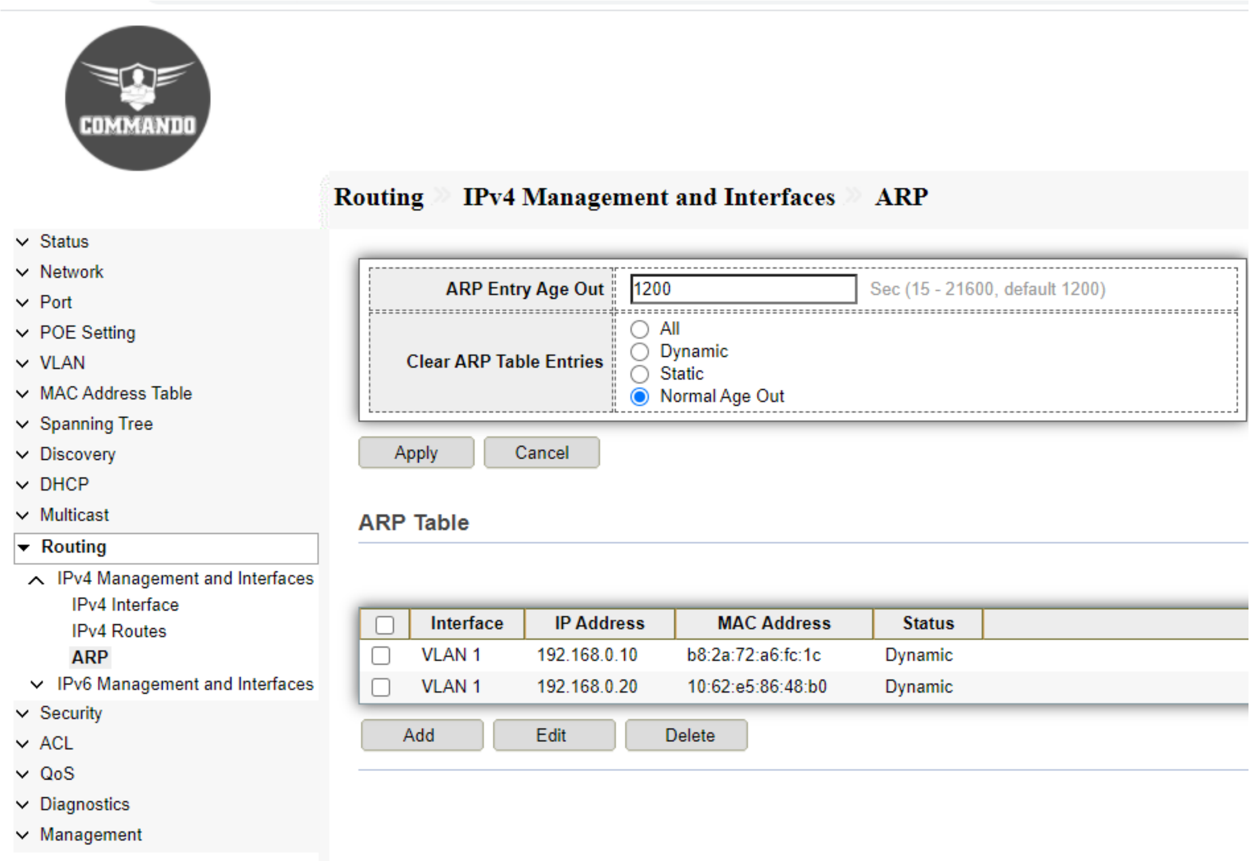
Fig 11.2.4 IPv4 routing table page

11.1.3 ARP

The C3000 Switches maintains an ARP (Address Resolution Protocol) table for all devices connected to it. The ARP table to obtain the MAC address of the device. The ARP table contains both static and dynamic addresses. Static addresses are manually configured and do not age out. The device creates dynamic addresses from the ARP packets it receives.

To view and configure ARP Table, click **Routing >> IPv4 Management and Interfaces >> ARP.**

Dynamic addresses age out after a configured time 20 minutes.

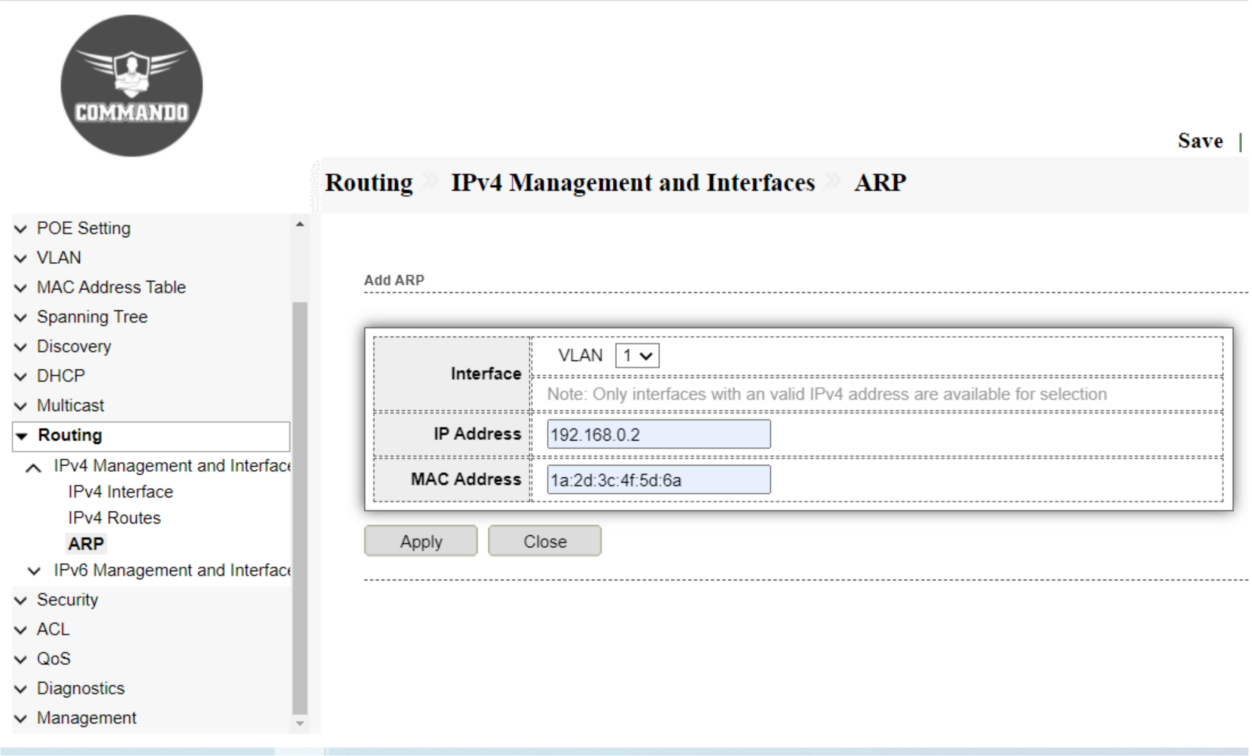


ARP Entry Age Out	1200 Sec (15 - 21600, default 1200)
Clear ARP Table Entries	○ All ○ Dynamic ○ Static ● Normal Age Out

ARP Table

□	Interface	IP Address	MAC Address	Status
□	VLAN 1	192.168.0.10	b8:2a:72:a6:fc:1c	Dynamic
□	VLAN 1	192.168.0.20	10:62:e5:86:48:b0	Dynamic

Fig 11.1.4 Default ARP table page



Add ARP

Interface	VLAN 1
	Note: Only interfaces with an valid IPv4 address are available for selection
IP Address	192.168.0.2
MAC Address	1a:2d:3c:4f:5d:6a

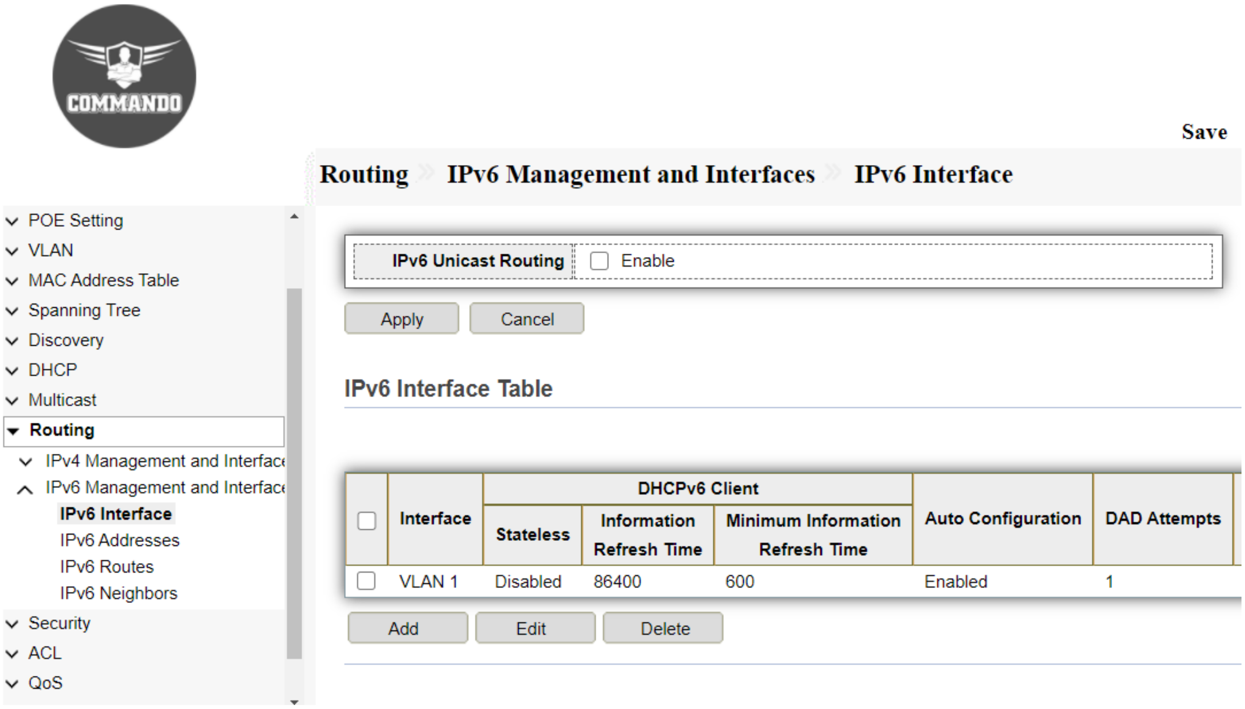
Fig 11.1.5 Add ARP page

11.2 IPv6 Management and Interfaces

Assigning IPv6 addresses to a network device enables the device to communicate with other devices on the network with IPv6 address.

11.2.1 IPv6 Interface

An IPv6 interface can be configured on a VLAN and loopback interface. To configure and view IPV6 interface, click **Routing >> IPv6 Management and Interfaces >> IPv6 Interface.**

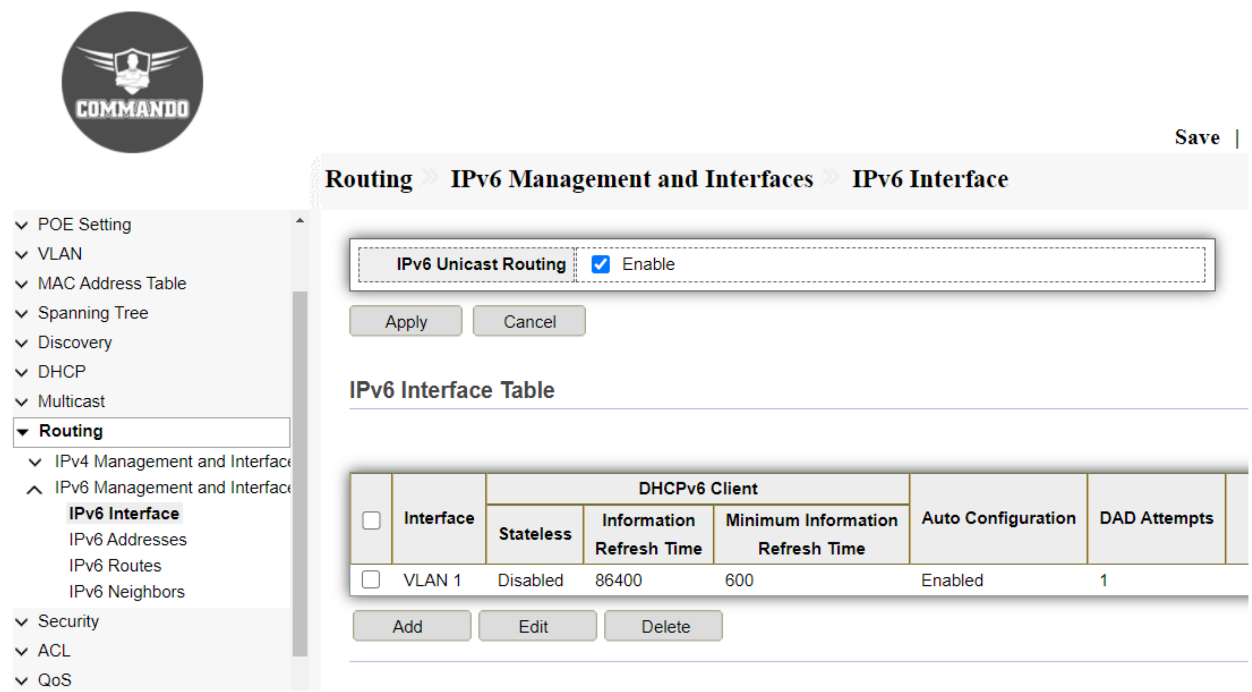


IPv6 Unicast Routing □ Enable

IPv6 Interface Table

□	Interface	DHCPv6 Client			Auto Configuration	DAD Attempts
		Stateless	Information Refresh Time	Minimum Information Refresh Time		
□	VLAN 1	Disabled	86400	600	Enabled	1

Fig 11.2.1 Default IPv6 interface Table page



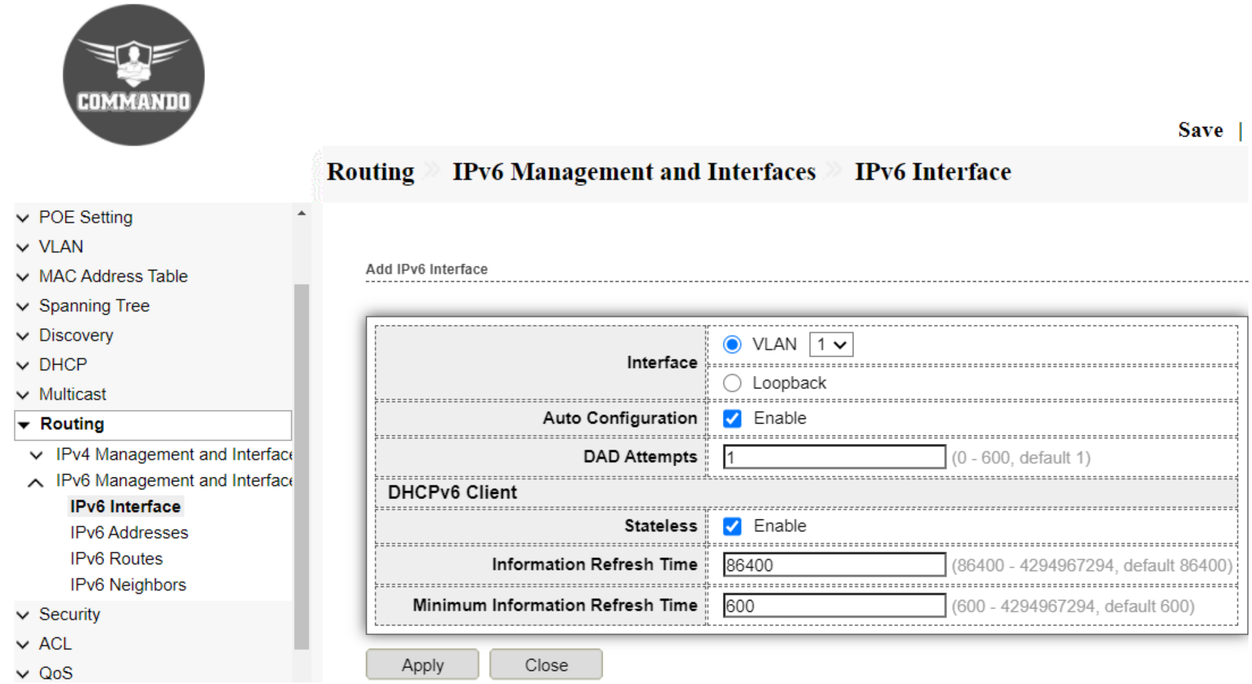
Routing » IPv6 Management and Interfaces » IPv6 Interface

IPv6 Unicast Routing ☑ Enable

IPv6 Interface Table

□	Interface	DHCPv6 Client			Auto Configuration	DAD Attempts
		Stateless	Information Refresh Time	Minimum Information Refresh Time		
□	VLAN 1	Disabled	86400	600	Enabled	1

Fig 11.2.2 Enable IPv6 Unicast Routing page



Routing » IPv6 Management and Interfaces » IPv6 Interface

Add IPv6 Interface

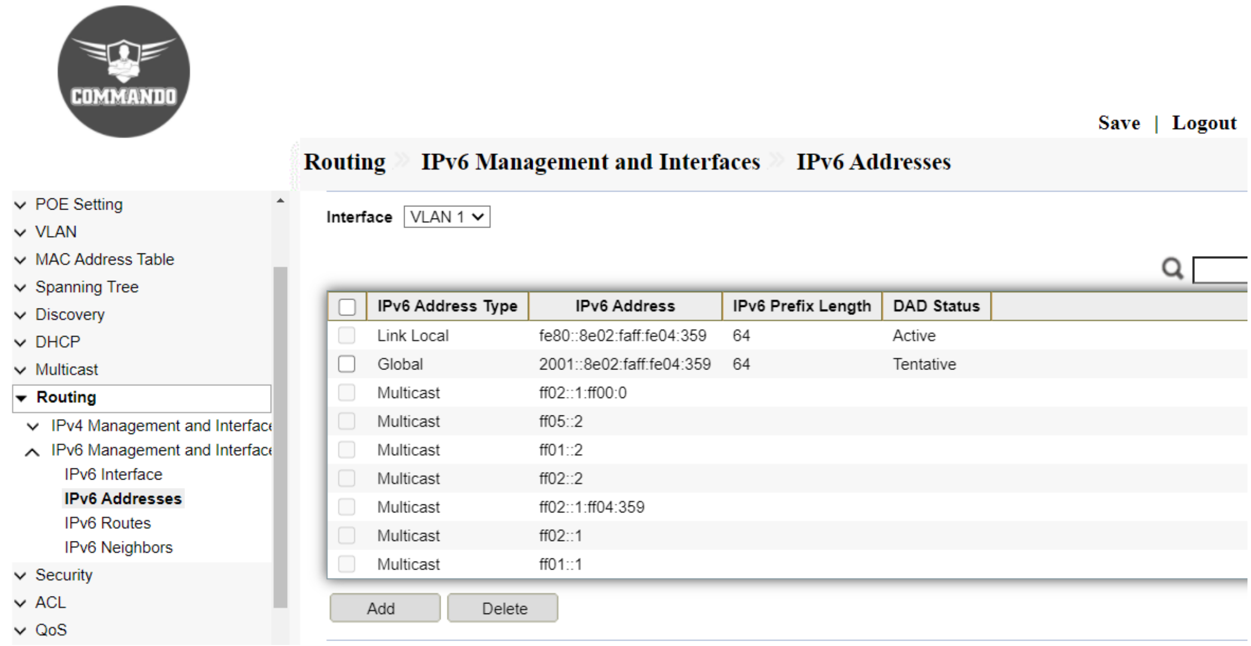
Interface	● VLAN 1 ○ Loopback
Auto Configuration	☑ Enable
DAD Attempts	1 (0 - 600, default 1)
DHCPv6 Client	
Stateless	☑ Enable
Information Refresh Time	86400 (86400 - 4294967294, default 86400)
Minimum Information Refresh Time	600 (600 - 4294967294, default 600)

Fig 11.2.3 Add IPv6 interface page

11.2.2 IPv6 Addresses

An IPv6 address is represented as eight groups of four hexadecimal digits, each group representing 16 bits (two octets, a group sometimes also called a hextet). The groups are separated by colons (:). The three types of IPv6 addresses are: unicast, anycast, and multicast addresses.

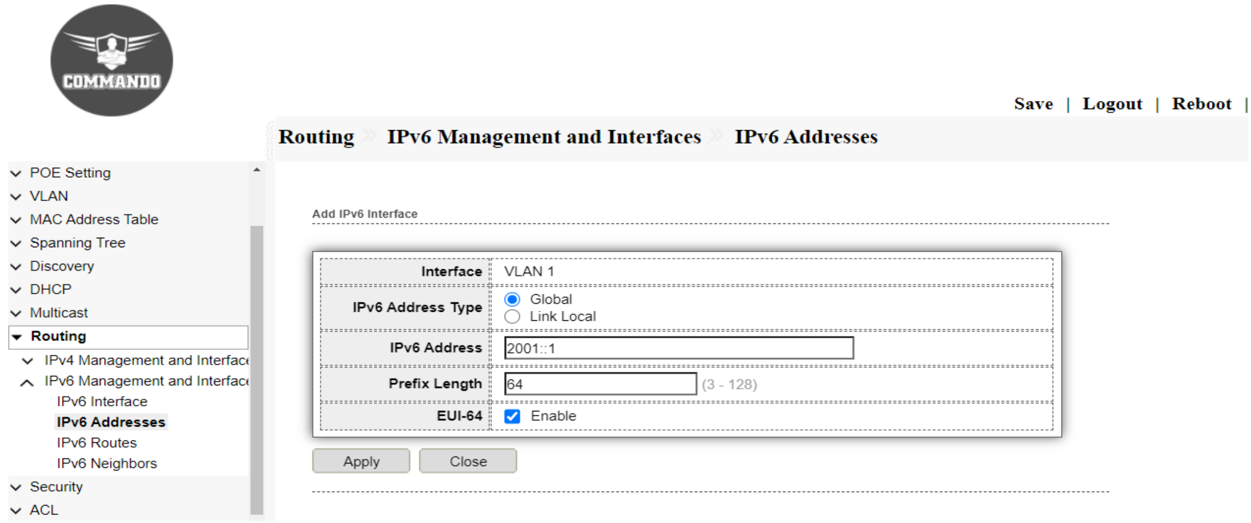
To configure and view IPV6 address, click **Routing >> IPv6 Management and Interfaces >> IPv6 addresses.**



Interface VLAN 1

□	IPv6 Address Type	IPv6 Address	IPv6 Prefix Length	DAD Status
□	Link Local	fe80::8e02:faff:fe04:359	64	Active
□	Global	2001::8e02:faff:fe04:359	64	Tentative
□	Multicast	ff02::1:ff00:0		
□	Multicast	ff05::2		
□	Multicast	ff01::2		
□	Multicast	ff02::2		
□	Multicast	ff02::1:ff04:359		
□	Multicast	ff02::1		
□	Multicast	ff01::1		

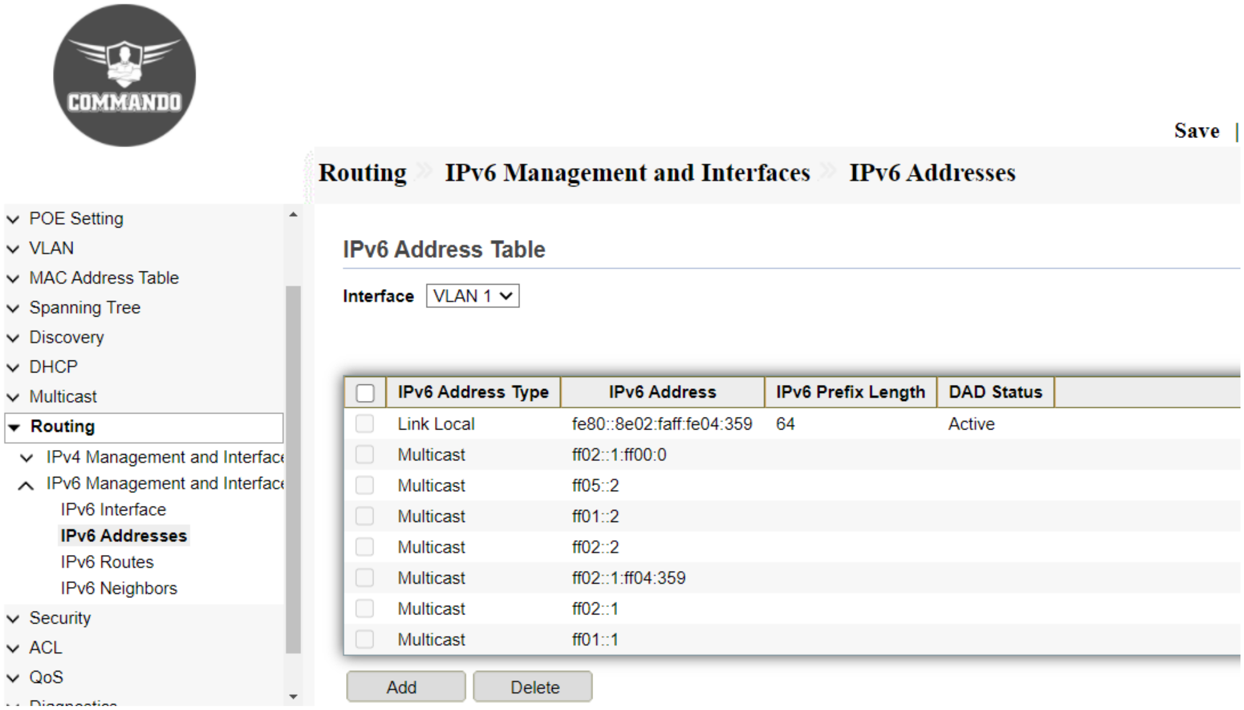
Fig 11.2.4 IPv6 address table page



Add IPv6 Interface

Interface	VLAN 1
IPv6 Address Type	● Global ○ Link Local
IPv6 Address	2001::1
Prefix Length	64 (3 - 128)
EUI-64	☑ Enable

Fig 11.2.5 Add IPv6 interface page



IPv6 Address Table

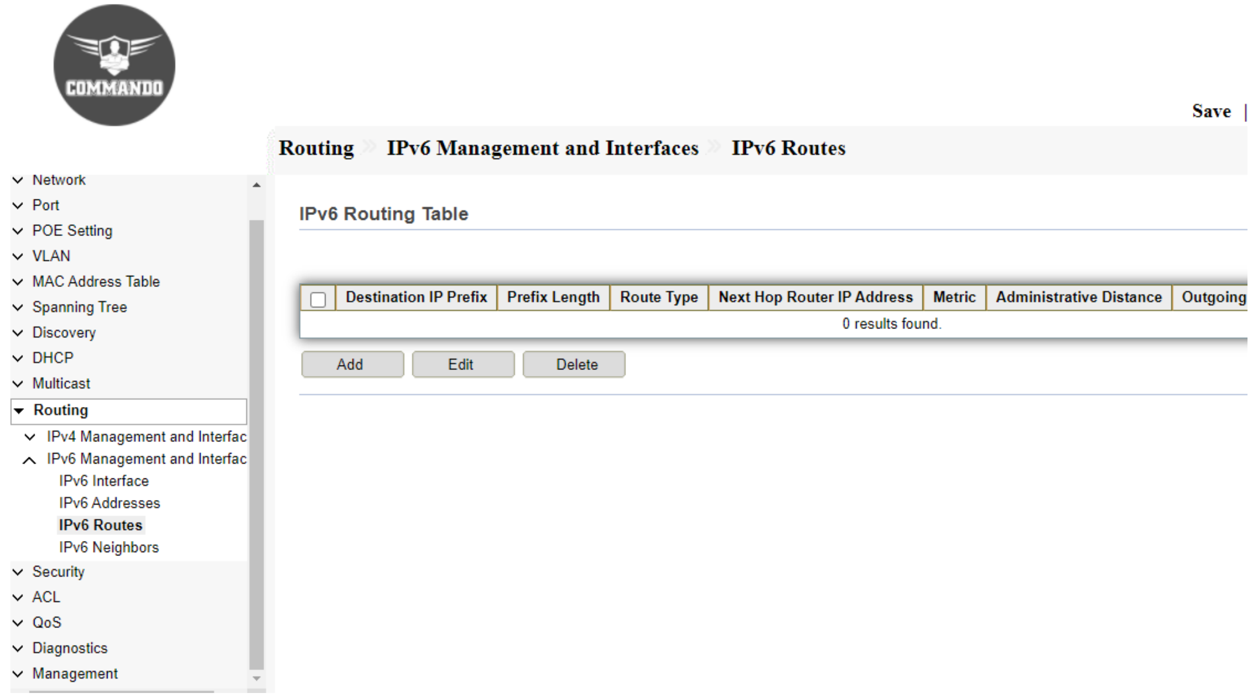
Interface VLAN 1

□	IPv6 Address Type	IPv6 Address	IPv6 Prefix Length	DAD Status
□	Link Local	fe80::8e02:faff:fe04:359	64	Active
□	Multicast	ff02::1:ff00:0		
□	Multicast	ff05::2		
□	Multicast	ff01::2		
□	Multicast	ff02::2		
□	Multicast	ff02::1:ff04:359		
□	Multicast	ff02::1		
□	Multicast	ff01::1		

Fig 11.2.6 IPv6 address table after adding IPv6 address page

11.2.3 IPv6 Routes

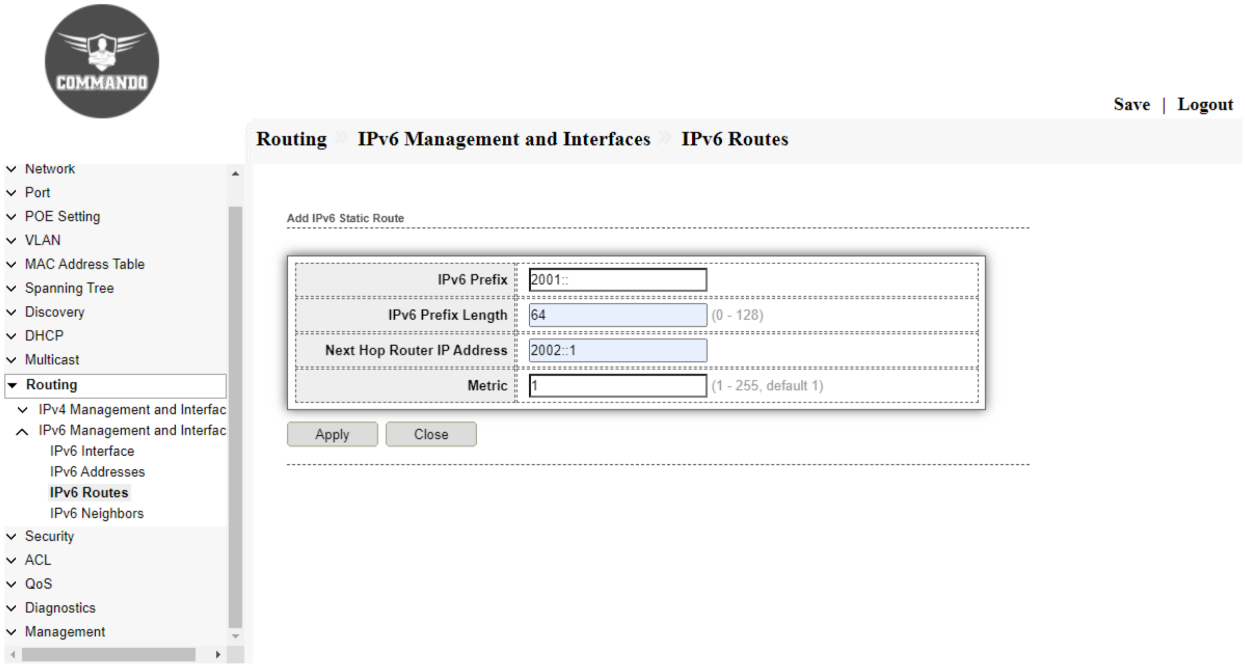
This page enables configuring and viewing IPv6 static routes on the device. When routing traffic, the next hop is decided on according to the longest prefix match. A destination IPv6 address may match multiple routes in the IPv6 Static Route Table. To configure and view IPV6 address, click **Routing >> IPv6 Management and Interfaces >> IPv6 Routes.**



IPv6 Routing Table

□	Destination IP Prefix	Prefix Length	Route Type	Next Hop Router IP Address	Metric	Administrative Distance	Outgoing
				0 results found.			

Fig 11.2.8 Default IPv6 routing table page



Add IPv6 Static Route

IPv6 Prefix	2001::
IPv6 Prefix Length	64 (0 - 128)
Next Hop Router IP Address	2002::1
Metric	1 (1 - 255, default 1)

Fig 11.2.9 Add IPv6 static route page

IPv6 Routes Configuration:
Click on "IPv6 Management and Interfaces", then "IPv6 Routes" from menu.
Click on "Add", then enter "IP Address", "Mask", "Next Hop Router IP Address" & "Metric" value. Click on "Apply".

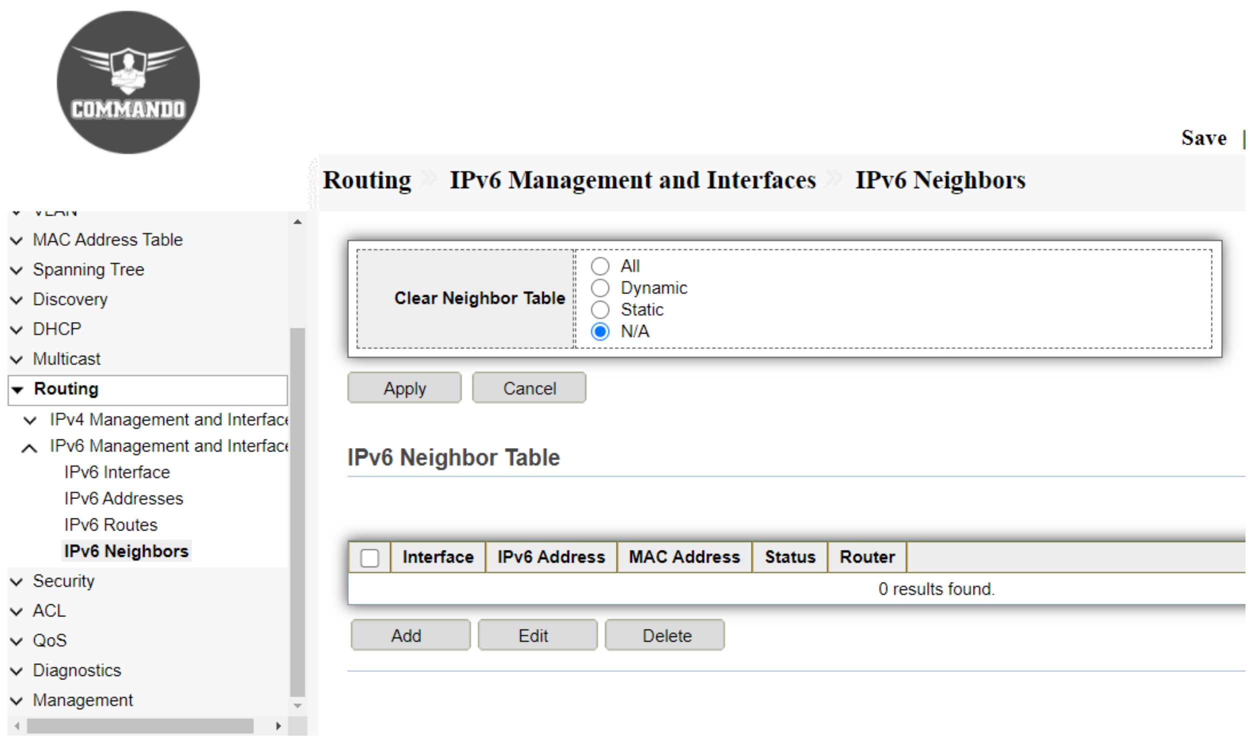
Configuration object and description:

Next Hop Router IP Address: Enter the next hop IP address or destination link Ip address.

11.2.4 IPv6 Neighbors

The IPv6 neighbor discovery process uses ICMP messages and solicited-node multicast addresses to determine the link-layer address of a neighbor on the same network (local link), verify the reachability of a IPv6 neighbor, and track neighboring devices.

To configure and view IPV6 address, click **Routing >> IPv6 Management and Interfaces >> IPv6 Neighbors.**

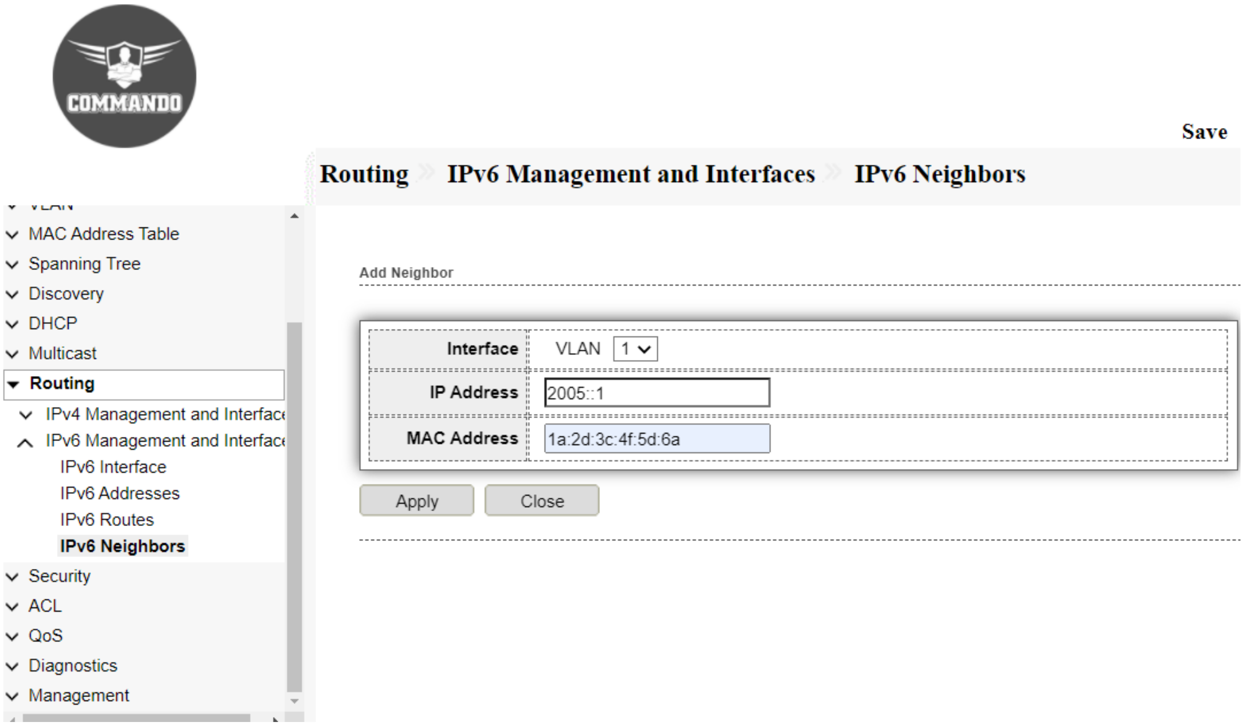


Clear Neighbor Table: ○ All ○ Dynamic ○ Static ● N/A

IPv6 Neighbor Table

□	Interface	IPv6 Address	MAC Address	Status	Router
			0 results found.		

Fig 11.2.11 Default IPv6 neighbor page



Interface	VLAN 1
IP Address	2005::1
MAC Address	1a:2d:3c:4f:5d:6a

Fig 11.2.12 Add IPv6 neighbor page

11.3.1 RIP Routes Management

Routing Information Protocol (RIP) is a dynamic routing protocol which uses hop count as a routing metric to find the best path between the source & the destination network. It is one of a family of IP Routing protocols and is an Interior Gateway Protocol (IGP) designed to distribute routing information within an Autonomous System (AS).

It is a distance vector routing protocol which has default AD value 120 & works on the application layer of OSI model. It uses port number 520. Typically, the best path is the path with the fewest hops. A hop is another router through which packets must travel to reach the destination. If RIP receives a RIP update from another router/switch that contains a path with fewer hops than the path stored in the route table, the system replaces the older route with the newer one. The system then includes the new path in the updates it sends to other RIP routers. A router/switch running RIP sends the contents of its routing table to each of its adjacent routers every 30 seconds by default.

Features of RIP:

Updates of the network are exchanged periodically.

Updates (routing information) are always broadcast.

Full routing tables are sent in updates.

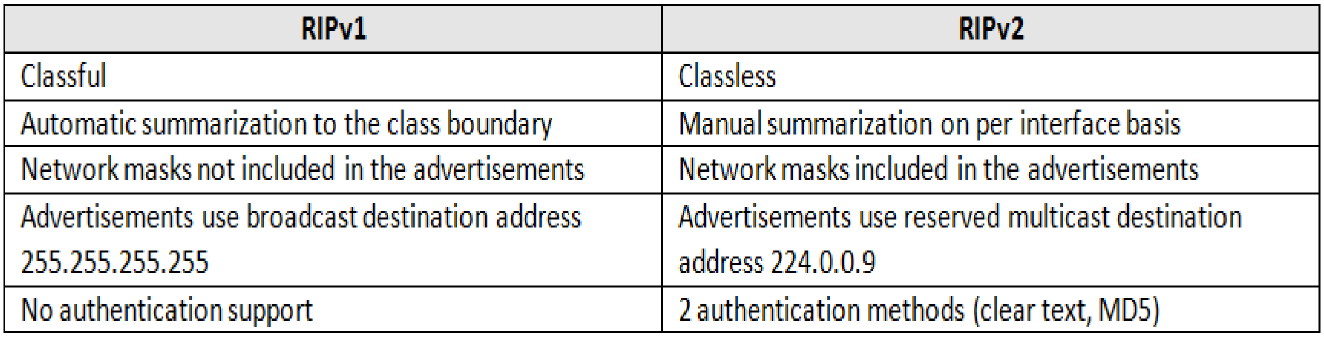
Routers/Switches always trust on routing information received from neighbor routers. This is also known as Routing on rumor.

The disadvantages of RIP include:

Increased network traffic: RIP checks with its neighboring routers every 30 seconds, which increases network traffic.

Maximum hop count limitation: RIP has a maximum hop count of 15, which means that on large networks, other remote routers may not be able to be reached.

Comparison of RIP v1 & RIP v2



RIPv1	RIPv2
Classful	Classless
Automatic summarization to the class boundary	Manual summarization on per interface basis
Network masks not included in the advertisements	Network masks included in the advertisements
Advertisements use broadcast destination address 255.255.255.255	Advertisements use reserved multicast destination address 224.0.0.9
No authentication support	2 authentication methods (clear text, MD5)

Steps to Configure RIP in C3000 with Web GUI

1. Create any VLAN for routing purpose from 2 to 4094.

2. Assign IP address to created VLAN as per other connected router/switch IP address as they required to be in same network.

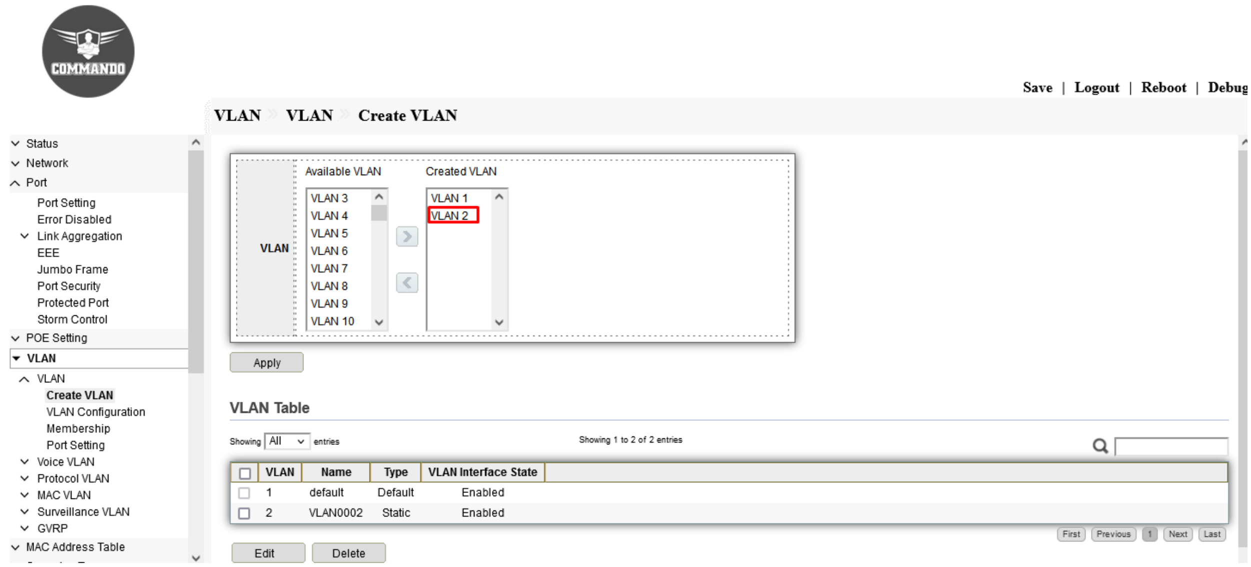
3. Go to Interface where you connected L3 Switch/Router and assign Created VLAN in access mode.

4. Enable RIP.

5. Add connected Network ID to RIP

6. Check the learn route with RIP.

Step 1: Create VLAN for routing purpose



VLAN

Available VLAN	Created VLAN
VLAN 3 VLAN 4 VLAN 5 VLAN 6 VLAN 7 VLAN 8 VLAN 9 VLAN 10	VLAN 1 VLAN 2

VLAN Table

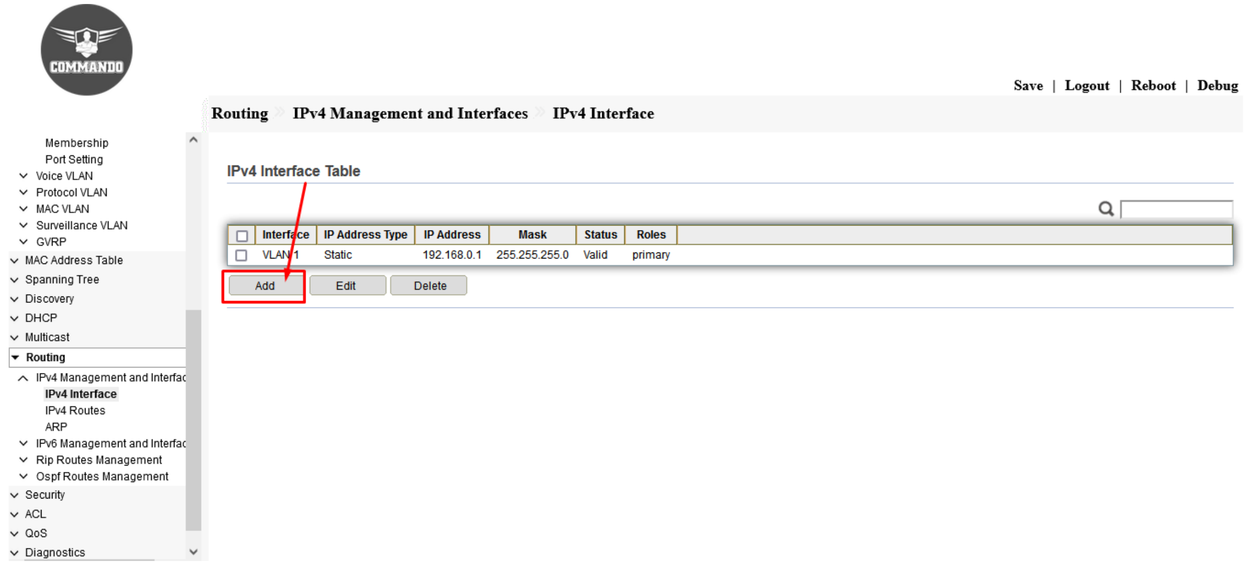
Showing All entries

Showing 1 to 2 of 2 entries

□	VLAN	Name	Type	VLAN Interface State
□	1	default	Default	Enabled
□	2	VLAN0002	Static	Enabled

Fig 11.3.1 Creating VLAN 2 Page

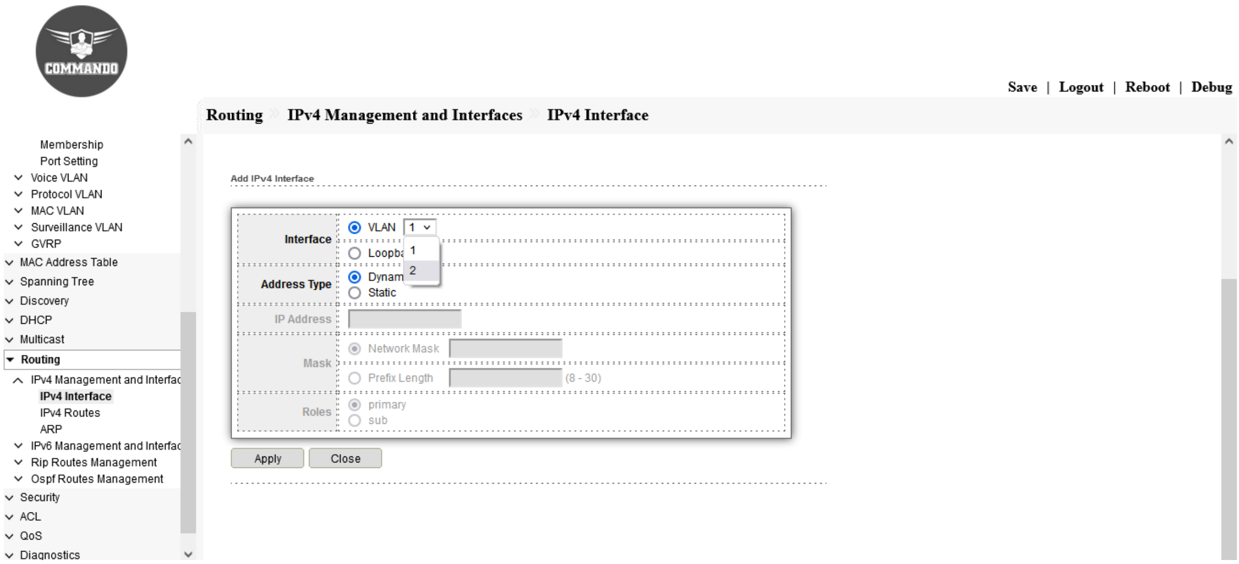
Step 2: Assign IP address to created VLAN



IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary

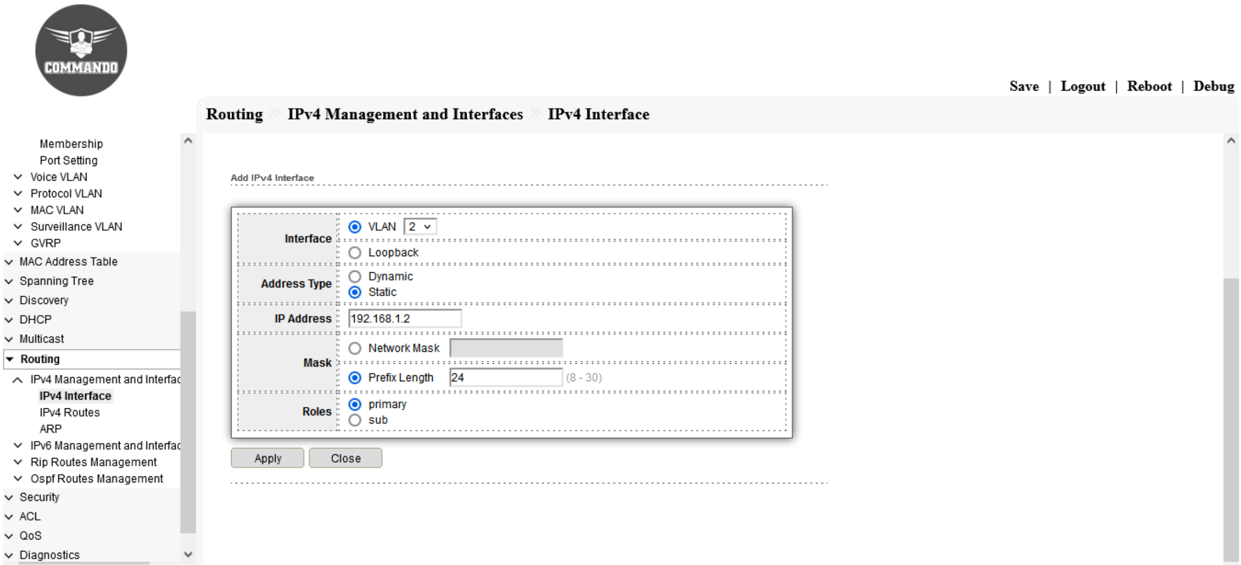
Fig 11.3.2 Add IP address for VLAN Page



Add IPv4 Interface

Interface	● VLAN 1 (1, 2) ○ Loopba
Address Type	● Dynam ○ Static
IP Address	
Mask	● Network Mask ○ Prefix Length (8 - 30)
Roles	● primary ○ sub

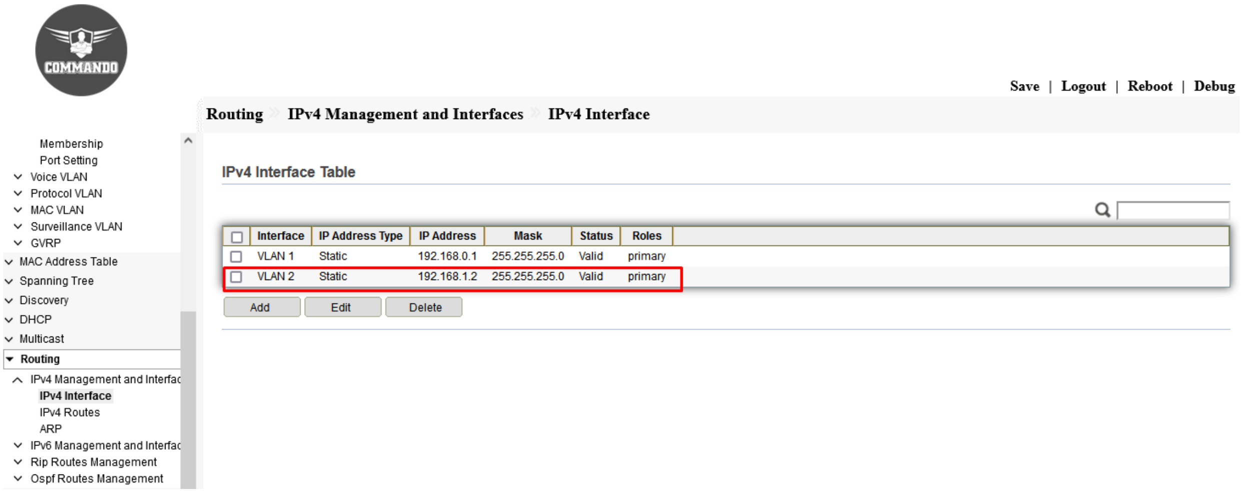
Fig 11.3.3 Selecting VLAN for providing IP address Page



Add IPv4 Interface

Interface	● VLAN 2 ○ Loopback
Address Type	○ Dynamic ● Static
IP Address	192.168.1.2
Mask	○ Network Mask ● Prefix Length 24 (8 - 30)
Roles	● primary ○ sub

Fig 11.3.4 Add Static VLAN IP address with subnet mask Page

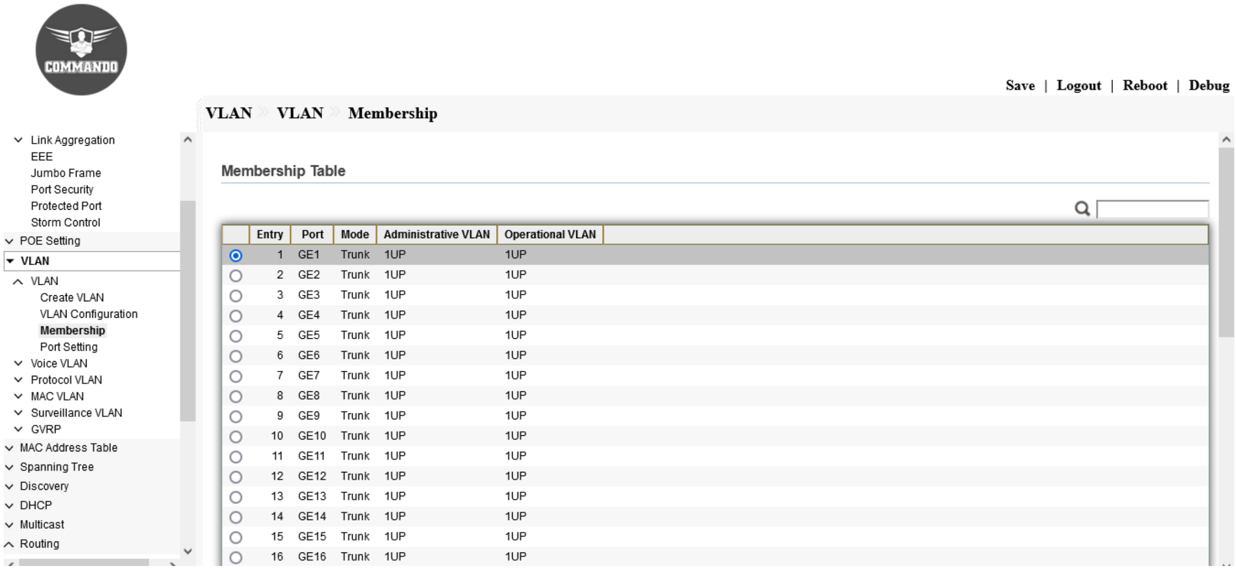


IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary
□	VLAN 2	Static	192.168.1.2	255.255.255.0	Valid	primary

Fig 11.3.5 Assign IP address to created VLAN Page

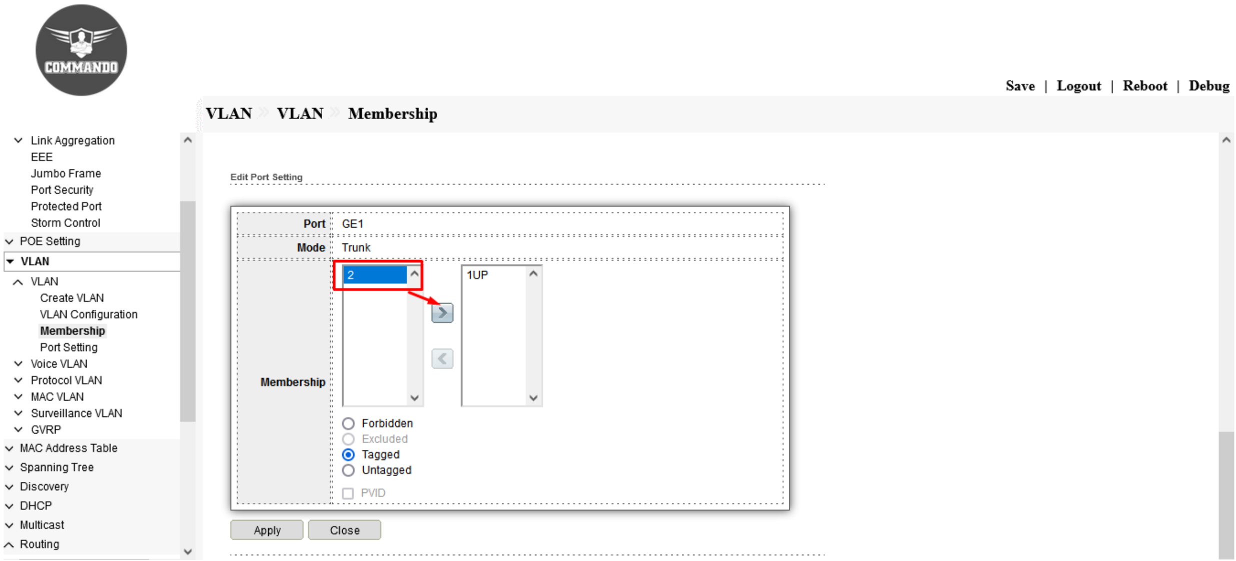
Step 3: Configuration Interface connected to Other L3 device and assign Created VLAN in access mode.



Membership Table

	Entry	Port	Mode	Administrative VLAN	Operational VLAN
●	1	GE1	Trunk	1UP	1UP
○	2	GE2	Trunk	1UP	1UP
○	3	GE3	Trunk	1UP	1UP
○	4	GE4	Trunk	1UP	1UP
○	5	GE5	Trunk	1UP	1UP
○	6	GE6	Trunk	1UP	1UP
○	7	GE7	Trunk	1UP	1UP
○	8	GE8	Trunk	1UP	1UP
○	9	GE9	Trunk	1UP	1UP
○	10	GE10	Trunk	1UP	1UP
○	11	GE11	Trunk	1UP	1UP
○	12	GE12	Trunk	1UP	1UP
○	13	GE13	Trunk	1UP	1UP
○	14	GE14	Trunk	1UP	1UP
○	15	GE15	Trunk	1UP	1UP
○	16	GE16	Trunk	1UP	1UP

Fig 11.3.6 Selecting Interface to assign new VLAN membership page

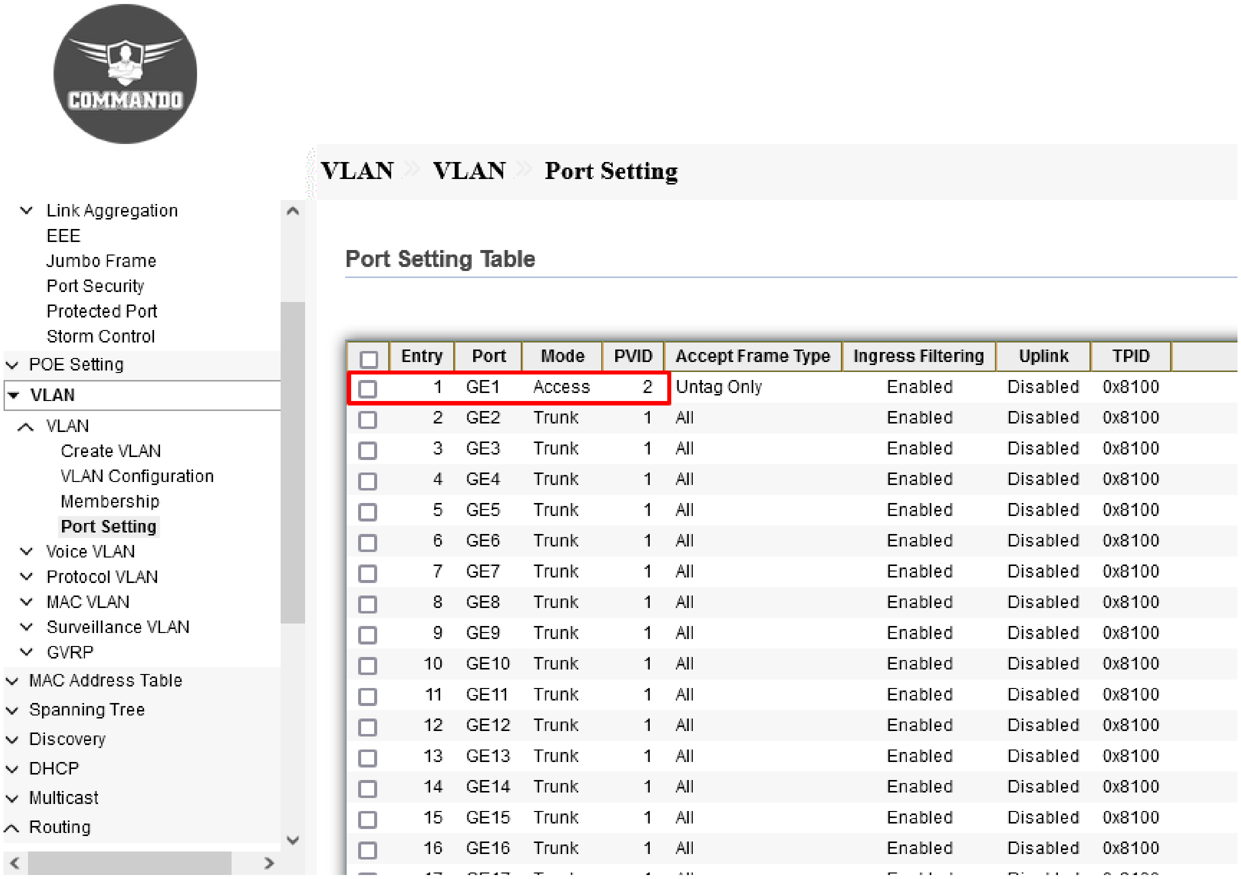


Edit Port Setting

Port	GE1
Mode	Trunk
Membership	2 → 1UP ○ Forbidden ○ Excluded ● Tagged ○ Untagged □ PVID

Fig 11.3.7 Edit Port setting for new VLAN membership page

Note: Remove VLAN 1 from port membership.

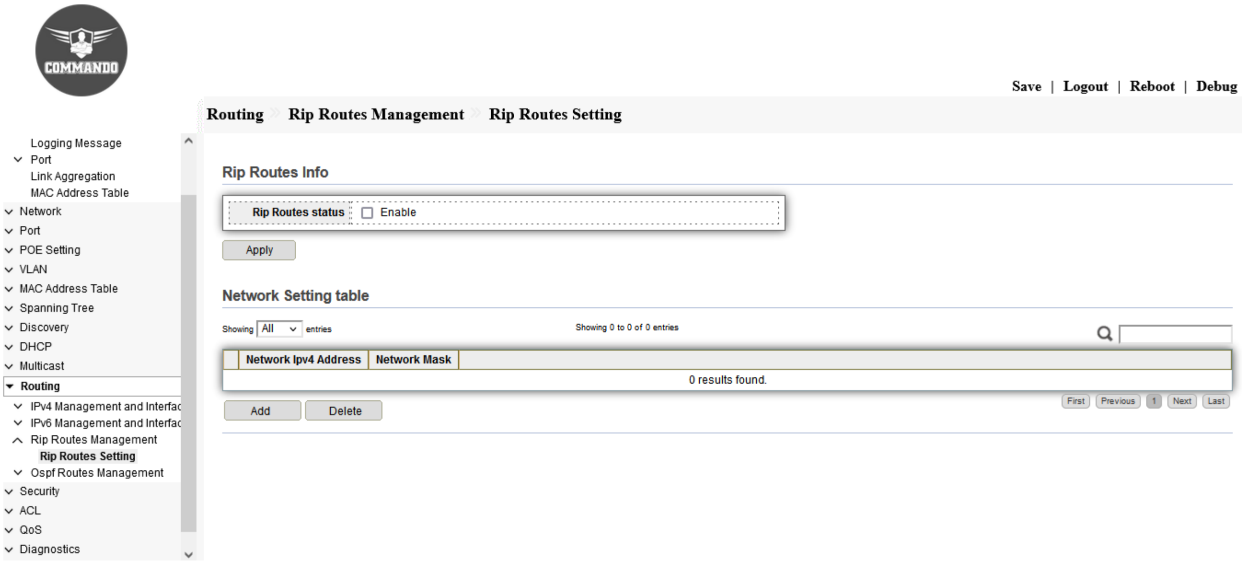


Port Setting Table

□	Entry	Port	Mode	PVID	Accept Frame Type	Ingress Filtering	Uplink	TPID
□	1	GE1	Access	2	Untag Only	Enabled	Disabled	0x8100
□	2	GE2	Trunk	1	All	Enabled	Disabled	0x8100
□	3	GE3	Trunk	1	All	Enabled	Disabled	0x8100
□	4	GE4	Trunk	1	All	Enabled	Disabled	0x8100
□	5	GE5	Trunk	1	All	Enabled	Disabled	0x8100
□	6	GE6	Trunk	1	All	Enabled	Disabled	0x8100
□	7	GE7	Trunk	1	All	Enabled	Disabled	0x8100
□	8	GE8	Trunk	1	All	Enabled	Disabled	0x8100
□	9	GE9	Trunk	1	All	Enabled	Disabled	0x8100
□	10	GE10	Trunk	1	All	Enabled	Disabled	0x8100
□	11	GE11	Trunk	1	All	Enabled	Disabled	0x8100
□	12	GE12	Trunk	1	All	Enabled	Disabled	0x8100
□	13	GE13	Trunk	1	All	Enabled	Disabled	0x8100
□	14	GE14	Trunk	1	All	Enabled	Disabled	0x8100
□	15	GE15	Trunk	1	All	Enabled	Disabled	0x8100
□	16	GE16	Trunk	1	All	Enabled	Disabled	0x8100

Fig 11.3.8 New VLAN membership Table page

Step 4: Enable RIP



Routing » Rip Routes Management » Rip Routes Setting

Rip Routes Info

Rip Routes status ☐ Enable

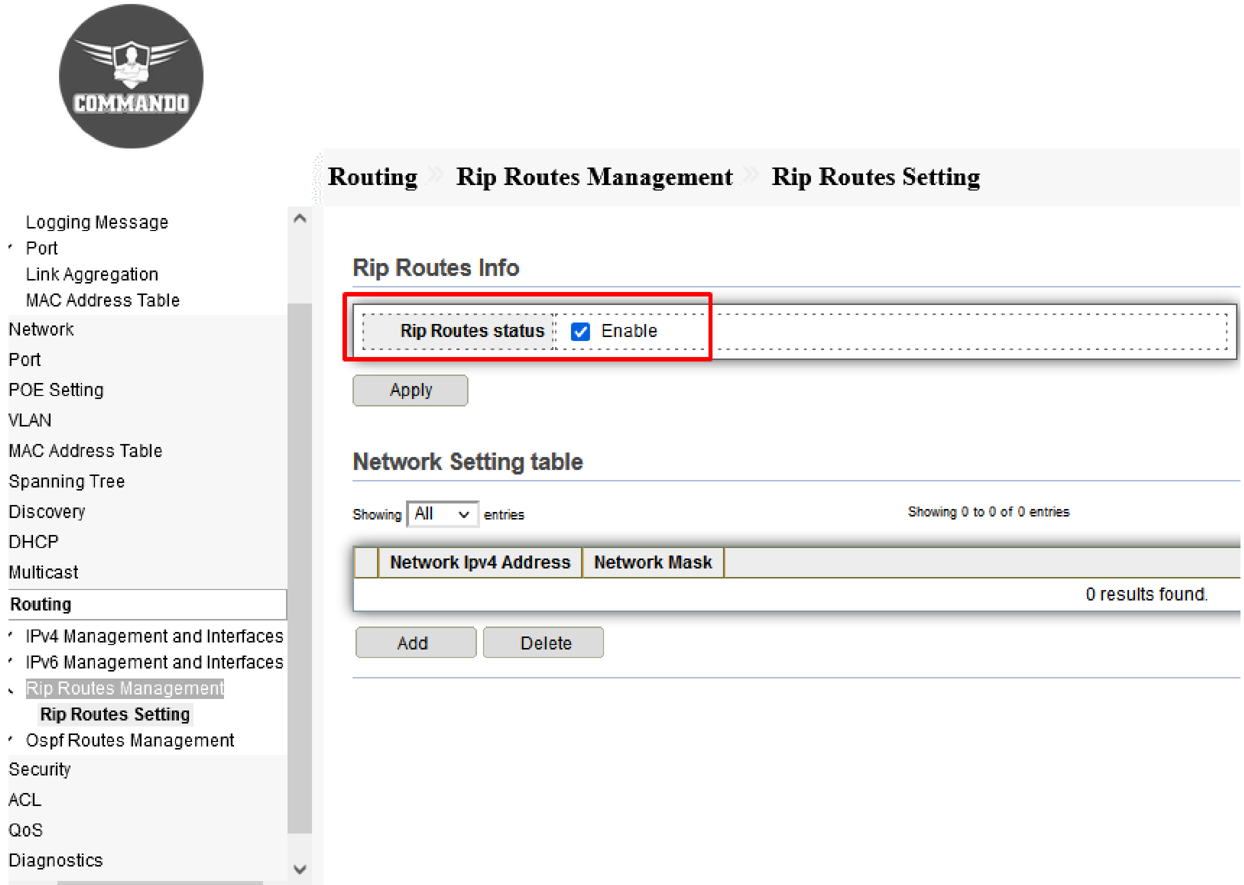
Network Setting table

Showing All entries

Showing 0 to 0 of 0 entries

	Network Ipv4 Address	Network Mask
0 results found.		

Fig 11.3.9 Default RIP route setting Page



Routing » Rip Routes Management » Rip Routes Setting

Rip Routes Info

Rip Routes status ☑ Enable

Network Setting table

Showing All entries

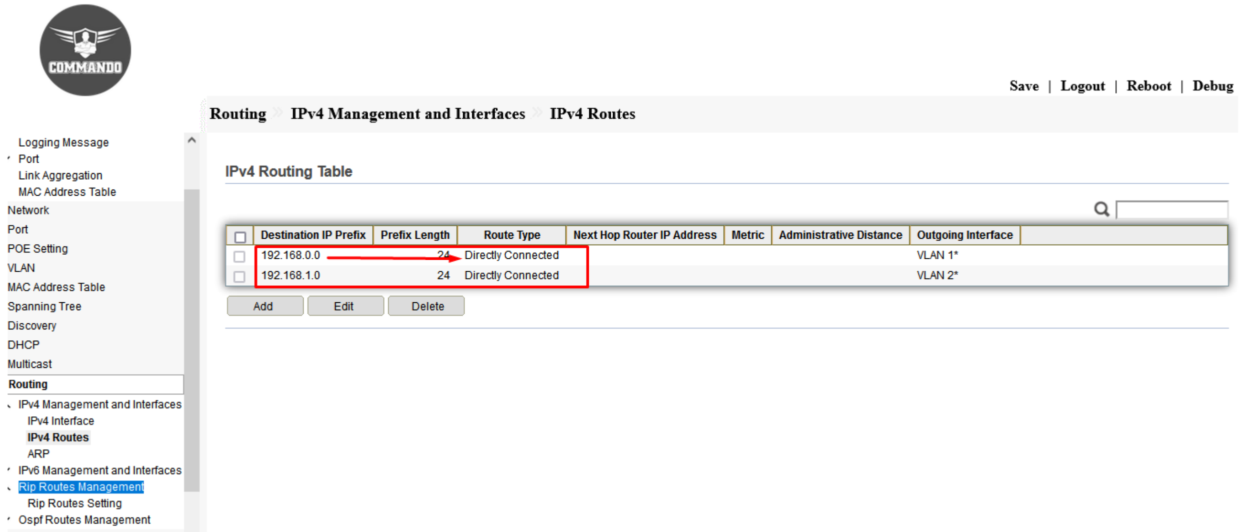
Showing 0 to 0 of 0 entries

	Network Ipv4 Address	Network Mask
0 results found.		

Fig 11.3.10 Enabling RIP in Switch Page

Note: After Enabling RIP then only you can add the connected network’s ID in the RIP.

Step 5: Add connected Network ID to RIP

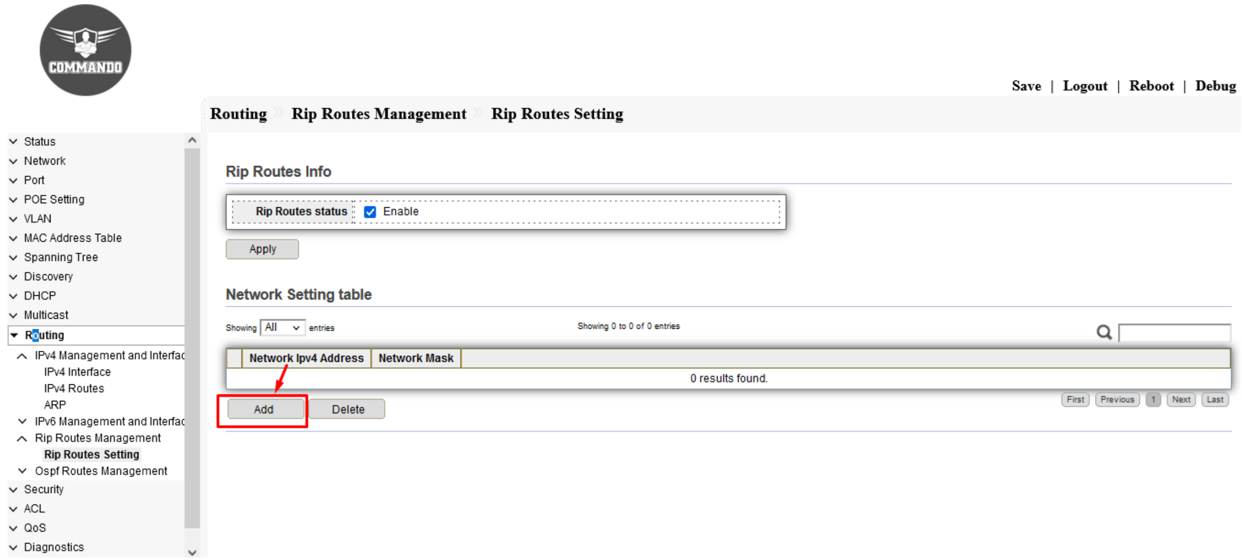


Routing > IPv4 Management and Interfaces > IPv4 Routes

IPv4 Routing Table

□	Destination IP Prefix	Prefix Length	Route Type	Next Hop Router IP Address	Metric	Administrative Distance	Outgoing Interface
□	192.168.0.0	24	Directly Connected				VLAN 1*
□	192.168.1.0	24	Directly Connected				VLAN 2*

Fig 11.3.11 To know connected Network in switch page



Routing > Rip Routes Management > Rip Routes Setting

Rip Routes Info

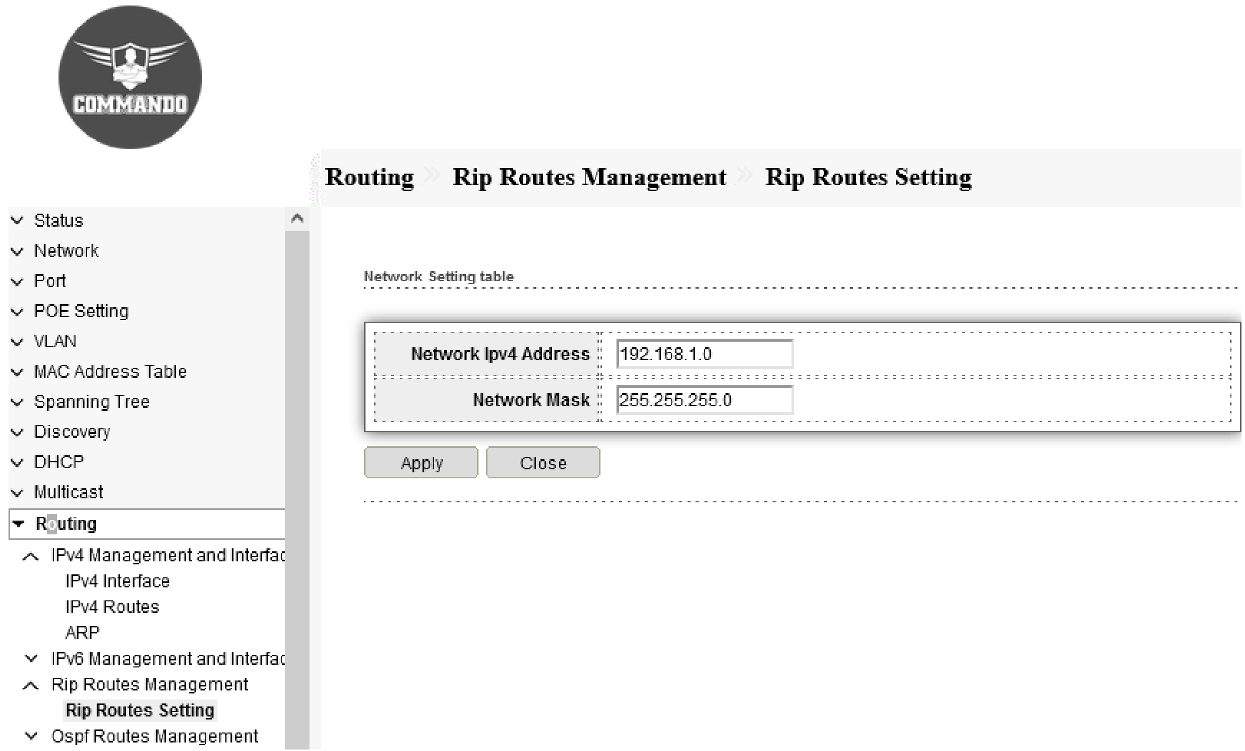
Rip Routes status ☑ Enable

Network Setting table

Showing All entries   Showing 0 to 0 of 0 entries

Network Ipv4 Address	Network Mask
0 results found.	

Fig 11.3.12 Add Connected Network ID in RIP Process Page

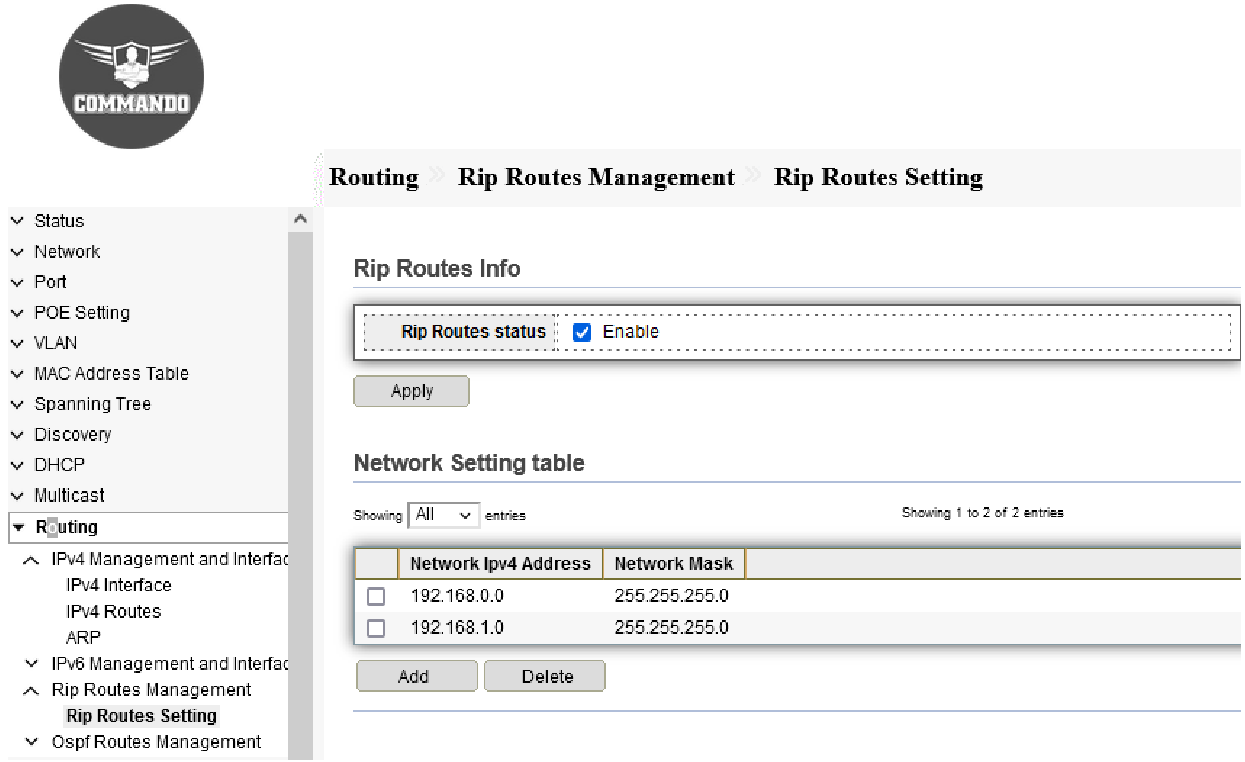


Routing » Rip Routes Management » Rip Routes Setting

Network Setting table

Network Ipv4 Address	192.168.1.0
Network Mask	255.255.255.0

Fig 11.3.13 Network ID setting in RIP Page



Routing » Rip Routes Management » Rip Routes Setting

Rip Routes Info

Rip Routes status ☑ Enable

Network Setting table

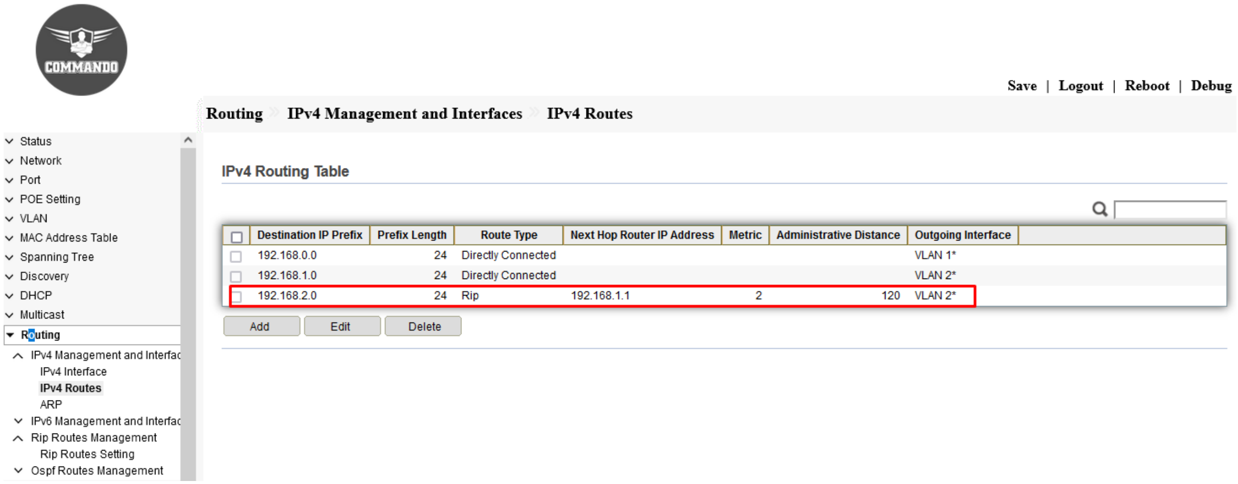
Showing All entries

Showing 1 to 2 of 2 entries

	Network Ipv4 Address	Network Mask
□	192.168.0.0	255.255.255.0
□	192.168.1.0	255.255.255.0

Fig 11.3.14 Network ID setting Table page

Step 6: Check RIP Route



IPv4 Routing Table

□	Destination IP Prefix	Prefix Length	Route Type	Next Hop Router IP Address	Metric	Administrative Distance	Outgoing Interface
□	192.168.0.0	24	Directly Connected				VLAN 1*
□	192.168.1.0	24	Directly Connected				VLAN 2*
□	192.168.2.0	24	Rip	192.168.1.1	2	120	VLAN 2*

Fig 11.3.15 IPv4 Routing Table page

11.4.1 OSFP Routes Management

OSPF is an Interior Gateway Protocol (IGP) is link-state Interior Gateway Protocol (IGP) developed by the Internet Engineering Task Force (IETF). OSPF Version 2 as defined in RFC 2328 is designed for IPv4. OSPF constructs network topologies and routing tables by dividing an Autonomous System (AS) into one or more logical areas, Advertising routes by sending Link State Advertisements (LSAs), Exchanging OSPF packets between devices in an OSPF area to synchronize routing information.

In an OSPF network, each router generates a link-state advertisement (LSA) based on its surrounding network topology and transmits this LSA in an update packet to other routers in the network. The OSPF works by Exchanging Hello packets to establish OSPF neighbor relationships, Flooding LSAs to advertise link state information form their LSDBs to create a weighted, directed graph, Using an SPF algorithm to calculate and generate routes, Maintaining and updating routing tables by any topology changes.

OSPF has five types of packets:

Hello packet

Hello packets are sent periodically by OSPF-enabled interfaces to discover and maintain OSPF neighbor relationships. These packets contain information about the Designated Router (DR), Backup Designated Router (BDR), and known neighbors on the same network.

Database Description (DD) packet

After an adjacency is established, it uses DD packets to describe their own LSDBs for LSDB synchronization. A DD packet contains the header of each LSA in an LSDB and is the summary of all LSAs.

Link State Request (LSR) packet

After DD packets exchanged, they send LSR packets to request each other's LSAs. The LSR packets contain the summaries of the requested LSAs.

Link State Update (LSU) packet

It uses an LSU packet to transmit LSAs requested by its neighbors or to flood its own updated LSAs. The LSU packet contains a set of LSAs.

Link State Acknowledgment Packets

These packet to make the flooding of link state advertisements reliable, flooded advertisements are explicitly acknowledged. This acknowledgment is accomplished through the sending and receiving of Link State Acknowledgment packets.

OSPF Network Types:

Broadcast

Networks using Ethernet or Fiber Distributed Data Interface (FDDI) at the link layer are broadcast networks by default.

Non-Broadcast Multi-Access (NBMA)

Networks using frame relay (FR) or X.25 at the link layer are NBMA networks by default.

Point-to-Multipoint (P2MP)

No networks are P2MP networks by default, regardless of the link layer protocol used by the network. Networks may be changed to P2MP networks. Typical practice is to change partial-meshed NBMA networks to P2MP networks.

Point-to-Point (P2P)

Networks using Point-to-Point Protocol (PPP), High-Level Data Link Control (HDLC), or Link Access Procedure Balanced (LAPB) at the link layer are P2P networks.

Common terms used in OSPF Process:

Router ID

A router ID is a 32-bit integer, which uniquely identifies an OSPF router in an AS. Each OSPF router has a router ID. A router ID is in the same format as an IP address. To ensure OSPF stability in actual network deployment, it is recommended that the IP address of a loopback interface on a router be used as the router ID of this router. A router ID can be manually configured or automatically selected by a router. If no router ID is manually configured for a router, the router automatically selects an interface IP address as its router ID.

The router ID selection rules are as follows:

1. The router preferentially selects the largest IP address among loopback interface addresses as the router ID.

2. If no loopback interface is configured, the router selects the largest IP address among interface addresses as the router ID.

3. A switch can obtain a router ID again only after a router ID is reconfigured for the switch or an OSPF router ID is reconfigured and the OSPF process restarts.

DR/BDR Election process:

DR election rules are used to elect a DR only when routers with different router IDs or configured with different DR priorities are started at the same time. The election rules are that the device with the highest DR priority is elected as DR and the device with the second highest DR priority as BDR. A router with a DR priority of 0 can be a DR other only. If routers have the same DR priority, the router with the greatest router ID is elected as the DR, the router with the second greatest router ID becomes the BDR, and other routers are DR others.

Area

There are five types of OSPF areas: Backbone area (area 0), Standard area, Stub area, totally stubby area, and not-so-stubby area (NSSA).

OSPF Route

There are six types of route types like Intra-Area (O), Inter-Area (O IA), External Type 1 (E1), NSSA Type 1 (N1), External Type 2 (E2), NSSA Type 2 (N2) .

OSPF authentication

OSPF supports null, simple password authentication and MD5 authentication. OSPF MD5 authentication can be configured globally or by interface. Plain text & MD5 authentication among neighboring routers within an area is supported: Configurable routing interface parameters include interface output cost, re-transmission interval, interface transmit delay, router priority, router dead & hello intervals, & authentication key.

Steps to Configure OSPF in C3000 with Web-GUI

1. Create any VLAN for routing purpose from 2 to 4094.

2. Assign IP address to created VLAN as per other connected router/switch IP address as they required to be in same network.

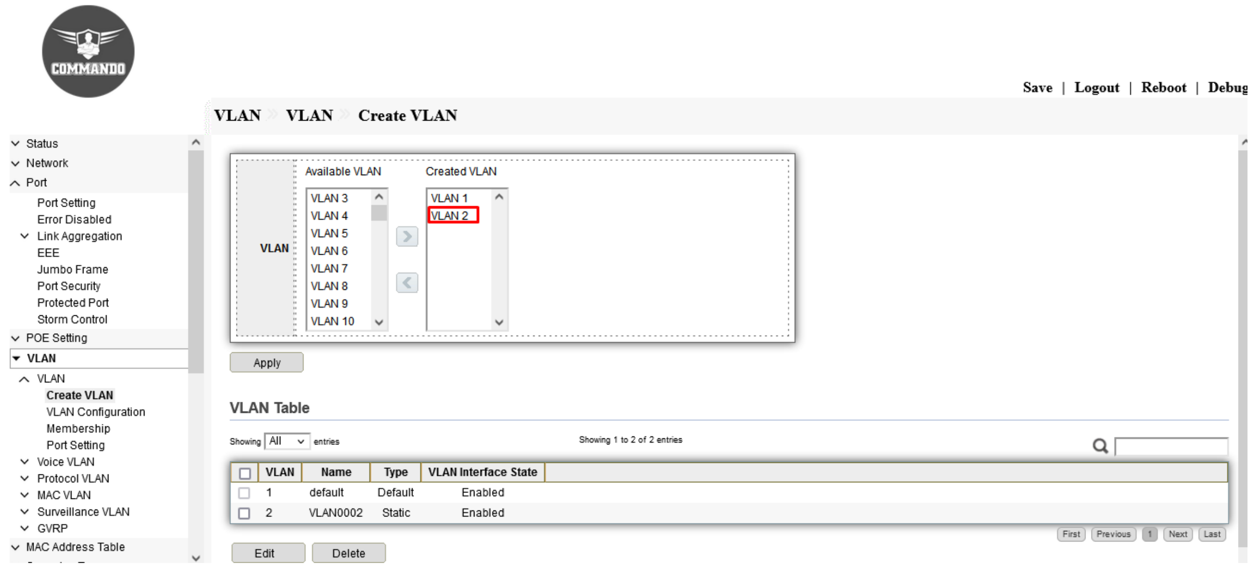
3. Go to Interface where you connected L3 Switch/Router and assign Created VLAN in access mode.

4. Enable OSPF.

5. Add connected Network ID to OSPF

6. Check OSPF Route

Step 1 : Create VLAN for routing purpose



VLAN » VLAN » Create VLAN

VLAN Table

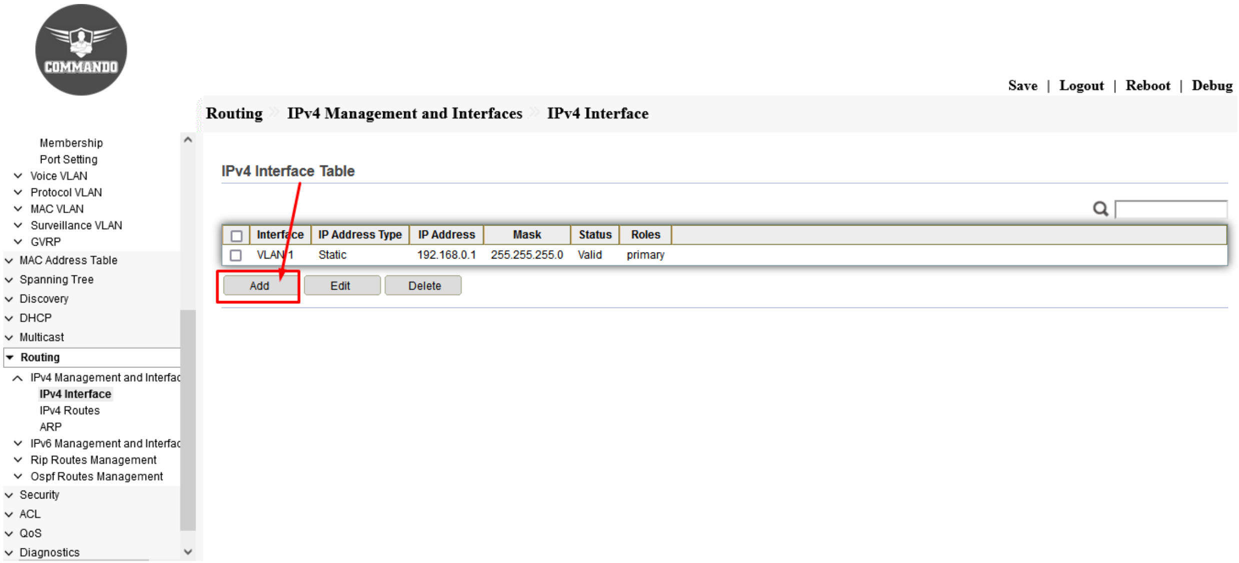
Showing All entries

Showing 1 to 2 of 2 entries

□	VLAN	Name	Type	VLAN Interface State
□	1	default	Default	Enabled
□	2	VLAN0002	Static	Enabled

Fig 11.4.1 Creating VLAN 2 Page

Step 2: Assign IP address to created VLAN

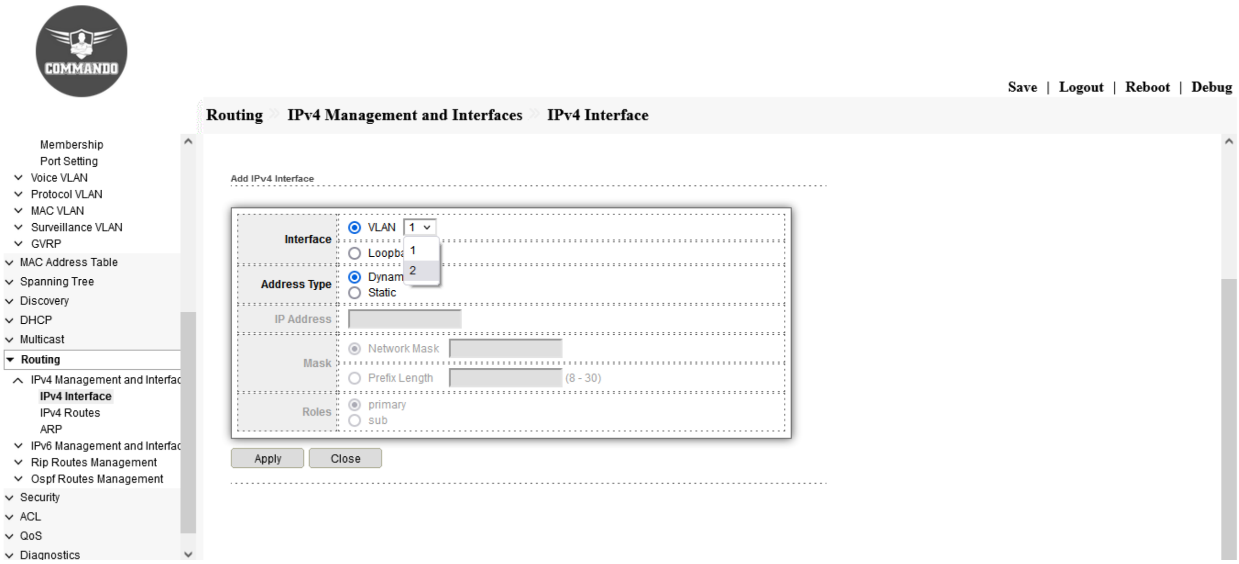


Routing » IPv4 Management and Interfaces » IPv4 Interface

IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary

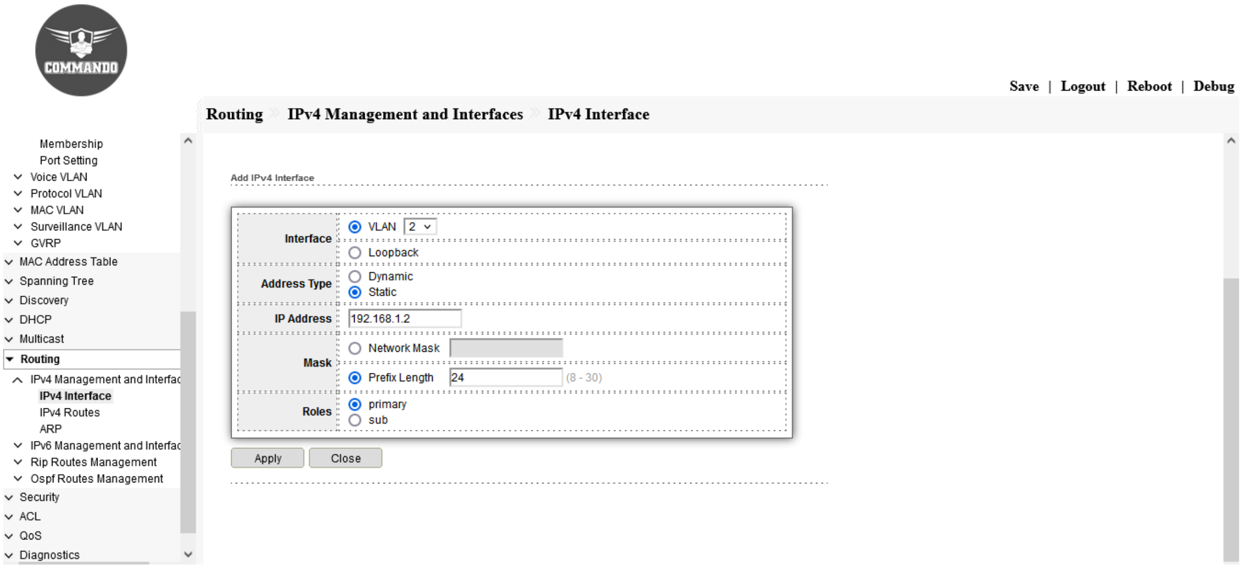
Fig 11.4.2 Add IP address for VLAN Page



Add IPv4 Interface

Interface	● VLAN 1 (1, 2) ○ Loopba
Address Type	● Dynam ○ Static
IP Address	
Mask	● Network Mask ○ Prefix Length (8 - 30)
Roles	● primary ○ sub

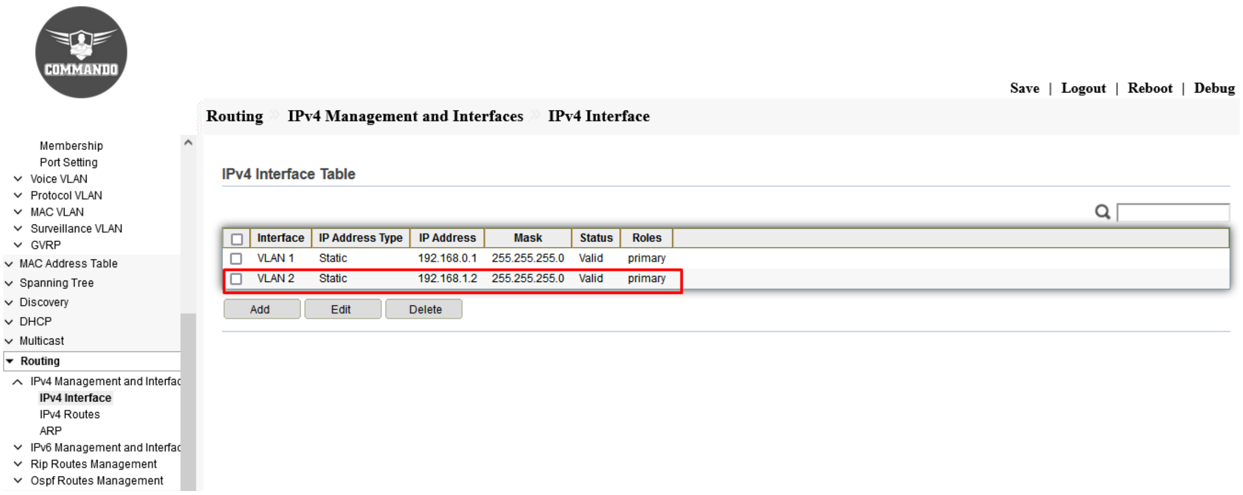
Fig 11.4.3 Selecting VLAN for providing IP address Page



Add IPv4 Interface

Interface	● VLAN 2 ○ Loopback
Address Type	○ Dynamic ● Static
IP Address	192.168.1.2
Mask	○ Network Mask ● Prefix Length 24 (8 - 30)
Roles	● primary ○ sub

Fig 11.4.4 Add Static VLAN IP address with subnet mask Page

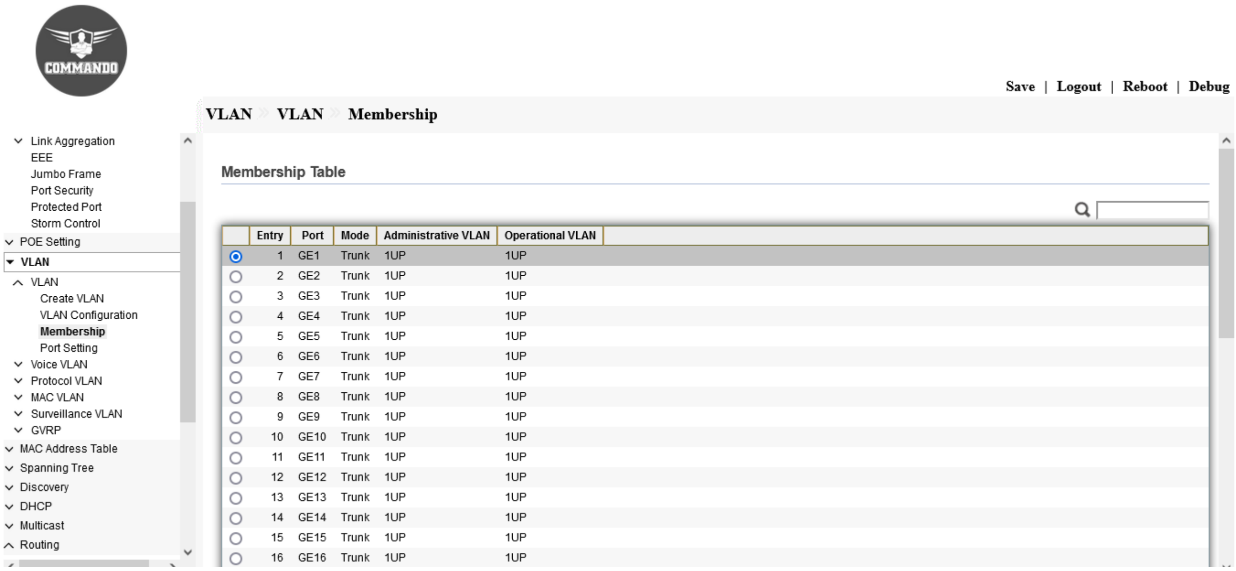


IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary
□	VLAN 2	Static	192.168.1.2	255.255.255.0	Valid	primary

Fig 11.4.5 Assign IP address to created VLAN Page

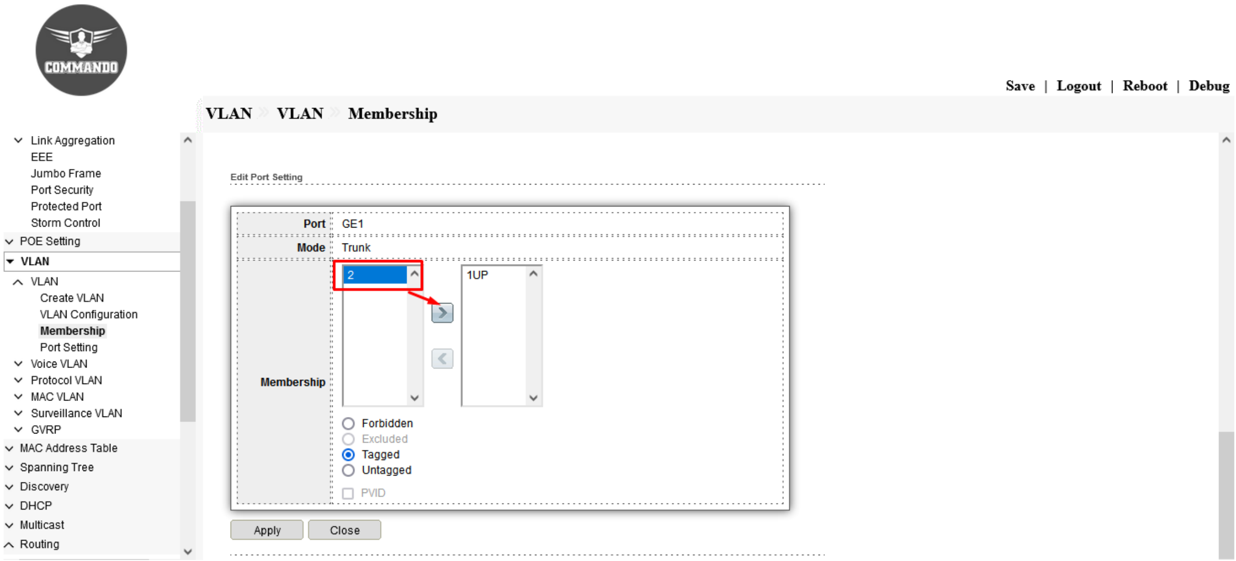
Step 3: Configuration Interface connected to Other L3 device and assign Created VLAN in access mode.



