User Manual
GFK-3129A
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SLM242

INDUSTRIAL MANAGED ETHERNET SWITCH

USER's MANUAL

EMERSON

Contents

Caution Notes as Used in this Publication

Caution notices are used where equipment might be damaged if care is not taken.

Notes: Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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Chapter 1: Getting to Know Your Switch

1.1 About the SLM242 Industrial Switch

SLM242 is managed redundant ring Ethernet switches with 24x10/100Base-(TX) ports and 2 Gigabit combo ports, With complete support of Ethernet Redundancy protocol, Redundant Ring (recovery time < 20ms over 250 units of connection) and MSTP/RSTP/STP (IEEE 802.1s/w/D) can protect your mission-critical applications from network interruptions or temporary malfunctions with its fast recovery technology. And all functions of SLM242 can also be managed centralized and convenient by PACSystems Ethernet Switch Configuration Tool or above, as well as the Web-based interface, console (CLI) configuration. Therefore, the switch is one of the most reliable choice for highly managed and Gigabit Fiber Ethernet application.

1.2 Software Features

- Fastest Redundant Ethernet Ring: Redundant Ring (Recovery time < 20ms over 250 units connection)
- MSTP (RSTP/STP compatible) for Ethernet Redundancy
- Supports IEEE 802.3az Energy-Efficient Ethernet technology
- Supports HTTPS/SSH protocols to enhance network security
- Supports NTP server protocol
- Supports IGMP v2/v3 (IGMP snooping support) to filter multicast traffic
- Supports SNMP v1/v2c/v3 & RMON & 802.1Q VLAN network management
- Supports ACL, TACACS+ and 802.1x user authentication for security
- Supports 9.6K Bytes Jumbo Frame
- Supports multiple notifications for incidents
- Supports management via Web-based interfaces, Console (CLI), and Windows utility
- Supports LLDP Protocol

1.3 Hardware Features

- 19-inch rack mountable design
- 24 x 10/100/1000Base-T(X) RJ-45 ports
- 2xGigabit combo ports consisting of one copper and and one SFP port (DDM supported)
- Dual VAC power supplies
- Operating temperature: -40 to 75oC
- Storage temperature: -40 to 85oC
- Operating humidity: 5% to 95%, non-condensing
- Dimensions: 440 (W) x 200 (D) x 44 (H) mm (17.32 x 7.87 x 1.73 inch)

Chapter 2: Hardware Overview

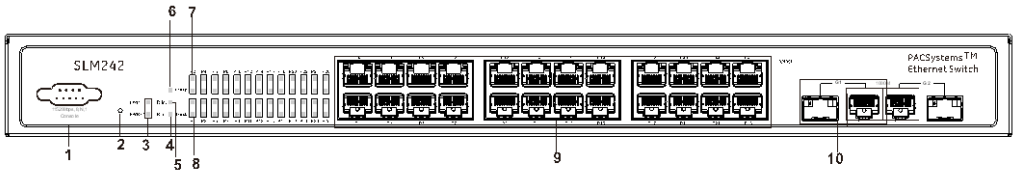
2.1 Front Panel

2.1.1 Ports and Connectors

The device comes with the following ports and connectors on the front panel.

Port	Description
Ethernet ports	24 x 10/100Base-T(X) copper ports
Combo ports	2 x Gigabit Combo ports with one copper port and one SFP port each.
Console port	1 x console port
Reset button	1 x reset button. Press the button for 3 seconds to reset and 5 seconds to return to factory default.

Figure 1:



1. Console port
2. Reset button
3. Power indicator
4. Ring status LED
5. RM status LED
6. Fault indicator
7. Link/ACT LED for Ethernet ports and Combo ports
8. Speed LED for Ethernet ports and Combo ports
9. LAN ports
10. Combo ports

2.1.2 LED

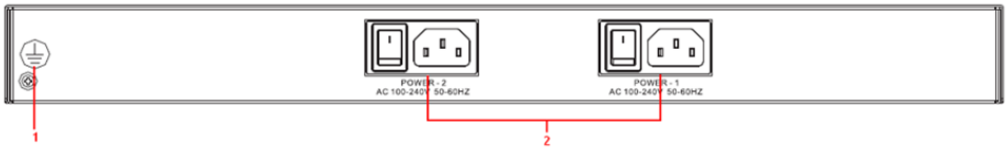
LED	Color	Status	Description
PWR	Green	On	System power is on
R.M	Green	On	Port is operated as Ring Master.
Ring	Green	On	Port is operated in Ring mode
Fault	Amber	On	Errors occur (power failure or port malfunctioning)
10/100Base-T(X) RJ45 port			
Link/ACT	Green	On	Port is connected
Speed	Amber	On	Port is running at 100Mbps
		Off	Port is running at 10Mbps
10/100/1000Base-T(X) RJ45 Port			
Link/ACT	Green	On	Port is connected

LED	Color	Status	Description
Speed	Amber	On	Port is running at 1000Mbps
		Off	Port is running at 10/100Mbps
100/1GBase-X SFP port			
Link/ACT	Green	On	Port is connected

2.2 Rear Panel

The device provides two AC power inputs on the back.

Figure 2:



1. Ground screw
2. AC power input (100V~240V / 50~60Hz)

Chapter 3: Hardware Installation

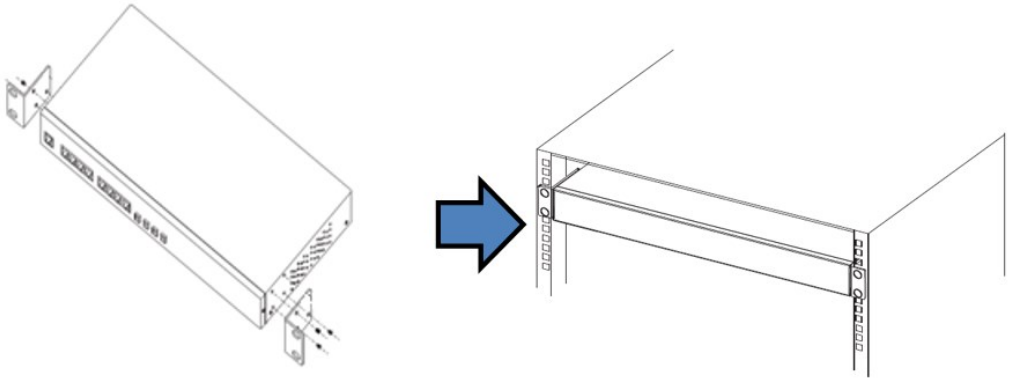
3.1 Rack-mount Installation

Follow the following steps to install the switch to a rack.

Step 1: Attach the mounting brackets to the front left and right sides of the switch using 4 screws

Step 2: With front brackets orientated in front of the rack, fasten the brackets to the rack using two more screws.

Figure 3:



3.2 Wiring

⚠CAUTION

- Be sure to disconnect the power cord before installing and/or wiring your switches.
- Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.
- If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.
- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
- Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring sharing similar electrical characteristics can be bundled together
- You should separate input wiring from output wiring
- It is advised to label the wiring to all devices in the system.

3.2.1 AC Power Connection

The device can be powered by AC electricity. Simply insert the AC power cable to the power connector at the back of the switch and turn on the power switch. The input voltage is 100V~240V / 50~60Hz.

3.2.2 Grounding

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screws to the grounding surface prior to connecting devices.

3.3 Connection

3.3.1 10/100/1000BASE-T(X) Pin Assignments

The device comes with standard Ethernet ports. According to the link type, the switch uses CAT 3, 4, 5,5e UTP cables to connect to any other network devices (PCs, servers, switches, routers, or hubs). Please refer to the following table for cable specifications.

Cable	Type	Max. Length	Connector
10BASE-T	Cat. 3, 4, 5 100-ohm	UTP 100 m (328 ft)	RJ-45
100BASE-TX	Cat. 5 100-ohm UTP	UTP 100 m (328 ft)	RJ-45
1000BASE-T	Cat. 5/Cat. 5e 100-ohm UTP	UTP 100 m (328ft)	RJ-45

With 10/100BASE-T(X) cables, pins 1 and 2 are used for transmitting data, and pins 3 and 6 are used for receiving data.

10/100Base-T(X) RJ-45 ports

Pin Number	Assignment
#1	TD+
#2	TD-
#3	RD+
#6	RD-

1000Base-T RJ-45 Port Pin Assignments:

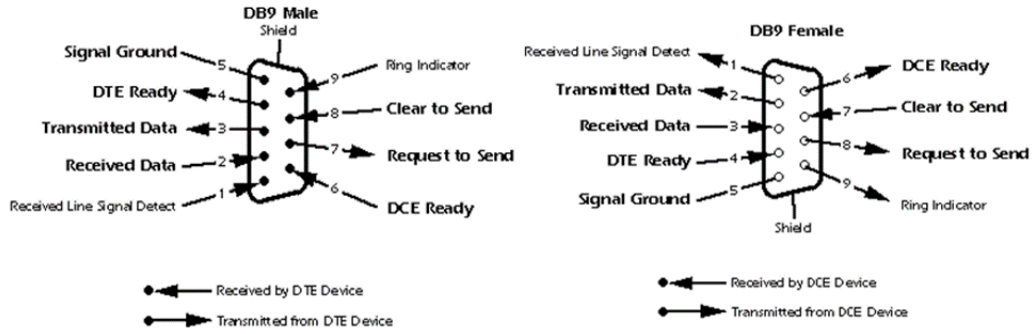
Pin Number	Assignment
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-

3.3.2 RS-232 Console Port Wiring

The device can be managed via the console port using a RS-232 cable which can be found in the package. Connect each end of the RS-232 cable to the switch and a PC respectively.

PC pin out (male) assignment	RS-232 with DB9 female connector	DB9 to RJ 45
Pin #2 RD	Pin #2 TD	Pin #2
Pin #3 TD	Pin #3 RD	Pin #3
Pin #5 GD	Pin #5 GD	Pin #5

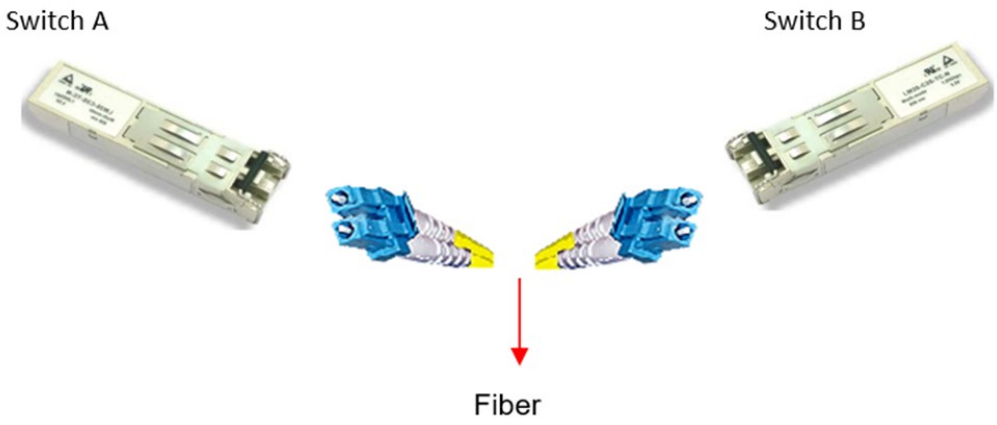
Figure 4:



3.3.3 SFP

The switch comes with two combo ports which include a SFP port that can connect to other devices using SFP modules. The SFP modules are hot-swappable input/output devices that can be plugged into the SFP ports to connect the switch with the fiber-optic network. Remember that the TX port of Switch A should be connected to the RX port of Switch B.

Figure 5:



⚠CAUTION

- Insert clean dust plugs into the SFPs after the cables are extracted from them.
- Clean the optic surfaces of the fiber cables before you plug them back into the optical bores of another SFP module.
- Avoid getting dust and other contaminants into the optical bores of your SFP modules in cases of malfunction.

Chapter 4: WEB Management

Figure 6:

4.1 About Web-based Management

An embedded HTML web site resides in flash memory on the CPU board. It contains advanced management features and allows you to manage the switch from anywhere on the network through a standard web browser such as Microsoft Internet Explorer.

The Web-Based Management function supports Internet Explorer 5.0 or later. It is based on Java Applets with an aim to reduce network bandwidth consumption, enhance access speed and present an easy viewing screen.

Note: By default, IE5.0 or later version does not allow Java Applets to open sockets. You need to explicitly modify the browser setting in order to enable Java Applets to use network ports.

Preparing for Web Management

The default values are shown as the following:

IP Address: **192.168.0.100**

Subnet Mask: **255.255.255.0**

Default Gateway: **192.168.0.254**

Username: **admin**

Password: **admin**

System Login

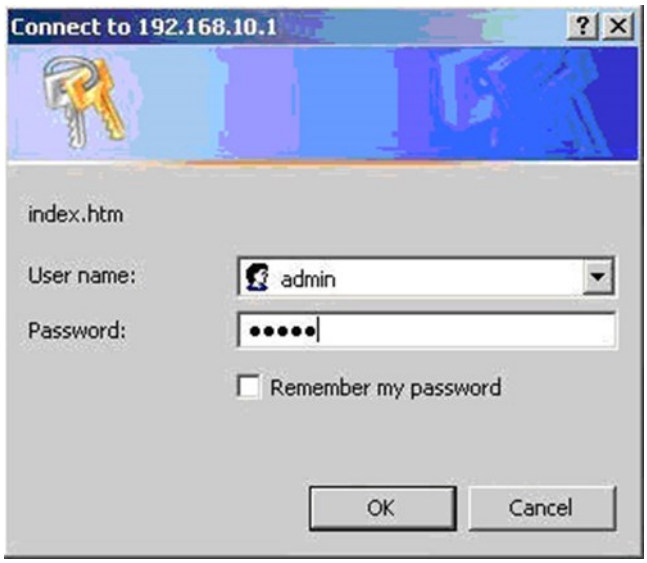
1. Launch the Internet Explorer.
2. Type http:// or https:// and the IP address of the switch. Press "**Enter**".

Figure 7:

3. The login screen appears.
4. Key in the username and password. The default username and password is "**admin**".

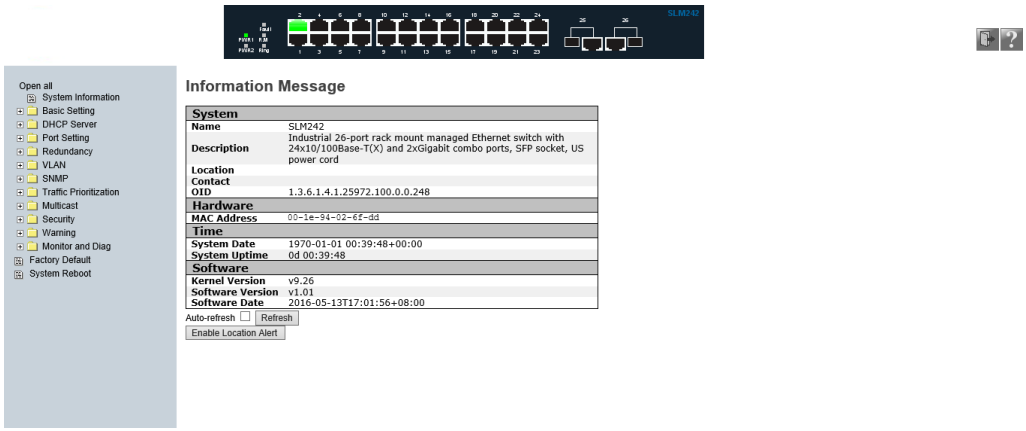
5. Click "**Enter**" or "**OK**" button. Then the main interface of the Web-based management appears.

Figure 8: Login screen



Main Interface

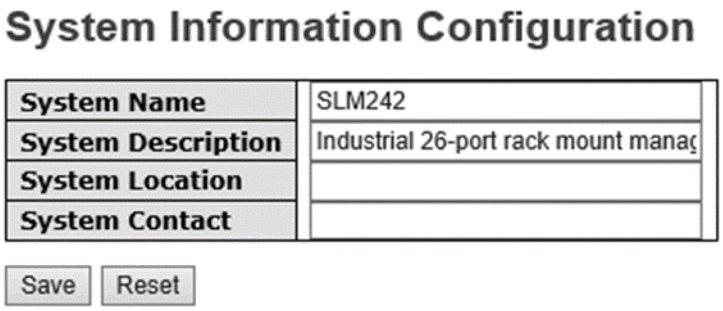
Figure 9: Main interface



4.2 Basic Setting

4.2.1 System Information

Figure 10:

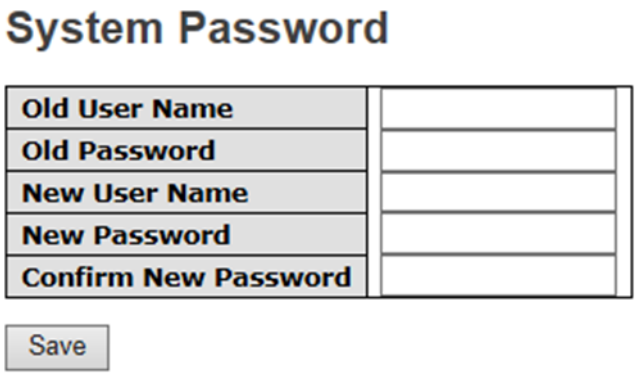


Label	Description
System Name	An administratively assigned name for this managed node. By convention, this is the node's fully-qualified domain name – a text string (0 to 255 characters) drawn from the alphabet (A-Z, a-z), digits (0-9), and the minus sign (-). No space characters are permitted as part of a name. The first character must be an alphabet, and the first or last character must not be a minus sign.
System Description	The administratively assigned description for this managed node. The allowed string length is 0 to 255, and the allowed contents are the ASCII characters from 32 to 126.
System Location	The physical location of this node (e.g., telephone closet, 3rd floor). The allowed string length is 0 to 255, and the allowed contents are the ASCII characters from 32 to 126.
System Contact	The textual identification of the contact person for this managed node, together with information on how to contact this person. The allowed string length is 0 to 255, and the allowed contents are the ASCII characters from 32 to 126.

4.2.2 Admin Password

This page allows you to configure the system password required to access the web pages or log in from CLI.

Figure 11:

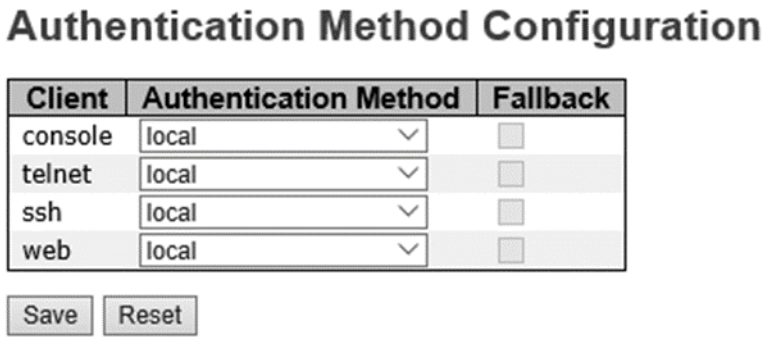


Label	Description
Old Username	Enter the current system Username. If this is incorrect, the new Username will not be set.
Old Password	Enter the current system password. If this is incorrect, the new password will not be set.
New Username	Enter the new system Username
New Password	Enter the new system password, and the password must meet the requirement: Minimum 8 characters; At least one Upper case letter. At least one numeric character. At least one special character such as @, #, $,6.
Confirm password	Re-type the new password.

4.2.3 Authentication

This page allows you to configure how a user is authenticated when logs into the switch via one of the management interfaces.

Figure 12:

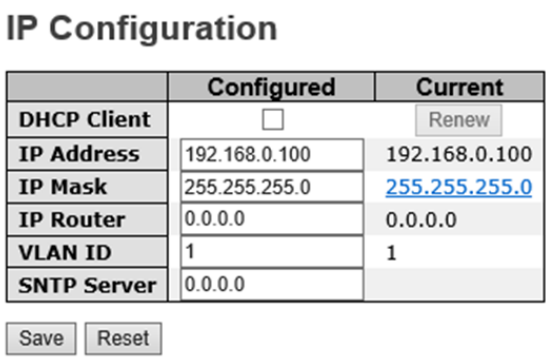


Label	Description
Client	The management client for which the configuration below applies.
Authentication Method	Authentication Method can be set to one of the following values: **None:** authentication is disabled, and login is not possible. **Local:** local user database on the switch is used for authentication. **Radius:** a remote RADIUS server is used for authentication.
Fallback	Check to enable fallback to local authentication. If none of the configured authentication servers are active, the local user database is used for authentication. This is only possible if **Authentication Method** is set to a value other than **none** or **local**.

4.2.4 IP Settings

You can configure IP information of the switch in this page.

Figure 13:

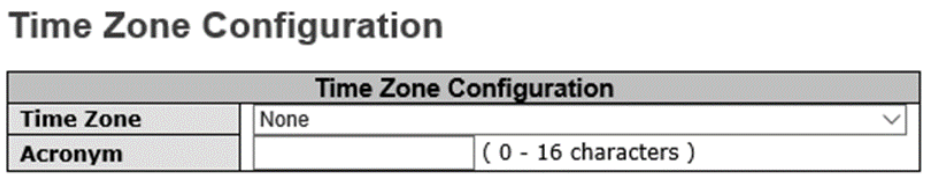


Label	Description
DHCP Client	Enable the DHCP client by checking this box. If DHCP fails or the configured IP address is zero, DHCP will retry. If DHCP retry fails, DHCP will stop trying and the configured IP settings will be used.
IP Address	Assigns the IP address of the network in use. If DHCP client function is enabled, you do not need to assign the IP address. The network DHCP server will assign the IP address to the switch and it will be displayed in this column. The default IP is 192.168.0.100
IP Mask	Assigns the subnet mask of the IP address. If DHCP client function is enabled, you do not need to assign the subnet mask.
IP Router	Assigns the network gateway for the switch. The default gateway is 192.168.0.254.
VLAN ID	Provides the managed VLAN ID. The allowed range is 1 through 4095.
NTP Server	Input NTP Server for time synchronization

4.2.5 Daylight Saving Time

Time Zone Configuration

Figure 14:



Label	Description
Time Zone	Select the time zone from the dropdown list according to the location of the switch and click **Save**.
Acronym	Set an acronym for the time zone. This is a user configurable acronym for identifying the time zone. Up to 16 alpha-numeric characters can be input. The acronym can contain '-', '_' or '.'

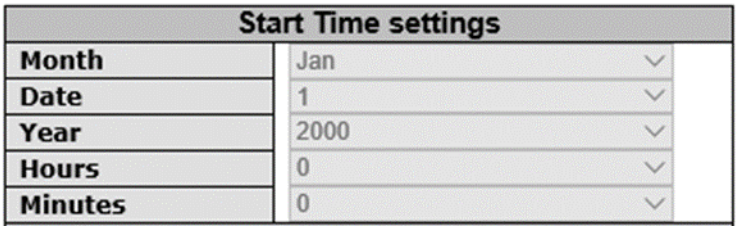
Daylight Saving Time Configuration

Figure 15:

Label	Description
Daylight Saving Time	This is used to set the clock forward or backward according to the configurations set below for a defined Daylight Saving Time duration. Select **Disable** to disable the configuration or **Recurring** to configure the duration to repeat every year. Select **Non-Recurring** to configure the duration for single time configuration. Default is **Disabled**.

Start Time Settings

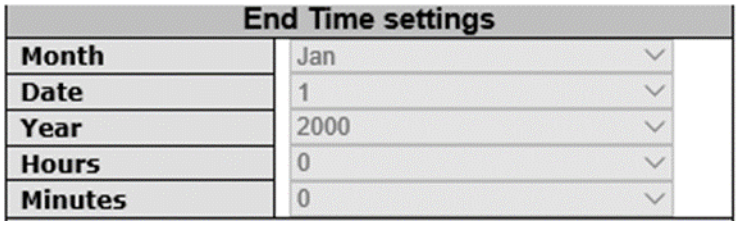
Figure 16:



Label	Description
Year	Select the starting year
Date	Select the starting day.
Month	Select the starting month.
Hours	Select the starting hour.
Minutes	Select the starting minute.

End Time Settings

Figure 17:



Label	Description
Year	Select the ending year
Day	Select the ending day.
Month	Select the ending month.
Hours	Select the ending hour.
Minutes	Select the ending minute.

Offset Settings

Figure 18:

Label	Description
Offset	Configures the offset time. The time is measured by minute.

4.2.6 HTTPS

You can configure HTTPS settings in the following page.

Figure 19:

Label	Description
Mode	Indicates the selected HTTPS mode. When the current connection is HTTPS, disabling HTTPS will automatically redirect web browser to an HTTP connection. The modes include: **Enabled:** enable HTTPS. **Disabled:** disable HTTPS.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values

4.2.7 SSH

You can configure SSH settings in the following page.

Figure 20:

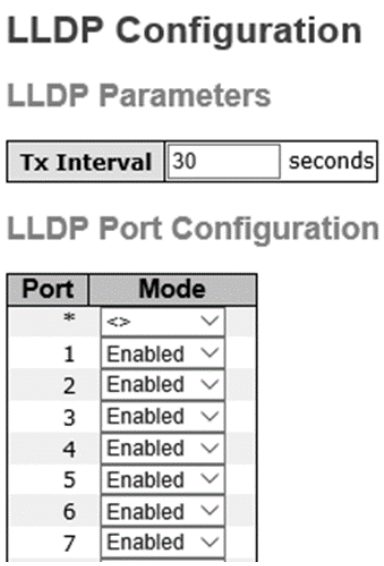
Label	Description
Mode	Indicates the selected SSH mode. The modes include: **Enabled:** enable SSH. **Disabled:** disable SSH.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values

4.2.8 LLDP

LLDP CONFIGURATIONS

This page allows you to examine and configure LLDP port settings.

Figure 21:

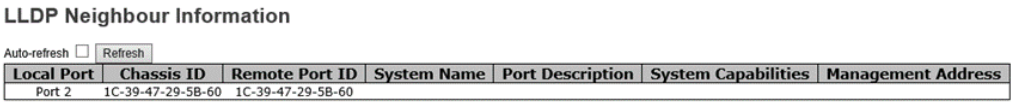


Label	Description
Port	The switch port number to which the following settings will be applied.
Mode	Indicates the selected LLDP mode **Rx only:** the switch will not send out LLDP information, but LLDP information from its neighbors will be analyzed. **Tx only:** the switch will drop LLDP information received from its neighbors but will send out LLDP information. **Disabled:** the switch will not send out LLDP information and will drop LLDP information received from its neighbors. **Enabled:** the switch will send out LLDP information and will analyze LLDP information received from its neighbors.