Membership Table

	Entry	Port	Mode	Administrative VLAN	Operational VLAN
●	1	GE1	Trunk	1UP	1UP
○	2	GE2	Trunk	1UP	1UP
○	3	GE3	Trunk	1UP	1UP
○	4	GE4	Trunk	1UP	1UP
○	5	GE5	Trunk	1UP	1UP
○	6	GE6	Trunk	1UP	1UP
○	7	GE7	Trunk	1UP	1UP
○	8	GE8	Trunk	1UP	1UP
○	9	GE9	Trunk	1UP	1UP
○	10	GE10	Trunk	1UP	1UP
○	11	GE11	Trunk	1UP	1UP
○	12	GE12	Trunk	1UP	1UP
○	13	GE13	Trunk	1UP	1UP
○	14	GE14	Trunk	1UP	1UP
○	15	GE15	Trunk	1UP	1UP
○	16	GE16	Trunk	1UP	1UP

Fig 11.4.6 Selecting Interface to assign new VLAN membership page

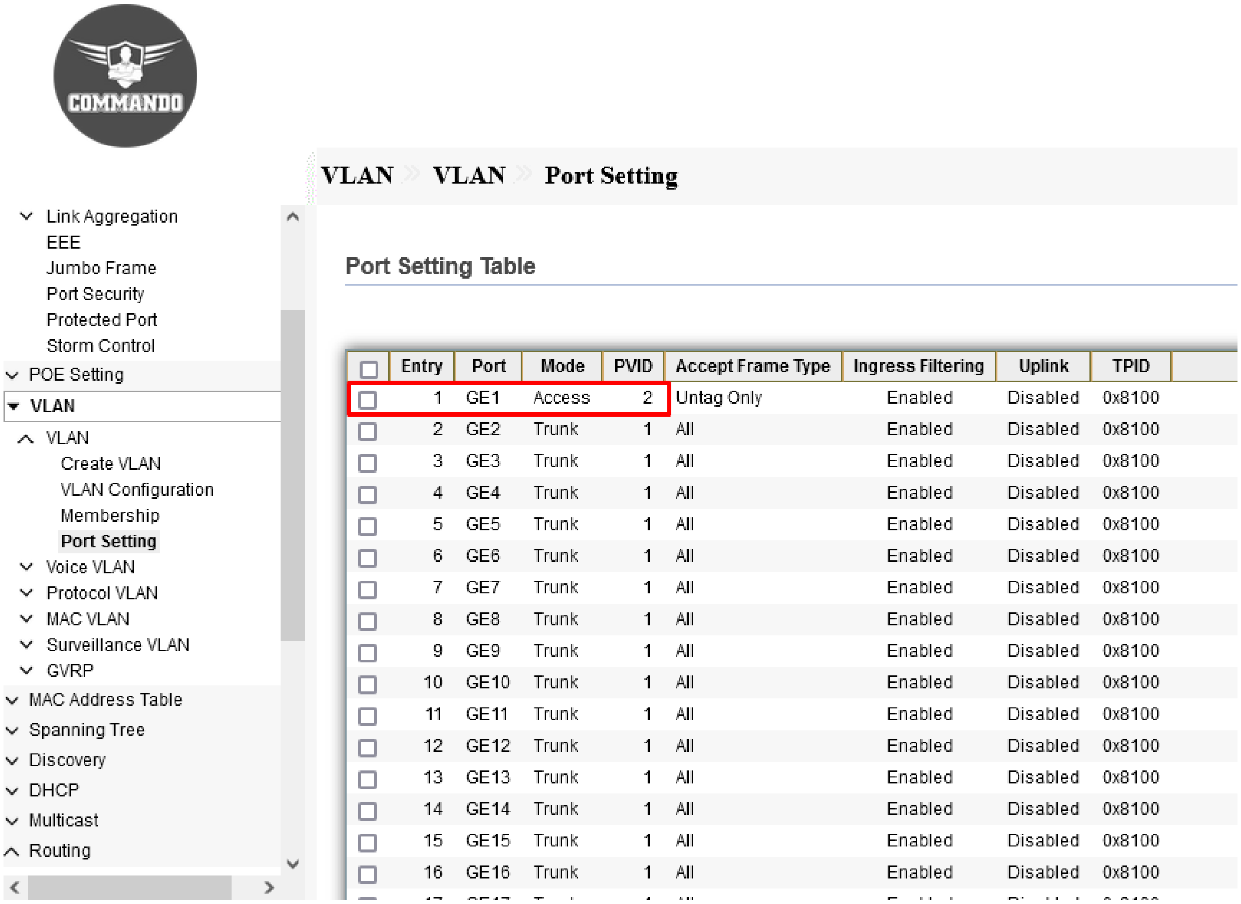


Edit Port Setting

Port	GE1
Mode	Trunk
Membership	2 → 1UP ○ Forbidden ○ Excluded ● Tagged ○ Untagged ☐ PVID

Fig 11.4.7 Edit Port setting for new VLAN membership page

Note: Remove VLAN 1 from access.

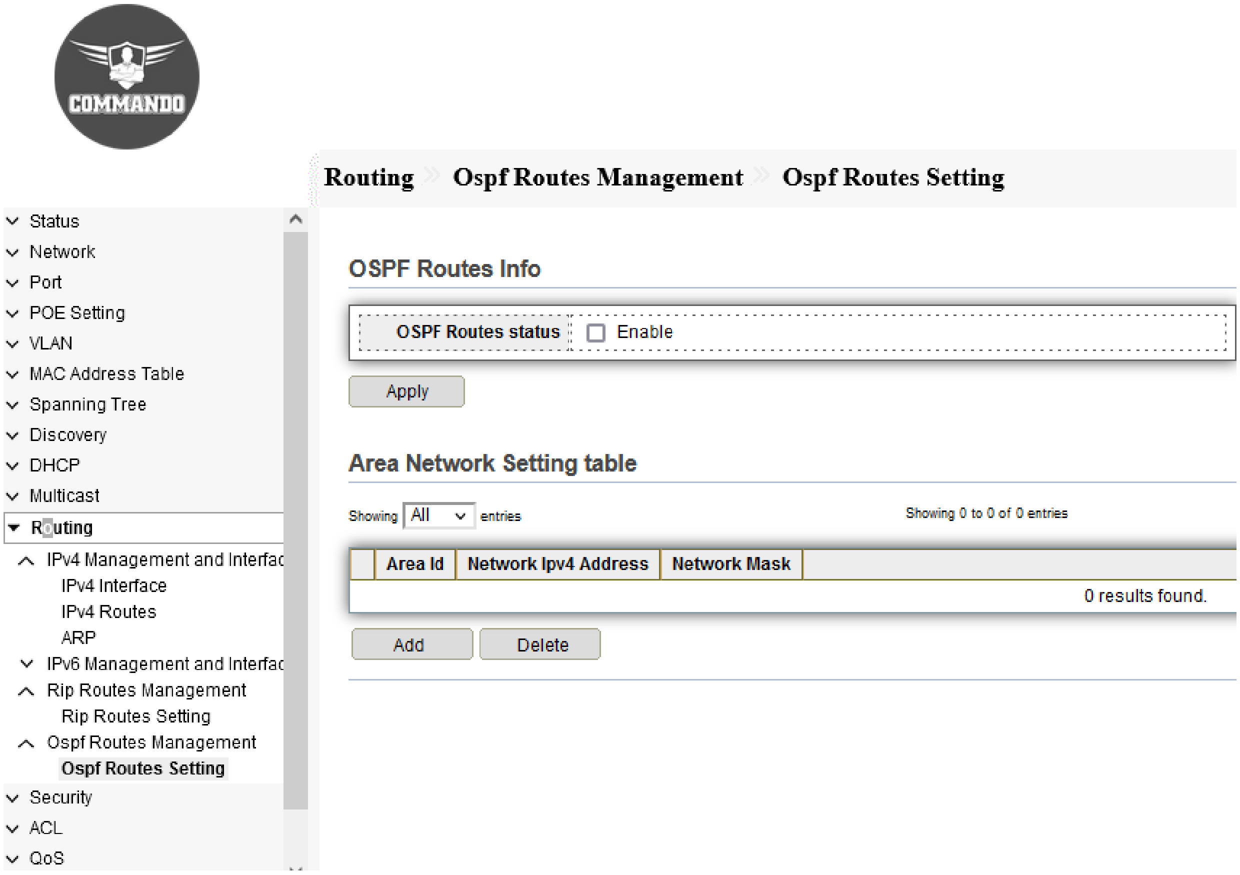


Port Setting Table

☐	Entry	Port	Mode	PVID	Accept Frame Type	Ingress Filtering	Uplink	TPID
☐	1	GE1	Access	2	Untag Only	Enabled	Disabled	0x8100
☐	2	GE2	Trunk	1	All	Enabled	Disabled	0x8100
☐	3	GE3	Trunk	1	All	Enabled	Disabled	0x8100
☐	4	GE4	Trunk	1	All	Enabled	Disabled	0x8100
☐	5	GE5	Trunk	1	All	Enabled	Disabled	0x8100
☐	6	GE6	Trunk	1	All	Enabled	Disabled	0x8100
☐	7	GE7	Trunk	1	All	Enabled	Disabled	0x8100
☐	8	GE8	Trunk	1	All	Enabled	Disabled	0x8100
☐	9	GE9	Trunk	1	All	Enabled	Disabled	0x8100
☐	10	GE10	Trunk	1	All	Enabled	Disabled	0x8100
☐	11	GE11	Trunk	1	All	Enabled	Disabled	0x8100
☐	12	GE12	Trunk	1	All	Enabled	Disabled	0x8100
☐	13	GE13	Trunk	1	All	Enabled	Disabled	0x8100
☐	14	GE14	Trunk	1	All	Enabled	Disabled	0x8100
☐	15	GE15	Trunk	1	All	Enabled	Disabled	0x8100
☐	16	GE16	Trunk	1	All	Enabled	Disabled	0x8100

Fig 11.4.8 New VLAN membership Table page

Step 4: Enable OSPF



Routing » Ospf Routes Management » Ospf Routes Setting

OSPF Routes Info

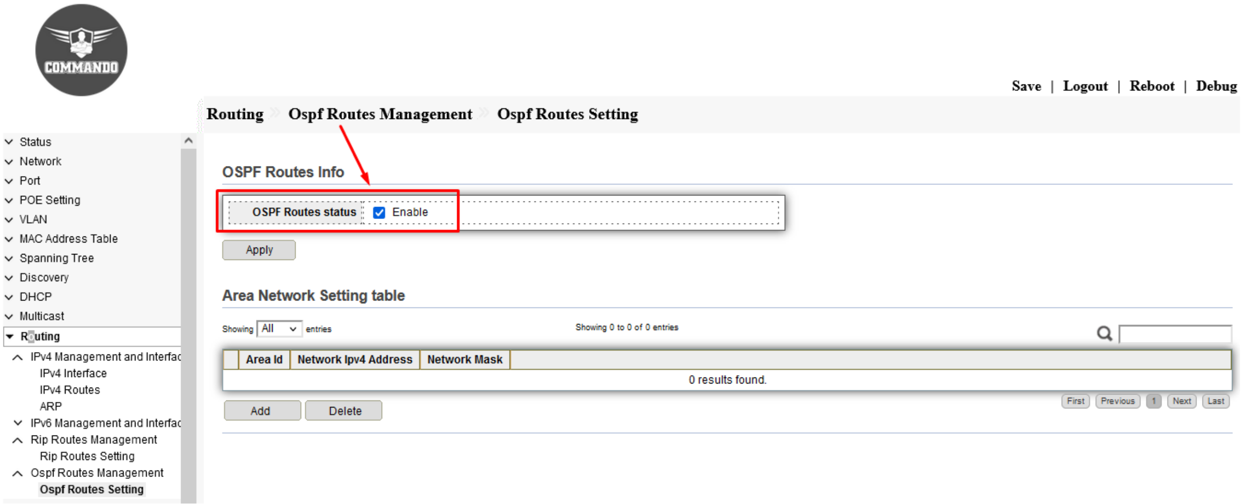
OSPF Routes status □ Enable

Area Network Setting table

Showing All entries Showing 0 to 0 of 0 entries

Area Id	Network Ipv4 Address	Network Mask
0 results found.		

Fig 11.4.9 Default OSPF route setting Page



Routing » Ospf Routes Management » Ospf Routes Setting

OSPF Routes Info

OSPF Routes status ☑ Enable

Area Network Setting table

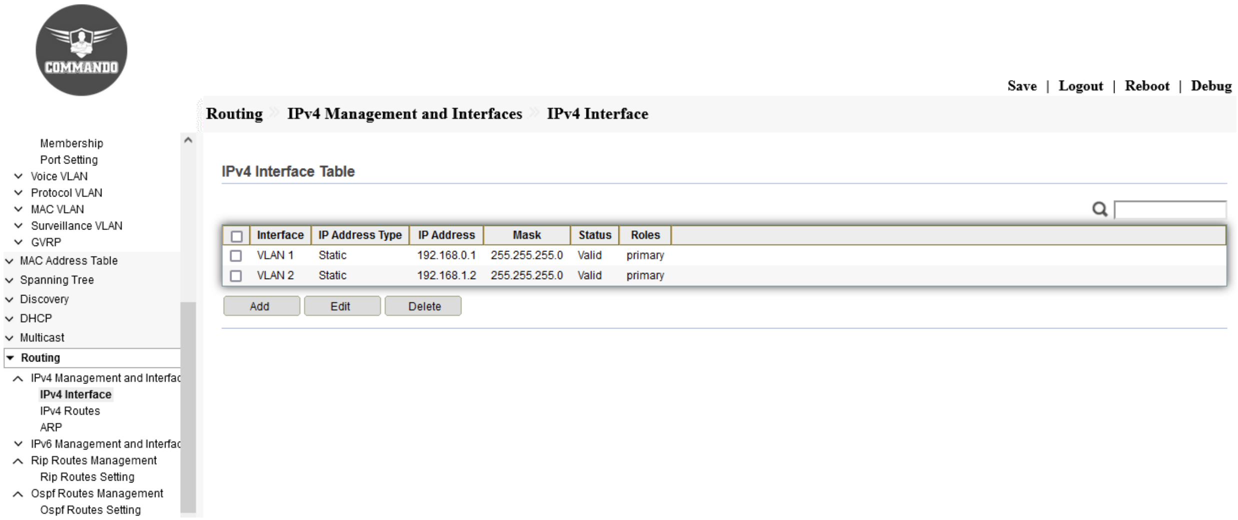
Showing All entries Showing 0 to 0 of 0 entries

Area Id	Network Ipv4 Address	Network Mask
0 results found.		

Fig 11.4.10 Enabling OSPF in Switch Page

Note: After Enabling OSPF then only you can add the connected network’s ID in the OSPF Process.

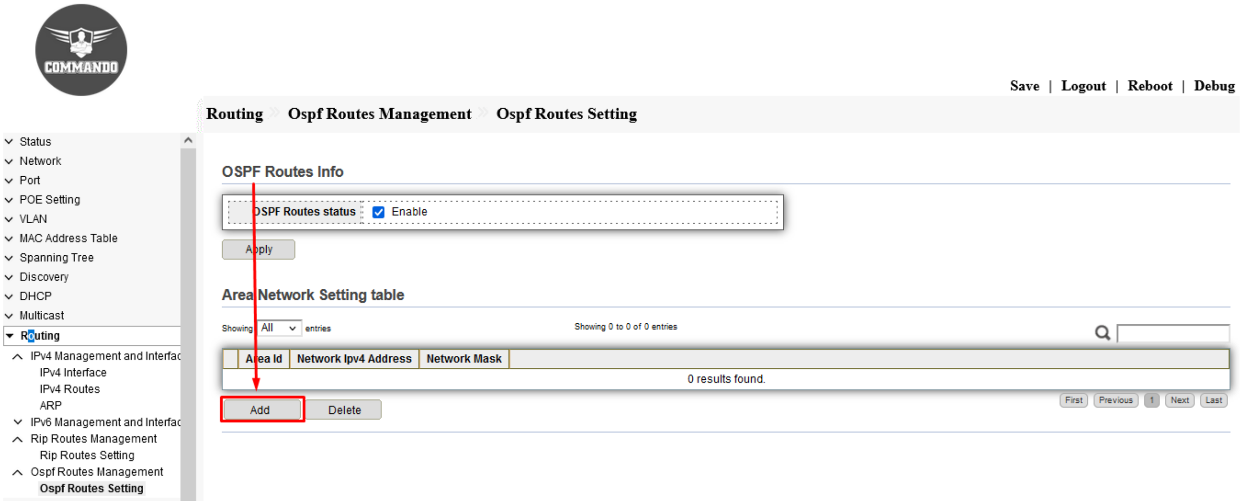
Step 5: Add connected Network ID to OSPF



IPv4 Interface Table

□	Interface	IP Address Type	IP Address	Mask	Status	Roles
□	VLAN 1	Static	192.168.0.1	255.255.255.0	Valid	primary
□	VLAN 2	Static	192.168.1.2	255.255.255.0	Valid	primary

Fig 11.4.11 To know connected Network in switch page



OSPF Routes Info

OSPF Routes status ☑ Enable

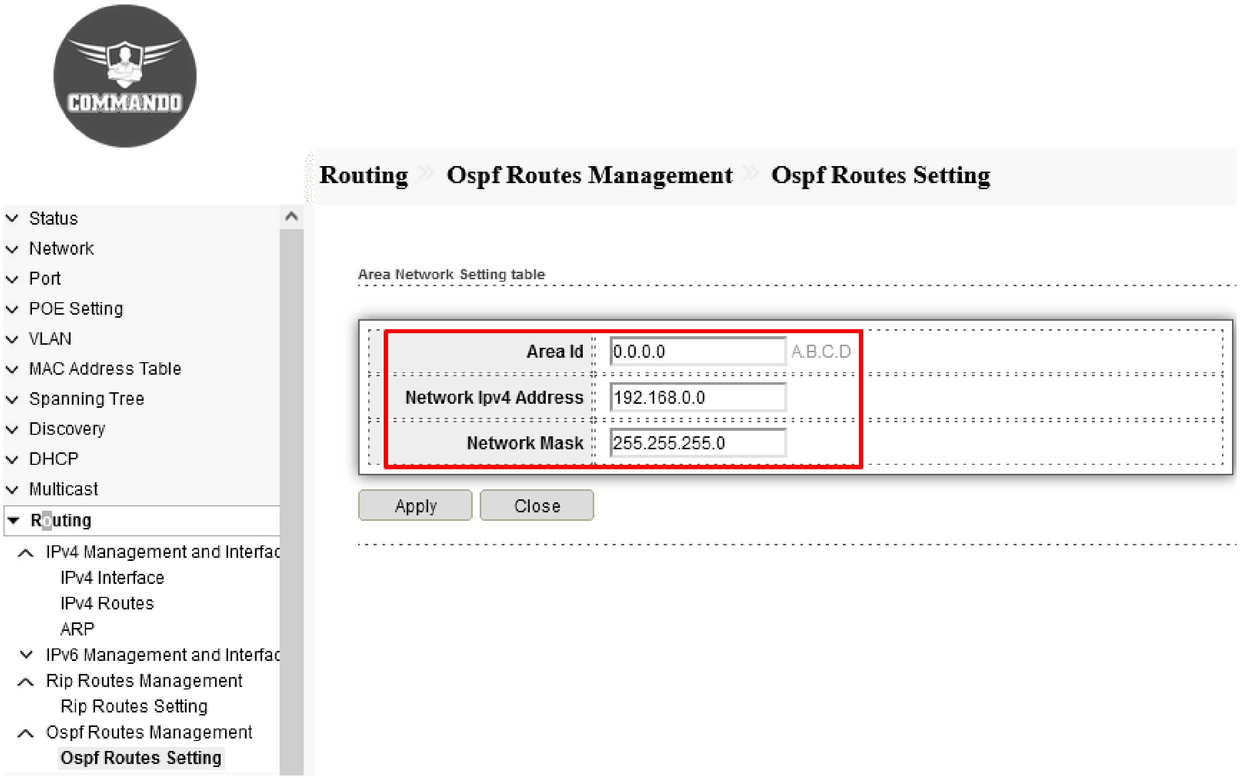
Area Network Setting table

Showing All entries

Showing 0 to 0 of 0 entries

□	Area Id	Network Ipv4 Address	Network Mask
0 results found.			

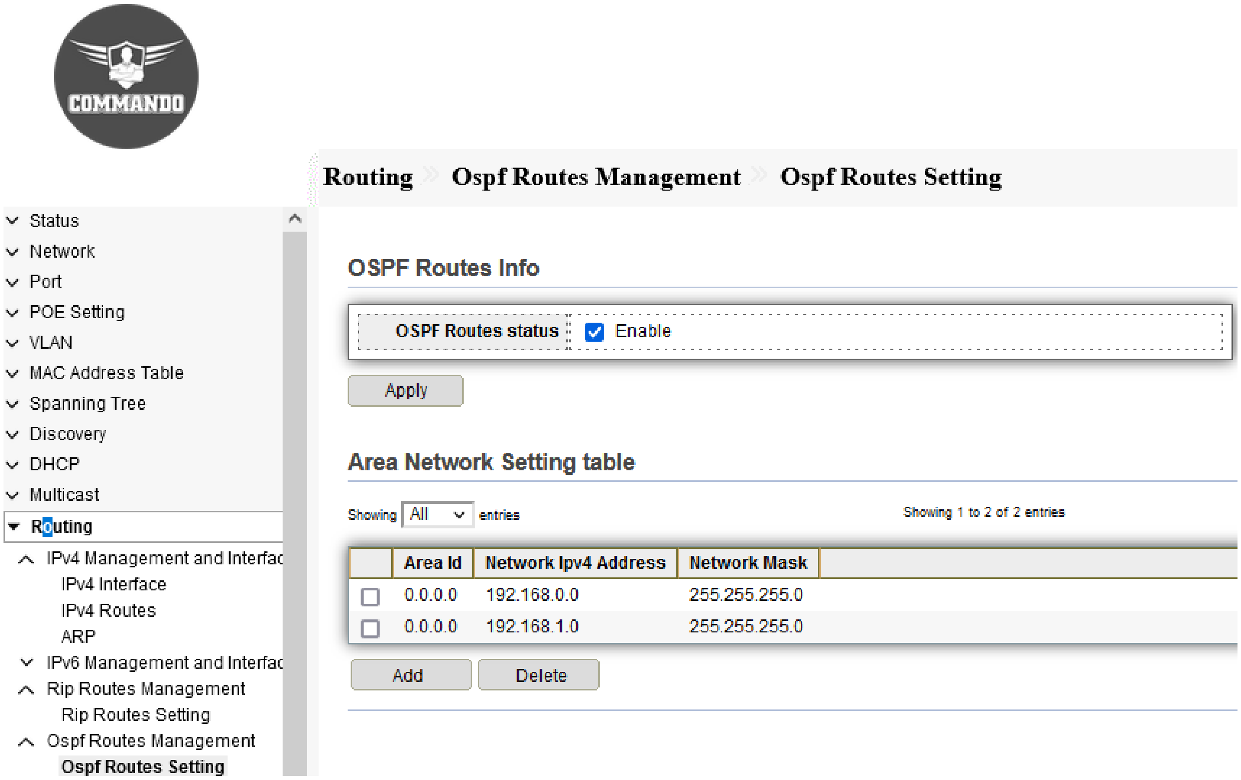
Fig 11.4.12 Add Connected Network ID in OSPF Process Page



Area Network Setting table

Area Id	0.0.0.0	A.B.C.D
Network Ipv4 Address	192.168.0.0	
Network Mask	255.255.255.0	

Fig 11.4.13 Network ID setting in OSPF Page



OSPF Routes Info

OSPF Routes status ☑ Enable

Area Network Setting table

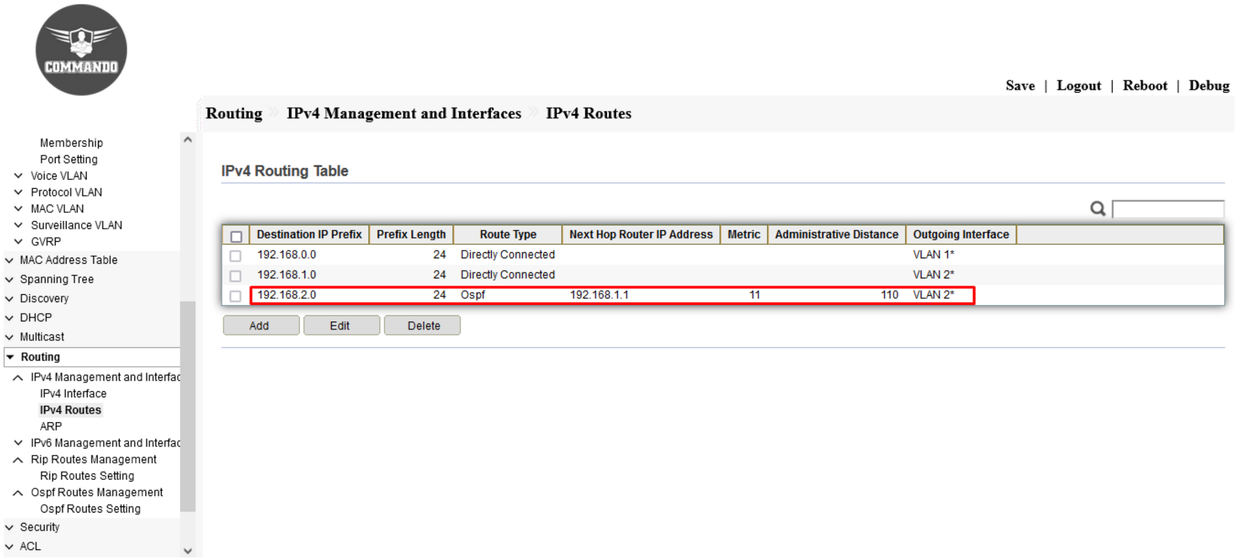
Showing All entries

Showing 1 to 2 of 2 entries

	Area Id	Network Ipv4 Address	Network Mask
□	0.0.0.0	192.168.0.0	255.255.255.0
□	0.0.0.0	192.168.1.0	255.255.255.0

Fig 11.4.14 Network ID setting Table page

Step 6: Check OSPF Route



IPv4 Routing Table

□	Destination IP Prefix	Prefix Length	Route Type	Next Hop Router IP Address	Metric	Administrative Distance	Outgoing Interface
□	192.168.0.0	24	Directly Connected				VLAN 1*
□	192.168.1.0	24	Directly Connected				VLAN 2*
□	192.168.2.0	24	Ospf	192.168.1.1	11	110	VLAN 2*

Fig 11.4.15 OSPF Learned Routing Table page

Chapter 12 Security

Group Header: Security

After clicking Security ✉ drop down arrow, following four corresponding web pages tabs are opened.

RADIUS: This page allow user to add, edit or delete RADIUS server settings and modify default parameter of RADIUS server. Remote Authorization Dial-In User Service (RADIUS) servers provide a centralized 802.1X or MAC-based network access control. The device can be configured to be a RADIUS client that can use a RADIUS server to provide centralized security, and as a RADIUS server.

TACACS+: TACACS (Terminal Access Controller Access Control System plus) that allows a remote access server to forward a user's logon password to an authentication server to determine whether access can be allowed to a given system.

AAA: An AAA server is a server program that handles user requests for access to computer resources and, for an enterprise, provides authentication, authorization, and accounting (AAA) services. Authentication is the process of identifying an individual, usually based on a username and password.

Method List: AAA Method Lists can be used to assign a list of methods for Authentication, Authorization, Accounting. Methods Lists can be used to specify the order. If authentication service is not available or was not successful from the first method, second method can be used and so on.

Login Authentication: You can assign authentication methods to the various management access methods, such as SSH, Telnet, HTTP, and HTTPS. The authentication can be performed locally or on a RADIUS/TACACS+ server. Login authenticate with a username and password that is part of the configuration of the security appliance.

Authentication Manager: You can control access to your network through Switch by using authentication methods such as 802.1X, MAC Based and Web Based.

Property: Authentication manager implementation that delegates responsibility for authentication to one or more authentication providers.

Port Setting: The authentication manager port setting page control all the authentication methods, such as 802.1x, MAC authentication. It also handles network authentication requests and enforces authentication per port basis. The Auth Manager maintains operational data for all port-based network connection.

MAC-Based Local Account: Use MAC-based authentication to authenticate devices based on their physical media access control (MAC) address.

WEB-Based Local Account: WEB-Based Local Account can be defined as the process of verifying someone's identity by using pre-required details (Commonly username and password).

Sessions: Displays the web-based authentication settings for the specified interface.

DoS: A Denial of Service (DoS) attack is an attempt to make a switch unavailable to its users. DoS attacks saturate the switch with external communication requests, so that it cannot respond to legitimate traffic. These attacks usually lead to a switch CPU overload.

Property: A denial-of-service attack is a malicious attempt to overwhelm switch with traffic to disrupt its normal operations. A denial-of-service (DoS) attack occurs when legitimate users are unable to access and send traffic, or other network resources due to the actions of a malicious attacker. DoS attacks can cost an organization both time and money while their resources and services are inaccessible.

Port Setting: You can protect your network against DoS (Denial of Service) attacks from flooding your network with unwanted requests using DoS Protection, block or allow specific client devices to access your network using Access Control, or you can prevent ARP spoofing and ARP attacks using IP & MAC Binding by port setting.

Dynamic ARP Inspection--> Dynamic ARP inspection (DAI) is a security feature that rejects invalid and malicious ARP packets. The feature prevents a class of man-in-the-middle attacks, where an unfriendly station intercepts traffic for other stations by poisoning the ARP caches of its unsuspecting neighbors. The miscreant sends ARP requests or responses mapping another station’s IP address to its own MAC address.

Property: DAI relies on DHCP snooping. DHCP snooping listens to DHCP message exchanges and builds a bindings database of valid tuples (MAC address, IP address, VLAN interface). When DAI is enabled, the switch drops ARP packet if the sender MAC address and sender IP address do not match an entry in the DHCP snooping bindings database.

Statistics: Displays statistics for forwarded, dropped, MAC validation failure, IP packets.

DHCP Snooping: DHCP snooping is a series of techniques applied to improve the security of a DHCP infrastructure. When DHCP servers are allocating IP addresses to the clients on the LAN, DHCP snooping can be configured on LAN switches to prevent malicious or malformed DHCP traffic, or rogue DHCP servers.

Property: DHCP snooping is a security feature which acts as a firewall between untrusted hosts and trusted DHCP servers. Snooping prevents false DHCP responses and monitor clients. They can prevent man-in-the-middle attacks and authenticate host devices.

Statistics: Display DHCP snooping packet statistic which gives information about trusted ports.

Option82 Property: You can use DHCP option 82, also known as the DHCP relay agent information option, to help protect the switch against attacks such as spoofing (forging) of IP addresses and MAC addresses, and DHCP IP address exhaustion in LAN network.

Option82 Circuit ID: The DHCP Option 82 Circuit ID feature enhances validation security.

IP Source Guard: IP Source Guard is a security feature that restricts IP traffic on untrusted Layer 2 ports by filtering traffic based on the DHCP snooping binding database or manually configured IP source bindings. This feature helps prevent IP spoofing attacks when a host tries to spoof and use the IP address of another host.

Port Setting: When IP Source Guard is configured on a port, traffic coming on that port will be dropped unless there is a DHCP snooping entry to allow it.

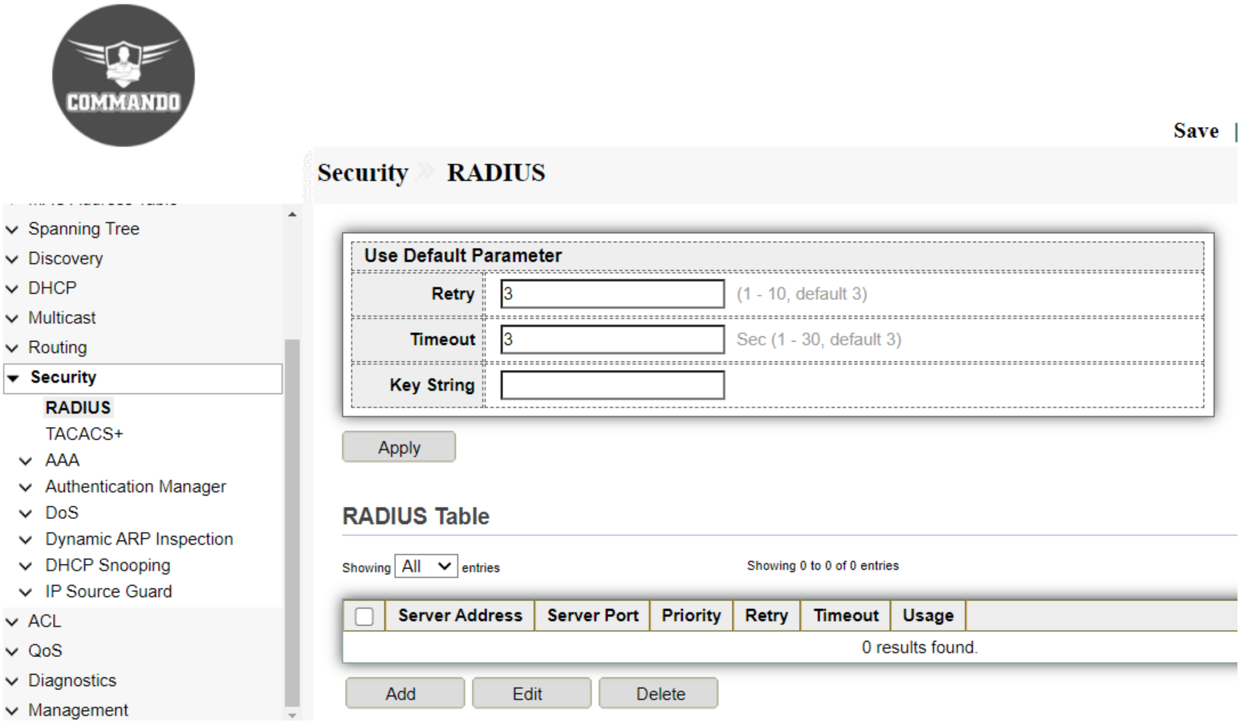
IMPV Binding: This page allow user to add static IP source guard entry and browse all IP source guard entries that learned by DHCP snooping or statically create by user.

Save Database: This page allow user to configure DHCP snooping database which can backup and restore dynamic DHCP snooping entries.

12.1 RADIUS (Remote Authorization Dial-In User Service)

RADIUS is a protocol that was originally designed to authenticate remote users to a dial-in access server. RADIUS is now used in a wide range of authentication scenarios. The device reads the user name and password. The device creates a message called an Access-Request message and sends it to the RADIUS server. Remote Authorization Dial-In User Service (RADIUS) servers provide a centralized 802.1X or MAC-based network access control. The device is a RADIUS client that can use a RADIUS server to provide centralized security.

An organization can establish a Remote Authorization Dial-In User Service (RADIUS) server to provide centralized 802.1X or MAC-based network access control for all its devices. In this way, authentication and authorization can be handled on a single server for all devices in the organization. To configure and view This page allow user to add, edit or delete RADIUS server settings and modify default parameter of RADIUS server. To configure and view RADIUS, click **Security >> RADIUS**



Use Default Parameter

Retry	3	(1 - 10, default 3)
Timeout	3	Sec (1 - 30, default 3)
Key String		

RADIUS Table

Showing All entries   Showing 0 to 0 of 0 entries

□	Server Address	Server Port	Priority	Retry	Timeout	Usage
			0 results found.			

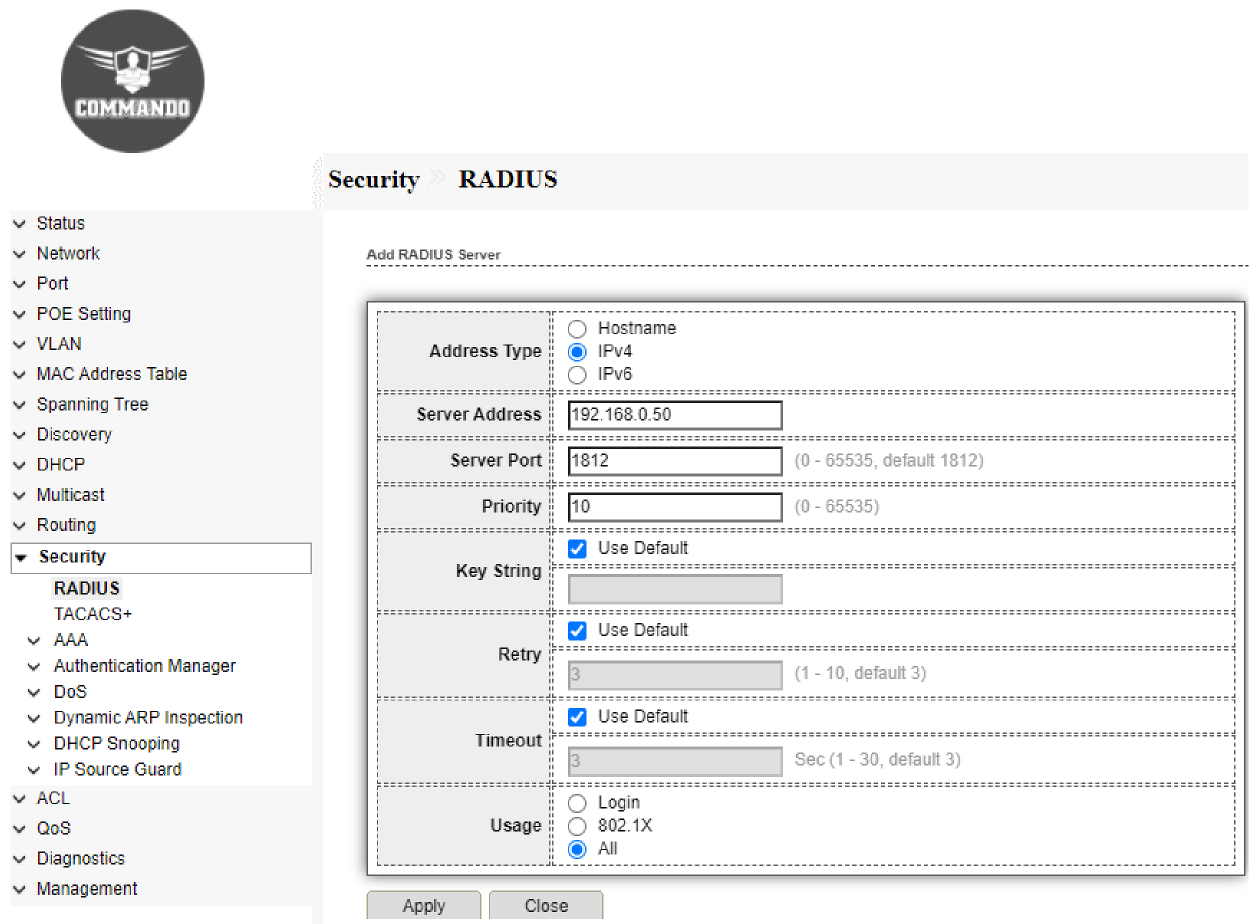
Fig 12.1.1 Default RADIUS Table page

RADIUS Configuration:

Click on “Security”, then “RADIUS” from menu. Now Click on “Add”, then select “Address Type [Hostname/IPv4/IPv6]”, Enter “Server Address”, “Server Port”, “Priority”, ”Key String”, ”Retry”, “Timeout” value & “Usage” and Click on “Apply”.

Configuration object and description:

Address Type: Select the Address Type. There are three options as follows
Hostname: Select the Server by Hostname.
IPv4: Select the IPv4 address type.
IPv6: Select the IPv6 address type.
Server Address: Enter the RADIUS server by IP address.
Server Port: Enter the RADIUS server by Port Number.
Priority: Enter the order in which this RADIUS server is used. Zero is the highest priority RADIUS server and is the first server used. If it cannot establish a session with the high priority server, the device tries the next highest priority server.
Key String: Enter the default key string used for authenticating and encrypting between the device and the RADIUS server. This key must match the key configured on the RADIUS server.
Retry: Enter the number of transmitted requests that are sent to the RADIUS server before a failure is considered to have occurred.
Timeout: Enter the number of seconds that the device waits for an answer from the RADIUS server before retrying the query or switching to the next server.
Usage: Enter the RADIUS server authentication type. The options are:
Login- RADIUS server is used for authenticating users that ask to administer the device.
802.1X- RADIUS server is used for 802.1x authentication.
All-RADIUS server is used for authenticating user that ask to administer the device and for 802.1X authentication.

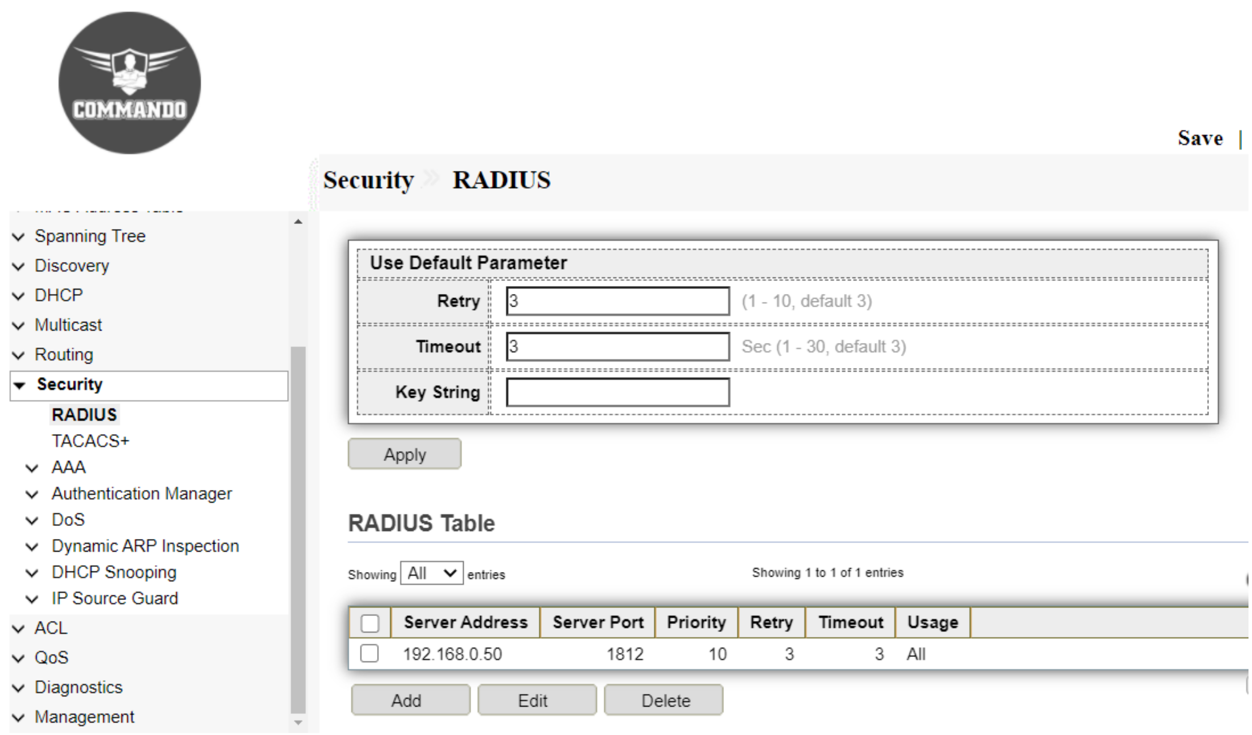


Security » RADIUS

Add RADIUS Server

Address Type	○ Hostname ● IPv4 ○ IPv6
Server Address	192.168.0.50
Server Port	1812 (0 - 65535, default 1812)
Priority	10 (0 - 65535)
Key String	☑ Use Default
Retry	☑ Use Default 3 (1 - 10, default 3)
Timeout	☑ Use Default 3 Sec (1 - 30, default 3)
Usage	○ Login ○ 802.1X ● All

Fig 12.1.2 Add RADIUS server page



Security » RADIUS

Use Default Parameter

Retry	3	(1 - 10, default 3)
Timeout	3	Sec (1 - 30, default 3)
Key String		

RADIUS Table

Showing All entries   Showing 1 to 1 of 1 entries

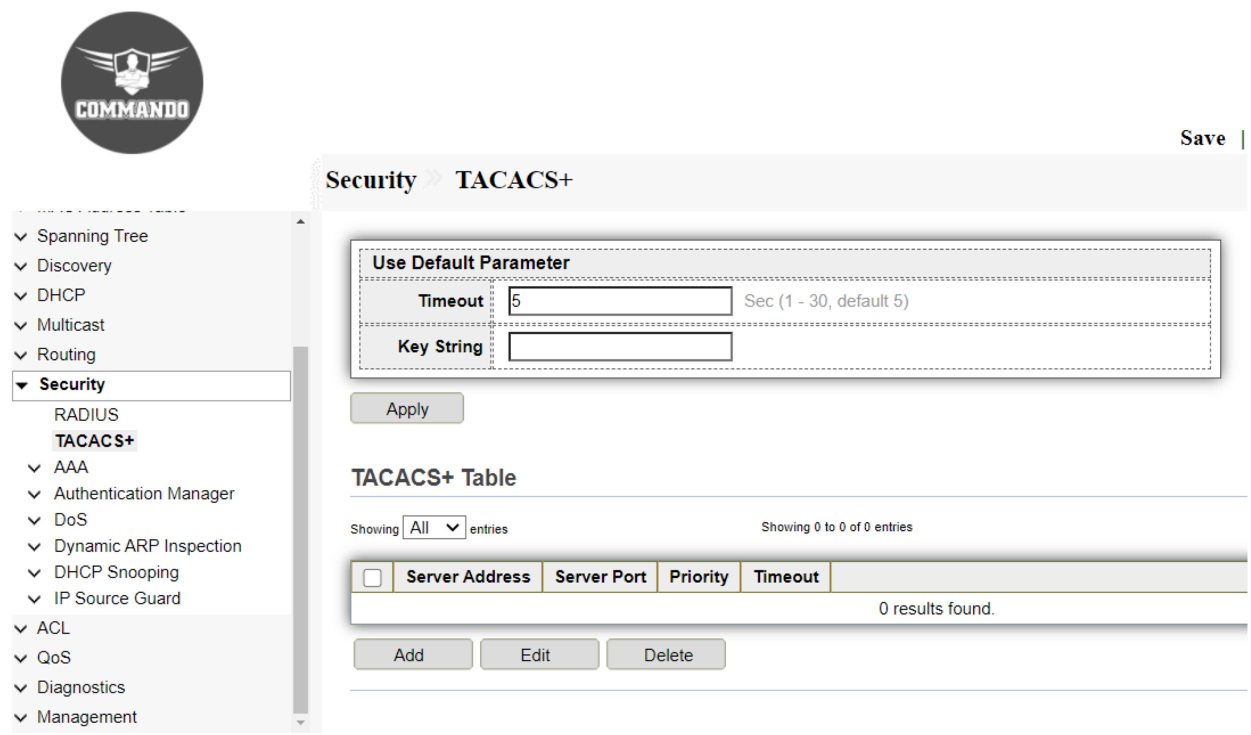
□	Server Address	Server Port	Priority	Retry	Timeout	Usage
□	192.168.0.50	1812	10	3	3	All

Fig 12.1.3 RADIUS Table page

12.2 TACACS+ (Terminal Access Controller Access Control Server Plus)

TACACS+, stands for Terminal Access Controller Access Control Server, is a security protocol used in AAA framework to provide centralize authentication for users who want to gain access to the network. The TACACS+ protocol provides detailed accounting information and flexible administrative control over the authentication, authorization, and accounting process. TACACS+ uses Transmission Control Protocol (TCP) for its transport. TACACS+ provides security by encrypting all traffic between the NAS and the process. An organization can establish a Terminal Access Controller Access Control System (TACACS+) server to provide centralized security for all of its devices. In this way, authentication and authorization can be handled on a single server for all devices in the organization. This page to add, edit or delete TACACS+ server settings and modify default parameter of TACACS+ server.

To view and configure TACACS+, click **Security >> TACACS+**



Use Default Parameter

Timeout	5	Sec (1 - 30, default 5)
Key String		

TACACS+ Table

Showing All entries   Showing 0 to 0 of 0 entries

□	Server Address	Server Port	Priority	Timeout
0 results found.				

Fig 12.2.1 Default TACACS+ Table page

TACACS+ Configuration:

Click on “Security”, then “TACACS+” from menu. Now Click on “Add”, then select “Address Type [Hostname/IPv4/IPv6]”, Enter “Server Address”, “Server Port”, “Priority”, ”Key String”, “Timeout” value and Click on “Apply”.

Configuration object and description:

Address Type: Select the Address Type. The Three options like Hostname, IPv4, IPv6.

Hostname: Select the Server by Hostname.

IPv4: Select the IPv4 address type.

IPv6: Select the IPv6 address type.

Server Address: Enter the TACACS+ server by IP address.

Server Port: Enter the TACACS+ server by Port Number.

Priority: Enter the order in which this TACACS+ server is used. Zero is the highest priority TACACS+ server and is the first server used. If it cannot establish a session with the high priority server, the device tries the next highest priority server.

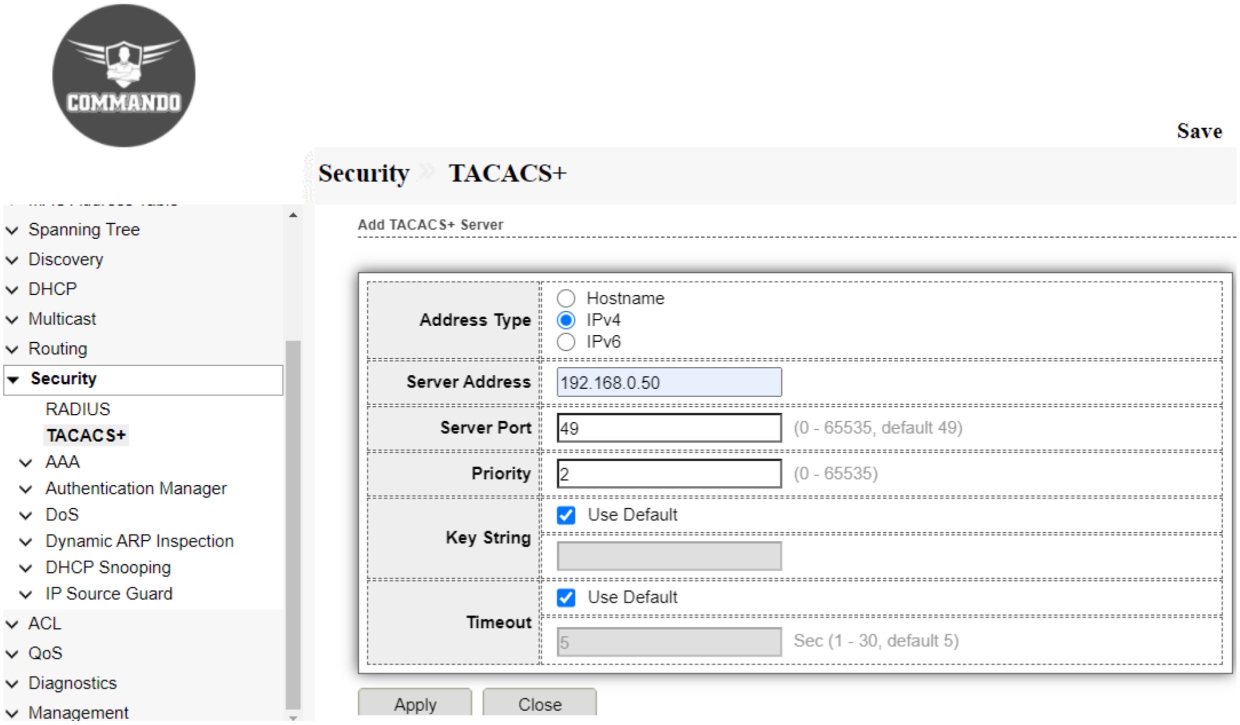
Key String: Enter the default key string used for authenticating and encrypting between the device and the TACACS+ server. This key must match the key configured on the TACACS+ server.

Timeout: Enter the amount of time that passes before the connection between the device and the TACACS+ server times out.

Authentication: Provides authentication of regular and 802.1X users logging onto the device by using usernames and user-defined passwords.

Authorization: Performed at login. After the authentication session is completed, an authorization session starts using the authenticated username. The RADIUS server then checks user privileges.

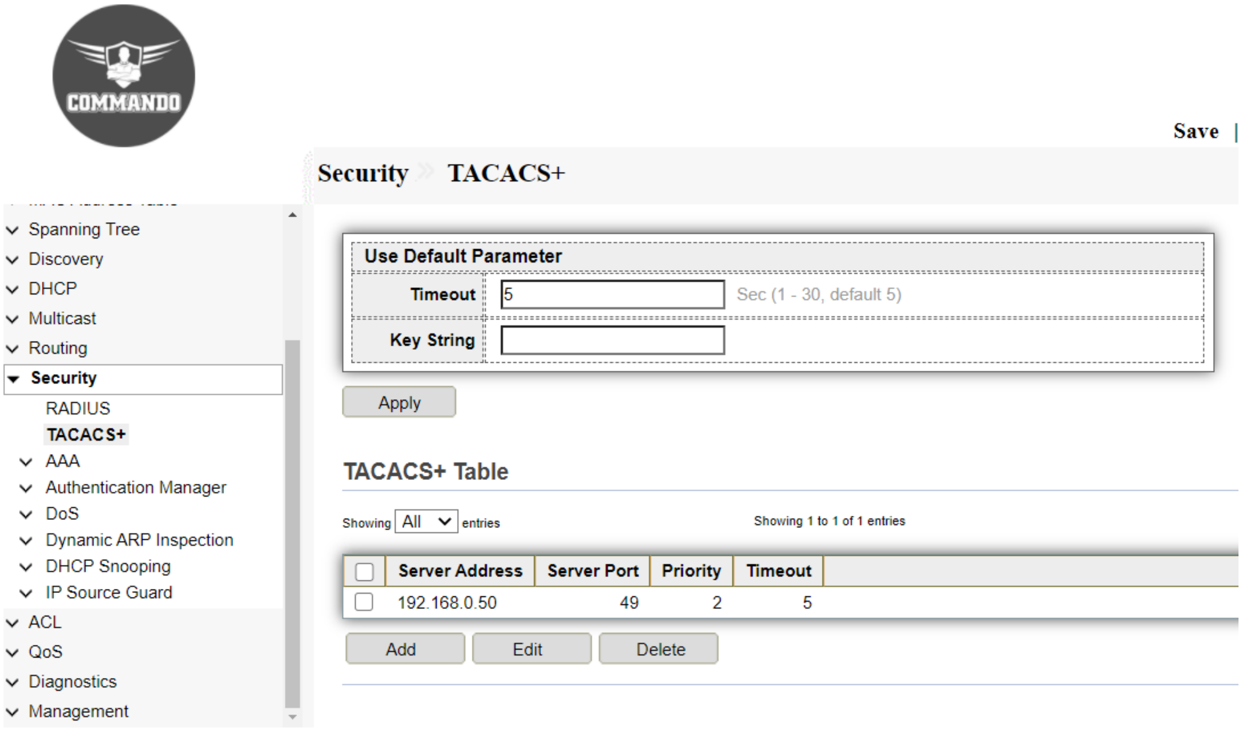
Accounting: Enable accounting of login sessions using the RADIUS server. This enables a system administrator to generate accounting reports from the RADIUS server.



Add TACACS+ Server

Address Type	○ Hostname ● IPv4 ○ IPv6
Server Address	192.168.0.50
Server Port	49 (0 - 65535, default 49)
Priority	2 (0 - 65535)
Key String	☑ Use Default
Timeout	☑ Use Default 5 Sec (1 - 30, default 5)

Fig 12.2.2 Add TACACS+ server page



Use Default Parameter

Timeout	5 Sec (1 - 30, default 5)
Key String	

TACACS+ Table

Showing All entries

Showing 1 to 1 of 1 entries

□	Server Address	Server Port	Priority	Timeout
□	192.168.0.50	49	2	5

Fig 12.2.3 TACACS+ table page

12.3 AAA

Authentication, authorization, and accounting (AAA) is a system for tracking user activities on an IP-based network and controlling their access to network resources. AAA is often implemented as a dedicated server. The AAA server compares a user's authentication credentials with other user credentials stored in a database. If the credentials match, the user is permitted access to the network. If the credentials do not match, authentication fails, and network access is denied.

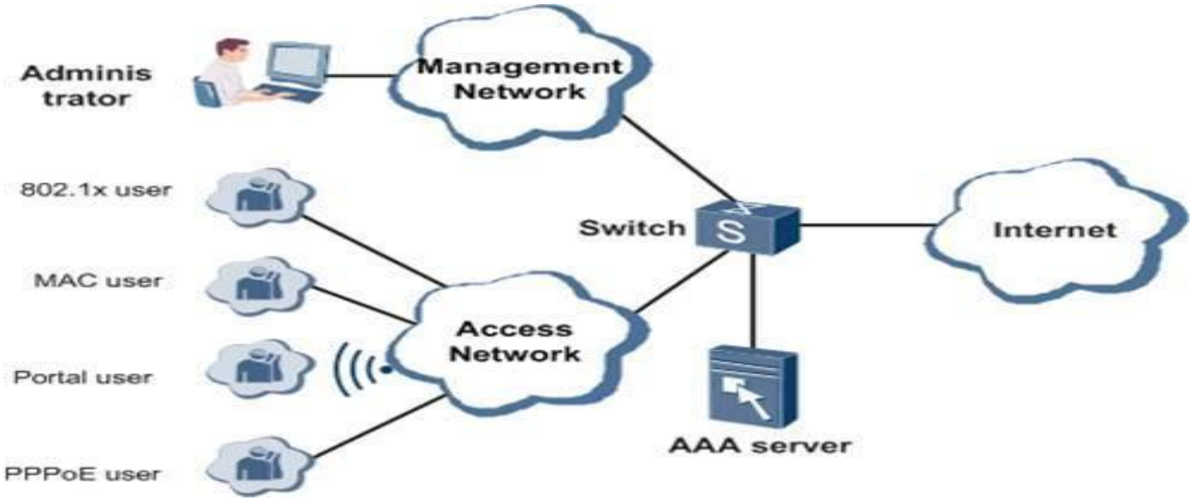
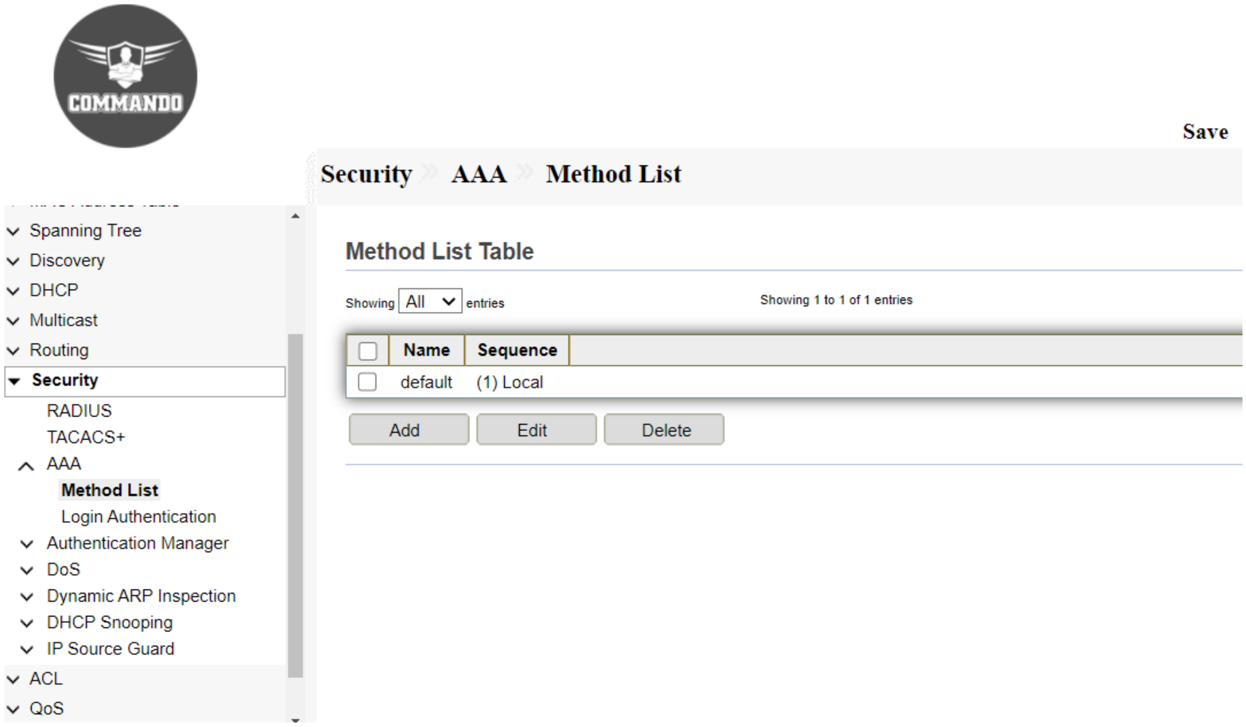


Fig 12.3.1 AAA Server Concept

12.3.1 AAA Method List

AAA stands for authentication, authorization, and accounting. AAA is a framework for intelligently controlling access to computer resources, enforcing policies, auditing usage, and providing the information necessary to bill for services. AAA provides authentication, authorization, and accounting functions for users, preventing unauthorized users from logging in to a switch and improving system security. AAA Method Lists can be used to assign a list of methods for Authentication, Authorization, Accounting. Methods Lists can be used to specify the order. If authentication service is not available or was not successful from the first method, second method can be used and so on.

To view and configure AAA Method List, click **Security >> AAA >> Method List.**



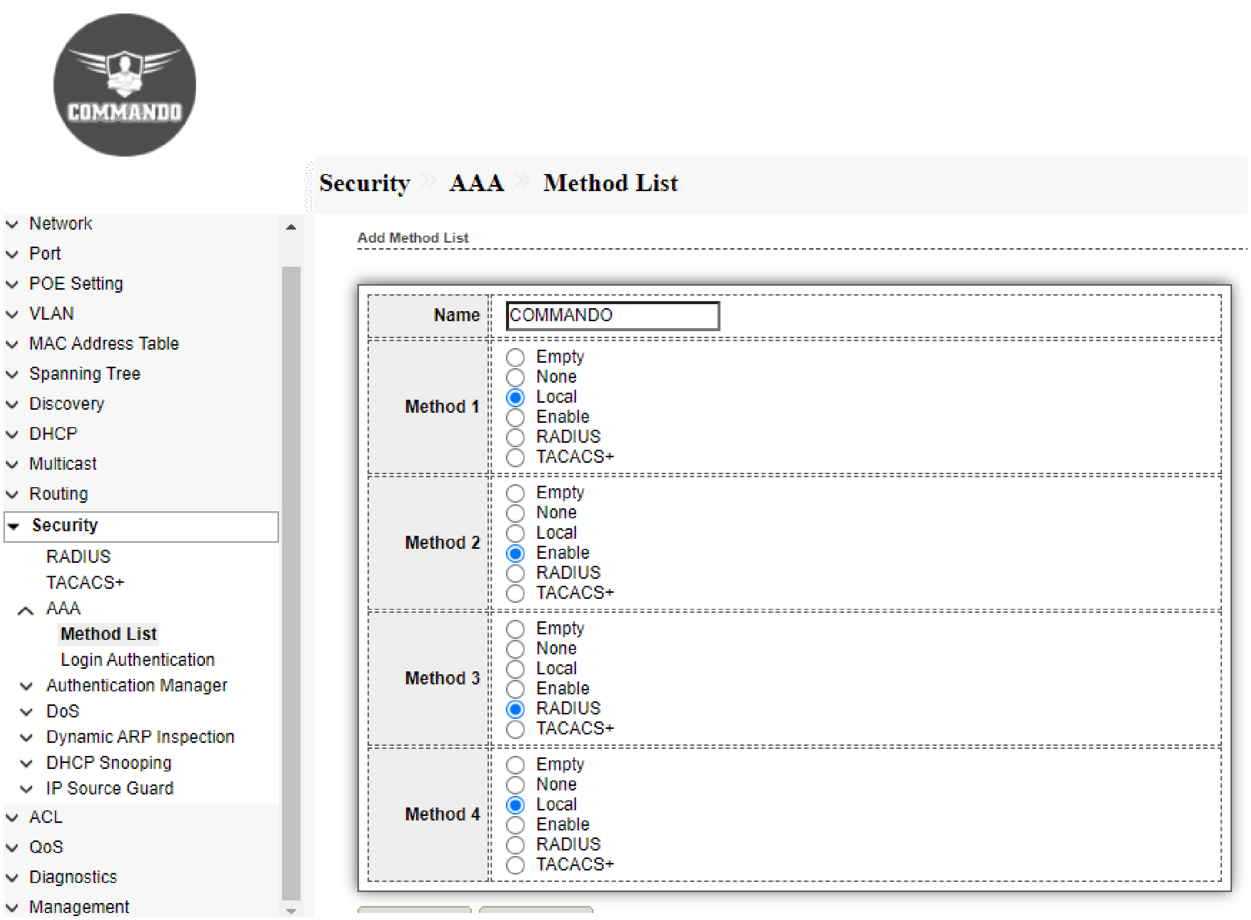
Method List Table

Showing All entries

Showing 1 to 1 of 1 entries

☐	Name	Sequence
☐	default	(1) Local

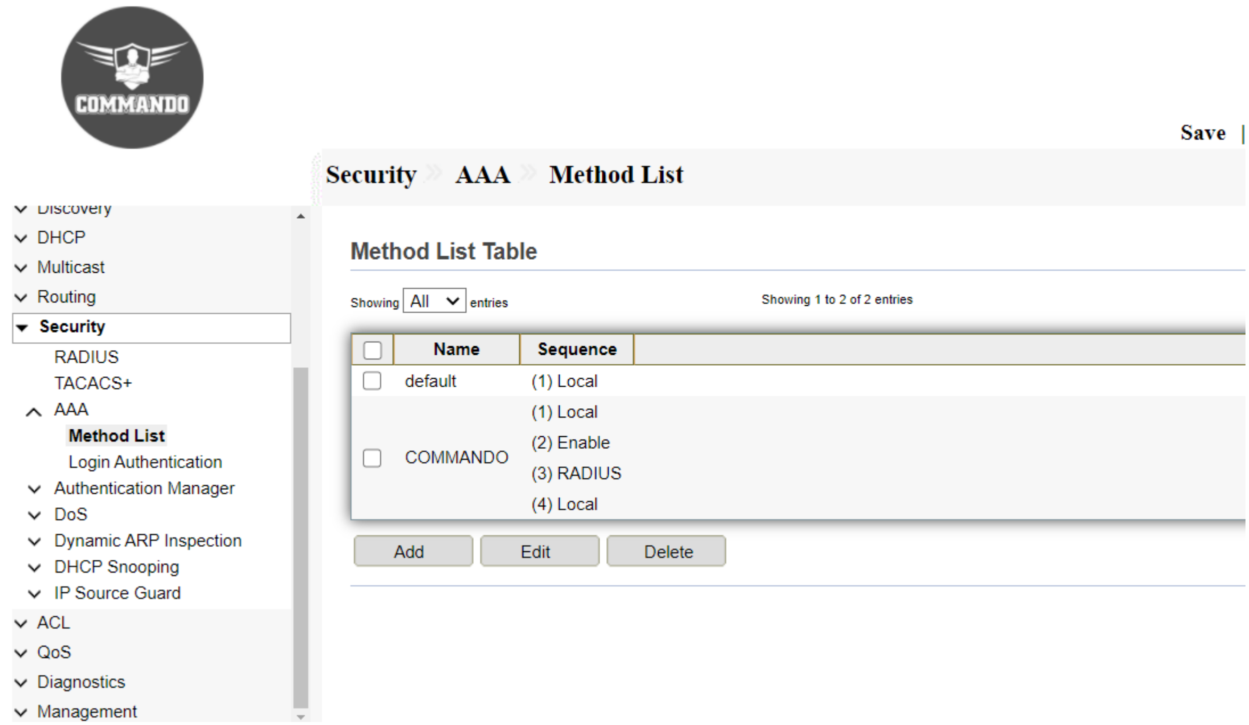
Fig 12.3.2 Default AAA Method List table page



Add Method List

Name	COMMANDO
Method 1	○ Empty ○ None ● Local ○ Enable ○ RADIUS ○ TACACS+
Method 2	○ Empty ○ None ○ Local ● Enable ○ RADIUS ○ TACACS+
Method 3	○ Empty ○ None ○ Local ○ Enable ● RADIUS ○ TACACS+
Method 4	○ Empty ○ None ● Local ○ Enable ○ RADIUS ○ TACACS+

Fig 12.3.3 Edit AAA Method List page



Method List Table

Showing All entries

Showing 1 to 2 of 2 entries

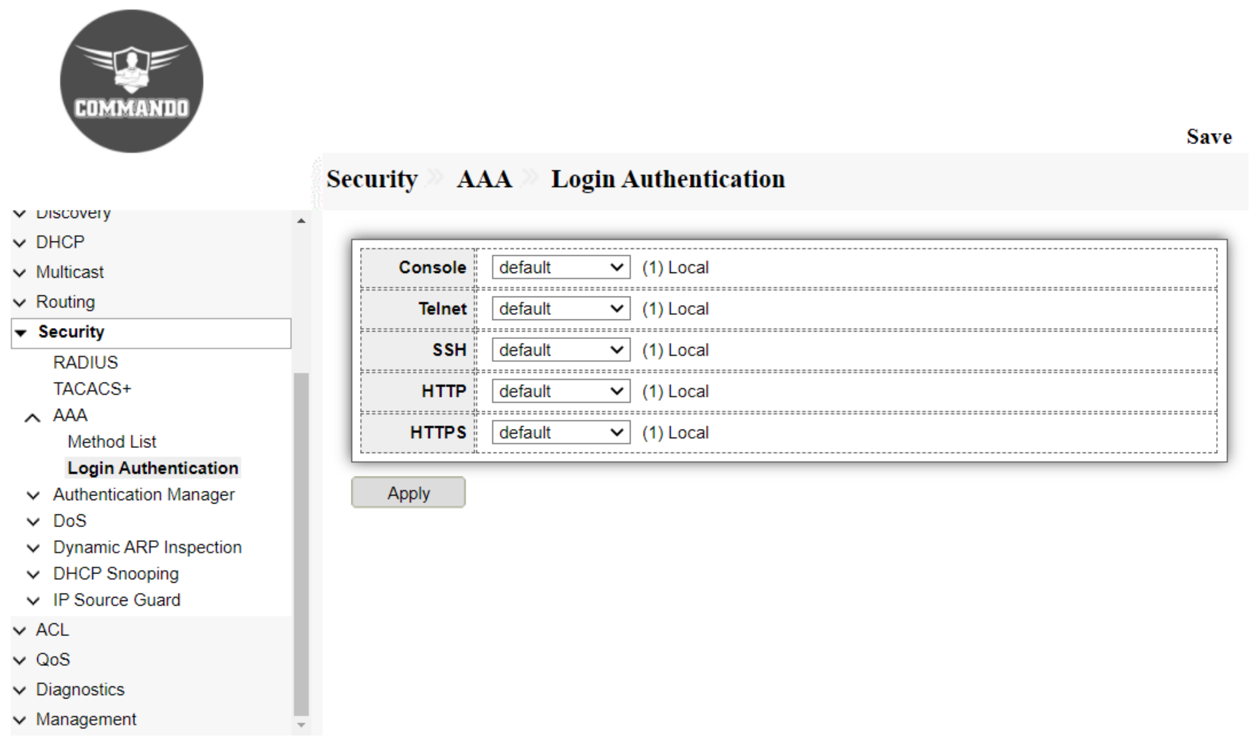
□	Name	Sequence
□	default	(1) Local
□	COMMANDO	(1) Local (2) Enable (3) RADIUS (4) Local

Fig 12.3.4 AAA Method List Table page

12.3.2 Login Authentication

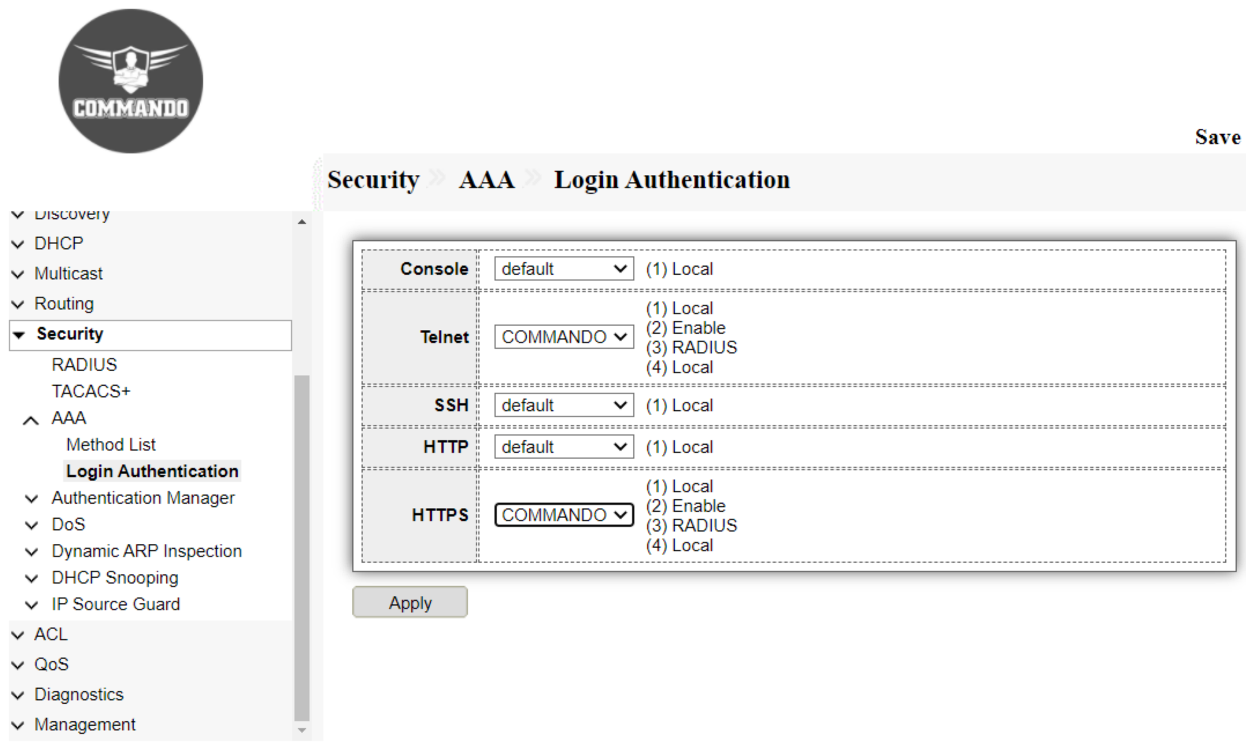
Local AAA means that you are performing AAA without the use of an external database. When performing local AAA, you can authenticate with a username and password that is part of the configuration of the switch. Authentication is based on each user having a unique set of login credentials for gaining network access. The AAA server compares a user's authentication credentials with other user credentials stored in a AAA database.

To view and configure the login authentication, click **Security >> AAA >> Login Authentication.**



Console	default	(1) Local
Telnet	default	(1) Local
SSH	default	(1) Local
HTTP	default	(1) Local
HTTPS	default	(1) Local

Fig 12.3.5 AAA Login Authentication page



Console	default	(1) Local
Telnet	COMMANDO	(1) Local (2) Enable (3) RADIUS (4) Local
SSH	default	(1) Local
HTTP	default	(1) Local
HTTPS	COMMANDO	(1) Local (2) Enable (3) RADIUS (4) Local

Fig 12.3.6 Setting AAA Login Authentication page

12.4 Authentication Manager

You can control access to your network through Switch by using authentication methods such as 802.1X, MAC Based and Web Based. Authentication prevents unauthenticated devices and users from gaining access to your LAN. For 802.1X and MAC Based authentication, end devices must be authenticated before they receive an IP address from a Dynamic Host Configuration Protocol (DHCP) server.

12.4.1 Property

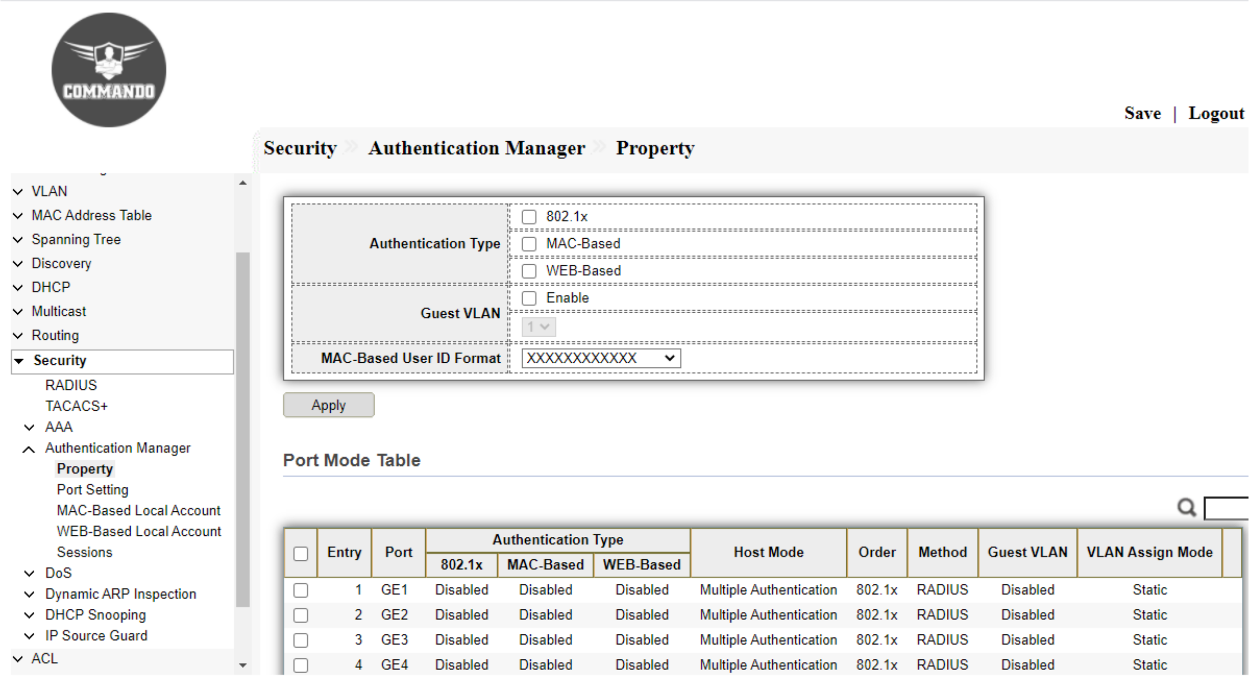
These are the following Authentication Type:

802.1X: Use IEEE 802.1x to do authentication

MAC-Based: Use MAC address to do authentication

WEB-Based: Use MAC address to do authentication

To view and configure Authentication Manager Property, click **Security >> Authentication Manager >> Property.**

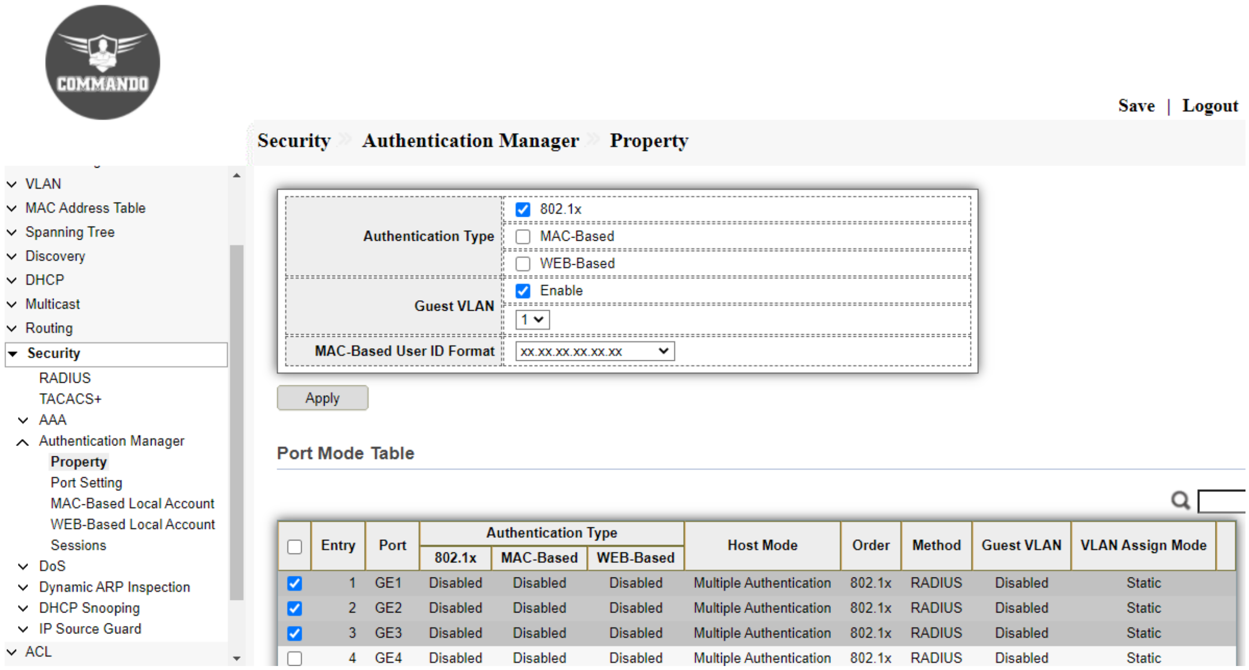


Authentication Type	□ 802.1x □ MAC-Based □ WEB-Based
Guest VLAN	□ Enable 1
MAC-Based User ID Format	XXXXXXXXXXXX

Port Mode Table

□	Entry	Port	Authentication Type			Host Mode	Order	Method	Guest VLAN	VLAN Assign Mode
			802.1x	MAC-Based	WEB-Based					
□	1	GE1	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
□	2	GE2	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
□	3	GE3	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
□	4	GE4	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static

Fig 12.4.1 Default Authentication Manager Port Mode Table page

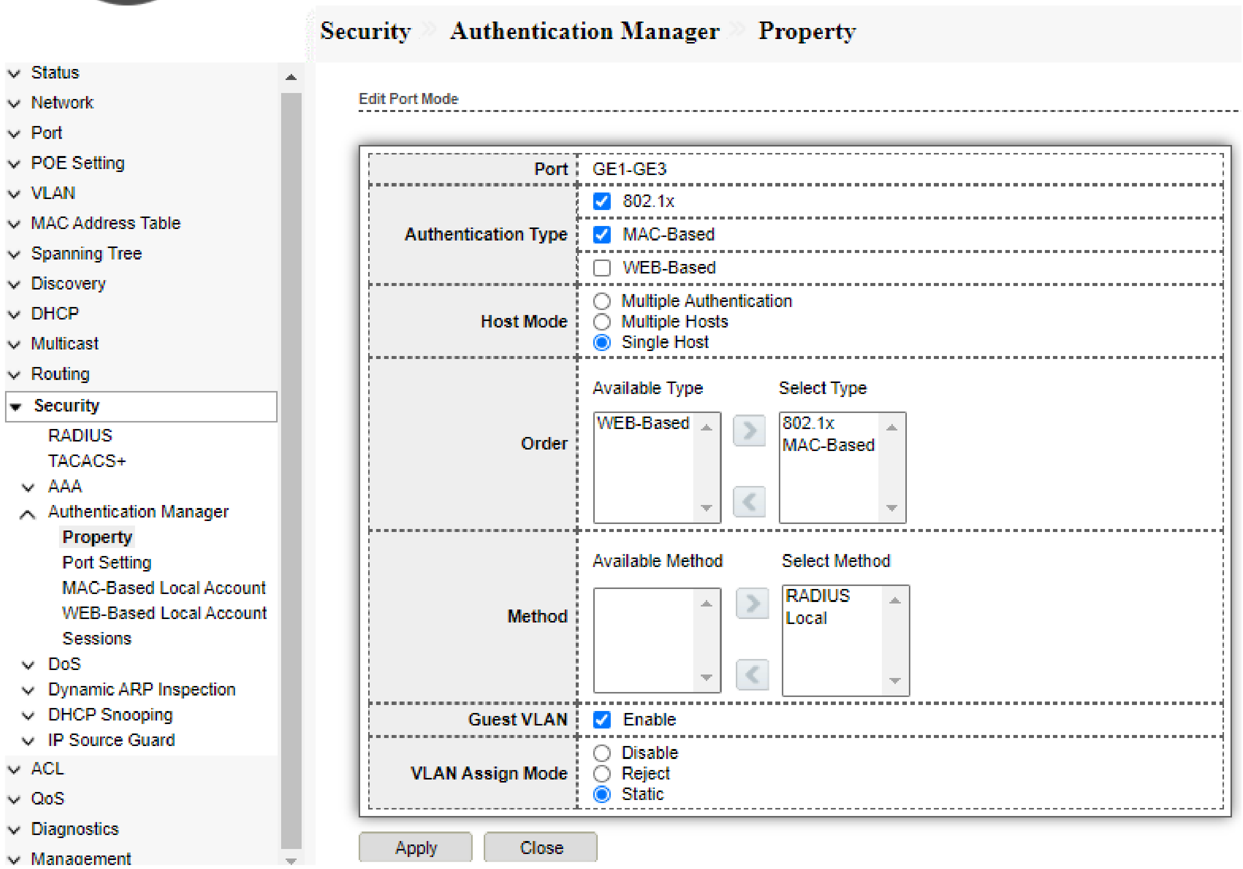


Authentication Type	☑ 802.1x ☐ MAC-Based ☐ WEB-Based
Guest VLAN	☑ Enable 1
MAC-Based User ID Format	xx:xx:xx:xx:xx:xx

Port Mode Table

☐	Entry	Port	Authentication Type			Host Mode	Order	Method	Guest VLAN	VLAN Assign Mode
			802.1x	MAC-Based	WEB-Based					
☑	1	GE1	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
☑	2	GE2	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
☑	3	GE3	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
☐	4	GE4	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static

Fig 12.4.2 Authentication Manager Selecting Ports page

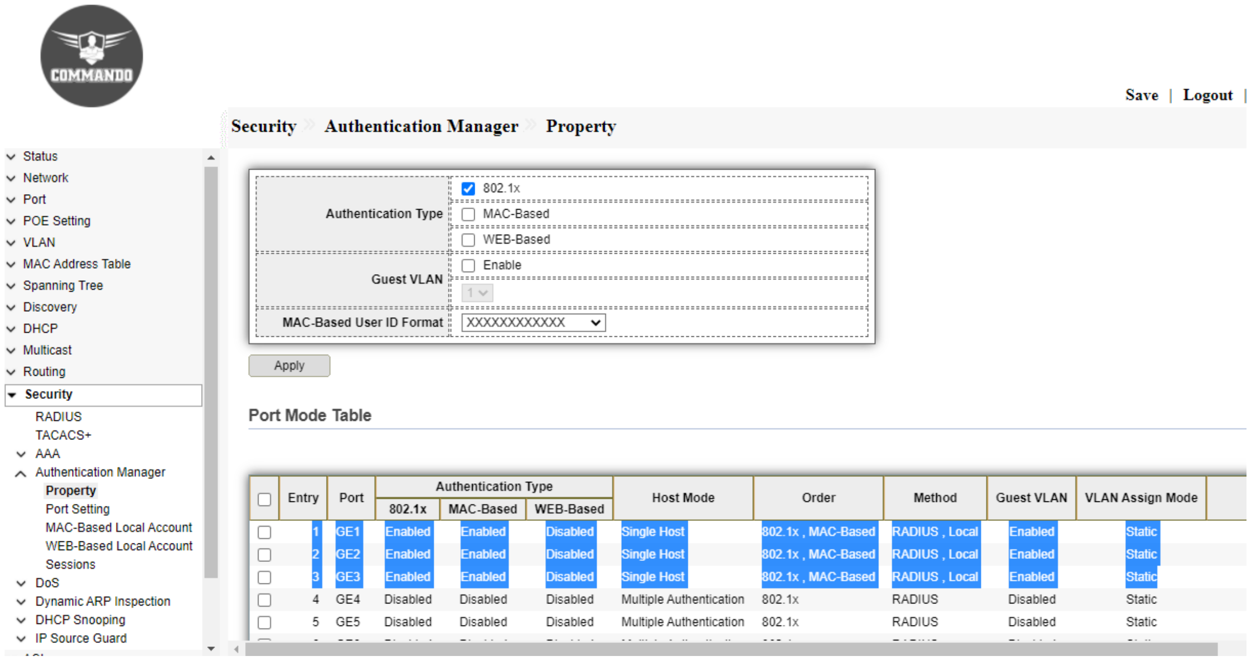


Security » Authentication Manager » Property

Edit Port Mode

Port	GE1-GE3
Authentication Type	☑ 802.1x ☑ MAC-Based ☐ WEB-Based
Host Mode	○ Multiple Authentication ○ Multiple Hosts ● Single Host
Order	Available Type: WEB-Based Select Type: 802.1x, MAC-Based
Method	Available Method: Select Method: RADIUS, Local
Guest VLAN	☑ Enable
VLAN Assign Mode	○ Disable ○ Reject ● Static

Fig 12.4.3 Authentication Manager Property edit page



Authentication Type	☑ 802.1x □ MAC-Based □ WEB-Based
Guest VLAN	□ Enable 1
MAC-Based User ID Format	XXXXXXXXXXXX

Port Mode Table

□	Entry	Port	Authentication Type			Host Mode	Order	Method	Guest VLAN	VLAN Assign Mode
			802.1x	MAC-Based	WEB-Based					
□	1	GE1	Enabled	Enabled	Disabled	Single Host	802.1x , MAC-Based	RADIUS , Local	Enabled	Static
□	2	GE2	Enabled	Enabled	Disabled	Single Host	802.1x , MAC-Based	RADIUS , Local	Enabled	Static
□	3	GE3	Enabled	Enabled	Disabled	Single Host	802.1x , MAC-Based	RADIUS , Local	Enabled	Static
□	4	GE4	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static
□	5	GE5	Disabled	Disabled	Disabled	Multiple Authentication	802.1x	RADIUS	Disabled	Static

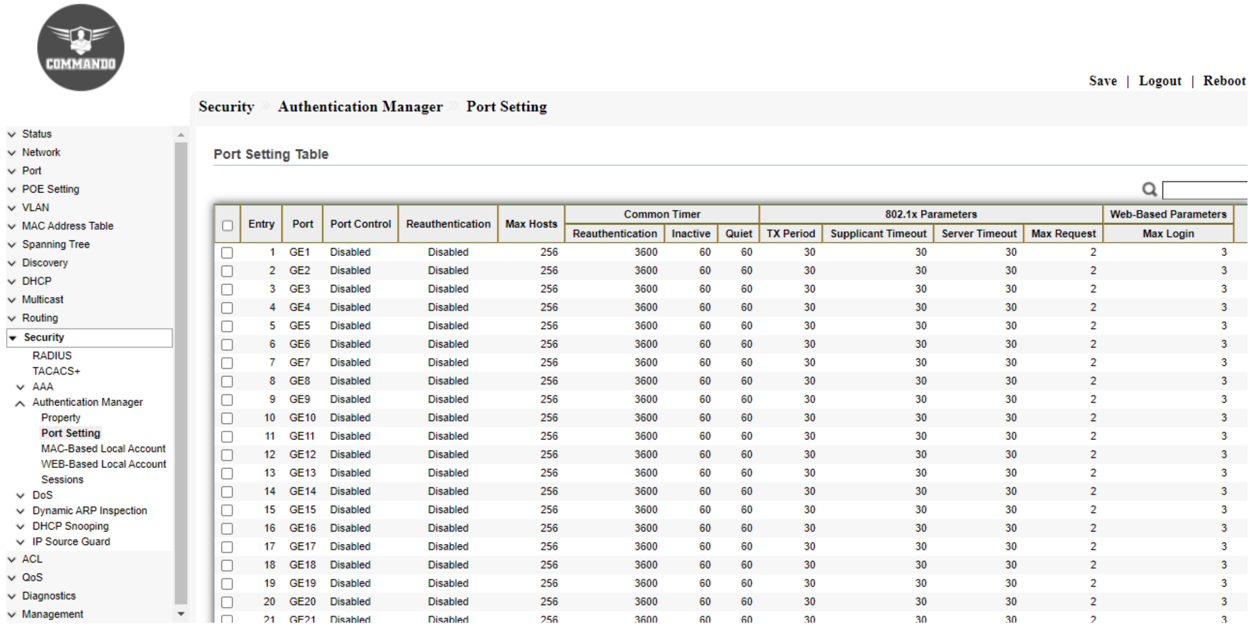
Fig 12.4.4 Authentication Manager Property Port Mode Table page

12.4.2 Port Setting

802.1X: 802.1X is an IEEE standard for port-based network access control (PNAC). It provides an authentication mechanism for devices seeking to access a LAN.

During the authentication process, the switch completes multiple message exchanges between the end device and the authentication server While 802.1X authentications is in process, only 802.1X traffic and control traffic can transit through the network.