LLDP NEIGHBOR INFORMATION

This page provides a status overview for all LLDP neighbors. The following table contains information for each port on which an LLDP neighbor is detected. The columns include the following information:

Figure 22:

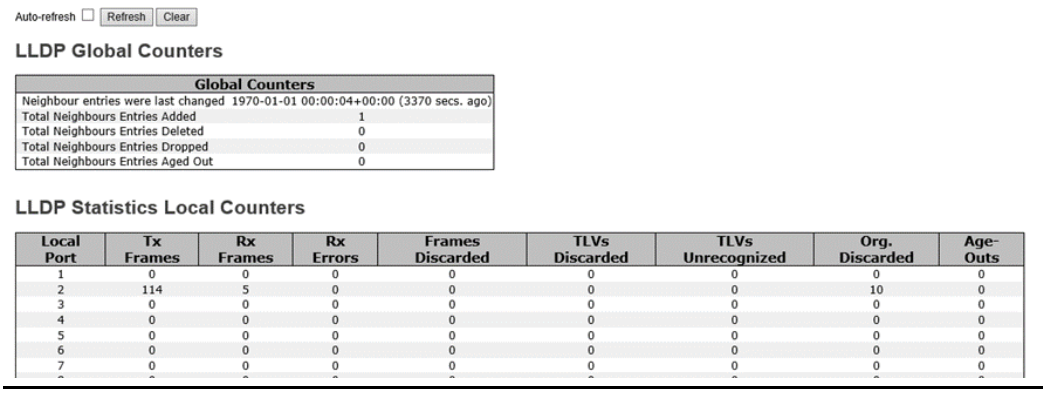


Label	Description
Local Port	The port that you use to transmits and receives LLDP frames.
Chassis ID	The identification number of the neighbor sending out the LLDP frames.
Remote Port ID	The identification of the neighbor port
System Name	The name advertised by the neighbor.
Port Description	The description of the port advertised by the neighbor.
System Capabilities	Description of the neighbor's capabilities. The capabilities include: 1. **Other** 2. **Repeater** 3. **Bridge** 4. **WLAN Access Point** 5. **Router** 6. **Telephone** 7. **DOCSIS Cable Device** 8. **Station Only** 9. **Reserved** When a capability is enabled, a (+) will be displayed. If the capability is disabled, a (-) will be displayed.
Management Address	The neighbor's address which can be used to help network management. This may contain the neighbor's IP address.
Refresh	Click to refresh the page immediately
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals

PORT STATISTICS

This page provides an overview of all LLDP traffic. Two types of counters are shown. Global counters will apply settings to the whole switch stack, while local counters will apply settings to specified switches.

Figure 23:



Global Counters

Label	Description
Neighbor entries were last changed at	Shows the time when the last entry was deleted or added.
Total Neighbors Entries Added	Shows the number of new entries added since switch reboot
Total Neighbors Entries Deleted	Shows the number of new entries deleted since switch reboot
Total Neighbors Entries Dropped	Shows the number of LLDP frames dropped due to full entry table
Total Neighbors Entries Aged Out	Shows the number of entries deleted due to expired time-to-live

Local Counters

Label	Description
Local Port	The port that receives or transmits LLDP frames
Tx Frames	The number of LLDP frames transmitted on the port
Rx Frames	The number of LLDP frames received on the port
Rx Errors	The number of received LLDP frames containing errors
Frames Discarded	If a port receives an LLDP frame, and the switch's internal table is full, the LLDP frame will be counted and discarded. This situation is known as "too many neighbors" in the LLDP standard. LLDP frames require a new entry in the table if Chassis ID or Remote Port ID is not included in the table. Entries are removed from the table when a given port links down, an LLDP shutdown frame is received, or when the entry ages out.
TLVs Discarded	Each LLDP frame can contain multiple pieces of information, known as TLVs (Type Length Value). If a TLV is malformed, it will be counted and discarded.
TLVs Unrecognized	The number of well-formed TLVs, but with an unknown type value
Org. Discarded	The number of organizationally TLVs received
Age-Outs	Each LLDP frame contains information about how long the LLDP information is valid (age-out time). If no new LLDP frame is received during the age-out time, the LLDP information will be removed, and the value of the age-out counter will be incremented.
Refresh	Click to refresh the page immediately
Clear	Click to clear the local counters. All counters (including global counters) are cleared upon reboot.
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals

4.2.9 Modbus TCP

Modbus TCP uses TCP/IP and Ethernet to carry the data of the Modbus message structure between compatible devices. The protocol is commonly used in SCADA systems for communications between a human-machine interface (HMI) and programmable logic controllers. This page enables you to enable and disable Modbus TCP support of the switch.

Figure 24:

Label	Description
Mode	Shows the existing status of the Modbus TCP function

Backup

You can save switch configurations. The configuration file is in XML format.

Figure 25:

Restore

You can load switch configurations. The configuration file is in XML format.

Figure 26:

Firmware Update

This page allows you to update the firmware of the switch.

Figure 27:

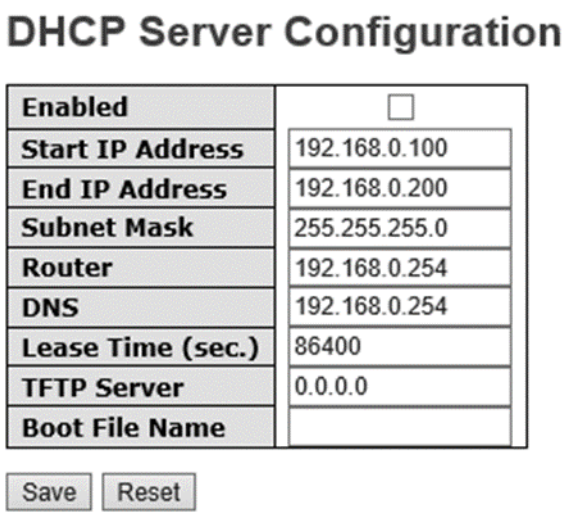
4.3 DHCP Server

The switch provides DHCP server functions. By enabling DHCP, the switch will become a DHCP server and dynamically assigns IP addresses and related IP information to network clients.

4.3.1 Settings

This page allows you to set up DHCP settings for the switch. You can check the **Enabled** checkbox to activate the function. Once the box is checked, you will be able to input information in each column.

Figure 28:



4.3.2 Dynamic Client List

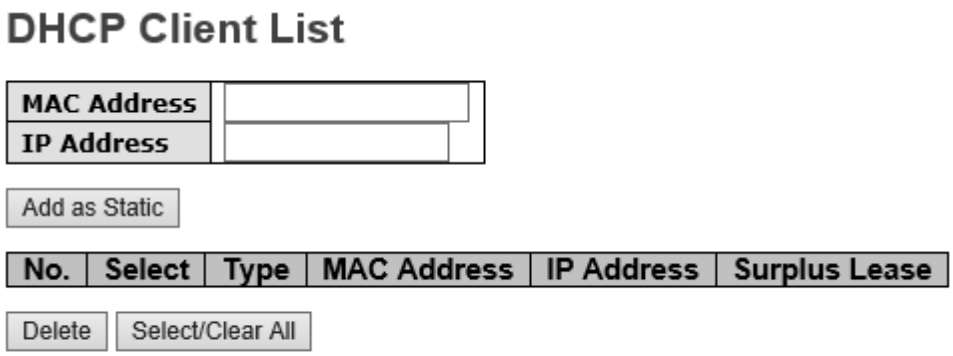
When DHCP server functions are activated, the switch will collect DHCP client information and display in the following table.

Figure 29:

4.3.3 Client List

You can assign a specific IP address within the dynamic IP range to a specific port. When a device is connected to the port and requests for dynamic IP assigning, the switch will assign the IP address that has previously been assigned to the connected device.

Figure 30:



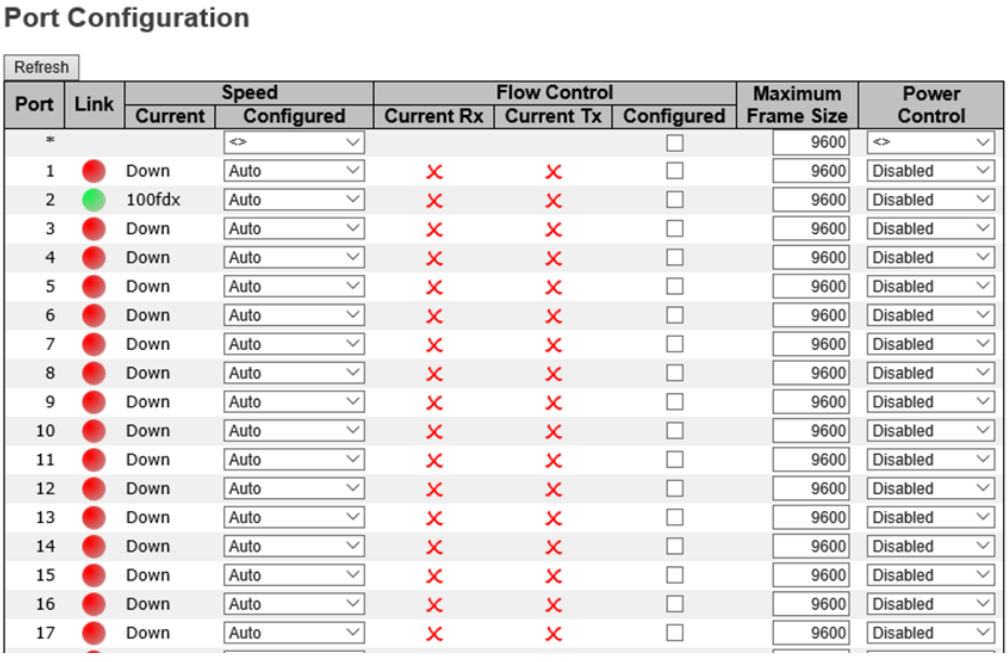
4.4 Port Setting

Port Setting allows you to manage individual ports of the switch, including traffic, power, and trunks.

4.4.1 Port Control

This page shows current port configurations. Ports can also be configured here.

Figure 31:



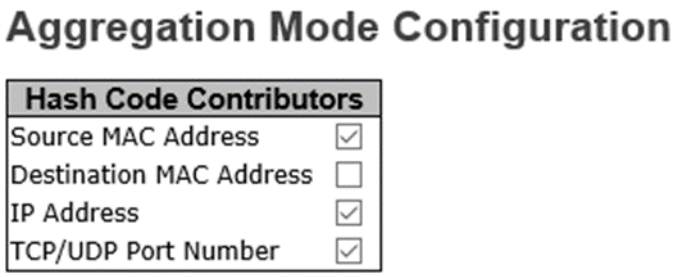
Label	Description
Port	The switch port number to which the following settings will be applied.
Link	The current link state is shown by different colors. Green indicates the link is up and red means the link is down.
Current Link Speed	Indicates the current link speed of the port.
Configured Link Speed	The drop-down list provides available link speed options for a given switch port. **Auto** selects the highest speed supported by the link partner. **Disabled** disables switch port configuration. **<>** configures all ports.
Flow Control	When **Auto** is selected for the speed, the flow control will be negotiated to the capacity advertised by the link partner. When a fixed-speed setting is selected, that is what is used. **Current Rx** indicates whether pause frames on the port are obeyed, and **Current Tx** indicates whether pause frames on the port are transmitted. The Rx and Tx settings are determined by the result of the last auto-negotiation. You can check the Configured column to use flow control. This setting is related to the setting of **Configured Link Speed**.
Maximum Frame	You can enter the maximum frame size allowed for the switch port in this column, including FCS. The allowed range is 1518 bytes to 9600 bytes.
Power Control	Shows the current power consumption of each port in percentage. The **Configured** column allows you to change power saving parameters for each port. **Disabled:** all power savings functions are disabled. **ActiPHY:** link down and power savings enabled. **PerfectReach:** link up and power savings enabled. **Enabled:** both link up and link down power savings enabled.
Total Power Usage	Total power consumption of the board, measured in percentage.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.
Refresh	Click to refresh the page. Any changes made locally will be udone.

4.4.2 Port Trunk

CONFIGURATION

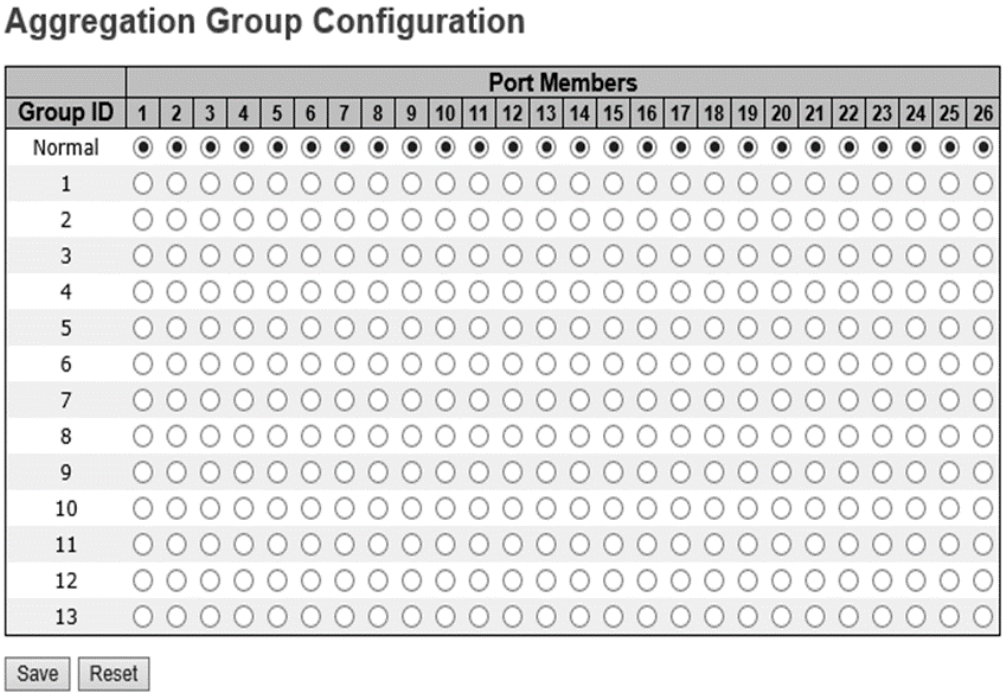
This page allows you to configure the aggregation hash mode and the aggregation group.

Figure 32:



Label	Description
Source MAC Address	Calculates the destination port of the frame. You can check this box to enable the source MAC address or uncheck to disable. By default, **Source MAC Address** is enabled.
Destination MAC Address	Calculates the destination port of the frame. You can check this box to enable the destination MAC address or uncheck to disable. By default, **Destination MAC Address** is disabled.
IP Address	Calculates the destination port of the frame. You can check this box to enable the IP address, or uncheck to disable. By default, **IP Address** is enabled.
TCP/UDP Port Number	Calculates the destination port of the frame. You can check this box to enable the TCP/UDP port number or uncheck to disable. By default, **TCP/UDP Port Number** is enabled.

Figure 33:

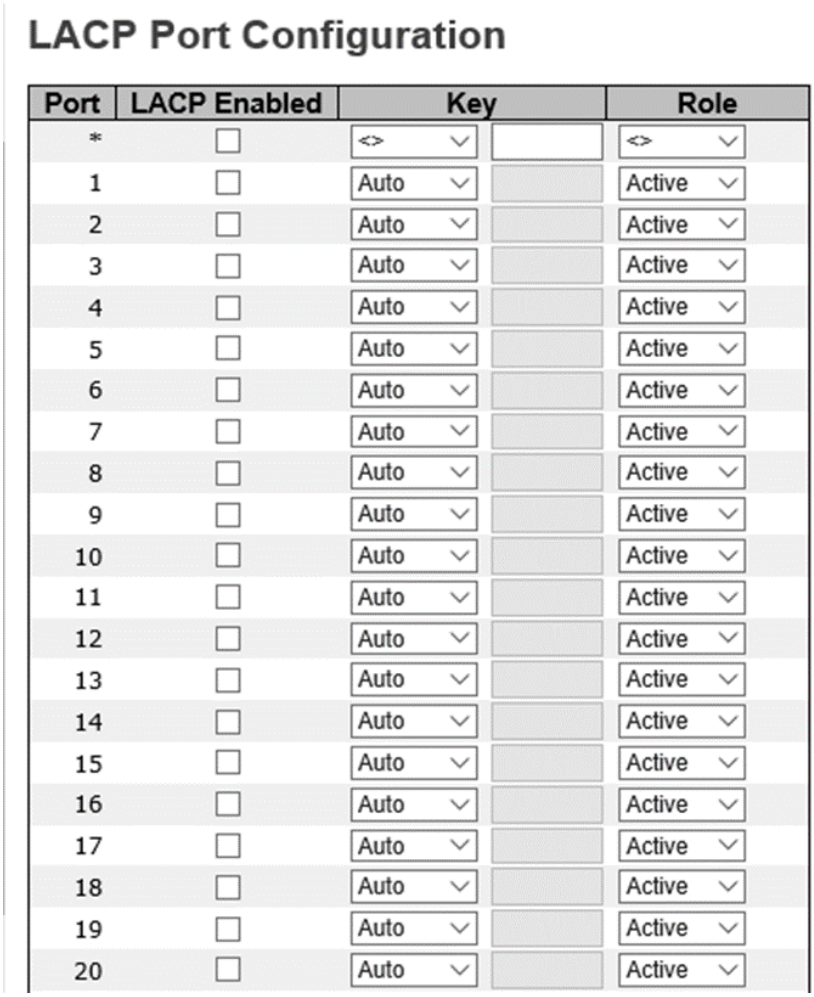


Label	Description
Group ID	Indicates the ID of each aggregation group. **Normal** means no aggregation. Only one group ID is valid per port.
Port Members	Lists each switch port for each group ID. Select a radio button to include a port in an aggregation or clear the radio button to remove the port from the aggregation. By default, no ports belong to any aggregation group. Only full duplex ports can join an aggregation and the ports must be in the same speed in each group.

LACP PORT

This page allows you to enable LACP functions to group ports together to form single virtual links, thereby increasing the bandwidth between the switch and other LACP-compatible devices. LACP trunks are similar to static port trunks, but they are more flexible because LACP is compliant with the IEEE 802.3ad standard. Hence, it is interoperable with equipment from other vendors that also comply with the standard. You can change LACP port settings in this page.

Figure 34:

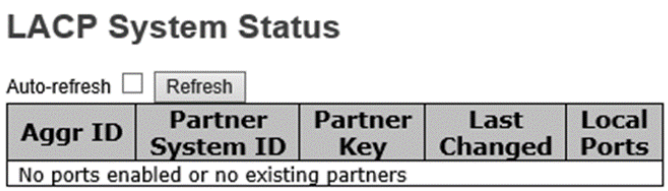


Label	Description
Port	Indicates the ID of each aggregation group. **Normal** indicates there is no aggregation. Only one group ID is valid per port.
LACP Enabled	Lists each switch port for each group ID. Check to include a port in an aggregation or clear the box to remove the port from the aggregation. By default, no ports belong to any aggregation group. Only full duplex ports can join an aggregation and the ports must be in the same speed in each group.
Key	The **Key** value varies with the port, ranging from 1 to 65535. **Auto** will set the key according to the physical link speed (10Mb = 1, 100Mb = 2, 1Gb = 3). **Specific** allows you to enter a user-defined value. Ports with the same key value can join in the same aggregation group, while ports with different keys cannot.
Role	Indicates LACP activity status. **Active** will transmit LACP packets every second, while **Passive** will wait for a LACP packet from a partner (speak if spoken to).
Save	CLICK TO SAVE CHANGES
Reset	Click to undo any changes made locally and revert to previously saved values

SYSTEM STATUS

This page provides a status overview for all LACP instances.

Figure 35:

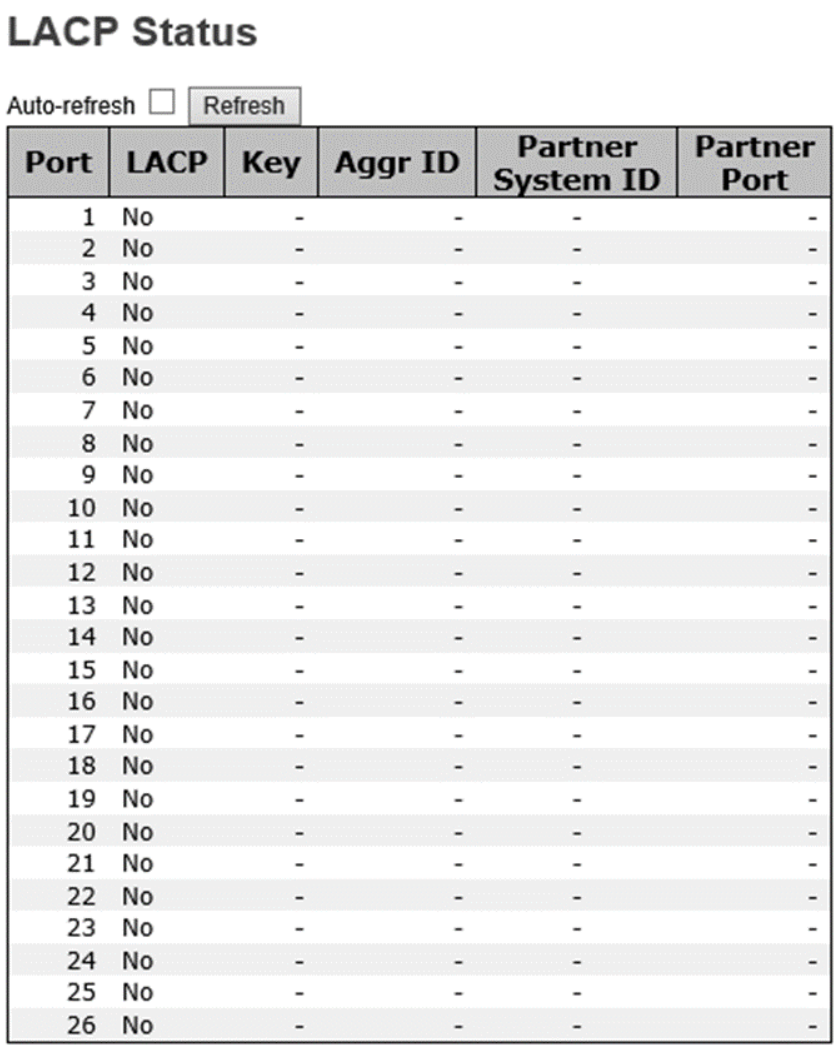


Label	Description
Aggr ID	The aggregation ID is associated with the aggregation instance. For LLAG, the ID is shown as '**isid:aggr-id**' and for GLAGs as '**aggr-id**'.
Partner System ID	System ID (MAC address) of the aggregation partner.
Partner Key	The key assigned by the partner to the aggregation ID.
Last Changed	The time since this aggregation changed.
Last Channged	Indicates which ports belong to the aggregation of the switch/stack. The format is: "**Switch ID:Port**".
Refresh	Click to refresh the page immediately.

PORT STATUS

This page provides an overview of the LACP status for all ports.

Figure 36:



LACP Status

Auto-refresh ☐ Refresh

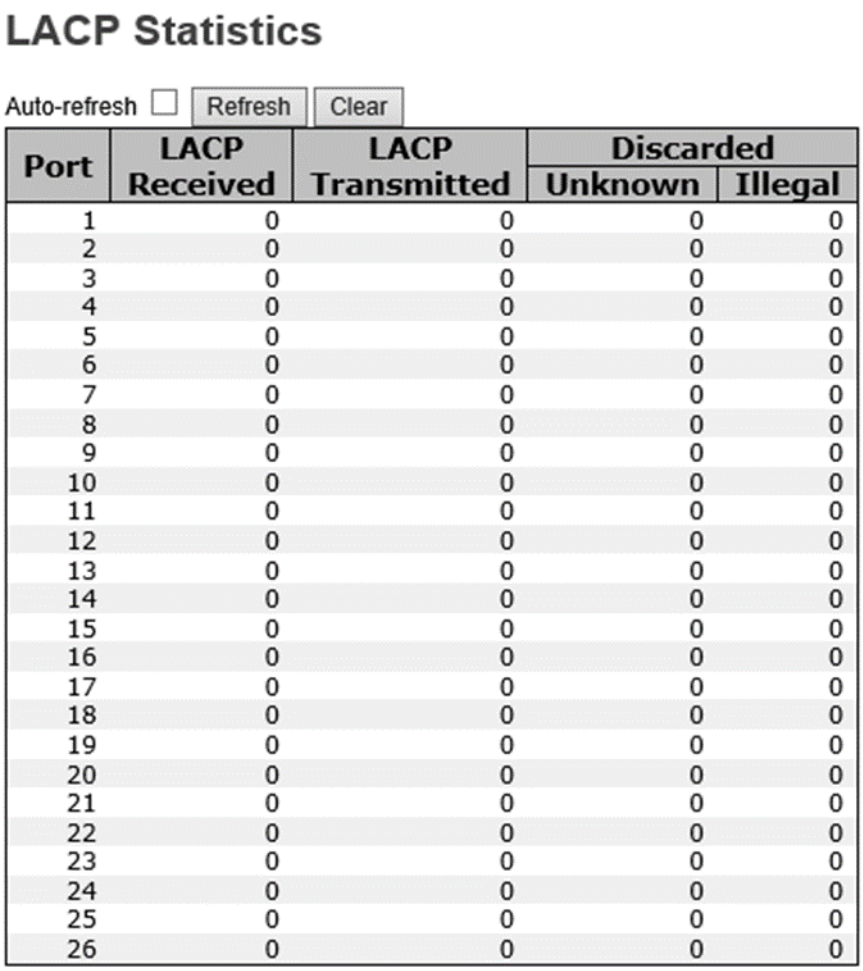
Port	LACP	Key	Aggr ID	Partner System ID	Partner Port
1	No	-	-	-	-
2	No	-	-	-	-
3	No	-	-	-	-
4	No	-	-	-	-
5	No	-	-	-	-
6	No	-	-	-	-
7	No	-	-	-	-
8	No	-	-	-	-
9	No	-	-	-	-
10	No	-	-	-	-
11	No	-	-	-	-
12	No	-	-	-	-
13	No	-	-	-	-
14	No	-	-	-	-
15	No	-	-	-	-
16	No	-	-	-	-
17	No	-	-	-	-
18	No	-	-	-	-
19	No	-	-	-	-
20	No	-	-	-	-
21	No	-	-	-	-
22	No	-	-	-	-
23	No	-	-	-	-
24	No	-	-	-	-
25	No	-	-	-	-
26	No	-	-	-	-

Label	Description
Port	Switch port number
LACP	**Yes** means LACP is enabled and the port link is up. **No** means LACP is not enabled or the port link is down. **Backup** means the port cannot join in the aggregation group unless other ports are removed. The LACP status is disabled.
Key	The key assigned to the port. Only ports with the same key can be aggregated
Aggr ID	The aggregation ID assigned to the aggregation group
Partner System ID	The partner's system ID (MAC address)
Partner Port	The partner's port number associated with the port
Refresh	Click to refresh the page immediately

LACP STATISTICS

This page provides an overview of the LACP statistics for all ports.

Figure 37:



LACP Statistics

Auto-refresh ☐ Refresh Clear

Port	LACP Received	LACP Transmitted	Discarded	
			Unknown	Illegal
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0

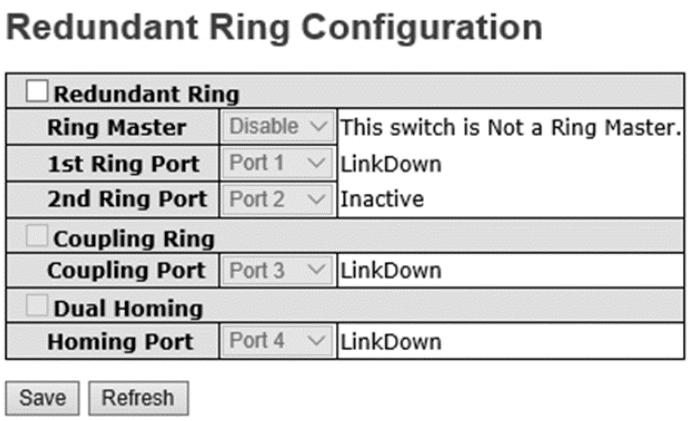
Label	Description
Port	Switch port number.
LACP Transmitted	The number of LACP frames sent from each port.
LACP Received	The number of LACP frames received at each port.
Discarded	The number of unknown or illegal LACP frames discarded at each port.
Refresh	Click to refresh the page immediately.
Clear	Click to clear the counters for all ports

4.5 Redundancy

4.5.1 Redundant Ring

Redundant Ring is the most powerful Ring in the world. The recovery time of Ring is less than 30 ms. It can reduce unexpected damage caused by network topology change. Ring Supports 3 Ring topology: Ring, Coupling Ring and Dual Homing.

Figure 38: Ring interface



The following table describes the labels in this screen.