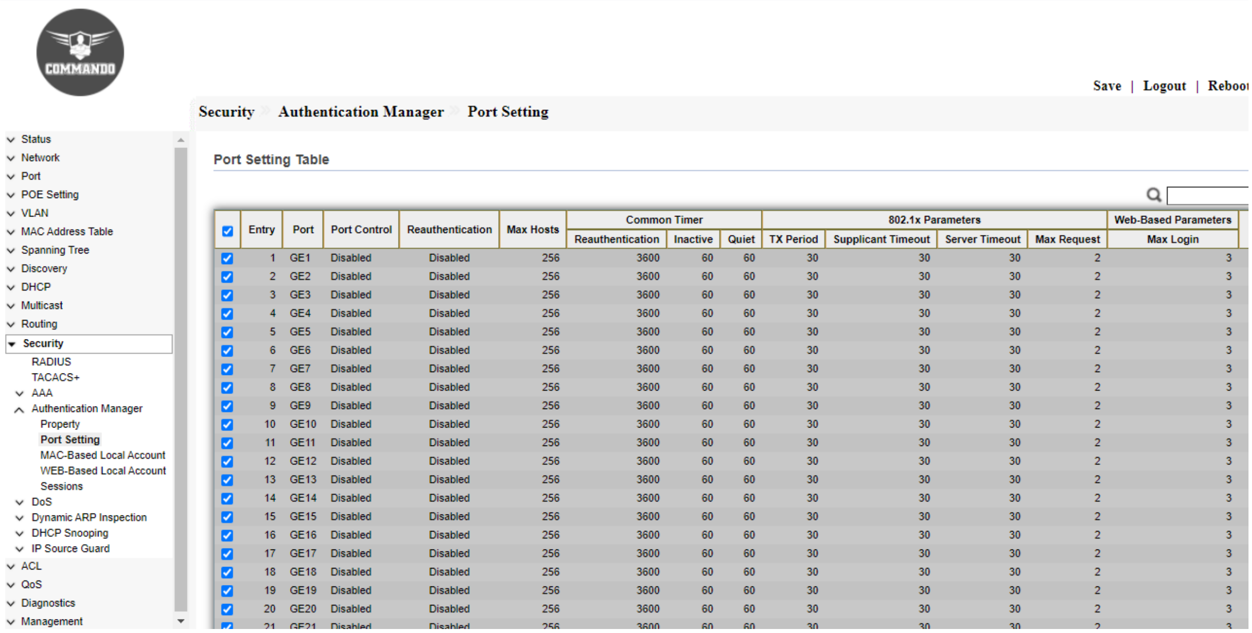
To view and configure the Authentication Manager Port Setting, click **Security >> Authentication Manager >> Port Setting.**



Port Setting Table

□	Entry	Port	Port Control	Reauthentication	Max Hosts	Common Timer			802.1x Parameters				Web-Based Parameters
						Reauthentication	Inactive	Quiet	TX Period	Supplicant Timeout	Server Timeout	Max Request	Max Login
□	1	GE1	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	2	GE2	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	3	GE3	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	4	GE4	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	5	GE5	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	6	GE6	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	7	GE7	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	8	GE8	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	9	GE9	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	10	GE10	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	11	GE11	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	12	GE12	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	13	GE13	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	14	GE14	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	15	GE15	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	16	GE16	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	17	GE17	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	18	GE18	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	19	GE19	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	20	GE20	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
□	21	GE21	Disabled	Disabled	256	3600	60	60	30	30	30	2	3

Fig 12.4.5 Authentication Manager Property Port Mode Table page

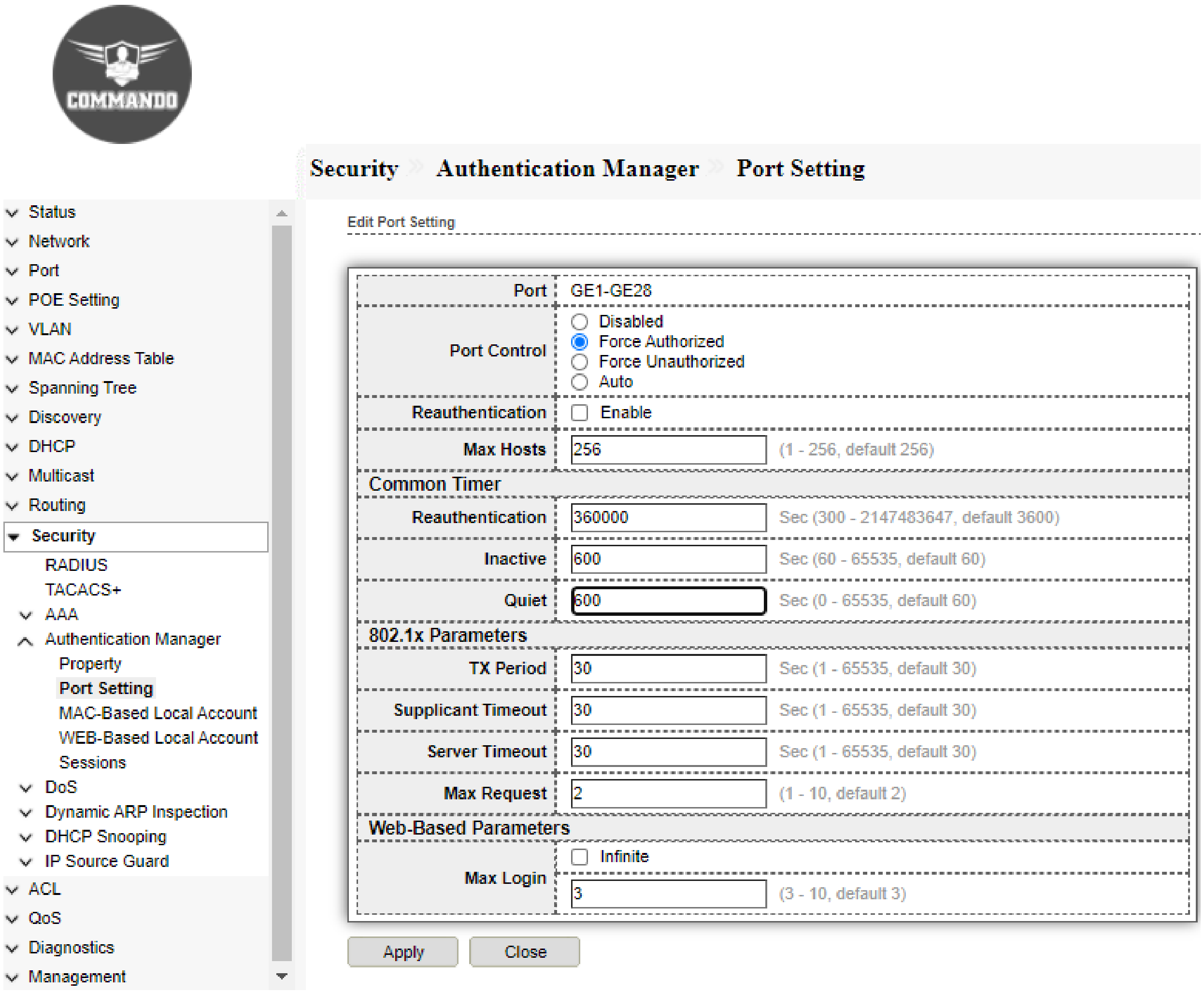


Security » Authentication Manager » Port Setting

Port Setting Table

☑	Entry	Port	Port Control	Reauthentication	Max Hosts	Common Timer			802.1x Parameters				Web-Based Parameters
						Reauthentication	Inactive	Quiet	TX Period	Supplicant Timeout	Server Timeout	Max Request	Max Login
☑	1	GE1	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	2	GE2	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	3	GE3	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	4	GE4	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	5	GE5	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	6	GE6	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	7	GE7	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	8	GE8	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	9	GE9	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	10	GE10	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	11	GE11	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	12	GE12	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	13	GE13	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	14	GE14	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	15	GE15	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	16	GE16	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	17	GE17	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	18	GE18	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	19	GE19	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	20	GE20	Disabled	Disabled	256	3600	60	60	30	30	30	2	3
☑	21	GE21	Disabled	Disabled	256	3600	60	60	30	30	30	2	3

Fig 12.4.6 Authentication Manager Property Selecting Port page

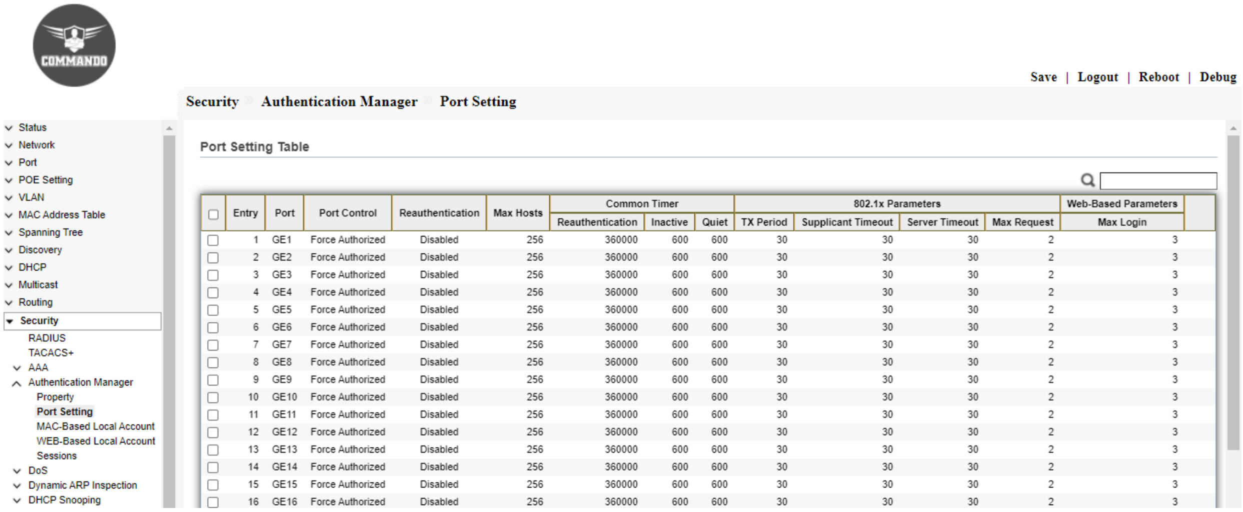


Security » Authentication Manager » Port Setting

Edit Port Setting

Port	GE1-GE28
Port Control	○ Disabled ● Force Authorized ○ Force Unauthorized ○ Auto
Reauthentication	□ Enable
Max Hosts	256 (1 - 256, default 256)
Common Timer	
Reauthentication	360000 Sec (300 - 2147483647, default 3600)
Inactive	600 Sec (60 - 65535, default 60)
Quiet	600 Sec (0 - 65535, default 60)
802.1x Parameters	
TX Period	30 Sec (1 - 65535, default 30)
Supplicant Timeout	30 Sec (1 - 65535, default 30)
Server Timeout	30 Sec (1 - 65535, default 30)
Max Request	2 (1 - 10, default 2)
Web-Based Parameters	
Max Login	□ Infinite 3 (3 - 10, default 3)

Fig 12.4.7 Authentication Manager Property edit port setting page



Security » Authentication Manager » Port Setting

Port Setting Table

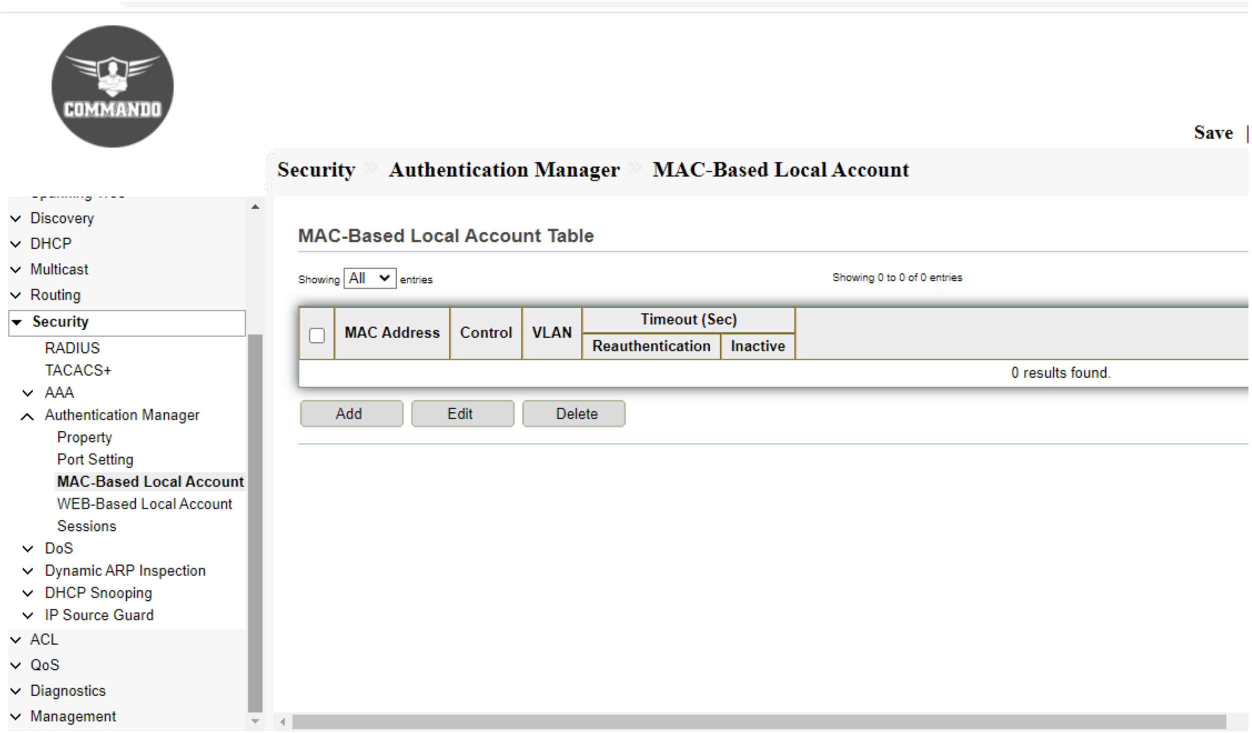
□	Entry	Port	Port Control	Reauthentication	Max Hosts	Common Timer			802.1x Parameters				Web-Based Parameters
						Reauthentication	Inactive	Quiet	TX Period	Supplicant Timeout	Server Timeout	Max Request	Max Login
□	1	GE1	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	2	GE2	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	3	GE3	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	4	GE4	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	5	GE5	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	6	GE6	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	7	GE7	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	8	GE8	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	9	GE9	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	10	GE10	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	11	GE11	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	12	GE12	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	13	GE13	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	14	GE14	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	15	GE15	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3
□	16	GE16	Force Authorized	Disabled	256	360000	600	600	30	30	30	2	3

Fig 12.4.8 Authentication Manager Port setting table page

12.4.3 MAC-Based Local Account

The 802.1X authentication method only works if the end device is 802.1X-enabled, but many single-purpose network devices such as printers and IP phones do not support the 802.1X protocol. You can configure MAC RADIUS authentication on interfaces that are connected to network devices that do not support 802.1X and for which you want to allow to access the LAN. When an end device that is not 802.1X-enabled is detected on the interface, the switch transmits the MAC address of the device to the authentication server. The server then tries to match the MAC address with a list of MAC addresses in its database. If the MAC address matches an address in the list, the end device is authenticated.
To view and configure MAC-Based Local Account, click **Security >> Authentication Manger >> MAC-Based Local Account.**

MAC-Based Configuration:
Click on “Security”, then “Authentication Manager” >> ” MAC-Based Local Account” from menu. Click on “Add” & enter “MAC Address” Select “Port Control [Force Authorized/ Force Unauthorized/Auto]” & Enter “VLAN” ID.
Next enter Assigned Timer parameters like “Reauthentication”, “Inactive”” value & Click on “Apply”.



Security » Authentication Manager » MAC-Based Local Account

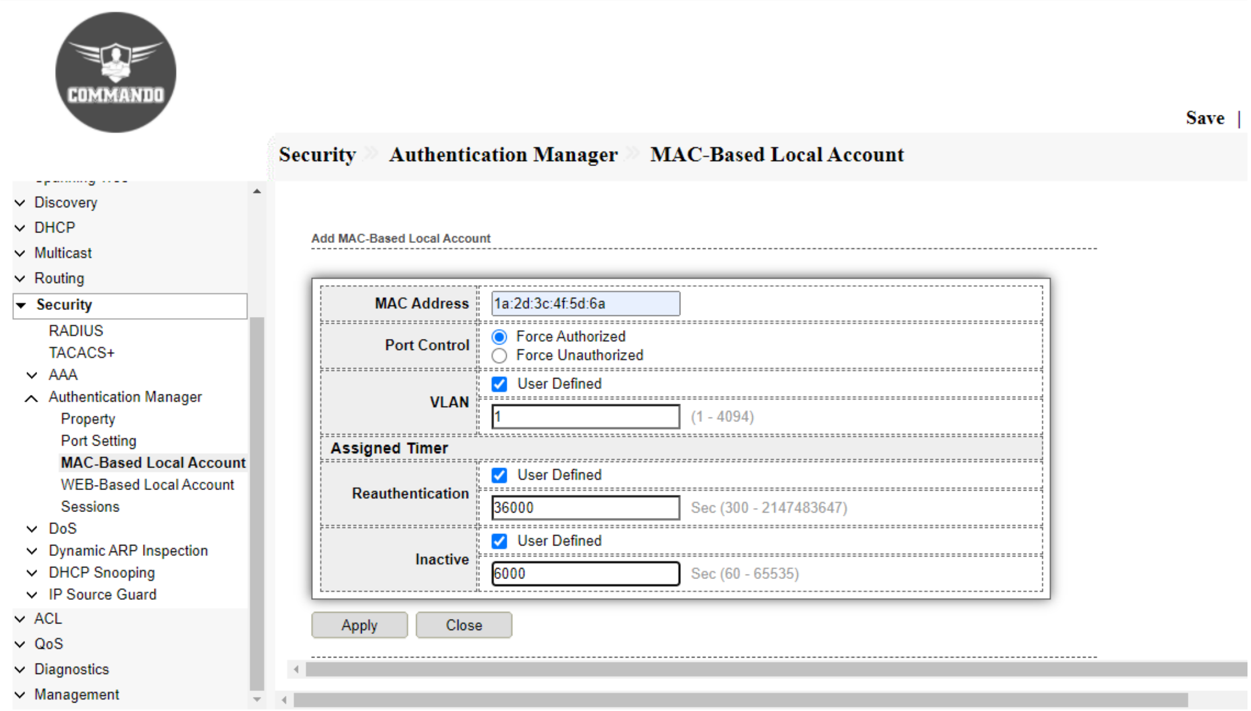
MAC-Based Local Account Table

Showing All entries

Showing 0 to 0 of 0 entries

□	MAC Address	Control	VLAN	Timeout (Sec)	
				Reauthentication	Inactive
0 results found.					

Fig 12.4.9 Authentication Manager Default MAC -Based Local Account page

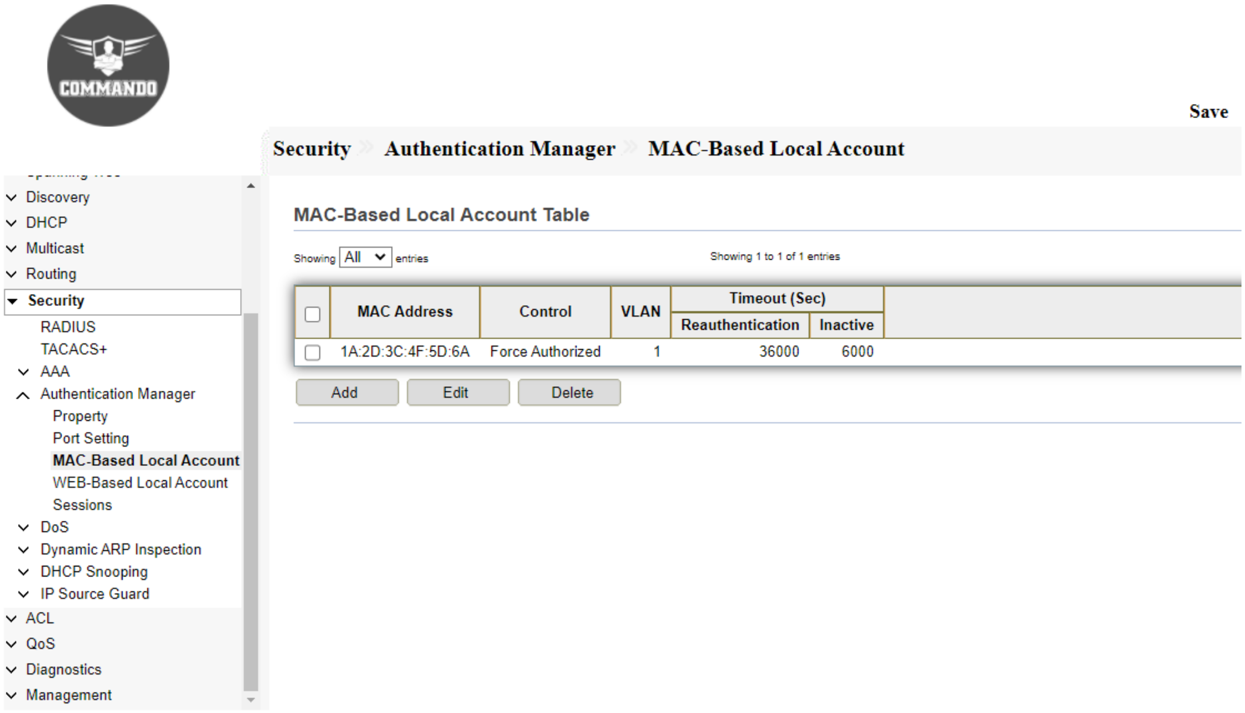


Security » Authentication Manager » MAC-Based Local Account

Add MAC-Based Local Account

MAC Address	1a:2d:3c:4f:5d:6a
Port Control	● Force Authorized ○ Force Unauthorized
VLAN	☑ User Defined 1 (1 - 4094)
Assigned Timer	
Reauthentication	☑ User Defined 36000 Sec (300 - 2147483647)
Inactive	☑ User Defined 6000 Sec (60 - 65535)

Fig 12.4.10 Authentication Manager MAC -Based user defined Local Account page



MAC-Based Local Account Table

Showing All entries   Showing 1 to 1 of 1 entries

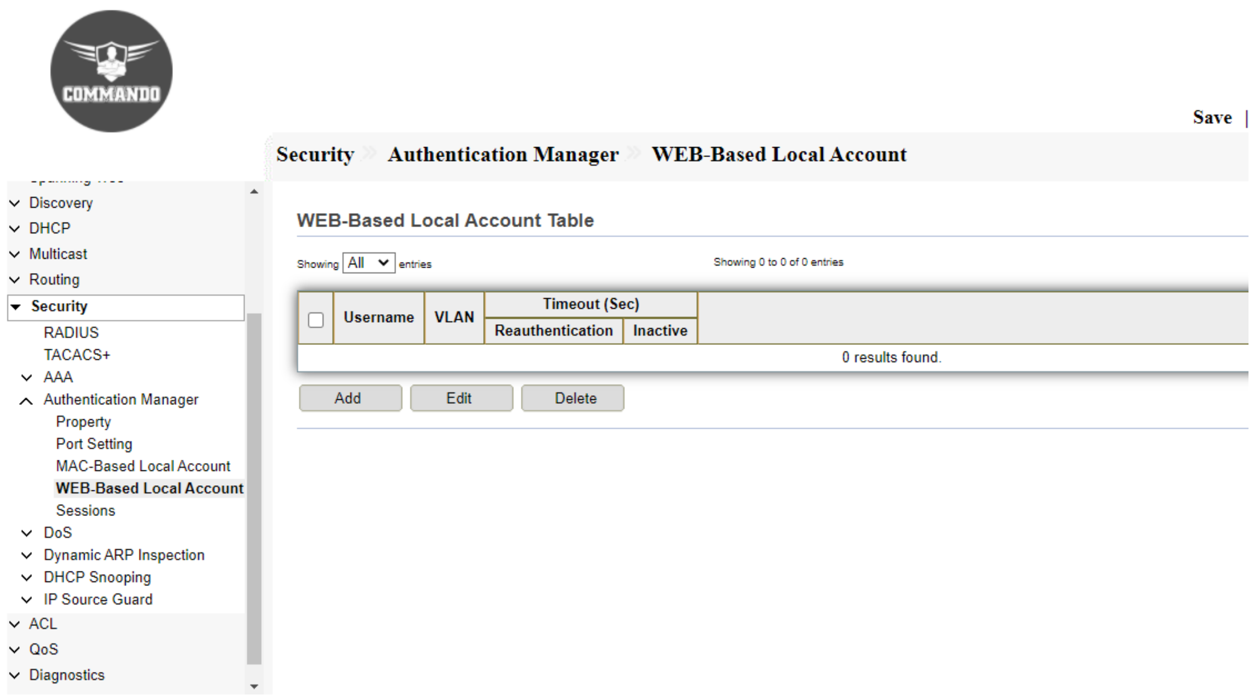
□	MAC Address	Control	VLAN	Timeout (Sec)	
				Reauthentication	Inactive
□	1A:2D:3C:4F:5D:6A	Force Authorized	1	36000	6000

Fig 12.4.11 MAC -Based user defined Local Account Table page

12.4.4 WEB-Based Local Account

WEB-Based authentication enables you to authenticate users on switches by redirecting Web browser requests to a login page that requires users to input a valid username and password before they can access the network.

To view and configure WEB-Based Local Account, click **Security >> Authentication Manger >> WEB-Based Local Account.**



WEB-Based Local Account Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Username	VLAN	Timeout (Sec)	
			Reauthentication	Inactive

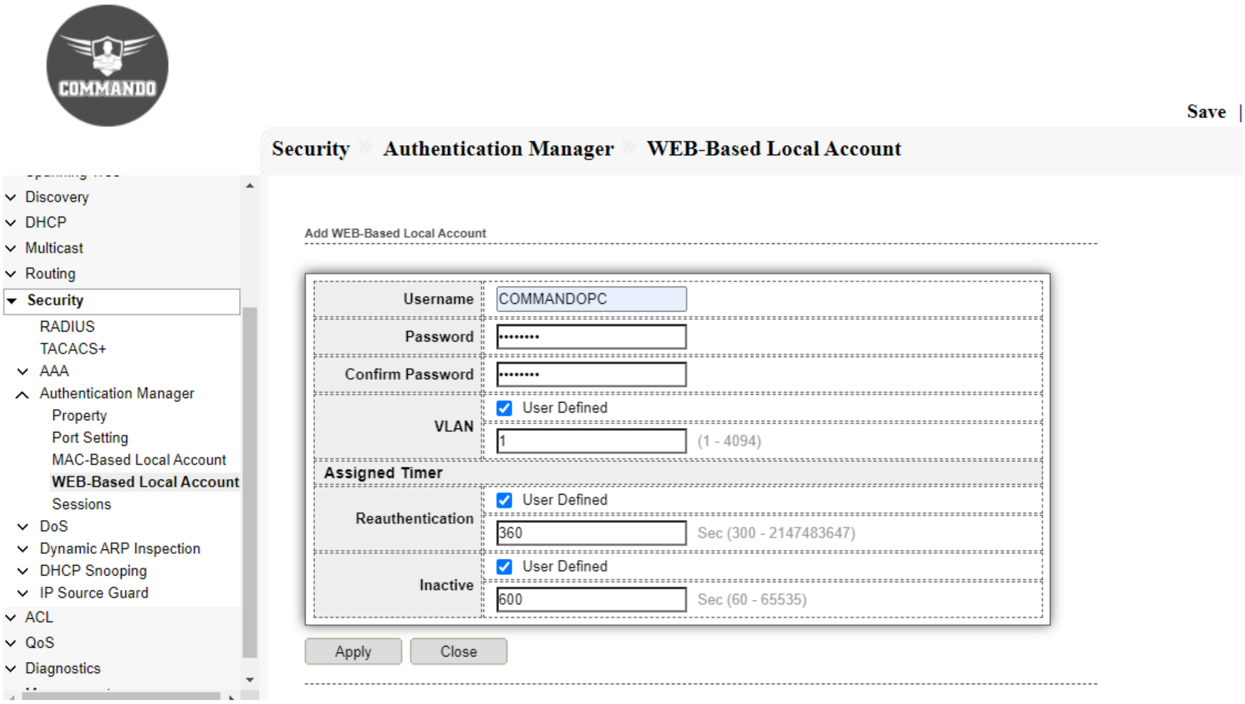
0 results found.

Fig 12.4.12 Default WEB-Based Local Account Table page

WEB-Based Configuration:

Click on “Security”, then “Authentication Manager” >> ” WEB-Based Local Account” from menu. Click on “Add” & enter “Username”, “Password” and “VLAN” ID.

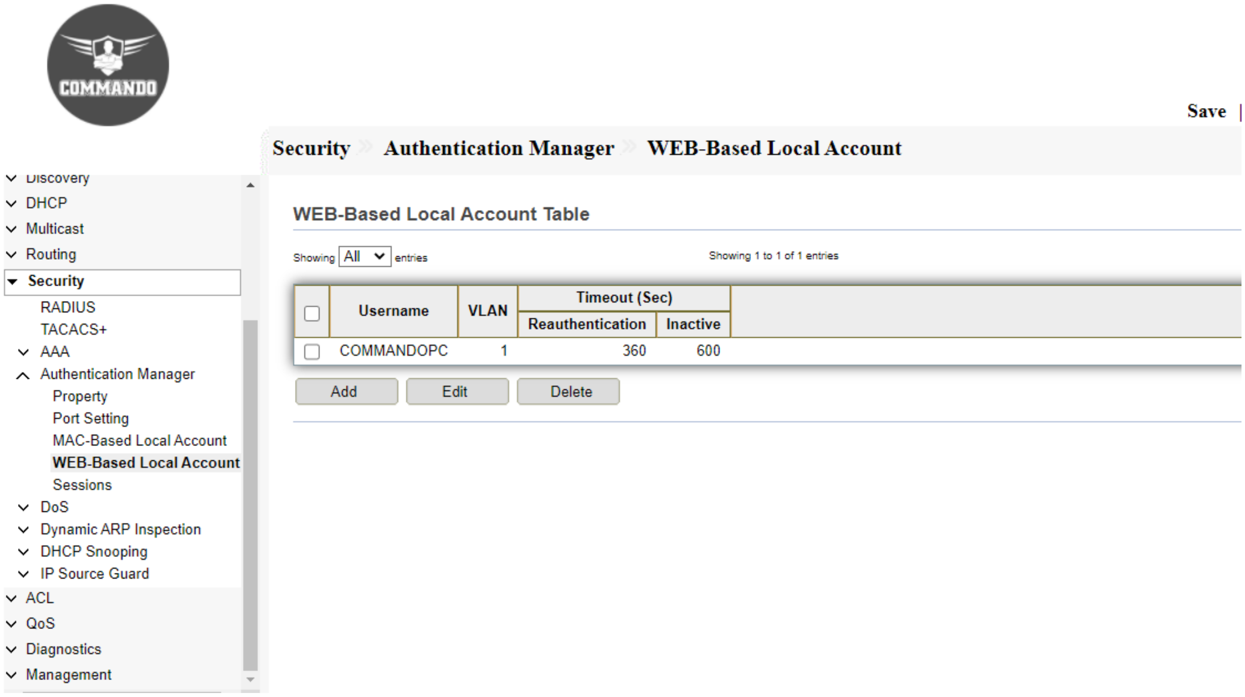
Next enter Assigned Timer parameters like “Reauthentication”, “Inactive”” value. &Click on “Apply”.



Add WEB-Based Local Account

Username	COMMANDOPC
Password	••••••••
Confirm Password	••••••••
VLAN	☑ User Defined 1 (1 - 4094)
Assigned Timer	
Reauthentication	☑ User Defined 360 Sec (300 - 2147483647)
Inactive	☑ User Defined 600 Sec (60 - 65535)

Fig 12.4.13 Add WEB-Based Local Account page



WEB-Based Local Account Table

Showing All entries   Showing 1 to 1 of 1 entries

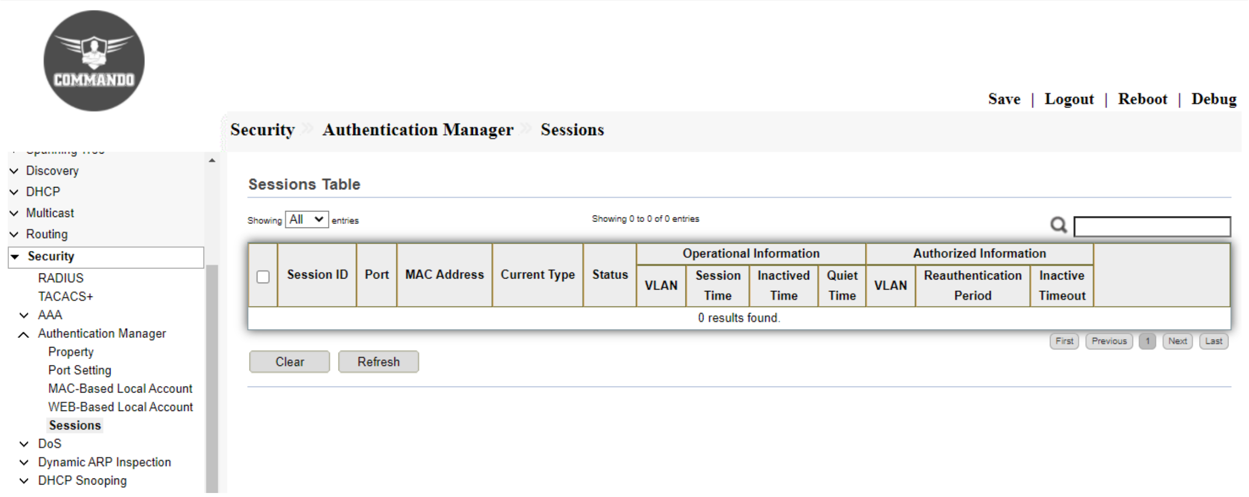
□	Username	VLAN	Timeout (Sec)	
			Reauthentication	Inactive
□	COMMANDOPC	1	360	600

Fig 12.4.14 WEB-Based Local Account table page

12.4.5 Sessions

This page shows all detail information of authentication sessions and allow user to select specific session. Session ID is unique of each session.

To view Sessions, click **Security >> Authentication Manger >> Sessions.**



Sessions Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Session ID	Port	MAC Address	Current Type	Status	Operational Information				Authorized Information			
						VLAN	Session Time	Inactived Time	Quiet Time	VLAN	Reauthentication Period	Inactive Timeout	
0 results found.													

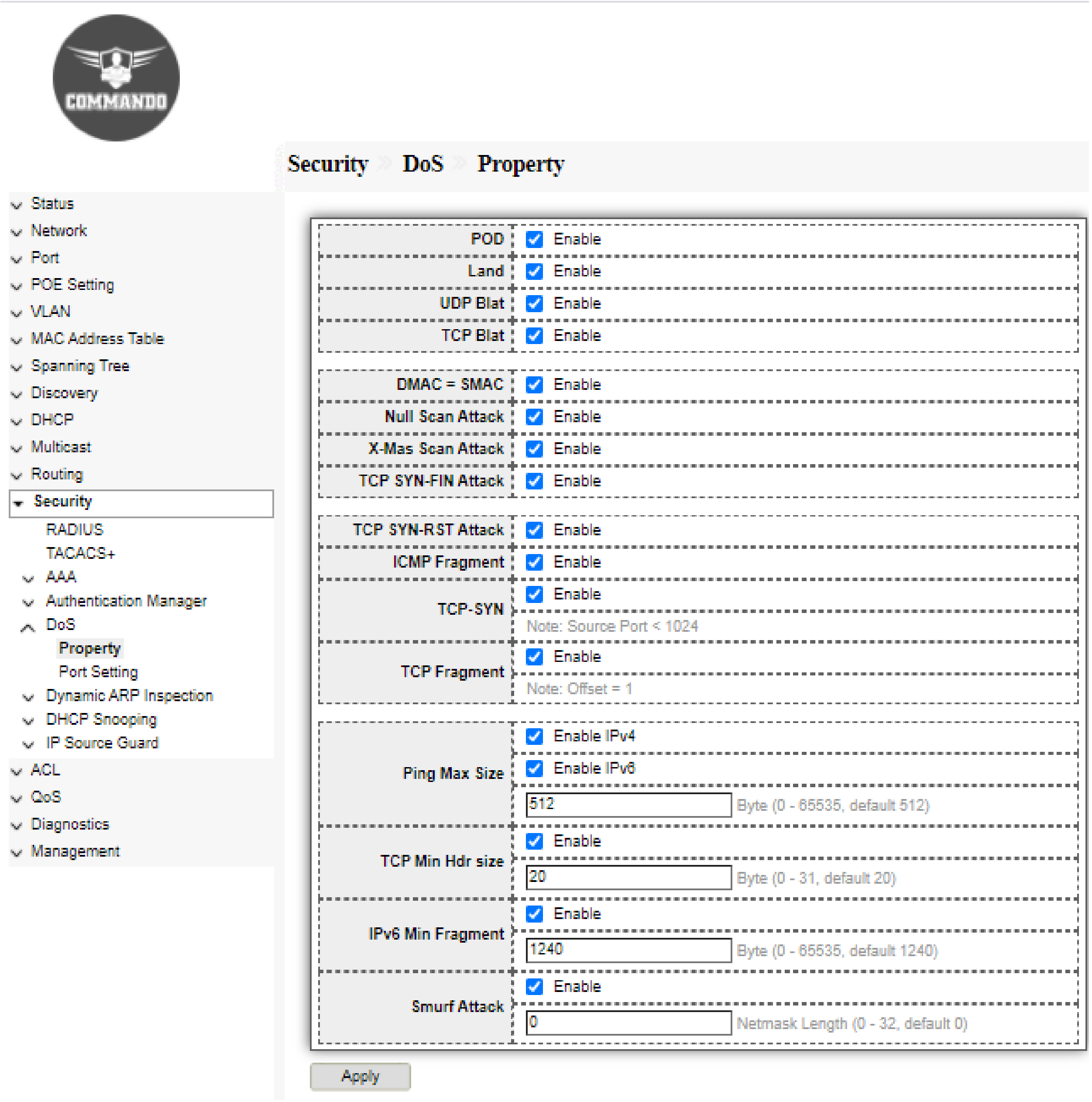
Fig 12.4.15 Authentication Manager Sessions Table page

12.5 DoS

A Denial of Service (DoS) attack is a hacker attempt to make a Switch unavailable to its users. DoS attacks saturate the switch with external communication requests, so that it cannot respond to legitimate traffic. These attacks usually lead to a switch CPU overload.

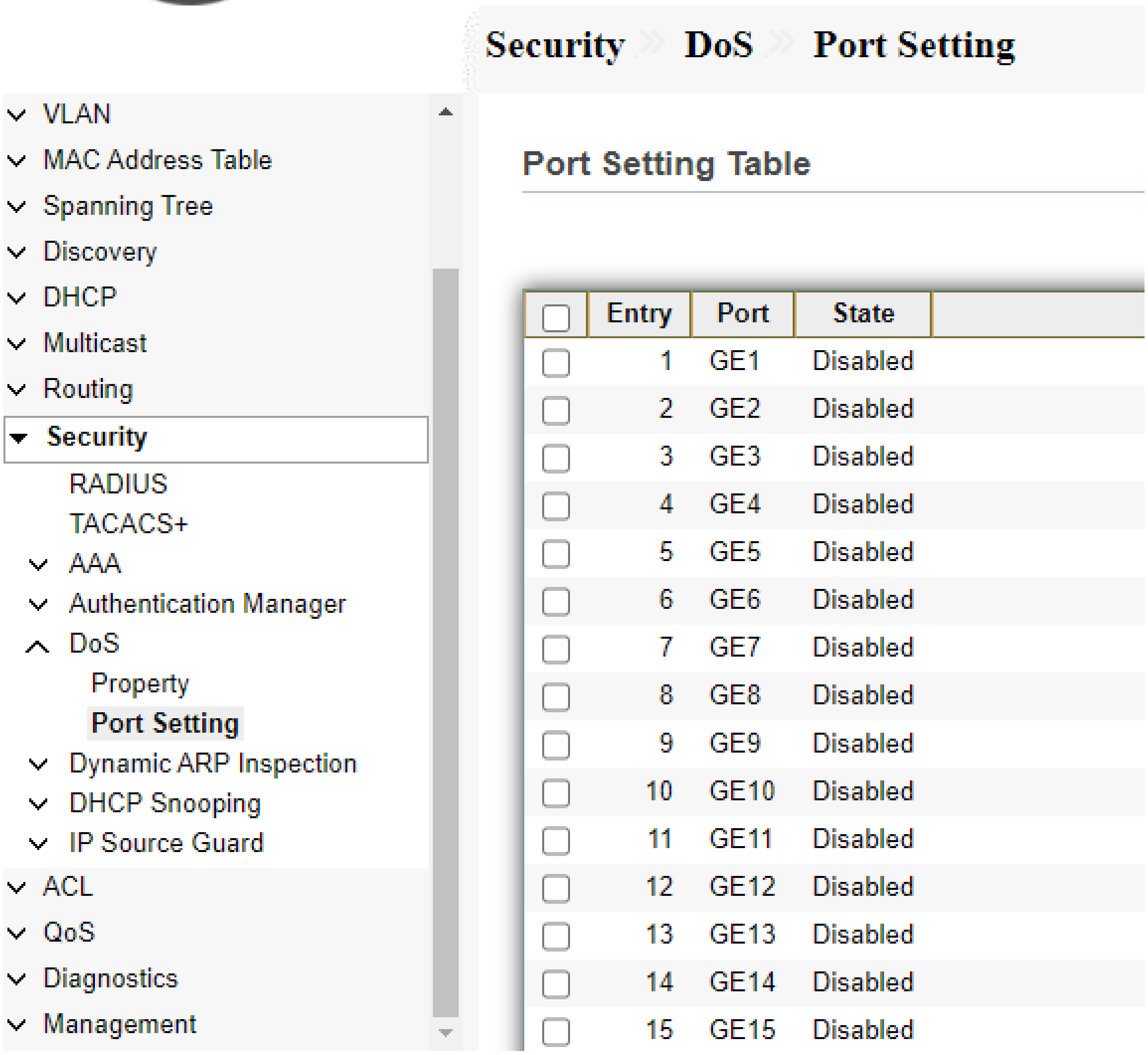
The DoS protection feature is a set of predefined rules that protect the network from malicious attacks. The DoS Security Suite Settings enables activating the security suite. A Denial of Service (DoS) attack is a hacker attempt to make a device unavailable to its users. DoS attacks saturate the device with external communication requests, so that it cannot respond to legitimate traffic. These attacks usually lead to a switch CPU overload. The Denial of Service (DoS) Prevention feature assists the system administrator in resisting such attacks.

To view and configure Dos Global Setting, click **Security >> Dos >> Property.**



POD	☑ Enable
Land	☑ Enable
UDP Blat	☑ Enable
TCP Blat	☑ Enable
DMAC = SMAC	☑ Enable
Null Scan Attack	☑ Enable
X-Mas Scan Attack	☑ Enable
TCP SYN-FIN Attack	☑ Enable
TCP SYN-RST Attack	☑ Enable
ICMP Fragment	☑ Enable
TCP-SYN	☑ Enable Note: Source Port < 1024
TCP Fragment	☑ Enable Note: Offset = 1
Ping Max Size	☑ Enable IPv4 ☑ Enable IPv6 512 Byte (0 - 65535, default 512)
TCP Min Hdr size	☑ Enable 20 Byte (0 - 31, default 20)
IPv6 Min Fragment	☑ Enable 1240 Byte (0 - 65535, default 1240)
Smurf Attack	☑ Enable 0 Netmask Length (0 - 32, default 0)

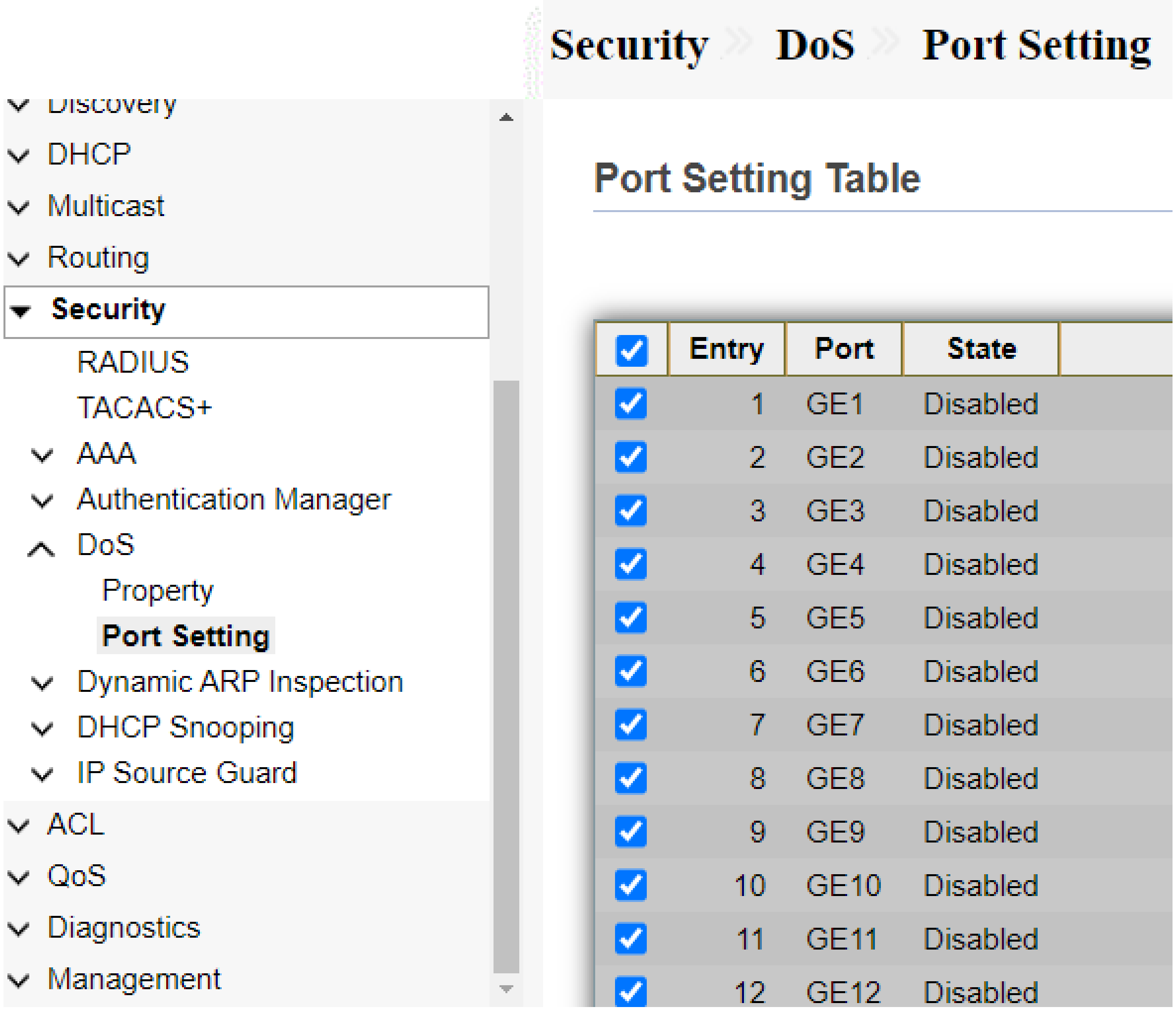
Fig 12.5.1 DoS property page



Port Setting Table

□	Entry	Port	State
□	1	GE1	Disabled
□	2	GE2	Disabled
□	3	GE3	Disabled
□	4	GE4	Disabled
□	5	GE5	Disabled
□	6	GE6	Disabled
□	7	GE7	Disabled
□	8	GE8	Disabled
□	9	GE9	Disabled
□	10	GE10	Disabled
□	11	GE11	Disabled
□	12	GE12	Disabled
□	13	GE13	Disabled
□	14	GE14	Disabled
□	15	GE15	Disabled

Fig 12.5.2 Default DoS Port Setting page

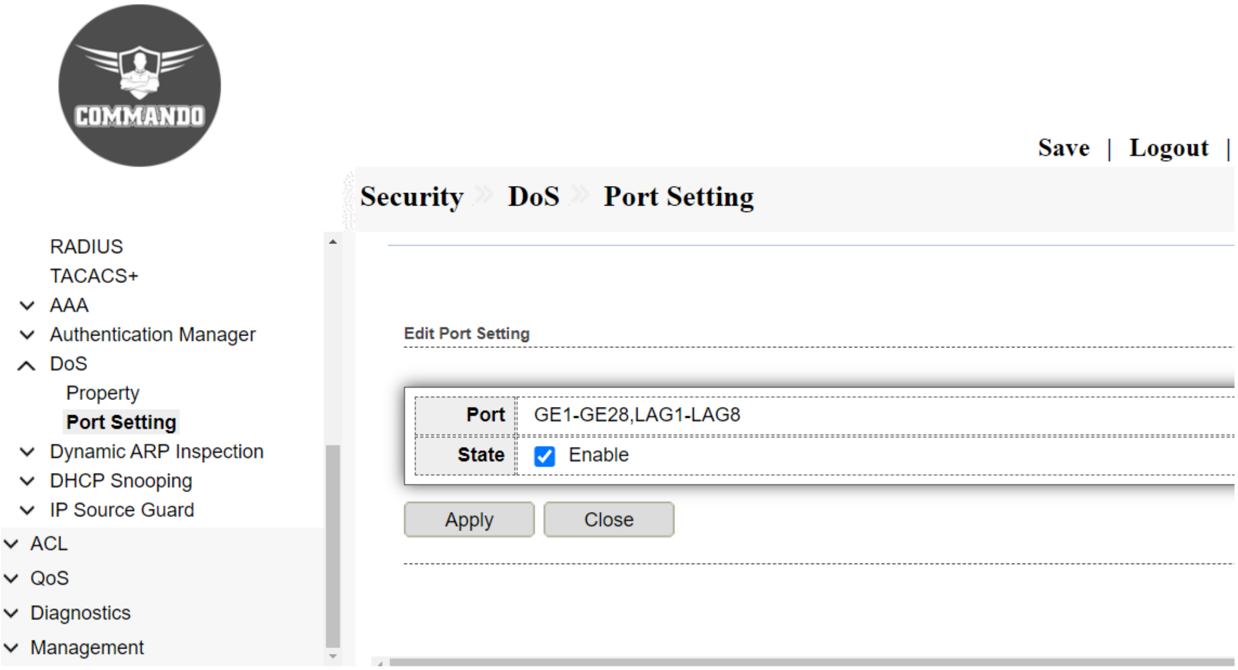


Security » DoS » Port Setting

Port Setting Table

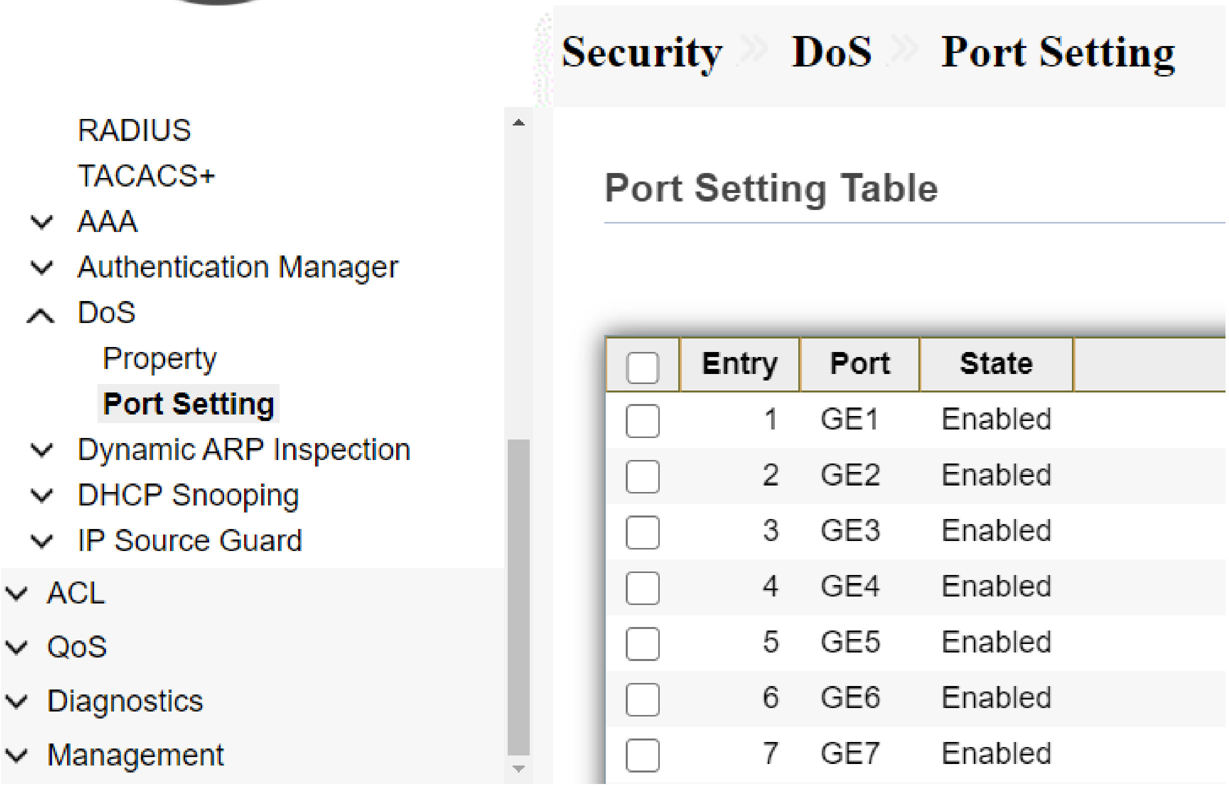
☑	Entry	Port	State
☑	1	GE1	Disabled
☑	2	GE2	Disabled
☑	3	GE3	Disabled
☑	4	GE4	Disabled
☑	5	GE5	Disabled
☑	6	GE6	Disabled
☑	7	GE7	Disabled
☑	8	GE8	Disabled
☑	9	GE9	Disabled
☑	10	GE10	Disabled
☑	11	GE11	Disabled
☑	12	GE12	Disabled

Fig 12.5.3 Selecting Port DoS Setting page



Port	GE1-GE28,LAG1-LAG8
State	☑ Enable

Fig 12.5.4 DoS Port Setting Table after enable all ports page



Security » DoS » Port Setting

Port Setting Table

□	Entry	Port	State
□	1	GE1	Enabled
□	2	GE2	Enabled
□	3	GE3	Enabled
□	4	GE4	Enabled
□	5	GE5	Enabled
□	6	GE6	Enabled
□	7	GE7	Enabled

Fig 12.5.5 DoS Port Setting Table after enabled ports page

12.6 Dynamic ARP Inspection

Dynamic ARP Inspection (DAI) is a security feature that validates Address Resolution Protocol (ARP) packets in a network. DAI allows a network administrator to intercept, log, and discard ARP packets with invalid MAC address to IP address bindings. This capability protects the network from certain "man-in-the-middle" attacks. Use the Dynamic ARP Inspection pages to configure settings of Dynamic ARP Inspection. This page allow user to configure global and per interface settings of Dynamic ARP Inspection.

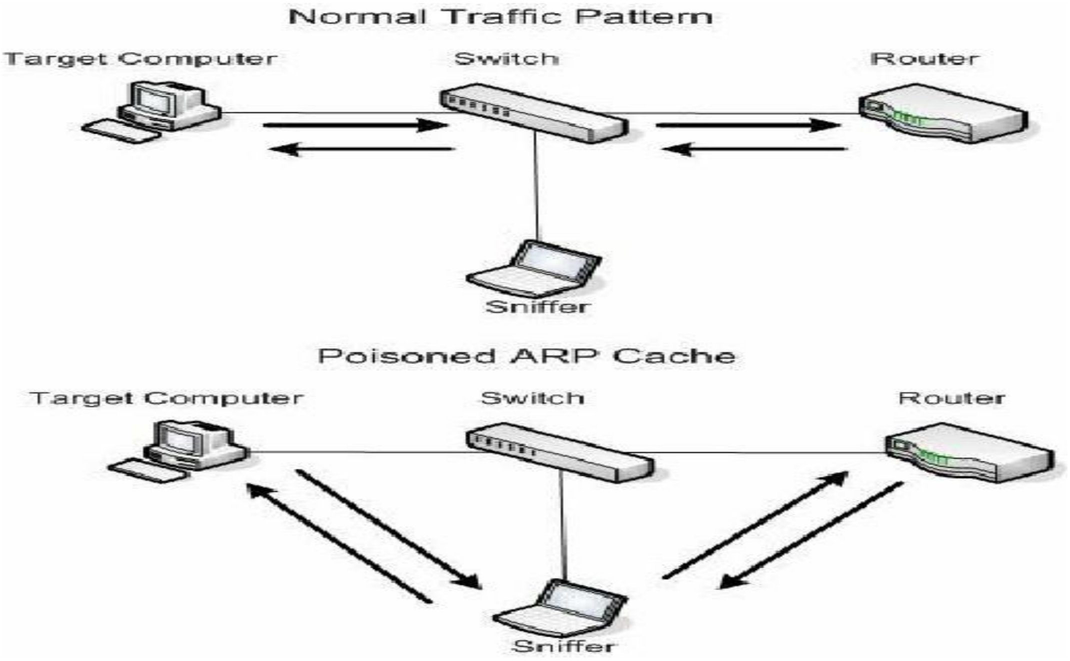


Fig 12.6.1 Dynamic ARP Inspection (DAI) Poisoned ARP Cache Concept

12.6.1 Dynamic ARP Inspection

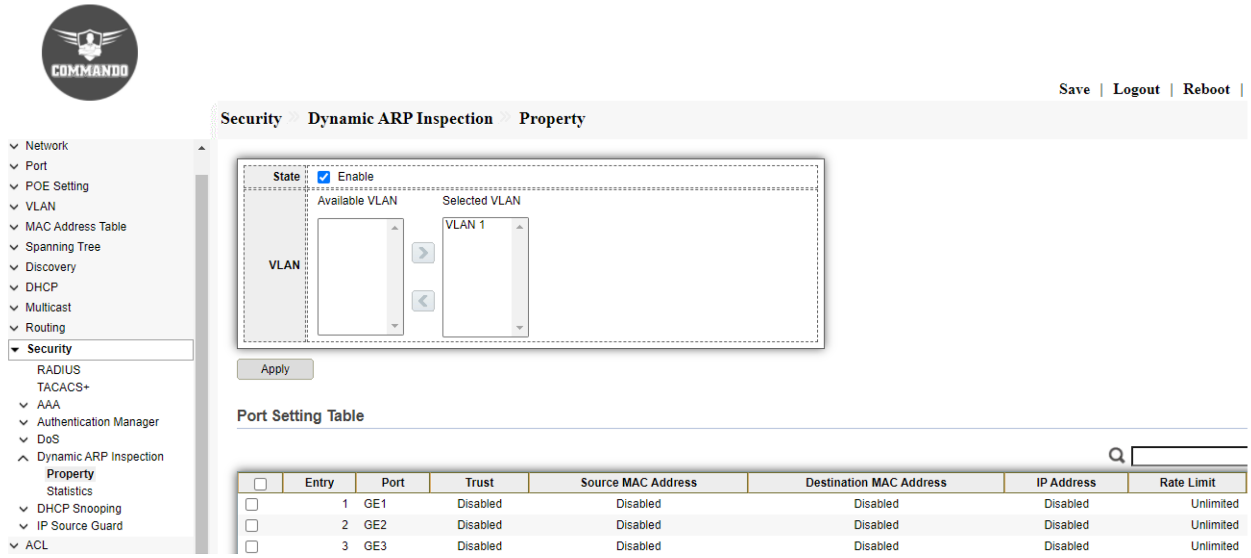
ARP inspection is performed only on untrusted interfaces. ARP packets that are received on the trusted interface are simply forwarded. If the ARP Packet Validation option is selected (Properties page), the following additional validation checks are performed:

Source MAC: Compares the packet's source MAC address in the Ethernet header against the sender's MAC address in the ARP request. This check is performed on both ARP requests and responses.

Destination MAC: compares the packet's destination MAC address in the Ethernet header against the destination interface's MAC address. This check is performed for ARP responses.

IP Addresses: Compares the ARP body for invalid and unexpected IP addresses. Addresses include 0.0.0.0

To view and configure Dynamic ARP Inspection Setting, , click **Security >> Dynamic ARP Inspection >> Property.**



Security » Dynamic ARP Inspection » Property

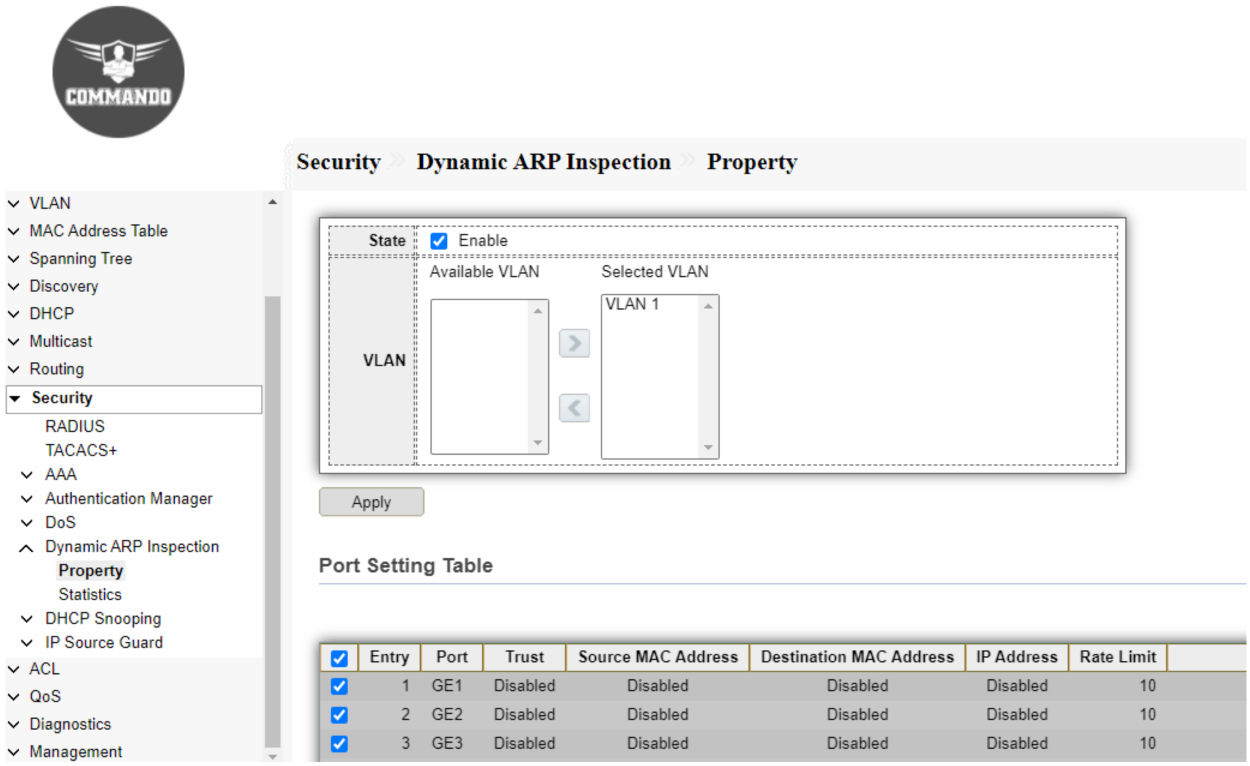
State ☑ Enable

VLAN — Available VLAN: (none) — Selected VLAN: VLAN 1

Port Setting Table

☐	Entry	Port	Trust	Source MAC Address	Destination MAC Address	IP Address	Rate Limit
☐	1	GE1	Disabled	Disabled	Disabled	Disabled	Unlimited
☐	2	GE2	Disabled	Disabled	Disabled	Disabled	Unlimited
☐	3	GE3	Disabled	Disabled	Disabled	Disabled	Unlimited

Fig 12.6.2 Dynamic ARP Inspection (DAI) port setting table page

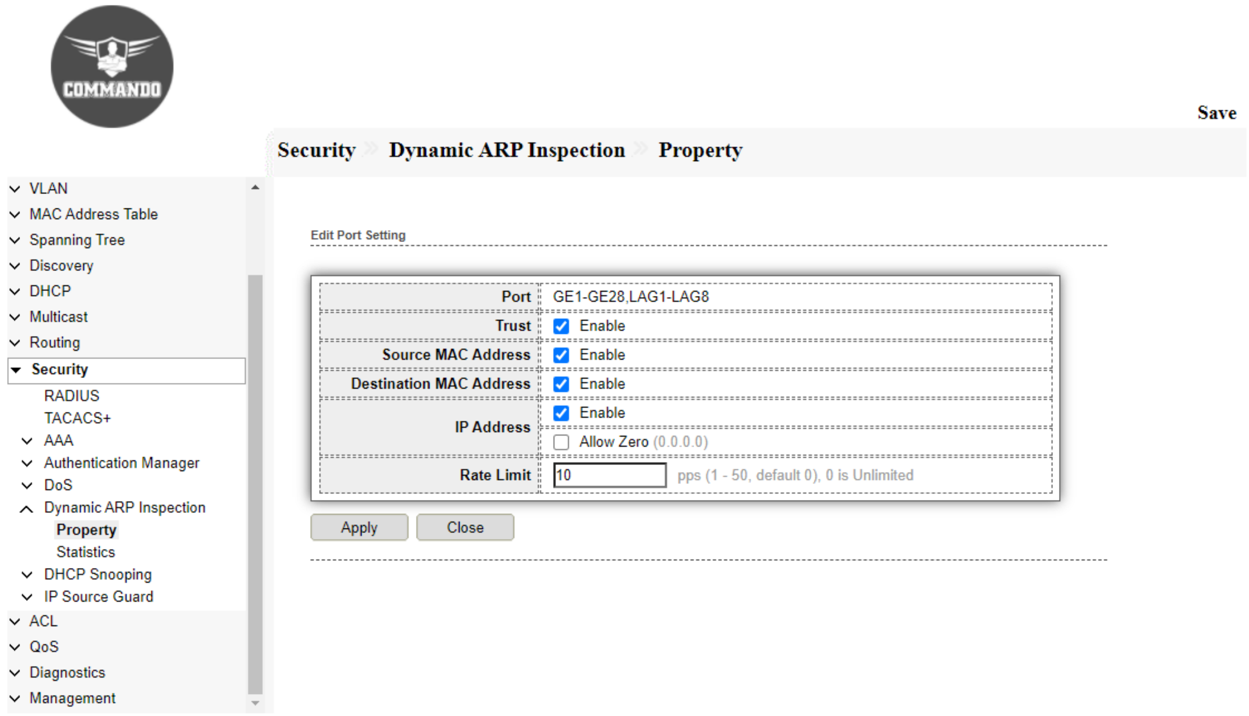


State	☑ Enable
VLAN	Available VLAN: Selected VLAN: VLAN 1

Port Setting Table

☑	Entry	Port	Trust	Source MAC Address	Destination MAC Address	IP Address	Rate Limit
☑	1	GE1	Disabled	Disabled	Disabled	Disabled	10
☑	2	GE2	Disabled	Disabled	Disabled	Disabled	10
☑	3	GE3	Disabled	Disabled	Disabled	Disabled	10

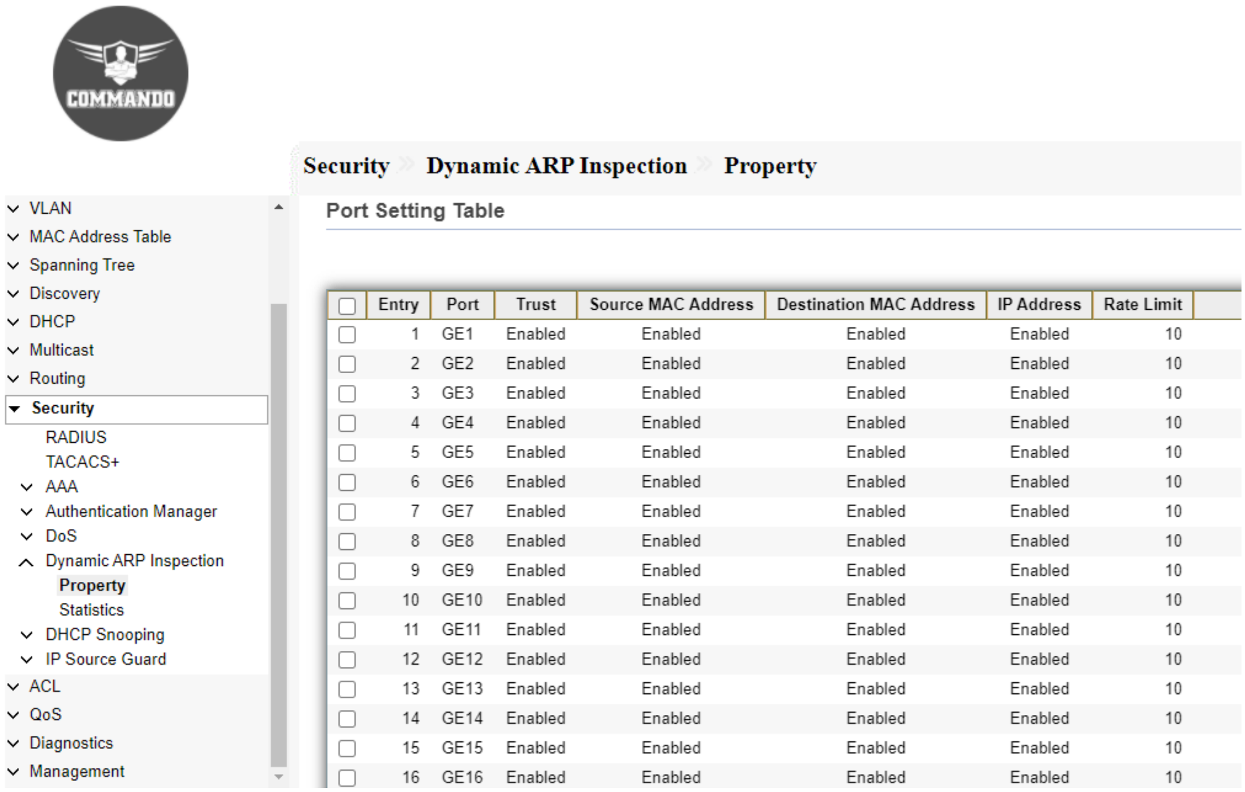
Fig 12.6.3 Dynamic ARP Inspection (DAI) port selection page



Edit Port Setting

Port	GE1-GE28,LAG1-LAG8
Trust	☑ Enable
Source MAC Address	☑ Enable
Destination MAC Address	☑ Enable
IP Address	☑ Enable □ Allow Zero (0.0.0.0)
Rate Limit	10 pps (1 - 50, default 0), 0 is Unlimited

Fig 12.6.4 Dynamic ARP Inspection (DAI) Edit Port Setting page



Security » Dynamic ARP Inspection » Property

Port Setting Table

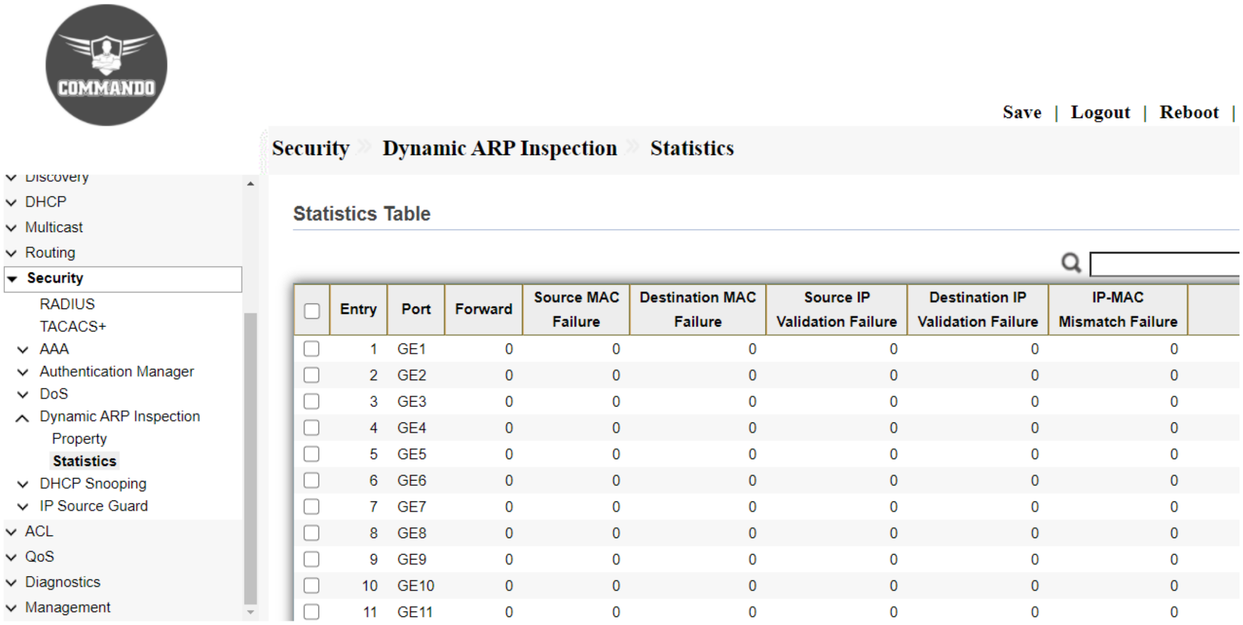
☐	Entry	Port	Trust	Source MAC Address	Destination MAC Address	IP Address	Rate Limit
☐	1	GE1	Enabled	Enabled	Enabled	Enabled	10
☐	2	GE2	Enabled	Enabled	Enabled	Enabled	10
☐	3	GE3	Enabled	Enabled	Enabled	Enabled	10
☐	4	GE4	Enabled	Enabled	Enabled	Enabled	10
☐	5	GE5	Enabled	Enabled	Enabled	Enabled	10
☐	6	GE6	Enabled	Enabled	Enabled	Enabled	10
☐	7	GE7	Enabled	Enabled	Enabled	Enabled	10
☐	8	GE8	Enabled	Enabled	Enabled	Enabled	10
☐	9	GE9	Enabled	Enabled	Enabled	Enabled	10
☐	10	GE10	Enabled	Enabled	Enabled	Enabled	10
☐	11	GE11	Enabled	Enabled	Enabled	Enabled	10
☐	12	GE12	Enabled	Enabled	Enabled	Enabled	10
☐	13	GE13	Enabled	Enabled	Enabled	Enabled	10
☐	14	GE14	Enabled	Enabled	Enabled	Enabled	10
☐	15	GE15	Enabled	Enabled	Enabled	Enabled	10
☐	16	GE16	Enabled	Enabled	Enabled	Enabled	10

Fig 12.6.5 DAI Port Setting Table page after enabling ports page

12.6.2 Dynamic ARP Inspection (DAI) Statistics

This page allow user to browse all statistics that recorded by Dynamic ARP Inspection function. Displays statistics for forwarded, dropped, MAC validation failure, IP validation failure, ACL permitted and denied, and DHCP permitted and denied packets for the specified VLAN. If no VLANs are specified or if a range is specified, displays information only for VLANs with DAI enabled (active).

To view Dynamic ARP Inspection Statistics, click **Security >> Dynamic ARP Inspection >> Statistics.**



Statistics Table

□	Entry	Port	Forward	Source MAC Failure	Destination MAC Failure	Source IP Validation Failure	Destination IP Validation Failure	IP-MAC Mismatch Failure
□	1	GE1	0	0	0	0	0	0
□	2	GE2	0	0	0	0	0	0
□	3	GE3	0	0	0	0	0	0
□	4	GE4	0	0	0	0	0	0
□	5	GE5	0	0	0	0	0	0
□	6	GE6	0	0	0	0	0	0
□	7	GE7	0	0	0	0	0	0
□	8	GE8	0	0	0	0	0	0
□	9	GE9	0	0	0	0	0	0
□	10	GE10	0	0	0	0	0	0
□	11	GE11	0	0	0	0	0	0

Fig 12.6.7 Dynamic ARP Inspection (DAI) Statistics Table page

12.7 DHCP Snooping

DHCP Snooping is a layer 2 security technology incorporated into the operating system of a capable network switch that drops DHCP traffic determined to be unacceptable. DHCP Snooping prevents unauthorized (rogue) DHCP servers offering IP addresses to DHCP clients. This page allow user to configure global and per interface settings of DHCP Snooping.

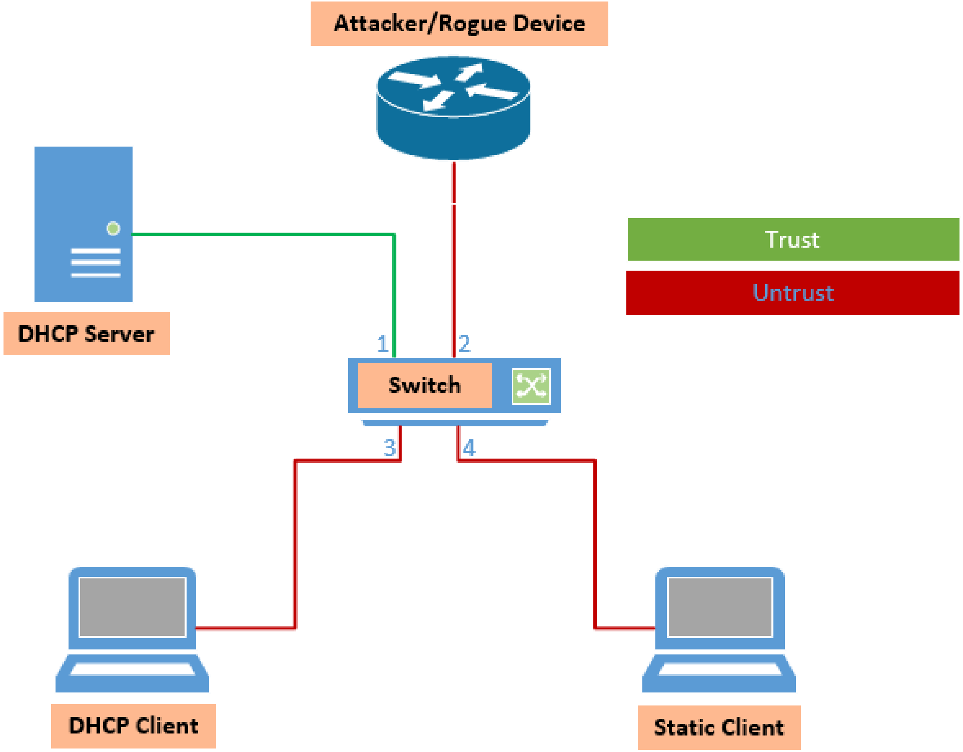


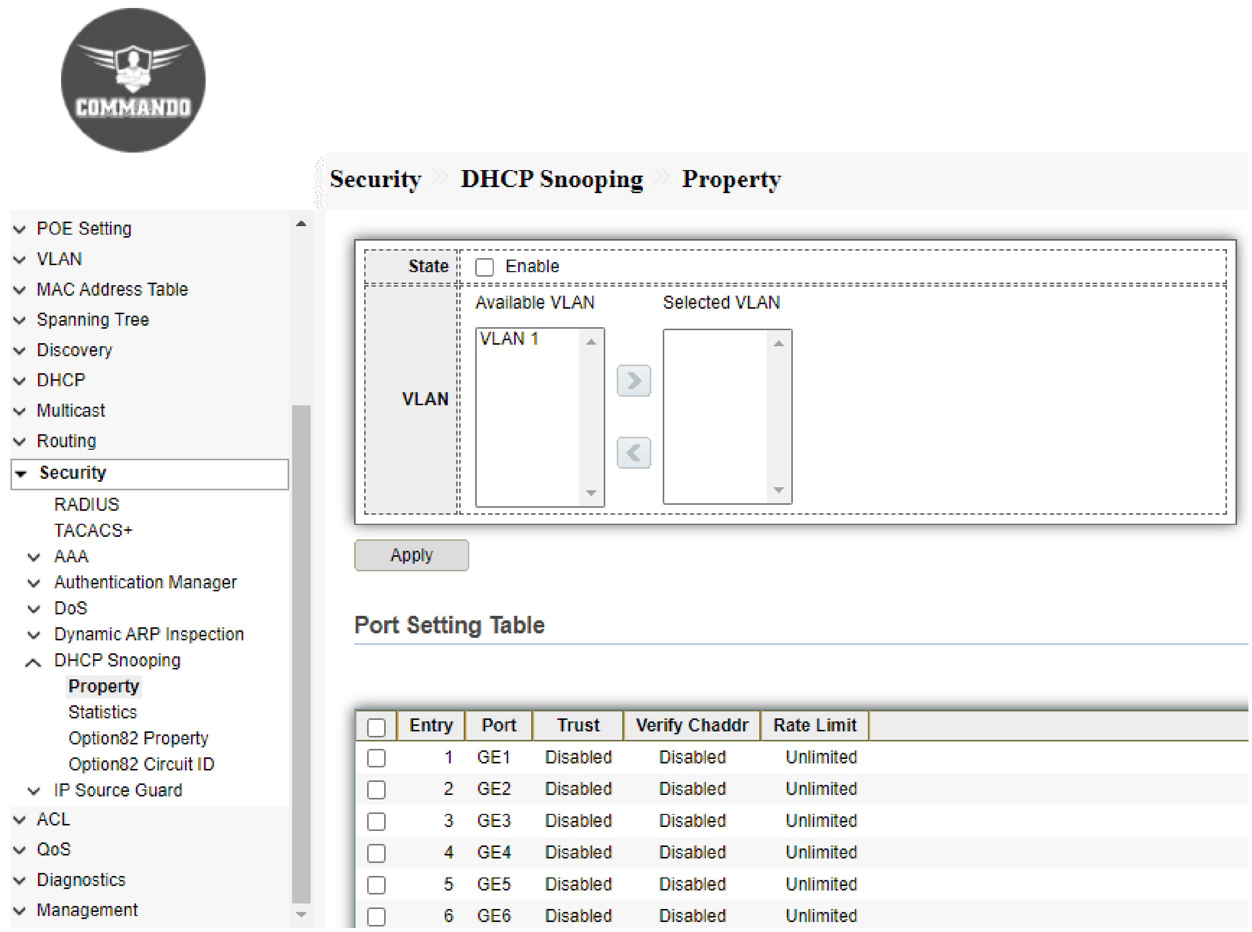
Fig 12.7.1 DHCP Snooping Concept

12.8.1 DHCP Snooping Property

DHCP snooping provides a security mechanism to prevent receiving false DHCP response packets and to log DHCP addresses. It does this by treating ports on the device as either trusted or untrusted. A trusted port is a port that is connected to a DHCP server and is allowed to assign DHCP addresses. DHCP messages received on trusted ports are allowed to pass through the device.

An untrusted port is a port that is not allowed to assign DHCP addresses. By default, all ports are considered untrusted until you declare them trusted.

To view and configure DHCP Snooping, click **Security >> DHCP Snooping >> Property.**



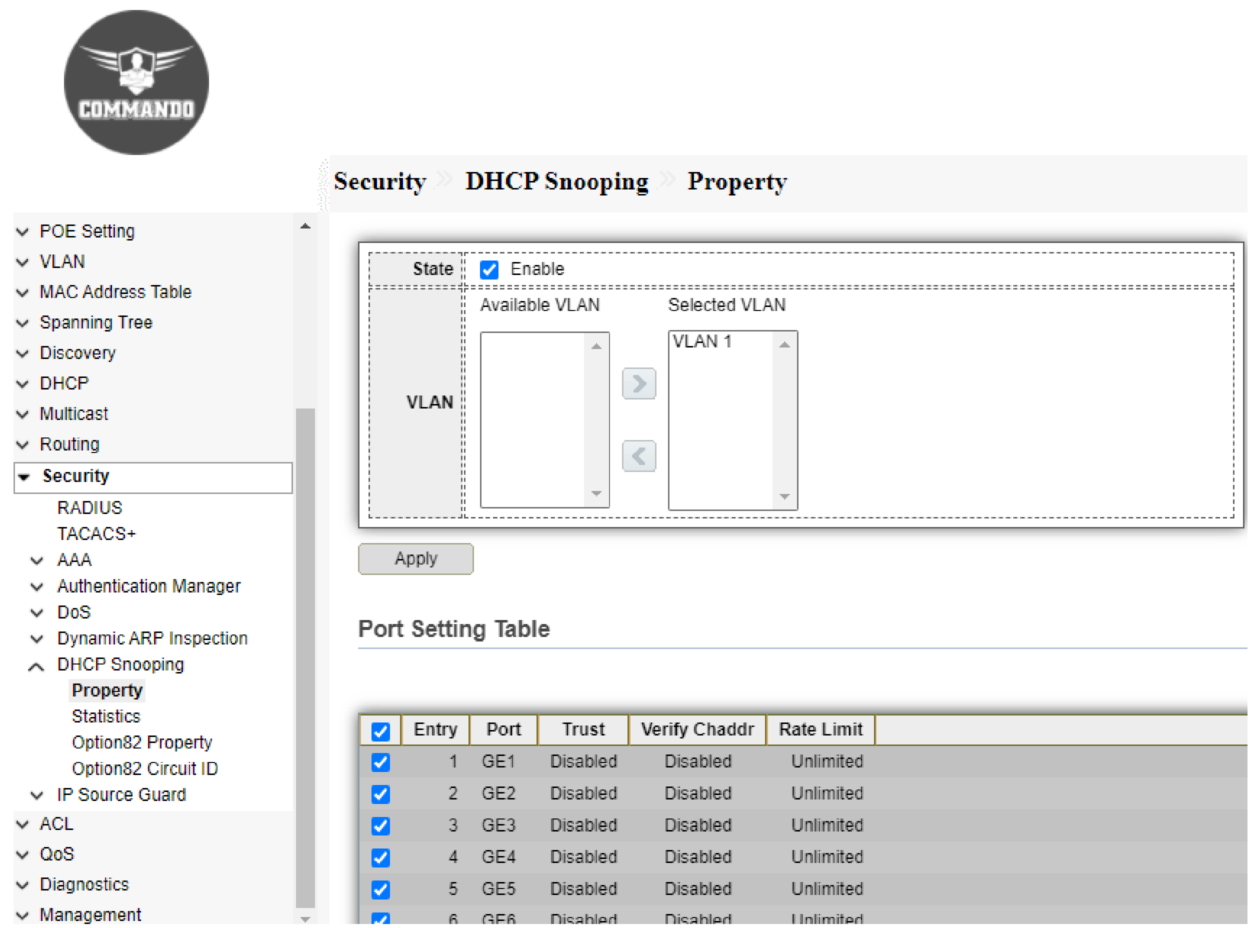
State □ Enable

VLAN Available VLAN: VLAN 1 — Selected VLAN:

Port Setting Table

□	Entry	Port	Trust	Verify Chaddr	Rate Limit
□	1	GE1	Disabled	Disabled	Unlimited
□	2	GE2	Disabled	Disabled	Unlimited
□	3	GE3	Disabled	Disabled	Unlimited
□	4	GE4	Disabled	Disabled	Unlimited
□	5	GE5	Disabled	Disabled	Unlimited
□	6	GE6	Disabled	Disabled	Unlimited

Fig 12.8.1 Default DHCP Snooping Port setting Table page

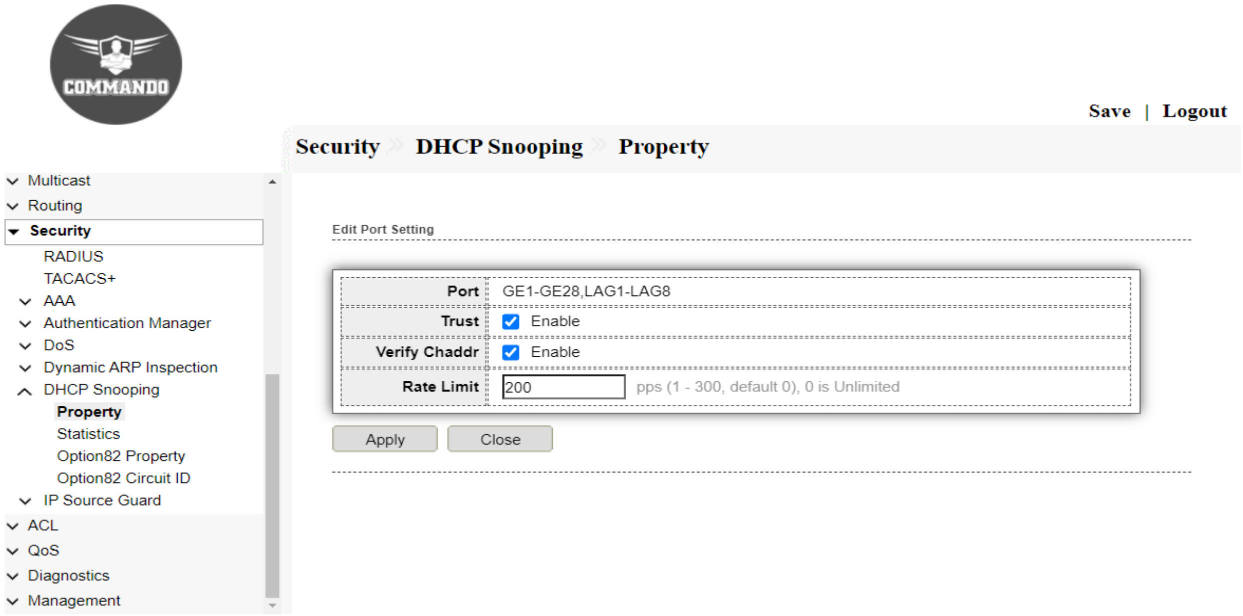


State	☑ Enable
VLAN	Available VLAN: (empty) Selected VLAN: VLAN 1

Port Setting Table

☑	Entry	Port	Trust	Verify Chaddr	Rate Limit
☑	1	GE1	Disabled	Disabled	Unlimited
☑	2	GE2	Disabled	Disabled	Unlimited
☑	3	GE3	Disabled	Disabled	Unlimited
☑	4	GE4	Disabled	Disabled	Unlimited
☑	5	GE5	Disabled	Disabled	Unlimited
☑	6	GE6	Disabled	Disabled	Unlimited

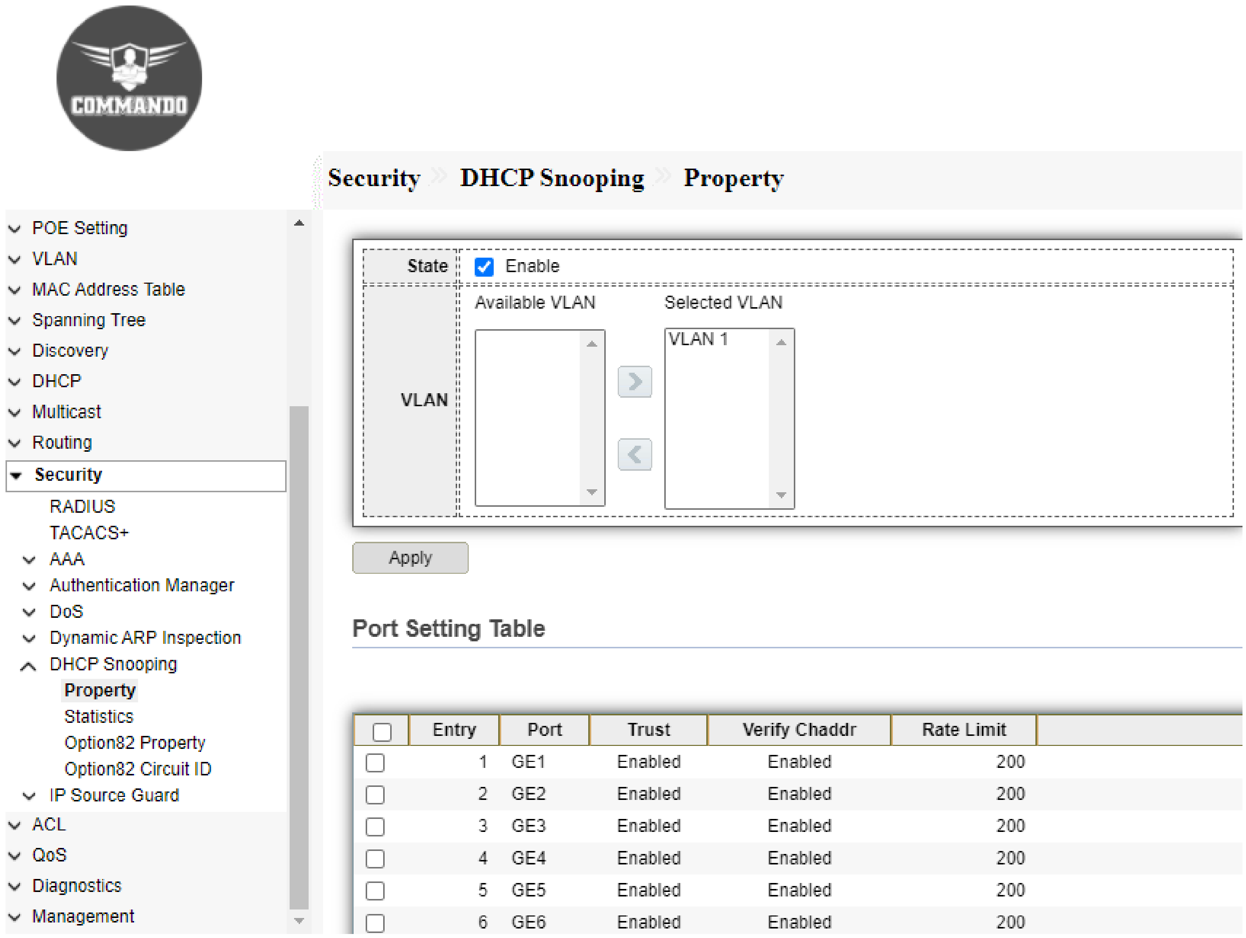
Fig 12.8.2 DHCP Snooping for selected Port setting page



Edit Port Setting

Port	GE1-GE28,LAG1-LAG8
Trust	☑ Enable
Verify Chaddr	☑ Enable
Rate Limit	200 pps (1 - 300, default 0), 0 is Unlimited

Fig 12.8.3 Created VLAN DHCP Snooping State page



Security » DHCP Snooping » Property

State ☑ Enable

VLAN: Available VLAN — (empty); Selected VLAN — VLAN 1

Port Setting Table

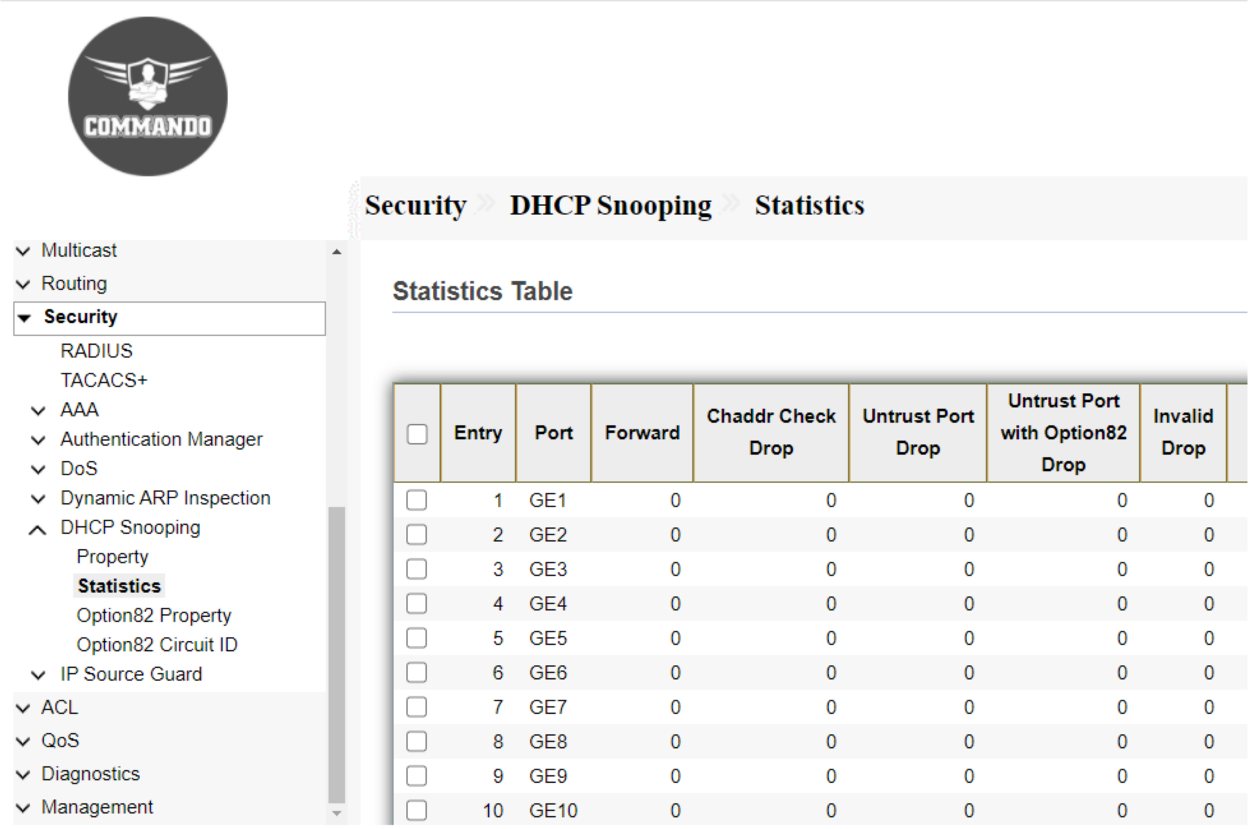
□	Entry	Port	Trust	Verify Chaddr	Rate Limit
□	1	GE1	Enabled	Enabled	200
□	2	GE2	Enabled	Enabled	200
□	3	GE3	Enabled	Enabled	200
□	4	GE4	Enabled	Enabled	200
□	5	GE5	Enabled	Enabled	200
□	6	GE6	Enabled	Enabled	200

Fig 12.8.4 DHCP Snooping Port setting Table After Enabling Ports page

12.8.2 Statistics

This page allows users to browse all statistics that's recorded by DHCP snooping function. Display information about trusted ports and display DHCP snooping trust.

To view the DHCP Snooping Statistics, click **Security >> DHCP Snooping >> Statistics.**



Statistics Table

□	Entry	Port	Forward	Chaddr Check Drop	Untrust Port Drop	Untrust Port with Option82 Drop	Invalid Drop
□	1	GE1	0	0	0	0	0
□	2	GE2	0	0	0	0	0
□	3	GE3	0	0	0	0	0
□	4	GE4	0	0	0	0	0
□	5	GE5	0	0	0	0	0
□	6	GE6	0	0	0	0	0
□	7	GE7	0	0	0	0	0
□	8	GE8	0	0	0	0	0
□	9	GE9	0	0	0	0	0
□	10	GE10	0	0	0	0	0

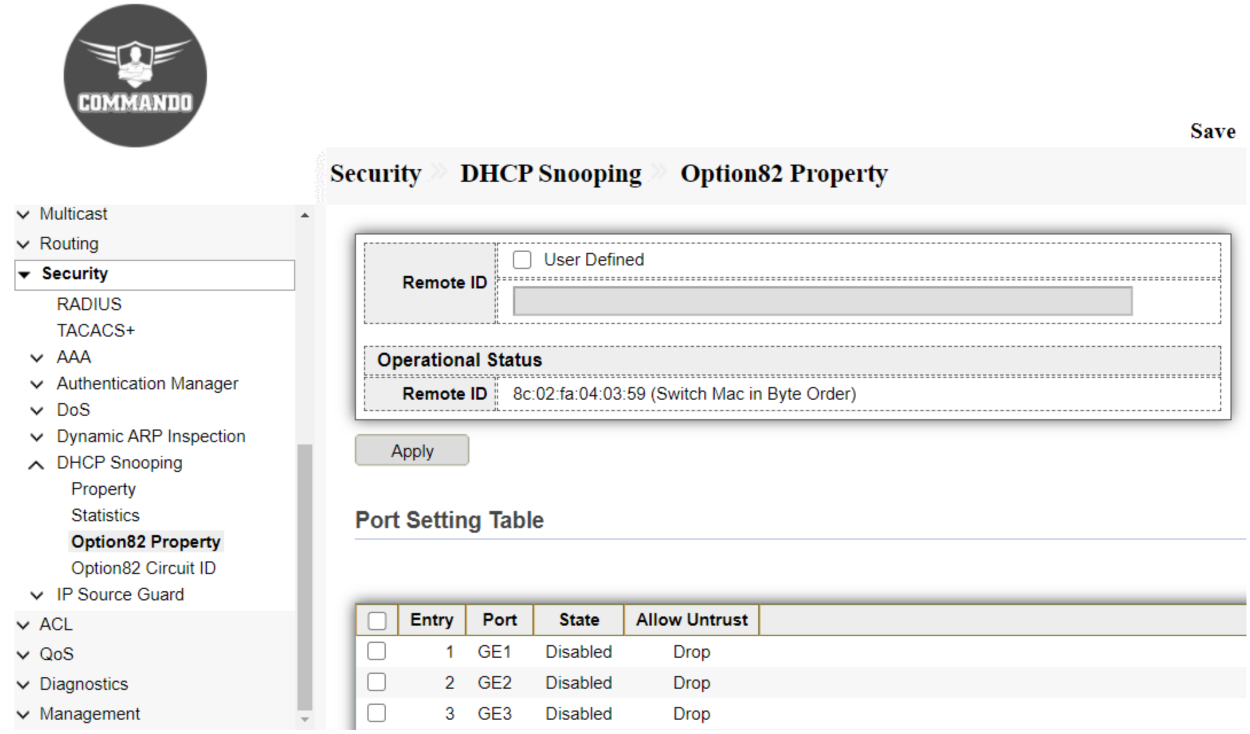
Fig 12.8.5 DHCP Snooping statistics Table page

12.8.3 Option82 Property

Option 82 (DHCP Relay Agent Information Option) passes port and agent information to a central DHCP server, indicating where an assigned IP address physically connects to the network.

The main goal of option 82 is to help to the DHCP server select the best IP subnet (network pool) from which to obtain an IP address. This DHCP Snooping Option82 allow user to set string of DHCP option82 remote ID filed. The string will attach in option82.

To view and configure DHCP Snooping Option82 Property, click **Security >> DHCP Snooping >> Option82 Property.**

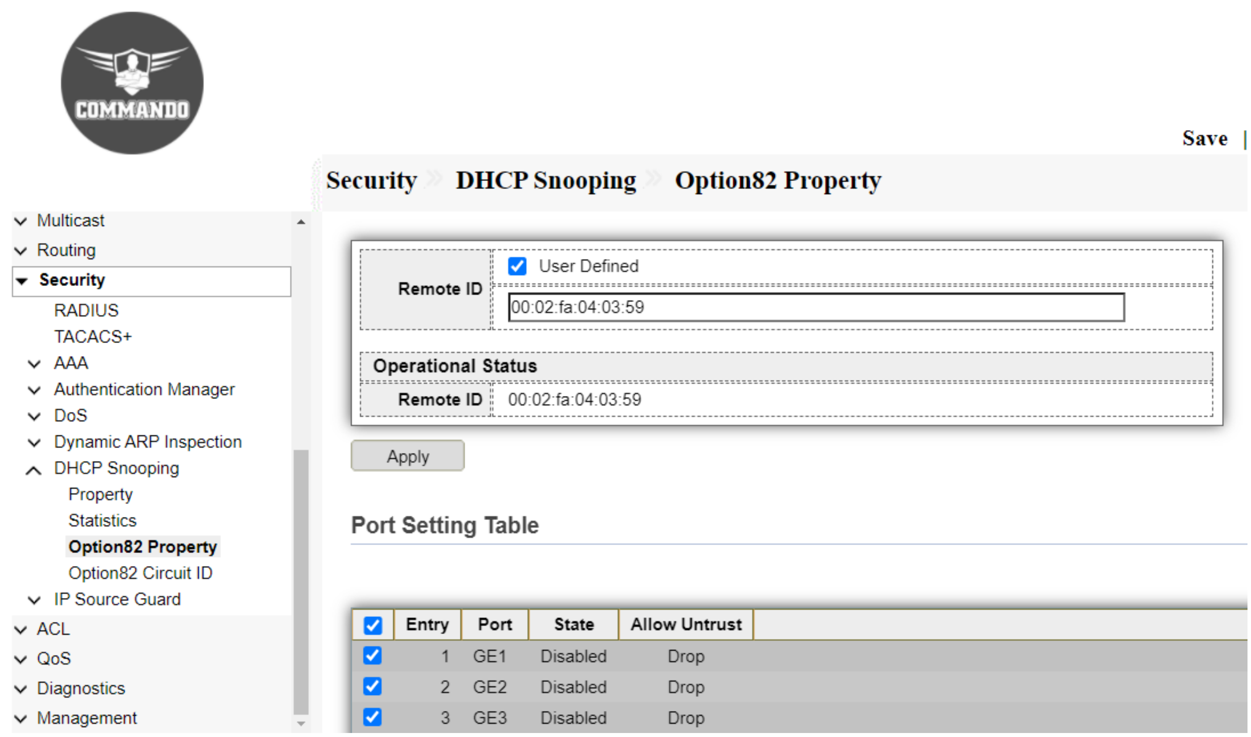


Remote ID	□ User Defined
Operational Status	
Remote ID	8c:02:fa:04:03:59 (Switch Mac in Byte Order)

Port Setting Table

□	Entry	Port	State	Allow Untrust
□	1	GE1	Disabled	Drop
□	2	GE2	Disabled	Drop
□	3	GE3	Disabled	Drop

Fig 12.8.6 Default DHCP Snooping Option82 Port setting table page



Remote ID	☑ User Defined 00:02:fa:04:03:59

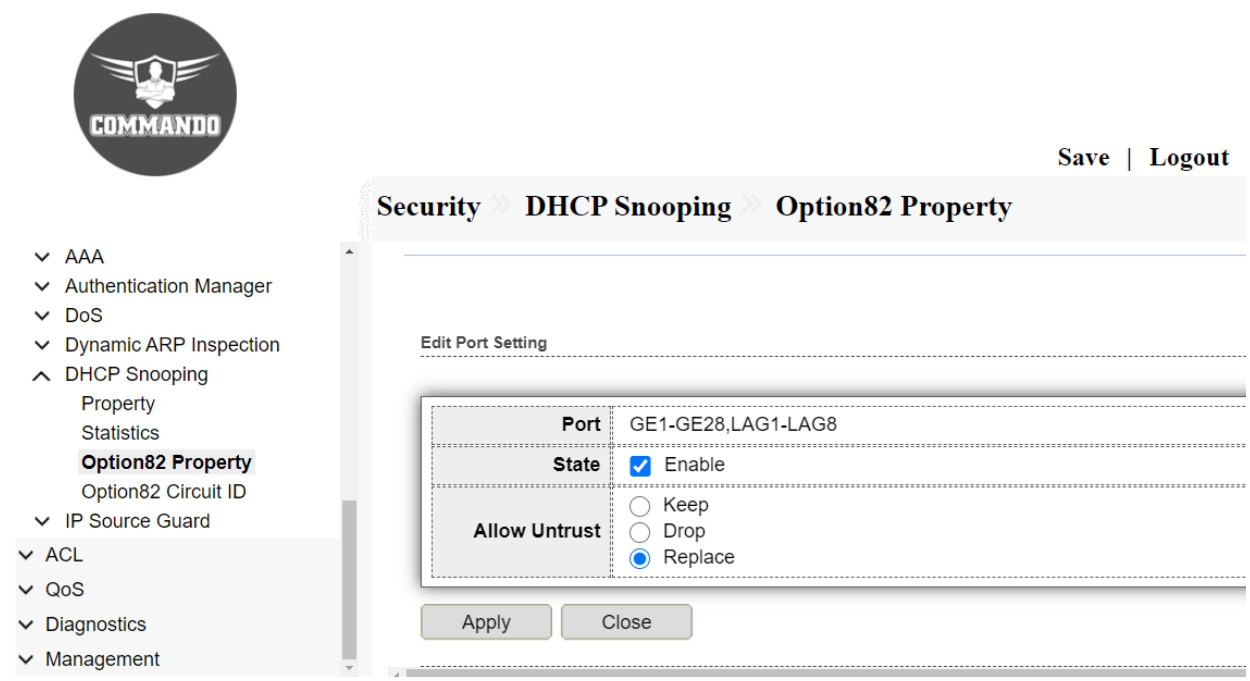
Operational Status

Remote ID	00:02:fa:04:03:59

Port Setting Table

☑	Entry	Port	State	Allow Untrust
☑	1	GE1	Disabled	Drop
☑	2	GE2	Disabled	Drop
☑	3	GE3	Disabled	Drop

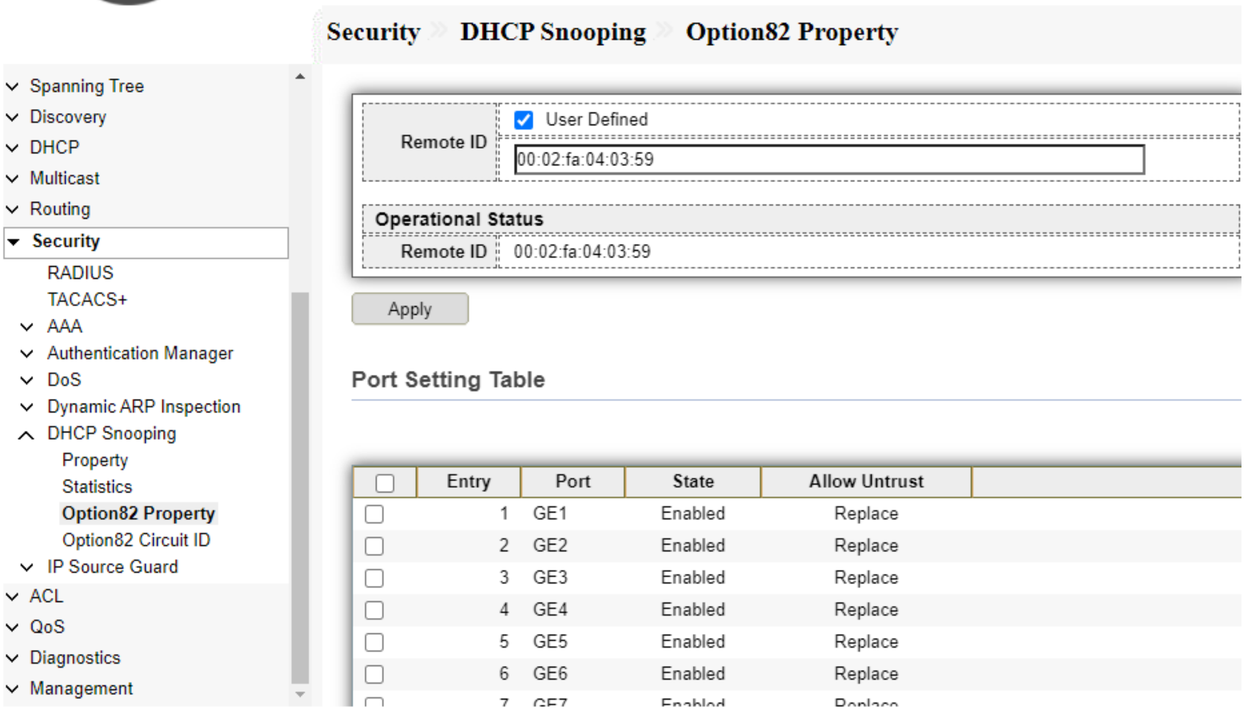
Fig 12.8.7 DHCP Snooping Option82 Port Selecting Ports page



Edit Port Setting

Port	GE1-GE28,LAG1-LAG8
State	☑ Enable
Allow Untrust	○ Keep ○ Drop ● Replace

Fig 12.8.8 DHCP Snooping Option82 Edit Port Setting page



Security » DHCP Snooping » Option82 Property

Remote ID	☑ User Defined 00:02:fa:04:03:59

Operational Status

Remote ID	00:02:fa:04:03:59

Apply

Port Setting Table

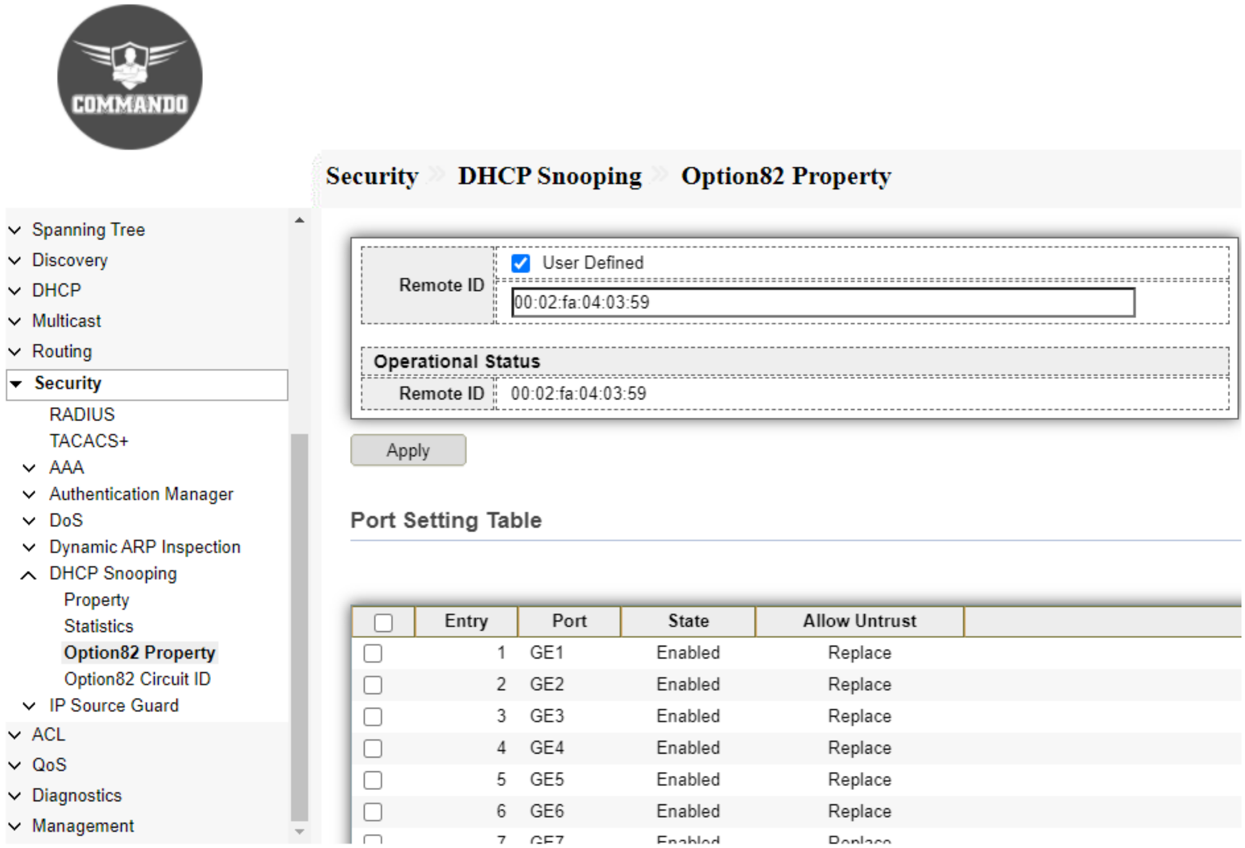
□	Entry	Port	State	Allow Untrust
□	1	GE1	Enabled	Replace
□	2	GE2	Enabled	Replace
□	3	GE3	Enabled	Replace
□	4	GE4	Enabled	Replace
□	5	GE5	Enabled	Replace
□	6	GE6	Enabled	Replace
□	7	GE7	Enabled	Replace

Fig 12.8.9 DHCP Snooping Option82 Edit Port Setting Table page after Enabling Ports page

12.8.4 Option82 Circuit ID

This page allow user to set string of DHCP option82 circuit ID filed. The string would attach in option82 if option inserted.

To view and configure DHCP Snooping Option82 Circuit ID, click **Security >> DHCP Snooping >> Option82 Circuit ID.**



Security » DHCP Snooping » Option82 Property

Remote ID ☑ User Defined

00:02:fa:04:03:59

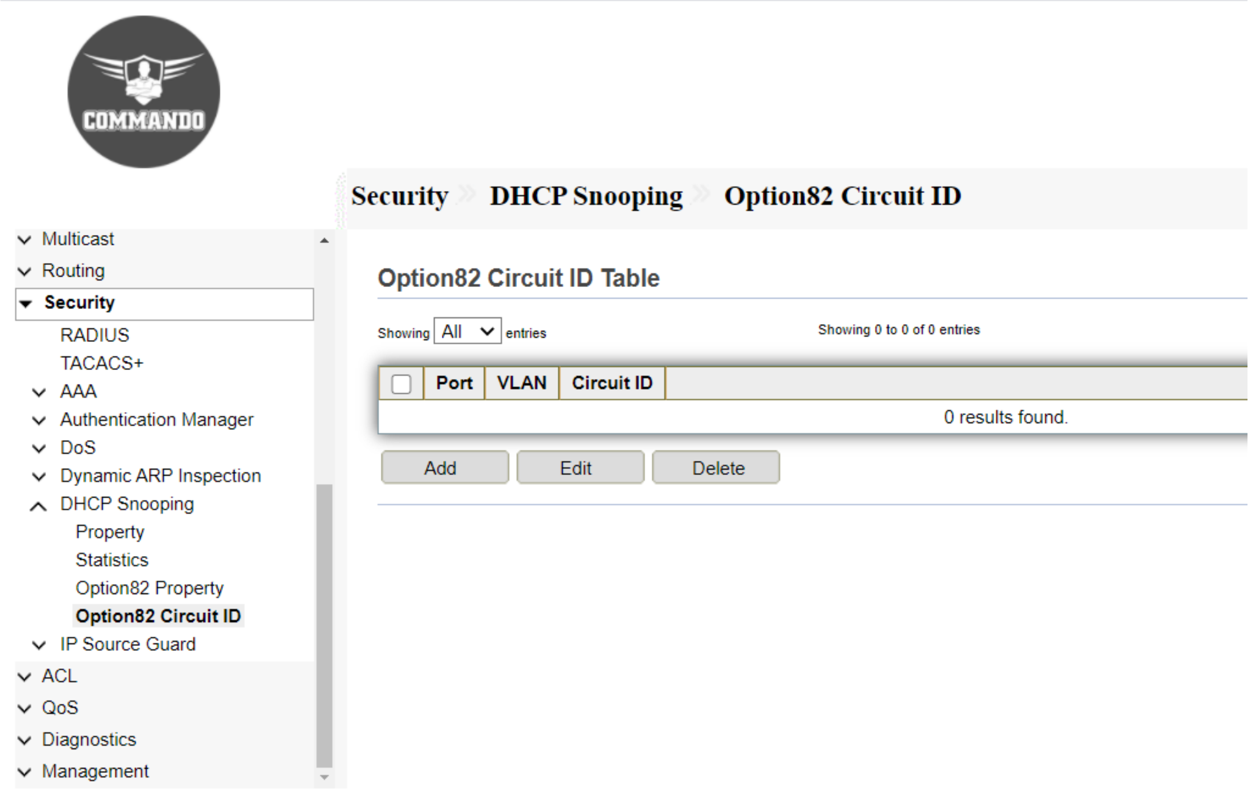
Operational Status

Remote ID 00:02:fa:04:03:59

Port Setting Table

□	Entry	Port	State	Allow Untrust
□	1	GE1	Enabled	Replace
□	2	GE2	Enabled	Replace
□	3	GE3	Enabled	Replace
□	4	GE4	Enabled	Replace
□	5	GE5	Enabled	Replace
□	6	GE6	Enabled	Replace
□	7	GE7	Enabled	Replace

Fig 12.8.10 DHCP Snooping Option82 Circuit ID Table page



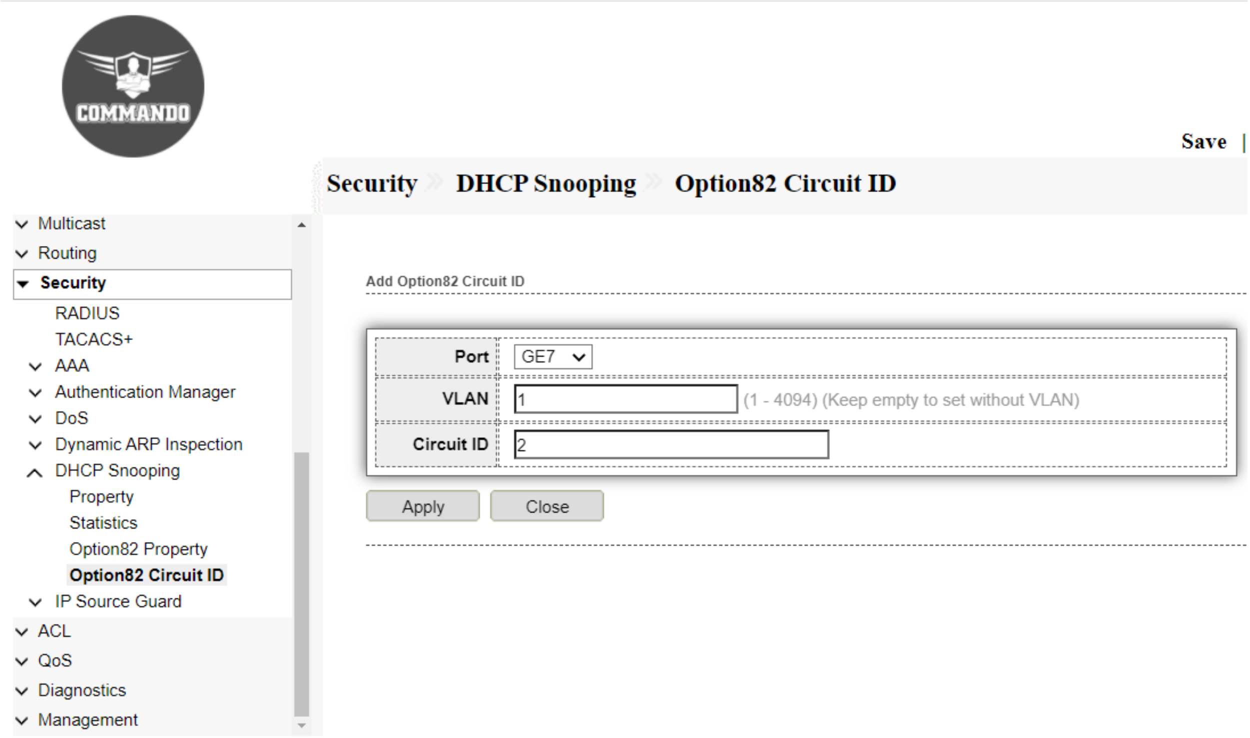
Option82 Circuit ID Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Port	VLAN	Circuit ID
0 results found.			

Fig 12.8.11 DHCP Snooping Add Option82 Circuit ID page



Add Option82 Circuit ID

Port	GE7
VLAN	1 (1 - 4094) (Keep empty to set without VLAN)
Circuit ID	2

Fig 12.8.12 DHCP SnoopingOption82 Circuit ID Table after enabling GE7 port page

12.9 IP Source Guard

IP Source Guard is a security feature that can be used to prevent traffic attacks caused when a host tries to use the IP address of its neighbor. When IP Source Guard is enabled, the device only transmits client IP traffic to IP addresses contained in the DHCP Snooping Binding database.

This includes both addresses added by DHCP Snooping and manually added entries. If the packet matches an entry in the database, the device forwards it. If not, it is dropped.

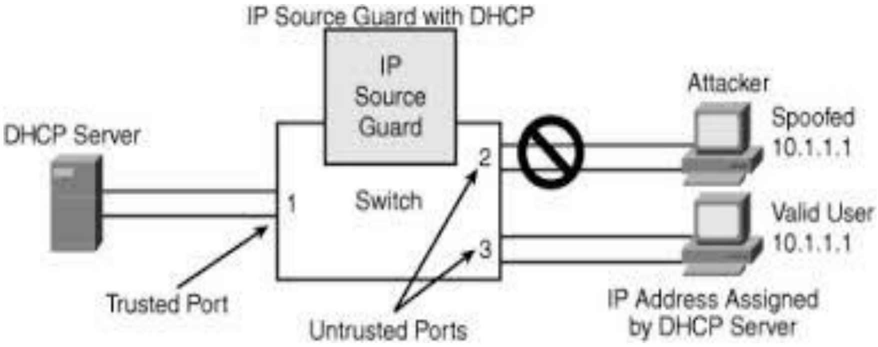
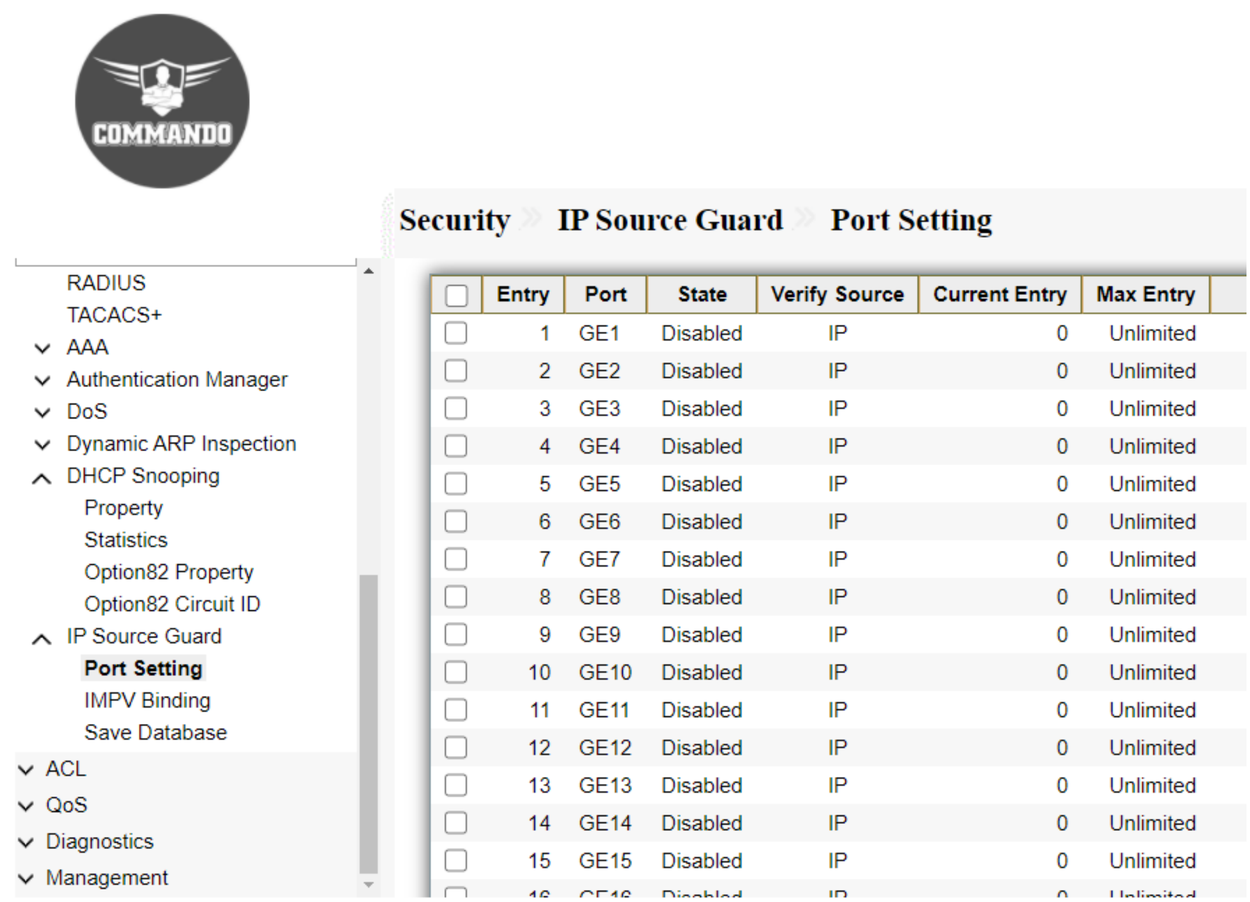


Fig 12.9.1 IP Source Guard concept

12.9.1 IP Source Guard Port Setting

Use the IP Source Guard pages to configure settings of IP Source Guard. Use the IP Source Guard pages to configure settings of IP Source Guard.

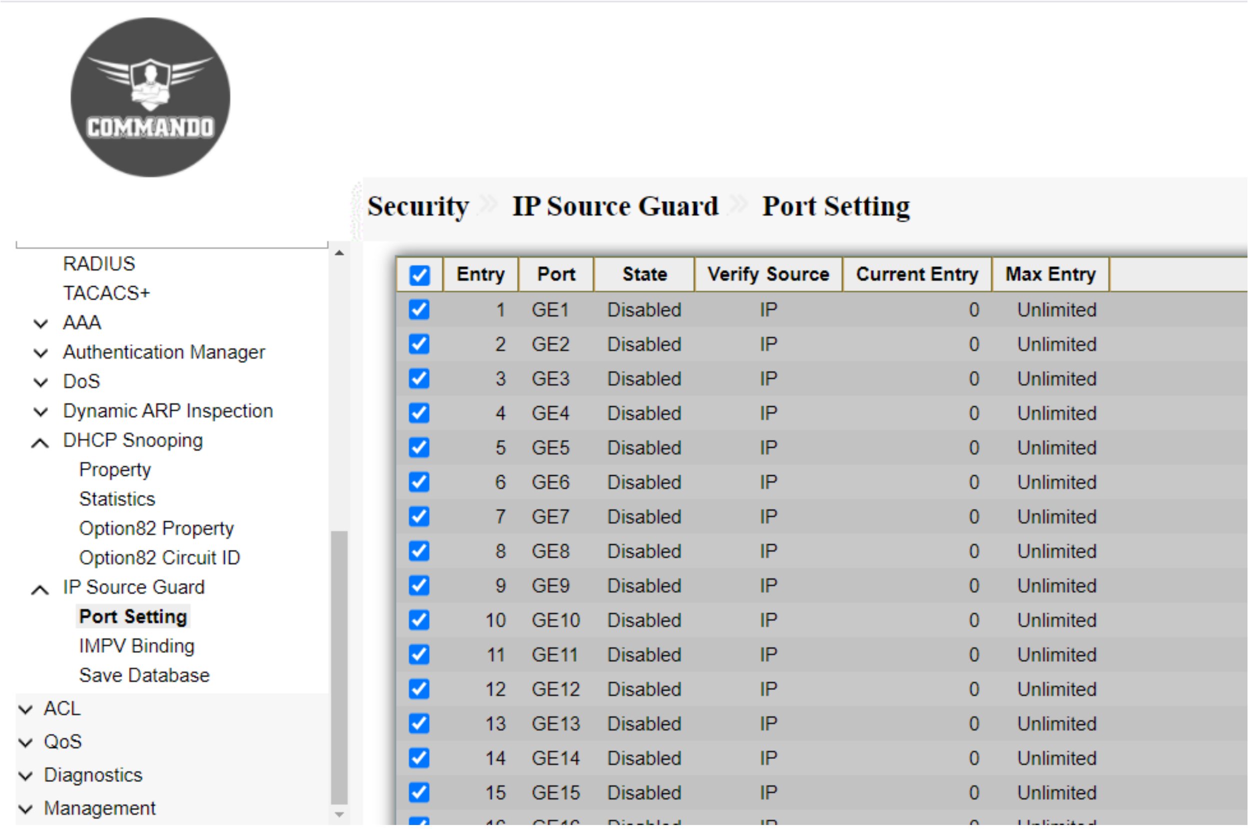
To view and configure IP source guard Port Setting, click **Security >> IP Source Guard >> Port Setting.**



Security » IP Source Guard » Port Setting

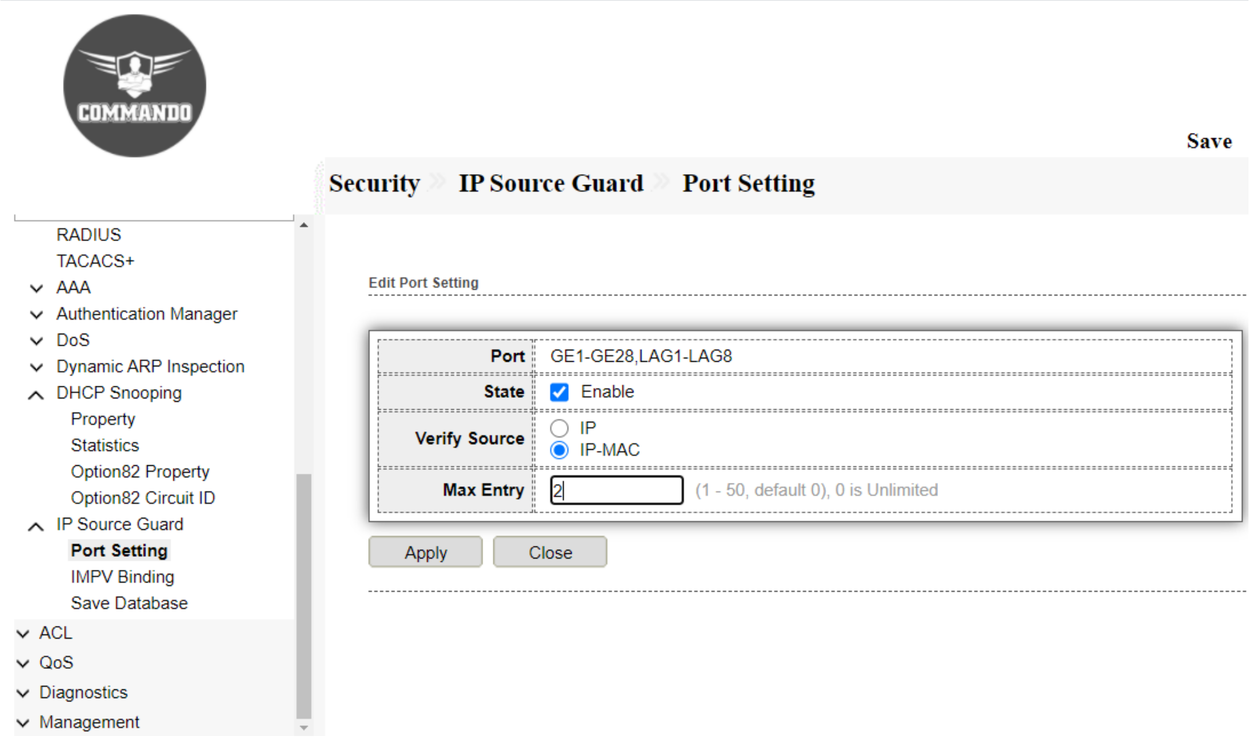
□	Entry	Port	State	Verify Source	Current Entry	Max Entry
□	1	GE1	Disabled	IP	0	Unlimited
□	2	GE2	Disabled	IP	0	Unlimited
□	3	GE3	Disabled	IP	0	Unlimited
□	4	GE4	Disabled	IP	0	Unlimited
□	5	GE5	Disabled	IP	0	Unlimited
□	6	GE6	Disabled	IP	0	Unlimited
□	7	GE7	Disabled	IP	0	Unlimited
□	8	GE8	Disabled	IP	0	Unlimited
□	9	GE9	Disabled	IP	0	Unlimited
□	10	GE10	Disabled	IP	0	Unlimited
□	11	GE11	Disabled	IP	0	Unlimited
□	12	GE12	Disabled	IP	0	Unlimited
□	13	GE13	Disabled	IP	0	Unlimited
□	14	GE14	Disabled	IP	0	Unlimited
□	15	GE15	Disabled	IP	0	Unlimited
□	16	GE16	Disabled	IP	0	Unlimited

Fig 12.9.2 IP source guard default Port Setting table page



☑	Entry	Port	State	Verify Source	Current Entry	Max Entry
☑	1	GE1	Disabled	IP	0	Unlimited
☑	2	GE2	Disabled	IP	0	Unlimited
☑	3	GE3	Disabled	IP	0	Unlimited
☑	4	GE4	Disabled	IP	0	Unlimited
☑	5	GE5	Disabled	IP	0	Unlimited
☑	6	GE6	Disabled	IP	0	Unlimited
☑	7	GE7	Disabled	IP	0	Unlimited
☑	8	GE8	Disabled	IP	0	Unlimited
☑	9	GE9	Disabled	IP	0	Unlimited
☑	10	GE10	Disabled	IP	0	Unlimited
☑	11	GE11	Disabled	IP	0	Unlimited
☑	12	GE12	Disabled	IP	0	Unlimited
☑	13	GE13	Disabled	IP	0	Unlimited
☑	14	GE14	Disabled	IP	0	Unlimited
☑	15	GE15	Disabled	IP	0	Unlimited
☑	16	GE16	Disabled	IP	0	Unlimited

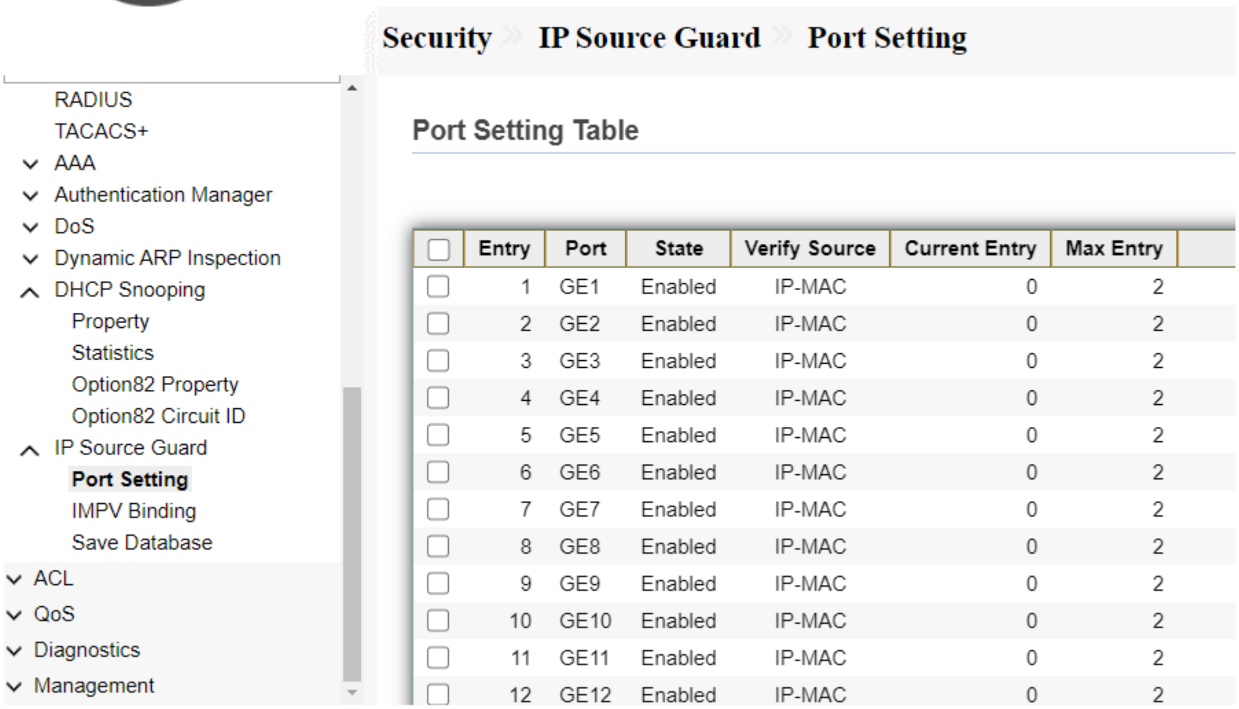
Fig 12.9.3 IP source guard Selecting Ports for Setting page



Edit Port Setting

Port	GE1-GE28,LAG1-LAG8
State	☑ Enable
Verify Source	○ IP ● IP-MAC
Max Entry	2 (1 - 50, default 0), 0 is Unlimited

Fig 12.9.4 Edit IP source guard Ports Setting page



Port Setting Table

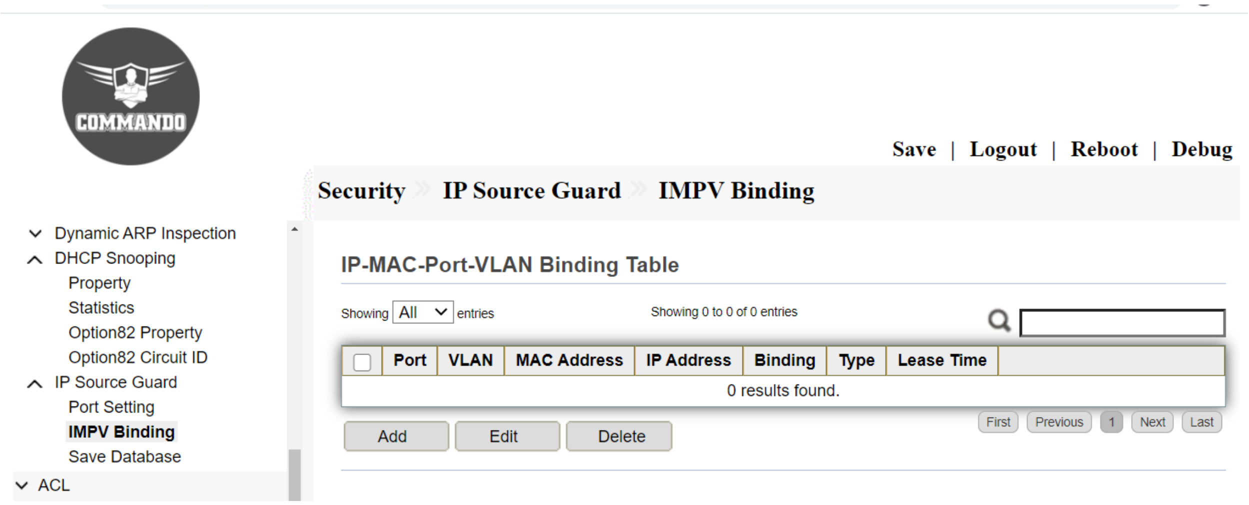
□	Entry	Port	State	Verify Source	Current Entry	Max Entry
□	1	GE1	Enabled	IP-MAC	0	2
□	2	GE2	Enabled	IP-MAC	0	2
□	3	GE3	Enabled	IP-MAC	0	2
□	4	GE4	Enabled	IP-MAC	0	2
□	5	GE5	Enabled	IP-MAC	0	2
□	6	GE6	Enabled	IP-MAC	0	2
□	7	GE7	Enabled	IP-MAC	0	2
□	8	GE8	Enabled	IP-MAC	0	2
□	9	GE9	Enabled	IP-MAC	0	2
□	10	GE10	Enabled	IP-MAC	0	2
□	11	GE11	Enabled	IP-MAC	0	2
□	12	GE12	Enabled	IP-MAC	0	2

Fig 12.9.5 IP source guard Port Setting table after setting page

12.9.2 IMPV Binding

This page allow user to add static IP source guard entry and browse all IP source guard entries that learned by DHCP snooping or statically create by user.

To view and configure IP Source Guard IPMV Binding, click **Security >> IP Source Guard >> IMPV Binding.**

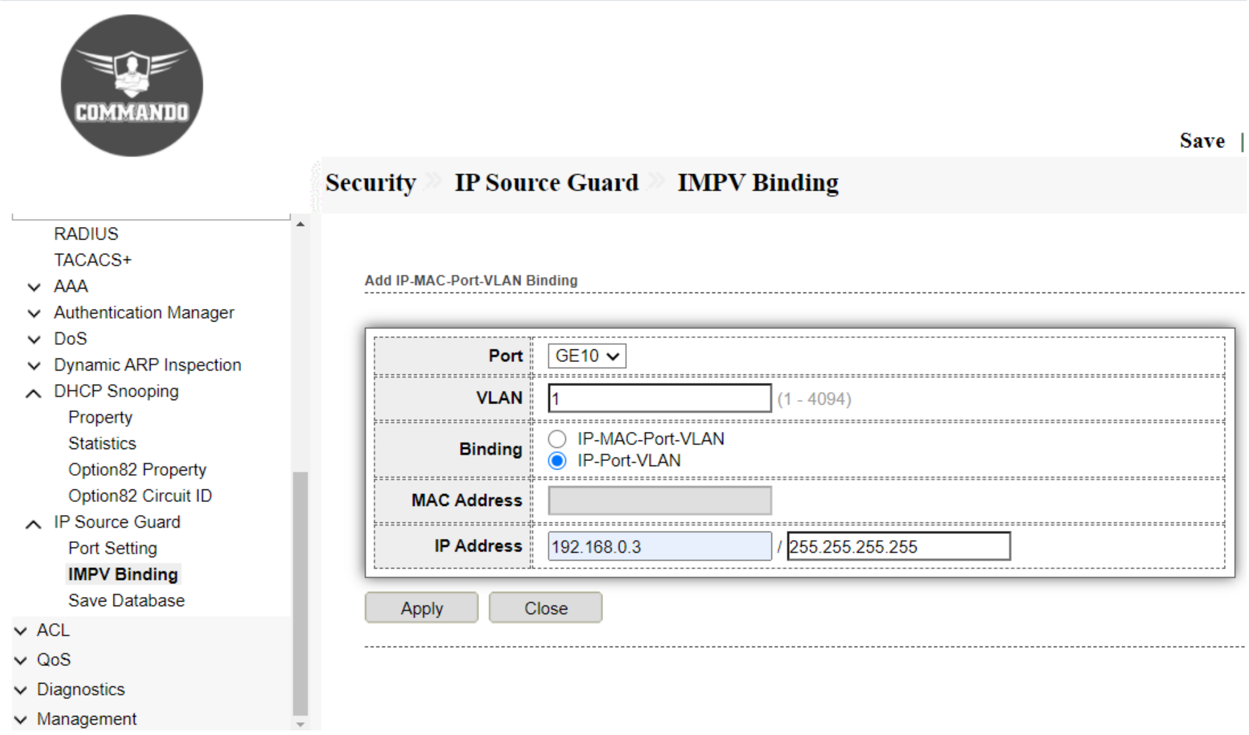


IP-MAC-Port-VLAN Binding Table

Showing All entries Showing 0 to 0 of 0 entries

□	Port	VLAN	MAC Address	IP Address	Binding	Type	Lease Time
0 results found.							

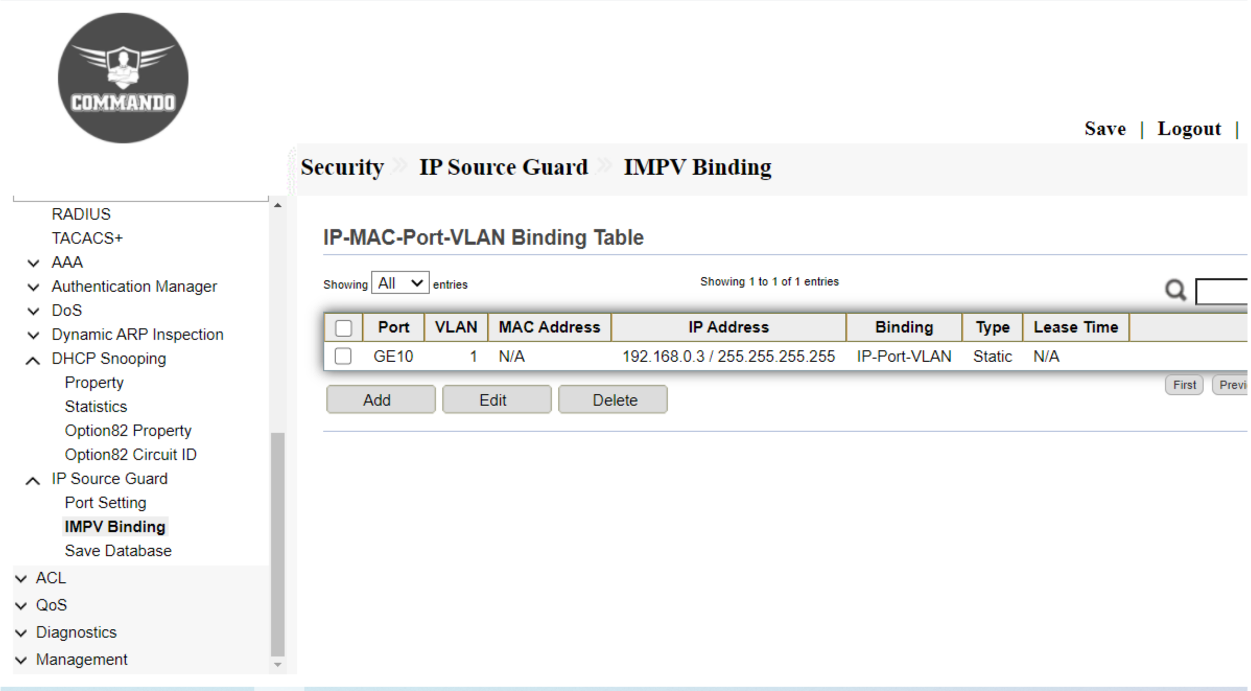
Fig 12.9.6 IP Source Guard Default IMPV Binding Table page



Add IP-MAC-Port-VLAN Binding

Port	GE10
VLAN	1 (1 - 4094)
Binding	○ IP-MAC-Port-VLAN ● IP-Port-VLAN
MAC Address	
IP Address	192.168.0.3 / 255.255.255.255

Fig 12.9.7 Add IP Source Guard IP-MAC-Port-VLAN Binding page



IP-MAC-Port-VLAN Binding Table

Showing All entries

Showing 1 to 1 of 1 entries

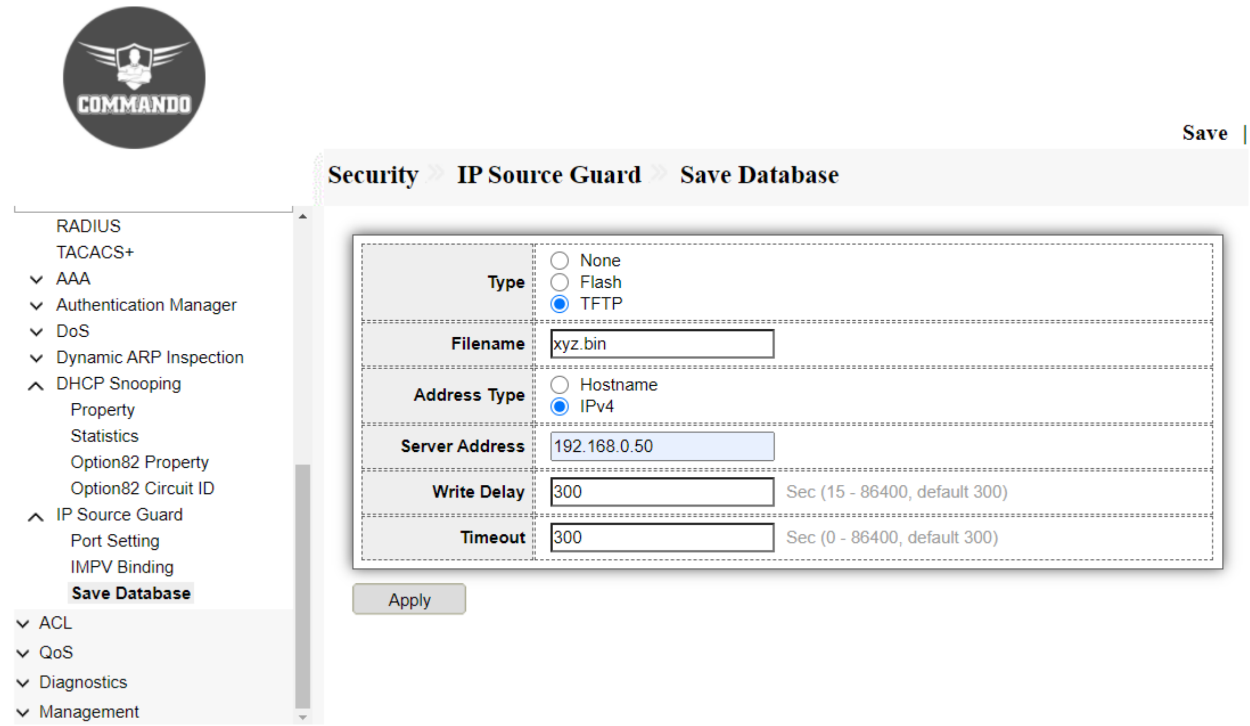
□	Port	VLAN	MAC Address	IP Address	Binding	Type	Lease Time
□	GE10	1	N/A	192.168.0.3 / 255.255.255.255	IP-Port-VLAN	Static	N/A

Fig 12.9.8 IP Source Guard IP-MAC-Port-VLAN Binding Table page

12.9.3 Save Database

This page allow user to configure DHCP snooping database which can backup and restore dynamic DHCP snooping entries.

To Save DHCP Snooping Database, click **Security >> DHCP Snooping >> Save Database.**



Type	○ None ○ Flash ● TFTP
Filename	xyz.bin
Address Type	○ Hostname ● IPv4
Server Address	192.168.0.50
Write Delay	300 Sec (15 - 86400, default 300)
Timeout	300 Sec (0 - 86400, default 300)

Fig 12.9.9 IP Source Guard Save Database page

Chapter 13 ACL

MAC ACL: MAC ACLs are used to filter traffic on a specific source MAC address or range of MAC addresses.

MAC ACE: When a frame is received on a port, the switch processes the frame through the first ACL. If the frame matches an ACE filter of the first ACL, the ACE action takes place. If the frame matches none of the ACE filters, the next ACL is processed.

IPv4 ACL: An ACL contains the hosts that are permitted or denied access to the network device. The IPv4-based ACL is a list of sources IPv4 addresses that use Layer 3 information to permit or deny access to traffic. IPv4 ACLs restrict IP-related traffic based on the configured IP filters.

IPv4 ACE: An Access Control List (ACL) is a list of one or more Access Control Entries (ACEs), where each ACE consists of a matching criterion and an action on IPV4 packets (permit or deny). Each ace has a sequence number to define the order, list of match criteria.

IPv6 ACL: IPv6 ACLs support the same options as IPv4 ACLs including source, destination IP, source, and destination ports. You can enable only IPv4 traffic in your network by blocking IPv6 traffic.

IPv6 ACE: An Access Control List (ACL) is a list of one or more Access Control Entries (ACEs), where each ACE consists of a matching criterion and an action on IPv6 Packets (permit or deny). Each ace has a sequence number to define the order, list of match criteria.

ACL Binding:

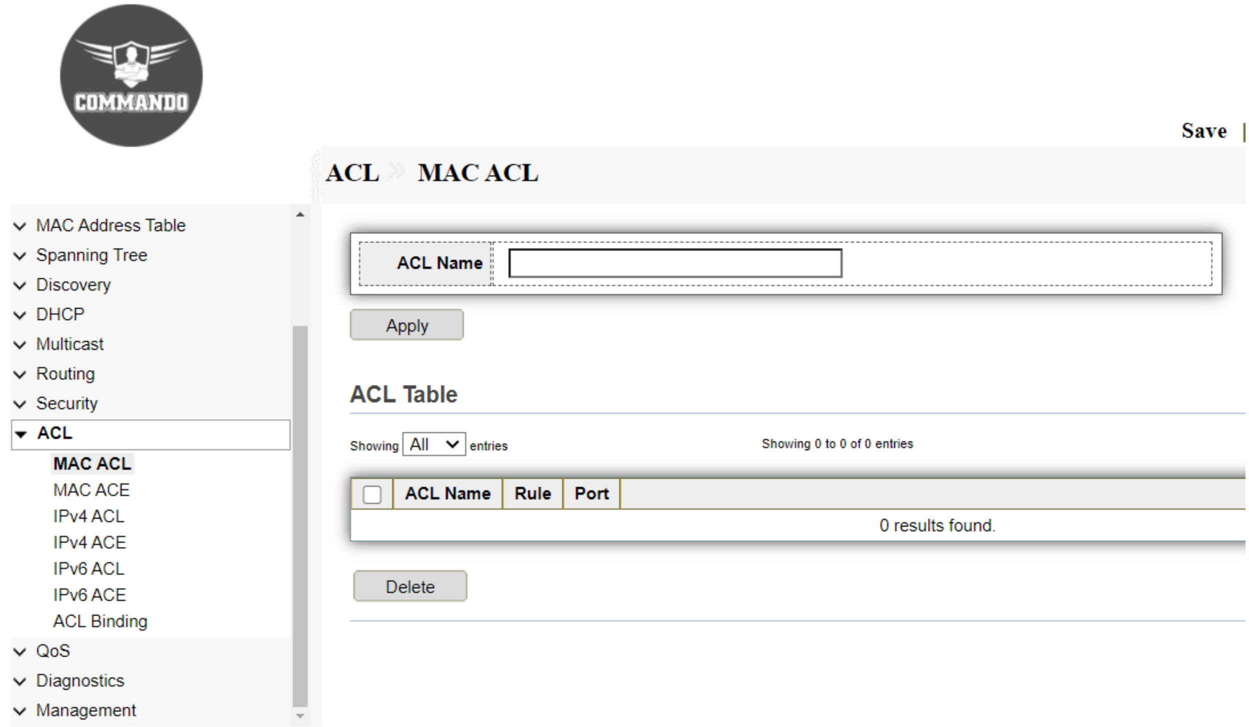
This page shows configuration of MAC, IPv4 & IPV6 Access List. An Access Control List (ACL) is an ordered list of classification filters and actions. Each single classification rule, together with its action, is called an Access Control Element (ACE). Each ACE is made up of filters that distinguish traffic groups and associated actions.

A single ACL may contain one or more ACEs, which are matched against the contents of incoming frames. Either a DENY or PERMIT action is applied to frames whose contents match the filter.

13.1 MAC ACL

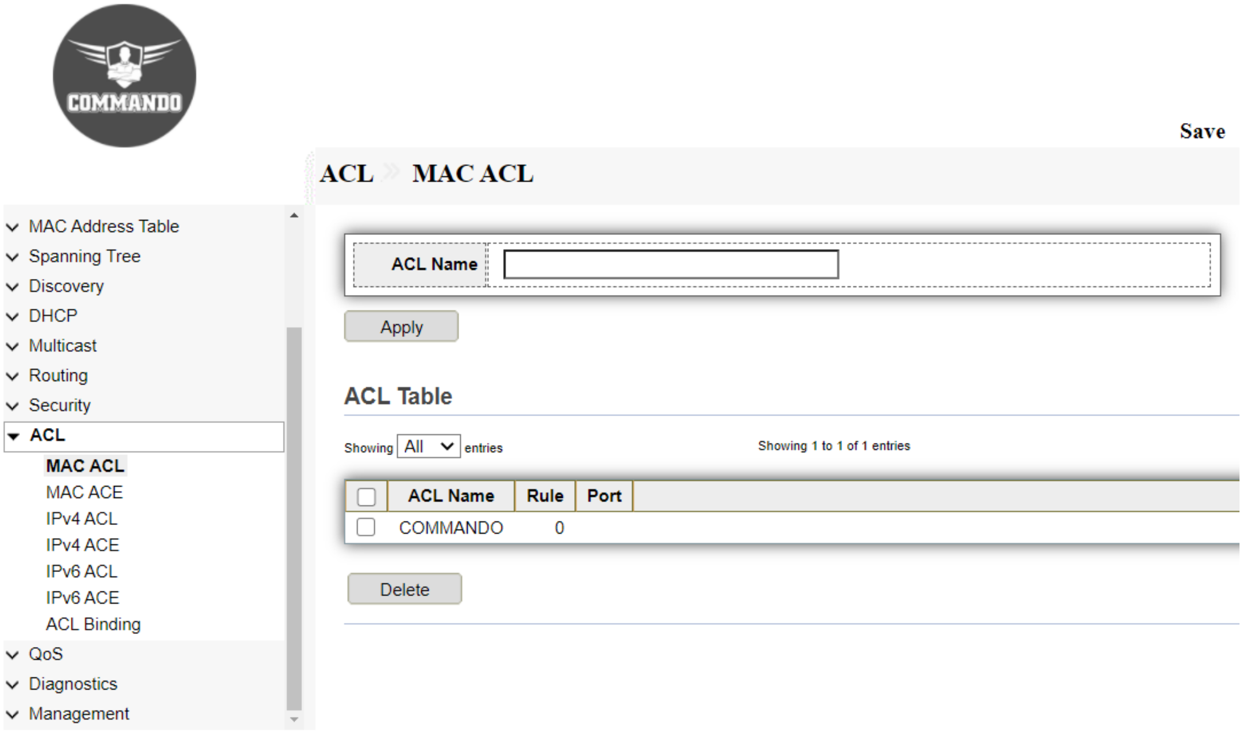
MAC-based ACLs are used to filter traffic based on Layer 2 fields. MAC-based ACLs check all frames for a match. This page allow user to add or delete ACL rule. A rule cannot be deleted if under binding.

To view and configure MAC ACL, click **ACL >> MAC ACL.**



□	ACL Name	Rule	Port
0 results found.			

Fig 13.1.1 Default MAC ACL Table page



ACL » MAC ACL

ACL Name

ACL Table

Showing All entries

Showing 1 to 1 of 1 entries

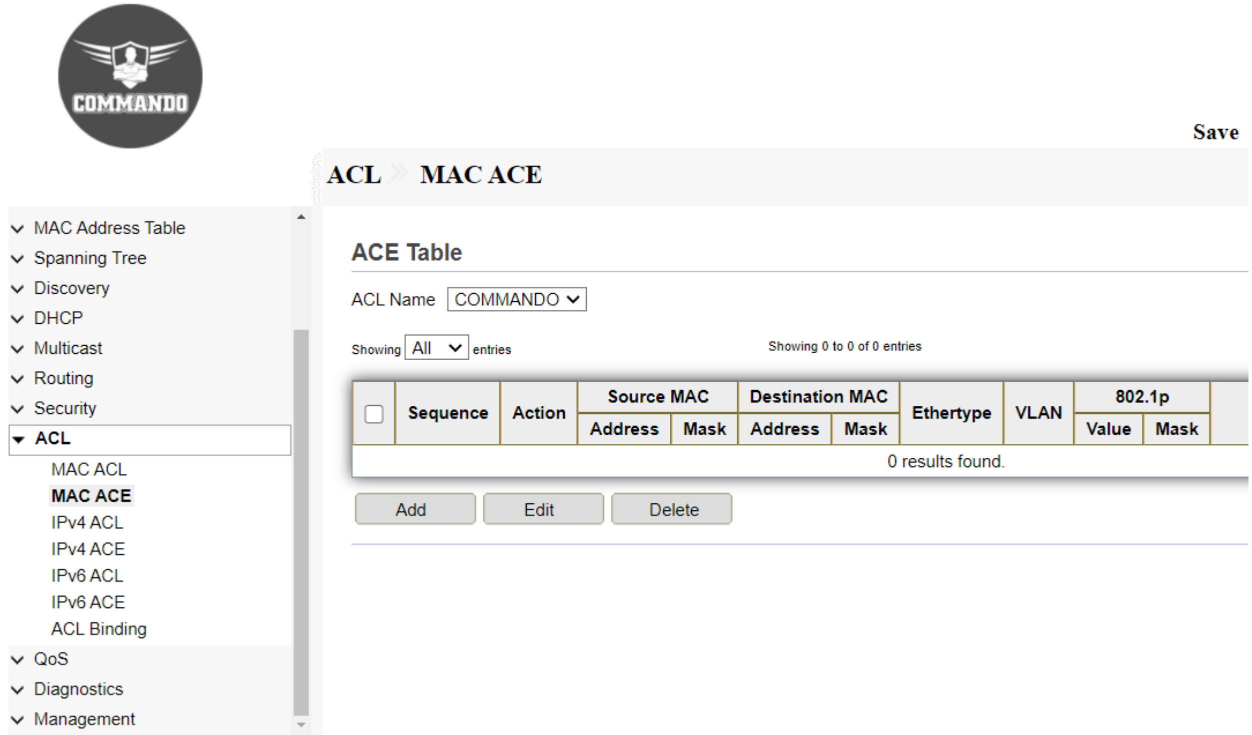
☐	ACL Name	Rule	Port
☐	COMMANDO	0	

Fig 13.1.2 MAC ACL Table after creating COMMANDO page

13.2 MAC ACE

This page allow user to add, edit or delete ACE rule. An ACE rule cannot be edited or deleted if ACL under binding. New ACE cannot be added if ACL under binding.

To view and configure MAC ACE, click **ACL >> MAC ACE**



ACE Table

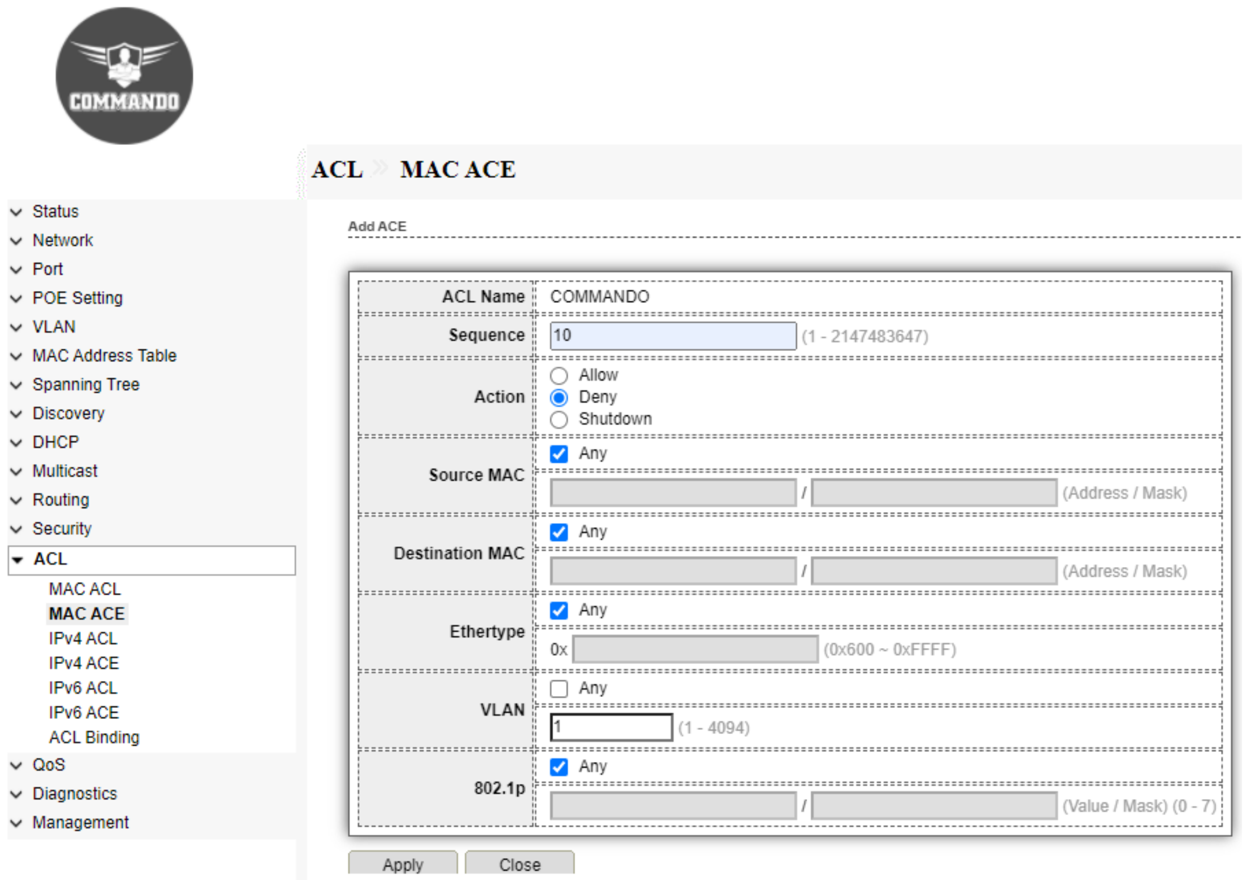
ACL Name: COMMANDO

Showing All entries

Showing 0 to 0 of 0 entries

□	Sequence	Action	Source MAC		Destination MAC		Ethertype	VLAN	802.1p	
			Address	Mask	Address	Mask			Value	Mask
0 results found.										

Fig 13.2.1 Default MAC ACE page

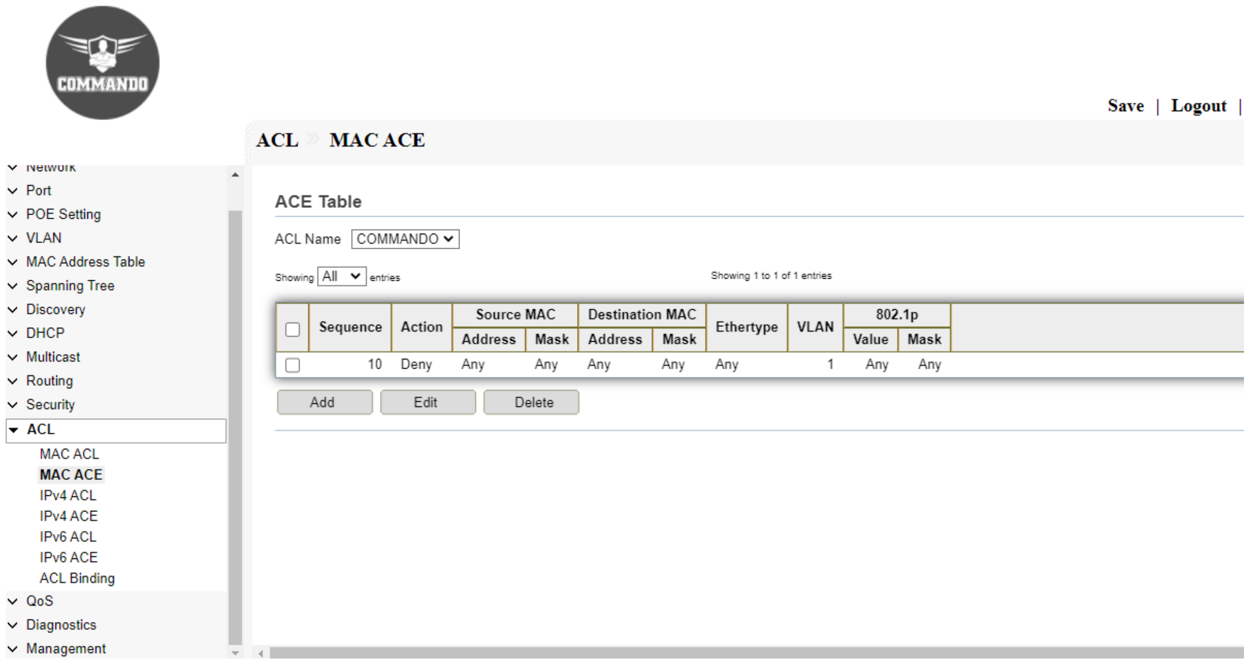


ACL » MAC ACE

Add ACE

ACL Name	COMMANDO
Sequence	10 (1 - 2147483647)
Action	○ Allow ● Deny ○ Shutdown
Source MAC	☑ Any / (Address / Mask)
Destination MAC	☑ Any / (Address / Mask)
Ethertype	☑ Any 0x (0x600 ~ 0xFFFF)
VLAN	☐ Any 1 (1 - 4094)
802.1p	☑ Any / (Value / Mask) (0 - 7)

Fig 13.2.2 Add MAC ACE page



ACL » MAC ACE

ACE Table

ACL Name COMMANDO

Showing All entries Showing 1 to 1 of 1 entries

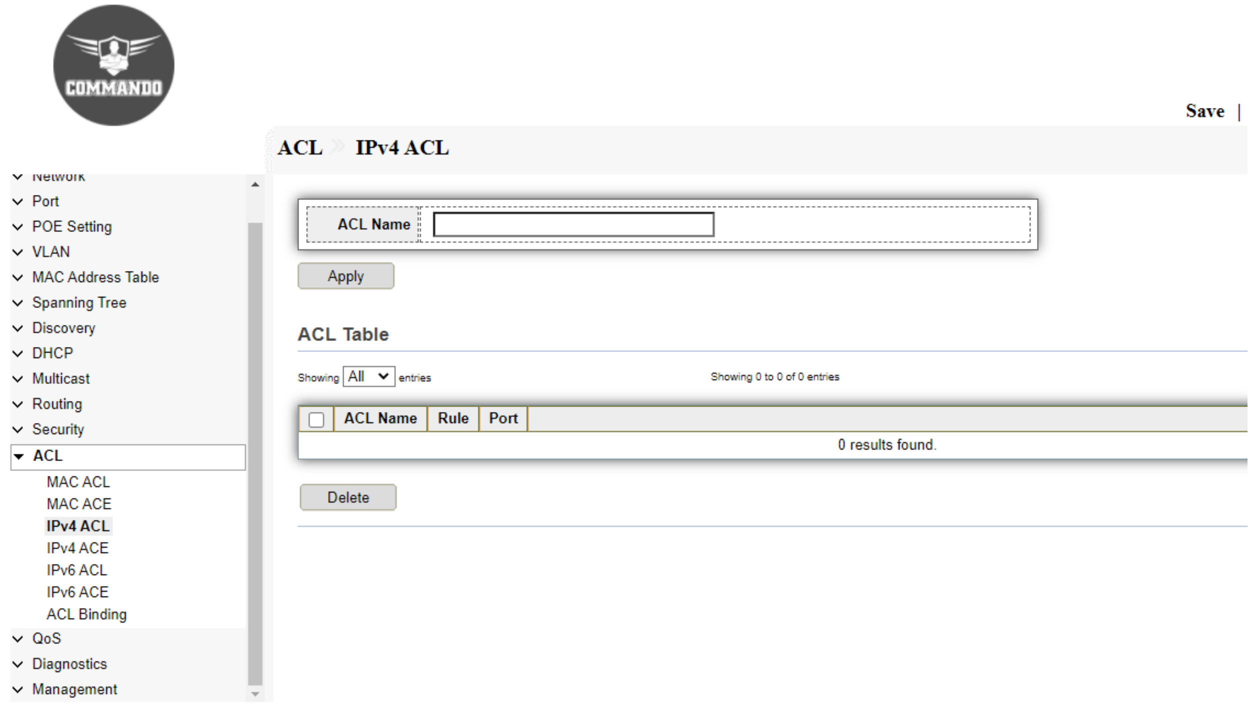
☐	Sequence	Action	Source MAC		Destination MAC		Ethertype	VLAN	802.1p	
			Address	Mask	Address	Mask			Value	Mask
☐	10	Deny	Any	Any	Any	Any	Any	1	Any	Any

Fig 13.2.3 MAC ACE Table page

13.3 IPv4 ACL

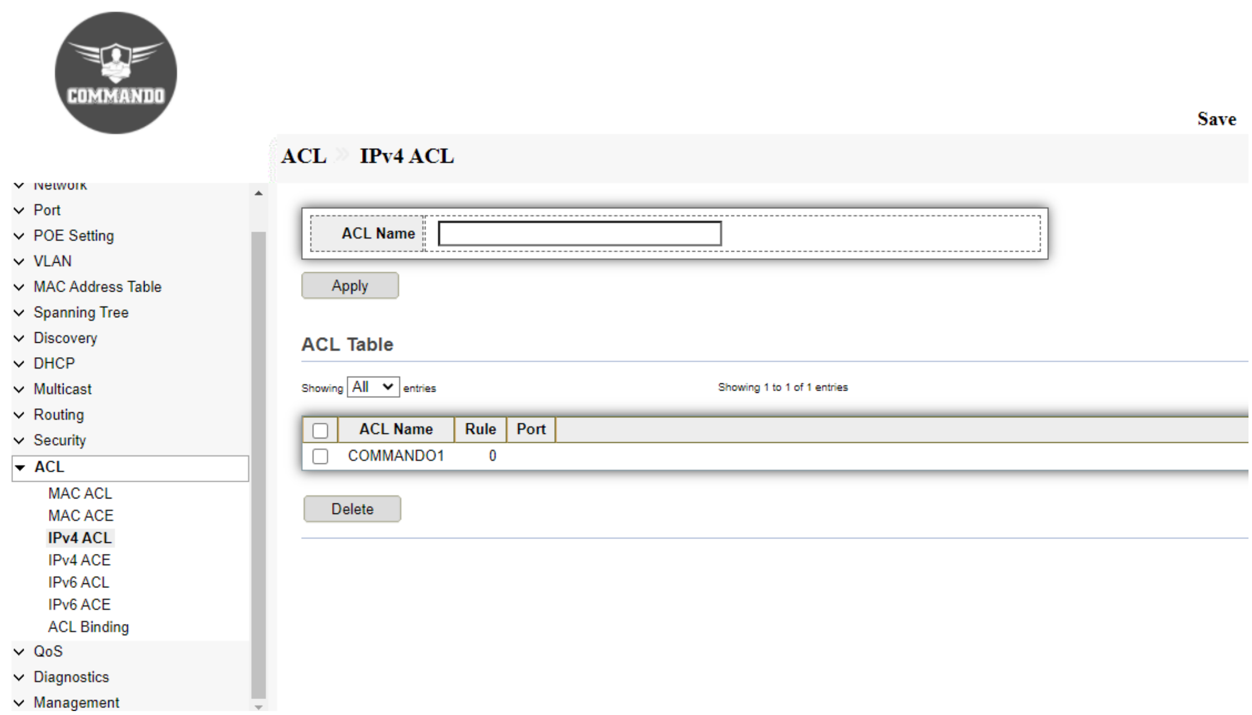
IPv4-based ACLs are used to check IPv4 packets, while other types of frames, such as ARPs, are not checked. This page allow user to add or delete IPv4 ACL rule. A rule cannot be deleted if under binding.

To view and configure IPv4 ACL, click **ACL >> IPv4 ACL**



□	ACL Name	Rule	Port
0 results found.			

Fig 13.3.1 Default ACL Table page



ACL » IPv4 ACL

ACL Name

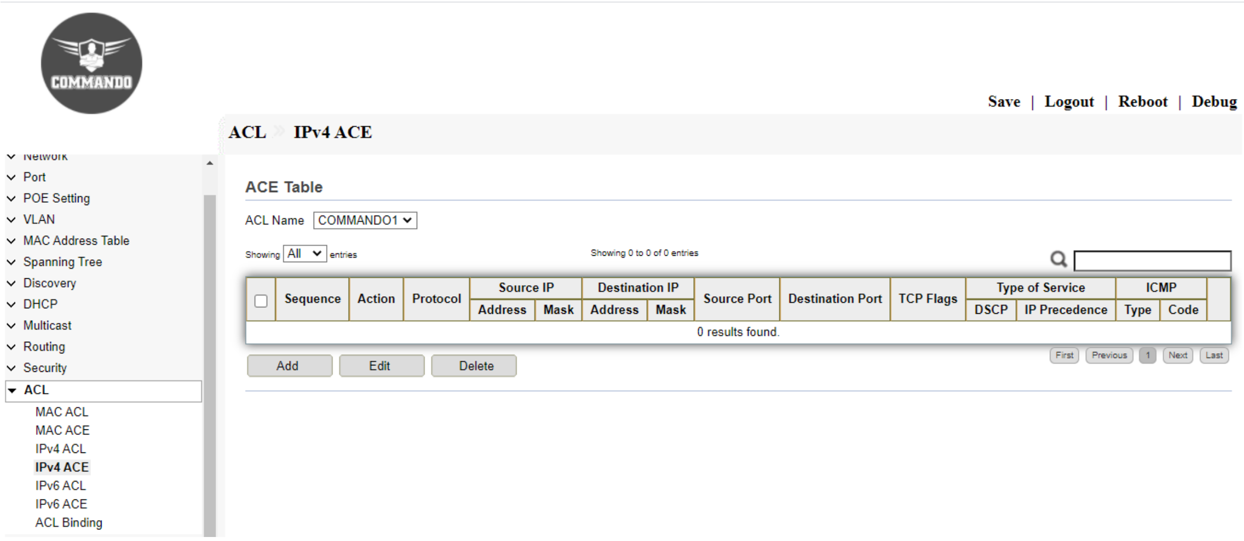
ACL Table

Showing All entries

Showing 1 to 1 of 1 entries

□	ACL Name	Rule	Port
□	COMMANDO1	0	

Fig 13.3.2 Edit IPv4 ACL Name page



ACL » IPv4 ACE

ACE Table

ACL Name COMMANDO1

Showing All entries

Showing 0 to 0 of 0 entries

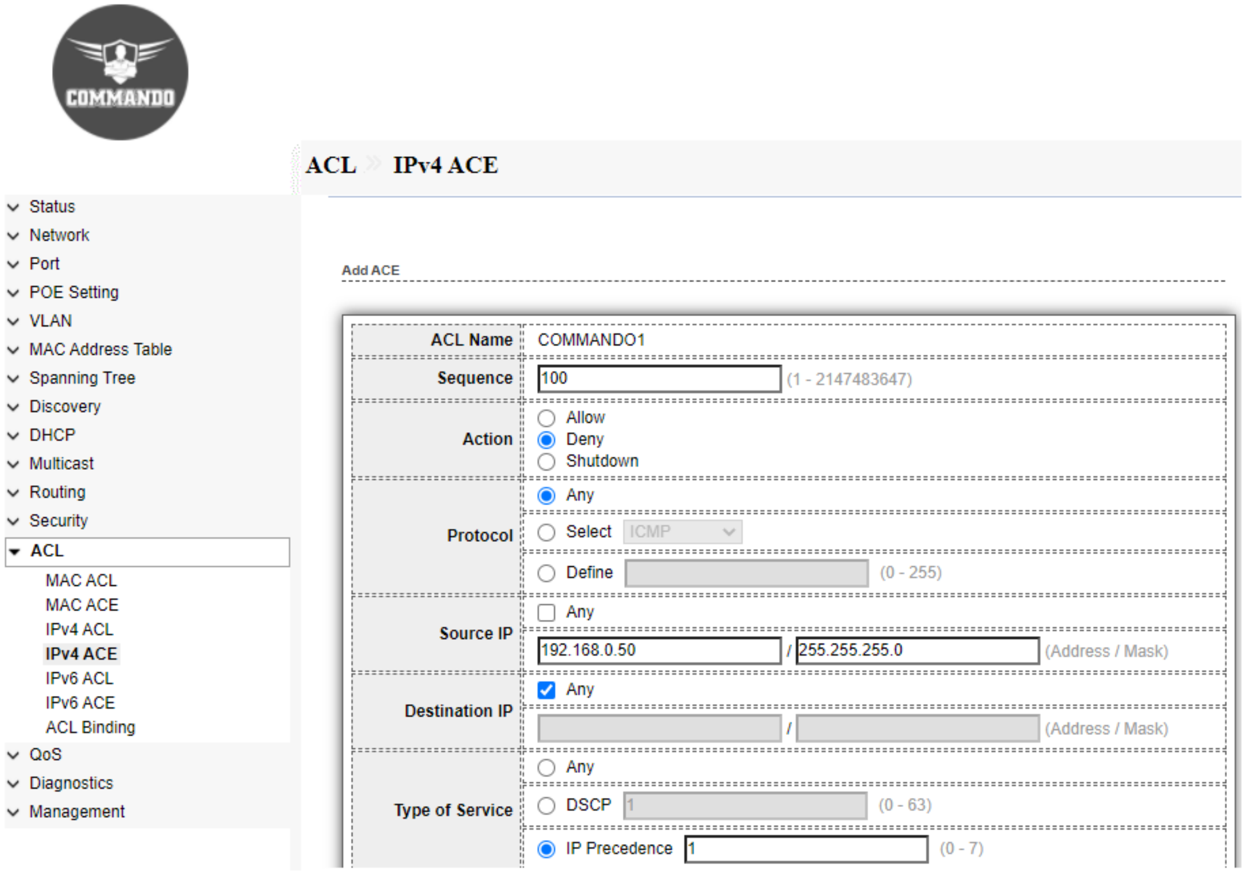
□	Sequence	Action	Protocol	Source IP		Destination IP		Source Port	Destination Port	TCP Flags	Type of Service		ICMP	
				Address	Mask	Address	Mask				DSCP	IP Precedence	Type	Code
0 results found.														

Fig 13.3.3 IPv4 ACL Table after creating COMMANDO1 ACL page

13.4 IPv4 ACE

This page allow user to add, edit or delete ACE rule. An ACE rule cannot be edited or deleted if ACL under binding. New ACE cannot be added if ACL under binding.

To display IPv4 ACE page, click **ACL >> IPv4 ACE**

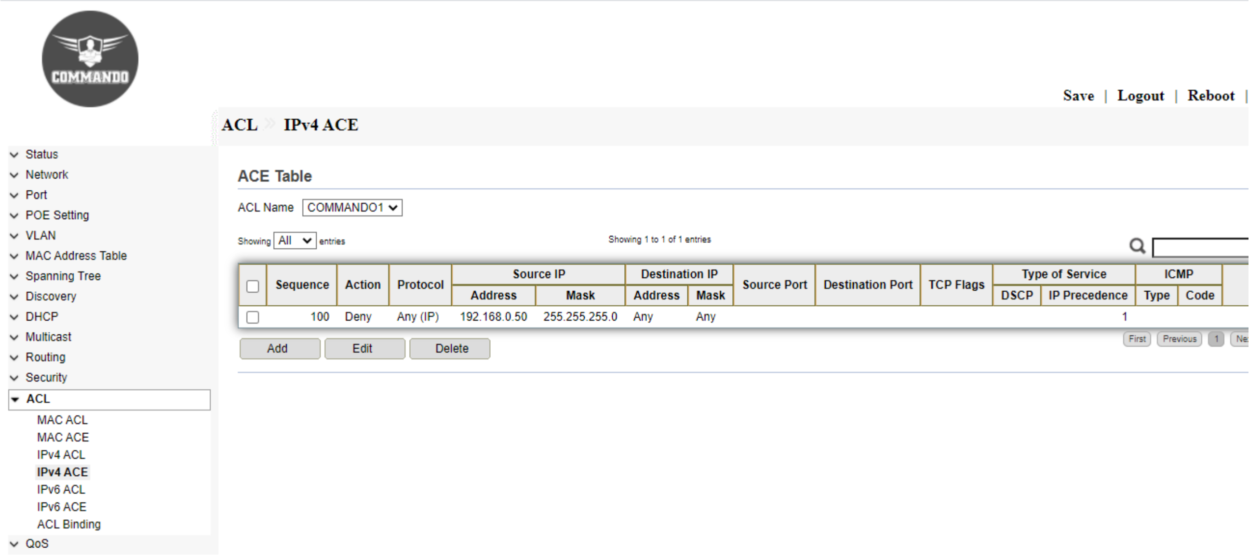


ACL » IPv4 ACE

Add ACE

ACL Name	COMMANDO1
Sequence	100 (1 - 2147483647)
Action	○ Allow ● Deny ○ Shutdown
Protocol	● Any ○ Select ICMP ○ Define (0 - 255)
Source IP	□ Any 192.168.0.50 / 255.255.255.0 (Address / Mask)
Destination IP	☑ Any / (Address / Mask)
Type of Service	○ Any ○ DSCP 1 (0 - 63) ● IP Precedence 1 (0 - 7)

Fig 13.4.1 Default IPv4 ACE Table page



ACE Table

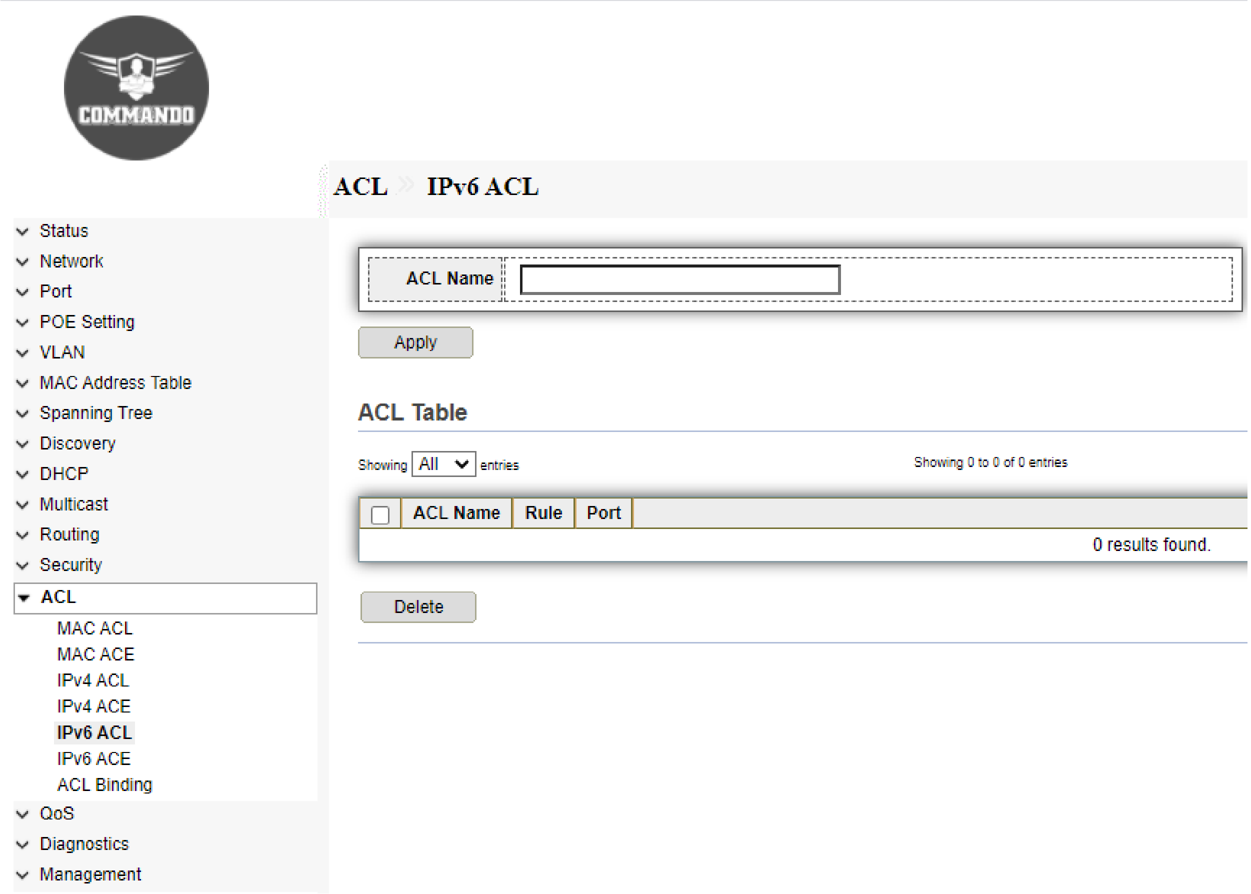
ACL Name COMMANDO1

Showing All entries

Showing 1 to 1 of 1 entries

□	Sequence	Action	Protocol	Source IP		Destination IP		Source Port	Destination Port	TCP Flags	Type of Service		ICMP	
				Address	Mask	Address	Mask				DSCP	IP Precedence	Type	Code
□	100	Deny	Any (IP)	192.168.0.50	255.255.255.0	Any	Any					1		

Fig 13.4.2 Add IPv4 ACE page



ACL Name	

ACL Table

Showing All entries

Showing 0 to 0 of 0 entries

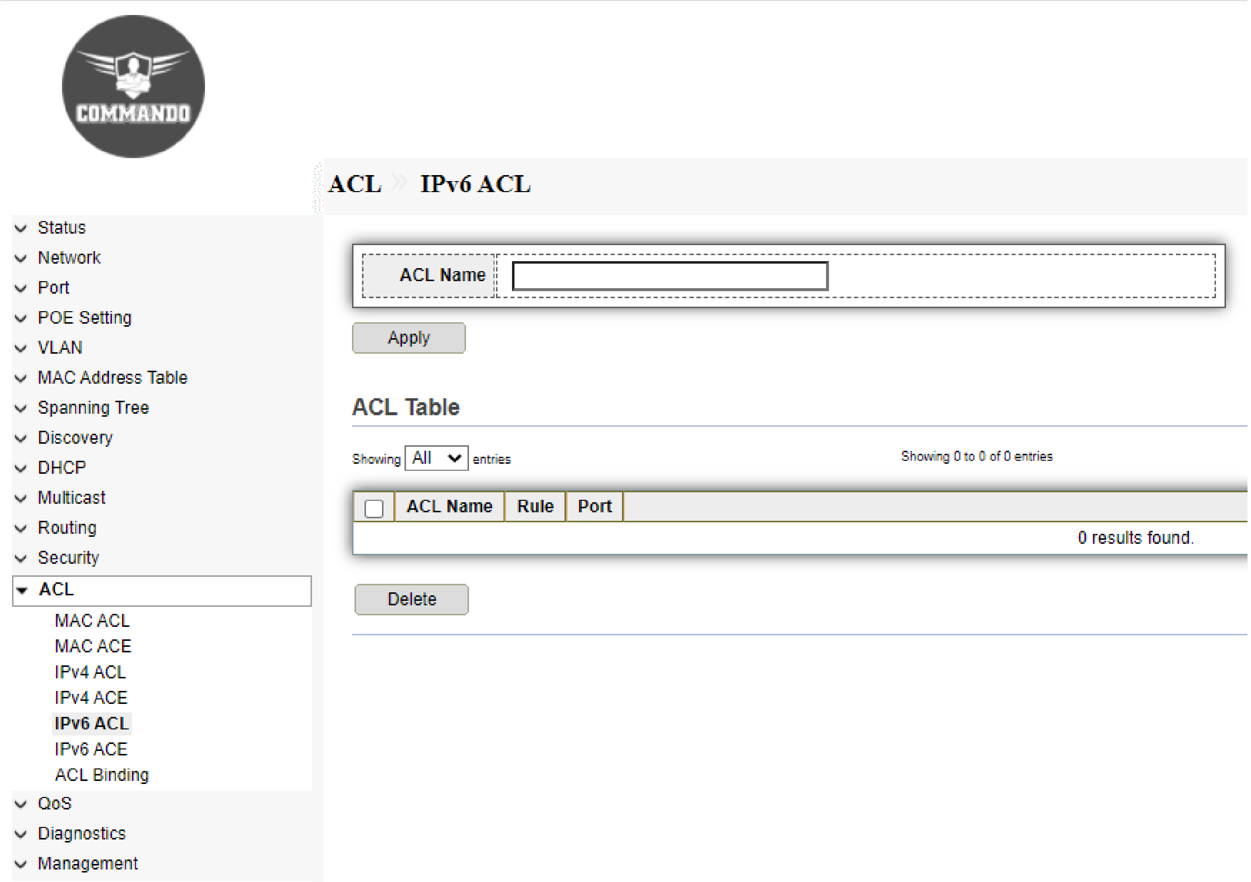
□	ACL Name	Rule	Port
0 results found.			

Fig 13.4.3 IPv4 ACE Table page

13.5 IPv6 ACL

The IPv6-Based ACL page displays and enables the creation of IPv6 ACLs, which check pure IPv6-based traffic. IPv6 ACLs do not check IPv6-over-IPv4 or ARP packets. This page allow user to add or delete Ipv6 ACL rule. A rule cannot be deleted if under binding.

To view and configure IPv6 ACL page, click **ACL >> IPv6 ACL**



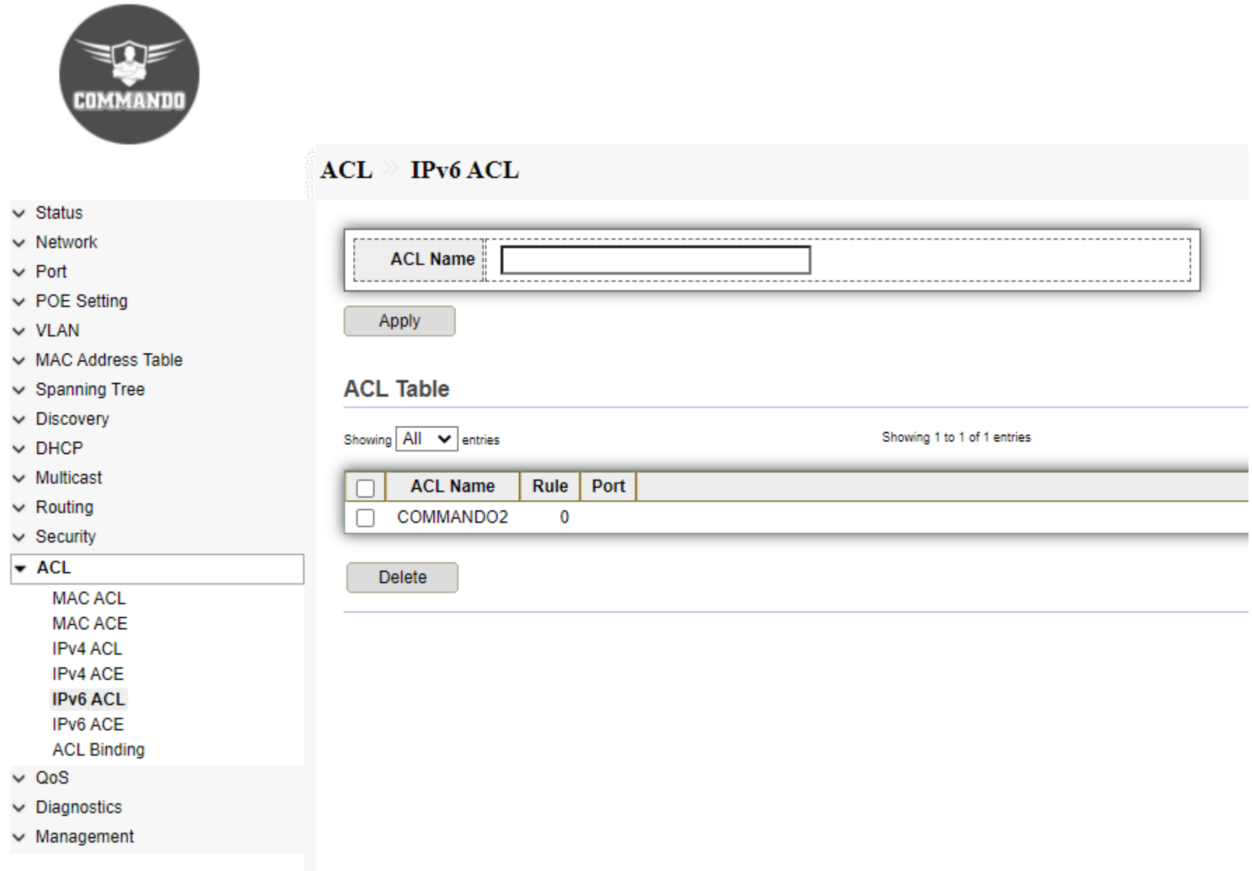
ACL Name	

ACL Table

Showing All entries Showing 0 to 0 of 0 entries

□	ACL Name	Rule	Port
0 results found.			

Fig 13.5.1 Default IPv6 ACL Table page



ACL Name

ACL Table

Showing All entries

Showing 1 to 1 of 1 entries

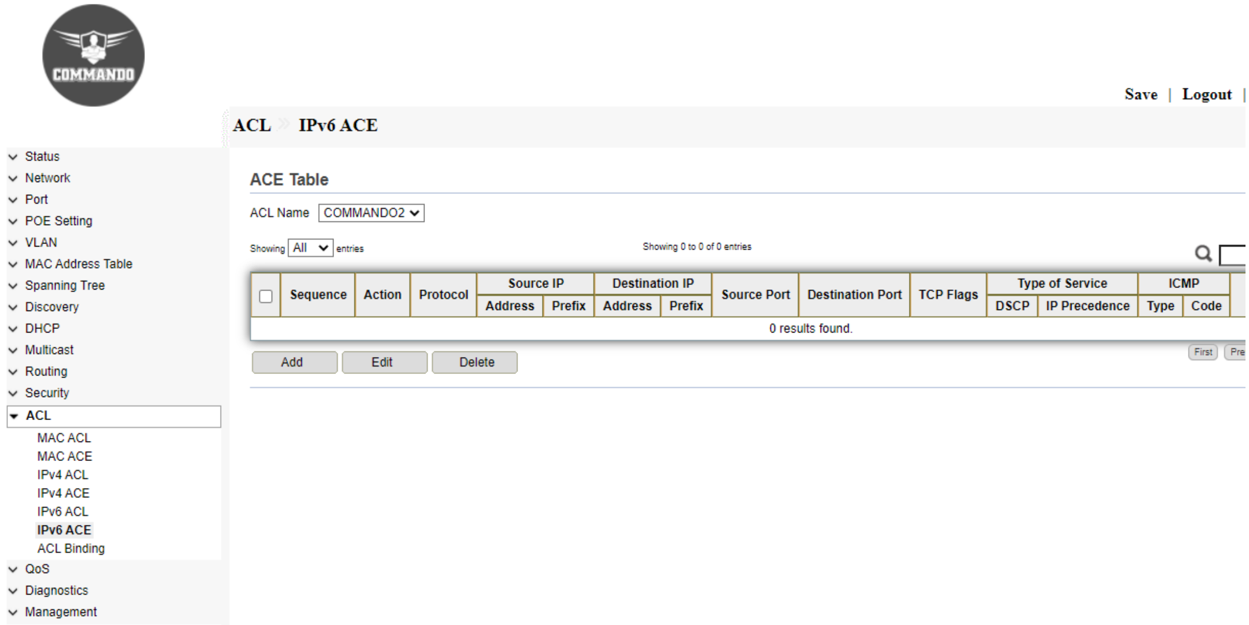
□	ACL Name	Rule	Port
□	COMMANDO2	0	

Fig 13.5.2 IPv6 ACL Table after changing page

13.6 IPv6 ACE

This page allow user to add, edit or delete ACE rule. An ACE rule cannot be edited or deleted if ACL under binding. New ACE cannot be added if ACL under binding.

To view and configure IPv6 ACE page, click **ACL >> IPv6 ACE**



ACE Table

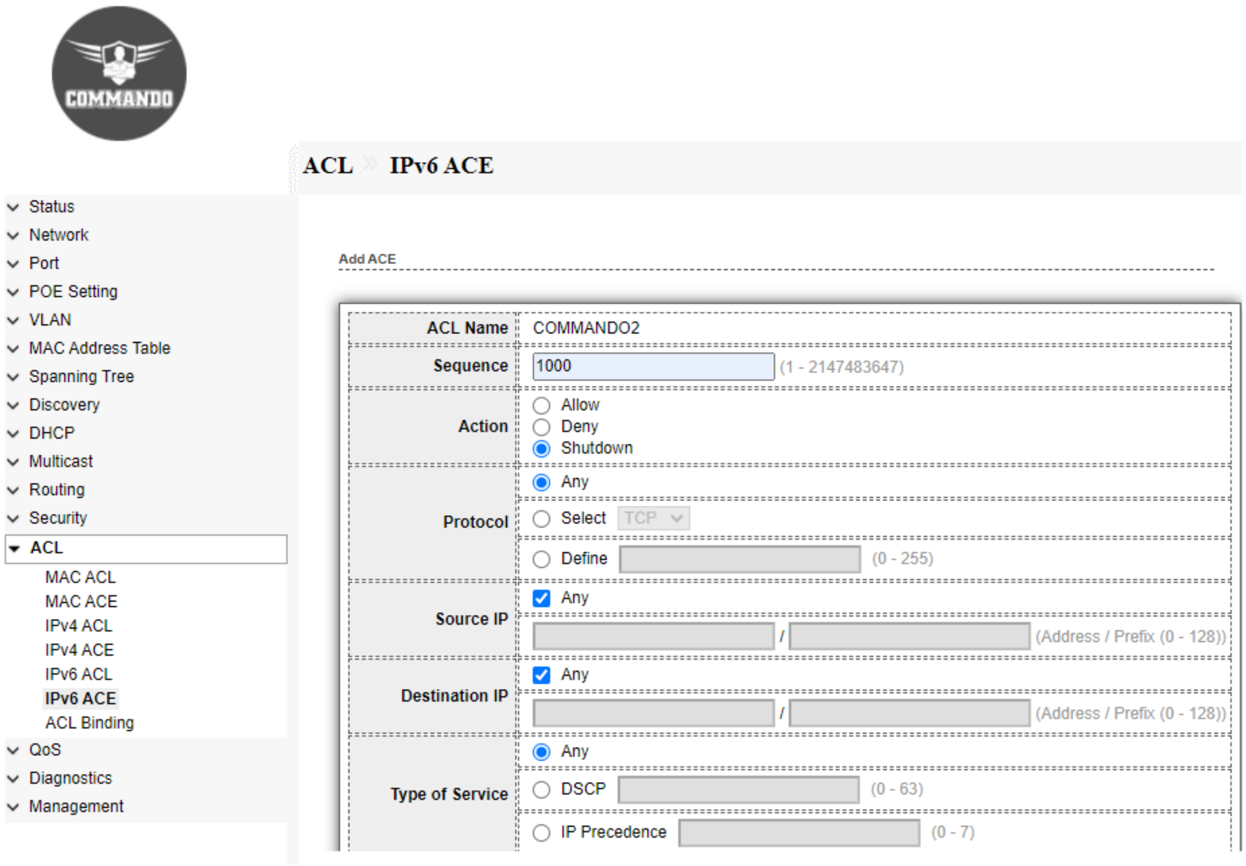
ACL Name COMMANDO2

Showing All entries

Showing 0 to 0 of 0 entries

□	Sequence	Action	Protocol	Source IP		Destination IP		Source Port	Destination Port	TCP Flags	Type of Service		ICMP	
				Address	Prefix	Address	Prefix				DSCP	IP Precedence	Type	Code
0 results found.														

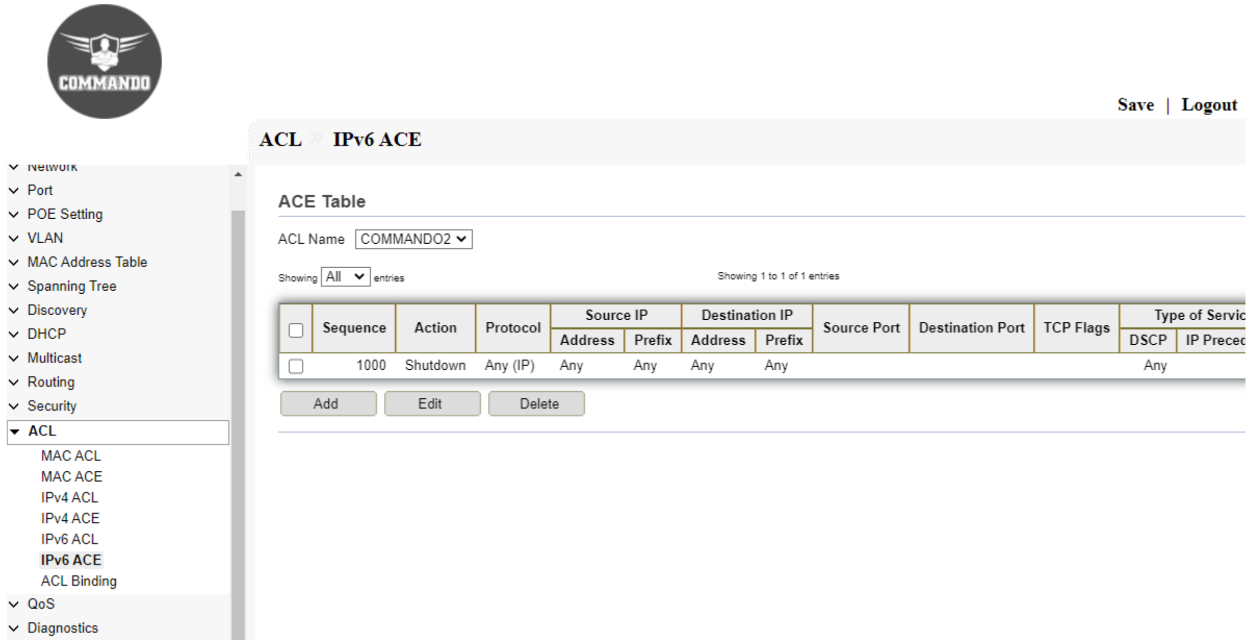
Fig 13.6.1 Default IPv6 ACE Table page



Add ACE

ACL Name	COMMANDO2
Sequence	1000 (1 - 2147483647)
Action	○ Allow ○ Deny ● Shutdown
Protocol	● Any ○ Select TCP ○ Define (0 - 255)
Source IP	☑ Any / (Address / Prefix (0 - 128))
Destination IP	☑ Any / (Address / Prefix (0 - 128))
Type of Service	● Any ○ DSCP (0 - 63) ○ IP Precedence (0 - 7)

Fig 13.6.2 Add IPv6 ACE page



ACE Table

ACL Name COMMANDO2

Showing All entries   Showing 1 to 1 of 1 entries

□	Sequence	Action	Protocol	Source IP		Destination IP		Source Port	Destination Port	TCP Flags	Type of Servic	
				Address	Prefix	Address	Prefix				DSCP	IP Preced
□	1000	Shutdown	Any (IP)	Any	Any	Any	Any				Any	

Fig 13.6.3 IPv6 ACE table after adding ACE page

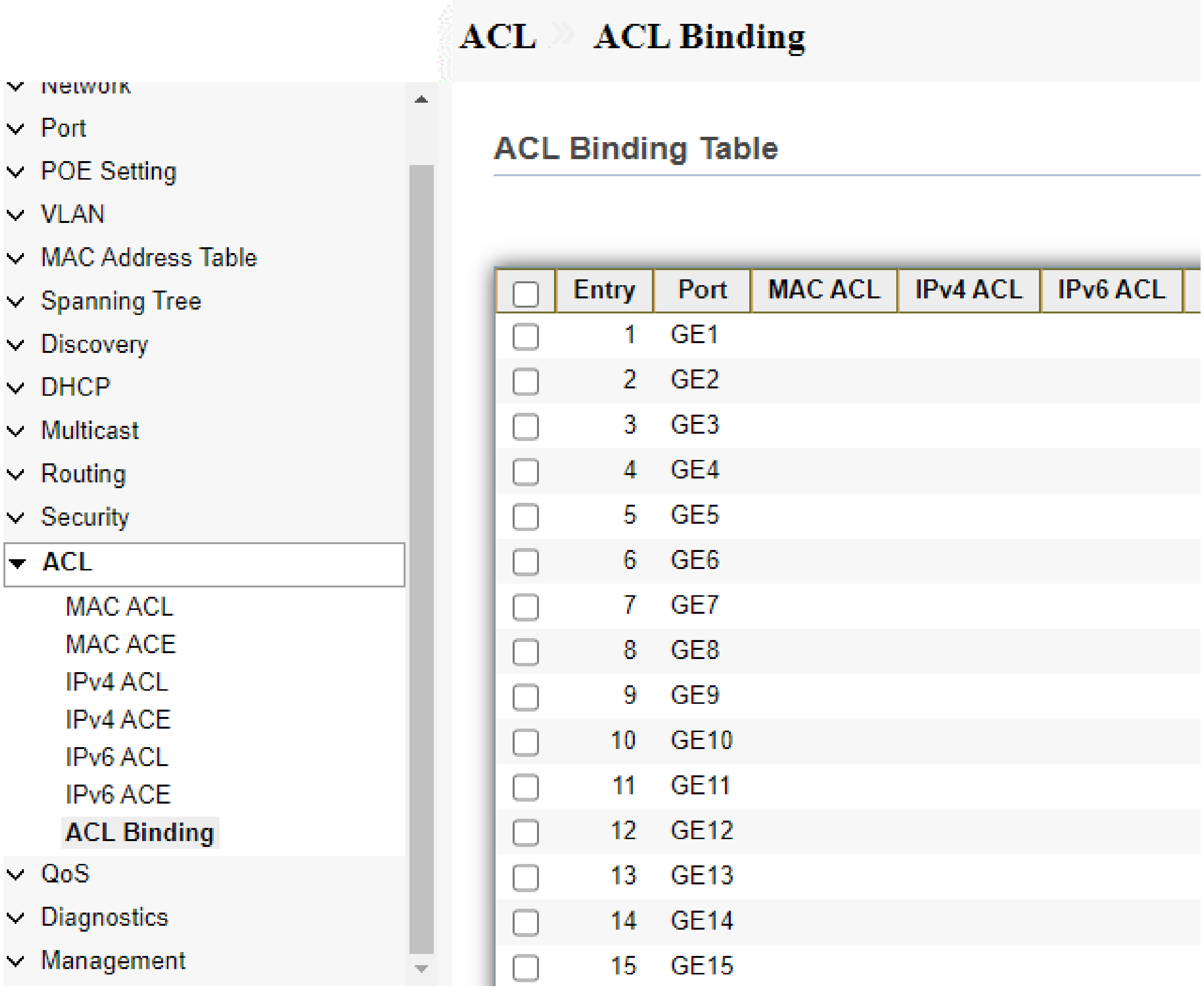
13.7 ACL Binding

When an ACL is bound to an interface (port, LAG or VLAN), its ACE rules are applied to packets arriving at that interface. Packets that do not match any of the ACEs in the ACL are matched to a default rule, whose action is to drop unmatched packets.