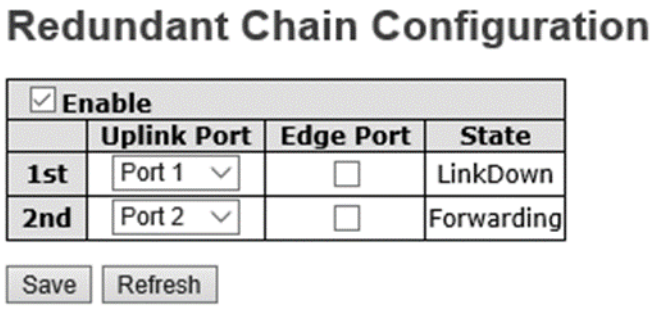
Label	Description
Redundant Ring	Mark to enable Ring.
Ring Master	There should be one and only one Ring Master in a ring. However if there are two or more switches which set Ring Master to enable, the switch with the lowest MAC address will be the actual Ring Master and others will be Backup Masters.
1st Ring Port	The primary port, when this switch is Ring Master.
2nd Ring Port	The backup port, when this switch is Ring Master.
Coupling Ring	Mark to enable Coupling Ring. Coupling Ring can be used to divide a big ring into two smaller rings to avoid effecting all switches when network topology change. It is a good application for connecting two Rings.
Coupling Port	Link to Coupling Port of the switch in another ring. Coupling Ring need four switches to build an active and a backup link. Set a port as coupling port. The coupled four ports of four switches will be run at active/backup mode.
Dual Homing	Mark to enable Dual Homing. By selecting Dual Homing mode, Ring will be connected to normal switches through two RSTP links (ex: backbone Switch). The two links work as active/backup mode and connect each Ring to the normal switches in RSTP mode.
Apply	Click "**Apply**" to set the configurations.

Note: We don't suggest you to set one switch as a Ring Master and a Coupling Ring at the same time due to heavy load.

4.5.2 Redundant Chain

Redundant Chain is very easy to configure and manage. Only one edge port of the edge switch needs to be defined. Other switches beside them just need to have Redundant Chain enabled.

Figure 39:



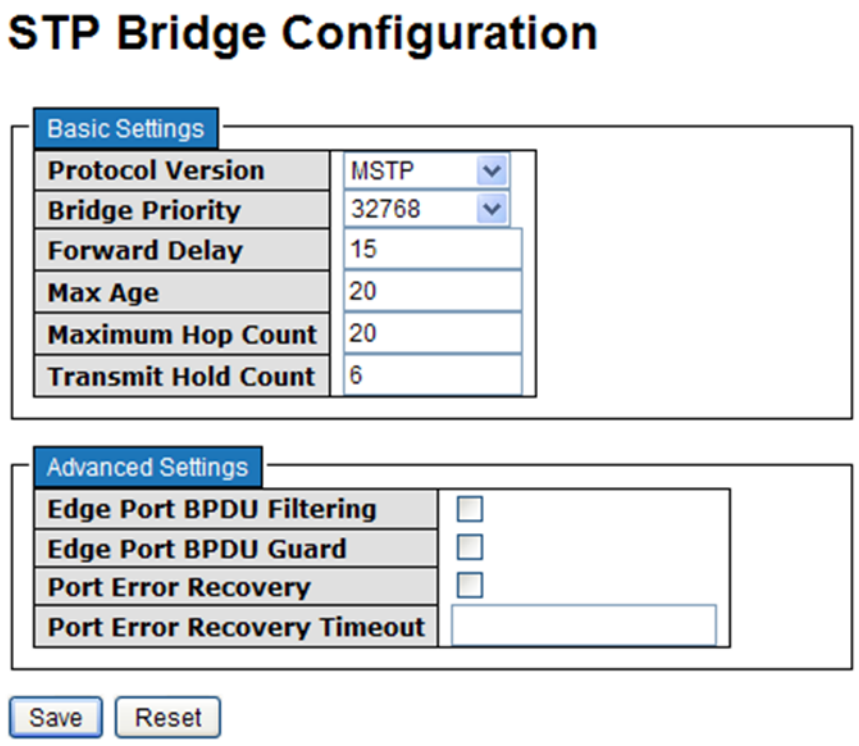
Label	Description
Enable	Check to enable redundant Chain function
1st Ring Port	The first port connecting to the ring
2nd Ring Port	The second port connecting to the ring
Edge Port	An Redundant Chain topology must begin with edge ports. The ports with a smaller switch MAC address will serve as the backup link and RM LED will light up.

4.5.3 MSTP

Bridge Settings

This page allows you to configure RSTP system settings. The settings are used by all RSTP Bridge instances in the Switch Stack.

Figure 40:



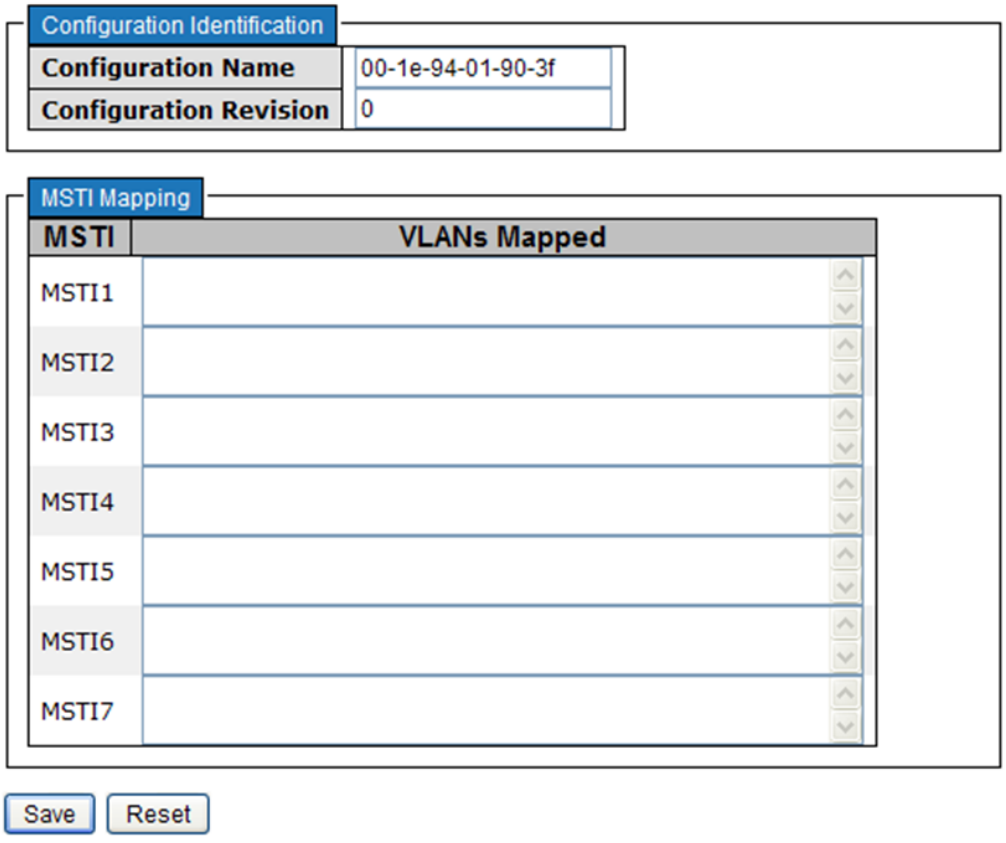
Label	Description
Protocol Version	The STP protocol version setting. Valid values are STP, RSTP and MSTP.
Forward Delay	The delay used by STP Bridges to transition Root and Designated Ports to Forwarding (used in STP compatible mode). Valid values are in the range 4 to 30 seconds.
Max Age	The maximum age of the information transmitted by the Bridge when it is the Root Bridge. Valid values are in the range 6 to 40 seconds, and MaxAge must be <= (FwdDelay-1)*2.
Maximum Hop Count	This defines the initial value of remainingHops for MSTI information generated at the boundary of an MSTI region. It defines how many bridges a root bridge can distribute its BPDU information. Valid values are in the range 4 to 30 seconds, and MaxAge must be <= (FwdDelay-1)*2.
Transmit Hold Count	The number of BPDU's a bridge port can send per second. When exceeded, transmission of the next BPDU will be delayed. Valid values are in the range 1 to 10 BPDU's per second.

Label	Description
Edge Port BPDU Filitering	Control whether a port explicitly configured as Edge will transmit and receive BPDUs.
Edge Port BPDU Guard	Control whether a port explicitly configured as Edge will disable itself upon reception of a BPDU. The port will enter the error-disabled state and will be removed from the active topology.
Port Error Recovery	Control whether a port in the error-disabled state automatically will be enabled after a certain time. If recovery is not enabled, ports have to be disabled and re-enabled for normal STP operation. The condition is also cleared by a system reboot.
Port Error Recovery timeout	The time to pass before a port in the error-disabled state can be enabled. Valid values are between 30 and 86400 seconds (24 hours).
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

MSTI Mapping

This page allows the user to inspect the current STP MSTI bridge instance priority configurations, and possibly change them as well.

Figure 41:

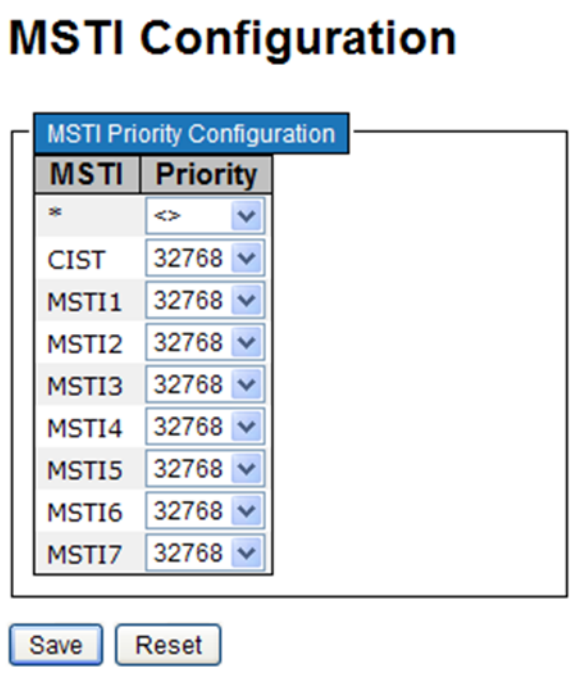


Label	Description
Configuration Name	The name identifiying the VLAN to MSTI mapping. Bridges must share the name and revision (see below), as well as the VLAN-to-MSTI mapping configuration in order to share spanning trees for MSTI's. (Intra-region). The name is at most 32 characters.
Configuration Revision	The revision of the MSTI configuration named above. This must be an integer between 0 and 65535.
MSTI	The bridge instances. The CIST is not available for explicit mapping, as it will receive the VLANs not explicitly mapped.
VLANS Mapped	The list of VLAN's mapped to the MSTI. The VLANs must be separated with comma and/or space. A VLAN can only be mapped to one MSTI. An unused MSTI should just be left empty. (I.e. not having any VLANs mapped to it.)
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

MSTI Priorities

This page allows the user to inspect the current STP MSTI bridge instance priority configurations, and possibly change them as well.

Figure 42:

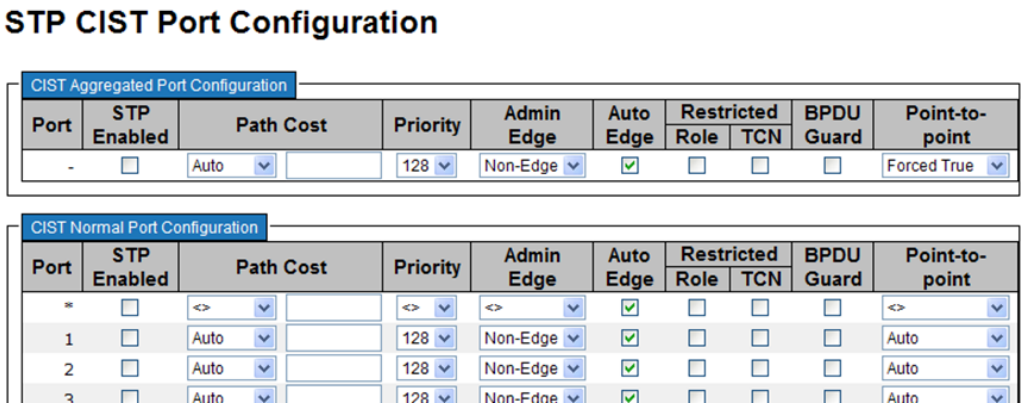


Label	Description
MSTI	The bridge instance. The CIST is the default instance, which is always active.
Priority	Controls the bridge priority. Lower numerical values have better priority. The bridge priority plus the MSTI instance number, concatenated with the 6-byte MAC address of the switch forms a Bridge Identifier.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

CIST Ports

This page allows the user to inspect the current STP CIST port configurations, and possibly change them as well. This page contains settings for physical and aggregated ports. The aggregation settings are stack global.

Figure 43:



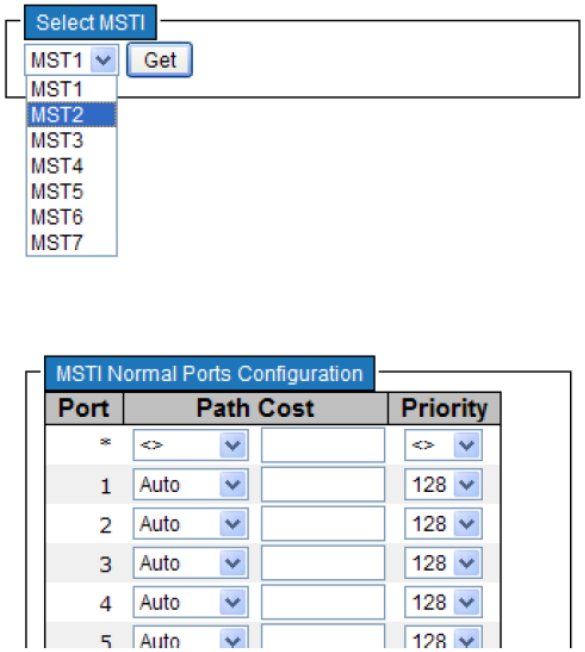
Label	Description
Port	The switch port number of the logical STP port.
STP Enabled	Controls whether STP is enabled on this switch port.
Path Cost	Controls the path cost incurred by the port. The Auto setting will set the path cost as appropriate by the physical link speed, using the 802.1D recommended values. Using the Specific setting, a user-defined value can be entered. The path cost is used when establishing the active topology of the network. Lower path cost ports are chosen as forwarding ports in favor of higher path cost ports. Valid values are in the range 1 to 200000000.
Priority	Controls the port priority. This can be used to control priority of ports having identical port cost. (See above).
OpenEdge (setate flag)	Operational flag describing whether the port is connecting directly to edge devices. (No Bridges attached). Transitioning to the forwarding state is faster for edge ports (having operEdge true) than for other ports.
AdminEdge	Controls whether the operEdge flag should start as beeing set or cleared. (The initial operEdge state when a port is initialized).