Although each interface can be bound to only one ACL, multiple interfaces can be bound to the same ACL by grouping them into a policy-map and binding that policy-map to the interface.

After an ACL is bound to an interface, it cannot be edited, modified, or deleted until it is removed from all the ports to which it is bound or in use. This page allow user to bind or unbind ACL rule to or from interface. IPv4 and IPv6 ACL cannot be bound to the same port simultaneously.

To view and configure ACL Binding page, click **ACL >> ACL Binding**

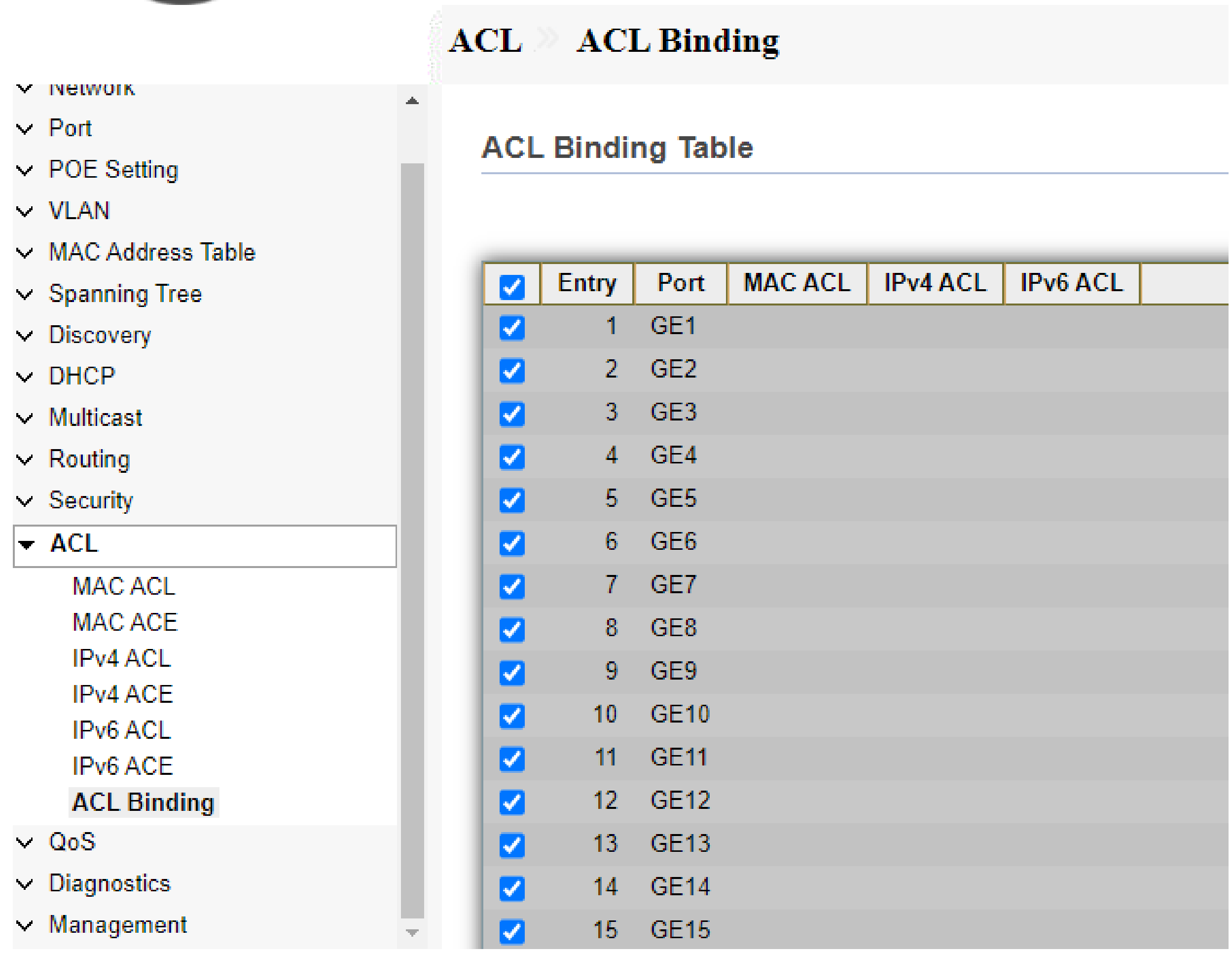


ACL » ACL Binding

ACL Binding Table

□	Entry	Port	MAC ACL	IPv4 ACL	IPv6 ACL
□	1	GE1			
□	2	GE2			
□	3	GE3			
□	4	GE4			
□	5	GE5			
□	6	GE6			
□	7	GE7			
□	8	GE8			
□	9	GE9			
□	10	GE10			
□	11	GE11			
□	12	GE12			
□	13	GE13			
□	14	GE14			
□	15	GE15			

Fig 13.7.1 ACL Binding Table page



Network
Port
POE Setting
VLAN
MAC Address Table
Spanning Tree
Discovery
DHCP
Multicast
Routing
Security
ACL
- MAC ACL
- MAC ACE
- IPv4 ACL
- IPv4 ACE
- IPv6 ACL
- IPv6 ACE
- ACL Binding

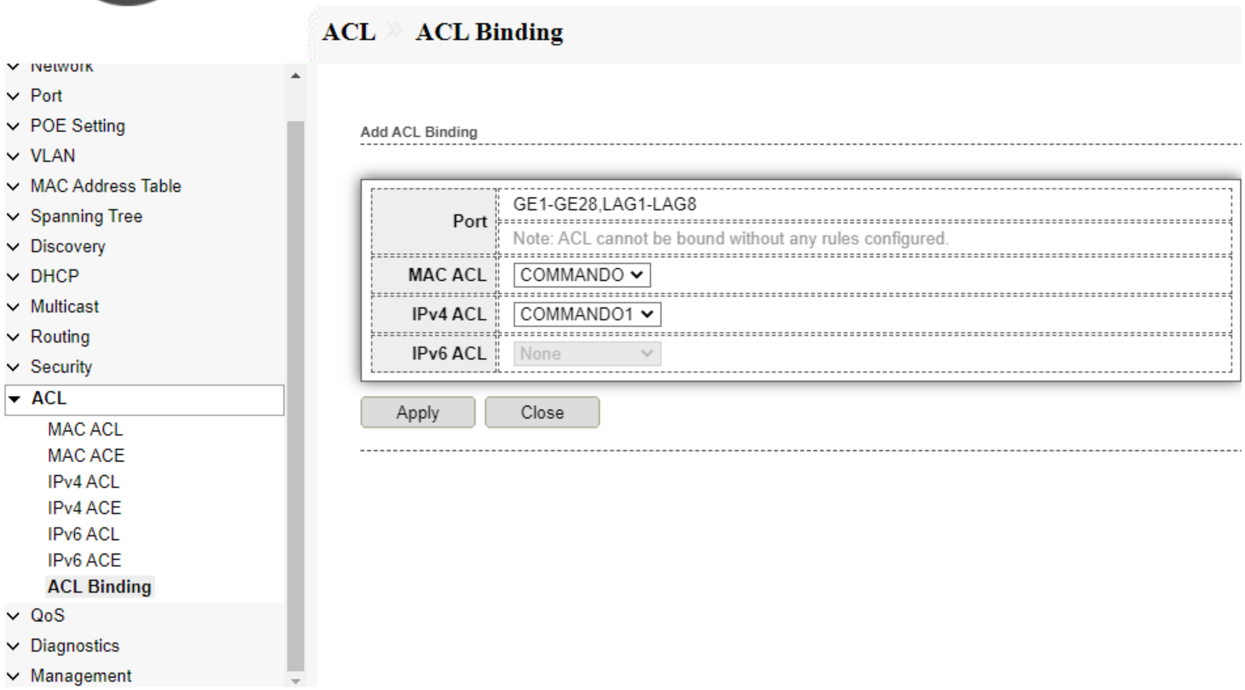
QoS
Diagnostics
Management

ACL » ACL Binding

ACL Binding Table

☑	Entry	Port	MAC ACL	IPv4 ACL	IPv6 ACL
☑	1	GE1			
☑	2	GE2			
☑	3	GE3			
☑	4	GE4			
☑	5	GE5			
☑	6	GE6			
☑	7	GE7			
☑	8	GE8			
☑	9	GE9			
☑	10	GE10			
☑	11	GE11			
☑	12	GE12			
☑	13	GE13			
☑	14	GE14			
☑	15	GE15			

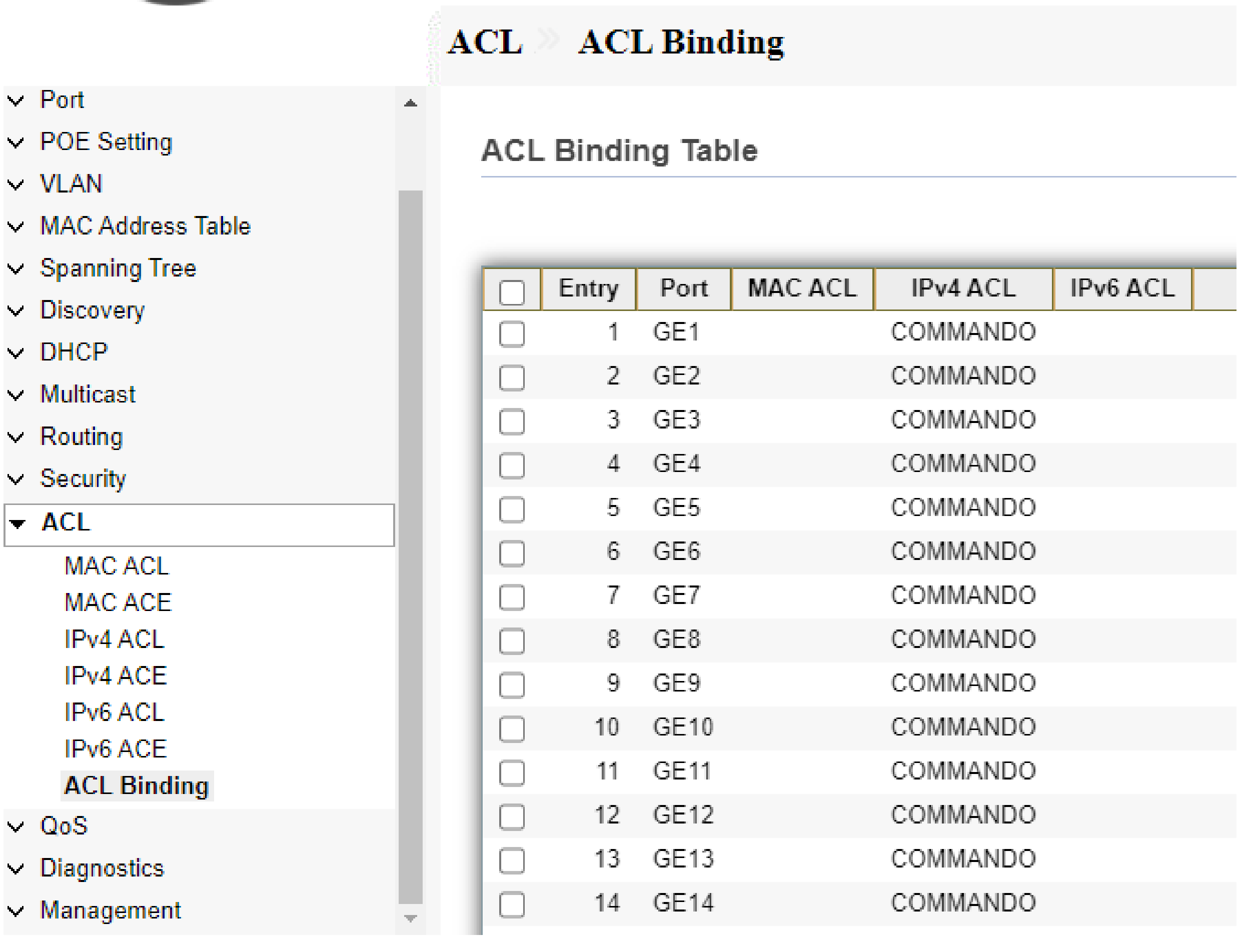
Fig 13.7.2 Selecting port for ACL Binding page



Add ACL Binding

Port	GE1-GE28,LAG1-LAG8 Note: ACL cannot be bound without any rules configured.
MAC ACL	COMMANDO
IPv4 ACL	COMMANDO1
IPv6 ACL	None

Fig 13.7.3 Add ACL Binding page



ACL Binding Table

□	Entry	Port	MAC ACL	IPv4 ACL	IPv6 ACL
□	1	GE1		COMMANDO	
□	2	GE2		COMMANDO	
□	3	GE3		COMMANDO	
□	4	GE4		COMMANDO	
□	5	GE5		COMMANDO	
□	6	GE6		COMMANDO	
□	7	GE7		COMMANDO	
□	8	GE8		COMMANDO	
□	9	GE9		COMMANDO	
□	10	GE10		COMMANDO	
□	11	GE11		COMMANDO	
□	12	GE12		COMMANDO	
□	13	GE13		COMMANDO	
□	14	GE14		COMMANDO	

Fig 13.7.4 ACL Binding Table after Enabled GE1 port page

Chapter 14 QoS

General: Quality of service (QoS) refers to any technology that manages data traffic to reduce packet loss, latency, and jitter on the network. QoS controls and manages network resources by setting priorities for specific types of data on the network.

Property: The QoS global properties include default values for QoS rule parameters, unit of measure, and QoS authentication timeouts.

Queue Scheduling: QoS Queue scheduling is a scheduling methodology of network traffic based upon QoS (Quality of Service). Here, the frames or packets are mapped to internal forwarding queues based on its QoS information, which are then services according to a queuing scheme.

CoS Mapping: Class of Service (CoS) is a queuing discipline. An algorithm compares fields of packets or CoS tags to classify packets and to assign to queues of differing priority.

DSCP Mapping: A Differentiated Services Code Point (DSCP) is a packet header value that can be used to request high priority or best effort delivery for traffic. DSCP Mapping is used to determine traffic classification for network data.

IP Precedence Mapping: IP Precedence allows you to specify the class of service (CoS) for a packet. You use the three precedence bits in the type of service (ToS) field of the IP version 4 (IPv4) header for this purpose. The traffic classified according to the user IP Precedence value is mapped.

Rate Limit: Use the Rate Limit pages to define values that determine how much traffic the switch can receive and send on specific port or queue.

Ingress / Egress Port: We can configure ingress port rate limit and egress port rate limit. The ingress/egress rate limit can be configured on the switch interface. Excess bandwidth above ingress/egress rate limit is discarded.

Egress Queue: Egress queues for each port for three kinds of queue scheduling algorithms like Strict-Priority Queue (SP) and Weighted Round Robin (WRR).

13.1 QoS General

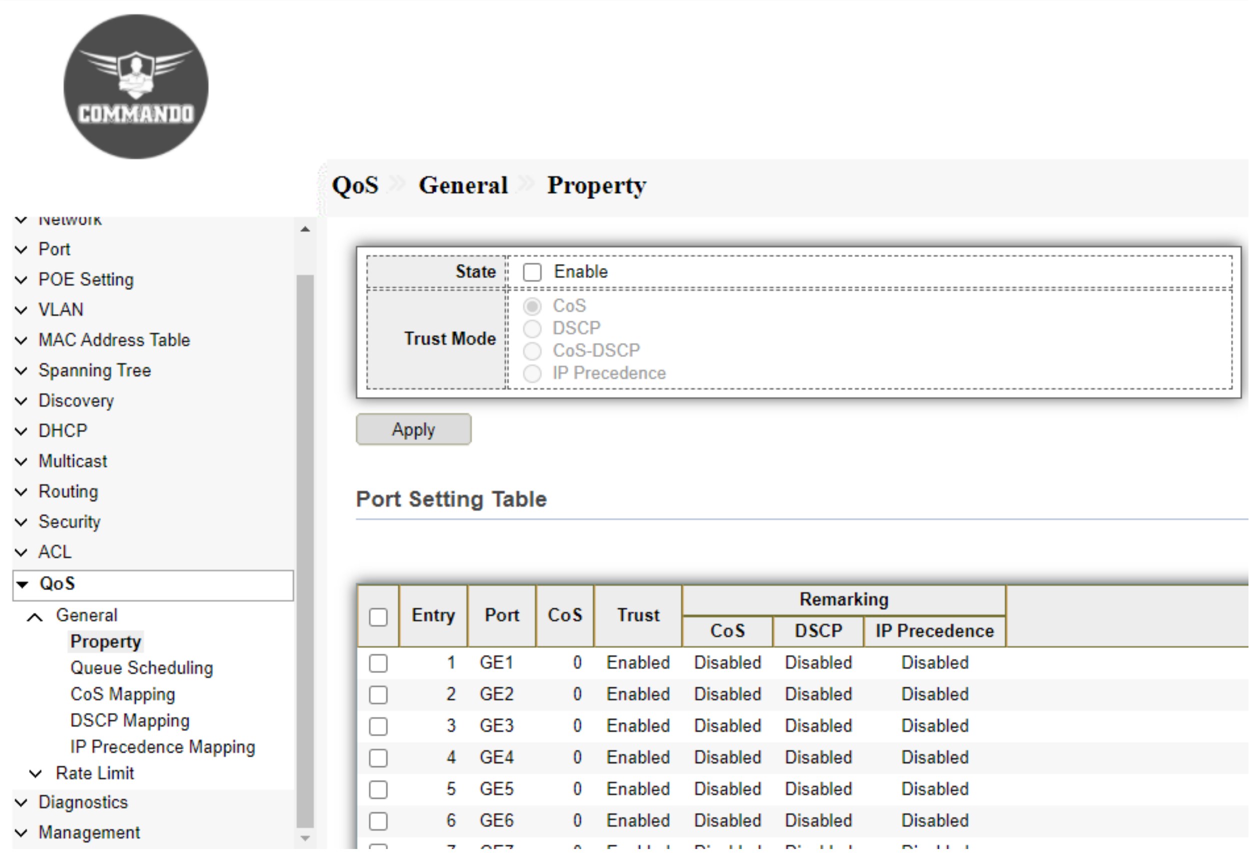
Generally, in IP network, all the packets are treated equally without priority difference following the First-in, First-out (FIFO) policy. That is, they make best effort to transmit the packets to the destination, not making any commitment or guarantee of the transmission reliability, delay or to satisfy other performance requirements. To deliver better service with the limited network resources, QoS monitors the traffic of the specific user on the ingress, so that it can make a better use of the assigned resource. The port traffic limit is the port-based traffic limit used for limiting the general speed of packet output on the port. Traffic Priority IP TOS, DSCP and 802.1p, etc. IP packet TOS byte of IP header has eight bits. The first three bits indicate the IP priority with the value ranging from 0 to 7. Bits 3 to 6 indicate the TOS priority, ranging from 0 to 15. The TOS byte of IP header is re-defined to DS field. Wherein, the DSCP priority is indicated by the first six bits (bits 0 to 5) with the value ranging from 0 to 63, and the last two bits (bits 6 and 7) are currently unused. 802.1p priority is in the layer-2 packet header and has each host supporting the protocol 802.1Q is added with a 4-byte 802.1Q tag head behind the source address in the original Ethernet frame head when sending data packets. The 4-byte 802.1Q tag head contains 2-byte tag protocol Identifier (TPID) whose value is 8100, and 2-byte tag control information (TCI). This information is added to IP packet with 802.1Q tag.

When congestion occurs, several packets will compete for the resources. Two kinds of queue scheduling algorithms are used to overcome the problem. These two kinds of queue scheduling algorithms are Strict-Priority Queue (SP) and Weighted Round Robin (WRR).

14.1.1 Property

Quality of Service (QoS) prioritizes traffic so that more important traffic can pass first. This result is a performance improvement for critical network traffic. C3000 Series Switches allow setting QoS on per port basis with queuing.

To view and configure QoS Property, click **QoS >> General >> Property.**

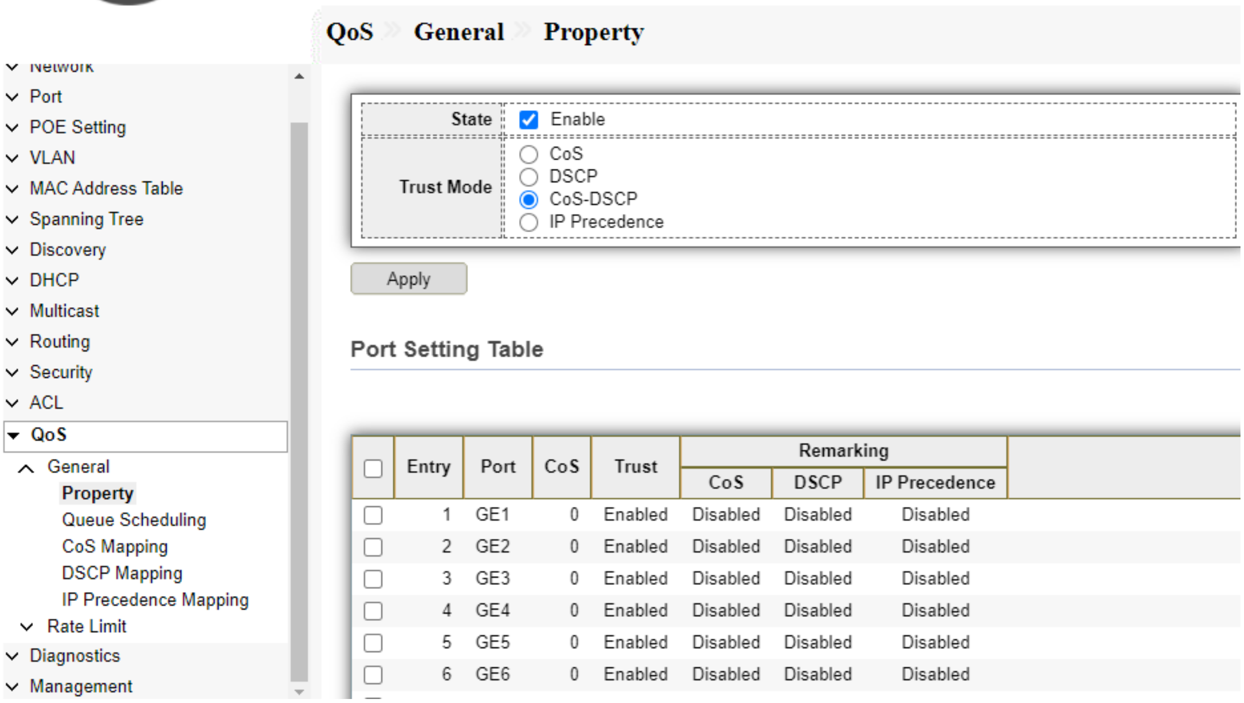


State	□ Enable
Trust Mode	● CoS ○ DSCP ○ CoS-DSCP ○ IP Precedence

Port Setting Table

□	Entry	Port	CoS	Trust	Remarking		
					CoS	DSCP	IP Precedence
□	1	GE1	0	Enabled	Disabled	Disabled	Disabled
□	2	GE2	0	Enabled	Disabled	Disabled	Disabled
□	3	GE3	0	Enabled	Disabled	Disabled	Disabled
□	4	GE4	0	Enabled	Disabled	Disabled	Disabled
□	5	GE5	0	Enabled	Disabled	Disabled	Disabled
□	6	GE6	0	Enabled	Disabled	Disabled	Disabled

Fig 14.1.1 Default QoS Port Setting table page



QoS » General » Property

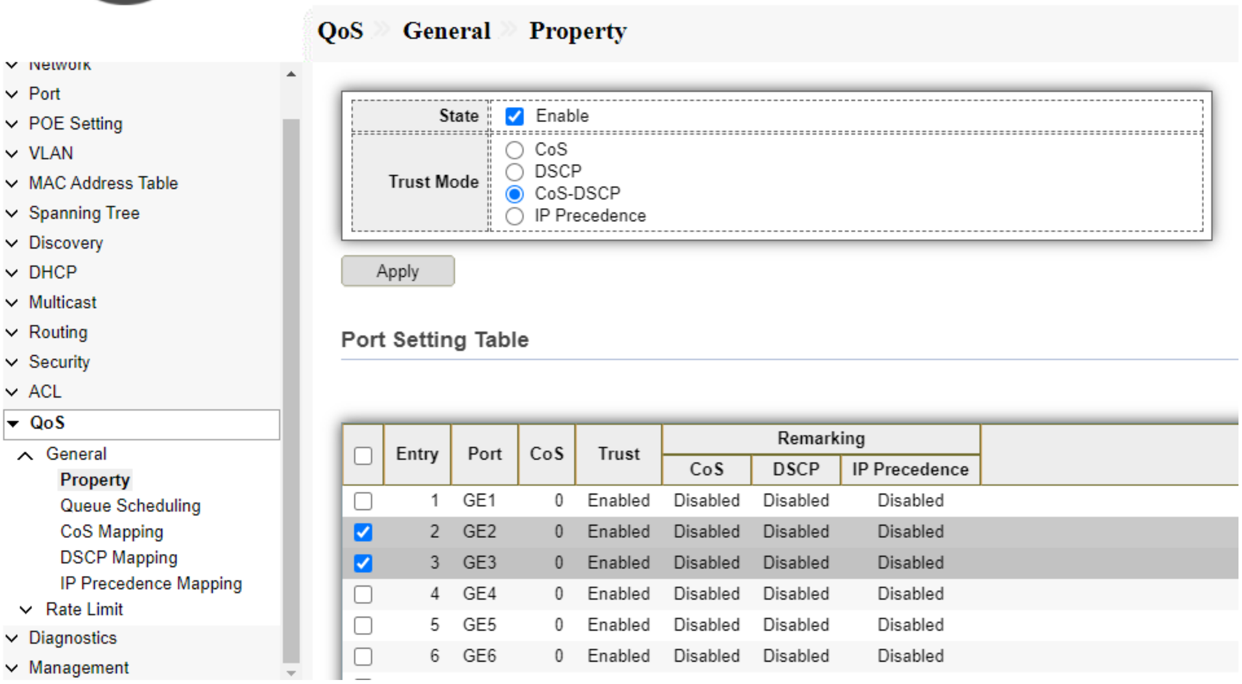
State ☑ Enable

Trust Mode ○ CoS ○ DSCP ● CoS-DSCP ○ IP Precedence

Port Setting Table

□	Entry	Port	CoS	Trust	Remarking		
					CoS	DSCP	IP Precedence
□	1	GE1	0	Enabled	Disabled	Disabled	Disabled
□	2	GE2	0	Enabled	Disabled	Disabled	Disabled
□	3	GE3	0	Enabled	Disabled	Disabled	Disabled
□	4	GE4	0	Enabled	Disabled	Disabled	Disabled
□	5	GE5	0	Enabled	Disabled	Disabled	Disabled
□	6	GE6	0	Enabled	Disabled	Disabled	Disabled

Fig 14.1.2 Enable QoS on Switch page

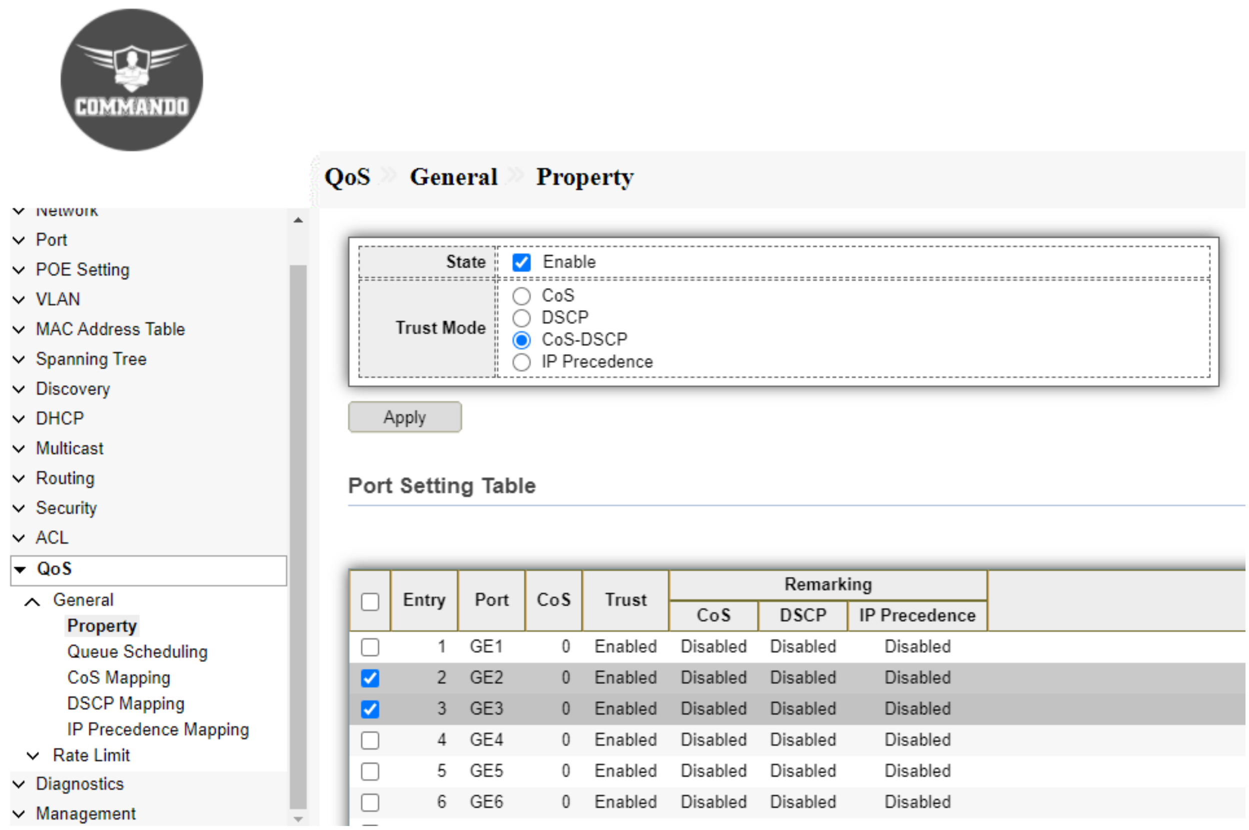


State	☑ Enable
Trust Mode	○ CoS ○ DSCP ● CoS-DSCP ○ IP Precedence

Port Setting Table

□	Entry	Port	CoS	Trust	Remarking		
					CoS	DSCP	IP Precedence
□	1	GE1	0	Enabled	Disabled	Disabled	Disabled
☑	2	GE2	0	Enabled	Disabled	Disabled	Disabled
☑	3	GE3	0	Enabled	Disabled	Disabled	Disabled
□	4	GE4	0	Enabled	Disabled	Disabled	Disabled
□	5	GE5	0	Enabled	Disabled	Disabled	Disabled
□	6	GE6	0	Enabled	Disabled	Disabled	Disabled

Fig 14.1.3 Selecting Ports for Qos setting page

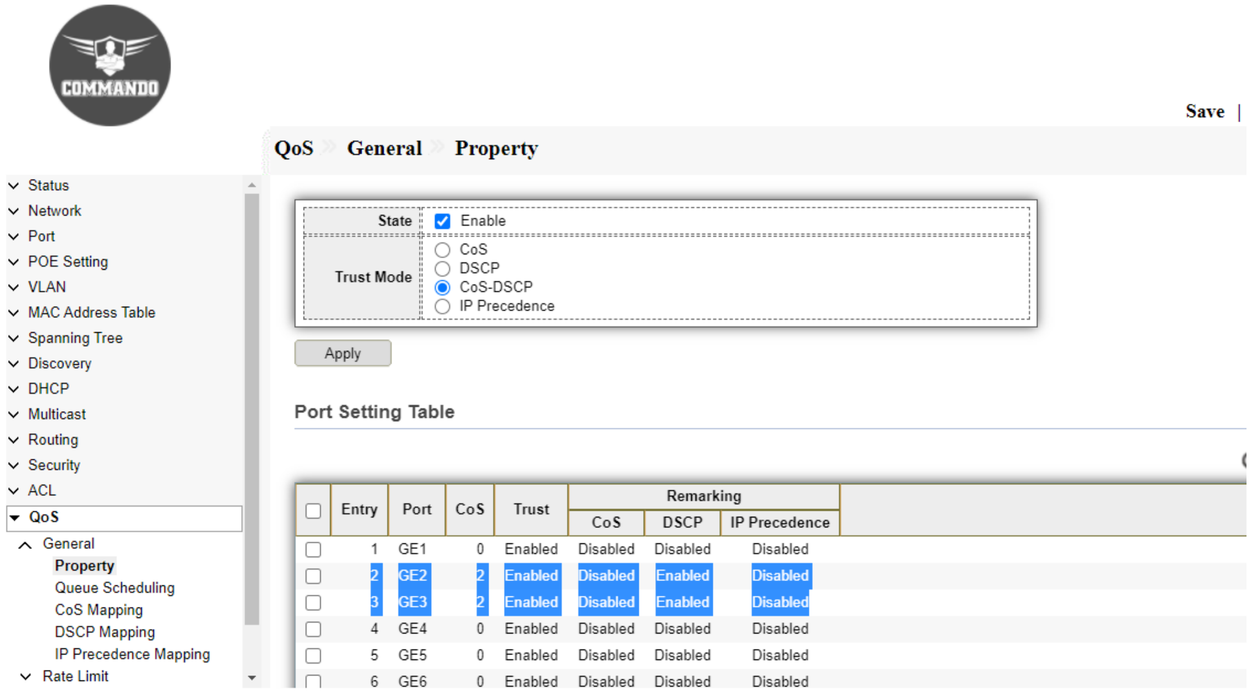


State	☑ Enable
Trust Mode	○ CoS ○ DSCP ● CoS-DSCP ○ IP Precedence

Port Setting Table

□	Entry	Port	CoS	Trust	Remarking		
					CoS	DSCP	IP Precedence
□	1	GE1	0	Enabled	Disabled	Disabled	Disabled
☑	2	GE2	0	Enabled	Disabled	Disabled	Disabled
☑	3	GE3	0	Enabled	Disabled	Disabled	Disabled
□	4	GE4	0	Enabled	Disabled	Disabled	Disabled
□	5	GE5	0	Enabled	Disabled	Disabled	Disabled
□	6	GE6	0	Enabled	Disabled	Disabled	Disabled

Fig 14.1.4 Edit Ports setting for Qos page



State	☑ Enable
Trust Mode	○ CoS ○ DSCP ● CoS-DSCP ○ IP Precedence

Port Setting Table

□	Entry	Port	CoS	Trust	Remarking		
					CoS	DSCP	IP Precedence
□	1	GE1	0	Enabled	Disabled	Disabled	Disabled
□	2	GE2	2	Enabled	Disabled	Enabled	Disabled
□	3	GE3	2	Enabled	Disabled	Enabled	Disabled
□	4	GE4	0	Enabled	Disabled	Disabled	Disabled
□	5	GE5	0	Enabled	Disabled	Disabled	Disabled
□	6	GE6	0	Enabled	Disabled	Disabled	Disabled

Fig 14.1.5 QoS Port Setting table page

14.1.2 Queue Scheduling

The switch supports eight queues for each interface. Queue number 8 is the highest priority queue and queue 1 is the lowest priority queue. There are two ways of determining how traffic in queues is handled, Strict Priority (SP) and Weighted Round Robin (WRR).

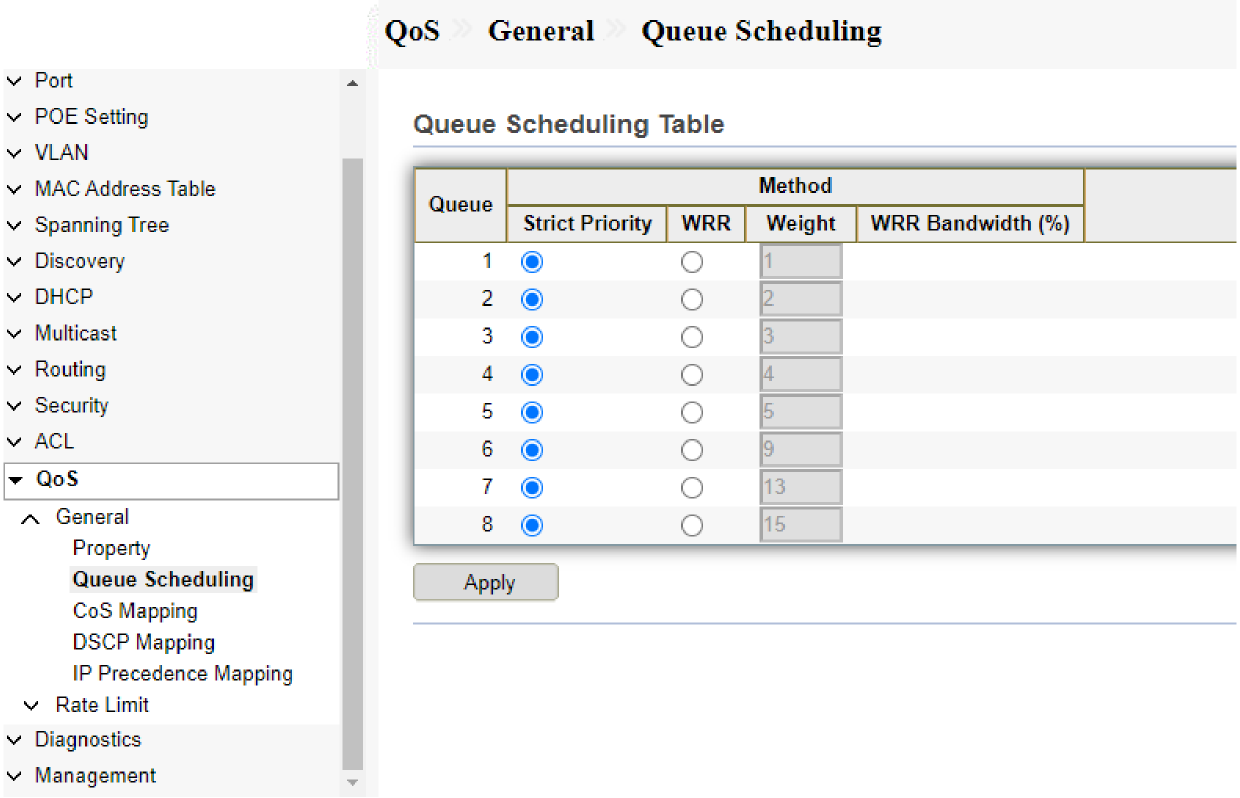
Strict Priority (SP): Egress traffic from the highest priority queue is transmitted first. Traffic from the lower queues is processed only after the highest queue has been transmitted, which provide the highest level of priority of traffic to the highest numbered queue.

Weighted Round Robin (WRR): In WRR mode the number of packets sent from the queue is proportional to the weight of the queue higher the weight, the with more priority frames are sent.

The queuing modes can be selected on the Queue page. When the queuing mode is by Strict Priority, the priority sets the order in which queues are serviced, starting with queue-8 (the highest priority queue) and going to the next lower queue when each queue is completed.

When the queuing mode is Weighted Round Robin, queues are serviced until their quota has been used up and then another queue is serviced. It is also possible to assign some of the lower queues to WRR, while keeping some of the higher queues in Strict Priority. In this case traffic for the SP queues is always sent before traffic from the WRR queues. After the SP queues have been emptied, traffic from the WRR queues is forwarded.

To view and configure Queue Scheduling, click **QoS >> General >> Queue Scheduling**

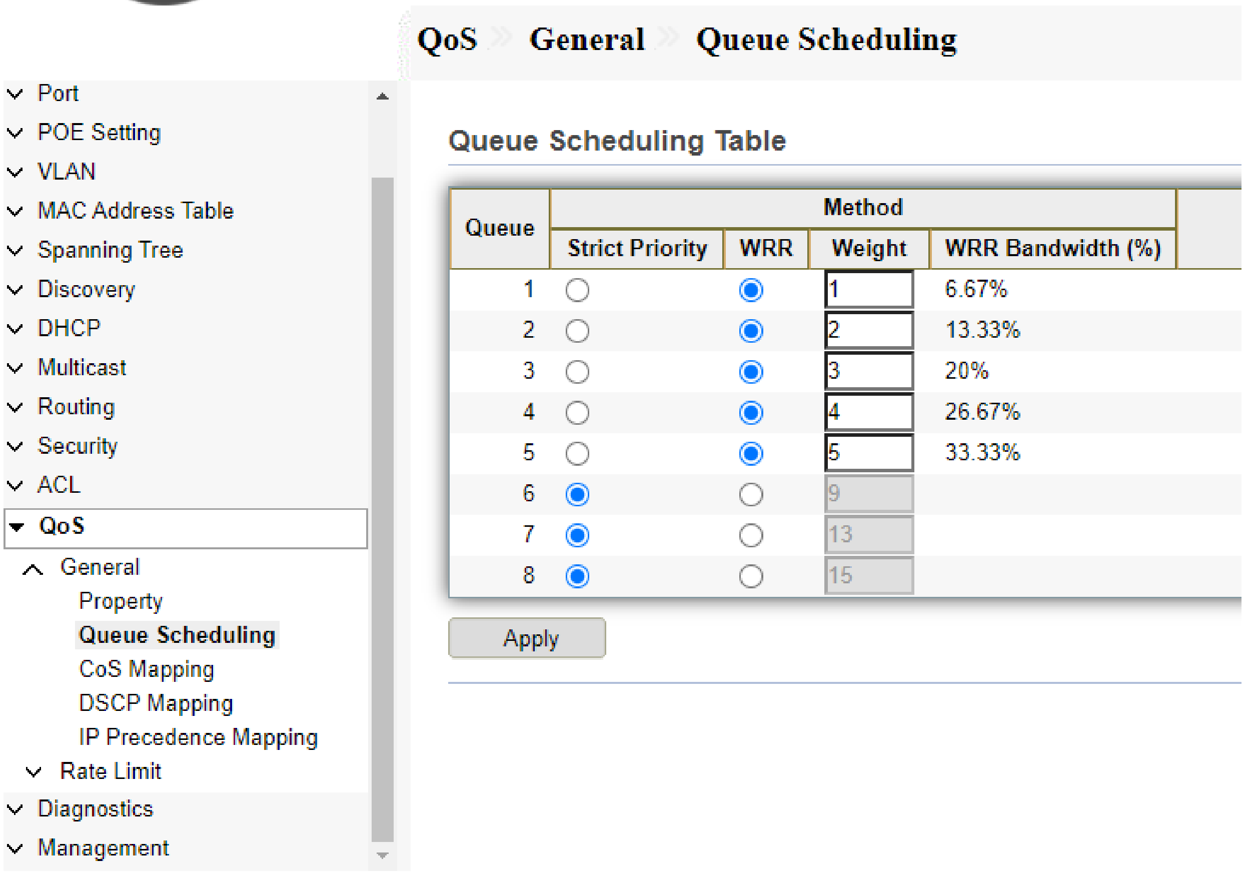


QoS » General » Queue Scheduling

Queue Scheduling Table

Queue	Method			
	Strict Priority	WRR	Weight	WRR Bandwidth (%)
1	●	○	1	
2	●	○	2	
3	●	○	3	
4	●	○	4	
5	●	○	5	
6	●	○	9	
7	●	○	13	
8	●	○	15	

Fig 14.1.6 Default QoS Scheduling table page



QoS » General » Queue Scheduling

Queue Scheduling Table

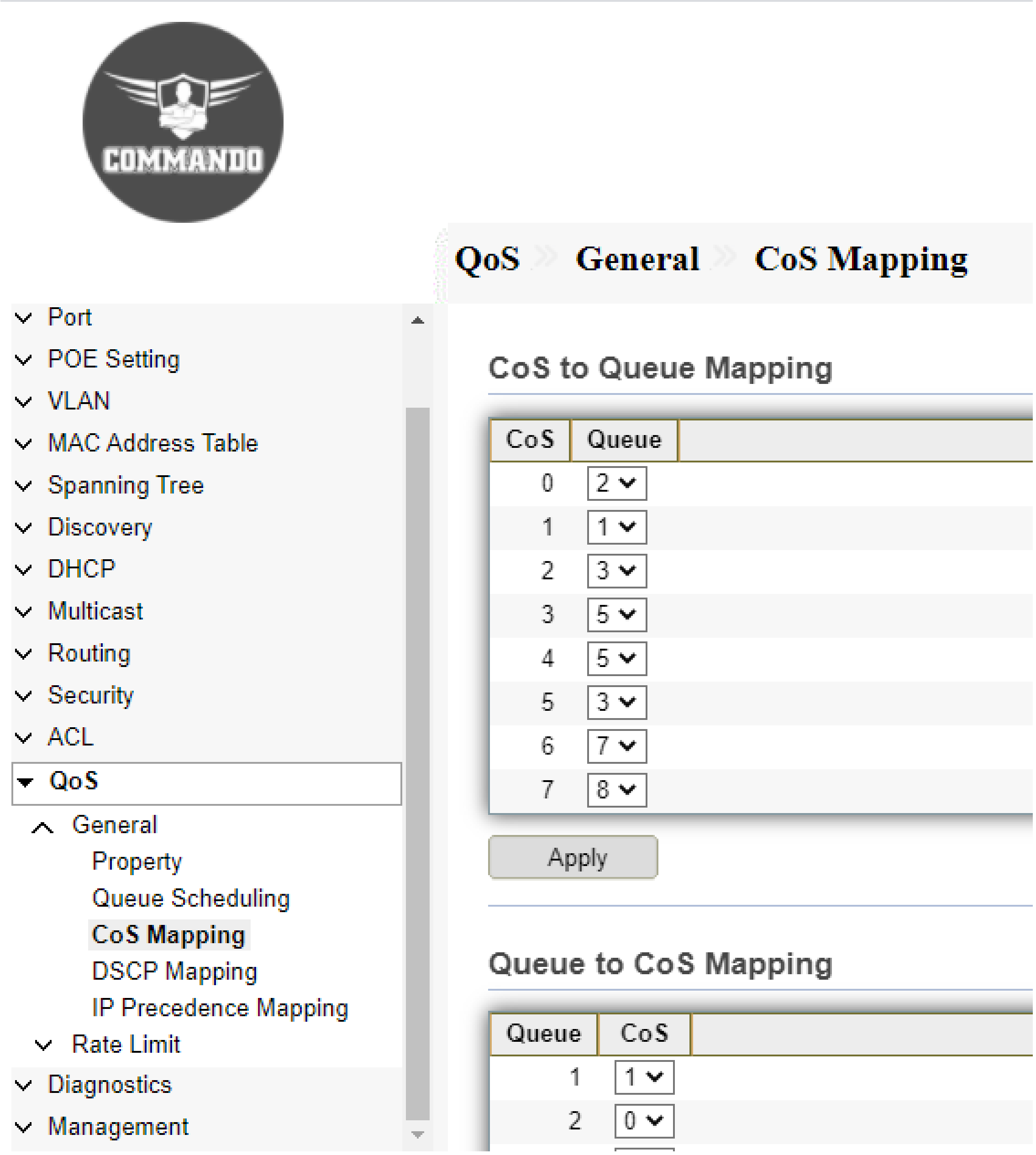
Queue	Method			
	Strict Priority	WRR	Weight	WRR Bandwidth (%)
1	○	●	1	6.67%
2	○	●	2	13.33%
3	○	●	3	20%
4	○	●	4	26.67%
5	○	●	5	33.33%
6	●	○	9	
7	●	○	13	
8	●	○	15	

Fig 14.1.7 QoS Scheduling changing Queue Method page

14.1.3 CoS Mapping

The CoS to Queue table determines the egress queues of the incoming packets based on the 802.1p priority in their VLAN tags. For incoming untagged packets, the 802.1p priority will be the default CoS/802.1p priority assigned to the ingress ports. CoS/802.1p priority for egress traffic from each queue can be set.

To view and configure CoS Mapping, click **QoS >> General >> CoS Mapping**



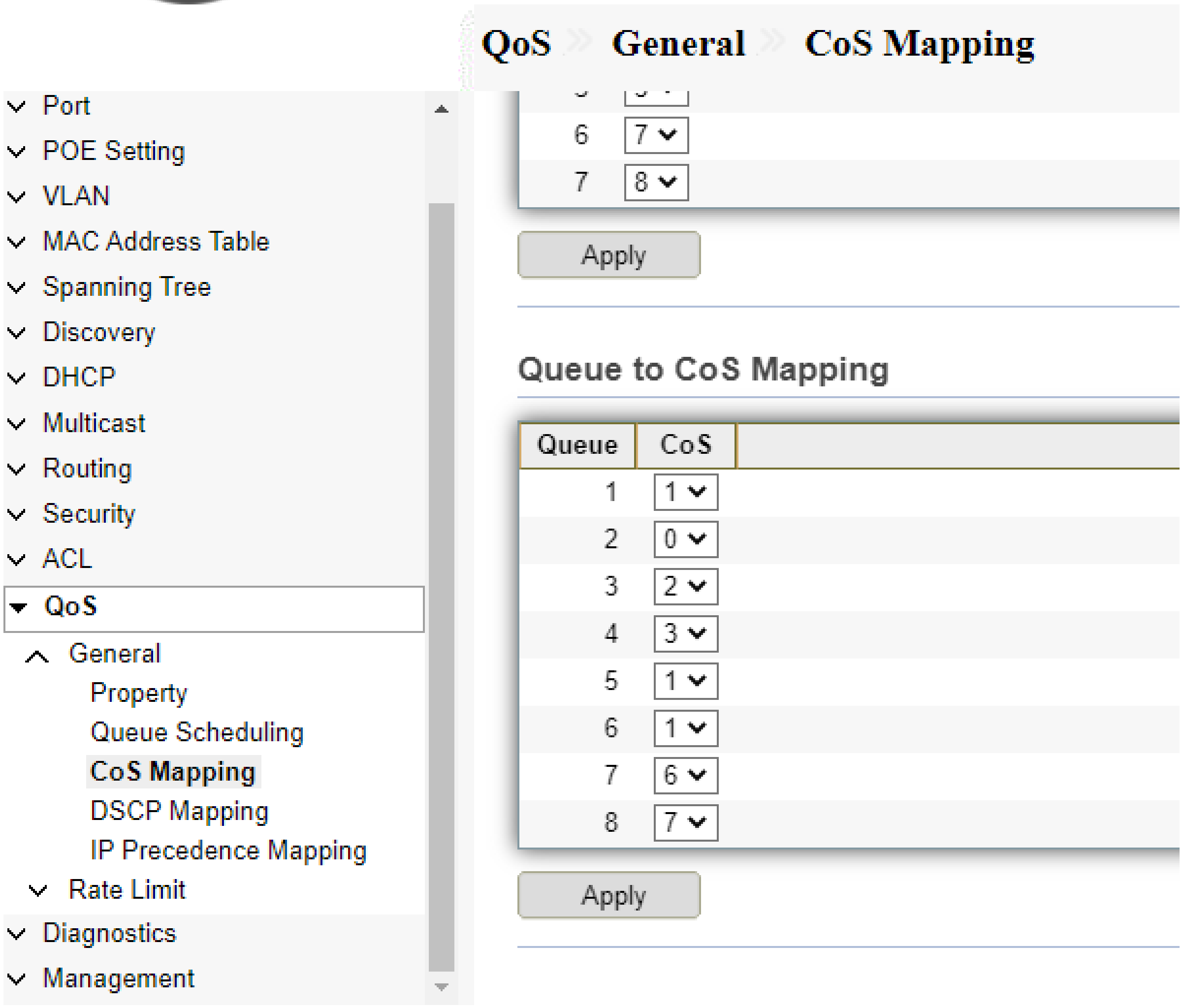
CoS to Queue Mapping

CoS	Queue
0	2
1	1
2	3
3	5
4	5
5	3
6	7
7	8

Queue to CoS Mapping

Queue	CoS
1	1
2	0

Fig 14.1.8 CoS to Queue Mapping Changing Queue values page



QoS » General » CoS Mapping

6	7
7	8

Queue to CoS Mapping

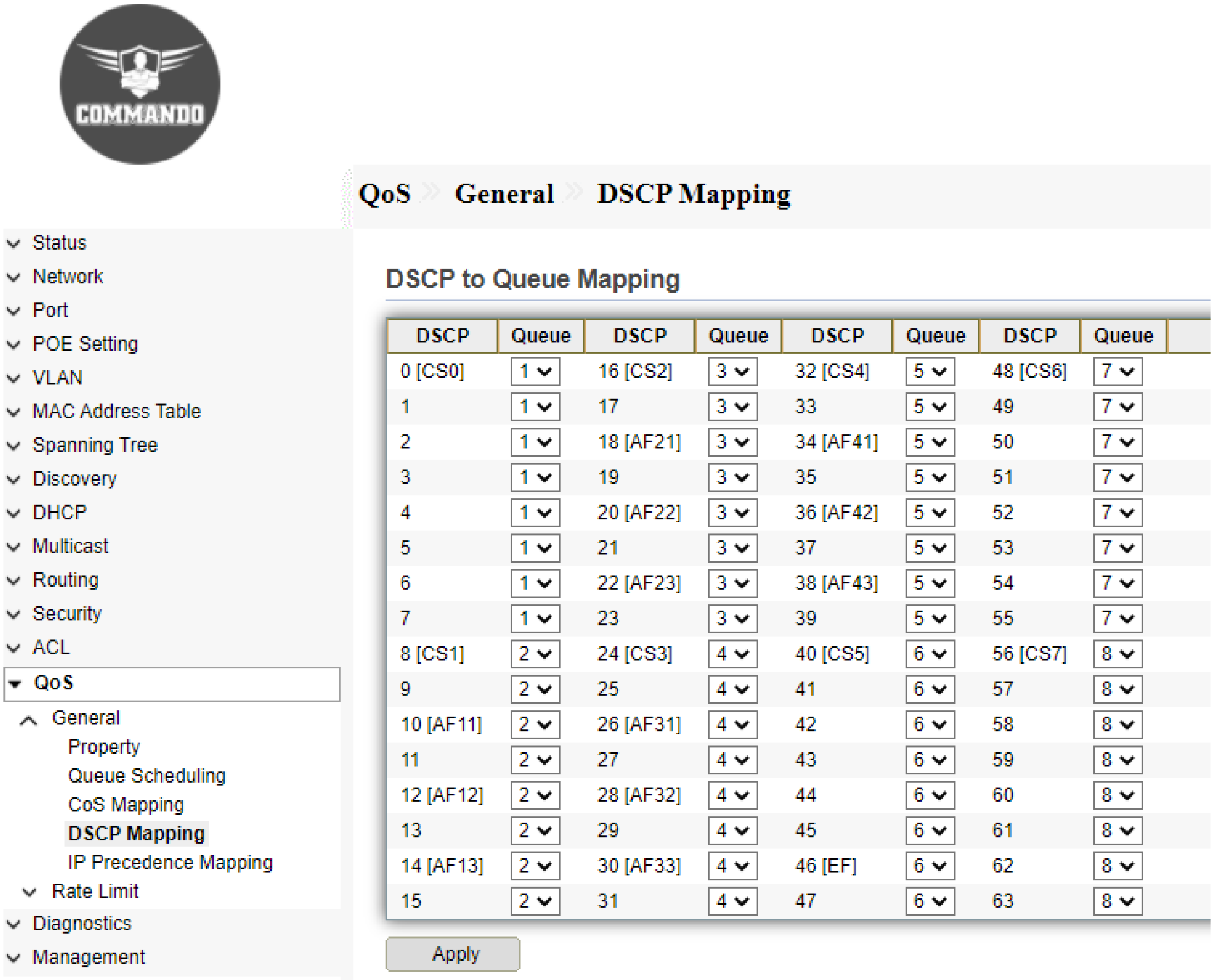
Queue	CoS
1	1
2	0
3	2
4	3
5	1
6	1
7	6
8	7

Fig 14.1.9 Queue to CoS Mapping Changing Queue values page

14.1.4 DSCP Mapping

The DSCP to Queue table determines the egress queues of the incoming IP packets based on their DSCP values. we can change DSCP value for egress traffic from each queue.

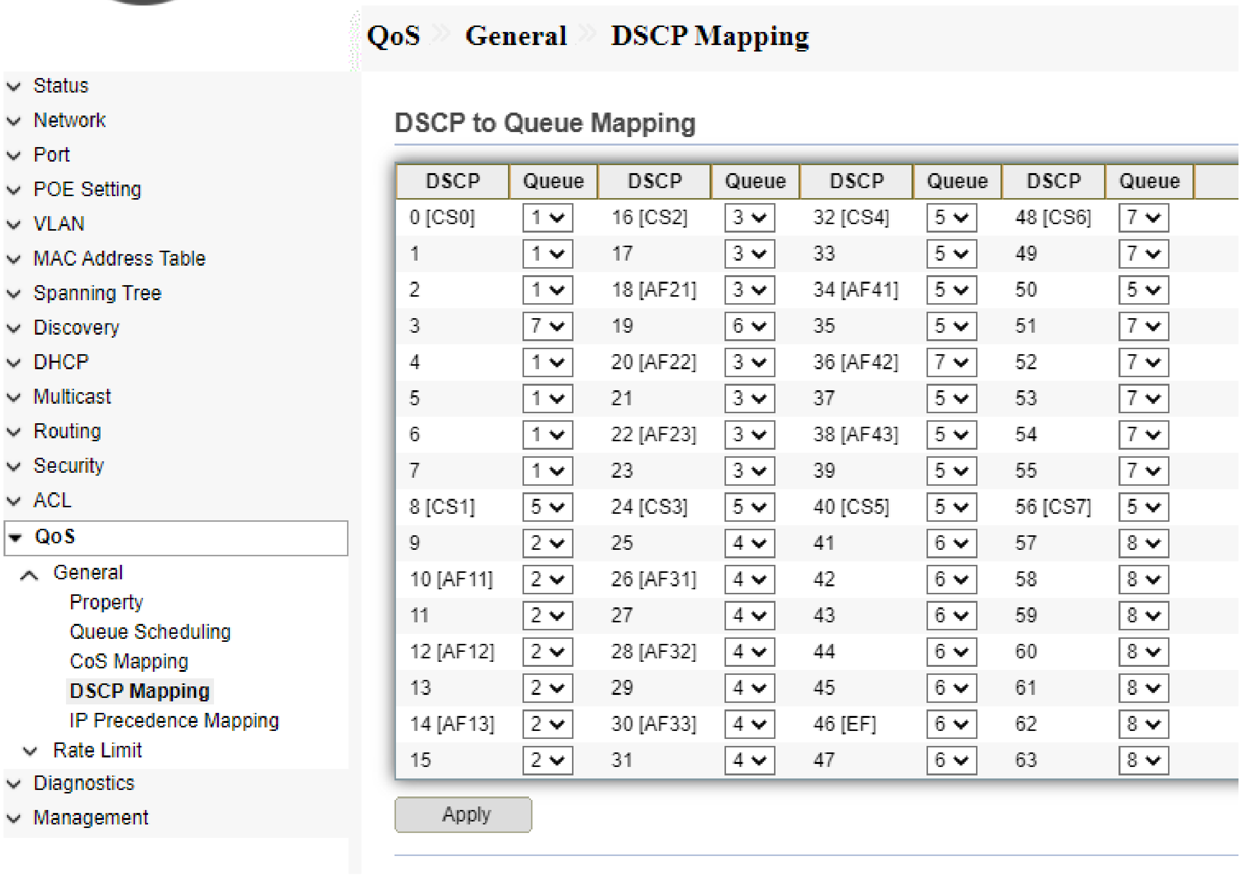
To view and configure DSCP Mapping, click **QoS >> General >> DSCP Mapping.**



DSCP to Queue Mapping

DSCP	Queue	DSCP	Queue	DSCP	Queue	DSCP	Queue
0 [CS0]	1	16 [CS2]	3	32 [CS4]	5	48 [CS6]	7
1	1	17	3	33	5	49	7
2	1	18 [AF21]	3	34 [AF41]	5	50	7
3	1	19	3	35	5	51	7
4	1	20 [AF22]	3	36 [AF42]	5	52	7
5	1	21	3	37	5	53	7
6	1	22 [AF23]	3	38 [AF43]	5	54	7
7	1	23	3	39	5	55	7
8 [CS1]	2	24 [CS3]	4	40 [CS5]	6	56 [CS7]	8
9	2	25	4	41	6	57	8
10 [AF11]	2	26 [AF31]	4	42	6	58	8
11	2	27	4	43	6	59	8
12 [AF12]	2	28 [AF32]	4	44	6	60	8
13	2	29	4	45	6	61	8
14 [AF13]	2	30 [AF33]	4	46 [EF]	6	62	8
15	2	31	4	47	6	63	8

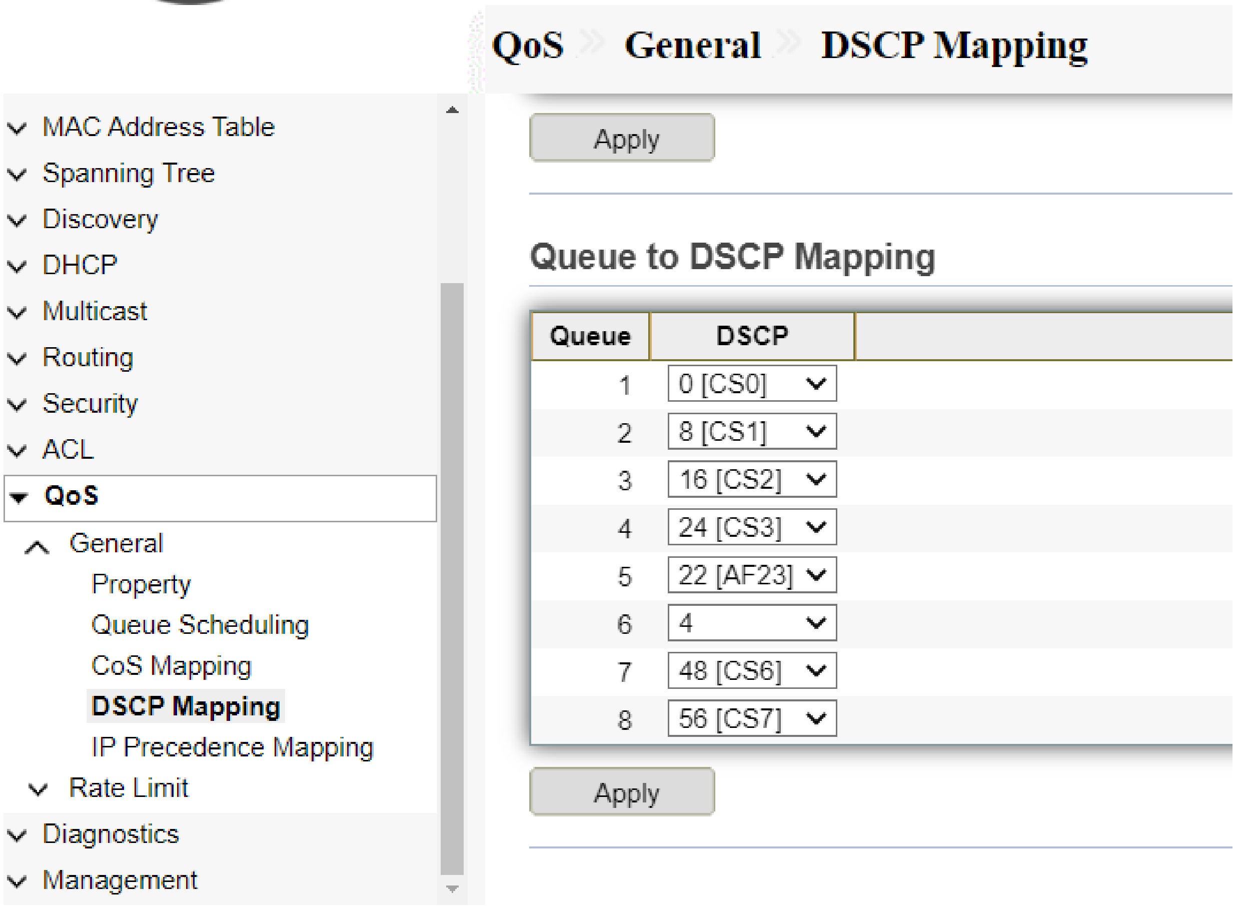
Fig 14.1.11 Default DSCP to Queue Mapping page



DSCP to Queue Mapping

DSCP	Queue	DSCP	Queue	DSCP	Queue	DSCP	Queue
0 [CS0]	1	16 [CS2]	3	32 [CS4]	5	48 [CS6]	7
1	1	17	3	33	5	49	7
2	1	18 [AF21]	3	34 [AF41]	5	50	5
3	7	19	6	35	5	51	7
4	1	20 [AF22]	3	36 [AF42]	7	52	7
5	1	21	3	37	5	53	7
6	1	22 [AF23]	3	38 [AF43]	5	54	7
7	1	23	3	39	5	55	7
8 [CS1]	5	24 [CS3]	5	40 [CS5]	5	56 [CS7]	5
9	2	25	4	41	6	57	8
10 [AF11]	2	26 [AF31]	4	42	6	58	8
11	2	27	4	43	6	59	8
12 [AF12]	2	28 [AF32]	4	44	6	60	8
13	2	29	4	45	6	61	8
14 [AF13]	2	30 [AF33]	4	46 [EF]	6	62	8
15	2	31	4	47	6	63	8

Fig 14.1.12 Changing DSCP to Queue Mapping page



Queue to DSCP Mapping

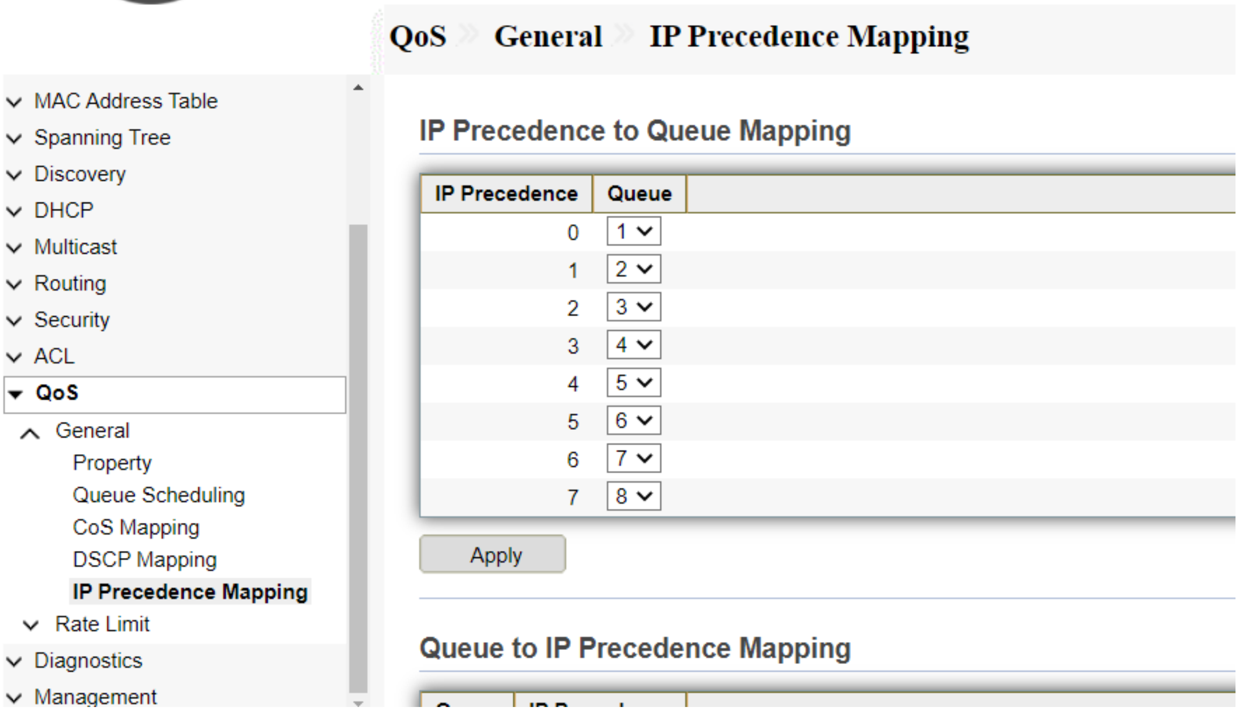
Queue	DSCP
1	0 [CS0]
2	8 [CS1]
3	16 [CS2]
4	24 [CS3]
5	22 [AF23]
6	4
7	48 [CS6]
8	56 [CS7]

Fig 14.1.13 Changing Queue to DSCP Mapping page

14.1.5 IP Precedence Mapping

This page allow user to configure IP Precedence to Queue mapping and Queue to IP Precedence mapping.

To view and configure IP Precedence Mapping, click **QoS >> General >> IP Precedence Mapping.**

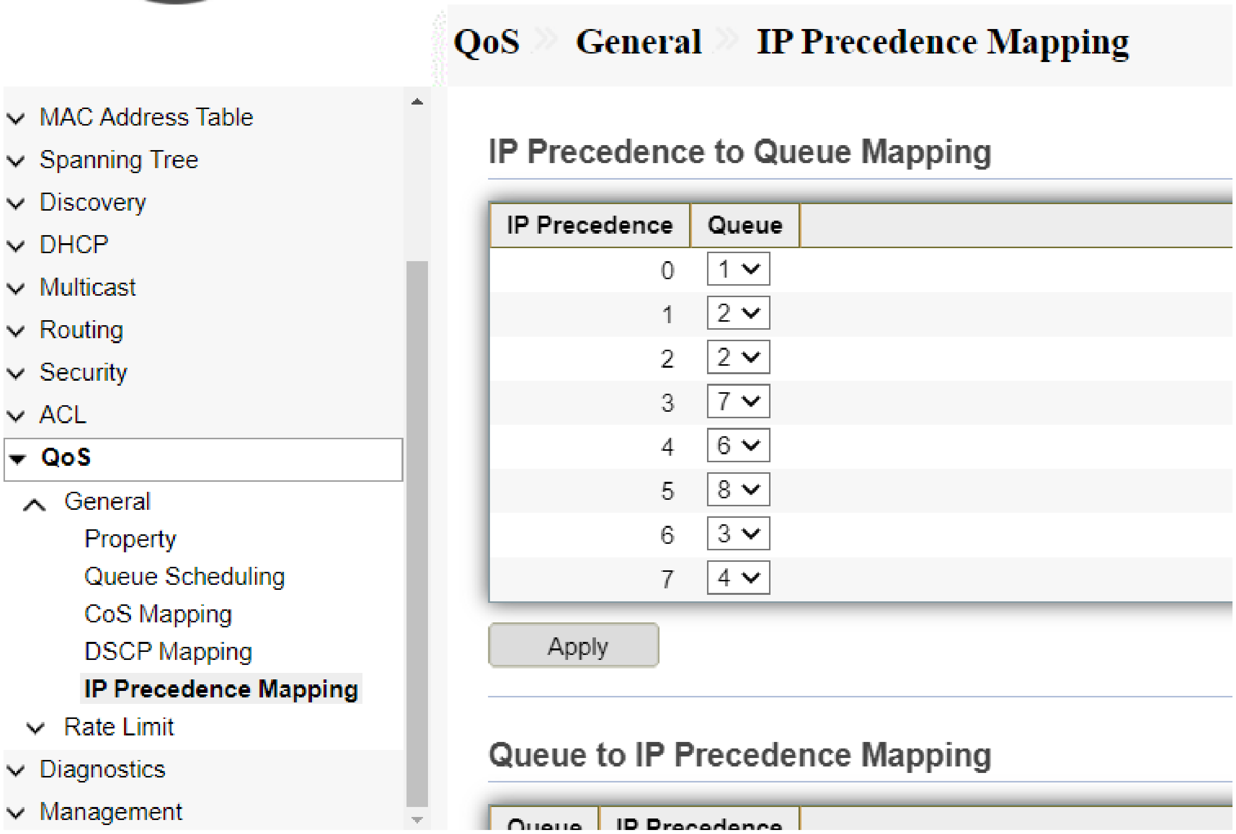


IP Precedence to Queue Mapping

IP Precedence	Queue
0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8

Queue to IP Precedence Mapping

Fig 14.1.15 IP Precedence to queue Mapping page



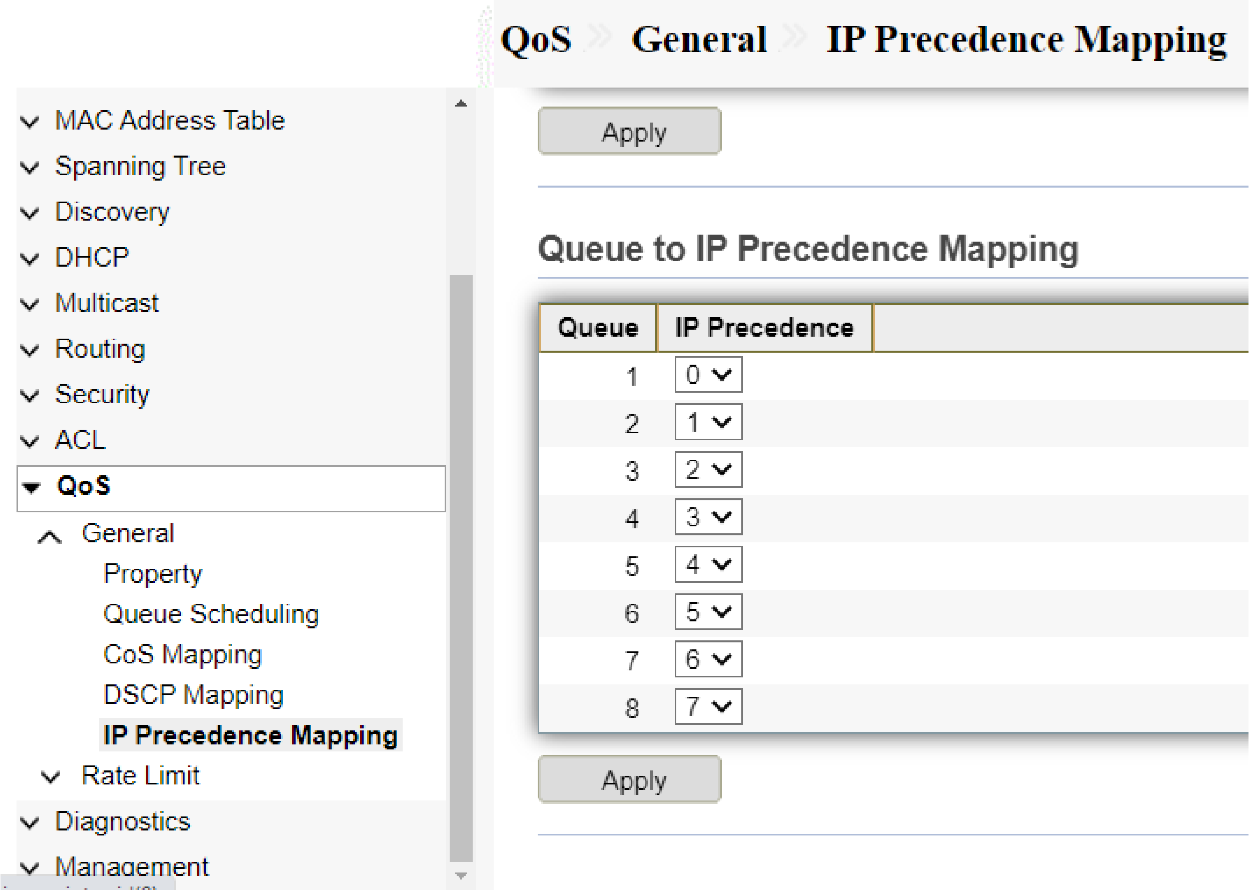
IP Precedence to Queue Mapping

IP Precedence	Queue
0	1
1	2
2	2
3	7
4	6
5	8
6	3
7	4

Queue to IP Precedence Mapping

Queue	IP Precedence

Fig 14.1.16 Changing IP Precedence to Queue Mapping values page

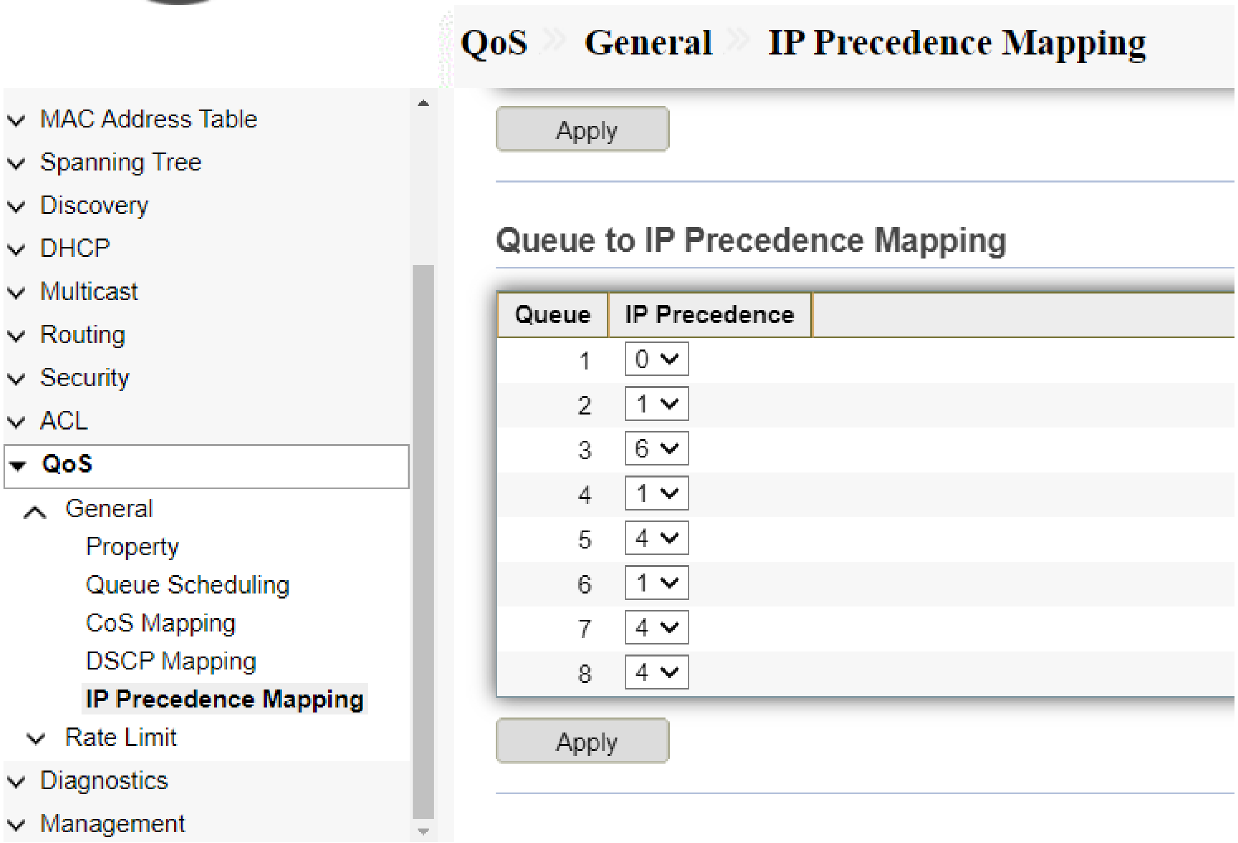


QoS » General » IP Precedence Mapping

Queue to IP Precedence Mapping

Queue	IP Precedence
1	0
2	1
3	2
4	3
5	4
6	5
7	6
8	7

Fig 14.1.17 Queue to IP Precedence Mapping page



Queue to IP Precedence Mapping

Queue	IP Precedence
1	0
2	1
3	6
4	1
5	4
6	1
7	4
8	4

Fig 14.1.18 Changing Queue to IP Precedence Mapping values page

14.2 Rate Limit

Rate limiting simply means that the switch will slow down traffic on a port to keep it from exceeding the limit that you set. Rate Limit pages to define values that determine how much traffic the switch can receive and send on specific port or queue. With Rate Limit configured, we can protect the network bandwidth from being occupied too much by some of the clients.

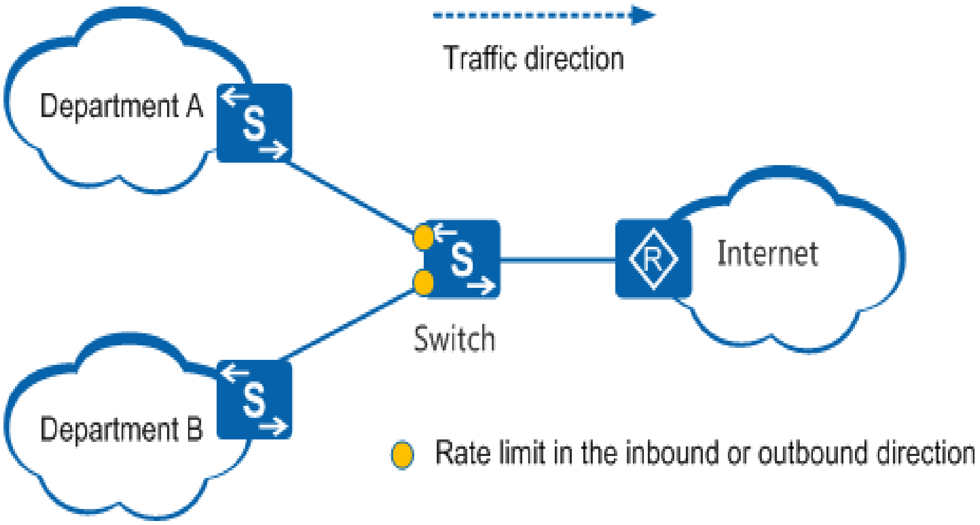


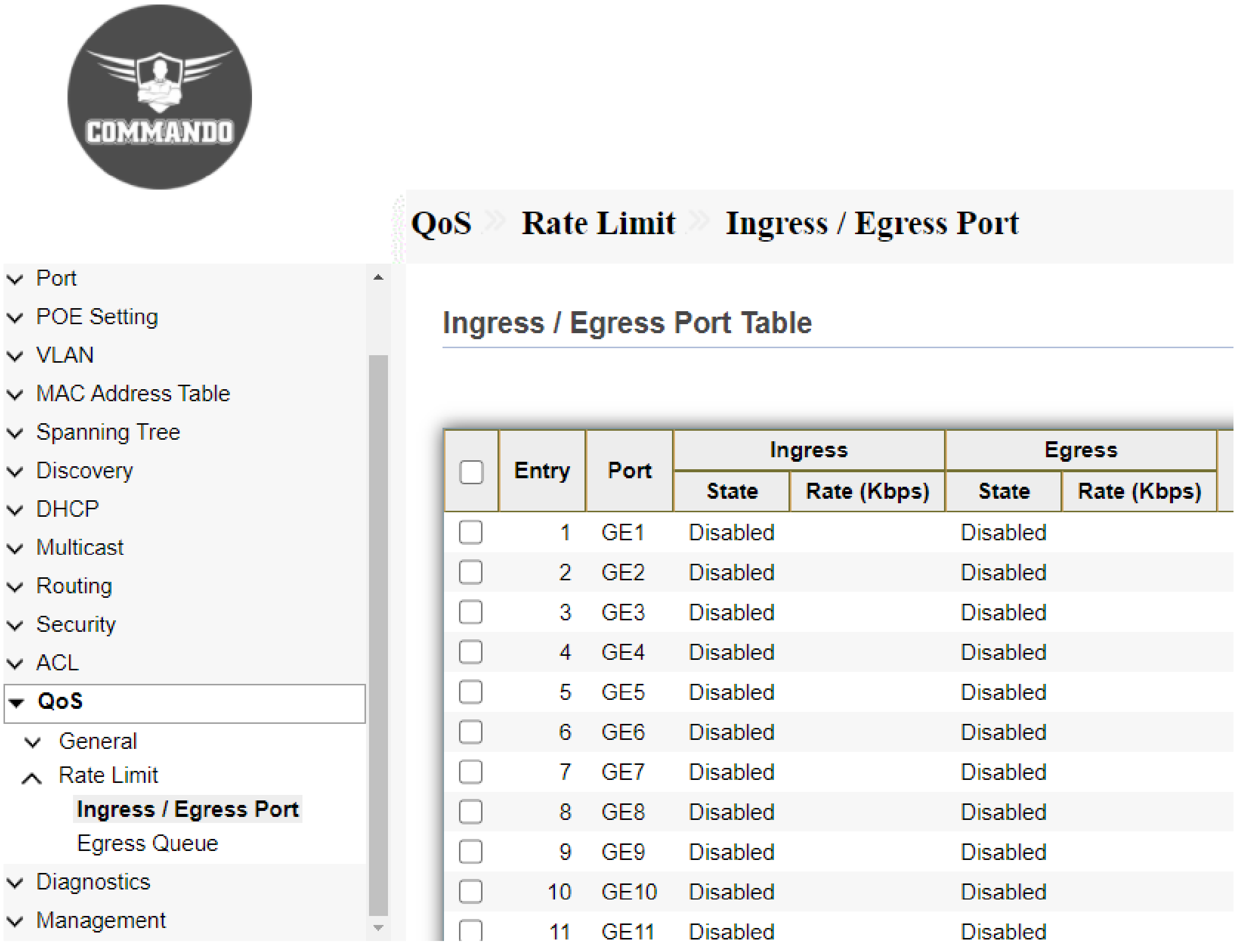
Fig 14.2.1 Rate Limiting concept

14.2.1 Ingress / Egress Port

This page allow user to configure ingress port rate limit and egress port rate limit.

The ingress rate limit is the number of bits per second that can be received from the ingress interface. Excess bandwidth above this limit is discarded in inbound and outbound direction.

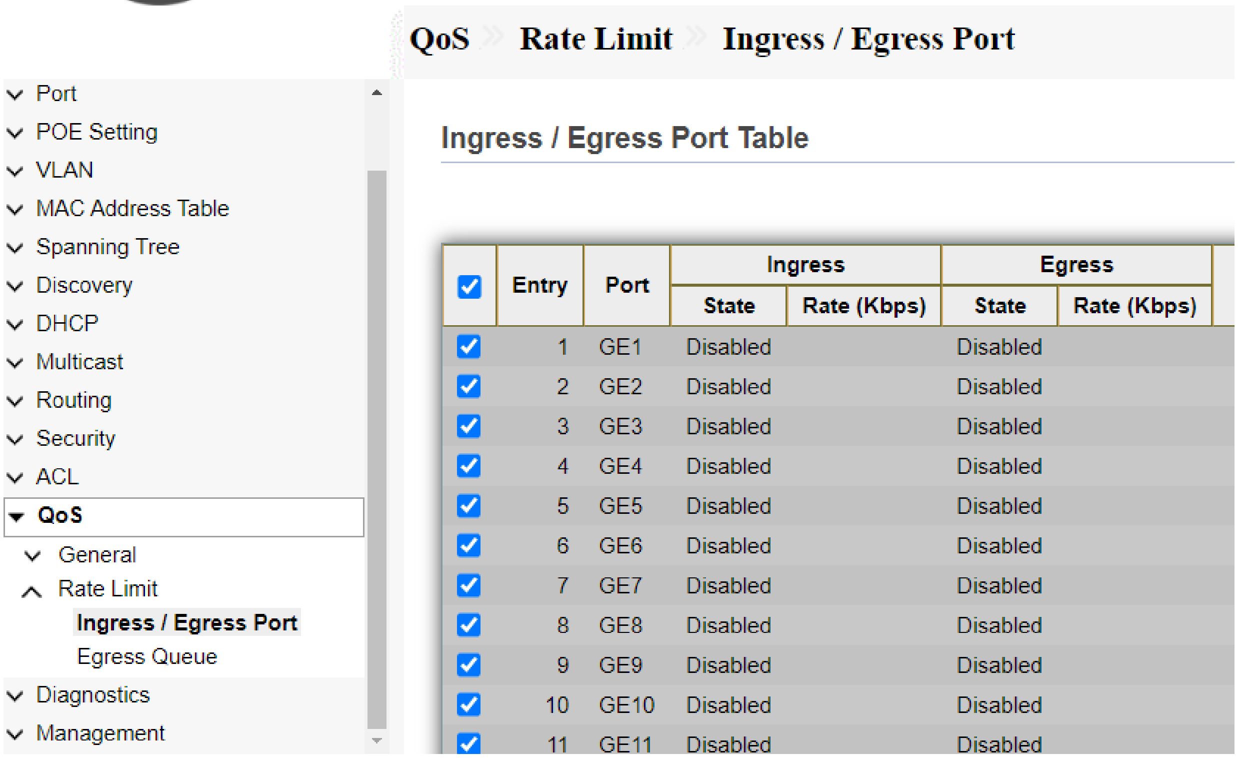
To view and configure Ingress / Egress Port, click **QoS >> Rate Limit >> Ingress / Egress Port.**



Ingress / Egress Port Table

□	Entry	Port	Ingress		Egress	
			State	Rate (Kbps)	State	Rate (Kbps)
□	1	GE1	Disabled		Disabled	
□	2	GE2	Disabled		Disabled	
□	3	GE3	Disabled		Disabled	
□	4	GE4	Disabled		Disabled	
□	5	GE5	Disabled		Disabled	
□	6	GE6	Disabled		Disabled	
□	7	GE7	Disabled		Disabled	
□	8	GE8	Disabled		Disabled	
□	9	GE9	Disabled		Disabled	
□	10	GE10	Disabled		Disabled	
□	11	GE11	Disabled		Disabled	

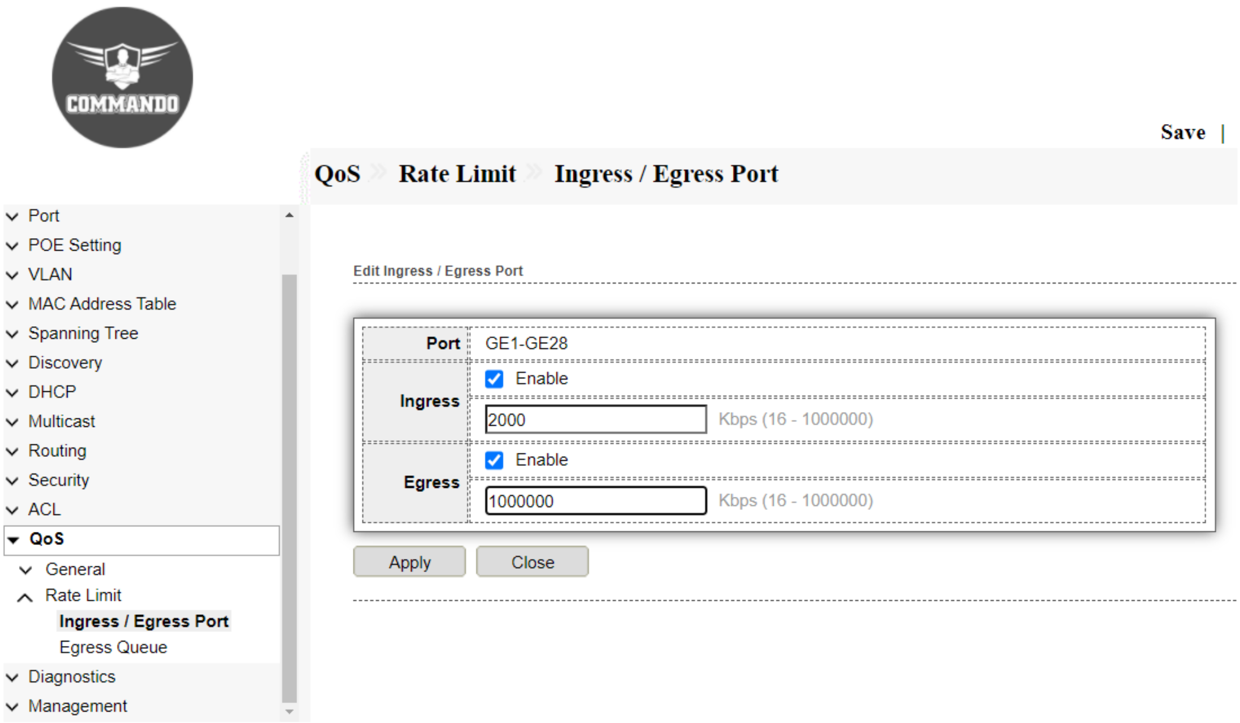
Fig 14.2.1 Ingress / Egress Port Table page



Ingress / Egress Port Table

☑	Entry	Port	Ingress		Egress	
			State	Rate (Kbps)	State	Rate (Kbps)
☑	1	GE1	Disabled		Disabled	
☑	2	GE2	Disabled		Disabled	
☑	3	GE3	Disabled		Disabled	
☑	4	GE4	Disabled		Disabled	
☑	5	GE5	Disabled		Disabled	
☑	6	GE6	Disabled		Disabled	
☑	7	GE7	Disabled		Disabled	
☑	8	GE8	Disabled		Disabled	
☑	9	GE9	Disabled		Disabled	
☑	10	GE10	Disabled		Disabled	
☑	11	GE11	Disabled		Disabled	

Fig 14.2.2 Selecting Ingress / Egress Port page

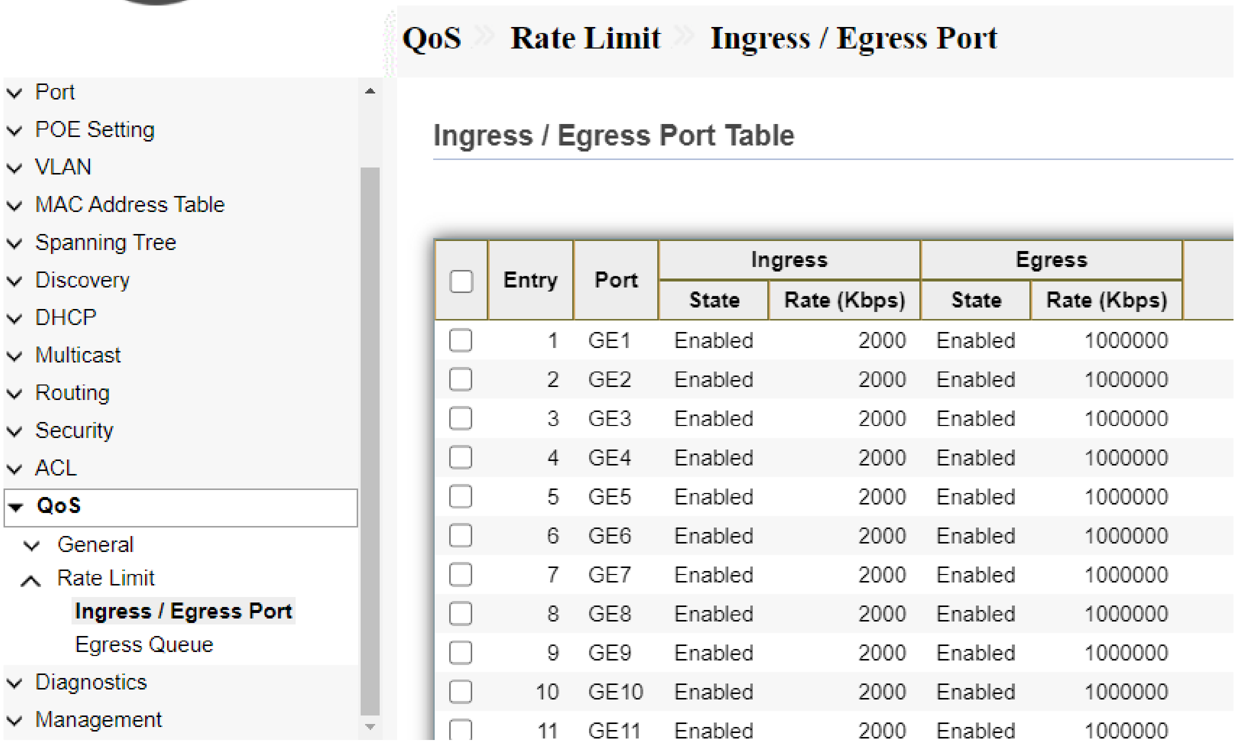


QoS » Rate Limit » Ingress / Egress Port

Edit Ingress / Egress Port

Port	GE1-GE28
Ingress	☑ Enable
	2000 Kbps (16 - 1000000)
Egress	☑ Enable
	1000000 Kbps (16 - 1000000)

Fig 14.2.3 Edit Rate Ingress / Egress Port page



Ingress / Egress Port Table

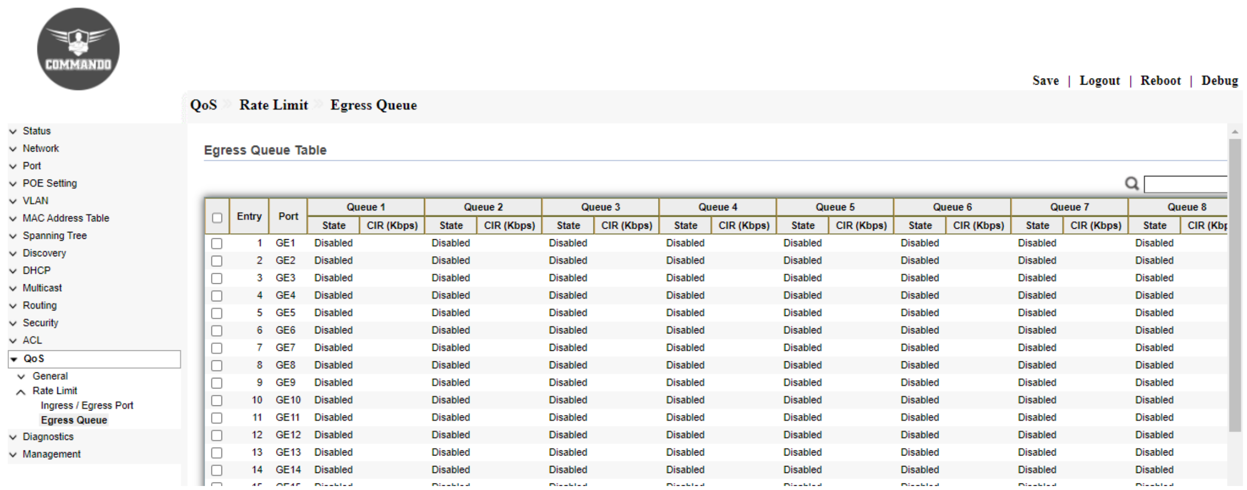
□	Entry	Port	Ingress		Egress	
			State	Rate (Kbps)	State	Rate (Kbps)
□	1	GE1	Enabled	2000	Enabled	1000000
□	2	GE2	Enabled	2000	Enabled	1000000
□	3	GE3	Enabled	2000	Enabled	1000000
□	4	GE4	Enabled	2000	Enabled	1000000
□	5	GE5	Enabled	2000	Enabled	1000000
□	6	GE6	Enabled	2000	Enabled	1000000
□	7	GE7	Enabled	2000	Enabled	1000000
□	8	GE8	Enabled	2000	Enabled	1000000
□	9	GE9	Enabled	2000	Enabled	1000000
□	10	GE10	Enabled	2000	Enabled	1000000
□	11	GE11	Enabled	2000	Enabled	1000000

Fig 14.2.4 Selecting Ingress / Egress Port page

14.2.2 Egress Queue

Egress rate limiting is performed by shaping the output load.