Label	Description
AutoEdge	Controls whether the bridge should enable automatic edge detection on the bridge port. This allows operEdge to be derived from whether BPDU's are received on the port or not.
Restricted Role	If enabled, causes the port not to be selected as Root Port for the CIST or any MSTI, even if it has the best spanning tree priority vector. Such a port will be selected as an Alternate Port after the Root Port has been selected. If set, it can cause lack of spanning tree connectivity. It can be set by a network administrator to prevent bridges external to a core region of the network influencing the spanning tree active topology, possibly because those bridges are not under the full control of the administrator. This feature is also known as Root Guard.
Restricted TCN	If enabled, causes the port not to propagate received topology change notifications and topology changes to other ports. If set it can cause temporary loss of connectivity after changes in a spanning trees active topology as a result of persistent incorrectly learned station location information. It is set by a network administrator to prevent bridges external to a core region of the network, causing address flushing in that region, possibly because those bridges are not under the full control of the administrator or is the physical link state for the attached LANs transitions frequently.
Point2Point	Controls whether the port connects to a point-to-point LAN rather than a shared medium. This can be automatically determined or forced either true or false. Transition to the forwarding state is faster for point-to-point LANs than for shared media.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

MSTI Ports

This page allows the user to inspect the current STP MSTI port configurations, and possibly change them as well. A MSTI port is a virtual port, which is instantiated seperately for each active CIST (physical) port for each MSTI instance configured and applicable for the port. The MSTI instance must be selected before displaying actual MSTI port configuration options. This page contains MSTI port settings for physical and aggregated ports. The aggregation settings are stack global.

Figure 44:



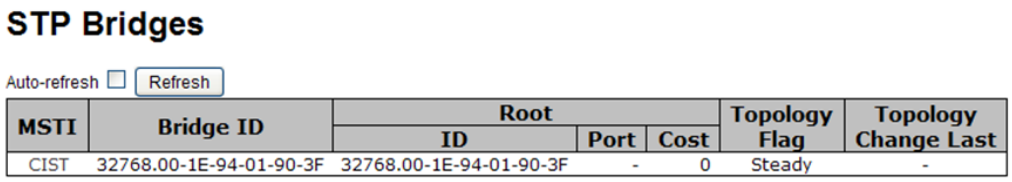
Label	Description
Port	The switch port number of the corresponding STP CIST (and MSTI) port.
Path Cost	Controls the path cost incurred by the port. The Auto setting will set the path cost as appropriate by the physical link speed, using the 802.1D recommended values. Using the Specific setting, a user-defined value can be entered. The path cost is used when establishing the active topology of the network. Lower path cost ports are chosen as forwarding ports in favor of higher path cost ports. Valid values are in the range 1 to 200000000.
Priority	Controls the port priority. This can be used to control priority of ports having identical port cost. (See above).

Bridges Status

This page provides a status overview for all STP bridge instances.

The displayed table contains a row for each STP bridge instance, where the column displays the following information:

Figure 45:

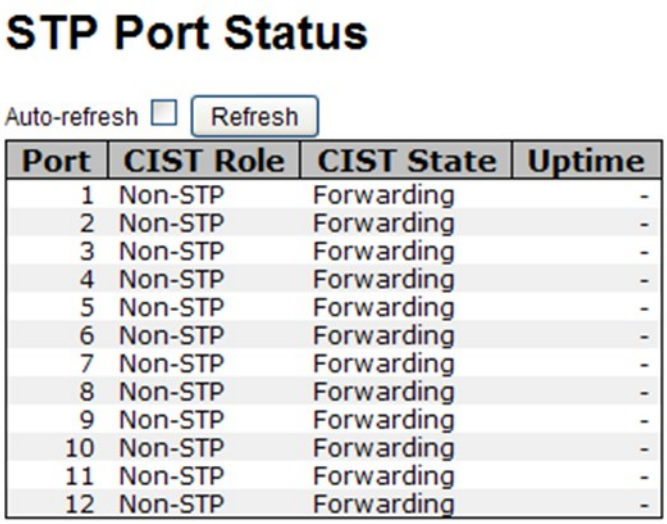


Label	Description
MSTI	The Bridge Instance. This is also a link to the STP Detailed Bridge Status.
Bridge ID	The Bridge ID of this Bridge instance.
Root ID	The Bridge ID of the currently elected root bridge.
Root Port	The switch port currently assigned the root port role.
Root Cost	Root Path Cost. For the Root Bridge this is zero. For all other Bridges, it is the sum of the Port Path Costs on the least cost path to the Root Bridge.
Topology Flag	The current state of the Topology Change Flag for this Bridge instance.
Topology Change Last	The time since last Topology Change occurred.

Port Status

This page displays the STP CIST port status for port physical ports in the currently selected switch.

Figure 46:

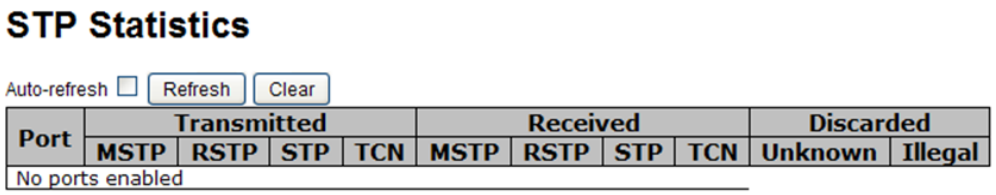


Label	Description
Port	The switch port number of the logical STP port.
CIST Role	The current STP port role of the CIST port. The port role can be one of the following values: AlternatePort BackupPort RootPort DesignatedPort.
State	The current STP port state of the CIST port. The port state can be one of the following values: Blocking Learning Forwarding.
Uptime	The time since the bridge port was last initialized.

Port Statistics

This page displays the RSTP port statistics counters for bridge ports in the currently selected switch.

Figure 47:



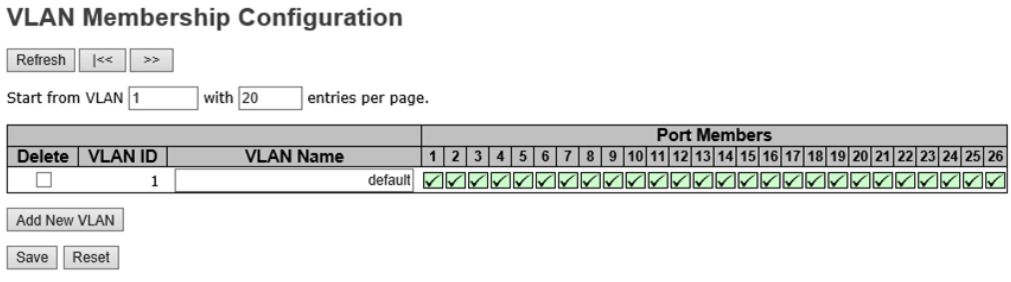
Label	Description
Port	The switch port number of the logical RSTP port.
RSTP	The number of RSTP Configuration BPDU's received/transmitted on the port.
STP	The number of legacy STP Configuration BPDU's received/transmitted on the port.
TCN	The number of (legacy) Topology Change Notification BPDU's received/transmitted on the port.
Discarded Unknown	The number of unknown Spanning Tree BPDU's received (and discarded) on the port.
Discarded Illegal	The number of illegal Spanning Tree BPDU's received (and discarded) on the port.

4.6 VLAN

4.6.1 VLAN Membership

You can view and change VLAN membership configurations for a selected switch stack in this page. Up to 64 VLANs are supported. This page allows for adding and deleting VLANs as well as adding and deleting port members of each VLAN.

Figure 48:

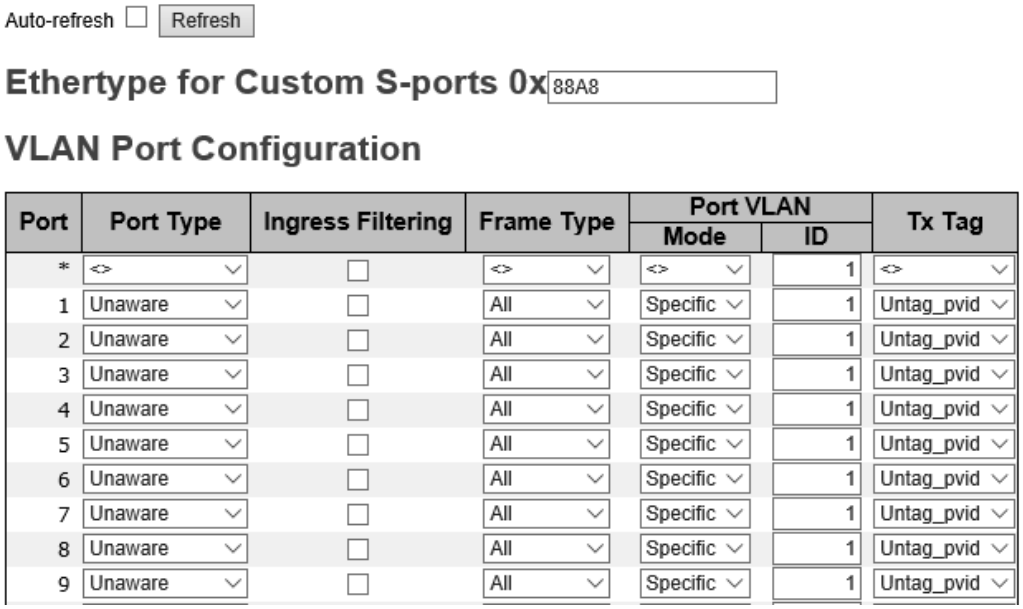


Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
VLAN ID	The VLAN ID for the entry.
MAC Address	The MAC address for the entry.
Port Members	Checkmarks indicate which ports are members of the entry. Check or uncheck as needed to modify the entry.
Add New VLAN	Click to add a new VLAN ID. An empty row is added to the table, and the VLAN can be configured as needed. Valid values for a VLAN ID are 1 through 4095. After clicking **Save**, the new VLAN will be enabled on the selected switch stack but contains no port members. A VLAN without any port members on any stack will be deleted when you click **Save**. Click **Delete** to undo the addition of new VLANs.

4.6.2 Ports

This page allows you to set up VLAN ports individually.

Figure 49:



Label	Description
Ethertype for customer S-Ports	This field specifies the Ether type used for custom S-ports. This is a global setting for all custom S-ports.
Port	The switch port number to which the following settings will be applied.
Port type	Port can be one of the following types: **Unaware, Customer (C-port), Service (S-port), Custom Service (S-custom-port).** If port type is **Unaware**, all frames are classified to the port VLAN ID and tags are not removed.

Label	Description
Ingress Filtering	Enable ingress filtering on a port by checking the box. This parameter affects VLAN ingress processing. If ingress filtering is enabled and the ingress port is not a member of the classified VLAN of the frame, the frame will be discarded. By default, ingress filtering is disabled (no check mark).
Frame Type	Determines whether the port accepts all frames or only tagged/untagged frames. This parameter affects VLAN ingress processing. If the port only accepts tagged frames, untagged frames received on the port will be discarded. By default, the field is set to **All**.
Port VLAN Mode	The allowed values are **None** or **Specific**. This parameter affects VLAN ingress and egress processing. If **None** is selected, a VLAN tag with the classified VLAN ID is inserted in frames transmitted on the port. This mode is normally used for ports connected to VLAN-aware switches. Tx tag should be set to Untag_pvid when this mode is used. If **Specific** (the default value) is selected, a port VLAN ID can be configured (see below). Untagged frames received on the port are classified to the port VLAN ID. If VLAN awareness is disabled, all frames received on the port are classified to the port VLAN ID. If the classified VLAN ID of a frame transmitted on the port is different from the port VLAN ID, a VLAN tag with the classified VLAN ID will be inserted in the frame.
Port VLAN ID	Configures the VLAN identifier for the port. The allowed range of the values is 1 through 4095. The default value is 1. The port must be a member of the same VLAN as the port VLAN ID.
Tx Tag	Determines egress tagging of a port. **Untag_pvid**: all VLANs except the configured PVID will be tagged. **Tag_all**: all VLANs are tagged. **Untag_all**: all VLANs are untagged.

4.6.3 Introduction of Port Types

Below is a detailed description of each port type, including Unaware, C-port, S-port, and S-custom-port.

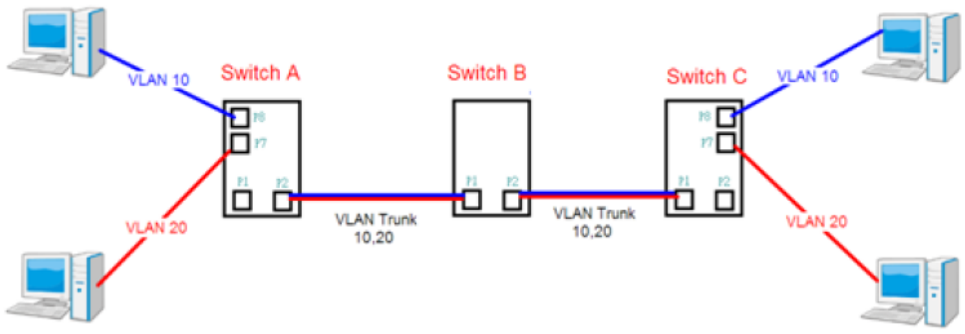
	Ingress action	Egress action
Unaware **The function of Unaware can be used for 802.1QinQ (double tag).**	When the port receives untagged frames, an untagged frame obtains a tag (based on PVID) and is forwarded. When the port receives tagged frames: 1. If the tagged frame contains a TPID of 0x8100, it will become a double-tag frame and will be forwarded. 2. If the TPID of tagged frame is not 0x8100 (ex. 0x88A8), it will be discarded.	The TPID of a frame transmitted by Unaware port will be set to 0x8100. The final status of the frame after egressing will also be affected by the Egress Rule.
C-port	When the port receives untagged frames, an untagged frame obtains a tag (based on PVID) and is forwarded. When the port receives tagged frames:	The TPID of a frame transmitted by C-port will be set to 0x8100.

	Ingress action	Egress action
	1. If the tagged frame contains a TPID of 0x8100, it will be forwarded. 2. If the TPID of tagged frame is not 0x8100 (ex. 0x88A8), it will be discarded.	
S-port	When the port receives untagged frames, an untagged frame obtains a tag (based on PVID) and is forwarded. When the port receives tagged frames: 1. If the tagged frame contains a TPID of 0x8100, it will be forwarded. 2. If the TPID of tagged frame is not 0x88A8 (ex. 0x8100), it will be discarded.	The TPID of a frame transmitted by S-port will be set to 0x88A8.
S-custom-port	When the port receives untagged frames, an untagged frame obtains a tag (based on PVID) and is forwarded. When the port receives tagged frames: 1. If the tagged frame contains a TPID of 0x8100, it will be forwarded. 2. If the TPID of tagged frame is not 0x88A8 (ex. 0x8100), it will be discarded.	The TPID of a frame transmitted by S-custom-port will be set to a self-customized value, which can be set by the user via **Ethertype for Custom S-ports.**

VLAN Settings Example:

VLAN Access Mode:

Figure 50:



Switch A,

Port 7 is VLAN Access mode = Untagged 20

Port 8 is VLAN Access mode = Untagged 10

Below are the switch settings.

Figure 51:

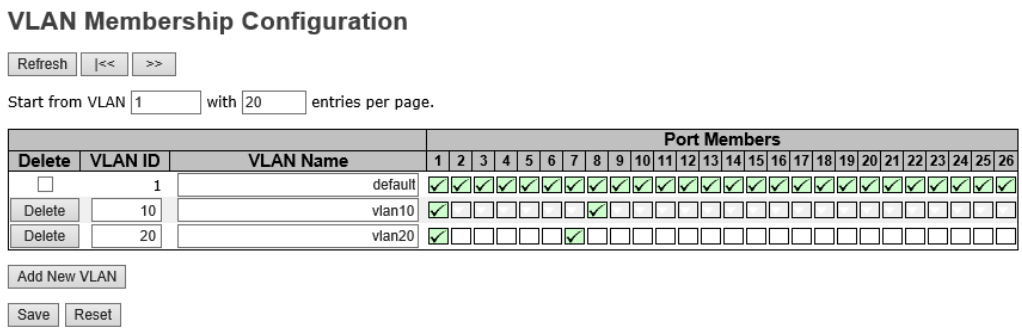
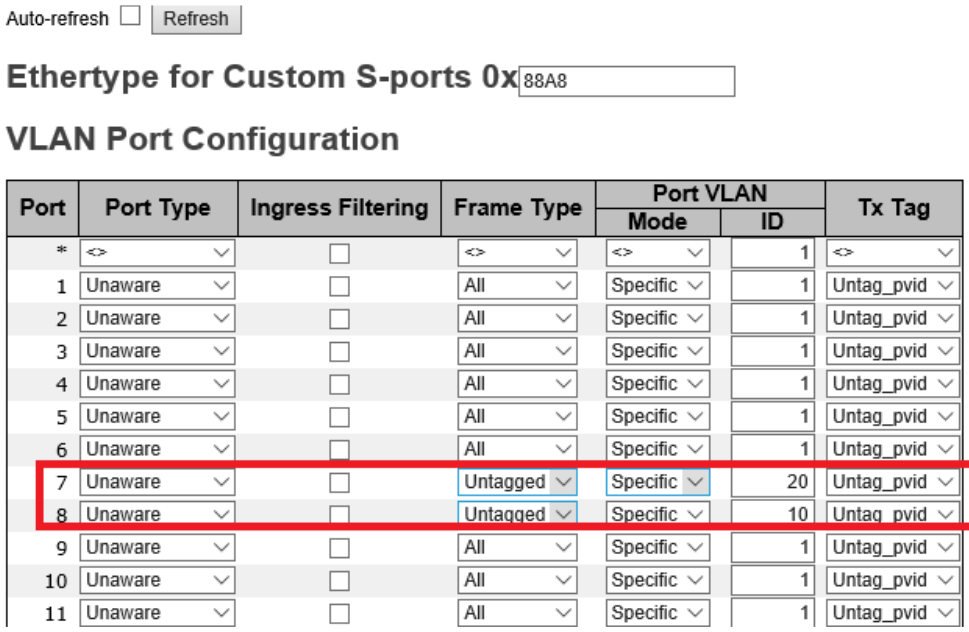
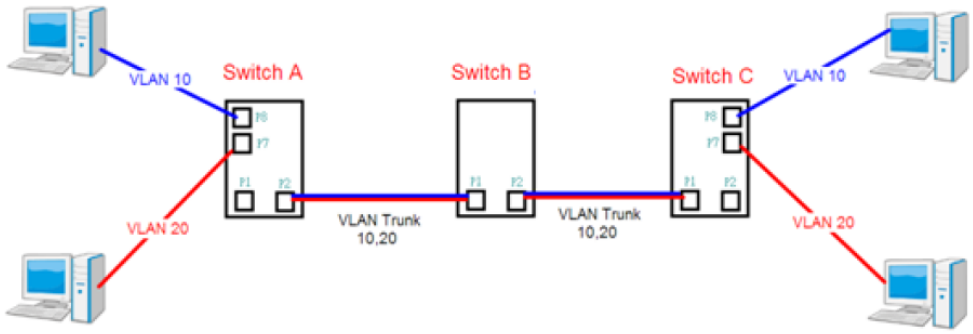


Figure 52:



VLAN 1Q Trunk Mode:

Figure 53:



Switch B,

Port 1 = VLAN 1Qtrunk mode = tagged 10, 20

Port 2 = VLAN 1Qtrunk mode = tagged 10, 20

Below are the switch settings.

Figure 54:

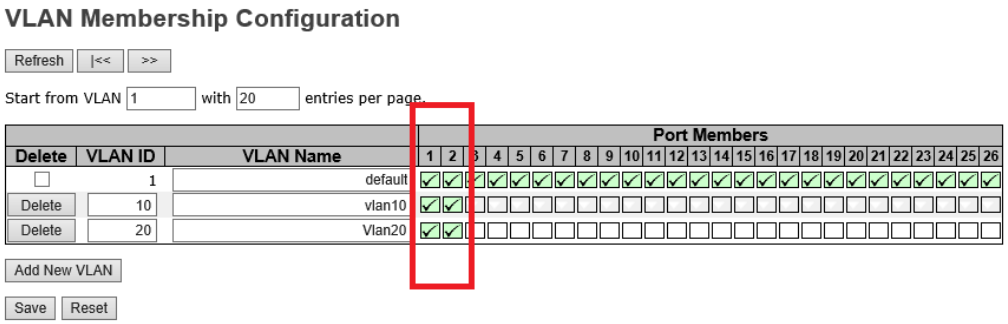
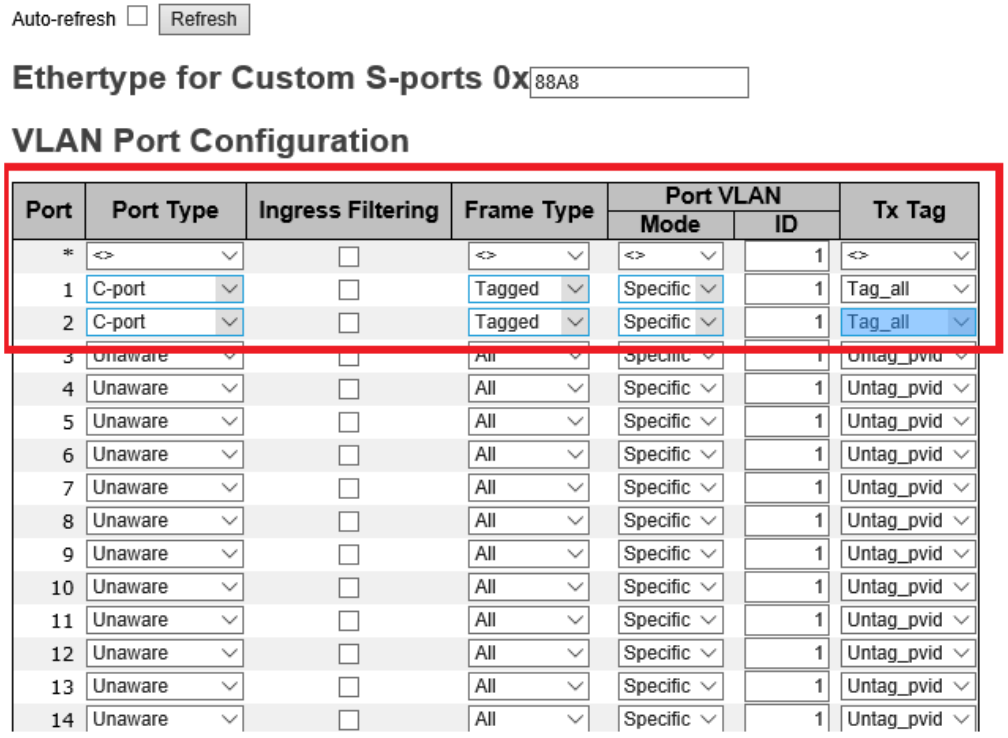


Figure 55:



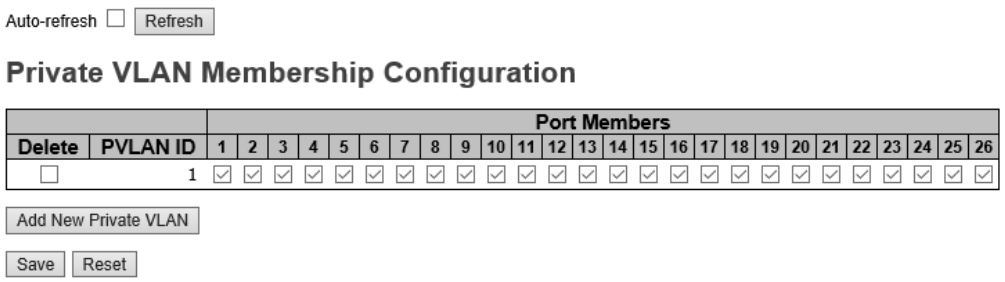
4.6.4 Private VLAN

1. VLAN Membership

The private VLAN membership configuration for the switch can be monitored and modified here. Private VLANs can be added or deleted here. Port members of each private VLAN can be added or removed here. Private VLANs are based on the source port mask, and there are no connections to VLANs. This means that VLAN IDs and private VLAN IDs can be identical.

A port must be a member of both a VLAN and a private VLAN to be able to forward packets. By default, all ports are VLAN unaware and members of VLAN 1 and private VLAN 1. A VLAN-unaware port can only be a member of one VLAN, but it can be a member of multiple private VLANs.

Figure 56:

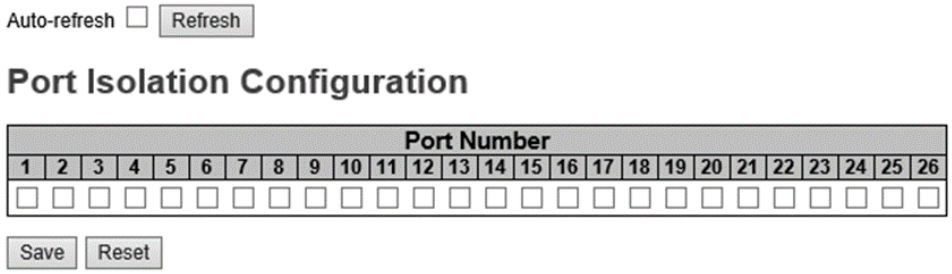


Label	Description

Delete	Check to delete the entry. It will be deleted during the next save.
PVLAN ID	Indicates the ID of this particular private VLAN.
Port Members	A row of check boxes for each port is displayed for each private VLAN ID. You can check the box to include a port in a private VLAN. To remove or exclude the port from the private VLAN, make sure the box is unchecked. By default, no ports are members, and all boxes are unchecked.
Adding New Private VLAN	Click the button to add a new private VLAN ID. An empty row is added to the table, and the private VLAN can be configured as needed. The allowed range for a private VLAN ID is the same as the switch port number range. Any values outside this range are not accepted, and a warning message appears. Click OK to discard the incorrect entry, or click Cancel to return to the editing and make a correction. The private VLAN is enabled when you click Save. The **Delete** button can be used to undo the addition of new private VLANs.

2. Port Isolation

Figure 57:

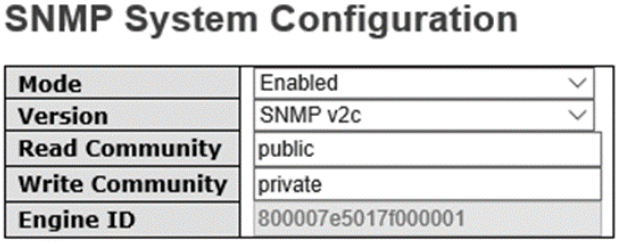


Label	Description
Port Member	A check box is provided for each port of a private VLAN. When checked, port isolation is enabled for that port. When unchecked, port isolation is disabled for that port. By default, port isolation is disabled for all ports.