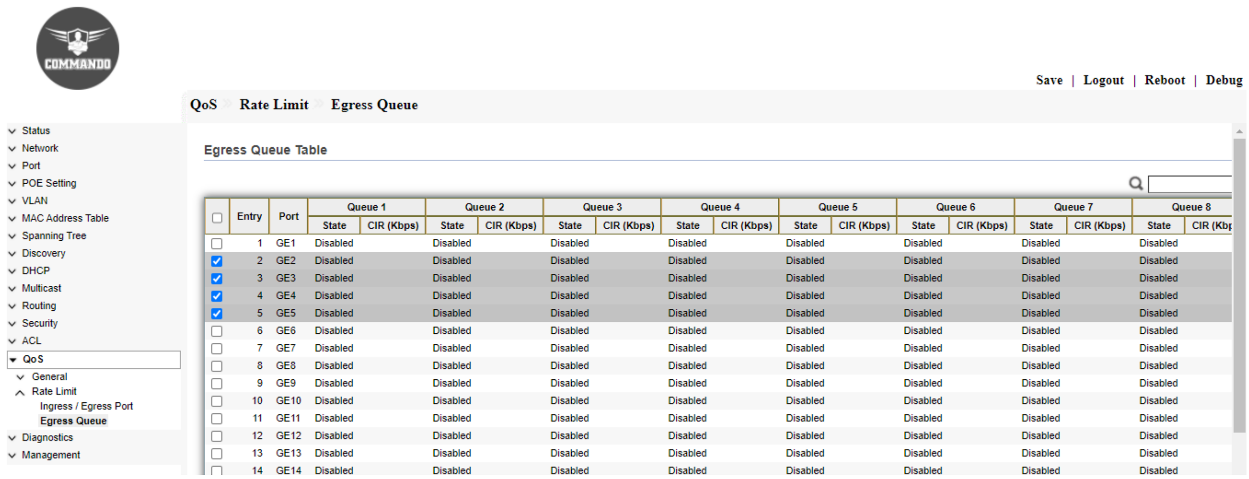
To view and configure Egress Queue, click **QoS >> Rate Limit >> Egress Queue.**



Egress Queue Table

□	Entry	Port	Queue 1		Queue 2		Queue 3		Queue 4		Queue 5		Queue 6		Queue 7		Queue 8	
			State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kb
□	1	GE1	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	2	GE2	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	3	GE3	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	4	GE4	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	5	GE5	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	6	GE6	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	7	GE7	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	8	GE8	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	9	GE9	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	10	GE10	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	11	GE11	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	12	GE12	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	13	GE13	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	14	GE14	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	

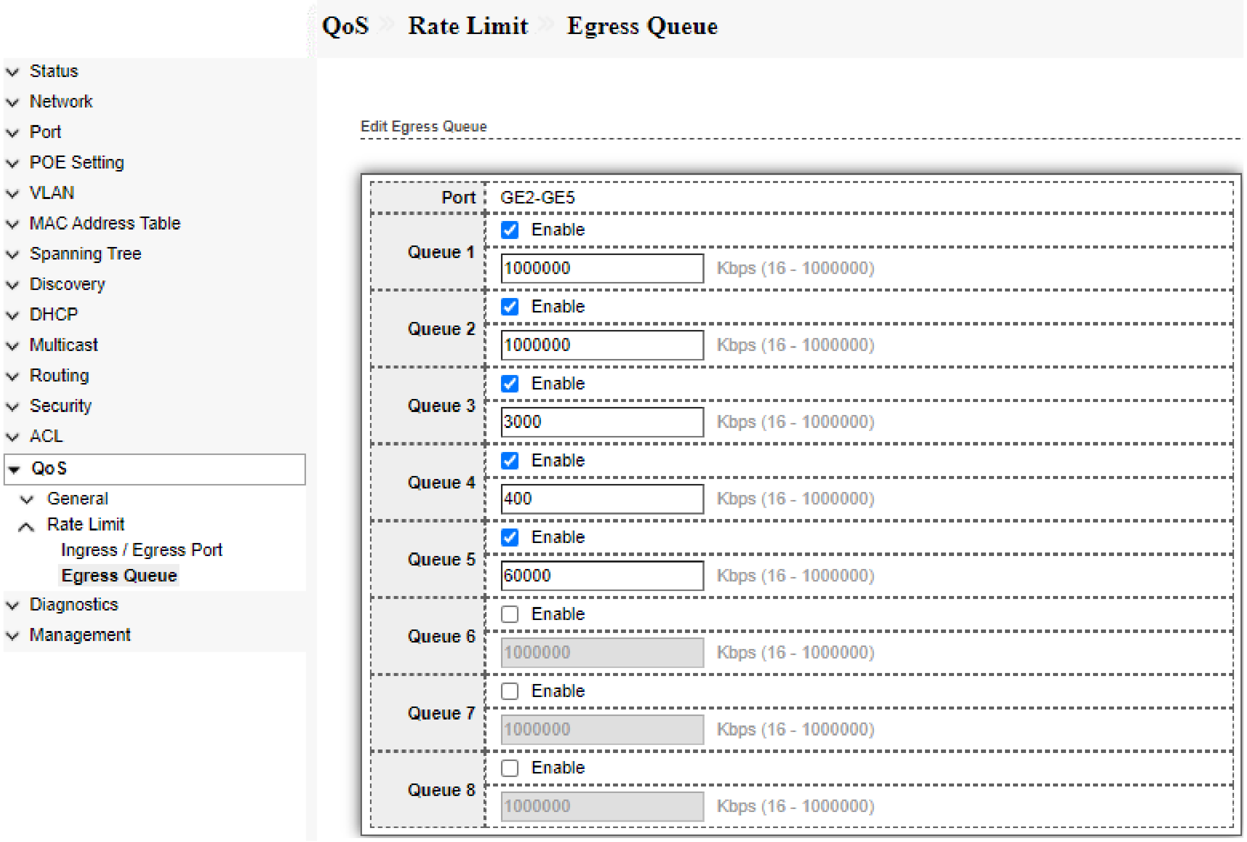
Fig 14.2.7 Default Egress Queue Table page



Egress Queue Table

□	Entry	Port	Queue 1		Queue 2		Queue 3		Queue 4		Queue 5		Queue 6		Queue 7		Queue 8	
			State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kb
□	1	GE1	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
☑	2	GE2	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
☑	3	GE3	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
☑	4	GE4	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
☑	5	GE5	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	6	GE6	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	7	GE7	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	8	GE8	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	9	GE9	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	10	GE10	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	11	GE11	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	12	GE12	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	13	GE13	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	14	GE14	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	

Fig 14.2.8 Selecting Egress Queue ports page

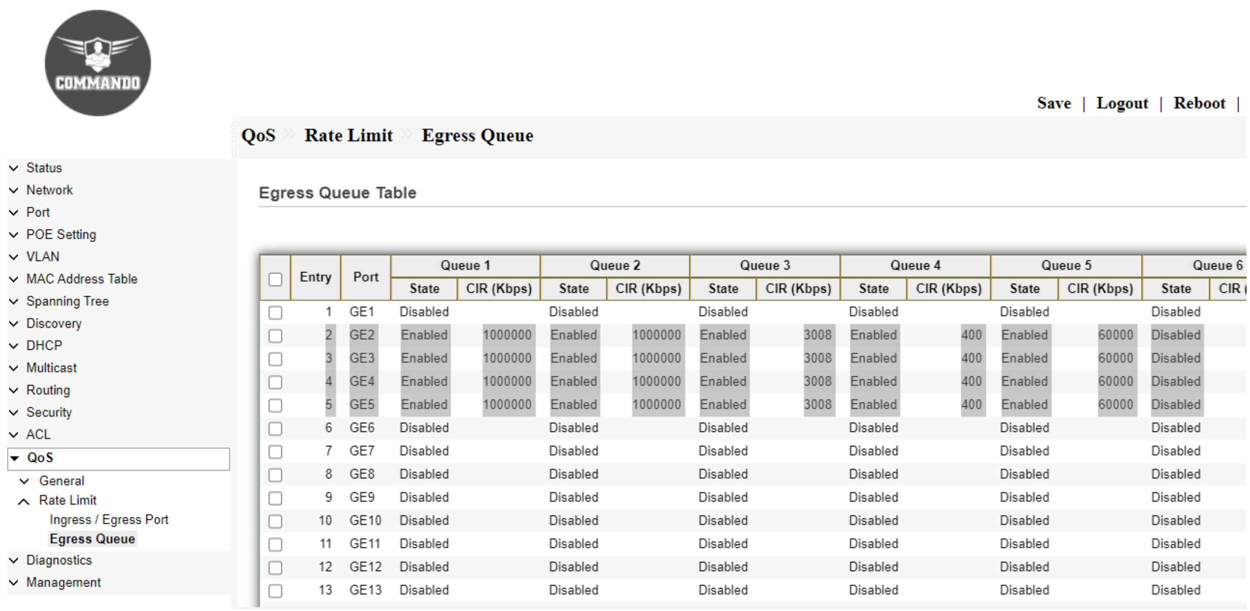


QoS » Rate Limit » Egress Queue

Edit Egress Queue

Port	GE2-GE5	
Queue 1	☑ Enable	
	1000000	Kbps (16 - 1000000)
Queue 2	☑ Enable	
	1000000	Kbps (16 - 1000000)
Queue 3	☑ Enable	
	3000	Kbps (16 - 1000000)
Queue 4	☑ Enable	
	400	Kbps (16 - 1000000)
Queue 5	☑ Enable	
	60000	Kbps (16 - 1000000)
Queue 6	□ Enable	
	1000000	Kbps (16 - 1000000)
Queue 7	□ Enable	
	1000000	Kbps (16 - 1000000)
Queue 8	□ Enable	
	1000000	Kbps (16 - 1000000)

Fig 14.2.9 Edit Egress Queue page



Egress Queue Table

□	Entry	Port	Queue 1		Queue 2		Queue 3		Queue 4		Queue 5		Queue 6	
			State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (Kbps)	State	CIR (
□	1	GE1	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	2	GE2	Enabled	1000000	Enabled	1000000	Enabled	3008	Enabled	400	Enabled	60000	Disabled	
□	3	GE3	Enabled	1000000	Enabled	1000000	Enabled	3008	Enabled	400	Enabled	60000	Disabled	
□	4	GE4	Enabled	1000000	Enabled	1000000	Enabled	3008	Enabled	400	Enabled	60000	Disabled	
□	5	GE5	Enabled	1000000	Enabled	1000000	Enabled	3008	Enabled	400	Enabled	60000	Disabled	
□	6	GE6	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	7	GE7	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	8	GE8	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	9	GE9	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	10	GE10	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	11	GE11	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	12	GE12	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	
□	13	GE13	Disabled		Disabled		Disabled		Disabled		Disabled		Disabled	

Fig 14.2.10 Egress Queue Table after Editing Queue page

Chapter 15 Diagnostics

Logging: Log files of a switch are classified into user log files and diagnostic log files.

Property: A diagnostic log file records the service processing flow and fault information. These logs sent to the log buffer, console, or terminal monitors.

Remote Server: You can set up a switch to automatically transfer diagnostic information to a remote server. If a fault occurs, you can provide your customer support.

Ping: Ping (Packet Internet Groper) tests the connection between two network nodes by sending packets to a host and measure the round-trip time.

Traceroute: Traceroute is used to display the route (path) each node has passed to reach the tested host, and measure transit delays of packets across entire path to host.

Copper Test: The Copper Test feature of the switch tests whether a port can link up or not through an RJ45 connector and helps to determine the cable performance and can carry out diagnostic test on the cable that is plugged on Switch ports to see its online status. With this information in hand, you can troubleshoot an interface.

Fiber Module: SFP module is available in two form-factors: GBIC or SFP. The operational information reported by the Small Form-factor Pluggable (SFP) transceiver are shown by C3000 Series Switches.

UDLD: UDLD (Unidirectional Link Detection) is a layer 1/2 protocol (unrelated to spanning tree) that protects the upper layer protocols from causing loops in the network. Unidirectional link occurs when traffic is transmitted between neighbors in one direction only which can cause spanning-tree topology loops.

Property: When a unidirectional link is detected, UDLD shuts down the affected LAN port and alerts the user. Unidirectional links can cause a variety of problems, including spanning tree topology loops. UDLD is a Layer 2 protocol that works with the Layer 1 protocols to determine the physical status of a link.

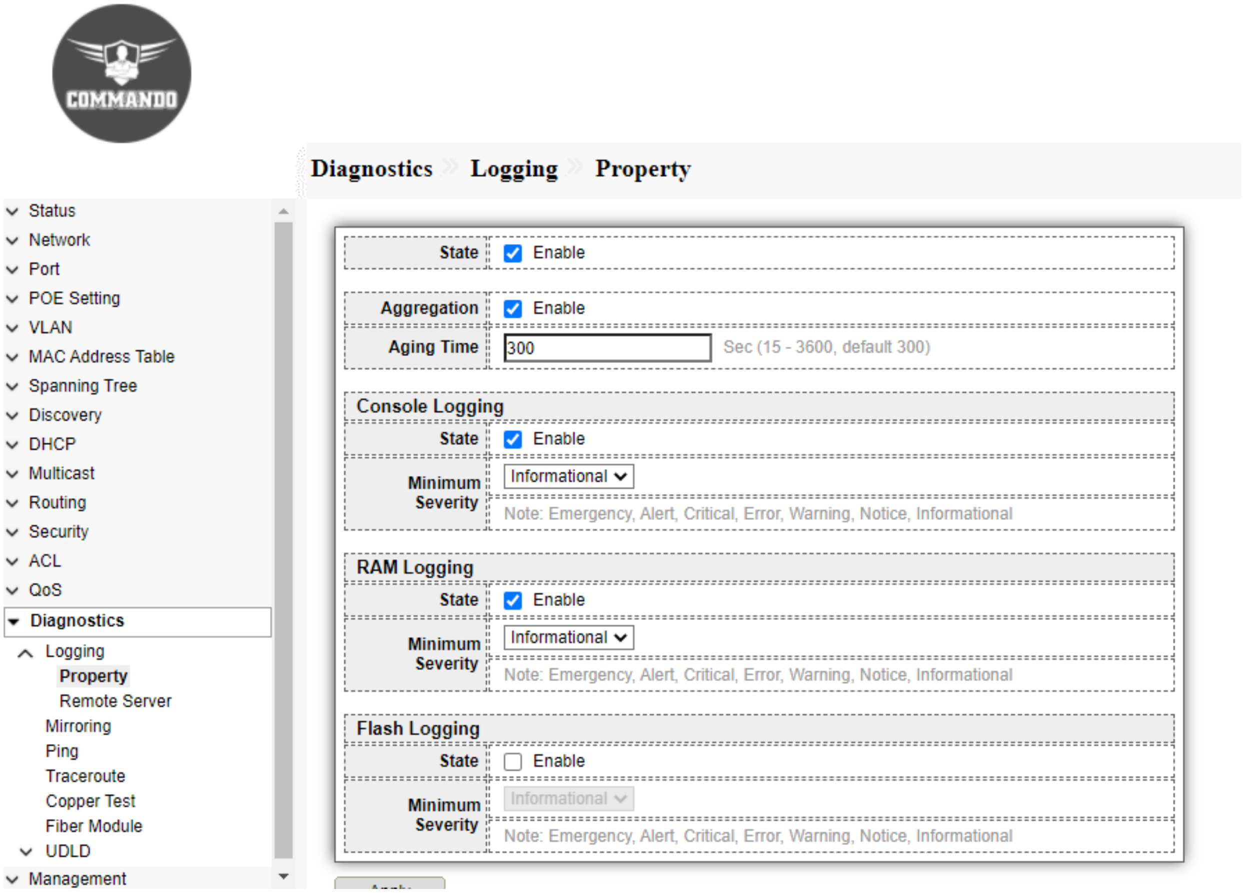
Neighbor: After enabling UDLD on the connected interface of the other switch, we can see that the local switch has detected its neighbor and updated the link's status to bidirectional. UDLD is capable of tracking multiple neighbors per interface.

15.1 Logging

Log files of a switch are classified into user log files and diagnostic log files. To Enable/Disable the global logging services these pages are used. When the logging service is enabled, Console Logging, RAM Logging, Flash Logging can be configured.

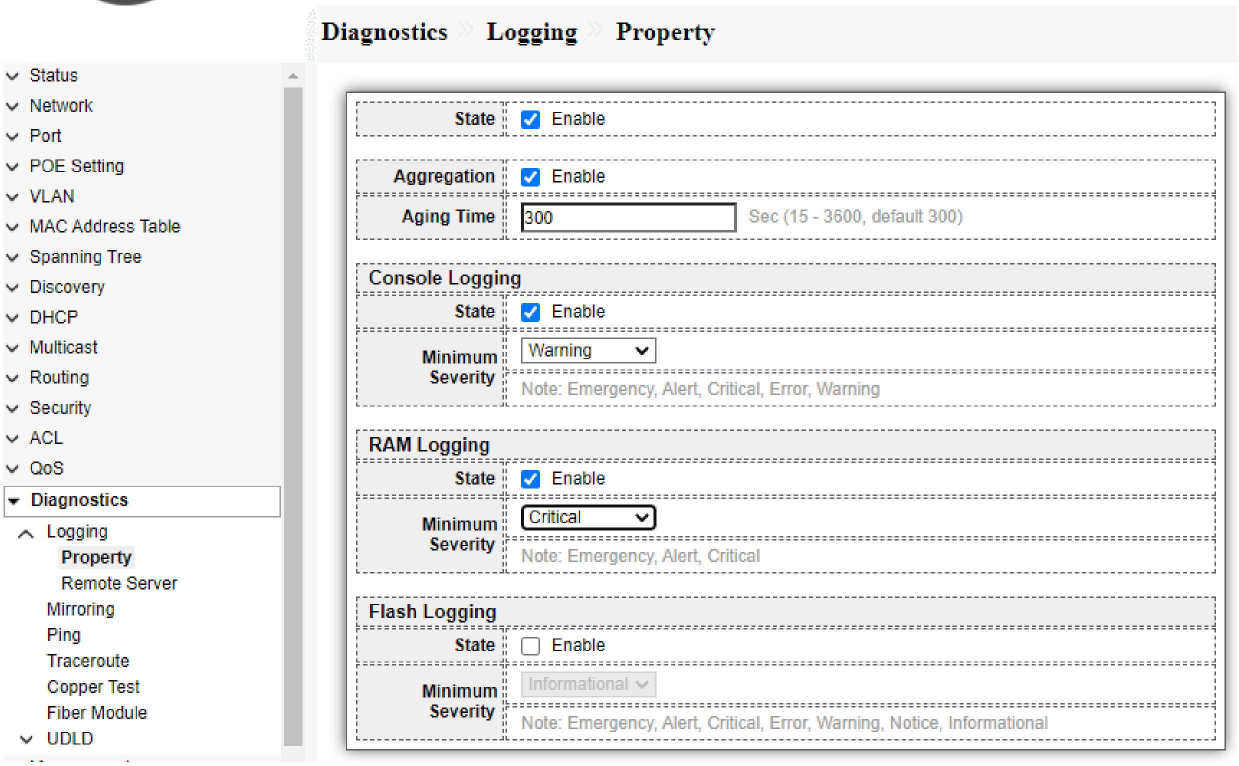
15.1.1 Property

To enable/disable the logging service, click **Diagnostic >> Logging >> Property**. By default, Console port showing informational messages.



State	☑ Enable
Aggregation	☑ Enable
Aging Time	300 Sec (15 - 3600, default 300)
Console Logging	
State	☑ Enable
Minimum Severity	Informational Note: Emergency, Alert, Critical, Error, Warning, Notice, Informational
RAM Logging	
State	☑ Enable
Minimum Severity	Informational Note: Emergency, Alert, Critical, Error, Warning, Notice, Informational
Flash Logging	
State	☐ Enable
Minimum Severity	Informational Note: Emergency, Alert, Critical, Error, Warning, Notice, Informational

Fig 15.1.1 Diagnostic Logging Property page



State	☑ Enable
Aggregation	☑ Enable
Aging Time	300 Sec (15 - 3600, default 300)

Console Logging

State	☑ Enable
Minimum Severity	Warning Note: Emergency, Alert, Critical, Error, Warning

RAM Logging

State	☑ Enable
Minimum Severity	Critical Note: Emergency, Alert, Critical

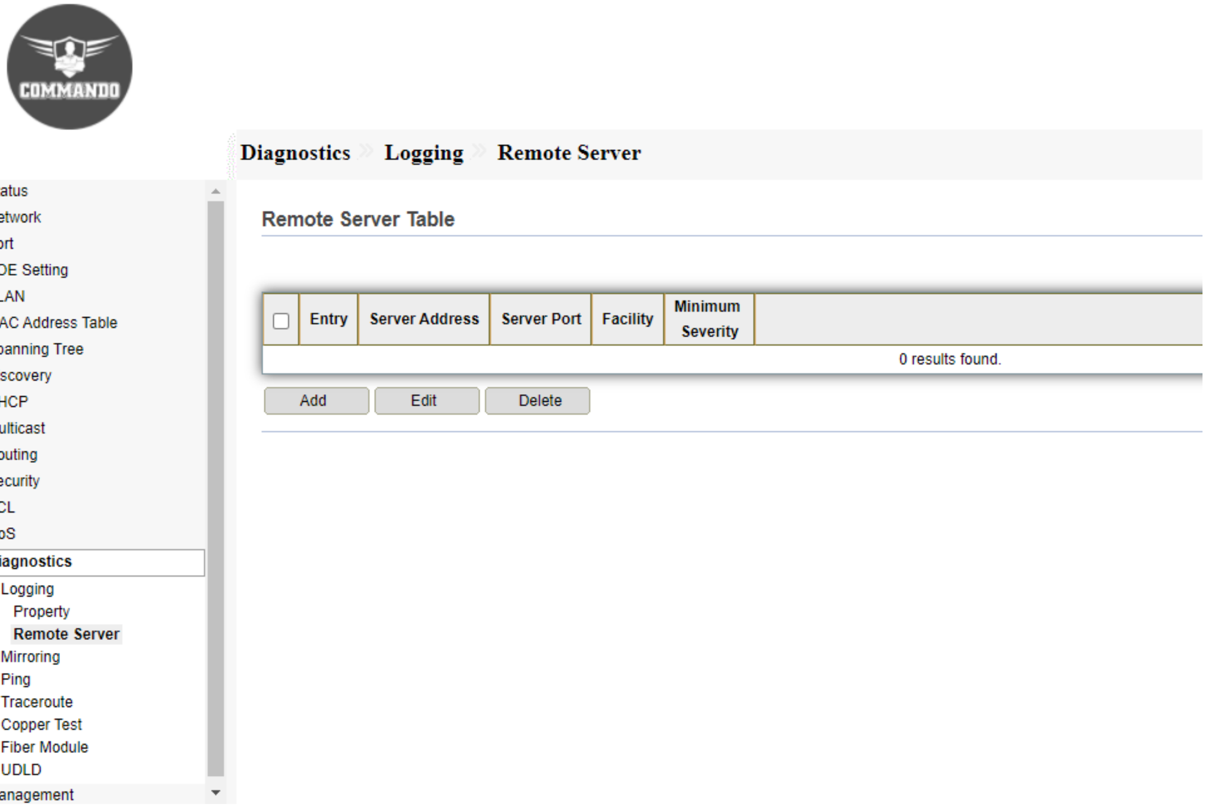
Flash Logging

State	☐ Enable
Minimum Severity	Informational Note: Emergency, Alert, Critical, Error, Warning, Notice, Informational

Fig 15.1.2 Changing Diagnostic Logging Property options page

15.1.2 Remote Server

To configure the remote logging server, click **Diagnostic >> Logging >> Remote Server.**



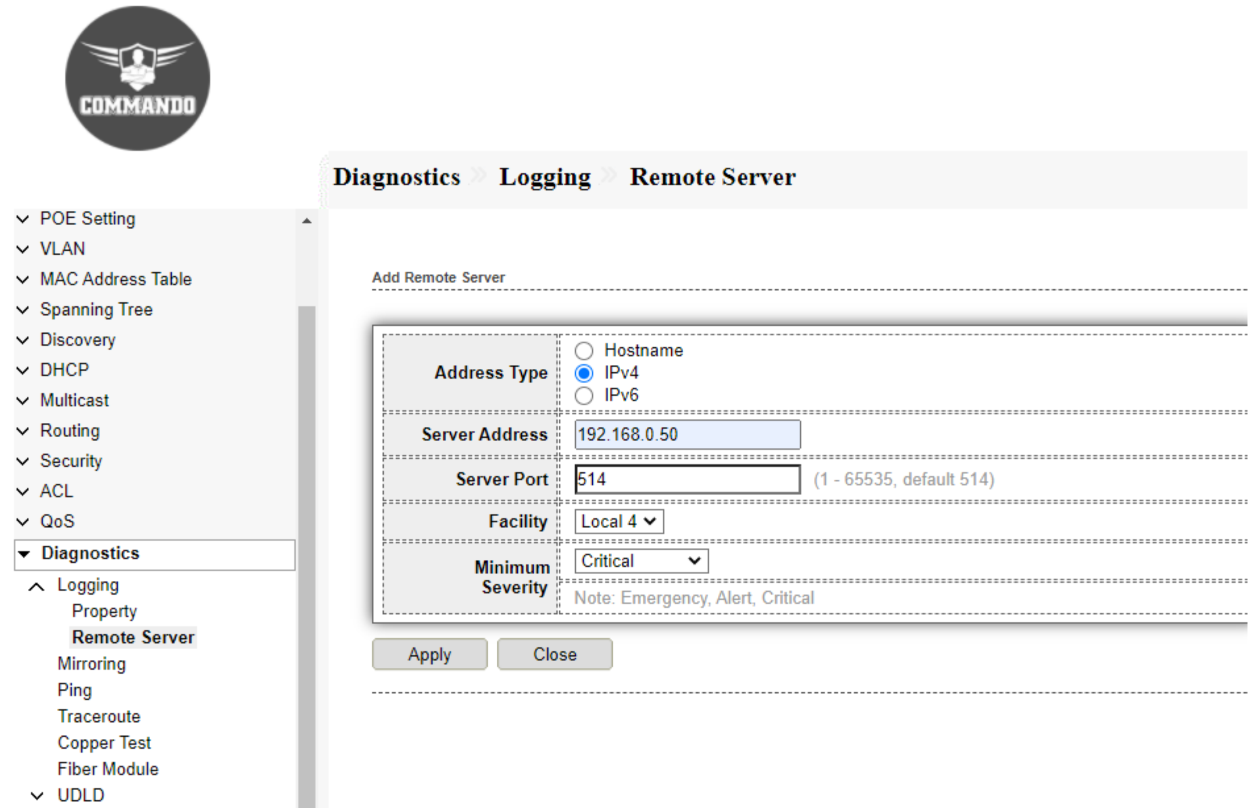
Diagnostics » Logging » Remote Server

Remote Server Table

□	Entry	Server Address	Server Port	Facility	Minimum Severity

0 results found.

Fig 15.1.3 Diagnostic Logging Default remote server page

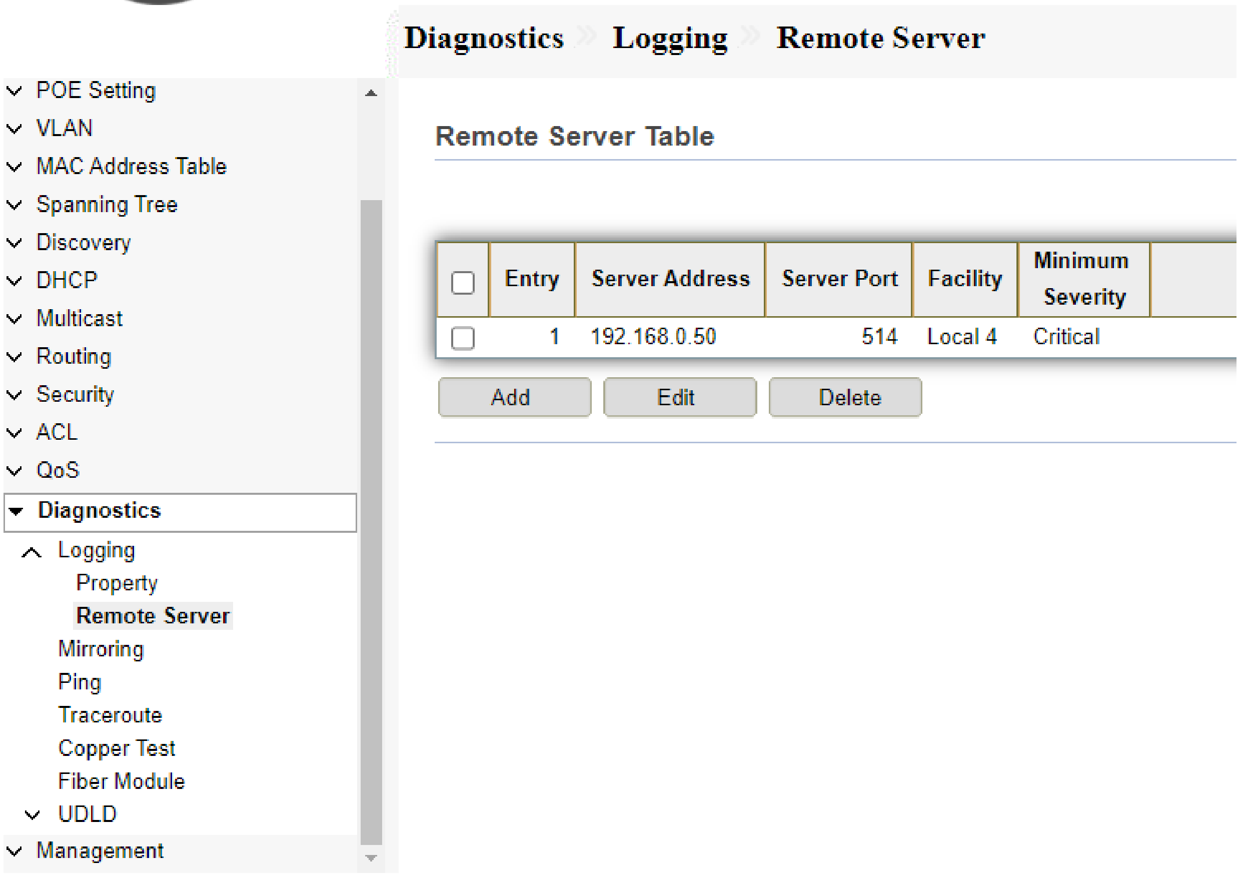


Diagnostics » Logging » Remote Server

Add Remote Server

Address Type	○ Hostname ● IPv4 ○ IPv6
Server Address	192.168.0.50
Server Port	514 (1 - 65535, default 514)
Facility	Local 4
Minimum Severity	Critical Note: Emergency, Alert, Critical

Fig 15.1.4 Diagnostic Logging Add remote server page



Remote Server Table

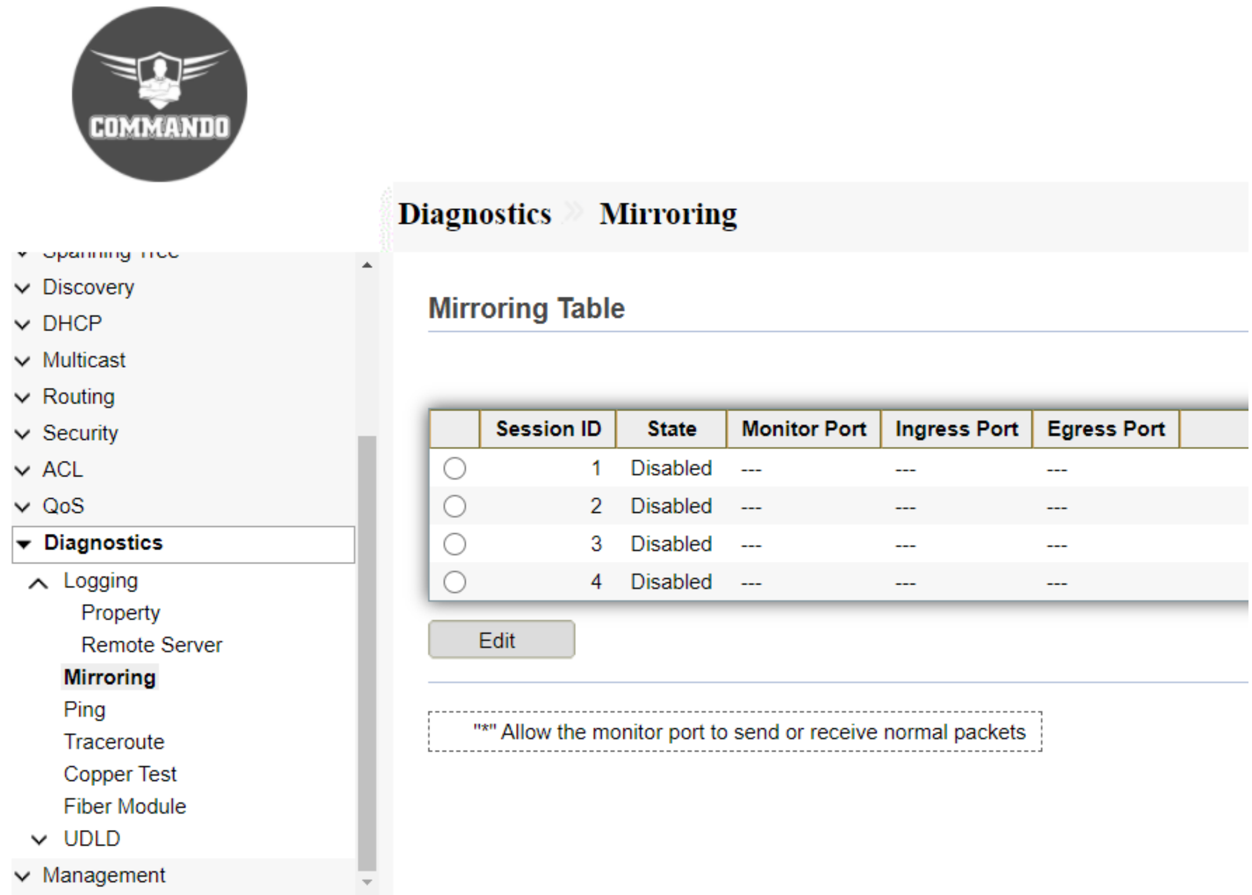
□	Entry	Server Address	Server Port	Facility	Minimum Severity
□	1	192.168.0.50	514	Local 4	Critical

Fig 15.1.5 Diagnostic Logging remote server Table page

15.2 Mirroring

Port mirroring is used on a network device to send a copy of network packets seen on other ports or multiple switch ports, or an entire VLAN to a network monitoring connection on another port on the device. This is commonly used for network appliances that require monitoring of network traffic, such as an intrusion detection system. A network analyzer connected to the monitoring port processes the data packets for diagnosing, debugging, and performance monitoring. Mirroring does not guarantee that all traffic from the source port(s) is received on the analyzer (destination) port. If more data is sent to the analyzer port than it can support, some data might be lost. Port mirroring lets you mirror the incoming (ingress) and outgoing (egress) traffic of a single port to a predefined destination port.

The mirroring option is ideal for performing diagnostics by allowing traffic that is being sent to and received from one or more source ports to be replicated out a monitoring/target port. To configure Port Mirroring, click **Port >> Mirroring.**

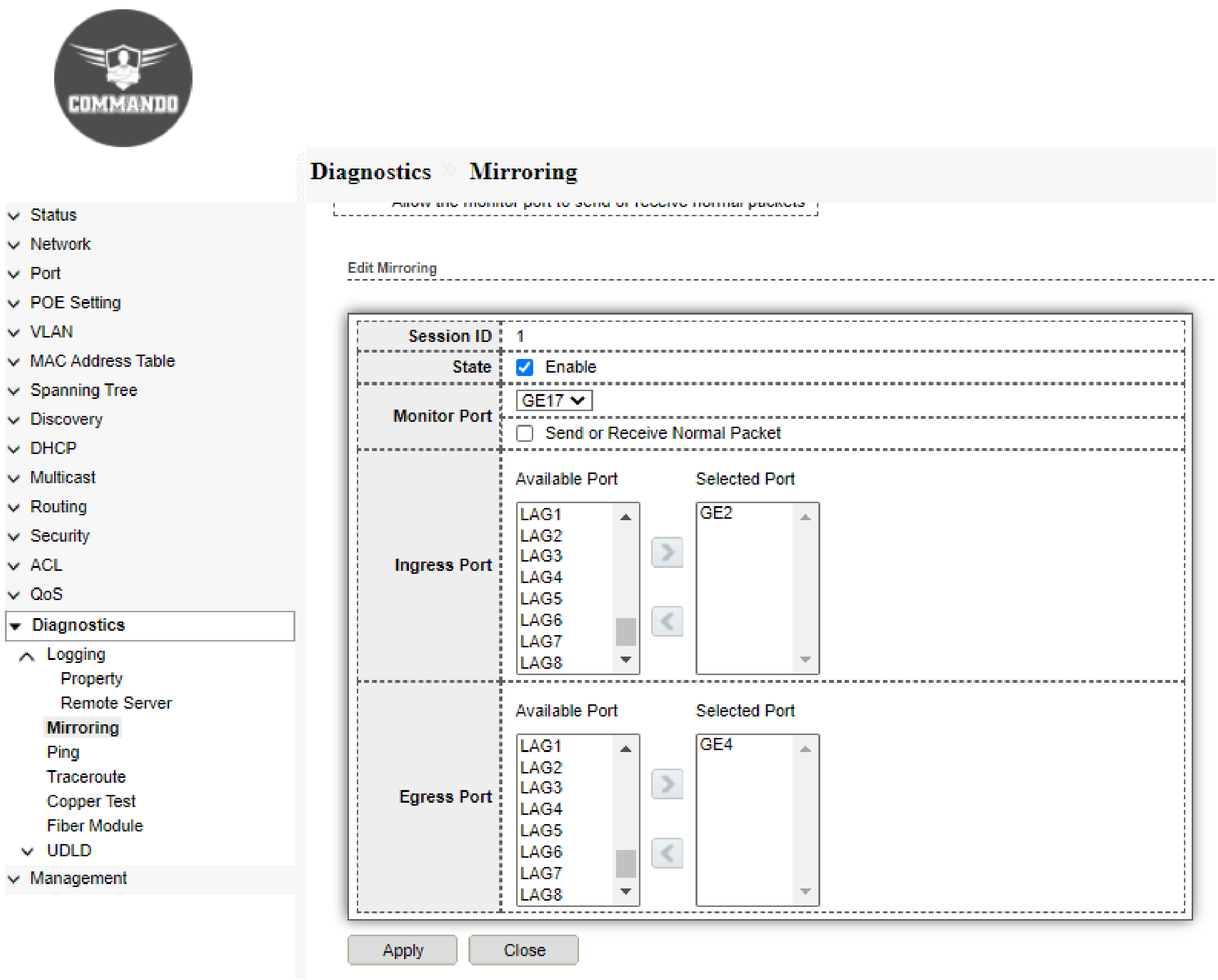


Mirroring Table

	Session ID	State	Monitor Port	Ingress Port	Egress Port
○	1	Disabled	---	---	---
○	2	Disabled	---	---	---
○	3	Disabled	---	---	---
○	4	Disabled	---	---	---

"*" Allow the monitor port to send or receive normal packets

Fig 15.2.1 Mirroring Table page

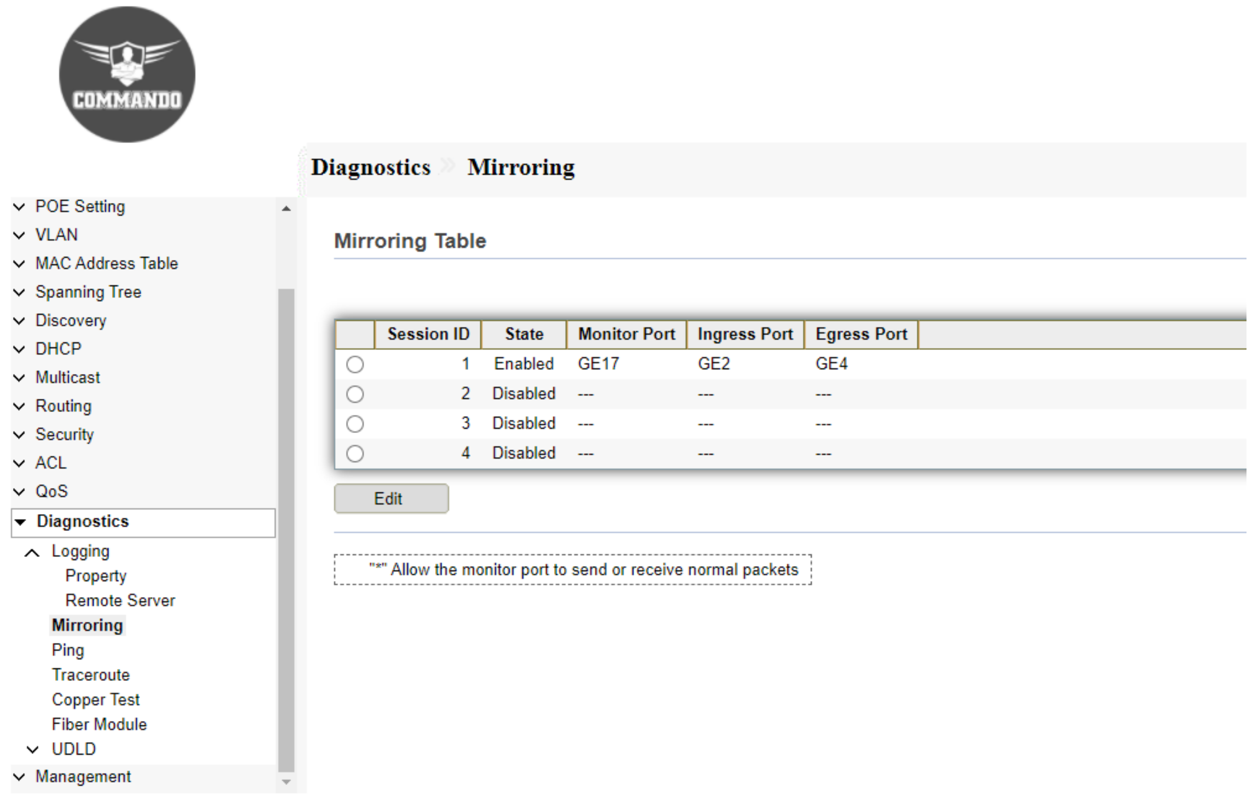


Allow the monitor port to send or receive normal packets

Edit Mirroring

Session ID	1
State	☑ Enable
Monitor Port	GE17 □ Send or Receive Normal Packet
Ingress Port	Available Port: LAG1, LAG2, LAG3, LAG4, LAG5, LAG6, LAG7, LAG8 Selected Port: GE2
Egress Port	Available Port: LAG1, LAG2, LAG3, LAG4, LAG5, LAG6, LAG7, LAG8 Selected Port: GE4

Fig 15.2.2 Edit Port Mirroring page



Diagnostics » Mirroring

Mirroring Table

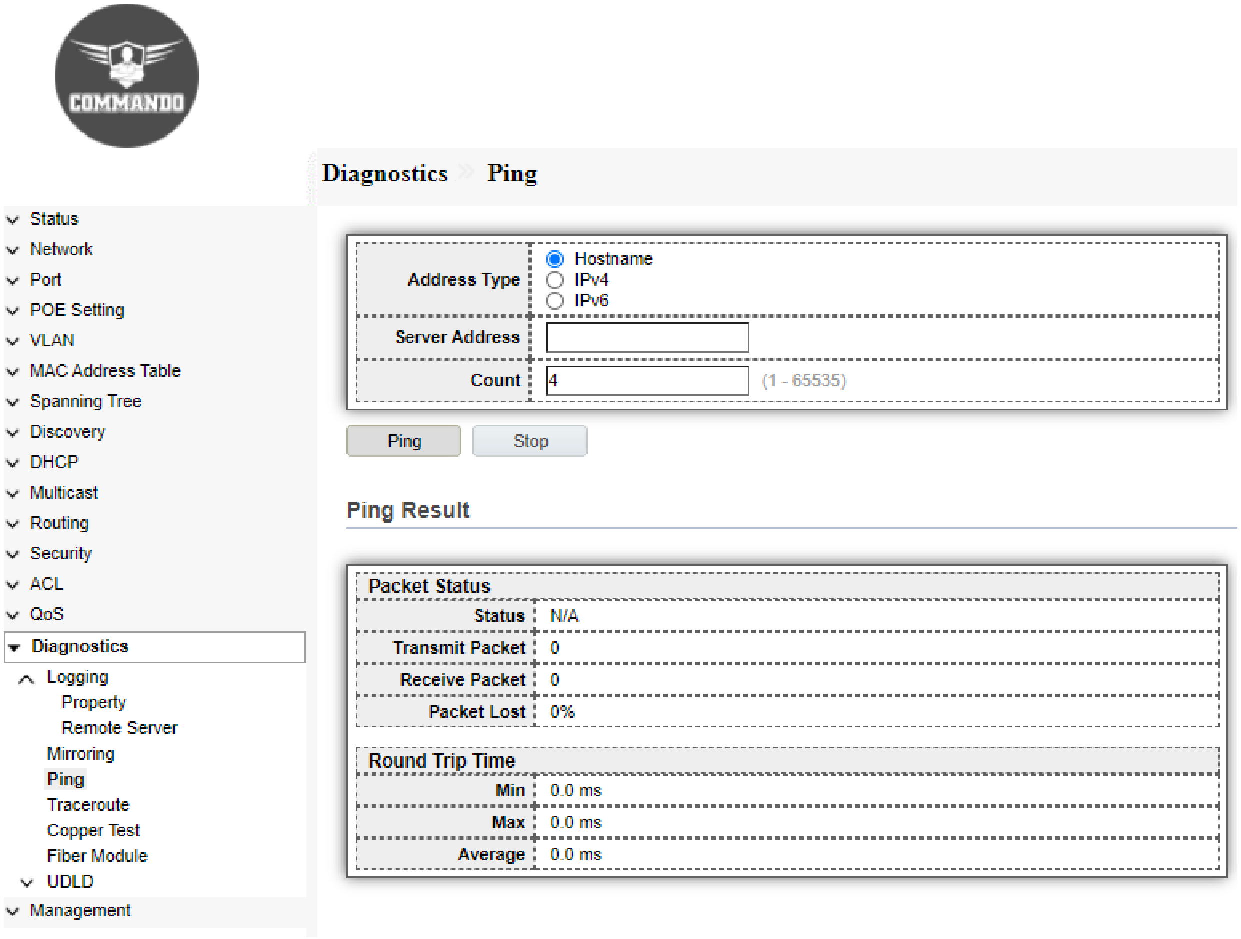
	Session ID	State	Monitor Port	Ingress Port	Egress Port
○	1	Enabled	GE17	GE2	GE4
○	2	Disabled	---	---	---
○	3	Disabled	---	---	---
○	4	Disabled	---	---	---

"*" Allow the monitor port to send or receive normal packets

Fig 15.2.3 Mirroring Table after configuring GE1 as monitor port page

15.2 Ping

Ping (Packet Internet Groper) tests the connection between two network nodes by sending packets to a host and measure the round-trip time. You can Ping to any IP or Hostname for that click **Diagnostic >> Ping.**



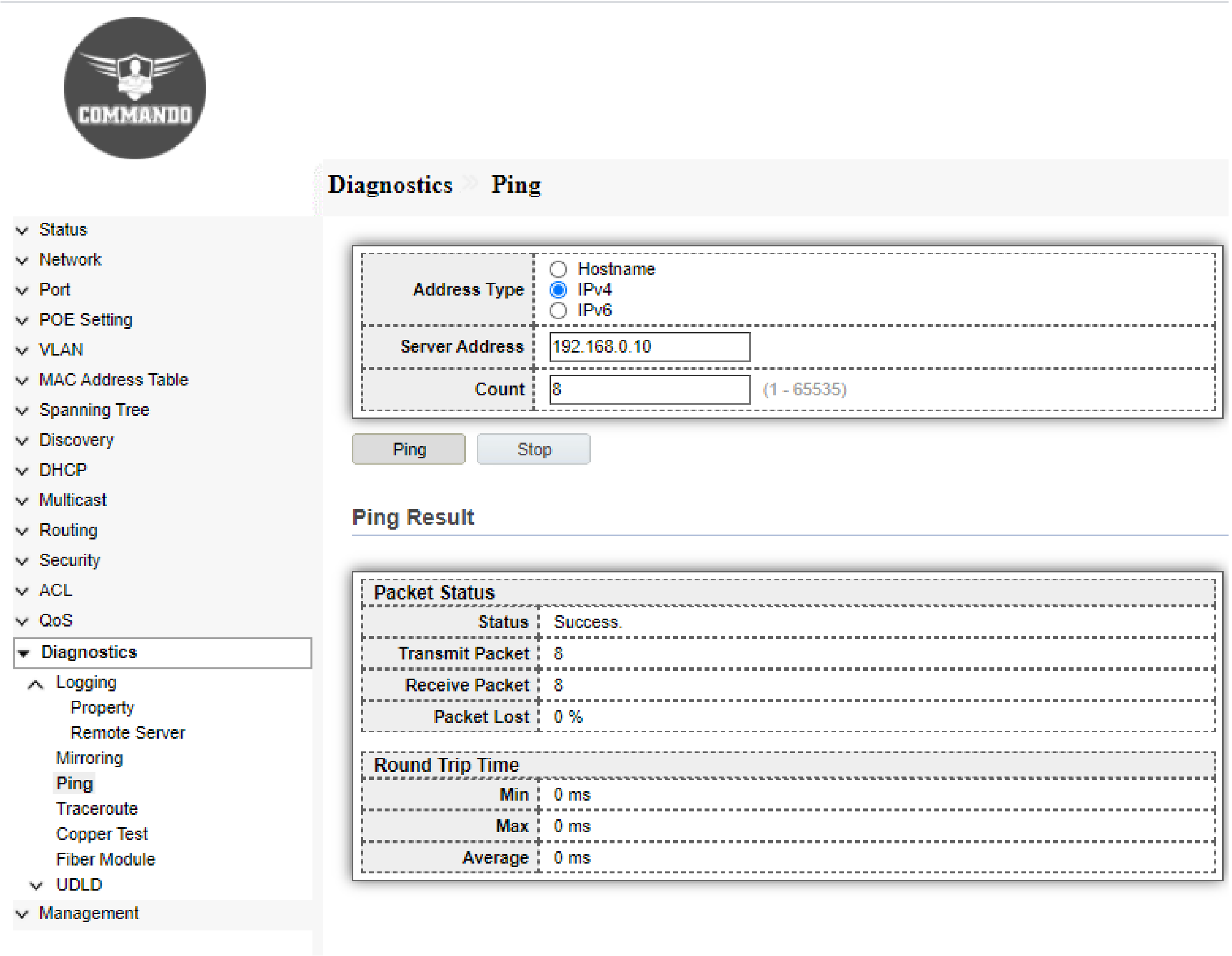
Address Type	● Hostname ○ IPv4 ○ IPv6
Server Address	
Count	4 (1 - 65535)

Ping Result

Packet Status	
Status	N/A
Transmit Packet	0
Receive Packet	0
Packet Lost	0%

Round Trip Time	
Min	0.0 ms
Max	0.0 ms
Average	0.0 ms

Fig 15.2.1 Diagnostic Default Ping test page



Diagnostics » Ping

Address Type	○ Hostname ● IPv4 ○ IPv6
Server Address	192.168.0.10
Count	8 (1 - 65535)

Ping Result

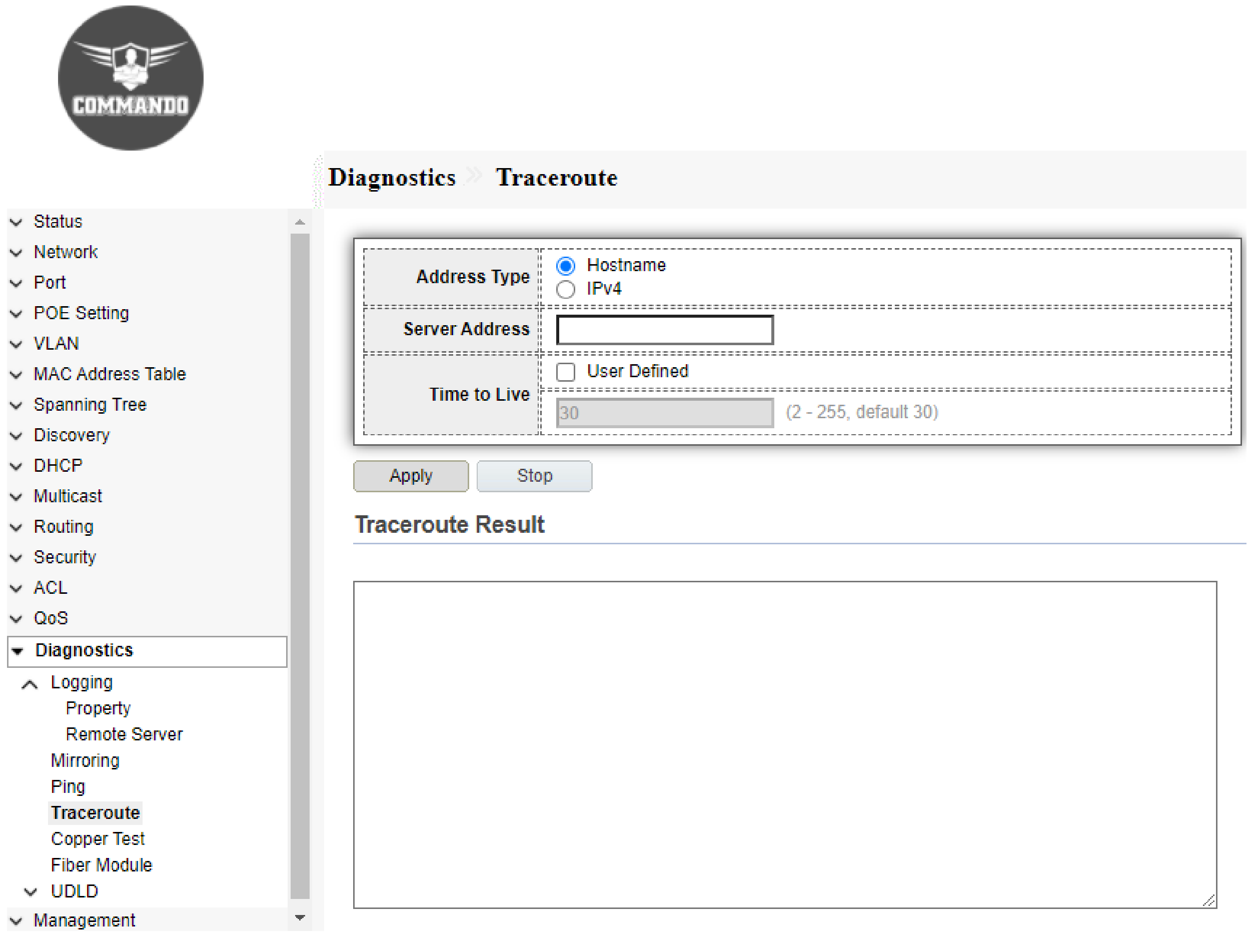
Packet Status	
Status	Success.
Transmit Packet	8
Receive Packet	8
Packet Lost	0 %

Round Trip Time	
Min	0 ms
Max	0 ms
Average	0 ms

Fig 15.2.2 Diagnostic Ping test result page

15.3 Traceroute

Traceroute discovers the IP routes along which packets were forwarded by sending an IP packet to the target host and back to the device. The Trace route page shows each hop between the device and a target host, and the round-trip time to each such hop. You can Traceroute any IP or Hostname for that click **Diagnostic >> Traceroute.**

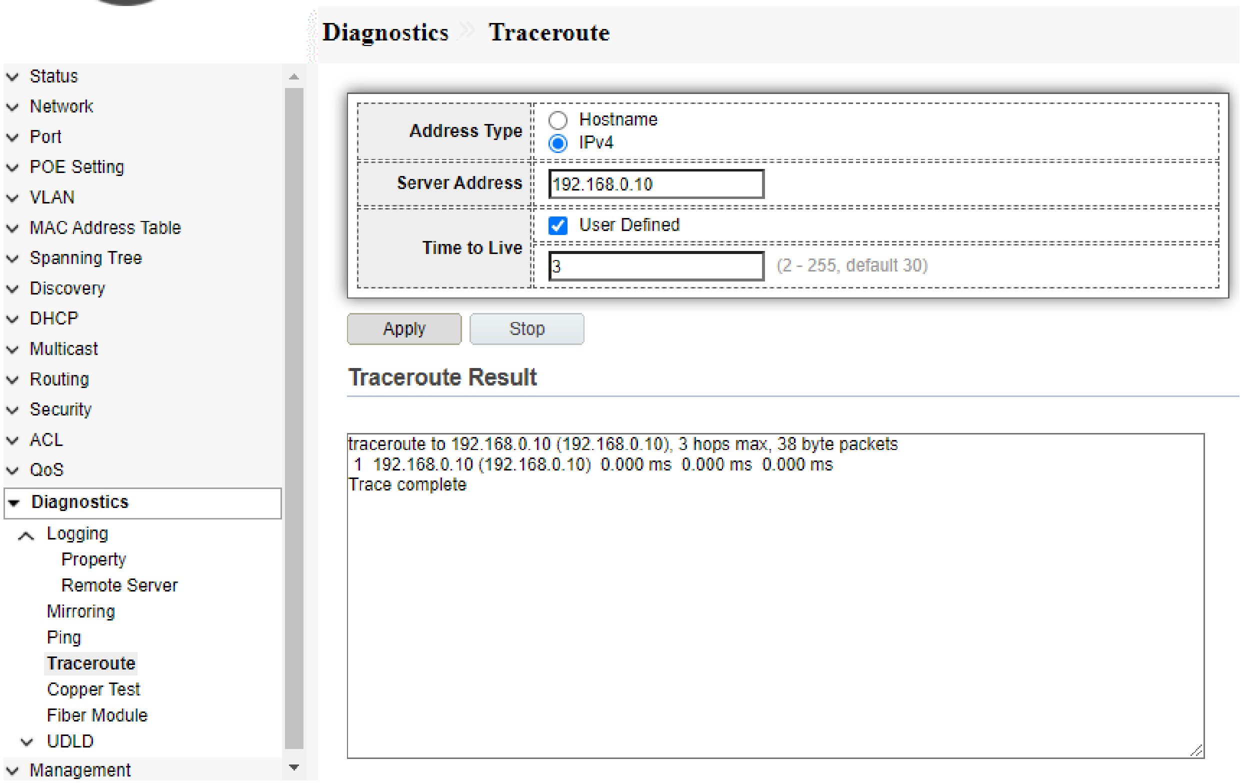


Diagnostics » Traceroute

Address Type	● Hostname ○ IPv4
Server Address	
Time to Live	□ User Defined 30 (2 - 255, default 30)

Traceroute Result

Fig 15.3.1 Diagnostic Traceroute Default test page



Diagnostics » Traceroute

Address Type	○ Hostname ● IPv4
Server Address	192.168.0.10
Time to Live	☑ User Defined 3 (2 - 255, default 30)

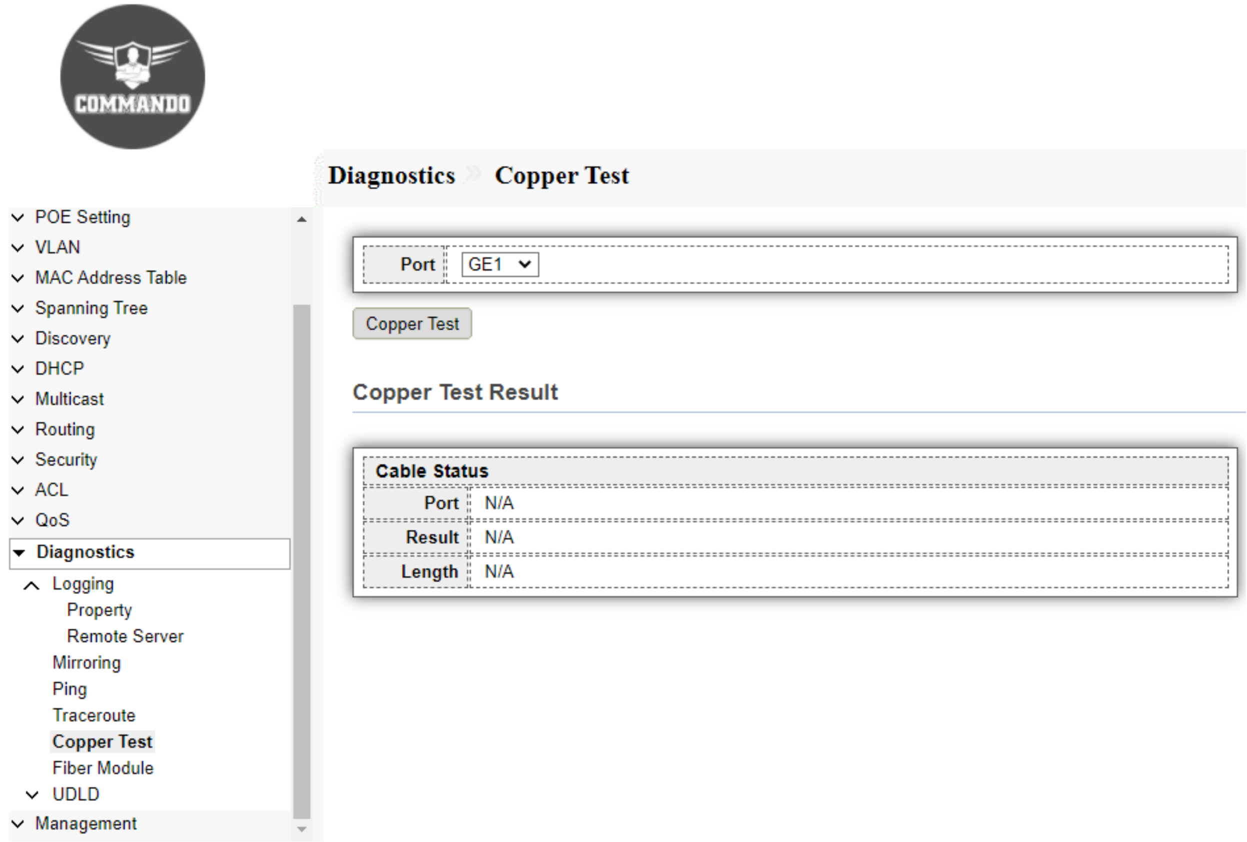
Traceroute Result

```
traceroute to 192.168.0.10 (192.168.0.10), 3 hops max, 38 byte packets
 1  192.168.0.10 (192.168.0.10)  0.000 ms  0.000 ms  0.000 ms
Trace complete
```

Fig 15.3.2 Traceroute result page

15.4 Copper Test

The Copper Test feature of the switch tests whether a port can link up or not through an RJ45 connector and helps to determine the cable performance and can carry out diagnostic test on the cable that is plugged on Switch ports to see its online status. With this information in hand, you can troubleshoot an interface. For copper length diagnostic, click **Diagnostic > Copper Test.**

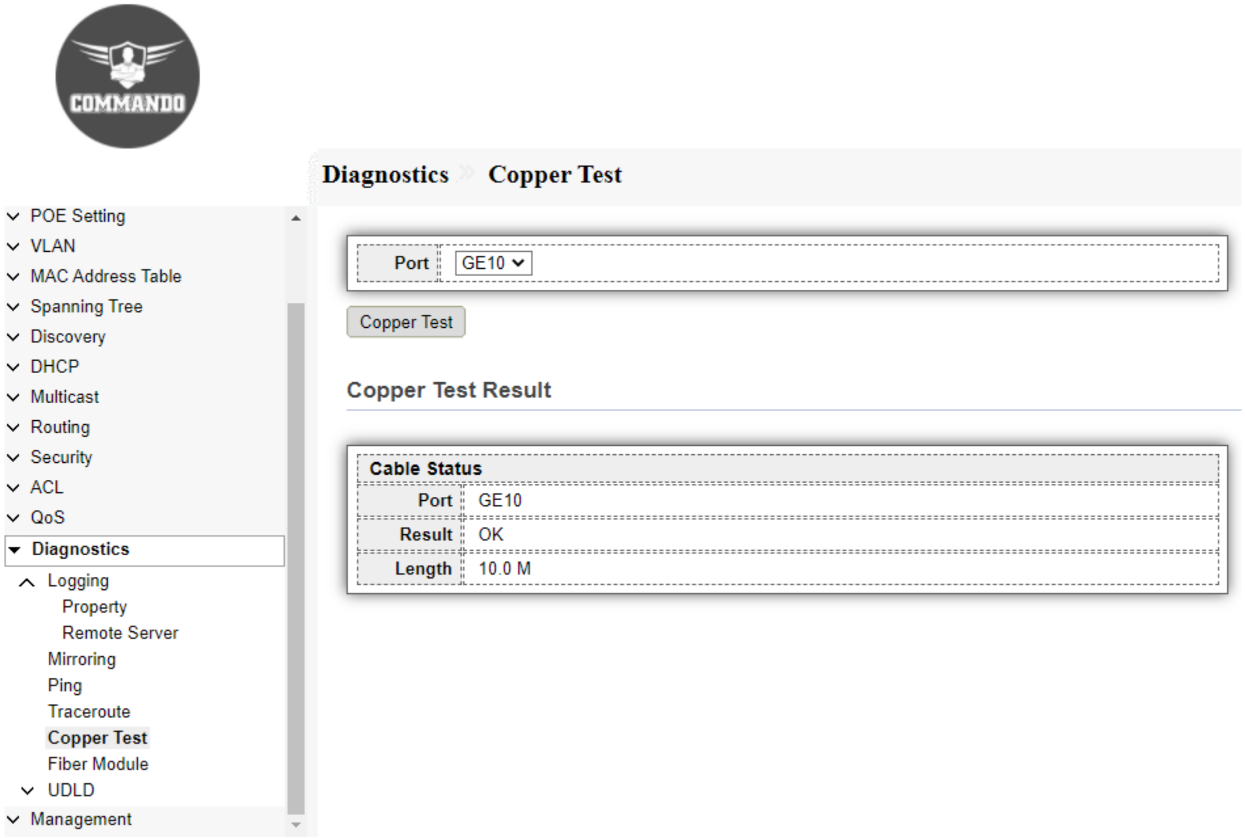


Port GE1

Copper Test Result

Cable Status	
Port	N/A
Result	N/A
Length	N/A

15.4.1 Diagnostic Default Copper Test Result page



Diagnostics » Copper Test

Port: GE10

Copper Test Result

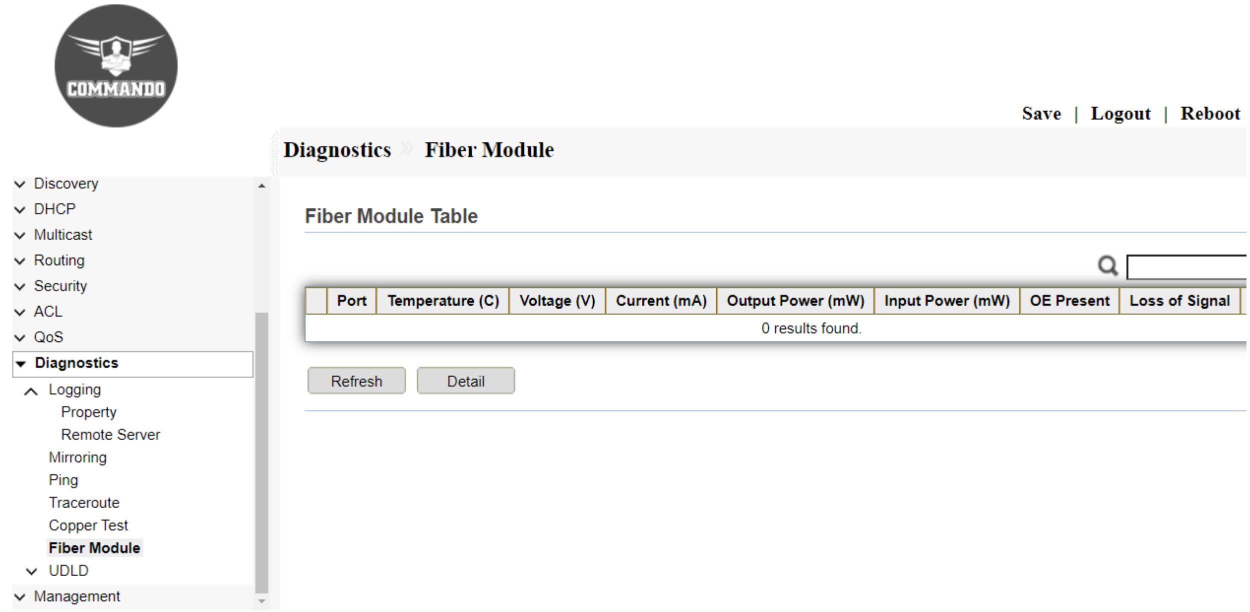
Cable Status	
Port	GE10
Result	OK
Length	10.0 M

Fig 15.4.2 Diagnostic Copper Test Result page

15.5 Fiber Module

The Fiber Module Status page displays the operating conditions reported by the SFP (Small Form-factor Pluggable) transceiver. The Optical Module Status page displays the operational information reported by the Small Form-factor Pluggable (SFP) transceiver.

To view and configure the Optical Module Diagnostic, click **Diagnostic >> Fiber Module.**

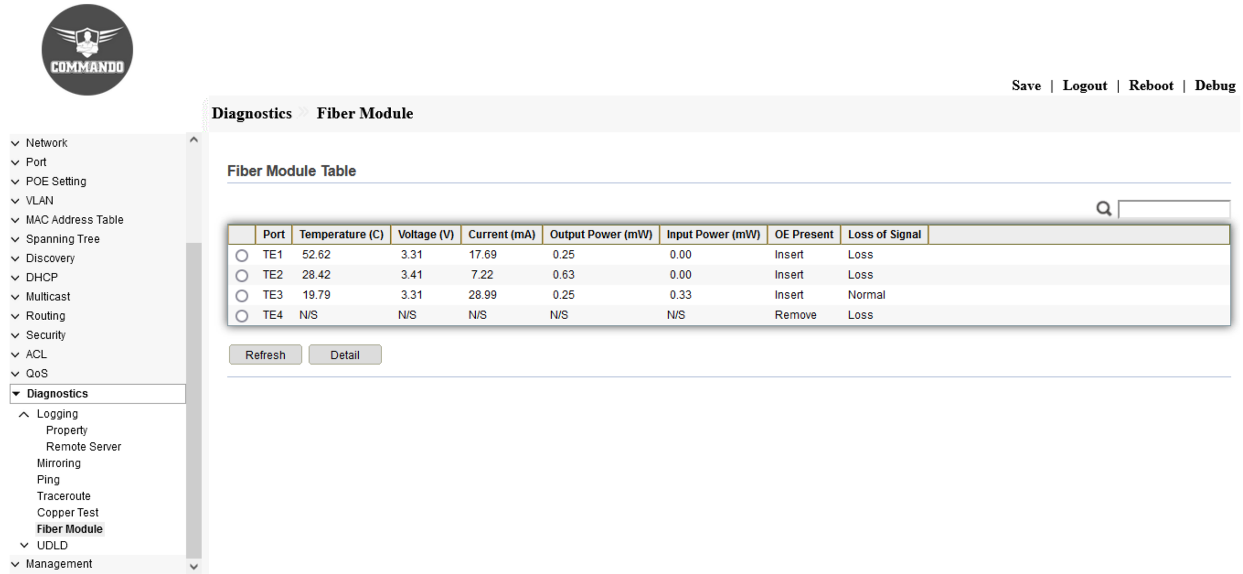


Fiber Module Table

	Port	Temperature (C)	Voltage (V)	Current (mA)	Output Power (mW)	Input Power (mW)	OE Present	Loss of Signal

0 results found.

Fig 15.5.1 Diagnostic Default Fiber Module Table page



Fiber Module Table

	Port	Temperature (C)	Voltage (V)	Current (mA)	Output Power (mW)	Input Power (mW)	OE Present	Loss of Signal
○	TE1	52.62	3.31	17.69	0.25	0.00	Insert	Loss
○	TE2	28.42	3.41	7.22	0.63	0.00	Insert	Loss
○	TE3	19.79	3.31	28.99	0.25	0.33	Insert	Normal
○	TE4	N/S	N/S	N/S	N/S	N/S	Remove	Loss

Fig 15.5.2 Fiber Module Table page

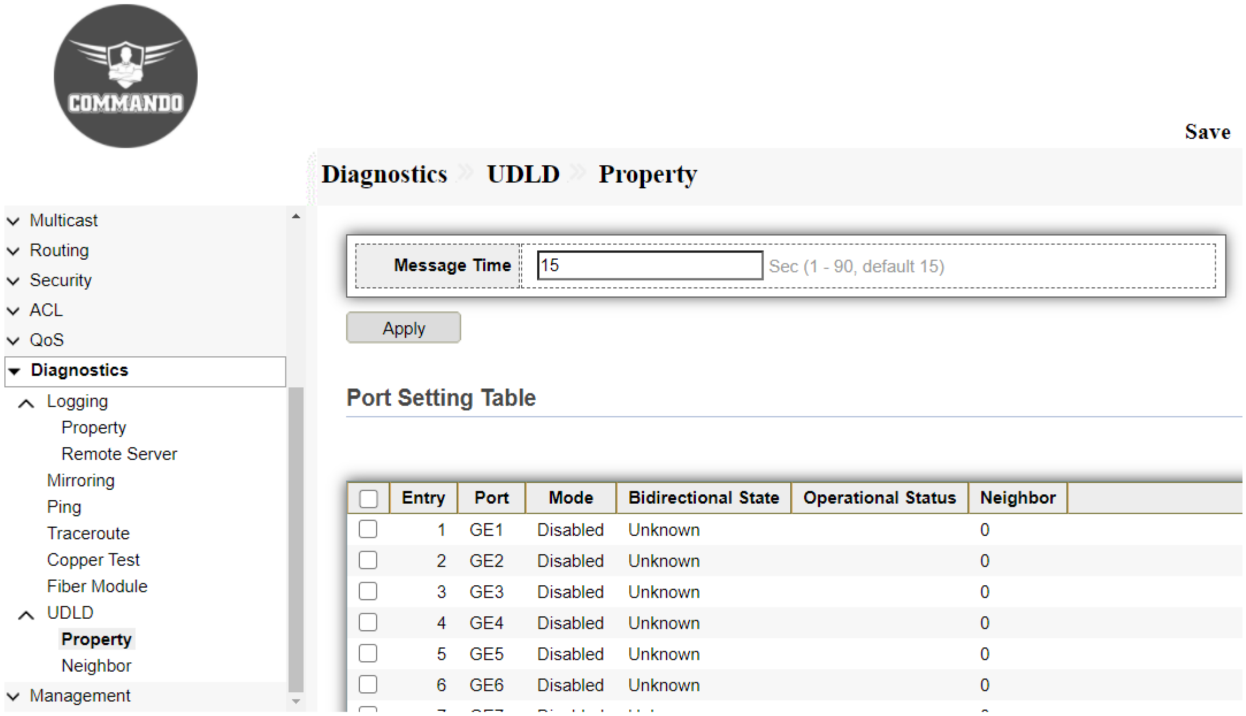
15.6 UDLD

UDLD (Unidirectional Link Detection) is a layer 1/2 protocol (unrelated to spanning tree) that protects the upper layer protocols from causing loops in the network. Unidirectional link occurs when traffic is transmitted between neighbors in one direction only which can cause spanning-tree topology loops. After enabling UDLD on the connected interface of the other switch, we can see that the local switch has detected its neighbor and updated the link's status to bidirectional.

15.6.1 Property

When a unidirectional link is detected, UDLD shuts down the affected LAN port and alerts the user. Unidirectional links can cause a variety of problems, including spanning tree topology loops. UDLD is a Layer 2 protocol that works with the Layer 1 protocols to determine the physical status of a link. This page allow user to configure global and per interface settings of UDLD.

To view and configure UDLD Property, click **Diagnostics >> UDLD >> Property.**

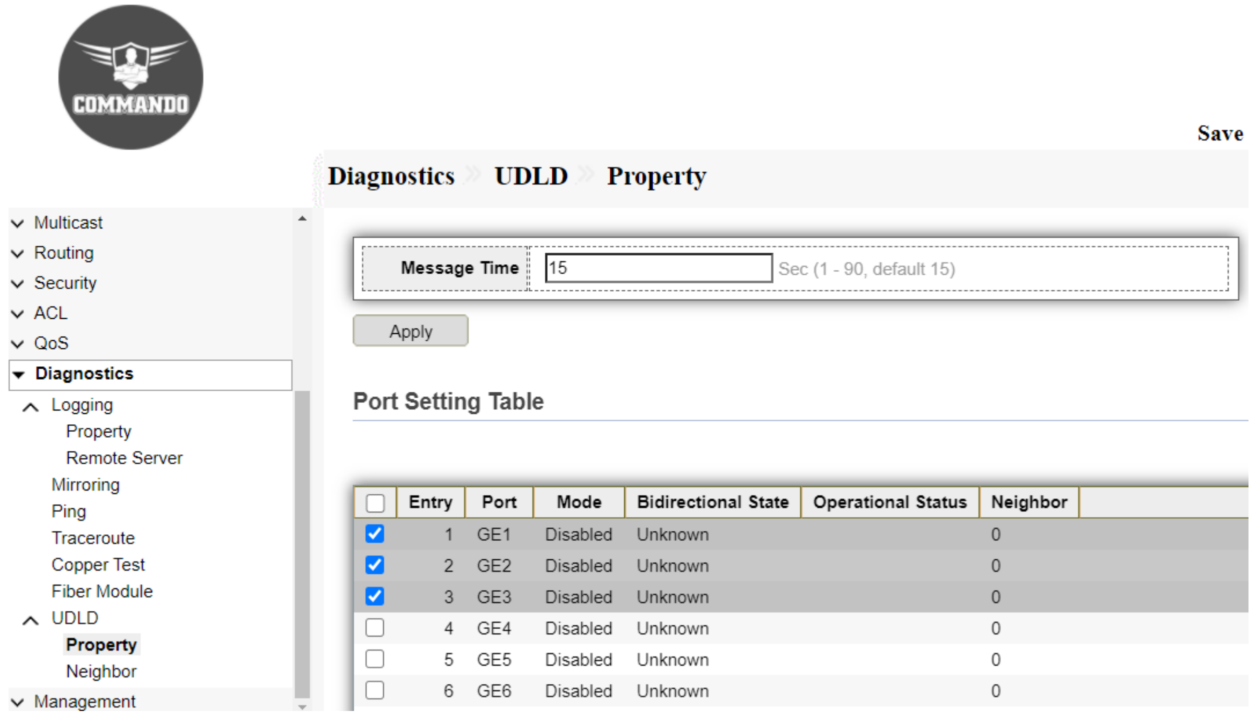


Message Time: 15 Sec (1 - 90, default 15)

Port Setting Table

☐	Entry	Port	Mode	Bidirectional State	Operational Status	Neighbor
☐	1	GE1	Disabled	Unknown		0
☐	2	GE2	Disabled	Unknown		0
☐	3	GE3	Disabled	Unknown		0
☐	4	GE4	Disabled	Unknown		0
☐	5	GE5	Disabled	Unknown		0
☐	6	GE6	Disabled	Unknown		0

Fig 15.6.1 UDLD Default Port Setting Table page

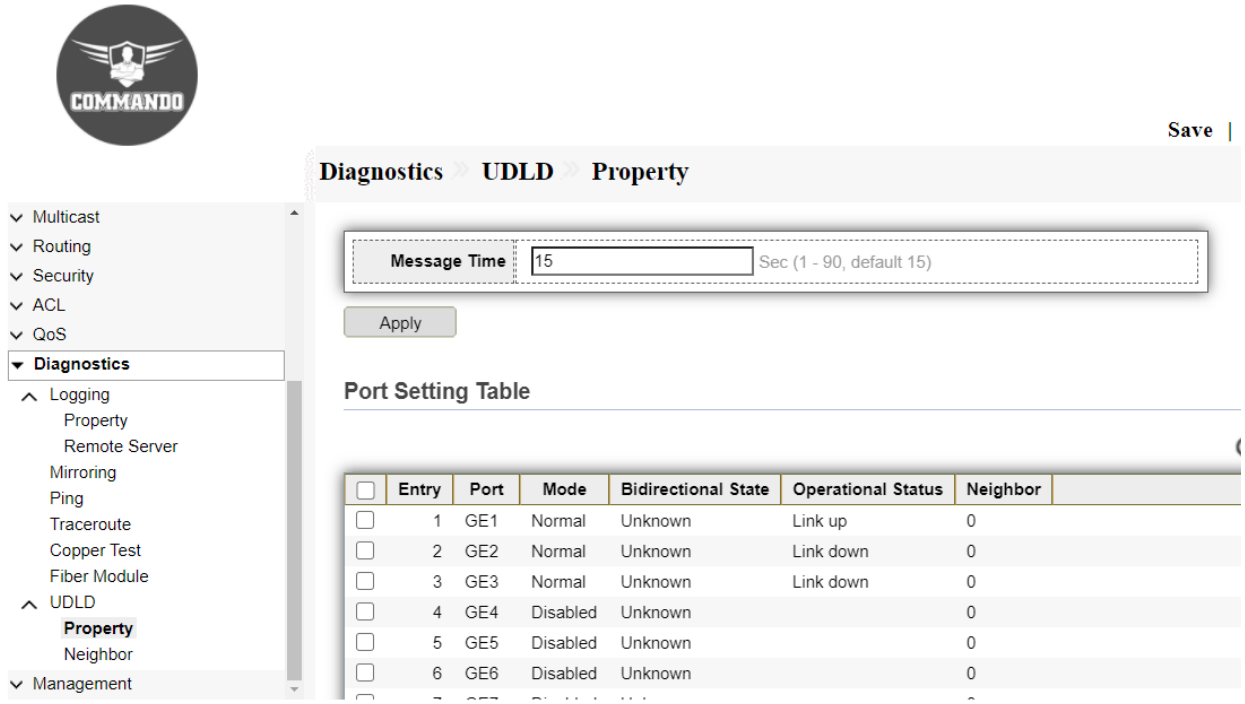


Message Time: 15 Sec (1 - 90, default 15)

Port Setting Table

□	Entry	Port	Mode	Bidirectional State	Operational Status	Neighbor
☑	1	GE1	Disabled	Unknown		0
☑	2	GE2	Disabled	Unknown		0
☑	3	GE3	Disabled	Unknown		0
□	4	GE4	Disabled	Unknown		0
□	5	GE5	Disabled	Unknown		0
□	6	GE6	Disabled	Unknown		0

Fig 15.6.2 UDLD Port selection page

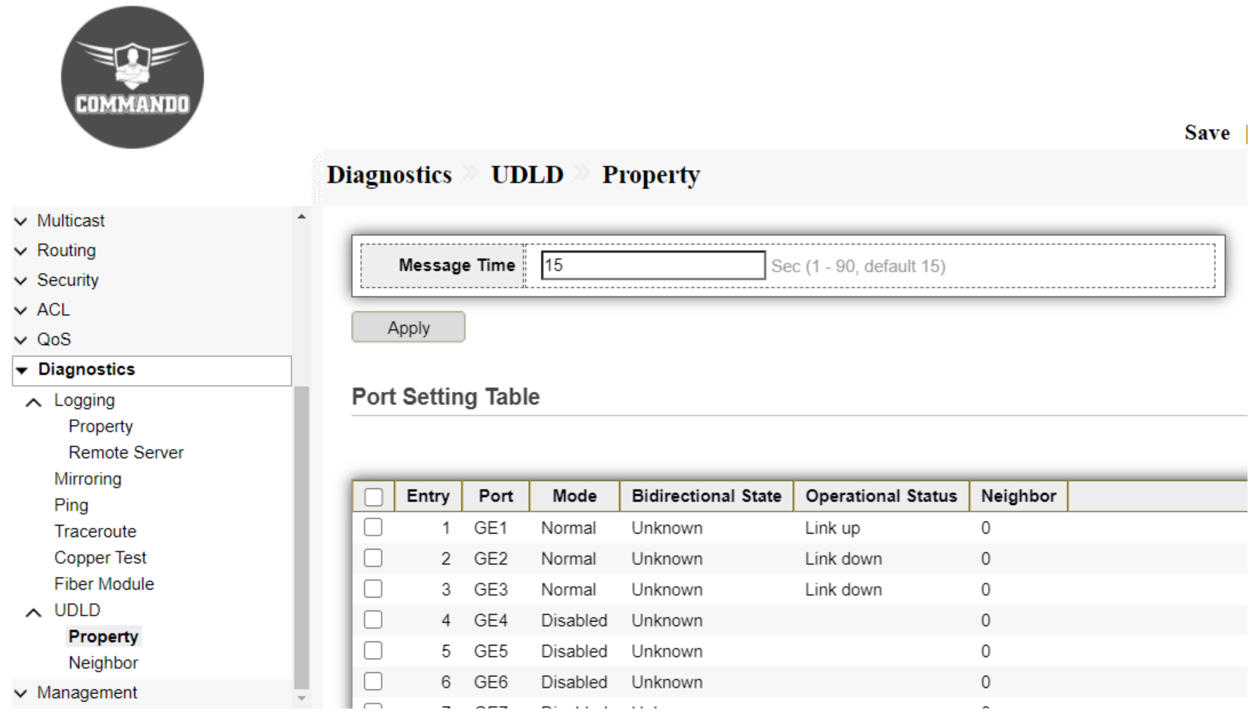


Message Time: 15 Sec (1 - 90, default 15)

Port Setting Table

□	Entry	Port	Mode	Bidirectional State	Operational Status	Neighbor
□	1	GE1	Normal	Unknown	Link up	0
□	2	GE2	Normal	Unknown	Link down	0
□	3	GE3	Normal	Unknown	Link down	0
□	4	GE4	Disabled	Unknown		0
□	5	GE5	Disabled	Unknown		0
□	6	GE6	Disabled	Unknown		0

Fig 15.6.3 UDLD Edit Port Setting page



Message Time: 15 Sec (1 - 90, default 15)

Port Setting Table

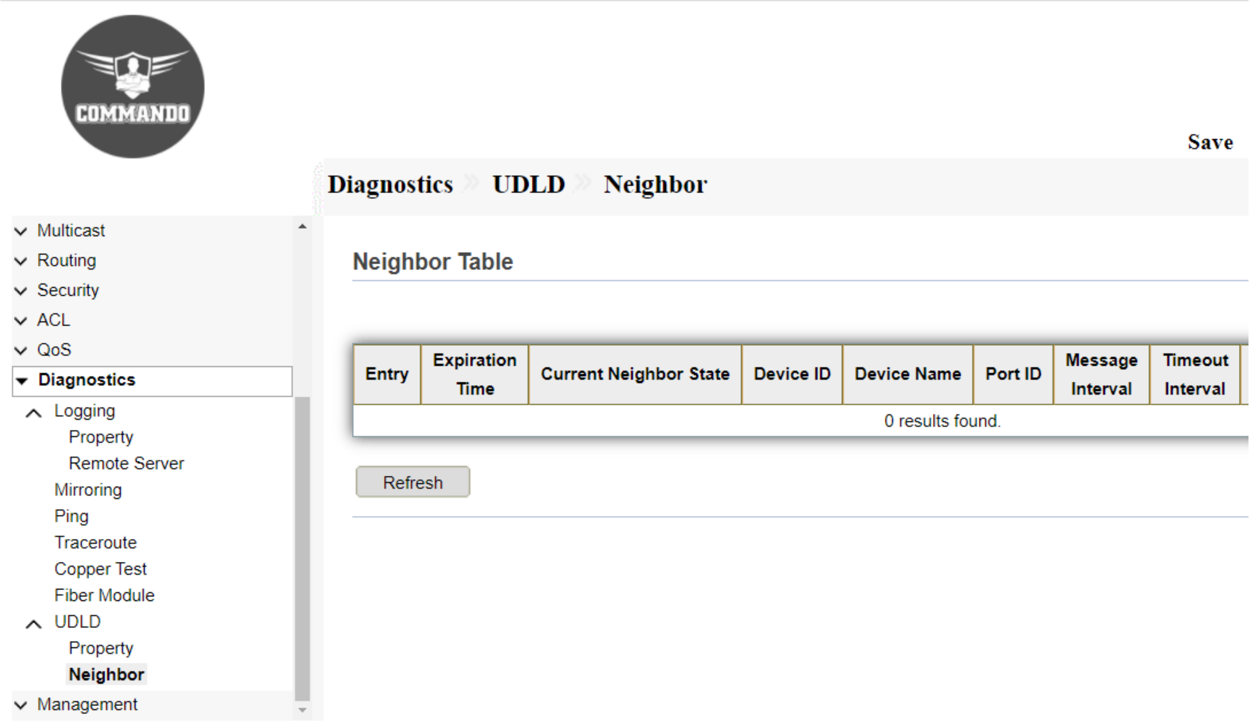
□	Entry	Port	Mode	Bidirectional State	Operational Status	Neighbor
□	1	GE1	Normal	Unknown	Link up	0
□	2	GE2	Normal	Unknown	Link down	0
□	3	GE3	Normal	Unknown	Link down	0
□	4	GE4	Disabled	Unknown		0
□	5	GE5	Disabled	Unknown		0
□	6	GE6	Disabled	Unknown		0

Fig 15.6.4 UDLD Port Setting Table page

15.6.2 UDLD Neighbor

After enabling UDLD on the connected interface of the other switch, we can see that the local switch has detected its neighbor and updated the link's status to bidirectional. UDLD is capable of tracking multiple neighbors per interface.

To view and configure Neighbor page, click **Diagnostics >> UDLD >> Neighbor**



Neighbor Table

Entry	Expiration Time	Current Neighbor State	Device ID	Device Name	Port ID	Message Interval	Timeout Interval
0 results found.							

Fig 15.6.4 UDLD Neighbor Table page

Chapter 16 Management

User Account: Use the Management pages to configure settings for the switch management features.

Management Access: These pages describe access rules for various management methods.

Management VLAN: Management VLAN is used for managing the switch from a remote location by using protocols such as telnet, SSH, SNMP etc. Normally the Management VLAN is VLAN 1, but you can use and configure any VLAN as a management VLAN. You can also configure Management IP address other than 192.168.0.1 and default gateway for Management VLAN.

Management Service: You can manage a switch through Telnet, SSH, HTTP, HTTPS, SNMP via web system and console port.

Management ACL: The management ACL contains rules that define a match condition for an inbound IP packet. You set a rule to allow or deny access to a matching inbound IP packet.

Management ACE: This section describes how to create ACLs and add rules (ACEs) to them.

Firmware: Firmware upgrade or backup firmware image through HTTP or TFTP to enhance functionality of switch.

Upgrade: Upgrade or backup firmware image through HTTP or TFTP server.

Active image: Network administrator can have dual image stored in switch and any one can be used as active image and other as backup image.

Configuration: Upgrade or backup configuration file through HTTP or TFTP server.

Upgrade: Upgrade or backup configuration file through HTTP or TFTP server.

Save Configuration: Configuration file to be saved.

SNMP: The Simple Network Management Protocol (SNMP) is a necessary tool for every network administrator. With an SNMP management station, you can graph the performance of network devices. With SNMP, network managers can view or modify network device information, and troubleshoot according to notifications sent by those devices in a timely manner.

View: C3000 Series Switch supports three SNMP versions: SNMPv1, SNMPv2c and SNMPv3.

Group: SNMP Groups are used to combine the SNMP users based on access privileges and authorization to different SNMP views at the MIBs.

Community: SNMP community string is a user ID or password that is sent along with a Get-Request. An SNMP community string is used to allow access to statistics within a managed device or router. A device can access data within other connected devices with the correct community string.

User: Specify the SNMP username on the host that connects to the SNMP agent and display the SNMP users.

Engine ID: The Engine ID is only used by SNMPv3 entities to uniquely identify them. Each SNMP agent maintains local information that is used in SNMPv3 message exchanges.

Trap Event: Monitored device (SNMP agent) send Traps are alert messages sent from a remote SNMP-enabled device to a central collector, the "SNMP manager".

Notification: SNMP uses traps otherwise known as notifications to notify the SNMP manager of network events.

RMON: RMON (Remote Network Monitoring) together with the SNMP system allows the network manager to monitor remote network devices efficiently. RMON reduces traffic flow between the NMS and managed devices, which is convenient to manage large networks.

Statistics: Traffic statistics (such as the total number of packets on a network segment during a certain time period, or total number of correct packets that are sent to a host).

Based on SNMP protocol, the NMS collects network data by communicating with Agents.

History: You can create a RMON history entry for an interface to gather information about network traffic within that interface.

Event: A RMON event is the action that occurs when an associated RMON alarm is triggered. When an alarm event occurs, it can be configured to generate a log event, a trap to an SNMP network management station, or both.

Alarm: A RMON alarm allows you to monitor a MIB object for a desired transitory state. An alarm periodically takes samples of the object's value and compares them to the configured thresholds.

These pages show tools like SNMP, RMON, Firmware upgrade, user account, save configuration, Alarm, Notification details. To upgrade firmware, User can upgrade firmware thought HTTP, or Configuration restore, or Configuration backup.

Restore Factory Default: Erase/Remove all current configuration.

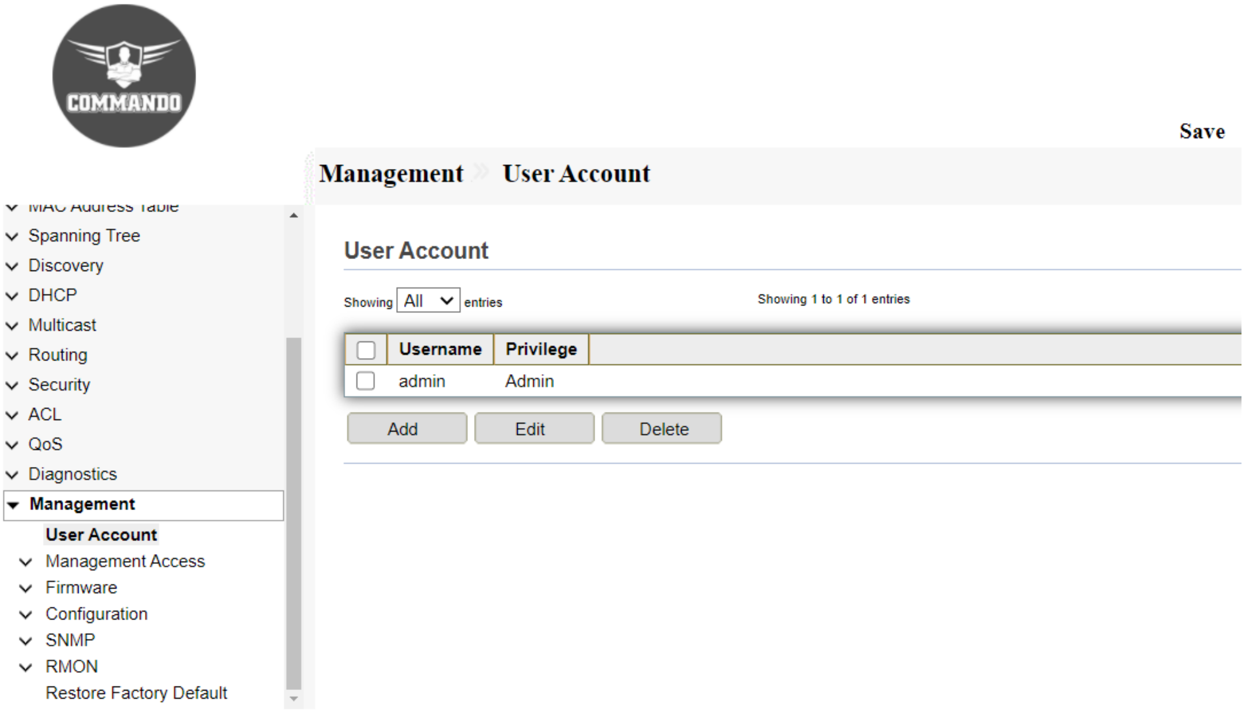
16.1 User Account

This page shows User account configuration where new Username & Password can be set to access the switch. Use this page to add and delete users and change the passwords of existing users.

To view and configure User Account, click **Management >> User Account**

Note: 1. By default, Username is “admin” and password: ******* written on backside of device.

2. Username “admin” can be changed and removed as per requirement.

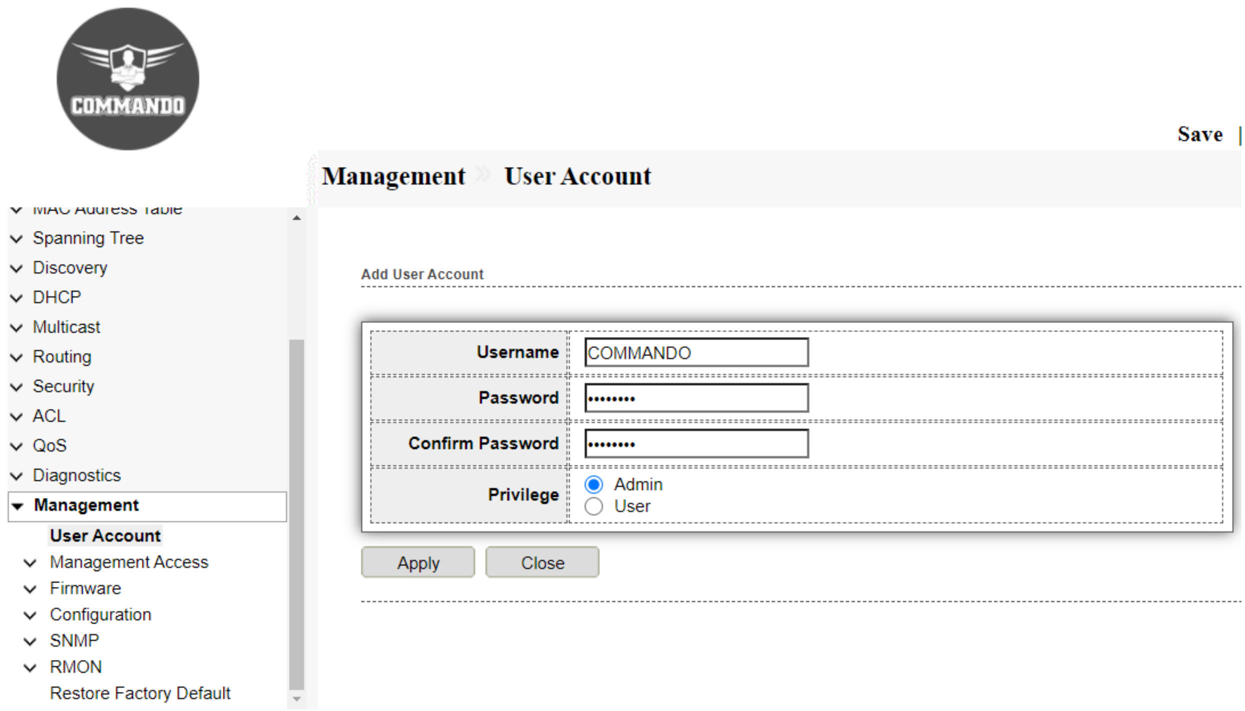


User Account

Showing All entries   Showing 1 to 1 of 1 entries

□	Username	Privilege
□	admin	Admin

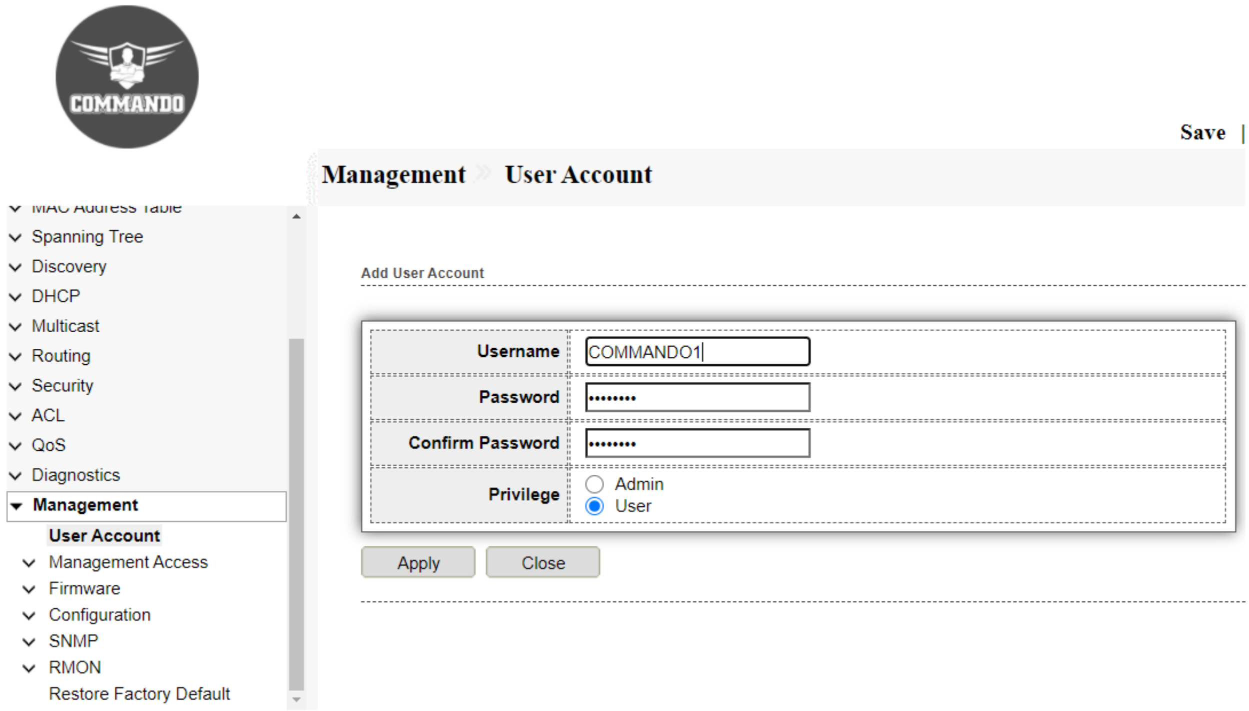
Fig 16.1.1 Default User Account page



Add User Account

Username	COMMANDO
Password	••••••••
Confirm Password	••••••••
Privilege	● Admin ○ User

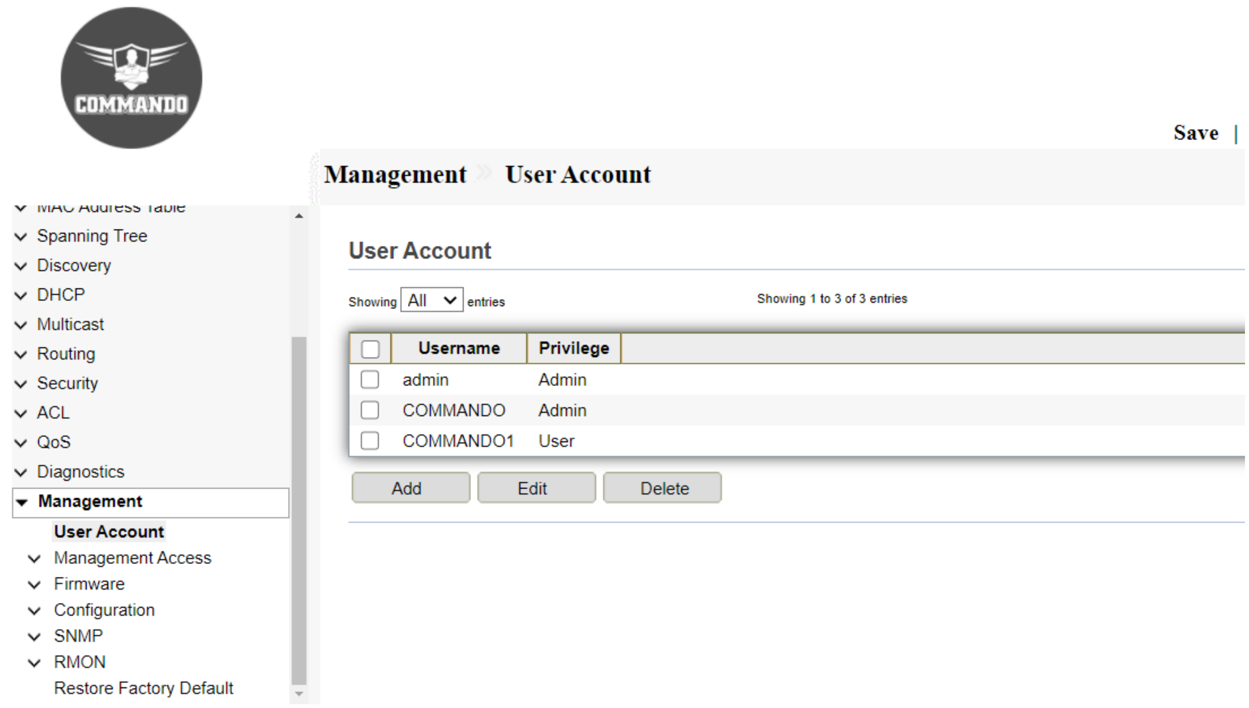
Fig 16.1.2 Add User Account having all privilege page



Add User Account

Username	COMMANDO1
Password	••••••••
Confirm Password	••••••••
Privilege	○ Admin ● User

Fig 16.1.3 Add User Account having very limited access page



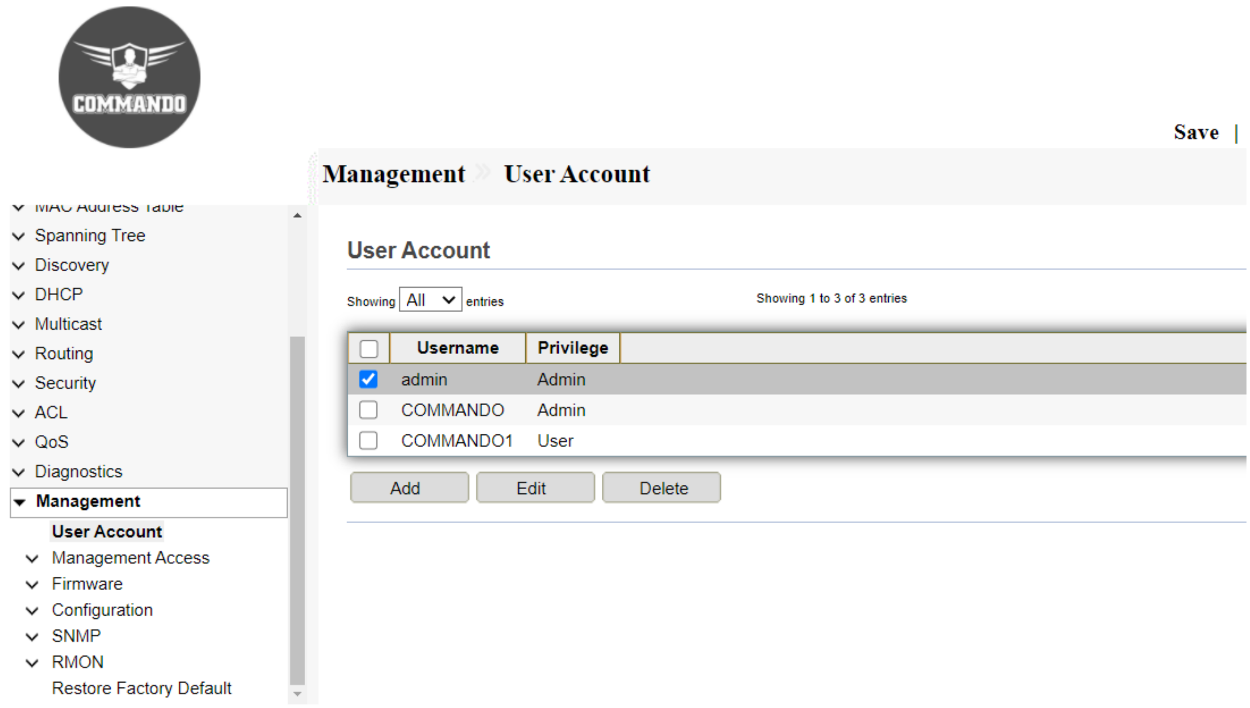
User Account

Showing All entries

Showing 1 to 3 of 3 entries

□	Username	Privilege
□	admin	Admin
□	COMMANDO	Admin
□	COMMANDO1	User

Fig 16.1.4 All User Account page



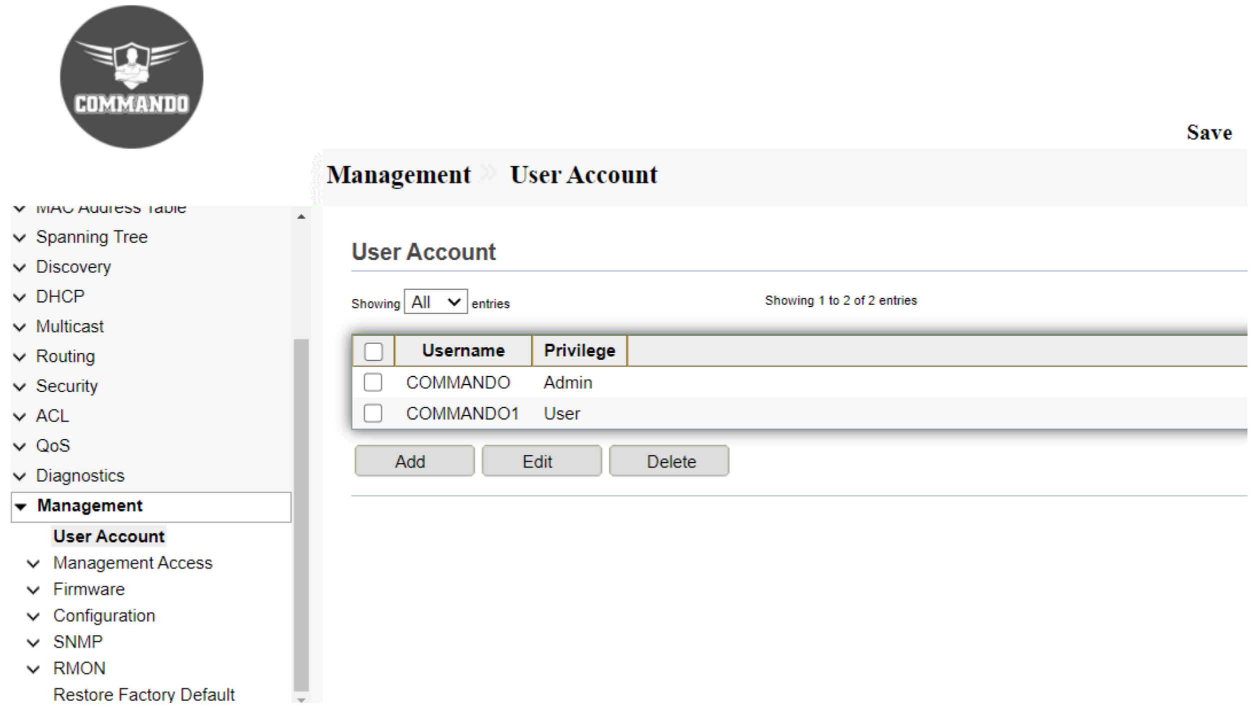
User Account

Showing All entries

Showing 1 to 3 of 3 entries

□	Username	Privilege
☑	admin	Admin
□	COMMANDO	Admin
□	COMMANDO1	User

Fig 16.1.5 Selecting and Add/Edit/Delete User Account page



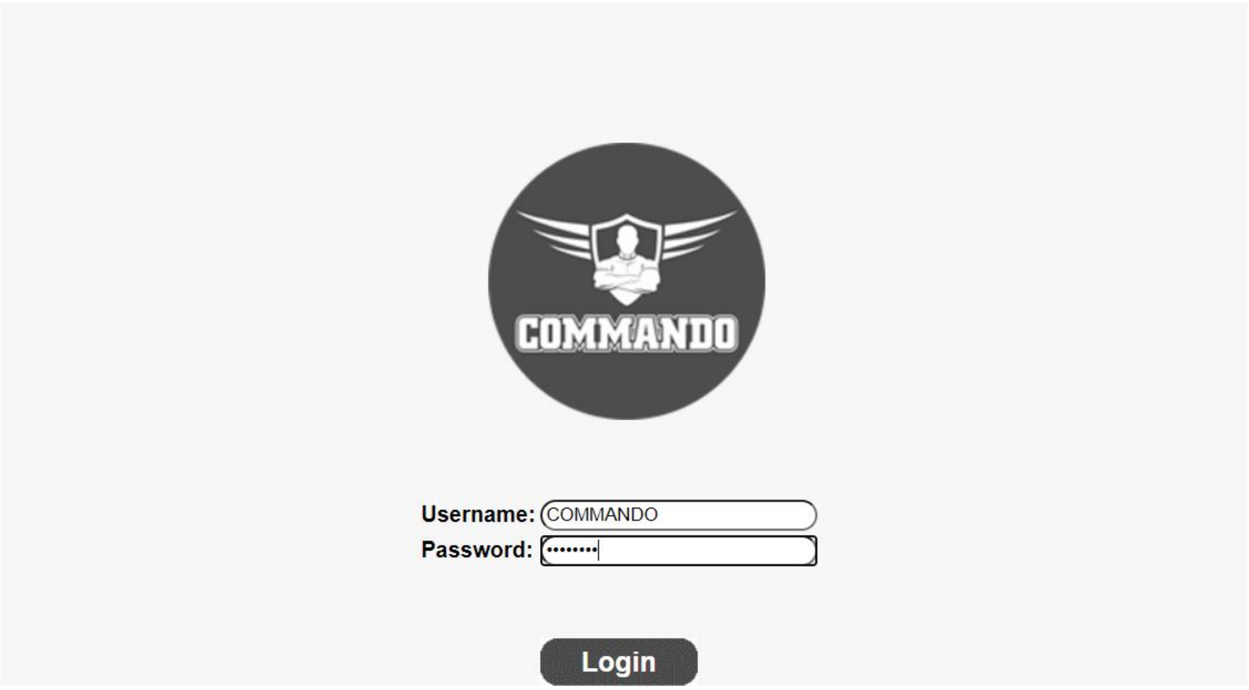
User Account

Showing All entries

Showing 1 to 2 of 2 entries

□	Username	Privilege
□	COMMANDO	Admin
□	COMMANDO1	User

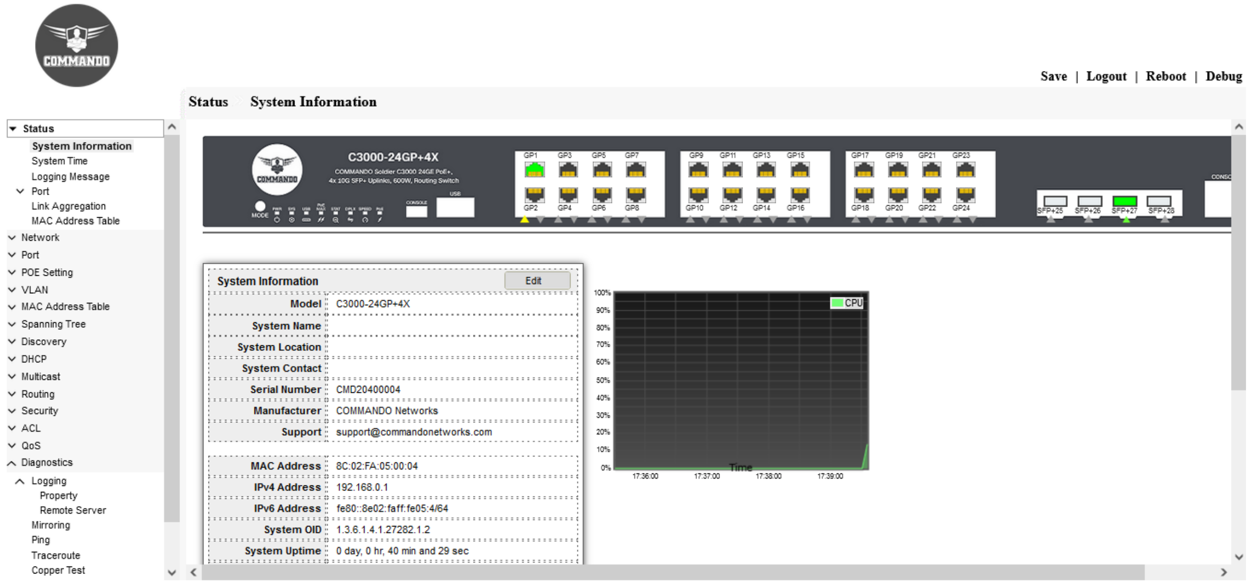
Fig 16.1.6 Deleting default admin account for security purpose page



Username: COMMANDO

Password: ••••••••

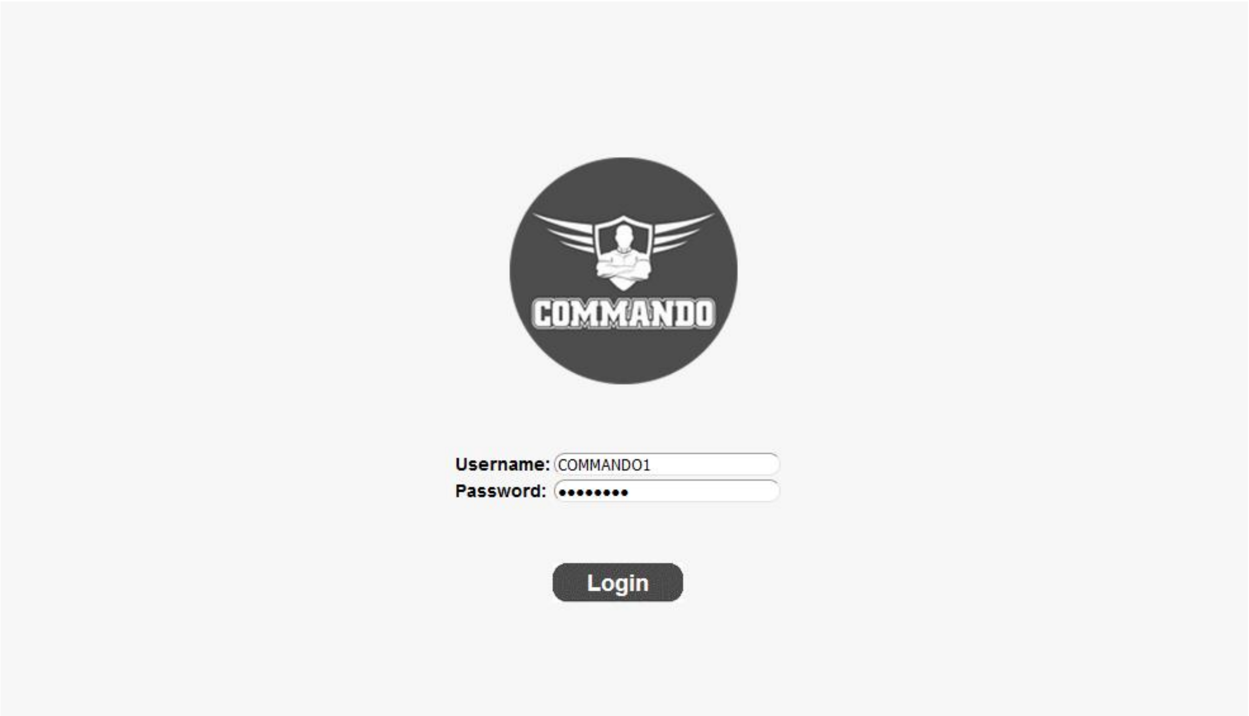
Fig 16.1.7 Login with COMMANDO admin privilege account page



System Information Edit

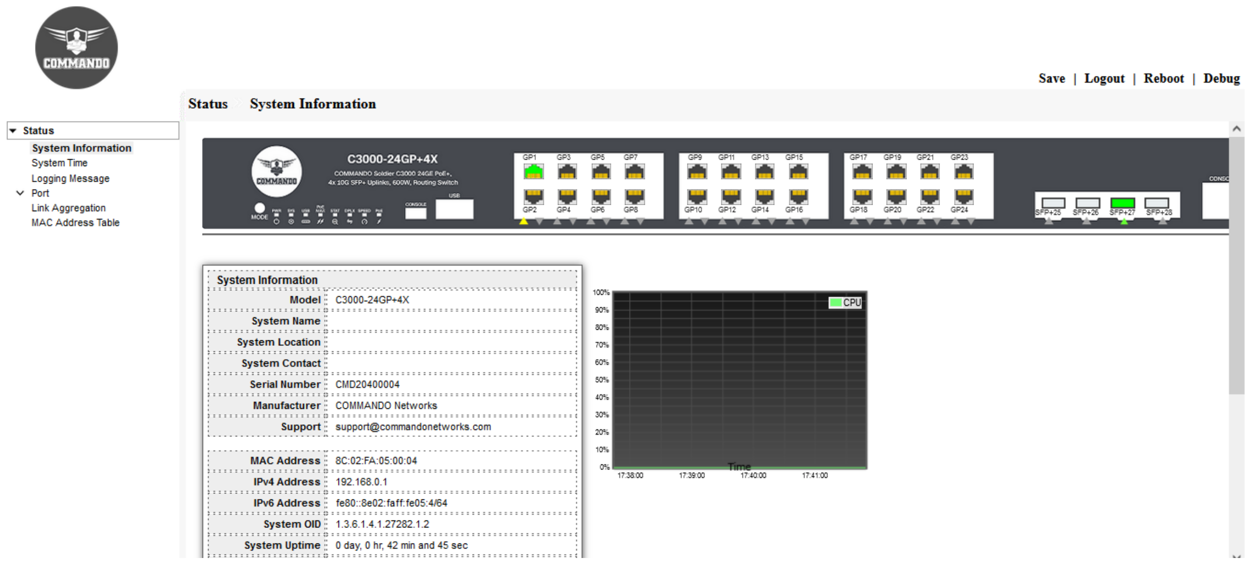
Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1
IPv6 Address	fe80::8e02:faff:fe05:4/64
System OID	1.3.6.1.4.1.27282.1.2
System Uptime	0 day, 0 hr, 40 min and 29 sec

Fig 16.1.8 C3000 Switch access with COMMANDO admin privilege account page



Username: COMMANDO1
Password: ••••••••

Fig 16.1.9 Login with COMMANDO1 user privilege account page



System Information

Model	C3000-24GP+4X
System Name	
System Location	
System Contact	
Serial Number	CMD20400004
Manufacturer	COMMANDO Networks
Support	support@commandonetworks.com
MAC Address	8C:02:FA:05:00:04
IPv4 Address	192.168.0.1
IPv6 Address	fe80::8e02:faff:fe05:4/64
System OID	1.3.6.1.4.1.27282.1.2
System Uptime	0 day, 0 hr, 42 min and 45 sec

Fig 16.1.10 C3000 Switch access with COMMANDO1 user privilege account page

16.2 Management Access

Access profiles determine how to authenticate and authorize users accessing the device through various access methods. Access Profiles can limit management access from specific sources. Only users who pass both the active access profile and the management access authentication methods are given management access to the device.

16.2.1 Management Service

Methods for accessing for configuration, troubleshooting, and managing the C3000 Series Switches:

Telnet: Telnet enables a user to manage an account or device remotely. The name stands for "teletype network". Historically, Telnet provided access to a command-line interface on a remote host.

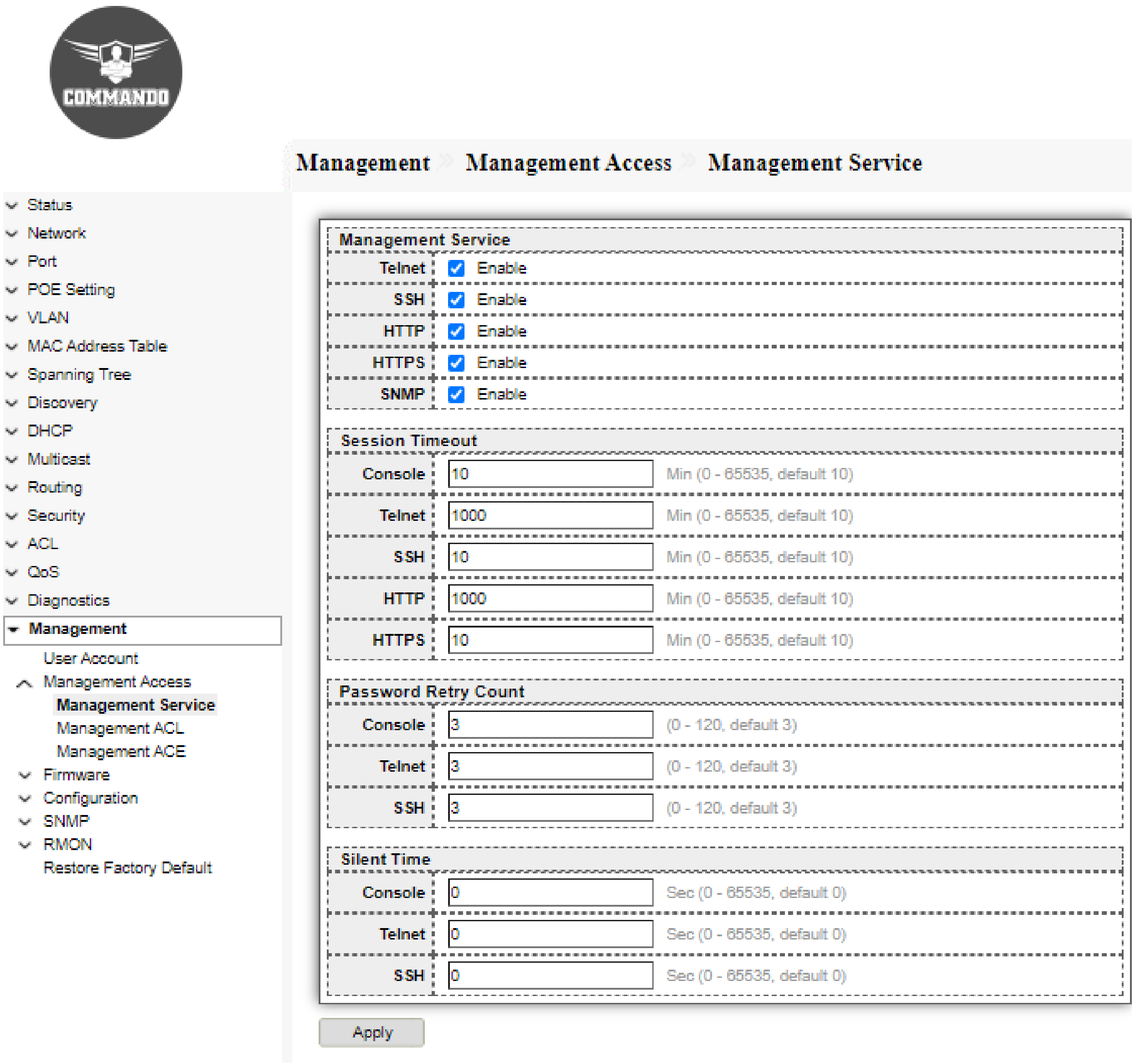
Secure Shell (SSH): Secure Shell (SSH) is a cryptographic network protocol for operating network services securely over an unsecured network. Secure Shell (SSH) is a protocol that provides a secure, remote connection to a device. SSH provides more security for remote connections than Telnet does by providing strong encryption when a device is authenticated. This software release supports SSH Version 1 (SSHv1) and SSH Version 2 (SSHv2). SSH functions the same in IPv6 as in IPv4. For IPv6, SSH supports IPv6 addresses and enables secure, encrypted connections with remote IPv6 nodes over an IPv6 transport. The SSH (Secure Shell) is a method for secure login from a terminal to a managed device. It protects communication security and integrity with strong authentication and encryption. It is a secure alternative to the non-protected login protocols, such as telnet. In an SSH login session, the PC acts as the SSH client, and the switch acts as the SSH server.

Hypertext Transfer Protocol (HTTP): HTTP protocol transfers information between the browser and the server in clear text, allowing the network, through which the information passes, to see the information transmitted.

Secure HTTP (HTTPS): HTTPS (HTTP Secure) is an adaptation of HTTP (Hypertext Transfer Protocol) for secure communication. HTTPS creates a secure channel over an insecure network. If adequate cipher suites are used and the server’s certificate is verified and trusted, the communication data can be protected from eavesdroppers and man-in-the-middle attacks. HTTPS is also referred to as HTTP over TLS, or HTTP over SSL, because in HTTPS, communication data is encrypted by TLS (Transport Layer Security) or SSL (Secure Sockets Layer). Now a days, HTTPS is widely used on the internet for secure communication between websites and web browsers. In a local network, HTTPS can also be used for secure access to switches.

Simple Network Management Protocol (SNMP): Simple Network Management Protocol (SNMP) is an Internet Standard protocol for collecting and organizing information about managed devices on IP networks and for modifying that information to change device behavior. SNMP is widely used in network management for network monitoring. SNMP works by sending messages, called protocol data units (PDUs), to devices within your network that "speak" SNMP. These messages are called SNMP Get-Requests. Using these requests, network administrators can track virtually any data values they specify.

To view and enable Management Service click **Security >> Management Access >> Management Service.** To access the switch CLI enable "Telnet" Service.



Management Service

Telnet	☑ Enable
SSH	☑ Enable
HTTP	☑ Enable
HTTPS	☑ Enable
SNMP	☑ Enable

Session Timeout

Console	10	Min (0 - 65535, default 10)
Telnet	1000	Min (0 - 65535, default 10)
SSH	10	Min (0 - 65535, default 10)
HTTP	1000	Min (0 - 65535, default 10)
HTTPS	10	Min (0 - 65535, default 10)

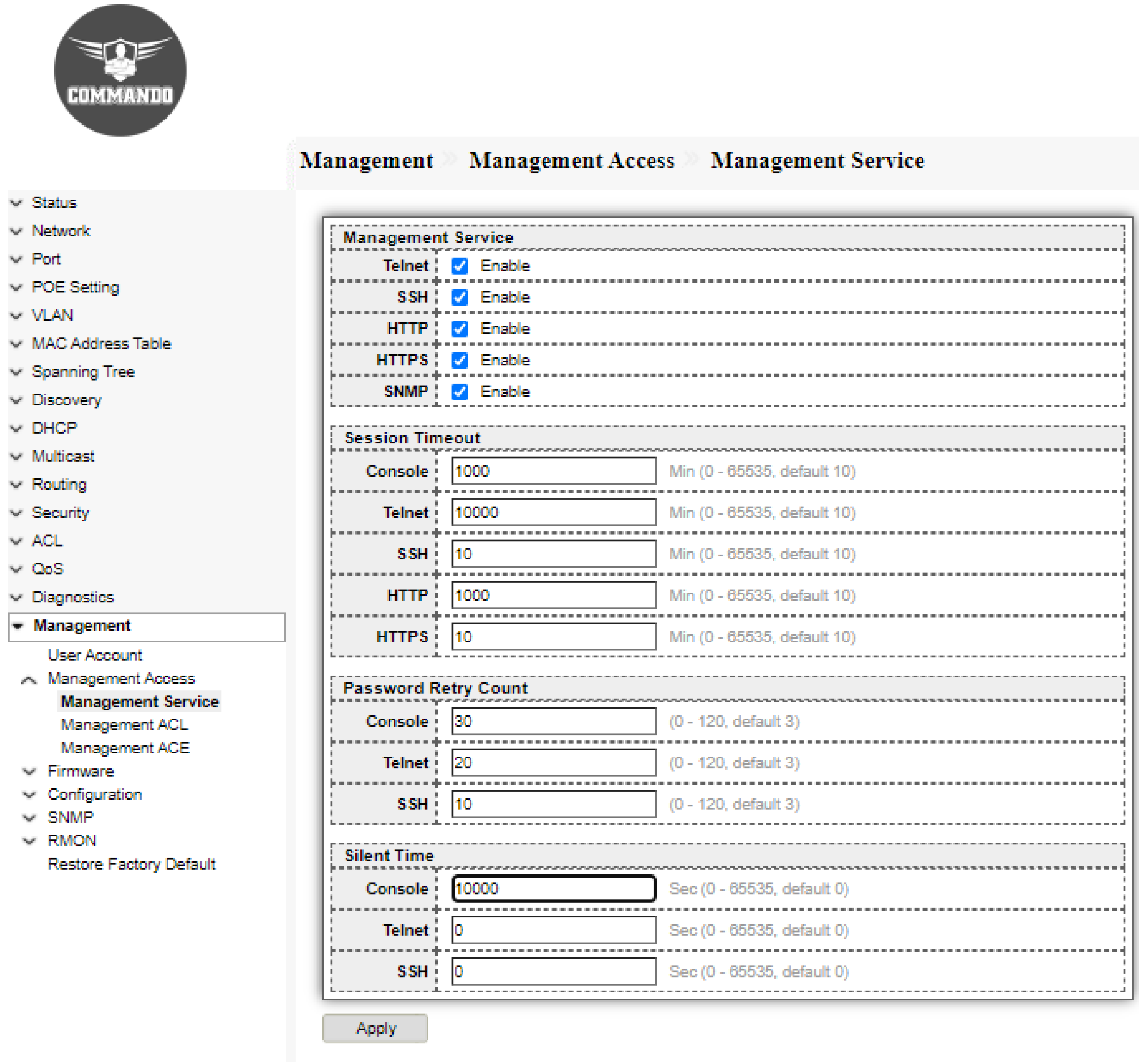
Password Retry Count

Console	3	(0 - 120, default 3)
Telnet	3	(0 - 120, default 3)
SSH	3	(0 - 120, default 3)

Silent Time

Console	0	Sec (0 - 65535, default 0)
Telnet	0	Sec (0 - 65535, default 0)
SSH	0	Sec (0 - 65535, default 0)

Fig 16.2.1 Management services page



Management » Management Access » Management Service

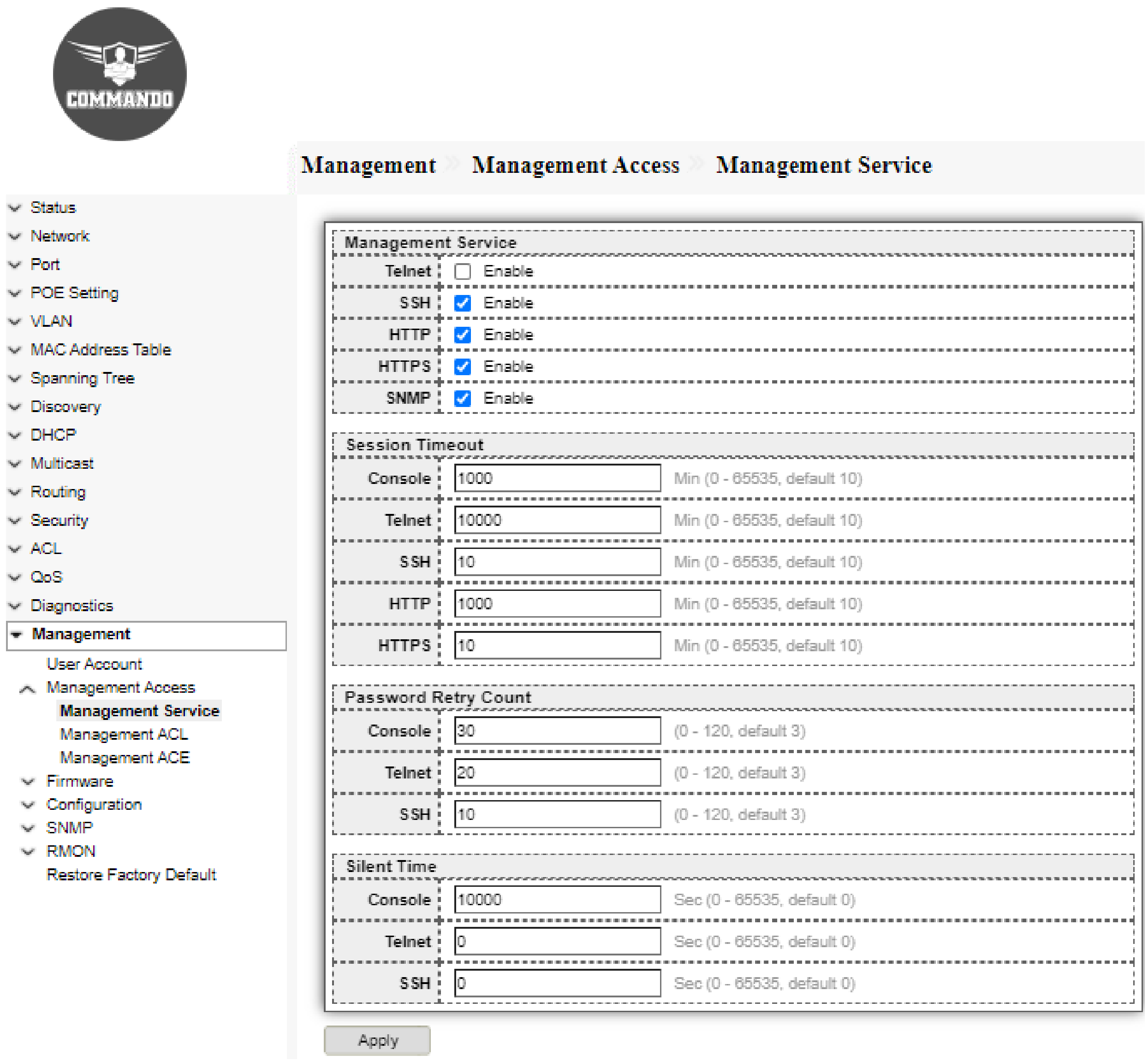
Management Service	
Telnet	☑ Enable
SSH	☑ Enable
HTTP	☑ Enable
HTTPS	☑ Enable
SNMP	☑ Enable

Session Timeout		
Console	1000	Min (0 - 65535, default 10)
Telnet	10000	Min (0 - 65535, default 10)
SSH	10	Min (0 - 65535, default 10)
HTTP	1000	Min (0 - 65535, default 10)
HTTPS	10	Min (0 - 65535, default 10)

Password Retry Count		
Console	30	(0 - 120, default 3)
Telnet	20	(0 - 120, default 3)
SSH	10	(0 - 120, default 3)

Silent Time		
Console	10000	Sec (0 - 65535, default 0)
Telnet	0	Sec (0 - 65535, default 0)
SSH	0	Sec (0 - 65535, default 0)

Fig 16.2.2 Enabling Management services with different session timeout page



Management Service

Telnet	□ Enable
SSH	☑ Enable
HTTP	☑ Enable
HTTPS	☑ Enable
SNMP	☑ Enable

Session Timeout

Console	1000	Min (0 - 65535, default 10)
Telnet	10000	Min (0 - 65535, default 10)
SSH	10	Min (0 - 65535, default 10)
HTTP	1000	Min (0 - 65535, default 10)
HTTPS	10	Min (0 - 65535, default 10)

Password Retry Count

Console	30	(0 - 120, default 3)
Telnet	20	(0 - 120, default 3)
SSH	10	(0 - 120, default 3)

Silent Time

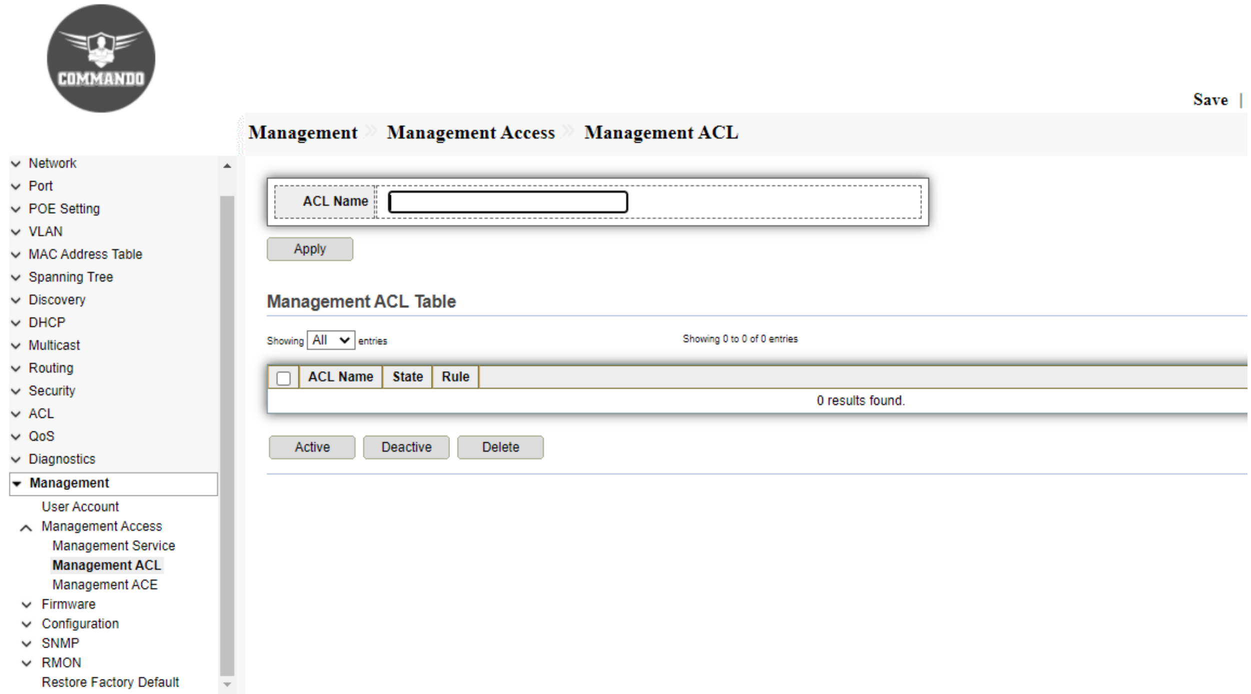
Console	10000	Sec (0 - 65535, default 0)
Telnet	0	Sec (0 - 65535, default 0)
SSH	0	Sec (0 - 65535, default 0)

Fig 16.2.3 Disabling telnet Management services page

16.2.2 Management ACL

Management Access Control List (ACL) is an additional feature that you can configure on your network to enhance security. An access rule is created and applied to permit or deny access to the network or to a particular device inside the network. Displays information Table about Access Control List where you can Active, Deactivate or Delete the ACL.

To view and configure Management ACL, click **Security >> Management Access >> Management ACL.**



Management » Management Access » Management ACL

ACL Name:

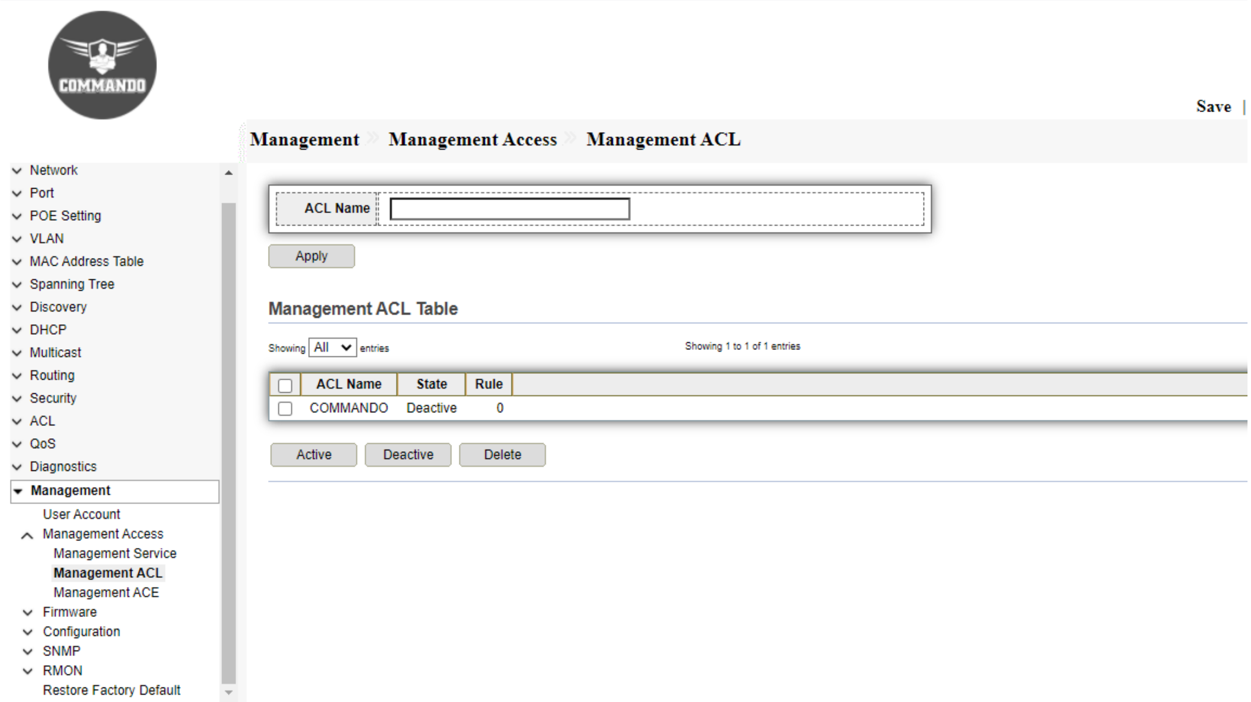
Management ACL Table

Showing All entries

Showing 0 to 0 of 0 entries

□	ACL Name	State	Rule
0 results found.			

Fig 16.2.4 Default Management ACL Table page



Management » Management Access » Management ACL

ACL Name:

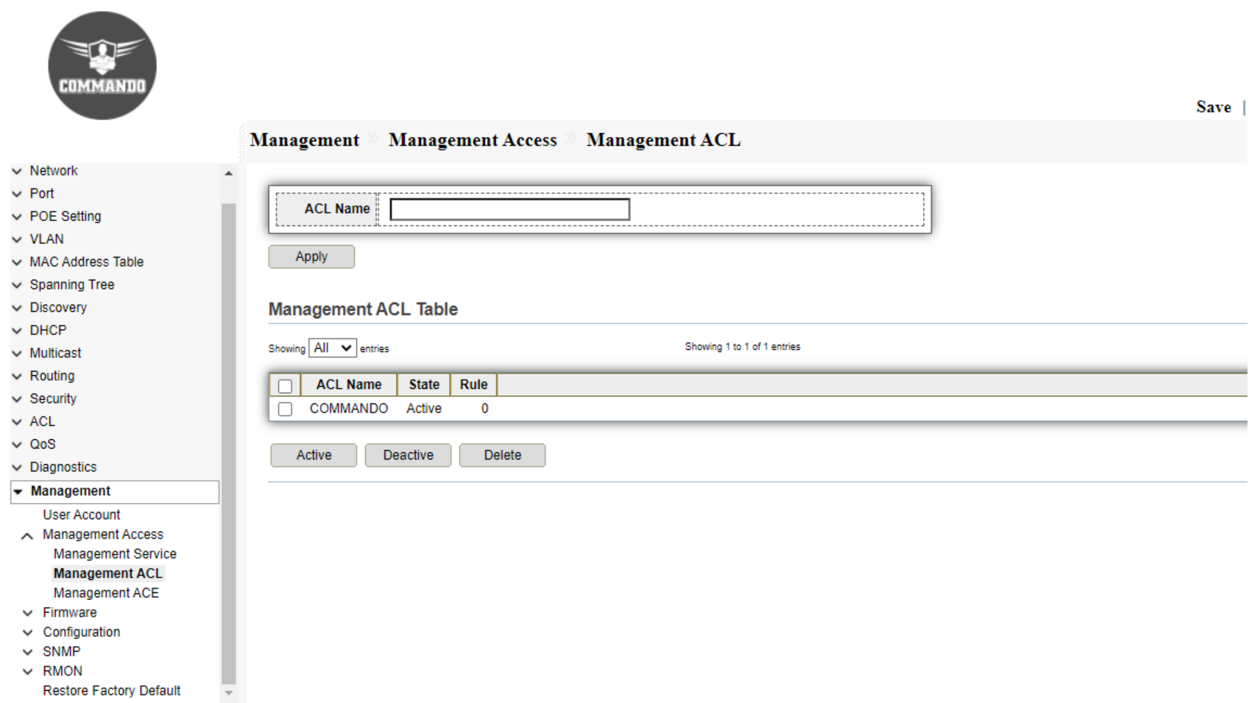
Management ACL Table

Showing All entries

Showing 1 to 1 of 1 entries

□	ACL Name	State	Rule
□	COMMANDO	Deactive	0

Fig 16.2.5 Adding Management ACL Name page



Management » Management Access » Management ACL

ACL Name:

Management ACL Table

Showing All entries

Showing 1 to 1 of 1 entries

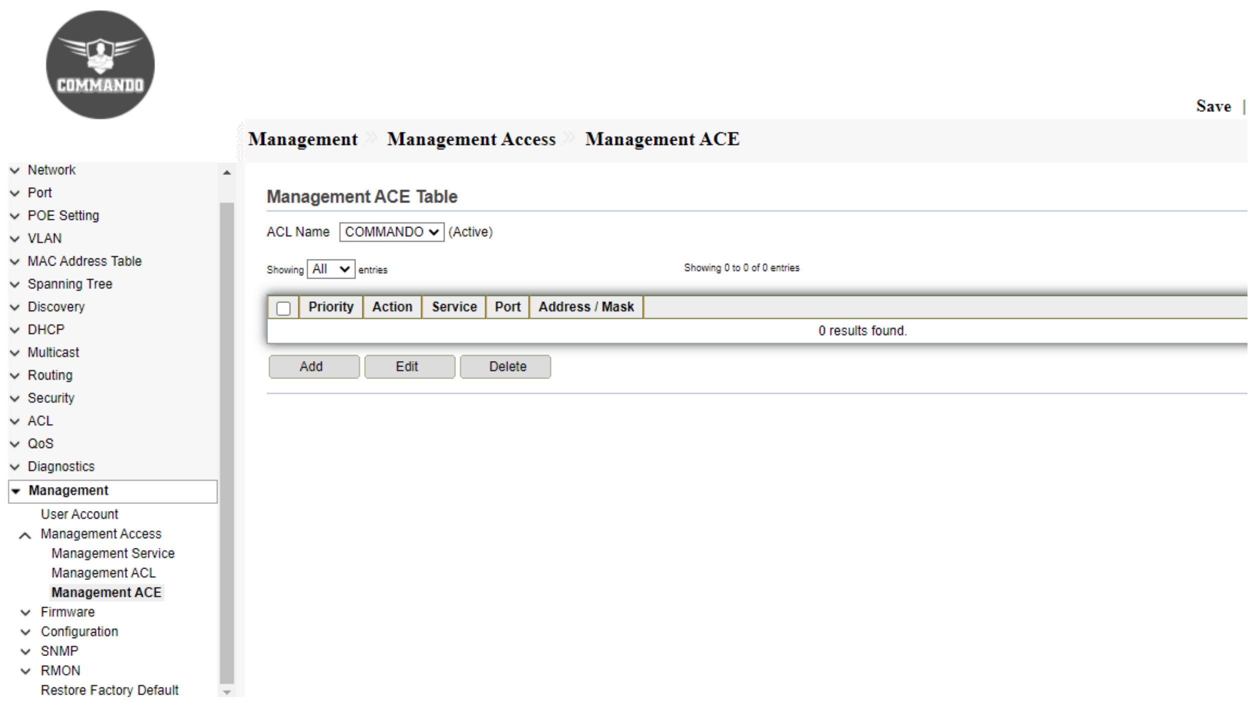
□	ACL Name	State	Rule
□	COMMANDO	Active	0

Fig 16.2.6 Activating Management ACL Table page

16.2.3 Management ACE

An Access Control List (ACL) is an ordered list of classification filters and actions. Each single classification rule, together with its action, is called an Access Control Element (ACE). Each ACE is made up of filters that distinguish traffic groups and associated actions. A single ACL may contain one or more ACEs, which are matched against the contents of incoming frames. Either a DENY or PERMIT action is applied to frames whose contents match the filter. This is to add, edit or delete ACE rule. An ACE rule cannot be edited or deleted if ACL under active. New ACE cannot be added if ACL under active.

To view and configure Management ACE, click **Security >> Management Access >> Management ACE.**



Management ACE Table

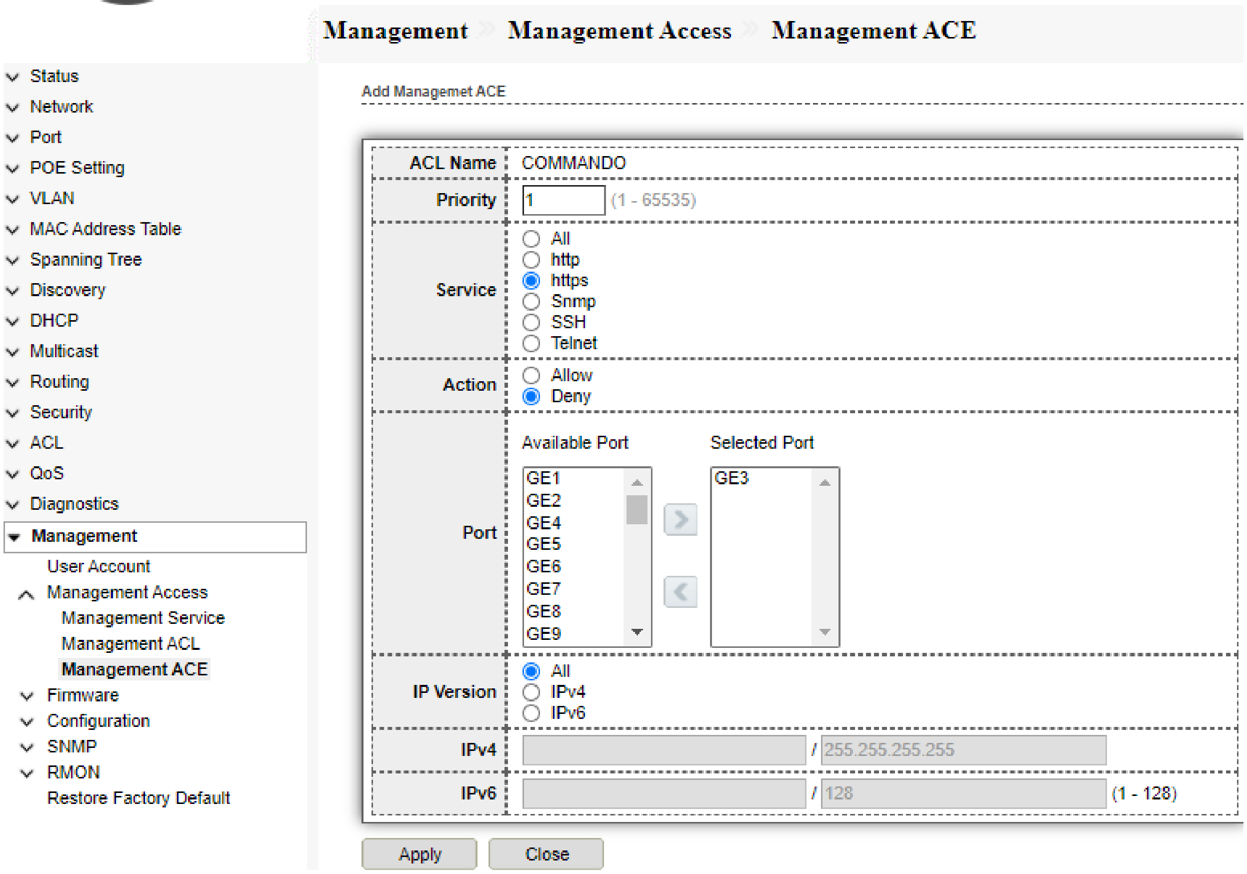
ACL Name COMMANDO (Active)

Showing All entries

Showing 0 to 0 of 0 entries

□	Priority	Action	Service	Port	Address / Mask
0 results found.					

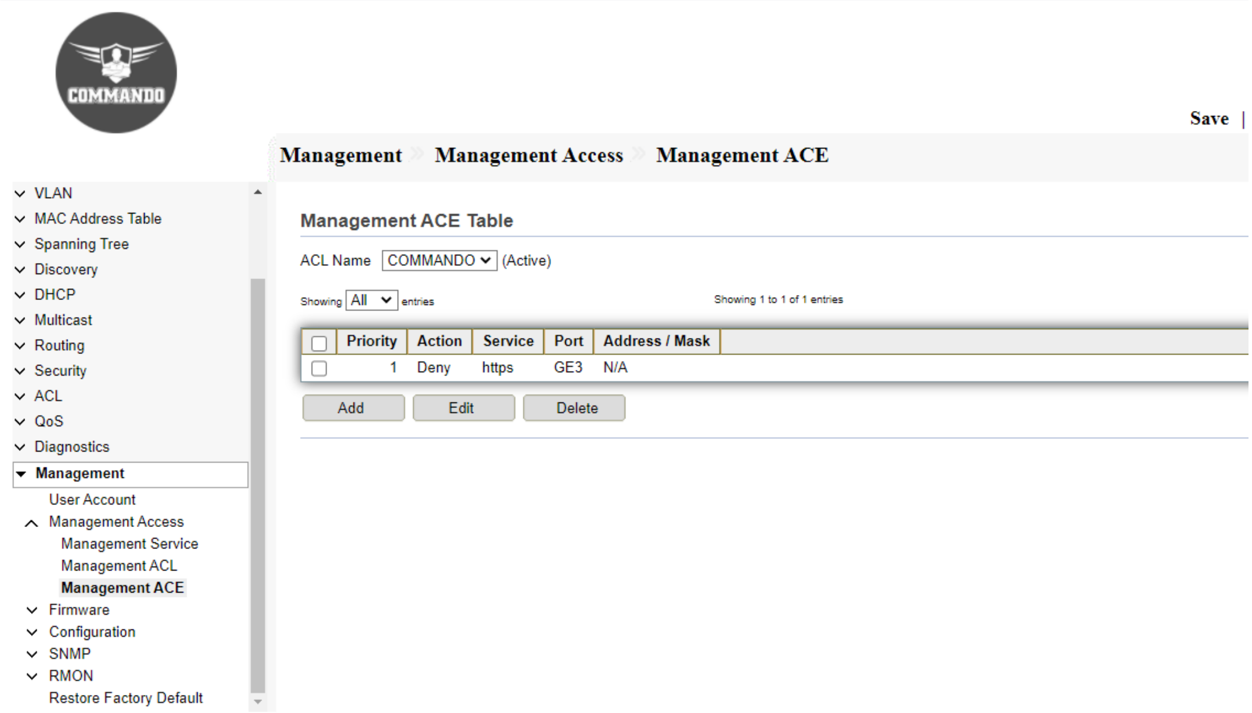
Fig 16.2.7 Default Management ACE Table page



Add Managemet ACE

ACL Name	COMMANDO
Priority	1 (1 - 65535)
Service	○ All ○ http ● https ○ Snmp ○ SSH ○ Telnet
Action	○ Allow ● Deny
Port	Available Port: GE1, GE2, GE4, GE5, GE6, GE7, GE8, GE9 Selected Port: GE3
IP Version	● All ○ IPv4 ○ IPv6
IPv4	/ 255.255.255.255
IPv6	/ 128 (1 - 128)

Fig 16.2.8 Add Management ACE Table page



Management ACE Table

ACL Name COMMANDO (Active)

Showing All entries

Showing 1 to 1 of 1 entries

□	Priority	Action	Service	Port	Address / Mask
□	1	Deny	https	GE3	N/A

Fig 16.2.9 Management ACE Table after ACL Activation page

16.3 Firmware

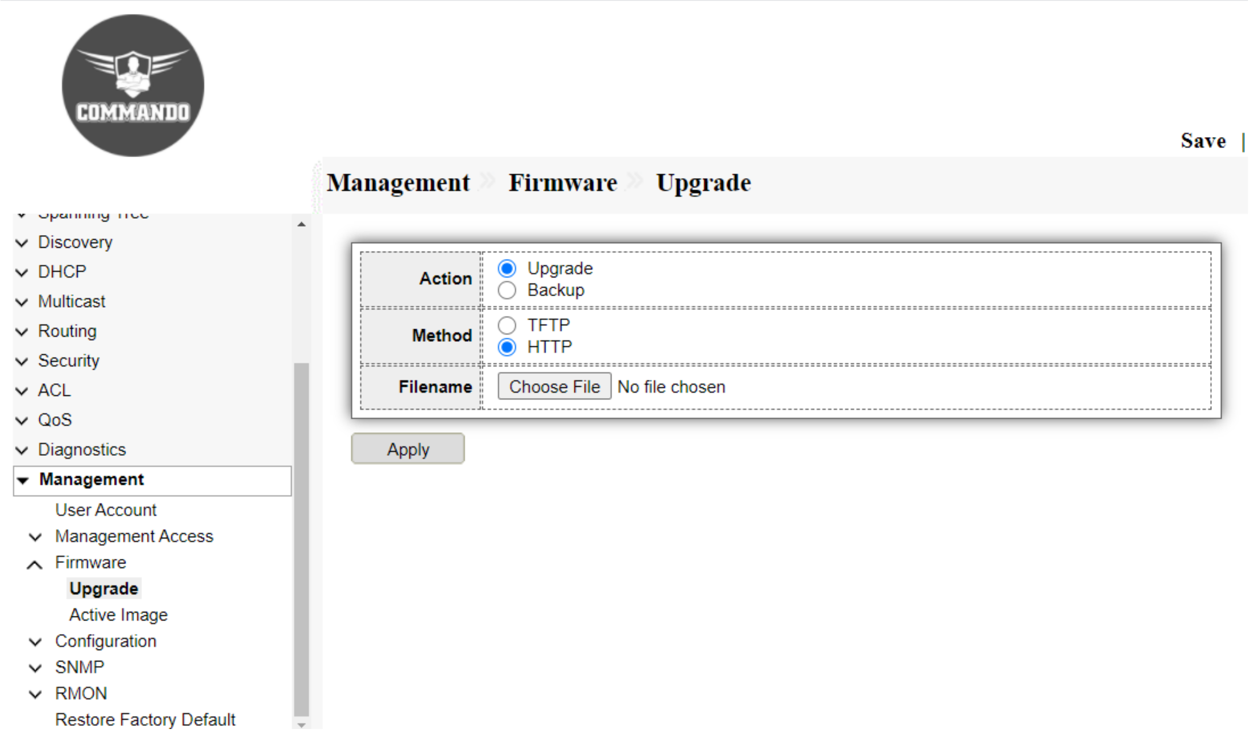
This page allow user to upgrade or backup firmware image through HTTP or TFTP server.

16.3.1 Upgrade

To view and configure firmware upgrade or backup, click **Management >> Firmware >> Upgrade.**

Installing from the Local System (HTTP): Firmware may be directly uploaded to the switch from the local system. Click ''Choose File'' to select the firmware that needed to upgrade. And then click ''Apply '' to start Upgrading.

Installing from the Remote Server (TFTP): Firmware may be fetched by the switch from a remote machine serving the firmware file. The Server must be providing the file via TFTP. Select Upgrade Method "TFTP", Select "Address Type [Hostname/IPv4/IPv6]", Then Enter "Server Address" & "Filename" And then click ''Apply '' to start upgrading.



Action	● Upgrade ○ Backup
Method	○ TFTP ● HTTP
Filename	Choose File No file chosen

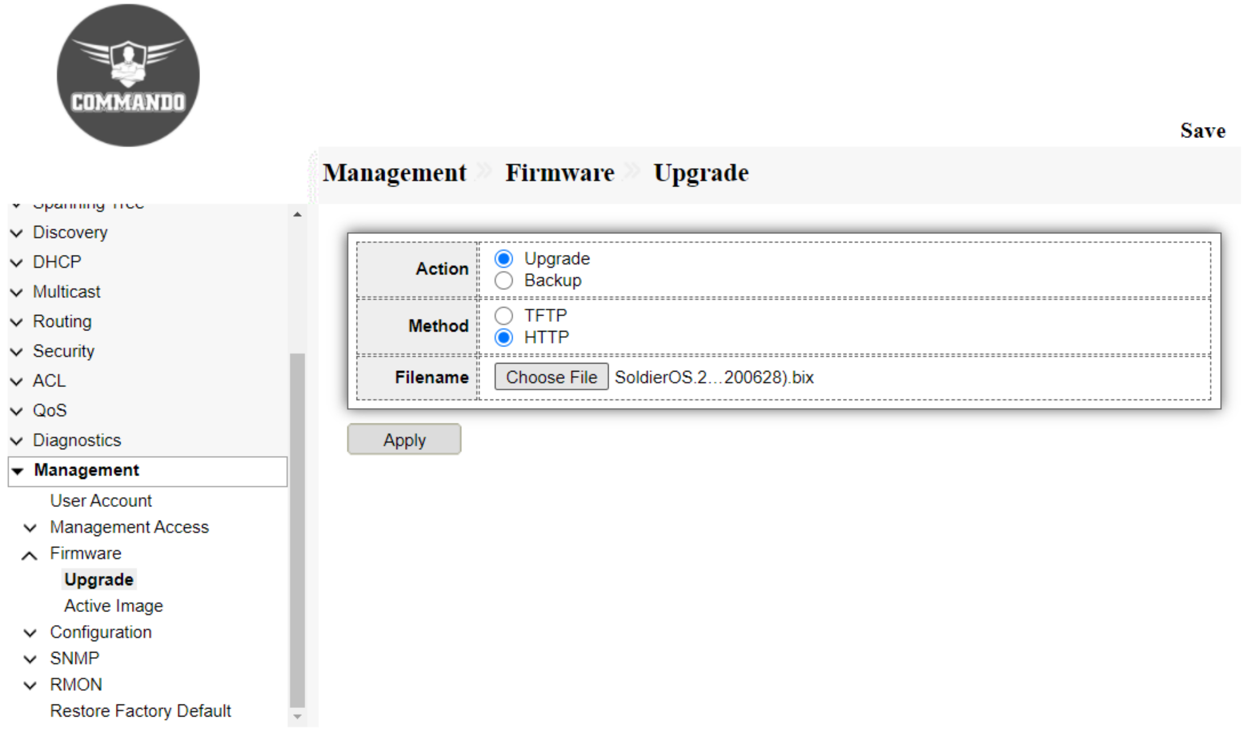
Fig 16.3.1 Default Firmware Upgrade page

Firmware Update Procedure to Firmware Version SoldierOS

Step 1 Collect the Firmware upgrade of switch.

Step 2: For Uploading prepared firmware file to COMMANDO Series C3000 by Web GUI by clicking Management >>Firmware>>Upgrade and select method HTTP choose file **vmlinux.bix.**

Step 3: Don't Power ON/OFF device. After successful uploading click reboot button on device. After that you must remove all browser history to login again with new firmware.



Action	● Upgrade ○ Backup
Method	○ TFTP ● HTTP
Filename	Choose File SoldierOS.2…200628).bix

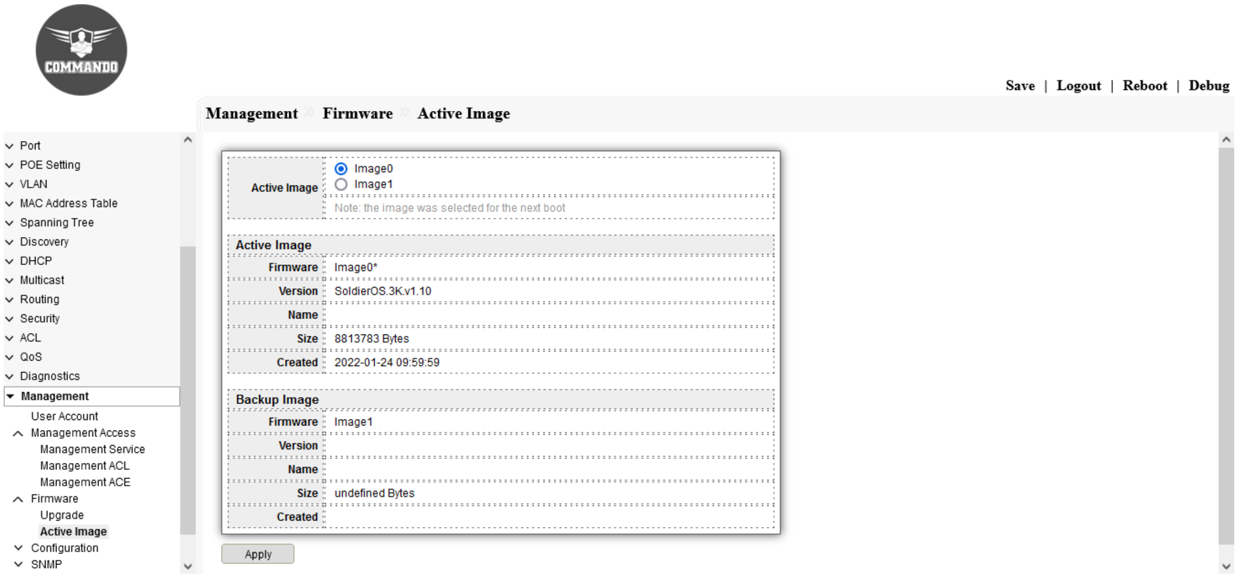
Apply

Fig 16.3.2 Firmware Upgrade page

16.3.2 Active Image

In all C3000 Series Switches support Dual Image. The switch stores two images. One image is set as the next start up image, and the other is set as the backup image. After you upgrade a firmware, the switch will automatically map the firmware file to the backup image. When the switch reboots, it will try to start up with the next startup image. When the switch fails to start up with the next startup image, it will try to start up with the backup image. In all C3000 Series Switches two images working in active and backup mode. When the active image is upgraded or unworkable, you can switch over services to the backup image to ensure normal running of the C3000 series Switches. No saved configuration is lost while changing images.

To view and configure Active Image, Click **Management>>Firmware>>Active Image**



Management » Firmware » Active Image

Active Image	● Image0 ○ Image1
	Note: the image was selected for the next boot

Active Image	
Firmware	Image0*
Version	SoldierOS.3K.v1.10
Name	
Size	8813783 Bytes
Created	2022-01-24 09:59:59

Backup Image	
Firmware	Image1
Version	
Name	
Size	undefined Bytes
Created	

Fig 16.3.3 Firmware Active Image page

16.4 Configuration

The Configuration Management and Update Firmware features allow you to browse to save and retrieve files directly from your local system. This is the easiest and recommended method.

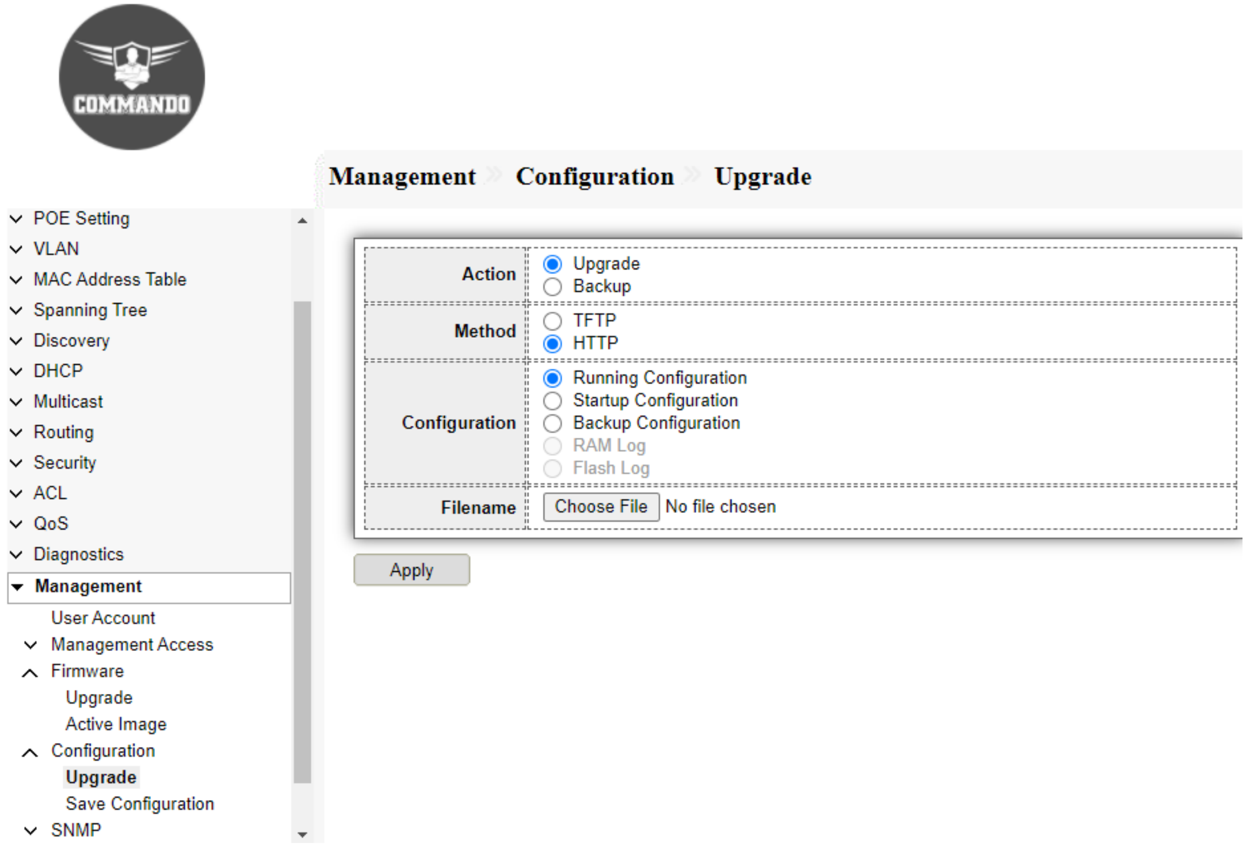
Alternatively, you can use a TFTP (Trivial File Transfer Protocol) server to centralize the storage of your configuration and firmware files. Free TFTP servers for Windows and Linux are available on the web. They are generally easy to install and setup.

16.4.1 Upgrade

This page allow user to upgrade or backup configuration file through HTTP or TFTP server.

To view and configure firmware upgrade or backup, click

Management >> Configuration >> Upgrade or Configuration >>Backup



Management » Configuration » Upgrade

Action	● Upgrade ○ Backup
Method	○ TFTP ● HTTP
Configuration	● Running Configuration ○ Startup Configuration ○ Backup Configuration ○ RAM Log ○ Flash Log
Filename	Choose File No file chosen

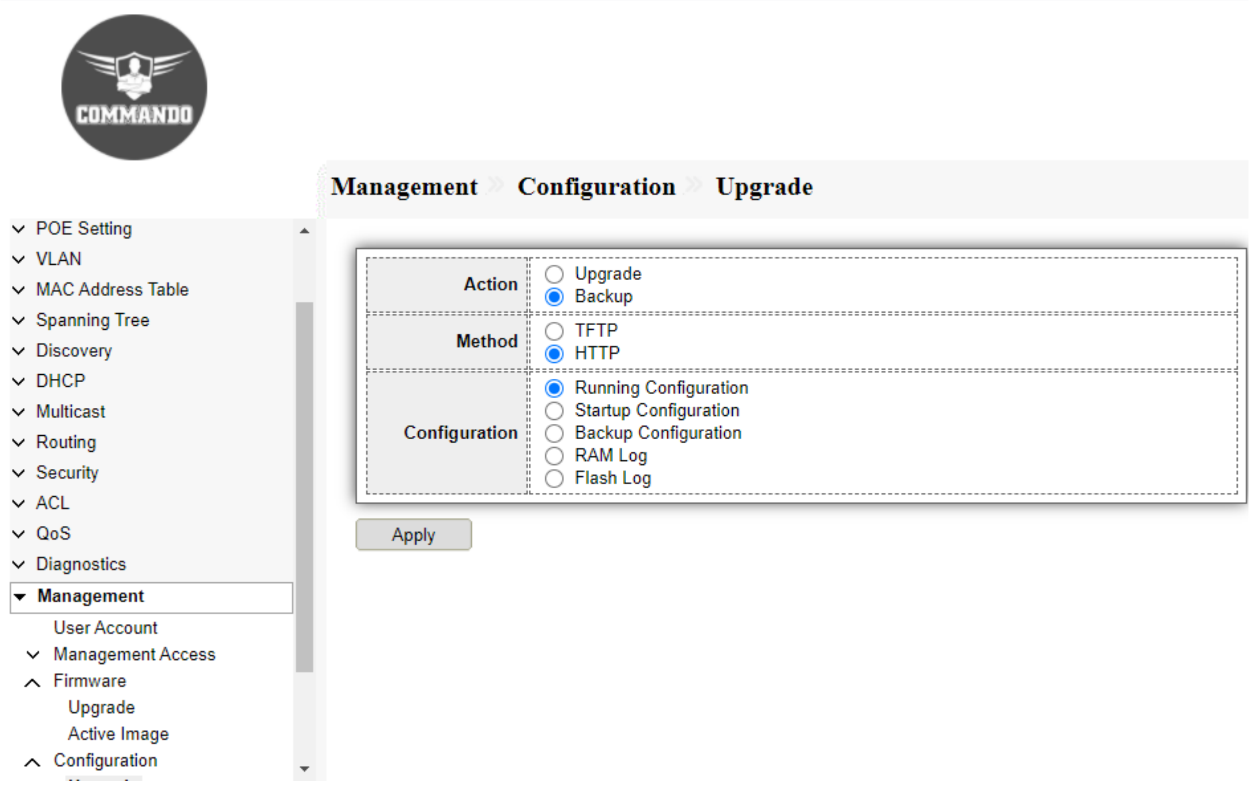
Fig 16.4.1 Configuration default upgrade page

Upgrading from the Local System (HTTP): Configuration can be directly uploaded to the switch from the local system. Select "Action [Upgrade]", then configuration "Method [HTTP]", "Configuration [Running/Startup/Backup]", now click "Choose File" to select the file that needed to upgrade and click "Apply" to start upgrading.

Upgrading from the Remote Server (TFTP): Select "Action [Upgrade]", then configuration "Method [TFTP]", "Configuration [Running/Startup/Backup]", Select "Address Type [Hostname/IPv4/IPv6]", Then Enter "Server Address" & "Filename" And then click ''Apply '' to start upgrading.

Backup from the Local System (HTTP): Configuration can be directly backup. Select "Action [Backup]", then configuration "Method [HTTP]", "Configuration [Running/Startup/Backup]", click "Apply" to start downloading back up file.

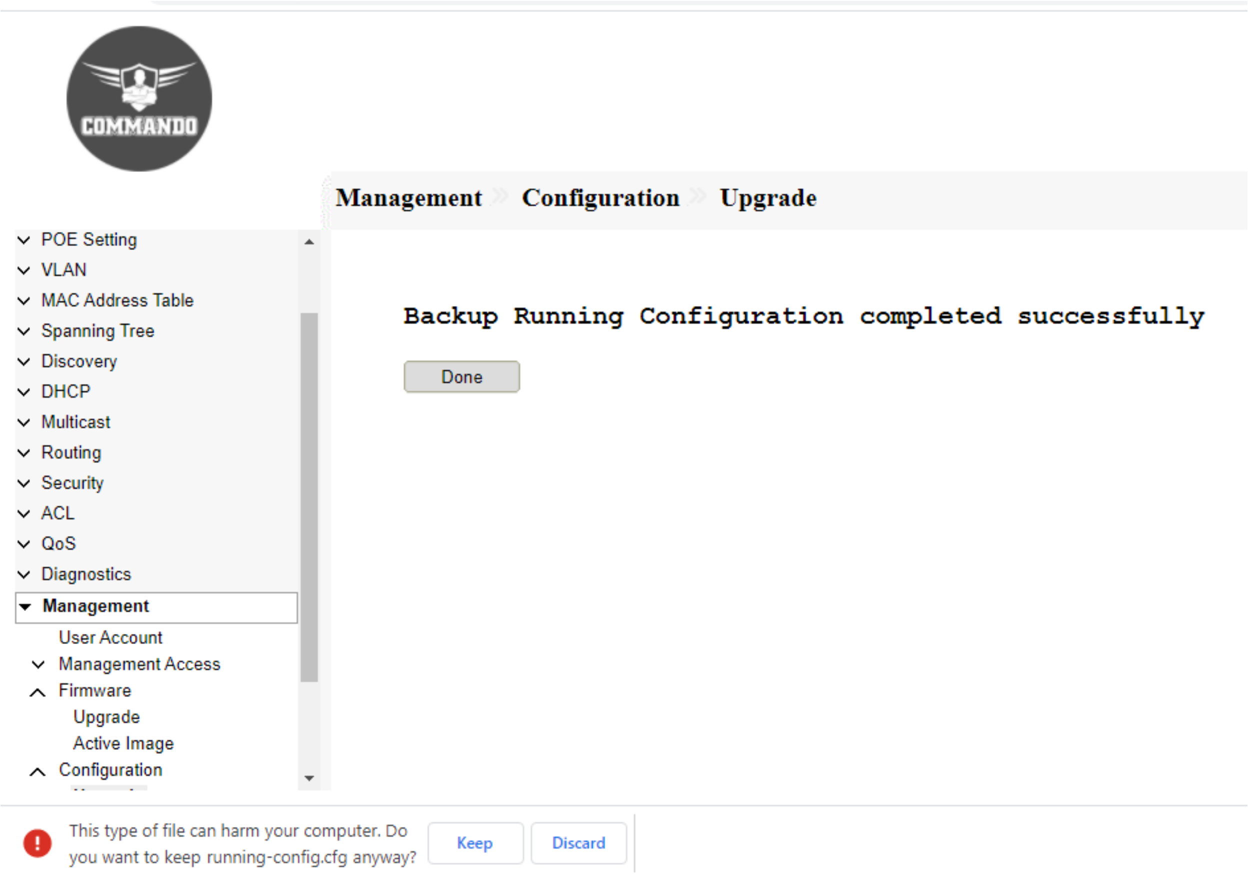
Backup from the Remote Server (TFTP): Configuration can be directly backup. Select "Action [Backup]", then configuration "Method [TFTP]", "Configuration [Running/Startup/Backup]", click "Apply" to start downloading back up file.



Management » Configuration » Upgrade

Action	○ Upgrade ● Backup
Method	○ TFTP ● HTTP
Configuration	● Running Configuration ○ Startup Configuration ○ Backup Configuration ○ RAM Log ○ Flash Log

Fig 16.4.2 Backup of Configuration from running configuration page



Management » Configuration » Upgrade

Backup Running Configuration completed successfully

Done

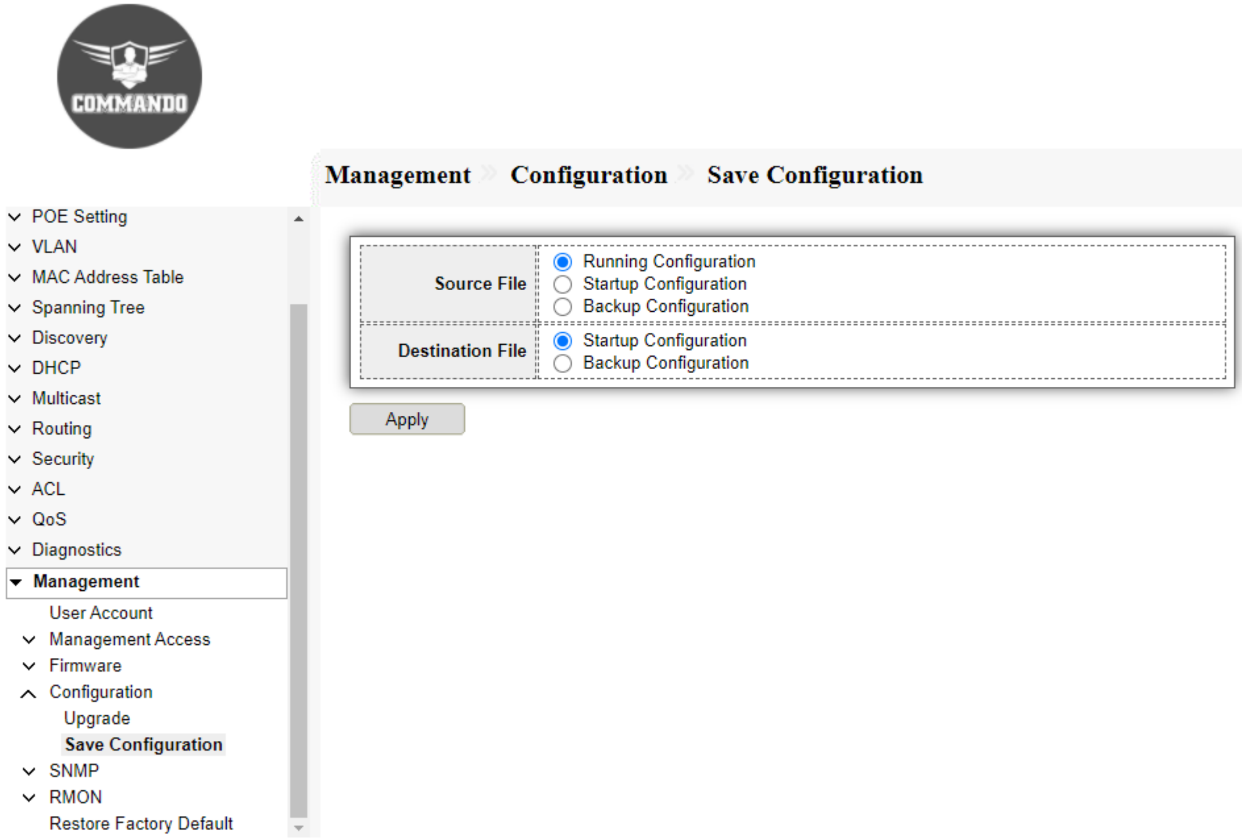
This type of file can harm your computer. Do you want to keep running-config.cfg anyway?

Fig 16.4.3 Backup running configuration page

16.4.2 Save Configuration

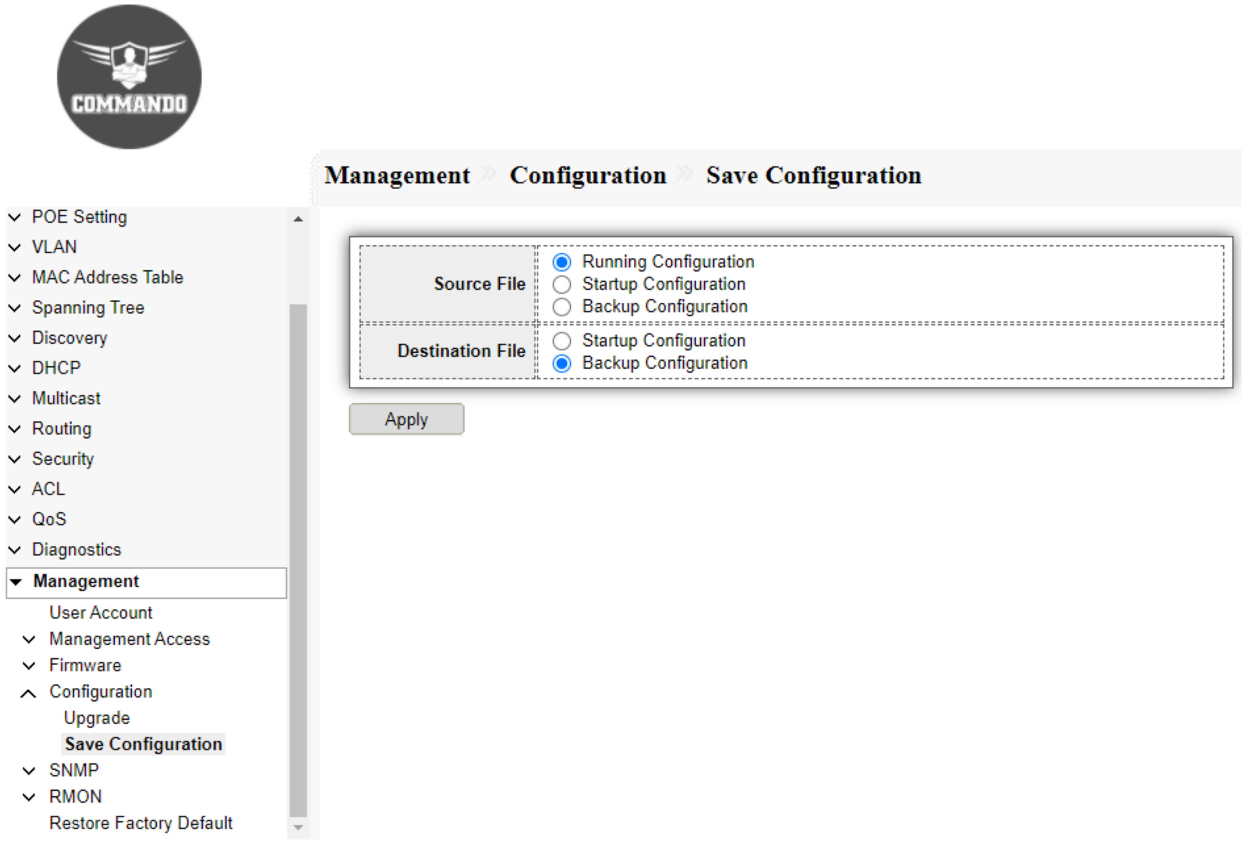
This page allow user to manage configuration file saved on PC or TFTP server. This saves configuration in the switch, which may be used later to revert to the current state if changes lead to an undesirable configuration. All the customized settings Switch will be erased. The standard procedure is to restore the device to factory settings, wiping it clean of any configuration file data.

To Save Configuration, click **Management >> Configuration >> Save Configuration.**



Source File	● Running Configuration ○ Startup Configuration ○ Backup Configuration
Destination File	● Startup Configuration ○ Backup Configuration

Fig 16.4.4 Save running Configuration to Startup Configuration page



Management » Configuration » Save Configuration

Source File	● Running Configuration ○ Startup Configuration ○ Backup Configuration
Destination File	○ Startup Configuration ● Backup Configuration

Fig 16.4.5 Save running Configuration to Backup Configuration page

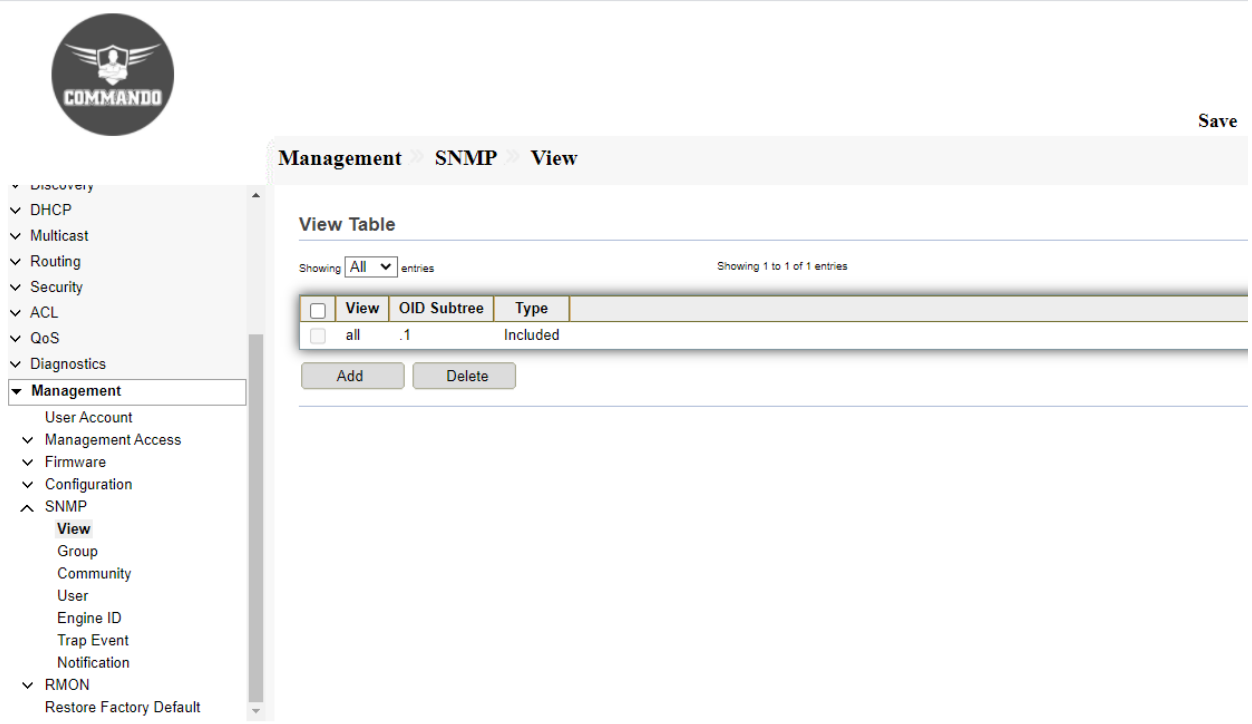
16.5 SNMP

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

16.5.1 View

A view is a user-defined label for a collection of MIB sub trees. Each sub tree ID is defined by the Object ID (OID) of the root of the relevant sub trees. Either well-known names can be used to specify the root of the desired sub tree or an OID can be entered.

To view and configure SNMP view table, click **Management >> SNMP >> View.**



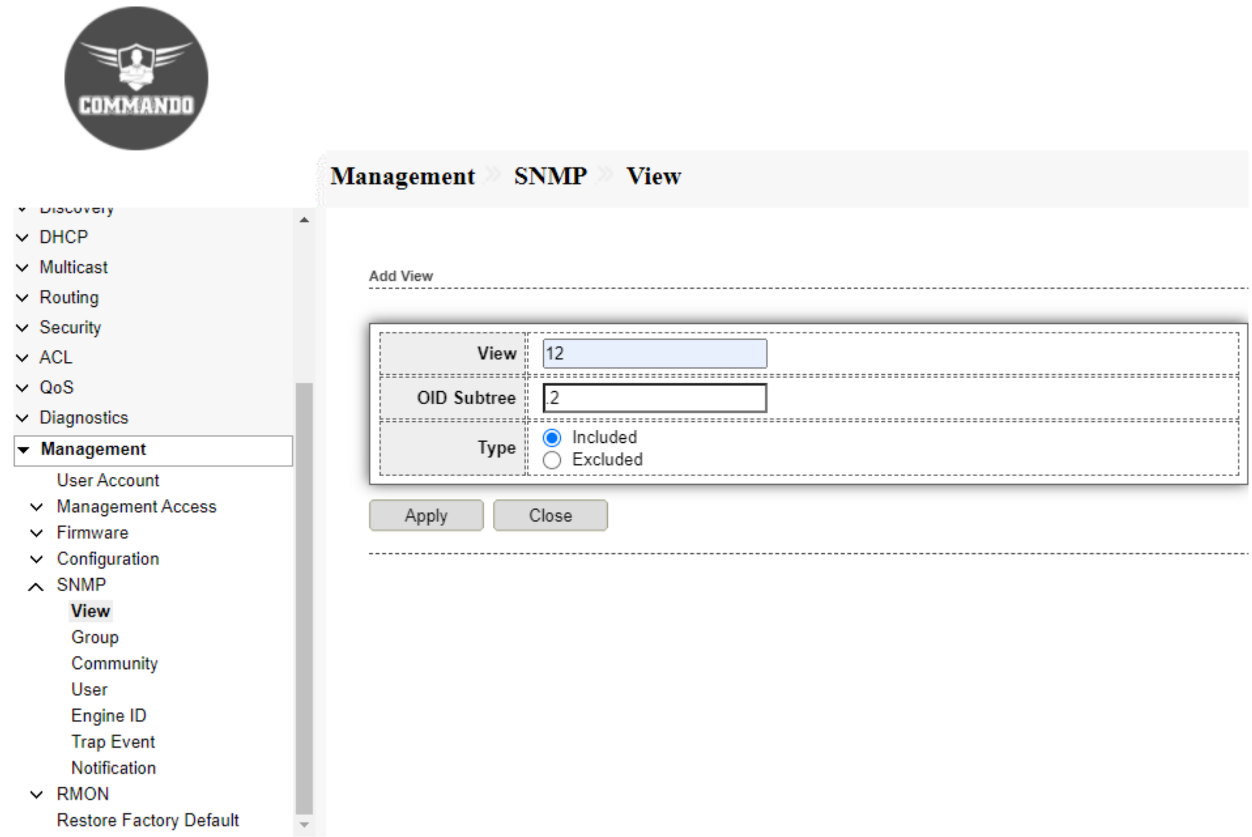
View Table

Showing All entries

Showing 1 to 1 of 1 entries

□	View	OID Subtree	Type
□	all	.1	Included

Fig 16.5.1 Default SNMP View Table page



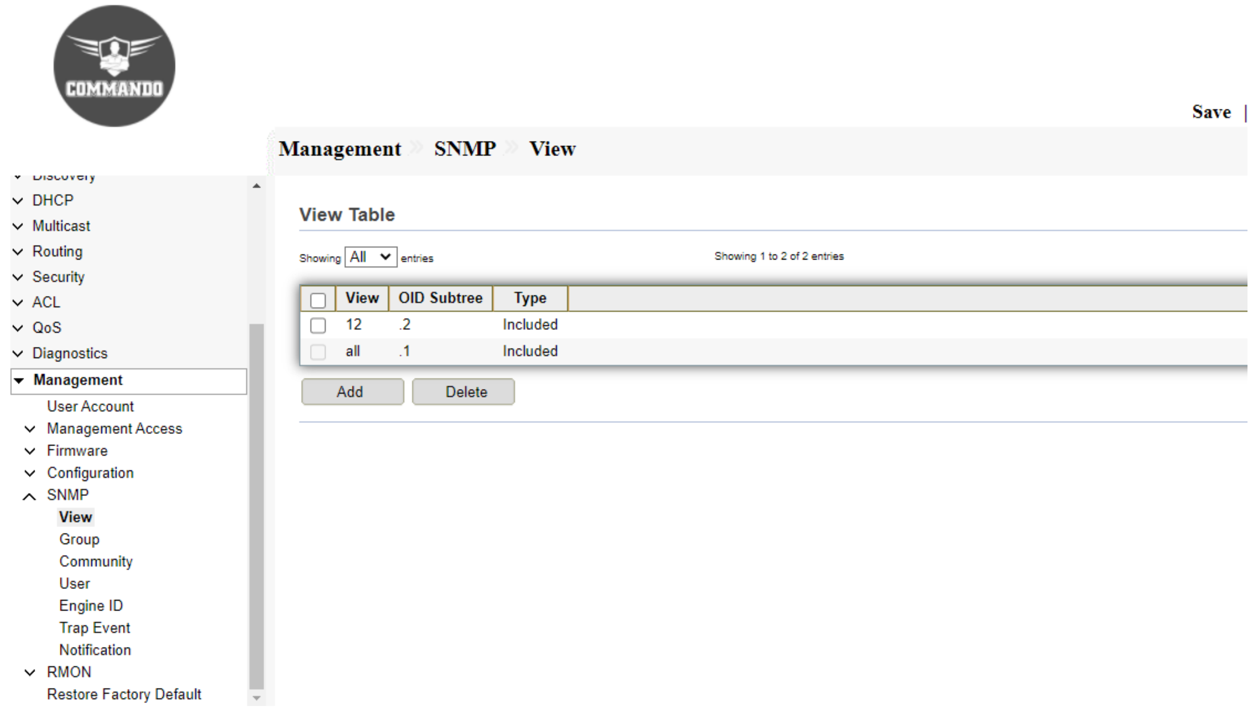
Management » SNMP » View

Add View

View	12
OID Subtree	.2
Type	● Included ○ Excluded

Apply Close

Fig 16.5.2 SNMP add View page



Save |

Management » SNMP » View

View Table

Showing All entries   Showing 1 to 2 of 2 entries

□	View	OID Subtree	Type
□	12	.2	Included
□	all	.1	Included

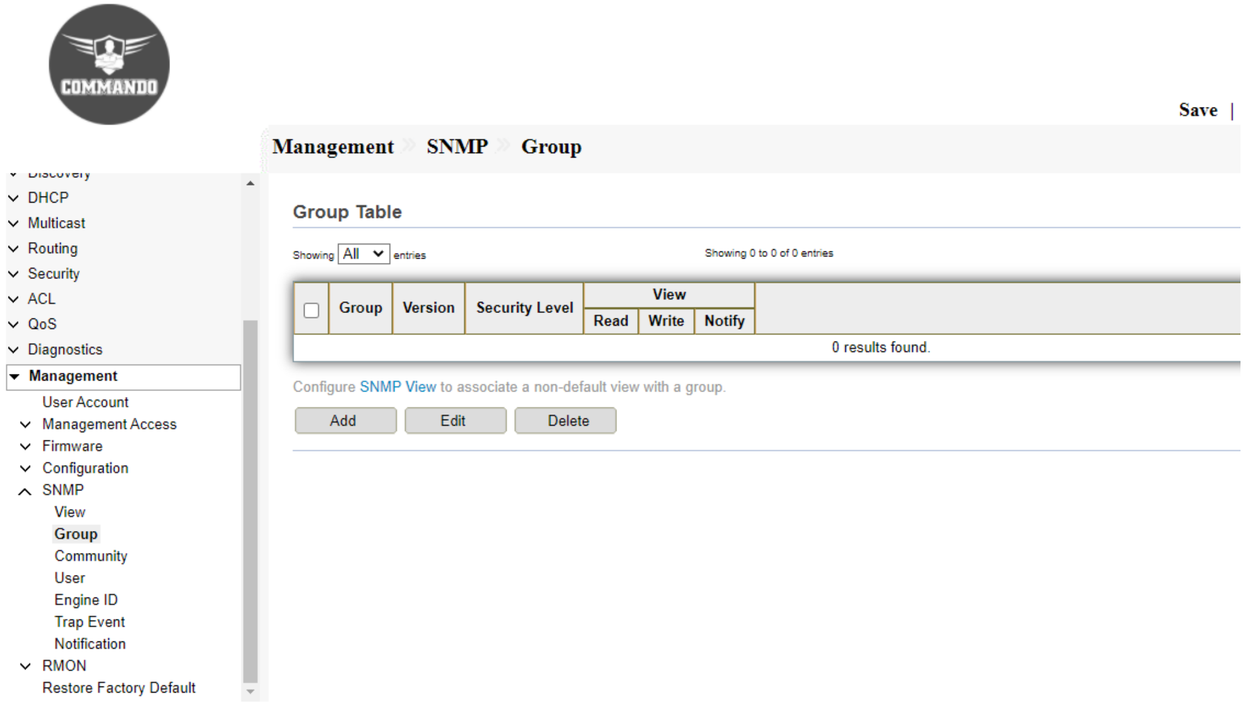
Add Delete

Fig 16.5.3 SNMP View Table page

16.5.2 Group

A group defines read/write privileges and a level of security. It becomes operational when it is associated with an SNMP user or community.

To view and configure SNMP group settings, click **Management >> SNMP >> Group.**



Group Table

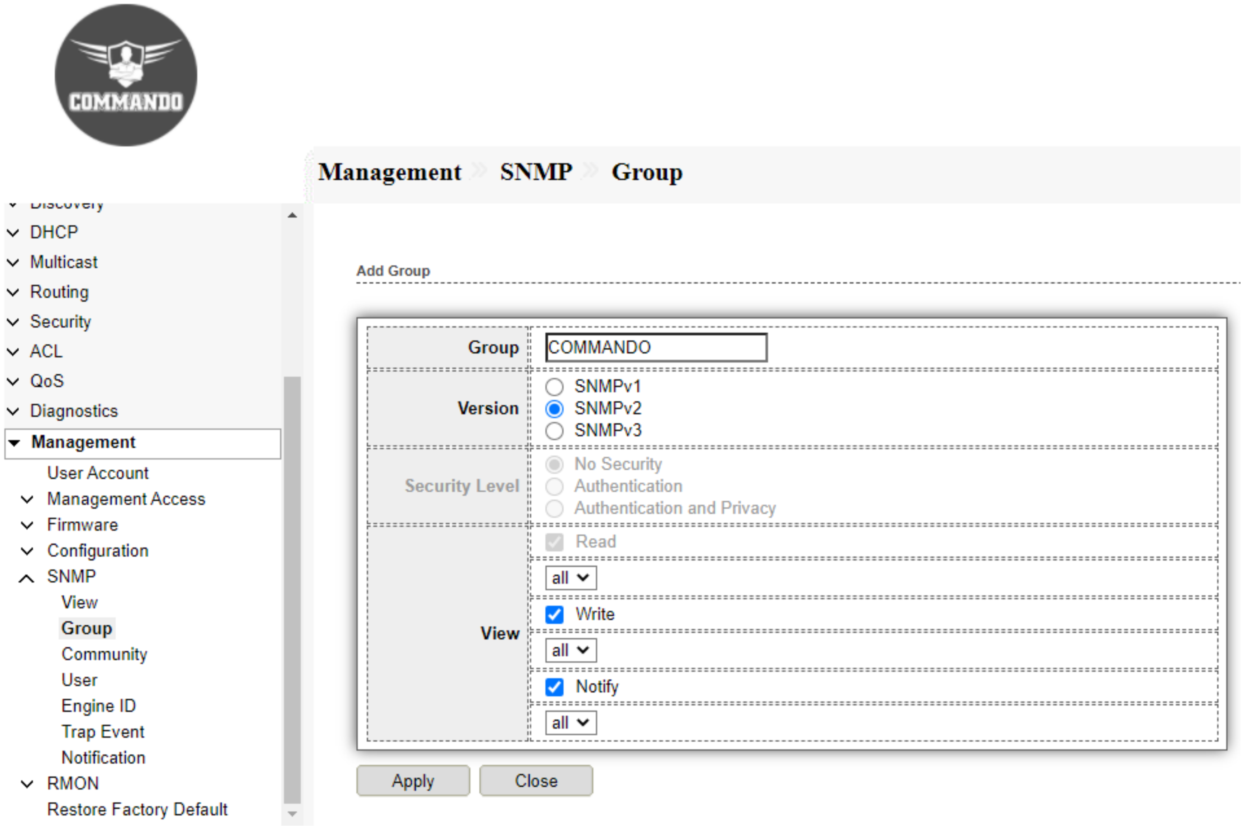
Showing All entries

Showing 0 to 0 of 0 entries

□	Group	Version	Security Level	View		
				Read	Write	Notify
0 results found.						

Configure SNMP View to associate a non-default view with a group.

Fig 16.5.4 SNMP Default Group Table page

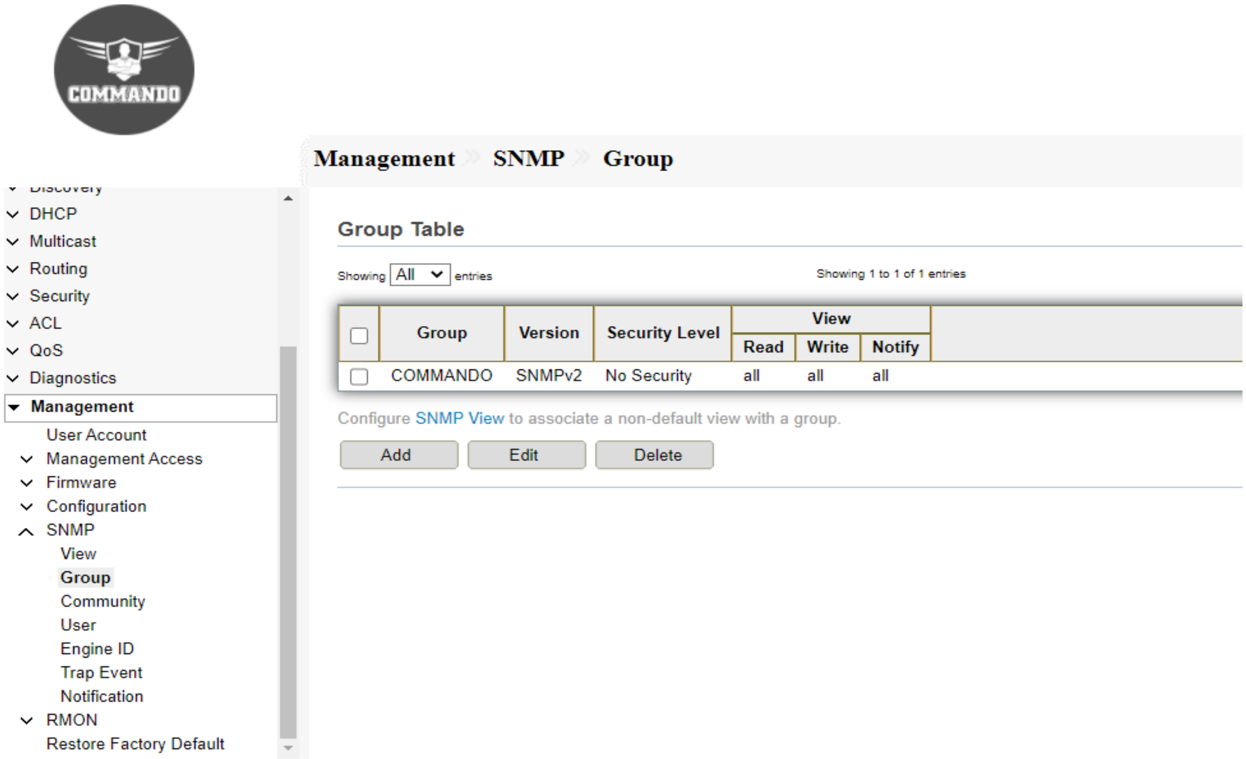


Management » SNMP » Group

Add Group

Group	COMMANDO
Version	○ SNMPv1 ● SNMPv2 ○ SNMPv3
Security Level	● No Security ○ Authentication ○ Authentication and Privacy
View	☑ Read all ☑ Write all ☑ Notify all

Fig 16.5.5 SNMP Add Group page



Management » SNMP » Group

Group Table

Showing All entries

Showing 1 to 1 of 1 entries

□	Group	Version	Security Level	View		
				Read	Write	Notify
□	COMMANDO	SNMPv2	No Security	all	all	all

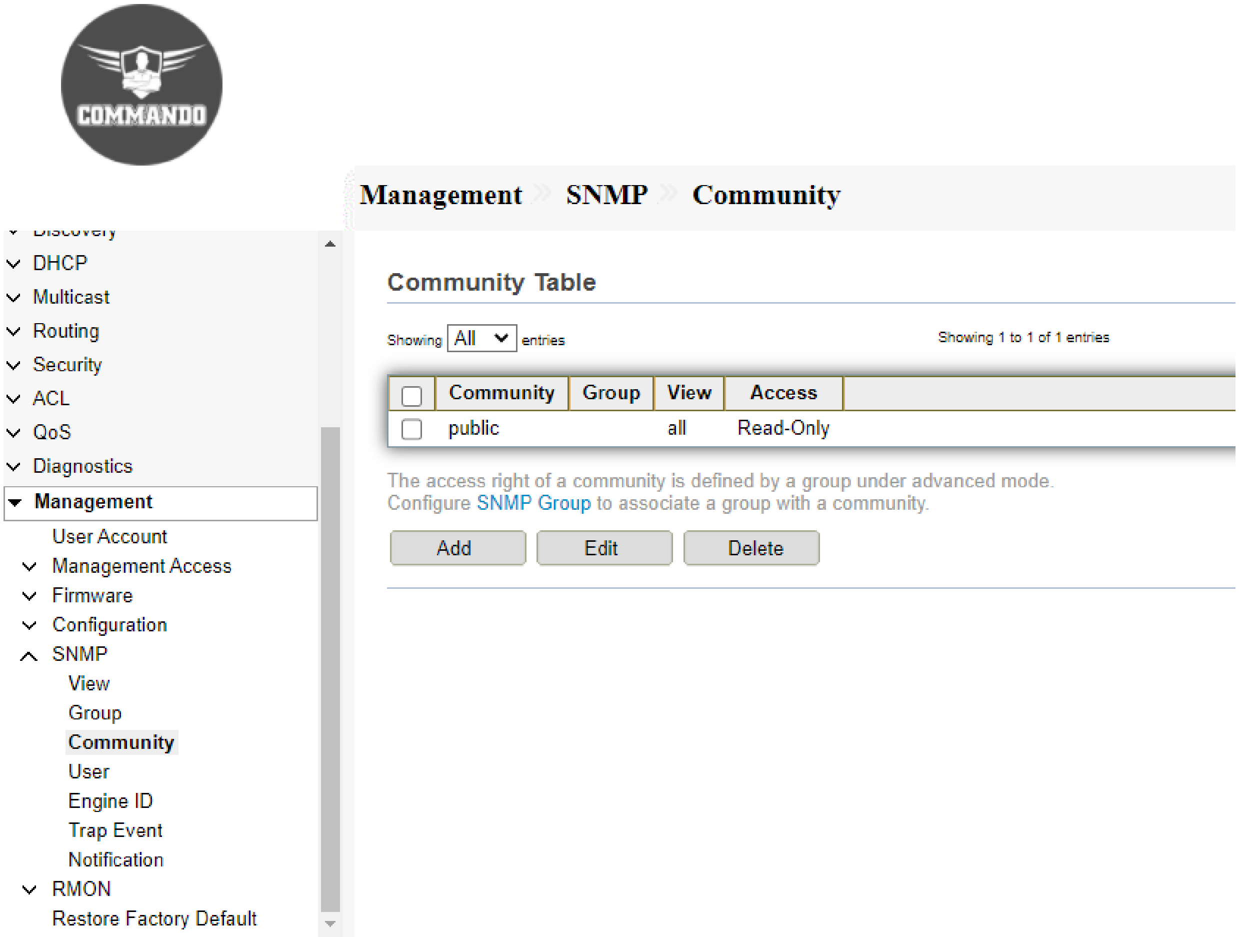
Configure SNMP View to associate a non-default view with a group.

Fig 16.5.6 SNMP Group Table after adding group page

16.5.3 Community

Access rights in SNMPv1 and SNMPv2 are managed by defining communities in the Communities page. The community name is a type of shared password between the SNMP management station and the device. It is used to authenticate the SNMP management station.

To view and configure the SNMP community settings, click **Management >> SNMP >> Community.**



Management » SNMP » Community

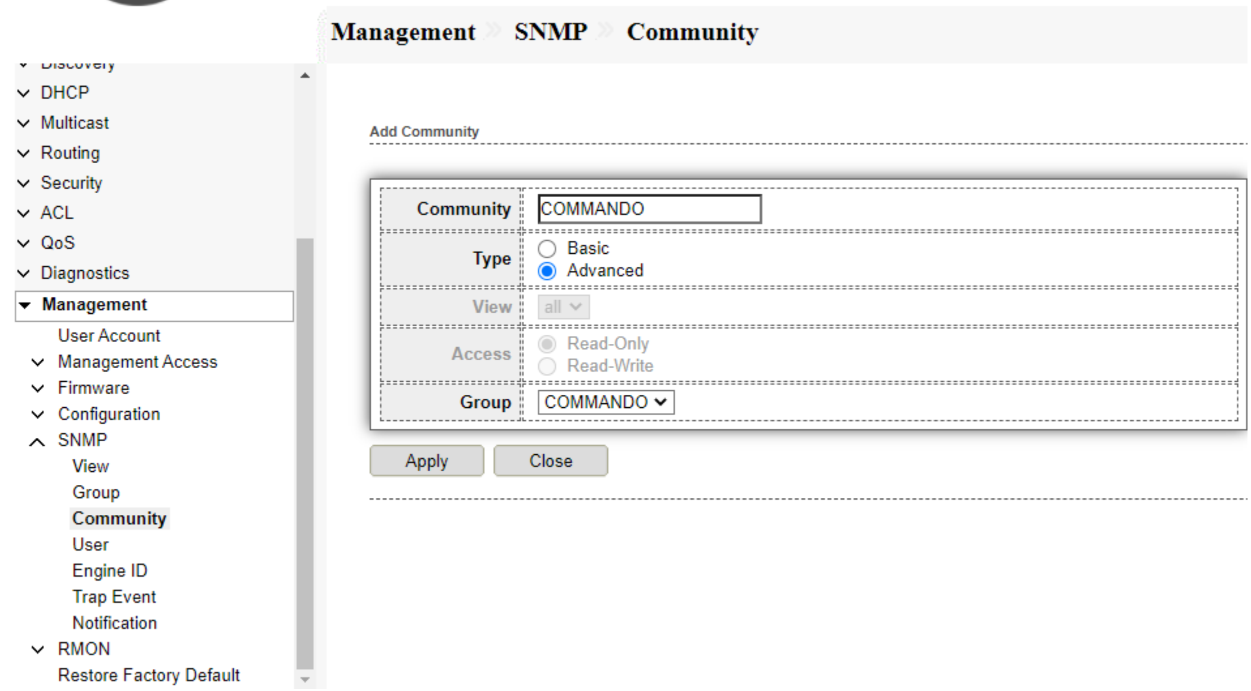
Community Table

Showing All entries — Showing 1 to 1 of 1 entries

□	Community	Group	View	Access
□	public		all	Read-Only

The access right of a community is defined by a group under advanced mode.
Configure SNMP Group to associate a group with a community.

Fig 16.5.7 SNMP Community Table page

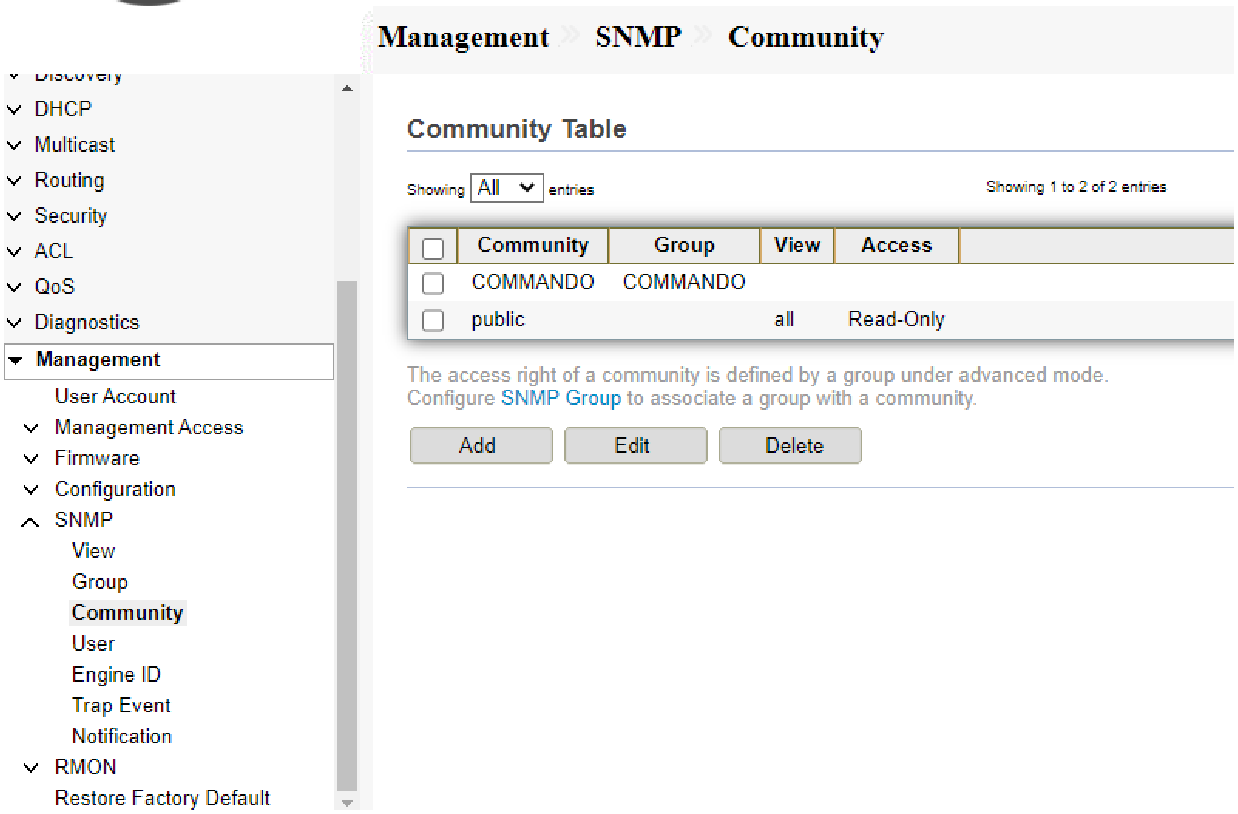


Management » SNMP » Community

Add Community

Community	COMMANDO
Type	○ Basic ● Advanced
View	all
Access	● Read-Only ○ Read-Write
Group	COMMANDO

Fig 16.5.8 Add SNMP Community page



Management » SNMP » Community

Community Table

Showing All entries

Showing 1 to 2 of 2 entries

□	Community	Group	View	Access
□	COMMANDO	COMMANDO		
□	public		all	Read-Only

The access right of a community is defined by a group under advanced mode.
Configure SNMP Group to associate a group with a community.

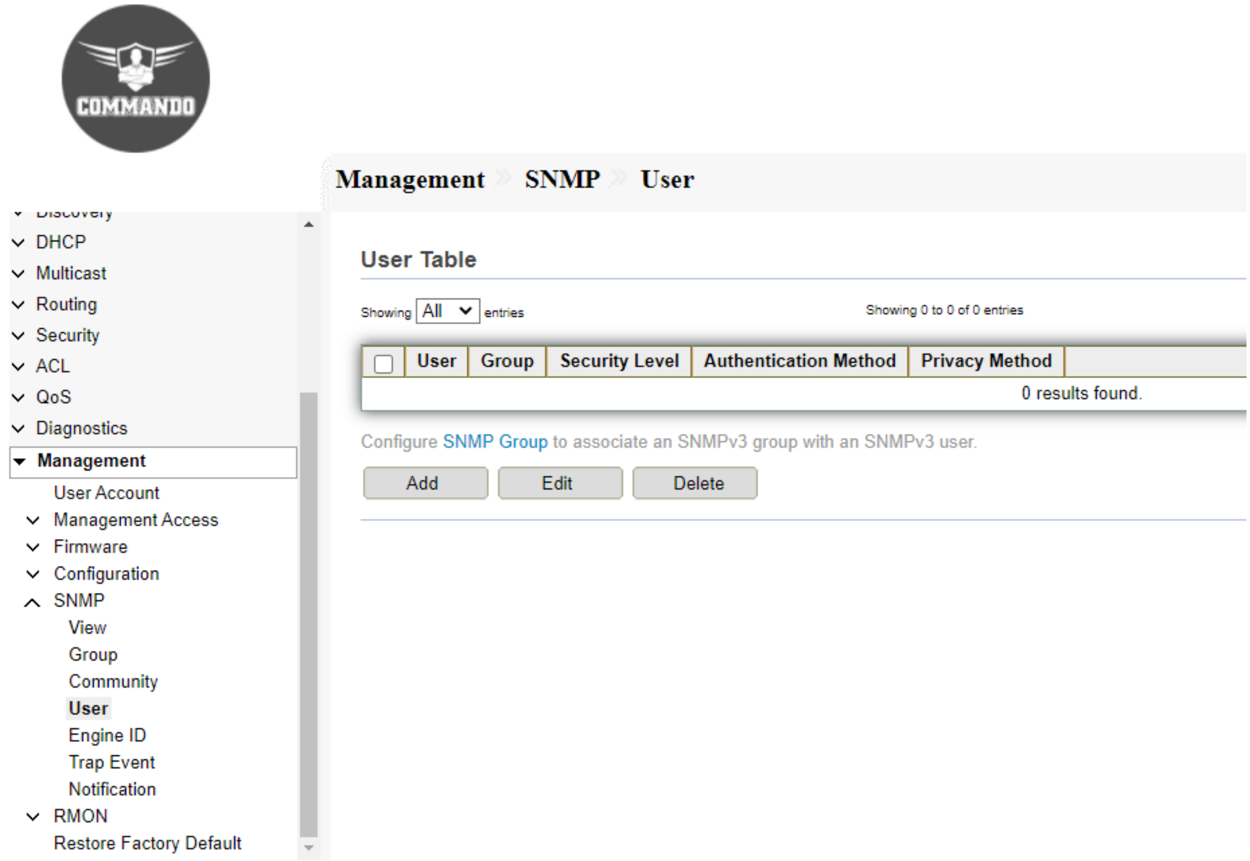
Fig 16.5.9 SNMP Community Table after adding community page

16.5.4 User

An SNMP user is defined by the login credentials (username, passwords, and authentication method) and by the context and scope in which it operates by association with a group and an Engine ID.

The configured user has the attributes of its group, having the access privileges configured within the associated view.

To view and configure SNMP users, click **Management >> SNMP >> User.**



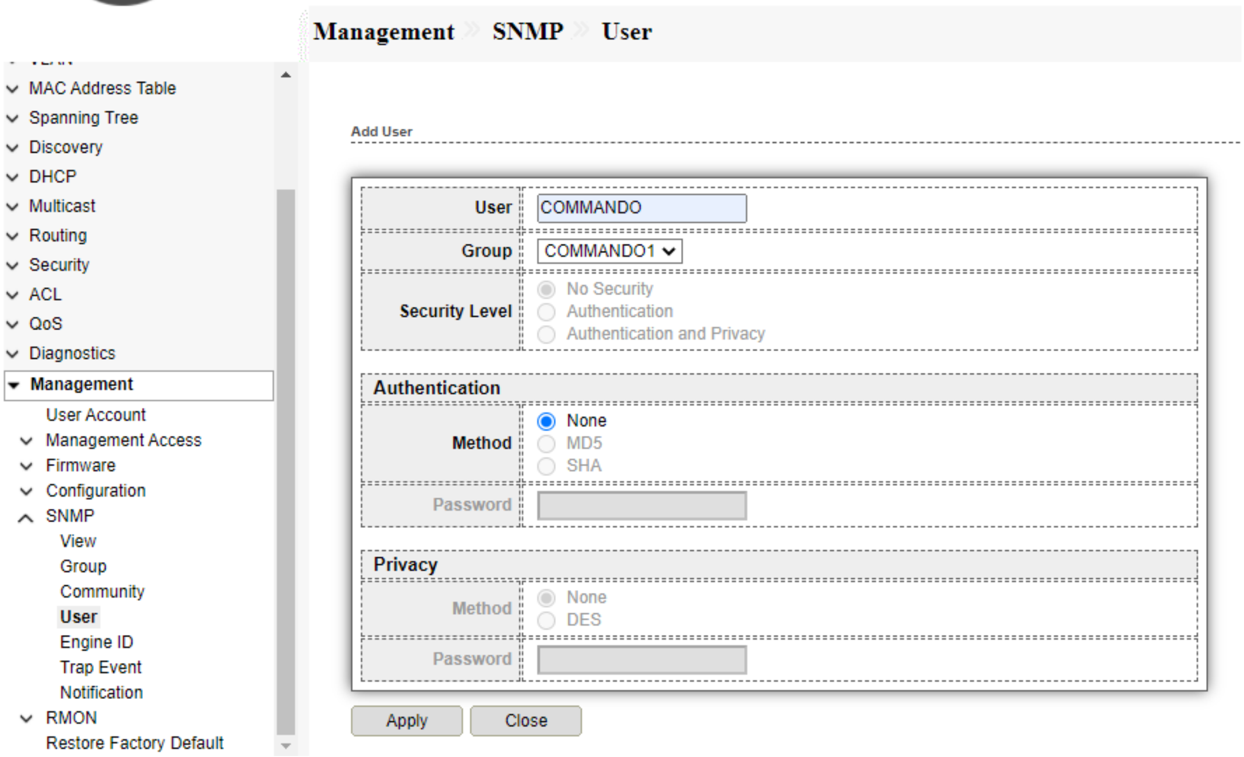
User Table

Showing All entries   Showing 0 to 0 of 0 entries

□	User	Group	Security Level	Authentication Method	Privacy Method
0 results found.					

Configure SNMP Group to associate an SNMPv3 group with an SNMPv3 user.

Fig 16.5.10 SNMP Default user Table page



Management » SNMP » User

Add User

User	COMMANDO
Group	COMMANDO1
Security Level	● No Security ○ Authentication ○ Authentication and Privacy

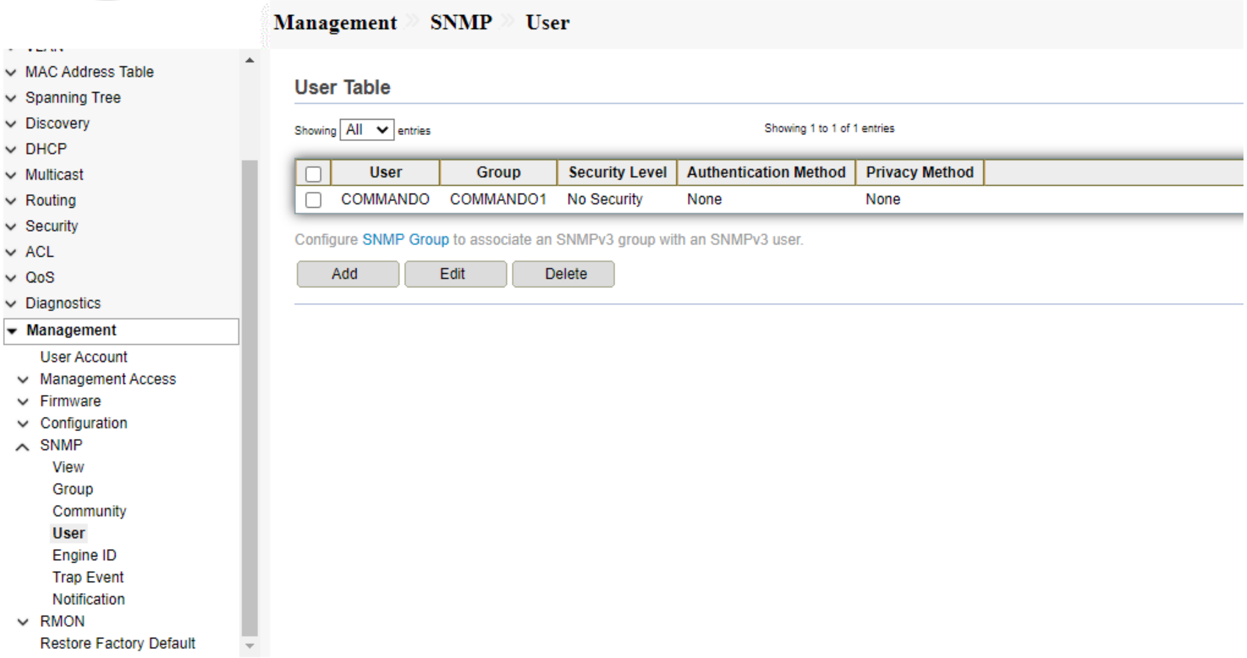
Authentication

Method	● None ○ MD5 ○ SHA
Password	

Privacy

Method	● None ○ DES
Password	

Fig 16.5.11 SNMP Add user page



User Table

Showing All entries   Showing 1 to 1 of 1 entries

□	User	Group	Security Level	Authentication Method	Privacy Method
□	COMMANDO	COMMANDO1	No Security	None	None

Configure SNMP Group to associate an SNMPv3 group with an SNMPv3 user.

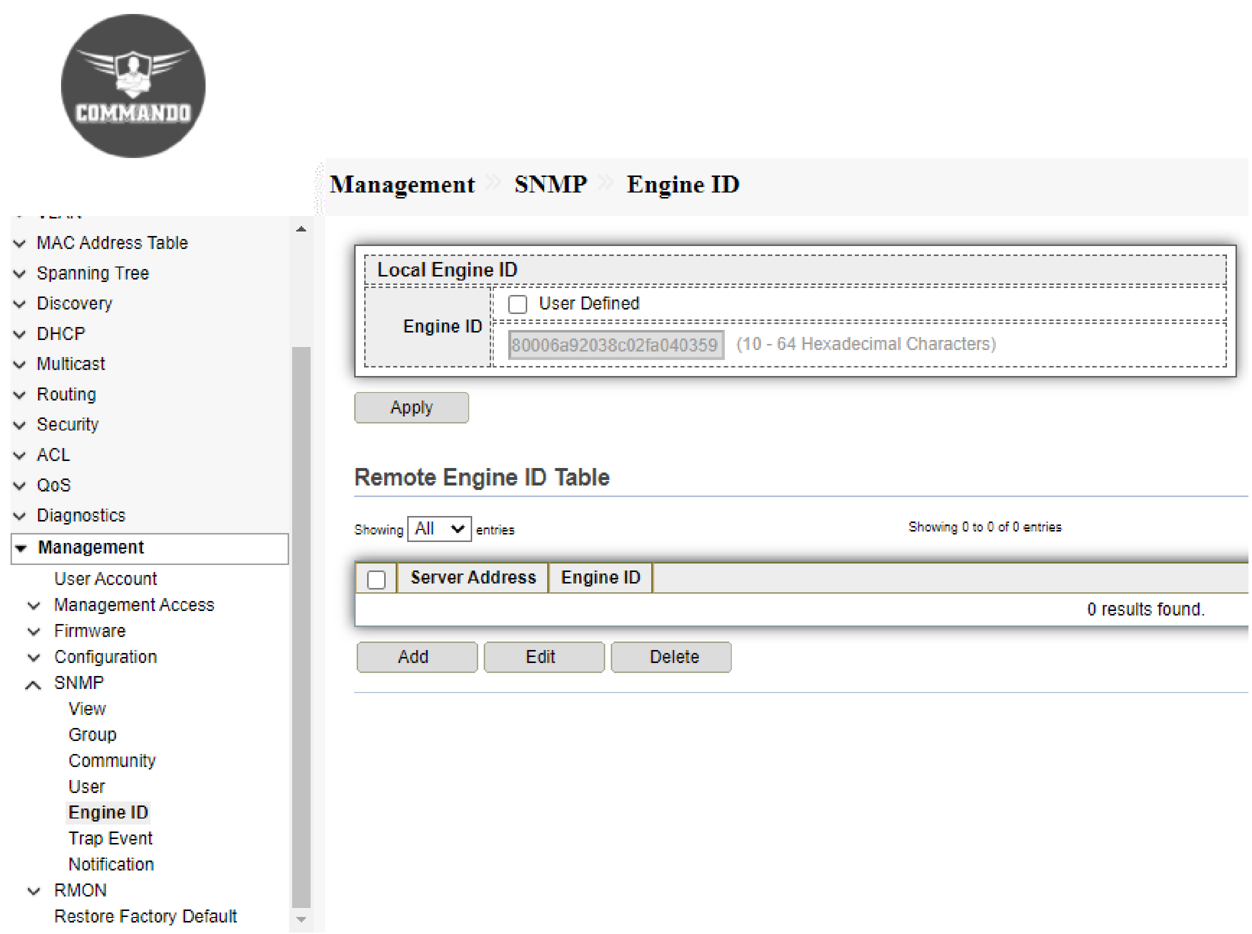
Fig 16.5.12 SNMP user Table after adding User page

16.5.5 Engine ID

The Engine ID is used by SNMPv3 entities to uniquely identify them. An SNMP agent is considered an authoritative SNMP engine. This means that the agent responds to incoming messages (Get, GetNext, GetBulk, Set) and sends trap messages to a manager. The agent's local information is encapsulated in fields in the message. Each SNMP agent maintains local information that is used in SNMPv3 message exchanges. The default SNMP Engine ID is comprised of the enterprise number and the default MAC address.

This engine ID must be unique for the administrative domain, so that no two devices in a network have the same engine ID.

To view and configure and display SNMP local and remote engine ID, click **Management >> SNMP >> Engine ID.**



Management » SNMP » Engine ID

Local Engine ID

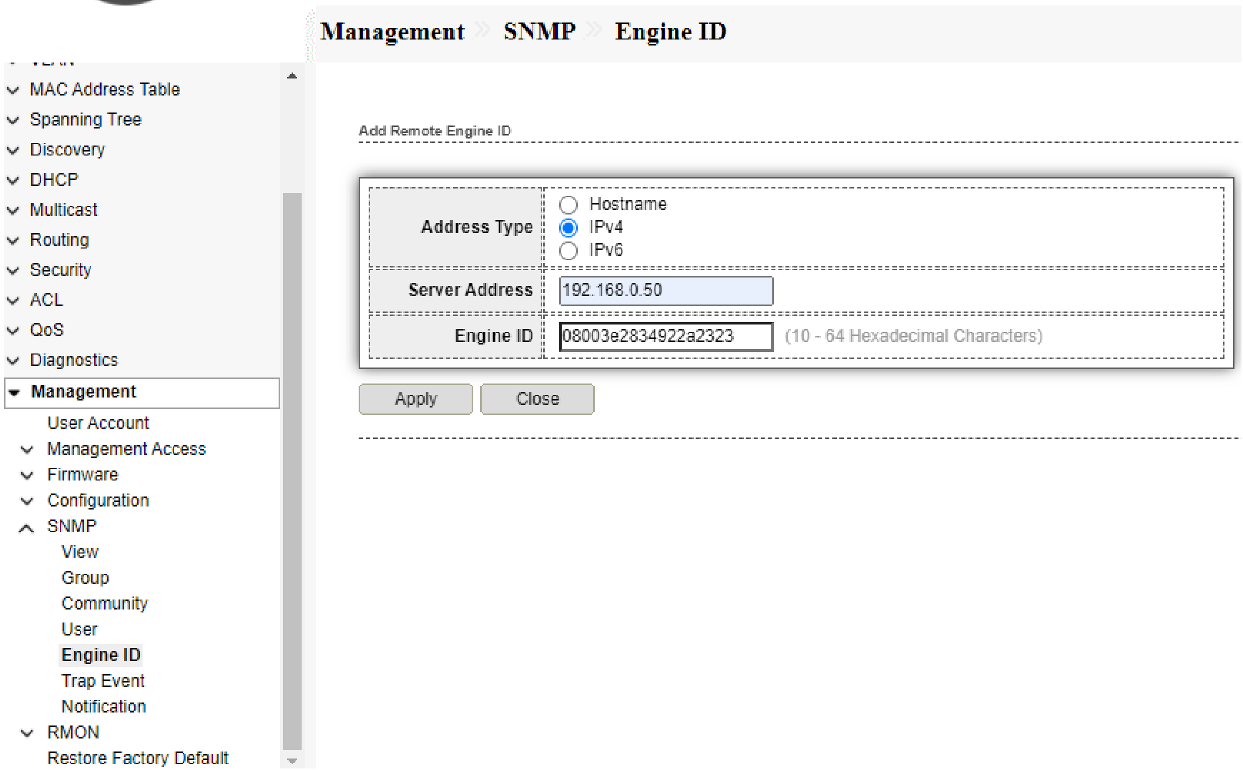
Engine ID	□ User Defined 80006a92038c02fa040359 (10 - 64 Hexadecimal Characters)

Remote Engine ID Table

Showing All entries — Showing 0 to 0 of 0 entries

□	Server Address	Engine ID
		0 results found.

Fig 16.5.13 SNMP Default Remote Engine ID Table page



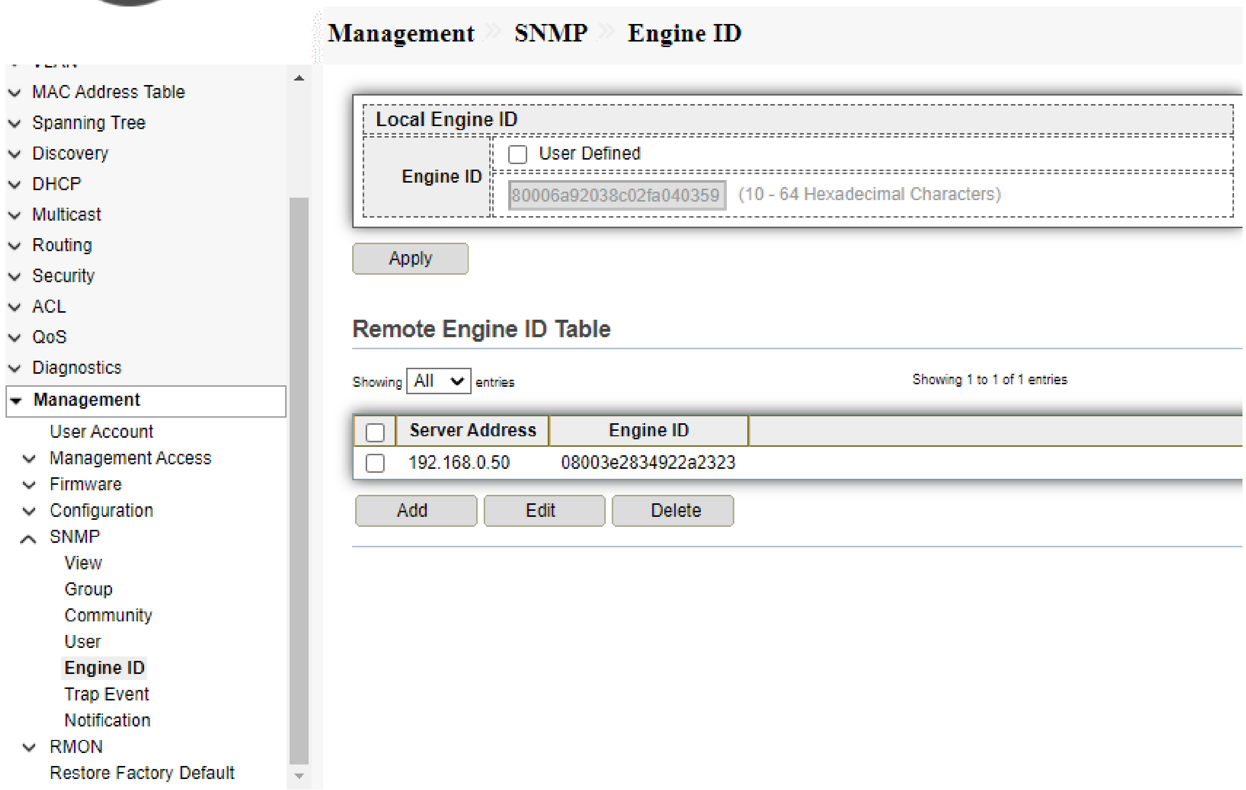
Management » SNMP » Engine ID

Add Remote Engine ID

Address Type	○ Hostname ● IPv4 ○ IPv6
Server Address	192.168.0.50
Engine ID	08003e2834922a2323 (10 - 64 Hexadecimal Characters)

Apply Close

Fig 16.5.14 SNMP Add Remote Engine ID page



Management » SNMP » Engine ID

Local Engine ID

Engine ID: □ User Defined

80006a92038c02fa040359 (10 - 64 Hexadecimal Characters)

Remote Engine ID Table

Showing All entries

Showing 1 to 1 of 1 entries

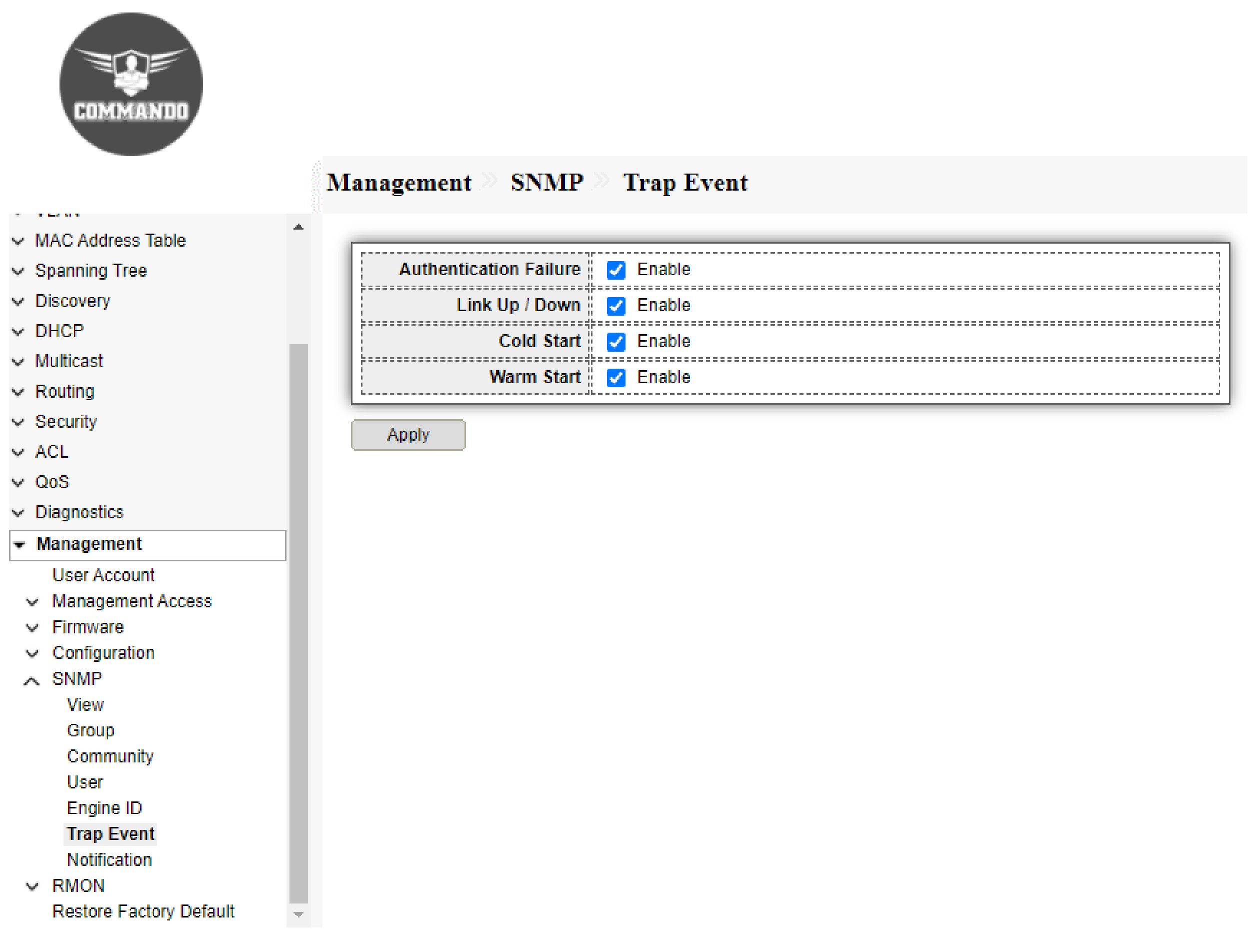
□	Server Address	Engine ID
□	192.168.0.50	08003e2834922a2323

Fig 16.5.15 SNMP Add Remote Engine ID page

16.5.6 Trap Event

The Trap Settings page enables configuring whether SNMP notifications are sent from the device, and for which cases.

To view and configure SNMP trap event, click **Management >> SNMP >> Trap Event.**



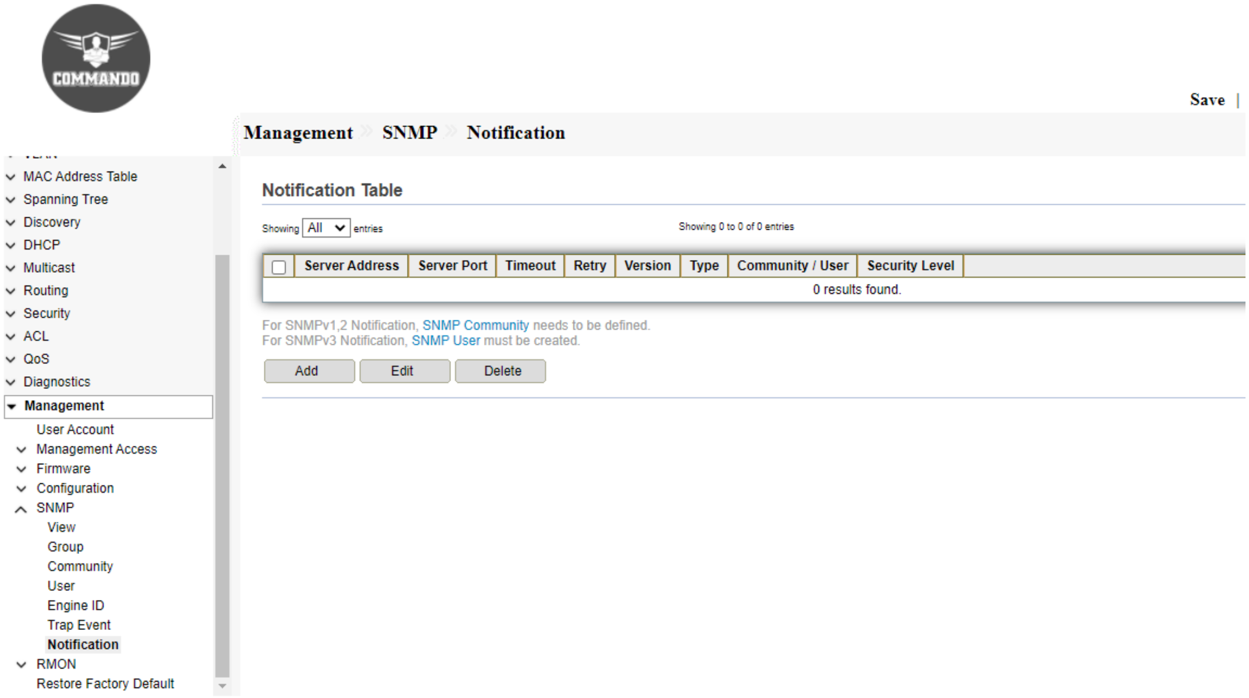
Authentication Failure	☑ Enable
Link Up / Down	☑ Enable
Cold Start	☑ Enable
Warm Start	☑ Enable

Fig 16.5.16 SNMP Trap Event page

16.5.7 Notification

An SNMP notification is a message sent from the device to the SNMP management station indicating that a certain event has occurred, such as a link up/down.

To view and configure the hosts to receive SNMPv1/v2/v3 notification, click **Management >> SNMP >> Notification.**



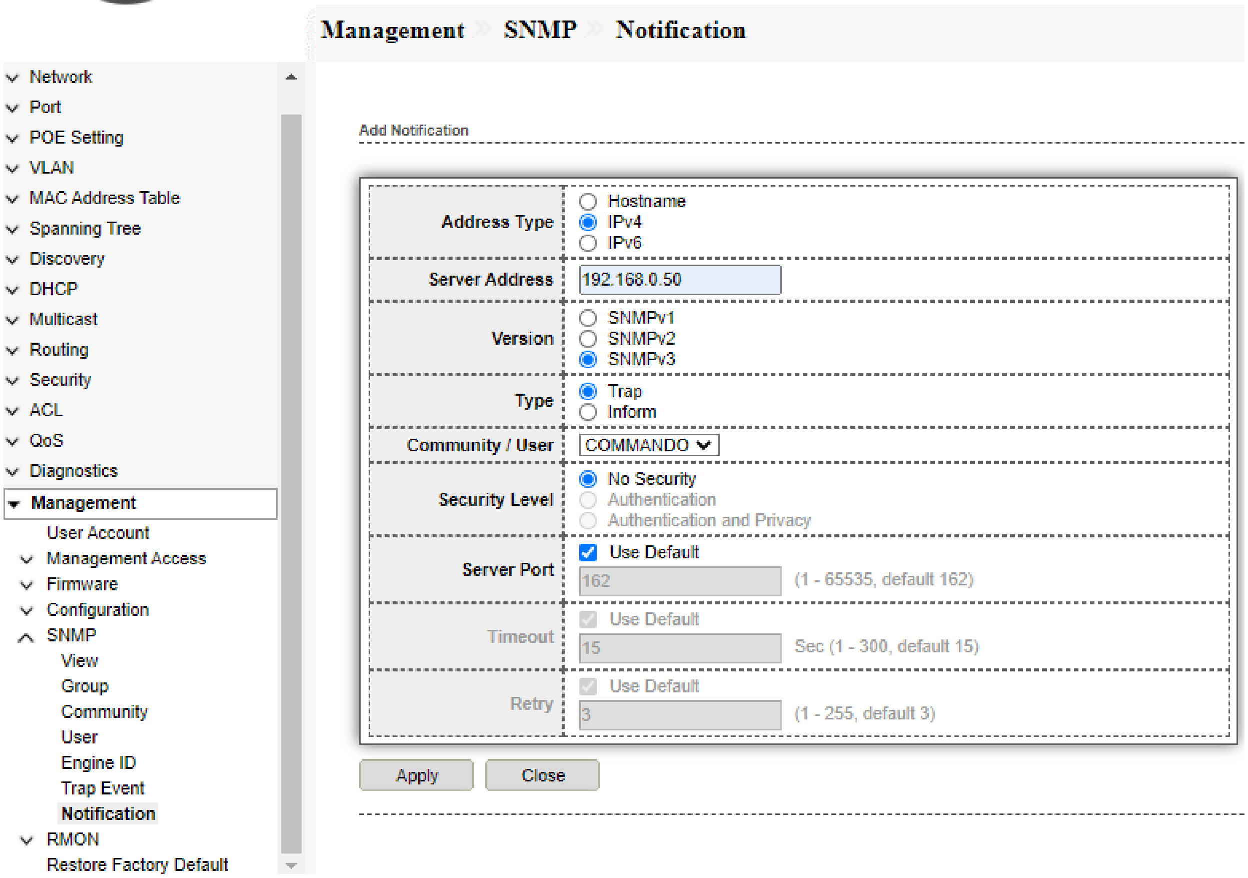
Notification Table

Showing All entries Showing 0 to 0 of 0 entries

□	Server Address	Server Port	Timeout	Retry	Version	Type	Community / User	Security Level
0 results found.								

For SNMPv1,2 Notification, SNMP Community needs to be defined.
For SNMPv3 Notification, SNMP User must be created.

Fig 16.5.17 SNMP Default Notification Table page

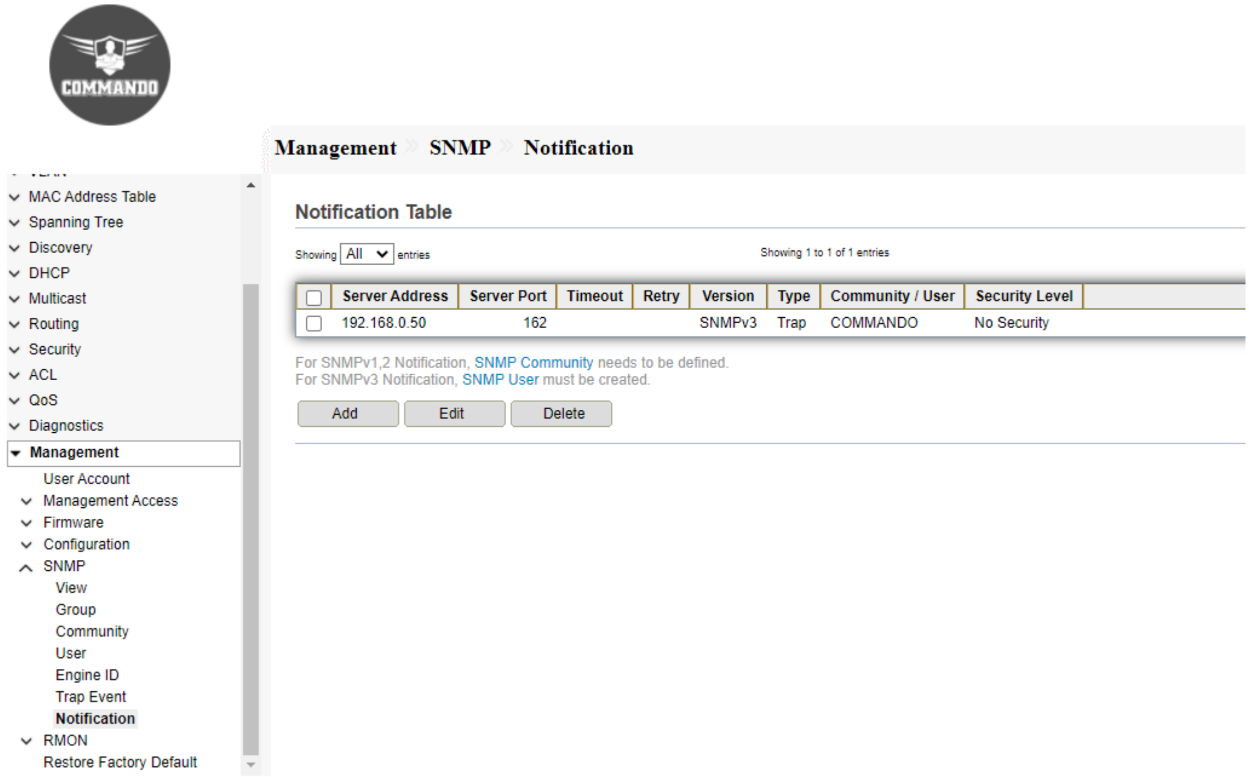


Management » SNMP » Notification

Add Notification

Address Type	○ Hostname ● IPv4 ○ IPv6
Server Address	192.168.0.50
Version	○ SNMPv1 ○ SNMPv2 ● SNMPv3
Type	● Trap ○ Inform
Community / User	COMMANDO
Security Level	● No Security ○ Authentication ○ Authentication and Privacy
Server Port	☑ Use Default 162 (1 - 65535, default 162)
Timeout	☑ Use Default 15 Sec (1 - 300, default 15)
Retry	☑ Use Default 3 (1 - 255, default 3)

Fig 16.5.18 SNMP Add Notification page



Management » SNMP » Notification

Notification Table

Showing All entries

Showing 1 to 1 of 1 entries

□	Server Address	Server Port	Timeout	Retry	Version	Type	Community / User	Security Level
□	192.168.0.50	162			SNMPv3	Trap	COMMANDO	No Security

For SNMPv1,2 Notification, SNMP Community needs to be defined.
For SNMPv3 Notification, SNMP User must be created.

Add Edit Delete

Fig 16.5.19 SNMP Notification Table page

16.6 RMON

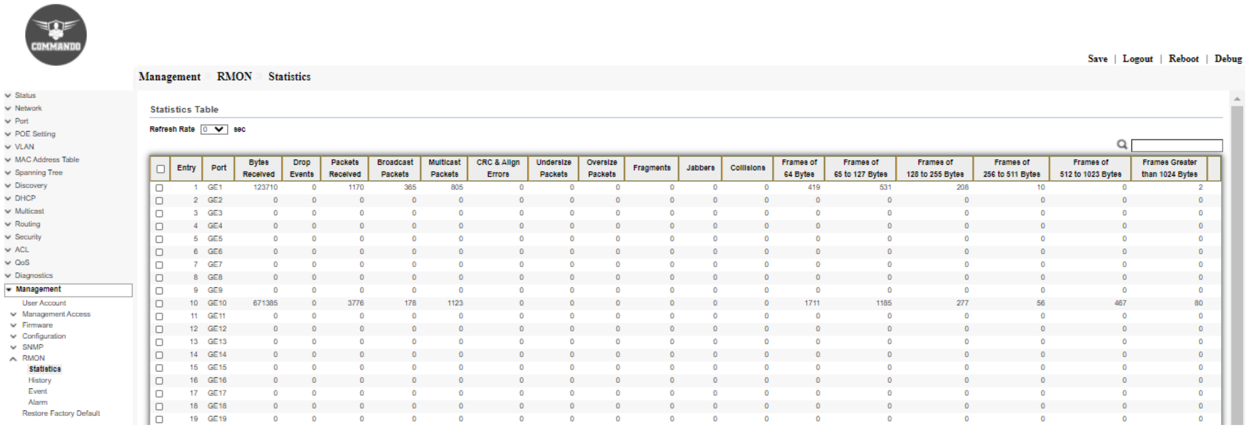
RMON (Remote Networking Monitoring) is an SNMP specification that enables an SNMP agent in the device to proactively monitor traffic statistics over a given period and send traps to an SNMP manager. The local SNMP agent compares

RMON decreases the traffic between the manager and the device because the SNMP manager does not have to poll the device frequently for information, and enables the manager to get timely status reports, because the device reports events as they occur.

16.6.1 Statistics

The Statistics page displays detailed information regarding packet sizes and information regarding physical layer errors.

To view RMON Statistics, click **Management >> RMON >> Statistics.**



Statistics Table

Refresh Rate 0 sec

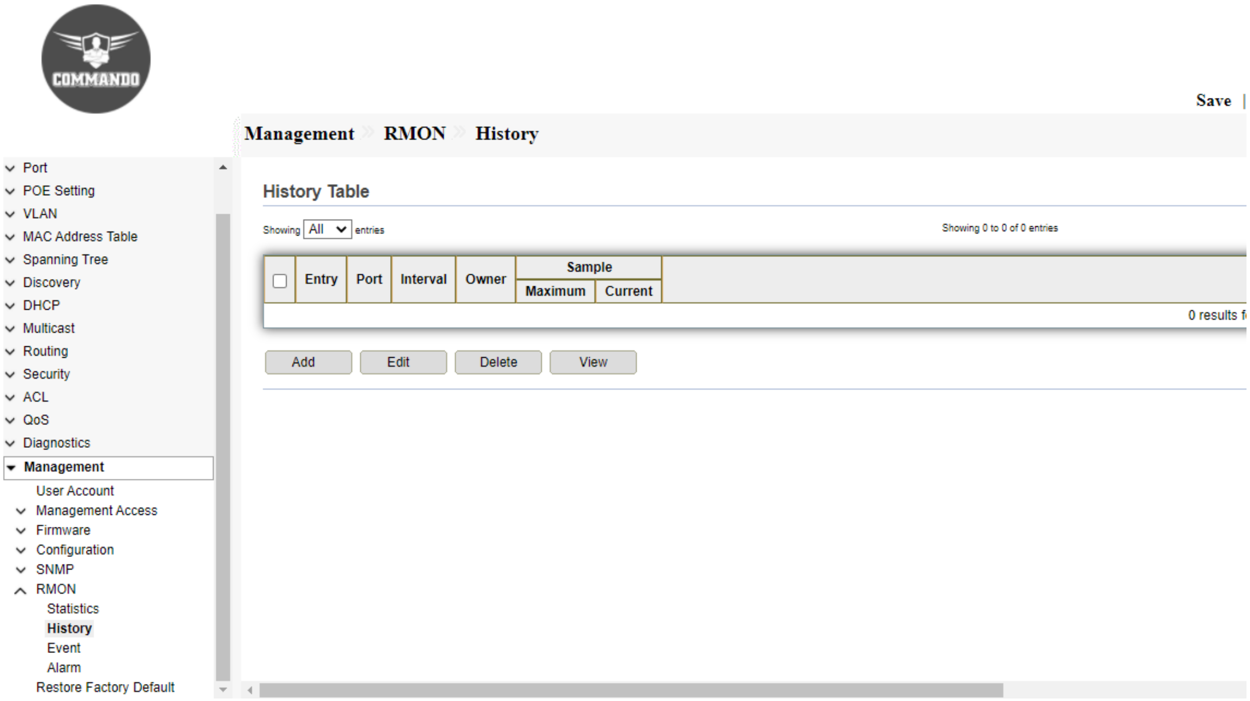
□	Entry	Port	Bytes Received	Drop Events	Packets Received	Broadcast Packets	Multicast Packets	CRC & Allign Errors	Undersize Packets	Oversize Packets	Fragments	Jabbers	Collisions	Frames of 64 Bytes	Frames of 65 to 127 Bytes	Frames of 128 to 255 Bytes	Frames of 256 to 511 Bytes	Frames of 512 to 1023 Bytes	Frames Greater than 1024 Bytes
□	1	GE1	123710	0	1170	365	805	0	0	0	0	0	0	419	531	208	10	0	2
□	2	GE2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	3	GE3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	4	GE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	5	GE5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	6	GE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	7	GE7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	8	GE8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	9	GE9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	10	GE10	671385	0	3776	178	1123	0	0	0	0	0	0	1711	1185	277	56	467	80
□	11	GE11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	12	GE12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	13	GE13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	14	GE14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	15	GE15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	16	GE16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	17	GE17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	18	GE18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
□	19	GE19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig 16.6.1 RMON Statistics Table page

16.6.2 History

The History Table page defines the sampling frequency, number of samples to store and the port from where to gather the data.

To view and configure RMON history, click **Management >> RMON >> History.**



Management » RMON » History

History Table

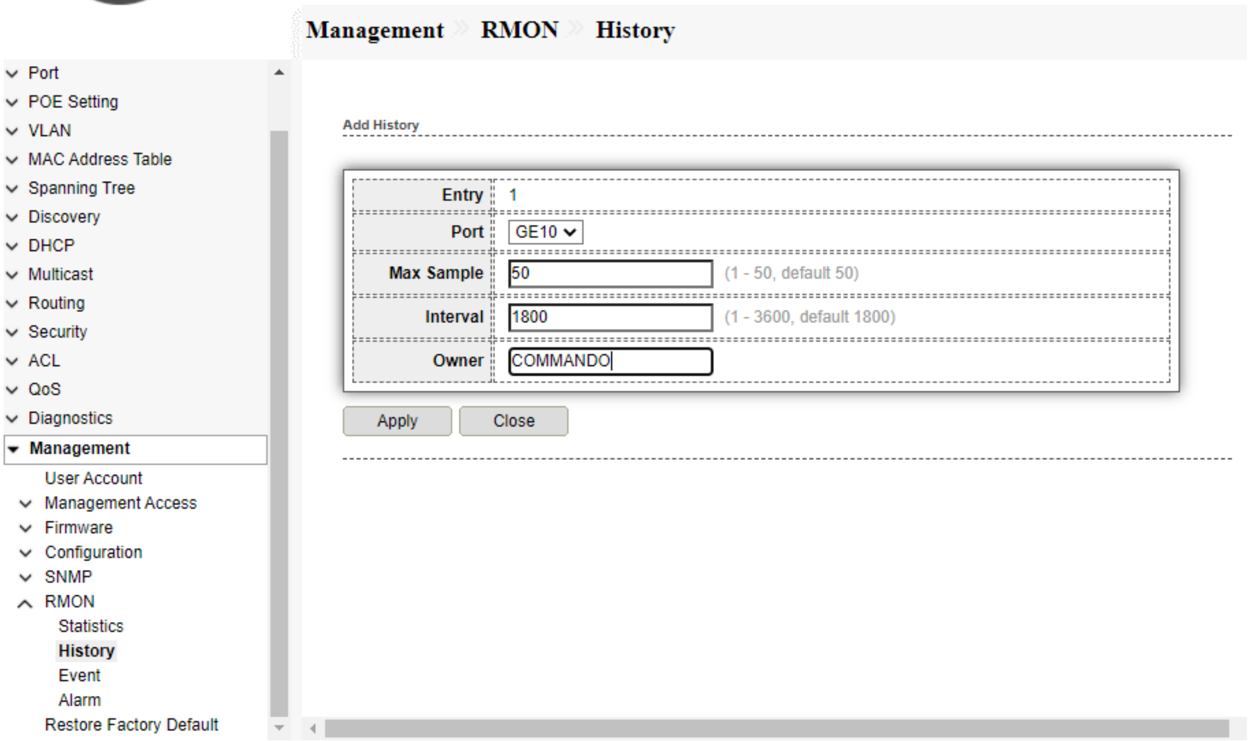
Showing All entries

Showing 0 to 0 of 0 entries

□	Entry	Port	Interval	Owner	Sample	
					Maximum	Current

0 results f

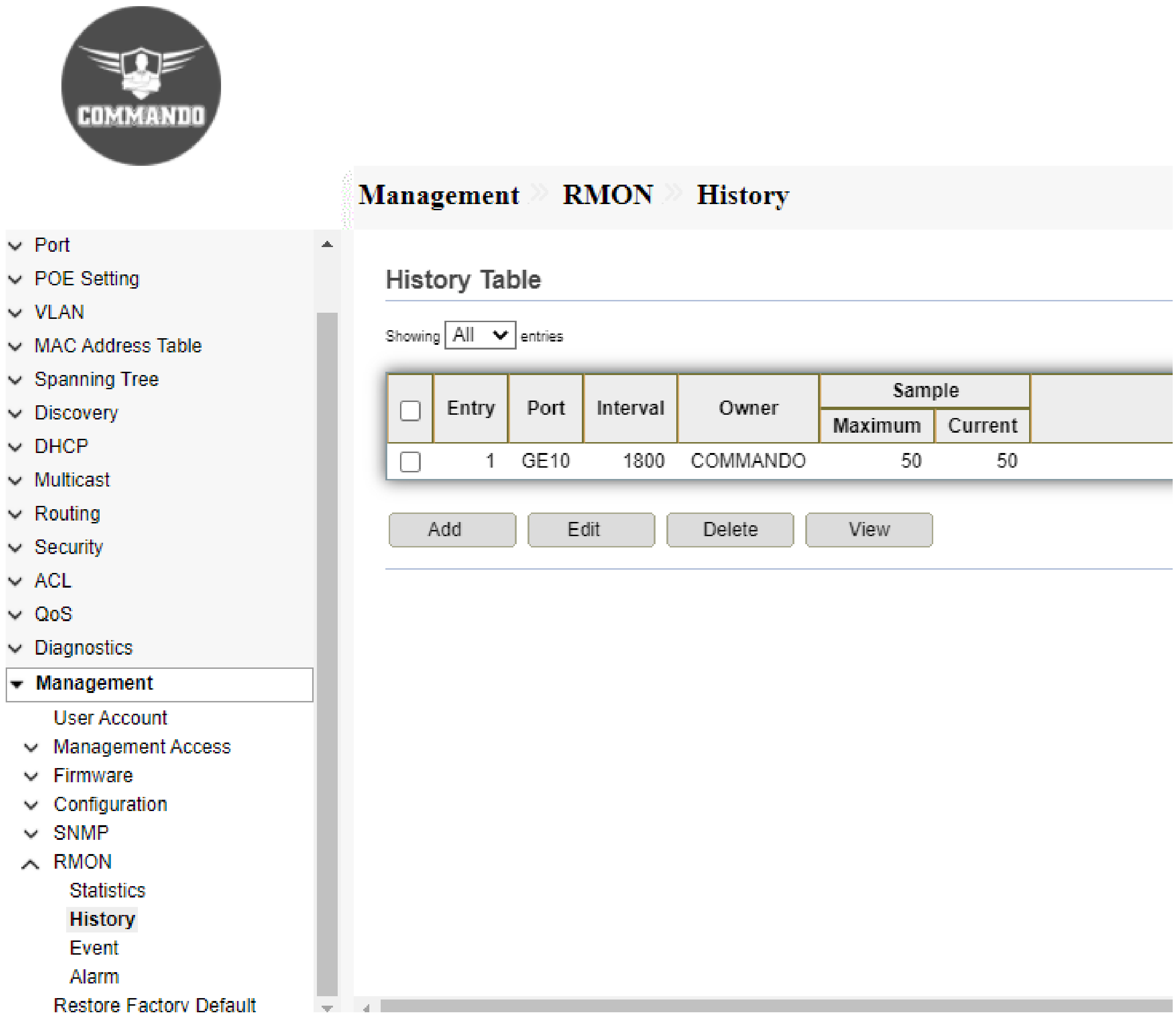
Fig 16.6.2 RMON Default History Table page



Add History

Entry	1	
Port	GE10	
Max Sample	50	(1 - 50, default 50)
Interval	1800	(1 - 3600, default 1800)
Owner	COMMANDO	

Fig 16.6.3 RMON Add History page



History Table

Showing All entries

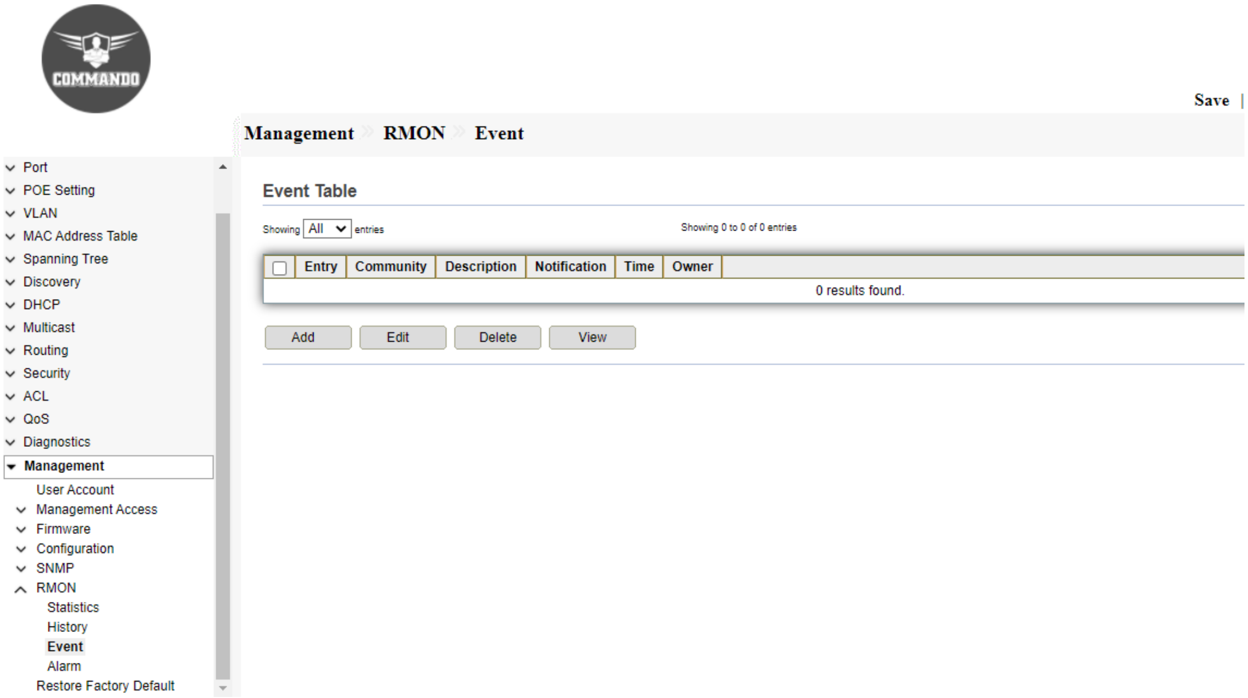
□	Entry	Port	Interval	Owner	Sample	
					Maximum	Current
□	1	GE10	1800	COMMANDO	50	50

Fig 16.6.4 RMON History Table page

16.6.3 Event

The Event Log Table page displays the log of events (actions) that occurred. Following types of events can be logged: Event Log or Trap or Event Log and Trap. The action in the event is performed when the event is bound to an alarm and the conditions of the alarm have occurred.

To view and configure RMON event, click **Management >> RMON >> Event.**



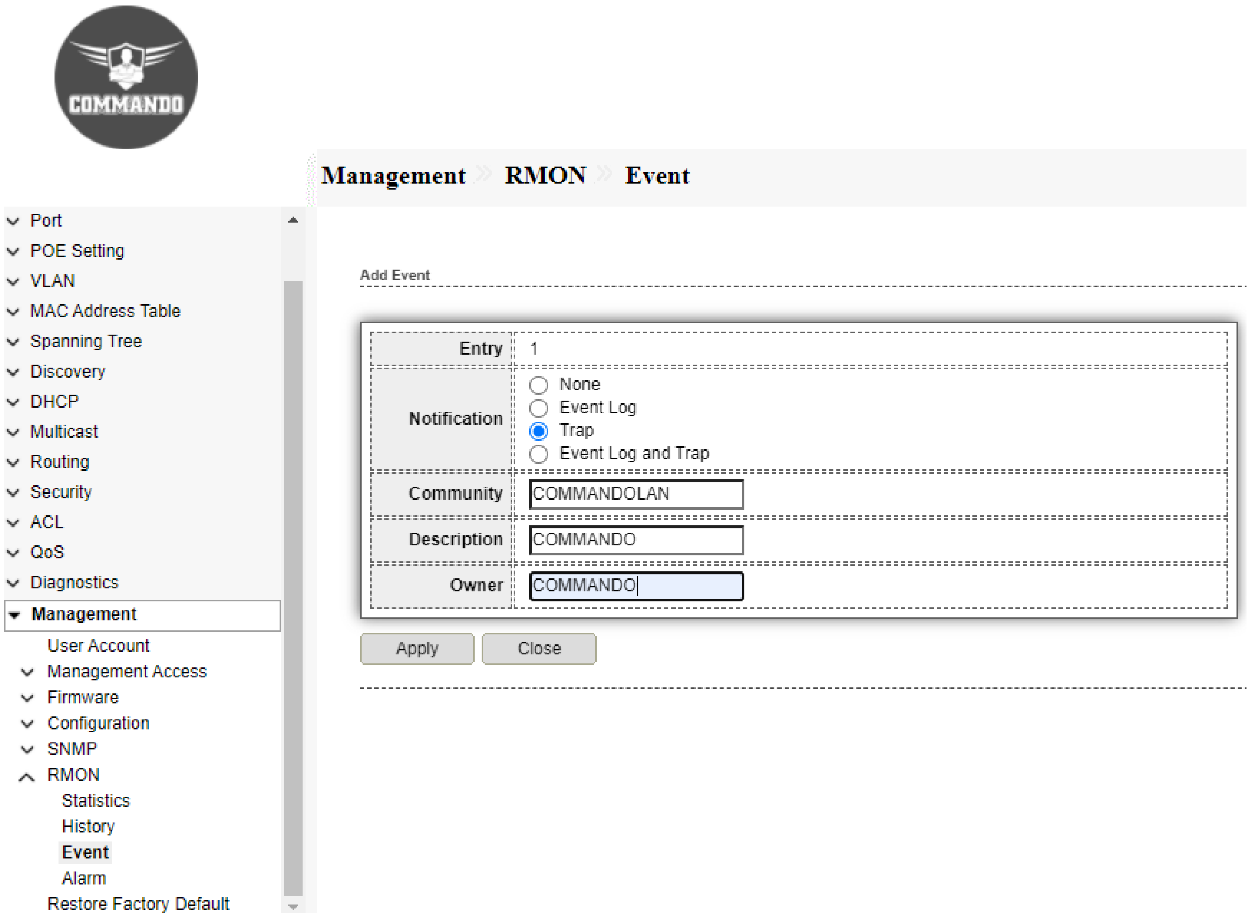
Management » RMON » Event

Event Table

Showing All entries   Showing 0 to 0 of 0 entries

□	Entry	Community	Description	Notification	Time	Owner
0 results found.						

Fig 16.6.5 RMON Default Event Table page

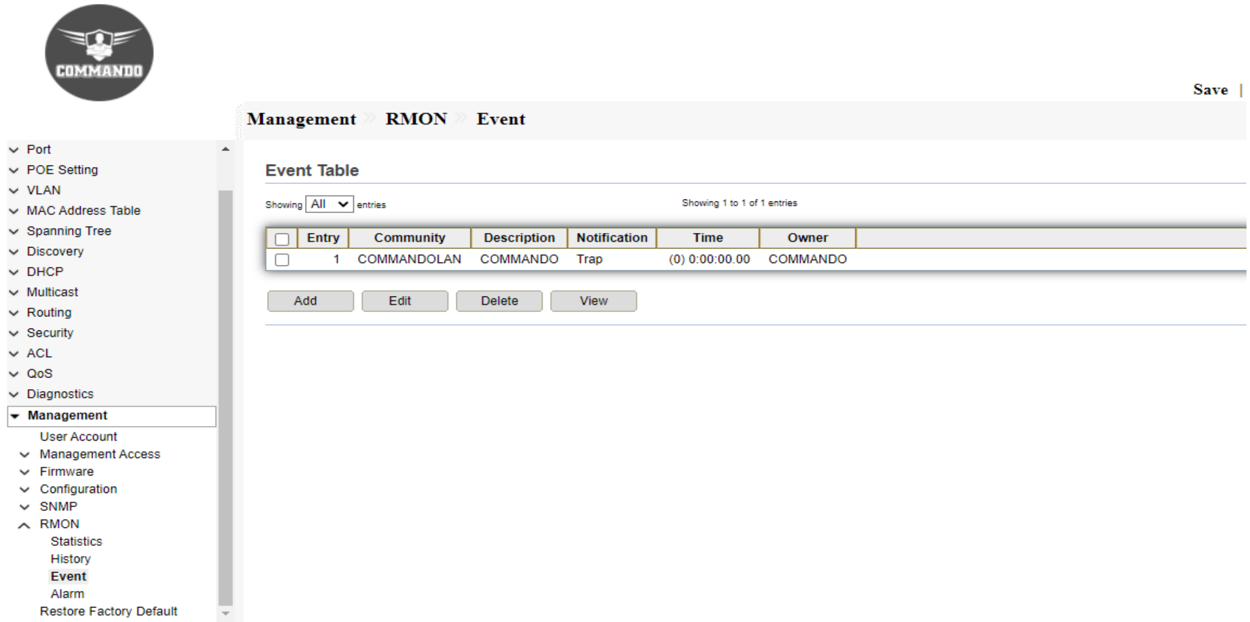


Management » RMON » Event

Add Event

Entry	1
Notification	○ None ○ Event Log ● Trap ○ Event Log and Trap
Community	COMMANDOLAN
Description	COMMANDO
Owner	COMMANDO

Fig 16.6.6 RMON Add Event page



Management » RMON » Event

Event Table

Showing All entries

Showing 1 to 1 of 1 entries

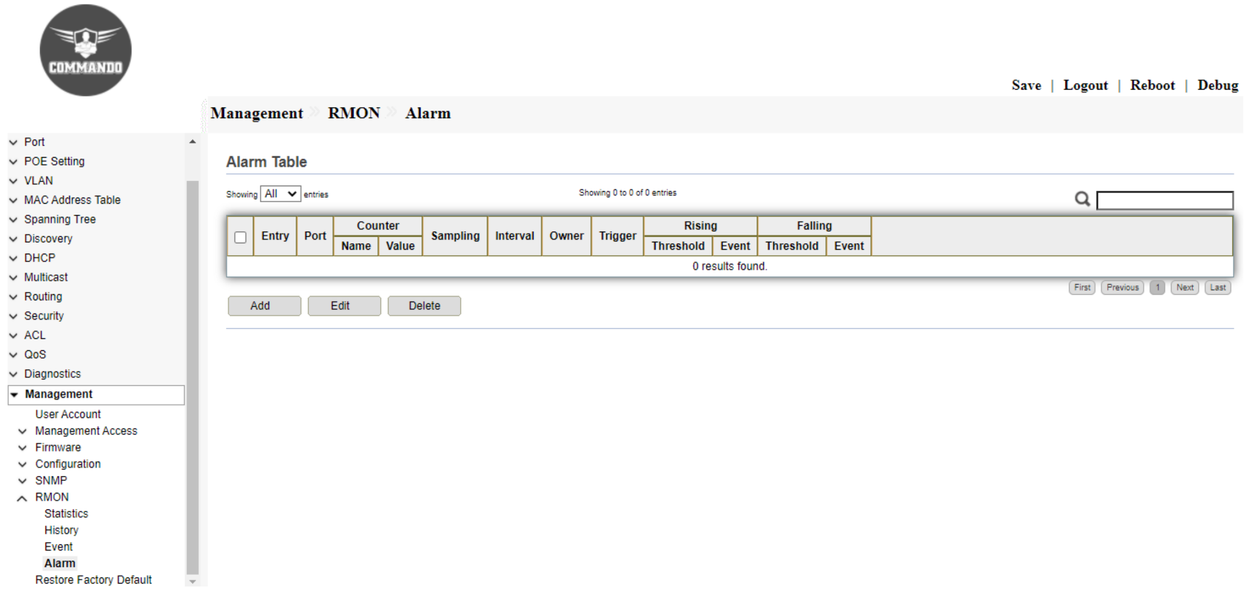
□	Entry	Community	Description	Notification	Time	Owner
□	1	COMMANDOLAN	COMMANDO	Trap	(0) 0:00:00.00	COMMANDO

Fig 16.6.7 RMON Event Table page

16.6.4 Alarm

The Alarms page provides the ability to configure alarms and to bind them with events.

To view and configure RMON Alarm menu, click **Management >> RMON >> Alarm.**



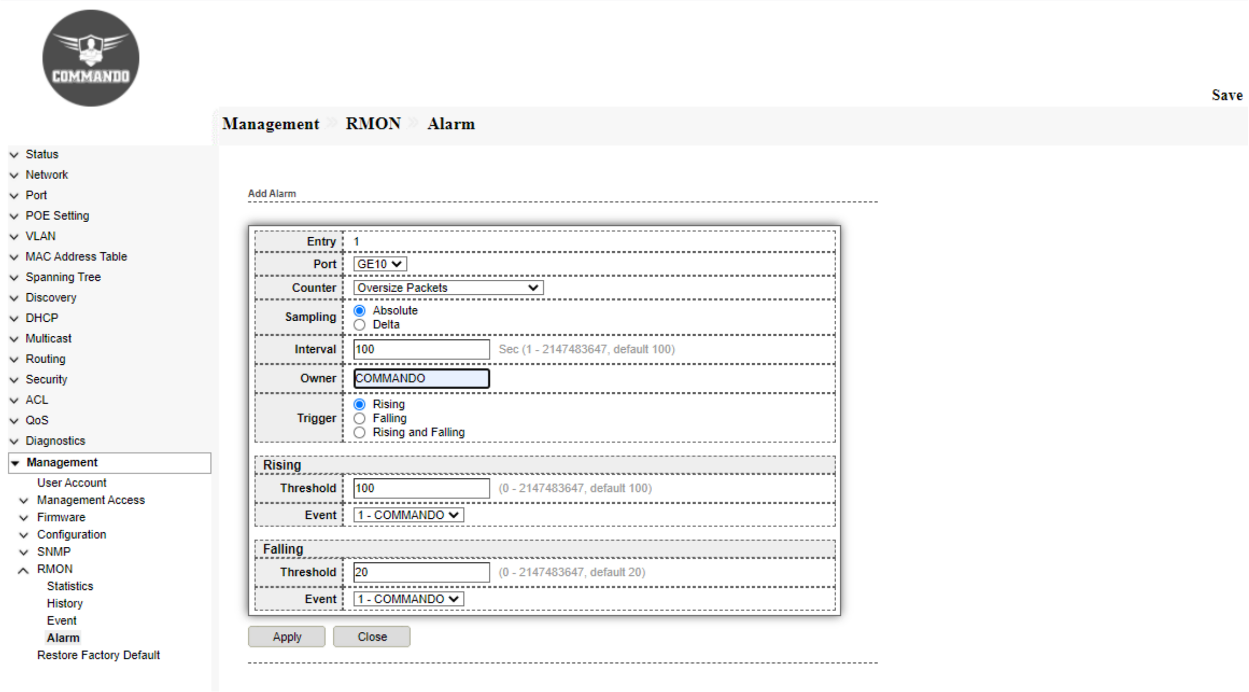
Alarm Table

Showing All entries

Showing 0 to 0 of 0 entries

□	Entry	Port	Counter		Sampling	Interval	Owner	Trigger	Rising		Falling	
			Name	Value					Threshold	Event	Threshold	Event
0 results found.												

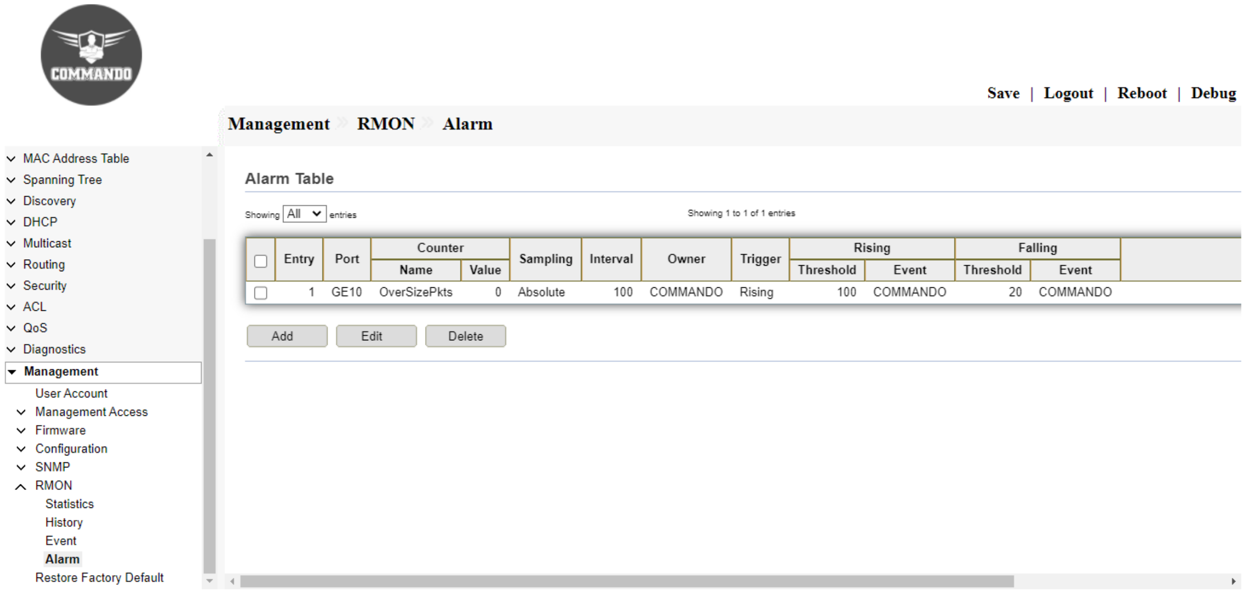
Fig 16.6.8 RMON Default Alarm page



Add Alarm

Entry	1
Port	GE10
Counter	Oversize Packets
Sampling	● Absolute ○ Delta
Interval	100 Sec (1 - 2147483647, default 100)
Owner	COMMANDO
Trigger	● Rising ○ Falling ○ Rising and Falling
Rising	
Threshold	100 (0 - 2147483647, default 100)
Event	1 - COMMANDO
Falling	
Threshold	20 (0 - 2147483647, default 20)
Event	1 - COMMANDO

Fig 16.6.9 RMON Add Alarm Counter page



Alarm Table

Showing All entries

Showing 1 to 1 of 1 entries

□	Entry	Port	Counter		Sampling	Interval	Owner	Trigger	Rising		Falling	
			Name	Value					Threshold	Event	Threshold	Event
□	1	GE10	OverSizePkts	0	Absolute	100	COMMANDO	Rising	100	COMMANDO	20	COMMANDO

Fig 16.6.10 RMON Alarm Table page

16.7 Restore Factory Default

C3000 Hardware also you can factory reset by software reset Command. Use Restore Factory Default, Click **Management>>Restore Factory Default** and again reboot the Switch to get factory default configuration in C3000 Series Switches.

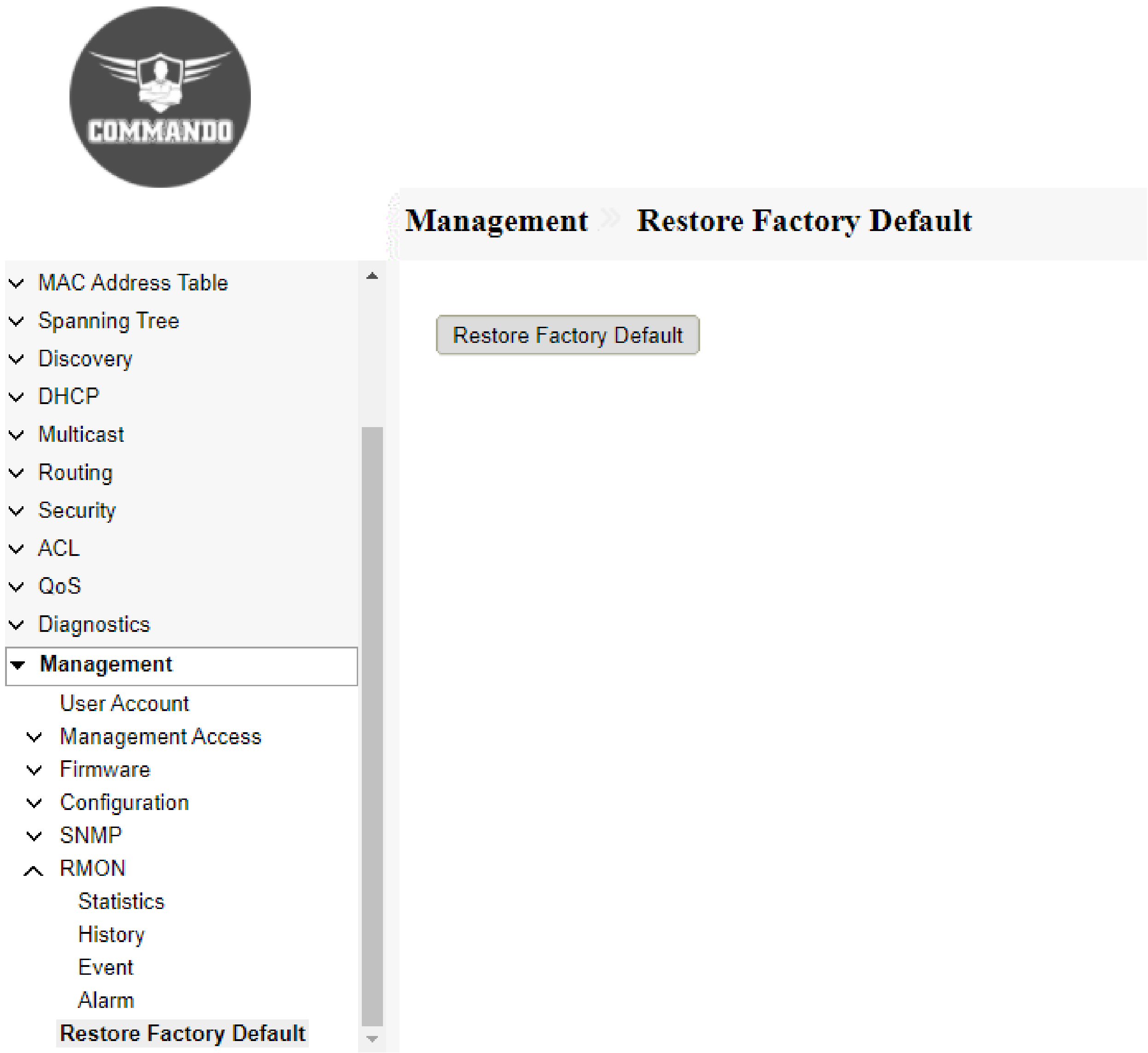


Fig 16.7.1 Restore Factory Default page

17. PoE/PoE+/Ultra PoE++ Setting

Power over Ethernet (PoE) is technology that passes electric power over twisted-pair Ethernet cable to powered devices (PD), such as wireless access points, IP cameras, and VoIP phones in addition to the data that cable usually carries. It enables one RJ45 cable to provide both data connection and electric power to PDs instead of having a separate cable for each. PoE is IEEE802.3af, PoE+ is IEEE802.3at and IEEE802.3bt. Currently, the max amount of power provided over Cat5 cabling is 15.4 watts for PoE, 30W watts for PoE+ and up to 90Watts for Ultra PoE++ supported by C3000 series Switches.

Note: This topic is applicable only for PoE/PoE+/Ultra PoE++ C3000 Series PoE Switches Only.

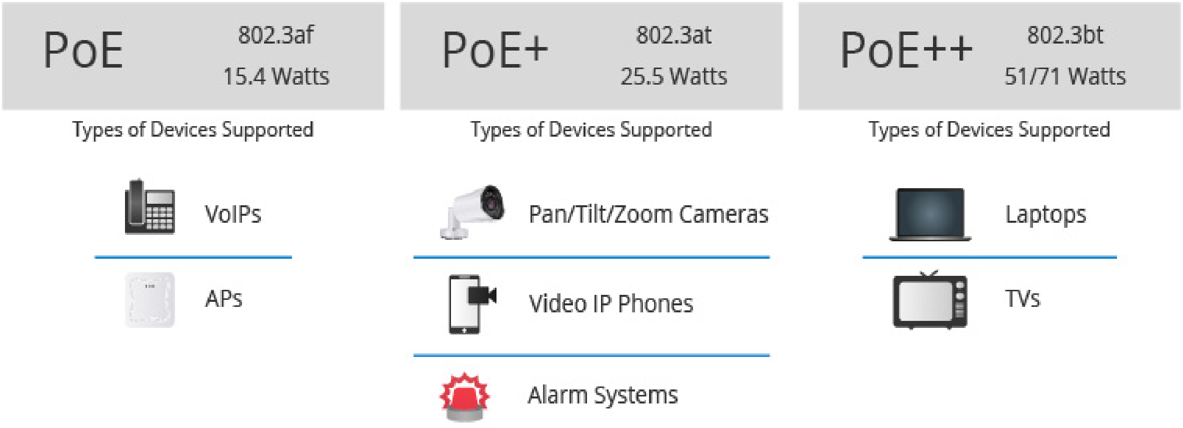
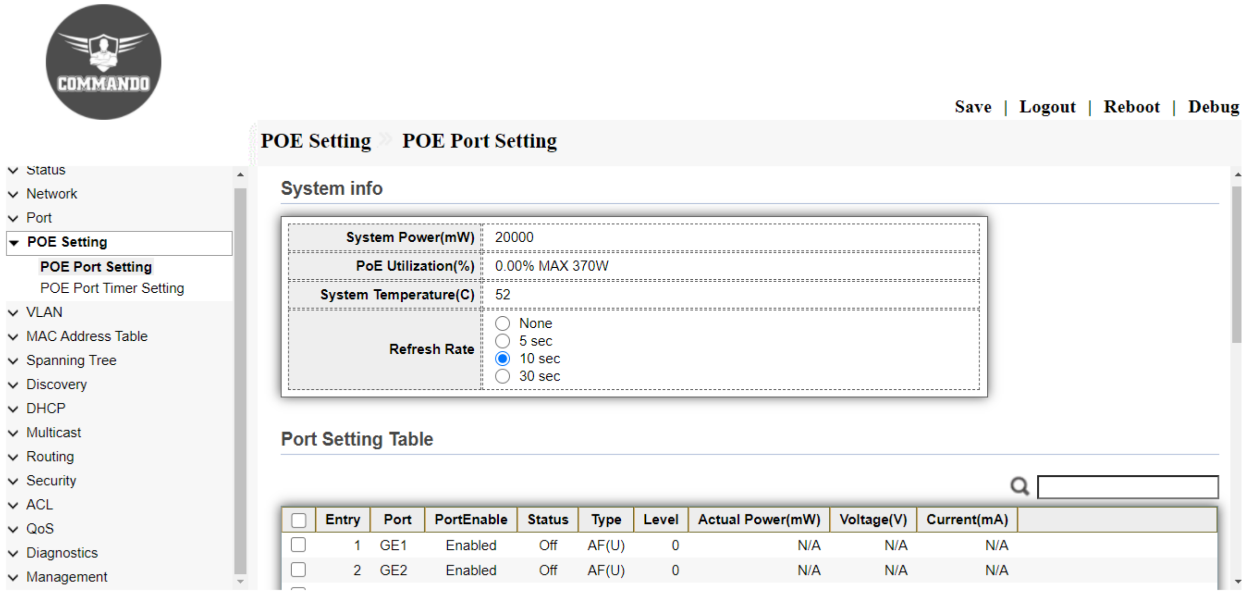


Fig 17.1 C3000 Series PoE/PoE+/Ultra PoE++ Switches Concept

17.1.1 POE Port Setting

The PoE/PoE+/Ultra PoE++ Settings page displays system PoE/PoE+/Ultra PoE++ information for auto enabling PoE/PoE+/Ultra PoE++ on the interfaces and monitoring the current power usage and maximum power limit per port.

For the POE Port Setting menu, click **POE Setting >> POE Port Setting.**



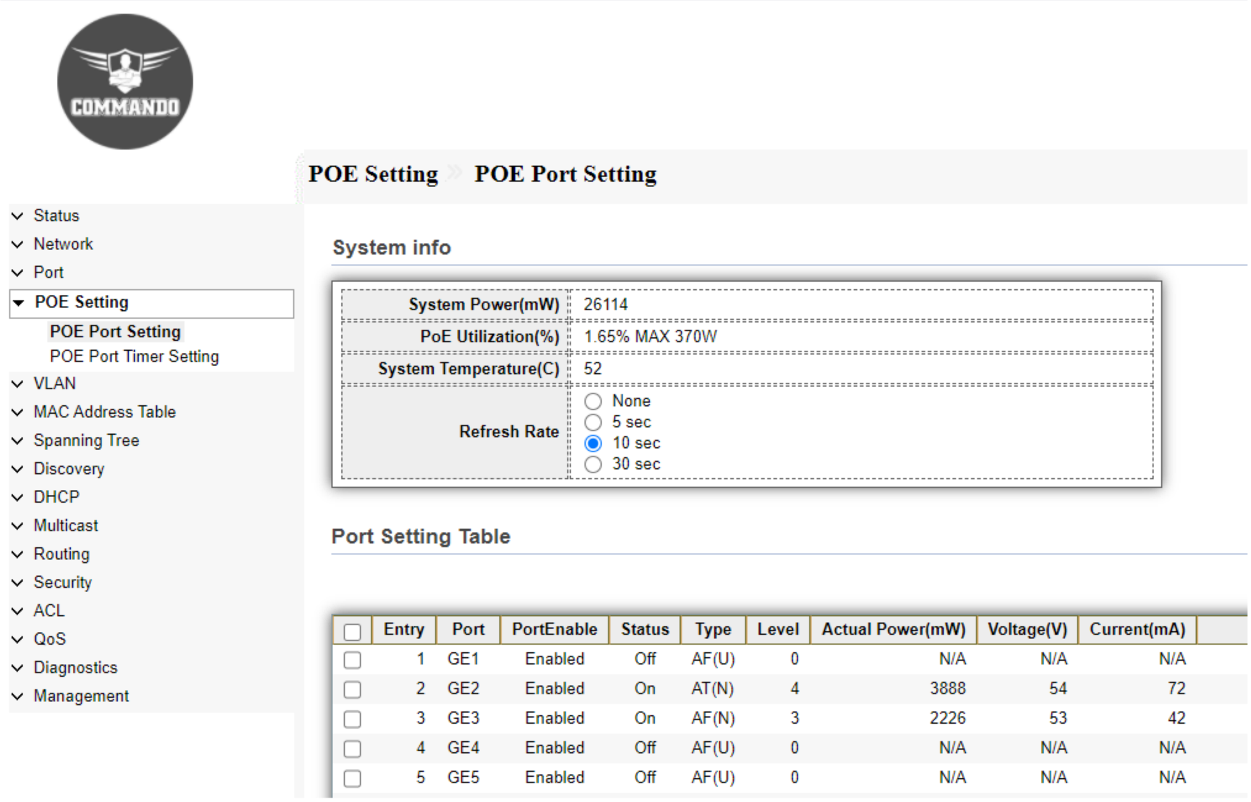
System info

System Power(mW)	20000
PoE Utilization(%)	0.00% MAX 370W
System Temperature(C)	52
Refresh Rate	○ None ○ 5 sec ● 10 sec ○ 30 sec

Port Setting Table

□	Entry	Port	PortEnable	Status	Type	Level	Actual Power(mW)	Voltage(V)	Current(mA)
□	1	GE1	Enabled	Off	AF(U)	0	N/A	N/A	N/A
□	2	GE2	Enabled	Off	AF(U)	0	N/A	N/A	N/A

Fig 17.1.1 PoE Port Setting System Default Info page



POE Setting » POE Port Setting

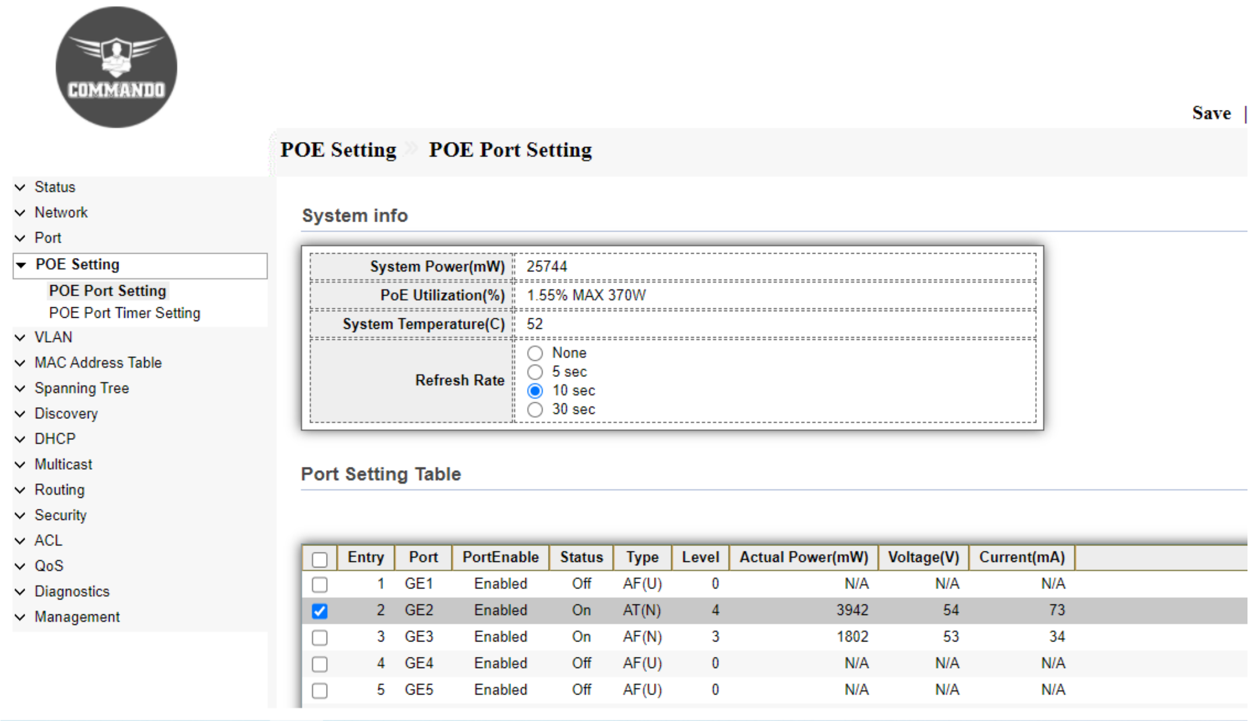
System info

System Power(mW)	26114
PoE Utilization(%)	1.65% MAX 370W
System Temperature(C)	52
Refresh Rate	○ None ○ 5 sec ● 10 sec ○ 30 sec

Port Setting Table

□	Entry	Port	PortEnable	Status	Type	Level	Actual Power(mW)	Voltage(V)	Current(mA)
□	1	GE1	Enabled	Off	AF(U)	0	N/A	N/A	N/A
□	2	GE2	Enabled	On	AT(N)	4	3888	54	72
□	3	GE3	Enabled	On	AF(N)	3	2226	53	42
□	4	GE4	Enabled	Off	AF(U)	0	N/A	N/A	N/A
□	5	GE5	Enabled	Off	AF(U)	0	N/A	N/A	N/A

Fig 17.1.2 PoE Port Setting System Info after adding PoE devices page



POE Setting » POE Port Setting

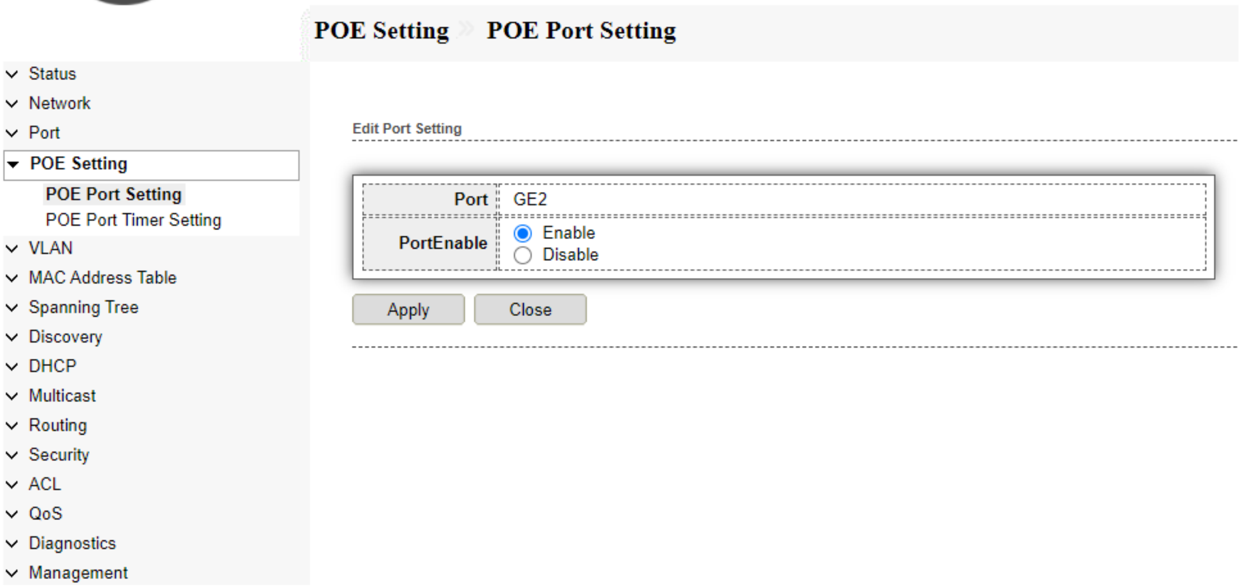
System info

System Power(mW)	25744
PoE Utilization(%)	1.55% MAX 370W
System Temperature(C)	52
Refresh Rate	○ None ○ 5 sec ● 10 sec ○ 30 sec

Port Setting Table

□	Entry	Port	PortEnable	Status	Type	Level	Actual Power(mW)	Voltage(V)	Current(mA)
□	1	GE1	Enabled	Off	AF(U)	0	N/A	N/A	N/A
☑	2	GE2	Enabled	On	AT(N)	4	3942	54	73
□	3	GE3	Enabled	On	AF(N)	3	1802	53	34
□	4	GE4	Enabled	Off	AF(U)	0	N/A	N/A	N/A
□	5	GE5	Enabled	Off	AF(U)	0	N/A	N/A	N/A

Fig 17.1.3 Selecting PoE Port for Setting page



Edit Port Setting

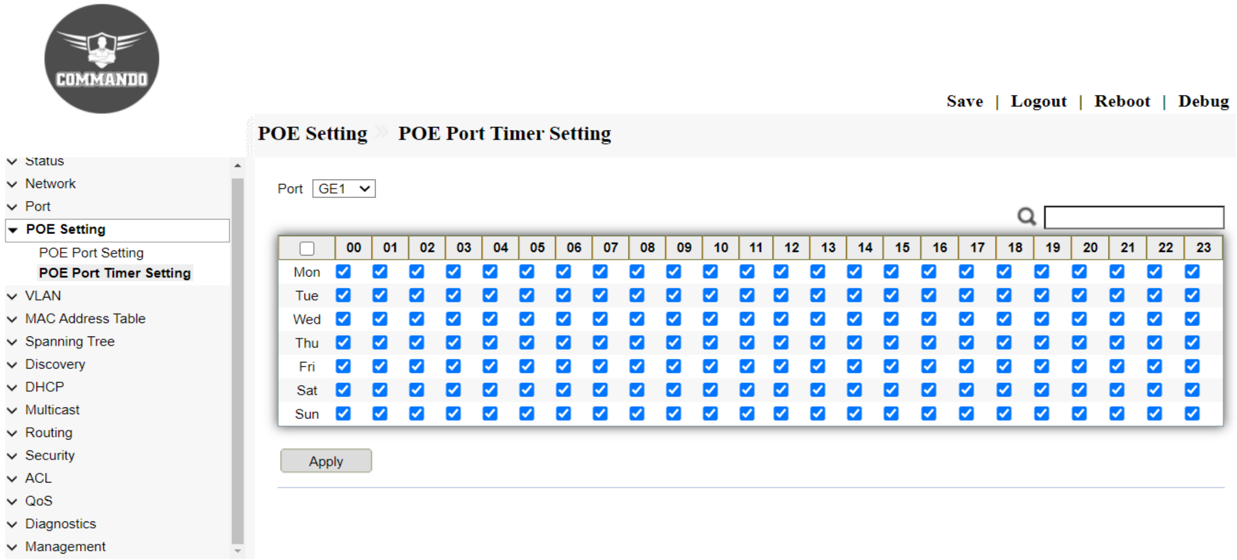
Port	GE2
PortEnable	● Enable ○ Disable

Fig 17.1.4 Edit PoE Port Setting page

17.2 POE Port Timer Setting

PoE/PoE+/Ultra PoE++ can be configured on the device for a specific period. This feature enables you to define, per port, the days in the week and the hours that PoE is enabled. By default, Power over Ethernet (PoE)-capable ports can deliver PoE/PoE+/Ultra PoE++ power continuously. C3000 Series Switches auto ON/OFF PoE/PoE+/Ultra PoE++ as per Scheduled time which makes them intelligent. PoE/PoE+/Ultra PoE++ Scheduling is a feature which allows you to specify the amount of time that power is delivered to a PoE/PoE+/Ultra PoE++ port. This can be used to save power when devices are not in use, or as a security feature to prevent access from being available outside of business hours. When the time is not active, PoE is disabled.

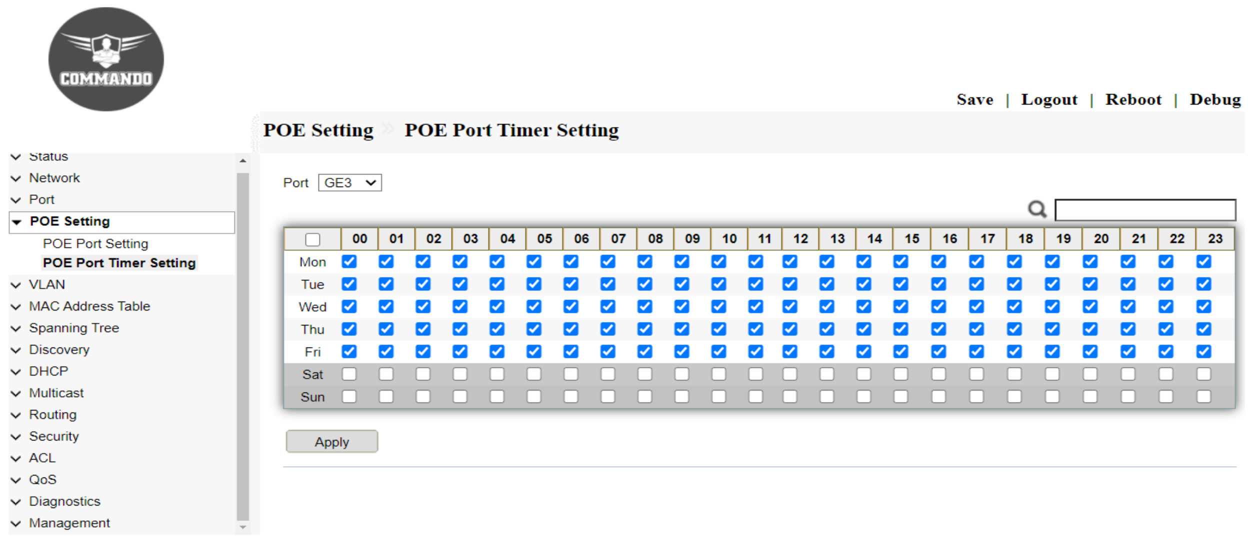
For the POE Port Timer Setting menu, click **POE Setting >> POE Port Timer Setting.**



Port GE1

☐	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mon	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Tue	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Wed	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Thu	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Fri	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Sat	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Sun	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

Fig 17.2.1 Default PoE Port Timer Setting for GE1 page



Port GE3

☐	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mon	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Tue	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Wed	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Thu	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Fri	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Sat	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sun	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Fig 17.2.2 Turning Off PoE Port and Setting timer for GE3 for Saturday and Sunday page