4.7 SNMP

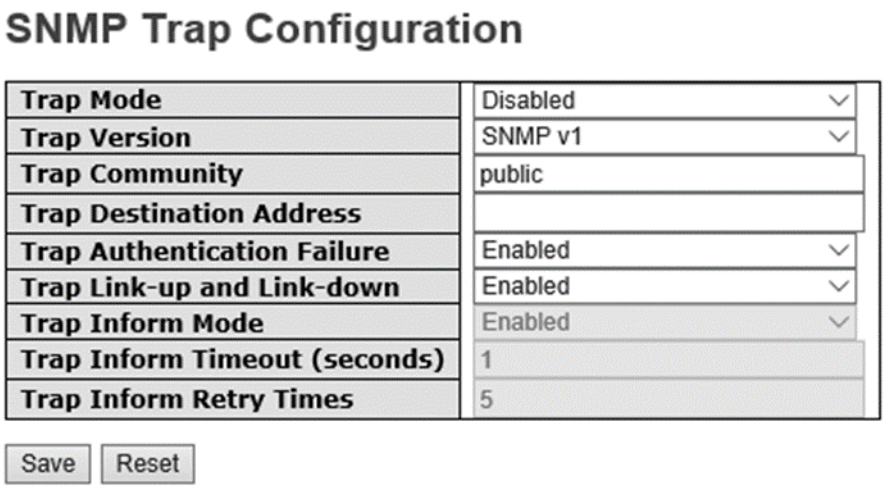
4.7.1 System

Figure 58:



Label	Description
Mode	Indicates existing SNMP mode. Possible modes include: **Enabled:** enable SNMP mode **Disabled:** disable SNMP mode
Version	Indicates the supported SNMP version. Possible versions include: **SNMP v1:** supports SNMP version 1. **SNMP v2c:** supports SNMP version 2c. **SNMP v3:** supports SNMP version 3.
Read Community	Indicates the read community string to permit access to SNMP agent. The allowed string length is 0 to 255, and only ASCII characters from 33 to 126 are allowed. The field only suits to SNMPv1 and SNMPv2c. SNMPv3 uses USM for authentication and privacy and the community string will be associated with SNMPv3 community table.
Write Community	Indicates the write community string to permit access to SNMP agent. The allowed string length is 0 to 255, and only ASCII characters from 33 to 126 are allowed. The field only suits to SNMPv1 and SNMPv2c. SNMPv3 uses USM for authentication and privacy and the community string will be associated with SNMPv3 community table.
Engine ID	Indicates the SNMPv3 engine ID. The string must contain an even number between 10 and 64 hexadecimal digits, but all-zeros and all-'F's are not allowed. Change of the Engine ID will clear all original local users.

Figure 59:

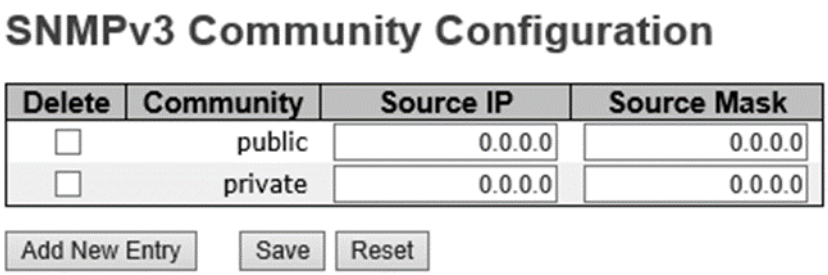


Label	Description
Trap Mode	Indicates existing SNMP trap mode. Possible modes include: **Enabled**: enable SNMP trap mode **Disabled**: disable SNMP trap mode
Trap Version	Indicates the supported SNMP trap version. Possible versions include: **SNMP v1**: supports SNMP trap version 1 **SNMP v2c**: supports SNMP trap version 2c **SNMP v3**: supports SNMP trap version 3
Trap Community	Indicates the community access string when sending SNMP trap packets. The allowed string length is 0 to 255, and only ASCII characters from 33 to 126 are allowed.
Trap Destination Address	Indicates the SNMP trap destination address
Trap Destination IPv6 Address	Provides the trap destination IPv6 address of this switch. IPv6 address consists of 128 bits represented as eight groups of four hexadecimal digits with a colon separating each field (:). For example, in 'fe80::215:c5ff: fe03:4dc7', the symbol '::' is a special syntax that can be used as a shorthand way of representing multiple 16-bit groups of contiguous zeros; but it can only appear once. It also uses a following legally IPv4 address. For example, ':192.1.2.34'.
Trap Authentication Failure	Indicates the SNMP entity is permitted to generate authentication failure traps. Possible modes include: **Enabled**: enable SNMP trap authentication failure. **Disabled**: disable SNMP trap authentication failure.
Trap Link-up and Link-down	Indicates the SNMP trap link-up and link-down mode. Possible modes include: **Enabled**: enable SNMP trap link-up and link-down mode. **Disabled**: disable SNMP trap link-up and link-down mode.
Trap Inform Mode	Indicates the SNMP trap inform mode. Possible modes include: **Enabled**: enable SNMP trap inform mode. **Disabled**: disable SNMP trap inform mode.
Trap Inform Timeout(seconds)	Configures the SNMP trap inform timeout. The allowed range is 0 to 2147.
Trap Inform Retry Times	Configures the retry times for SNMP trap inform. The allowed range is 0 to 255.

4.7.2 Communities

This page allows you to configure SNMPv3 community table. The entry index key is Community.

Figure 60:

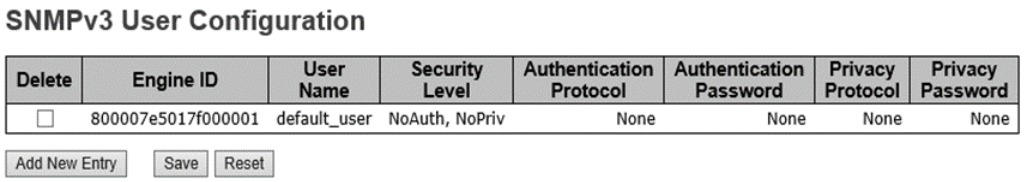


Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Community	Indicates the community access string to permit access to SNMPv3 agent. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.
Source IP	Indicates the SNMP source address
Source Mask	Indicates the SNMP source address mask

4.7.3 Users

This page allows you to configure SNMPv3 user table. The entry index keys are **Engine ID** and **User Name**.

Figure 61:

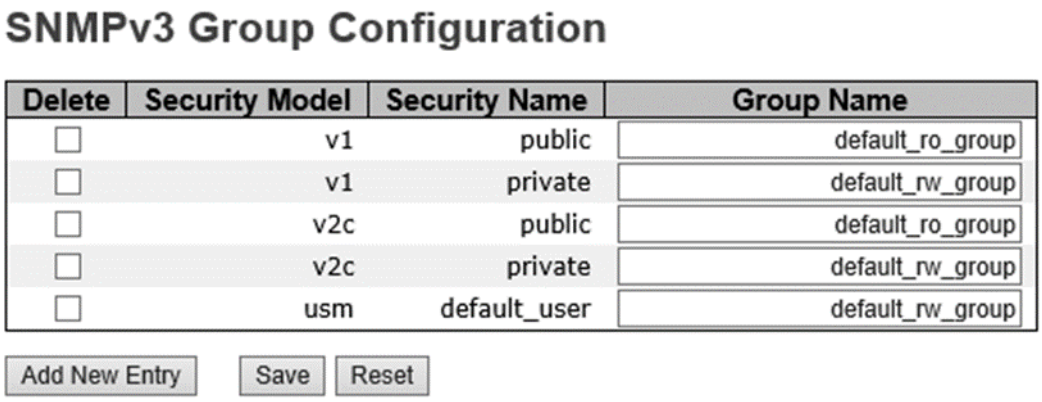


Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Engine ID	An octet string identifying the engine ID that this entry should belong to. The string must contain an even number between 10 and 64 hexadecimal digits, but all-zeros and all-'F's are not allowed. The SNMPv3 architecture uses User-based Security Model (USM) for message security and View-based Access Control Model (VACM) for access control. For the USM entry, the **usmUserEngineI**D and **usmUserName** are the entry keys. In a simple agent, usmUserEngineID is always that agent's own snmpEngineID value. The value can also take the value of the snmpEngineID of a remote SNMP engine with which this user can communicate. In other words, if user engine ID is the same as system engine ID, then it is local user; otherwise it's remote user.
User Name	A string identifying the user name that this entry should belong to. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.
Security Level	Indicates the security model that this entry should belong to. Possible security models include: **NoAuth, NoPriv:** no authentication and no privacy **Auth, NoPriv:** Authentication without privacy **Auth, Priv:** Authentication with privacy The value of security level cannot be modified if the entry already exists, which means the value must be set correctly at the time of entry creation.
Authentication Protocol	Indicates the authentication protocol that this entry should belong to. Possible authentication protocols include: **None:** no authentication protocol **MD5:** an optional flag to indicate that this user is using MD5 authentication protocol **SHA:** an optional flag to indicate that this user is using SHA authentication protocol The value of security level cannot be modified if the entry already exists, which means the value must be set correctly at the time of entry creation.
Authentication Password	A string identifying the authentication pass phrase. For MD5 authentication protocol, the allowed string length is 8 to 32. For SHA authentication protocol, the allowed string length is 8 to 40. Only ASCII characters from 33 to 126 are allowed.
Privacy Protocol	Indicates the privacy protocol that this entry should belong to. Possible privacy protocols include: **None:** no privacy protocol **DES:** an optional flag to indicate that this user is using DES authentication protocol
Privacy Password	A string identifying the privacy pass phrase. The allowed string length is 8 to 32, and only ASCII characters from 33 to 126 are allowed.

4.7.4 Groups

This page allows you to configure SNMPv3 group table. The entry index keys are **Security Model** and **Security Name**.

Figure 62:

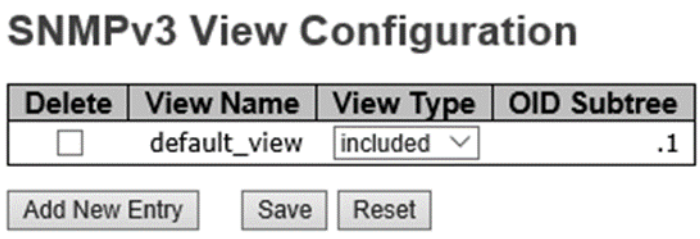


Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Security Model	Indicates the security model that this entry should belong to. Possible security models included: **v1**: Reserved for SNMPv1. **v2c**: Reserved for SNMPv2c. **usm**: User-based Security Model (USM).
Security Name	A string identifying the security name that this entry should belong to. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.
Group Name	A string identifying the group name that this entry should belong to. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.

4.7.5 Views

This page allows you to configure SNMPv3 view table. The entry index keys are **View Name** and **OID Subtree**.

Figure 63:

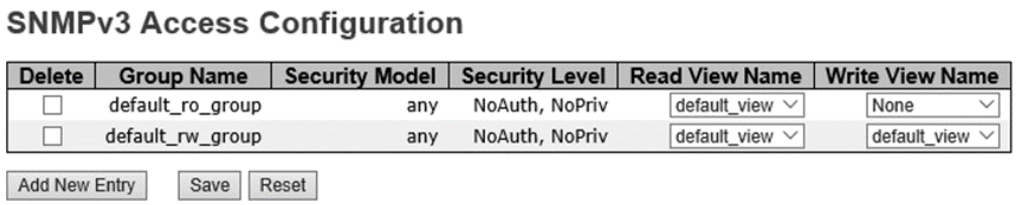


Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
View Name	A string identifying the view name that this entry should belong to. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.
View Type	Indicates the view type that this entry should belong to. Possible view types include: **Included**: an optional flag to indicate that this view subtree should be included. **Excluded**: An optional flag to indicate that this view subtree should be excluded. Generally, if an entry's view type is **Excluded**, it should exist another entry whose view type is **Included, and** its OID subtree oversteps the **Excluded** entry.
OID Subtree	The OID defining the root of the subtree to add to the named view. The allowed OID length is 1 to 128. The allowed string content is digital number or asterisk (*).

4.7.6 Access

This page allows you to configure SNMPv3 access table. The entry index keys are **Group Name, Security Model**, and **Security Level**.

Figure 64:



Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Group Name	A string identifying the group name that this entry should belong to. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.
Security Model	Indicates the security model that this entry should belong to. Possible security models include: **any**: Accepted any security model (v1|v2c|usm). **v1**: Reserved for SNMPv1. **v2c**: Reserved for SNMPv2c. **usm**: User-based Security Model (USM).
Security Level	Indicates the security model that this entry should belong to. Possible security models include: **NoAuth, NoPriv**: no authentication and no privacy **Auth, NoPriv**: Authentication without privacy **Auth, Priv**: Authentication with privacy
Read View Name	The name of the MIB view defining the MIB objects for which this request may request the current values. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.

Label	Description
Write View Name	The name of the MIB view defining the MIB objects for which this request may potentially SET new values. The allowed string length is 1 to 32, and only ASCII characters from 33 to 126 are allowed.

4.8 Traffic Prioritization

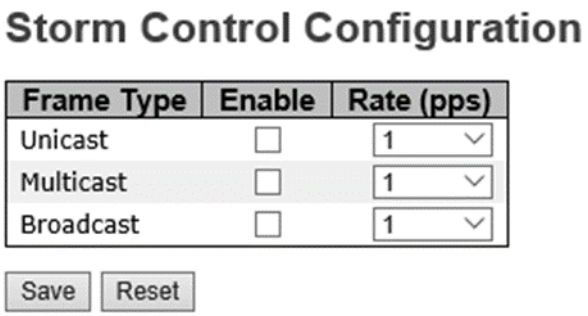
4.8.1 Storm Control

There is a unicast storm rate control, multicast storm rate control, and a broadcast storm rate control. These only affect flooded frames, i.e. frames with a (VLAN ID, DMAC) pair not present on the MAC Address table.

The rate is 2^n, where n is equal to or less than 15, or "No Limit". The unit of the rate can be either pps (packets per second) or kpps (kilopackets per second). The configuration indicates the permitted packet rate for unicast, multicast, or broadcast traffic across the switch.

Note: frames sent to the CPU of the switch are always limited to approximately 4 kpps. For example, broadcasts in the management VLAN are limited to this rate. The management VLAN is configured on the IP setup page.

Figure 65:

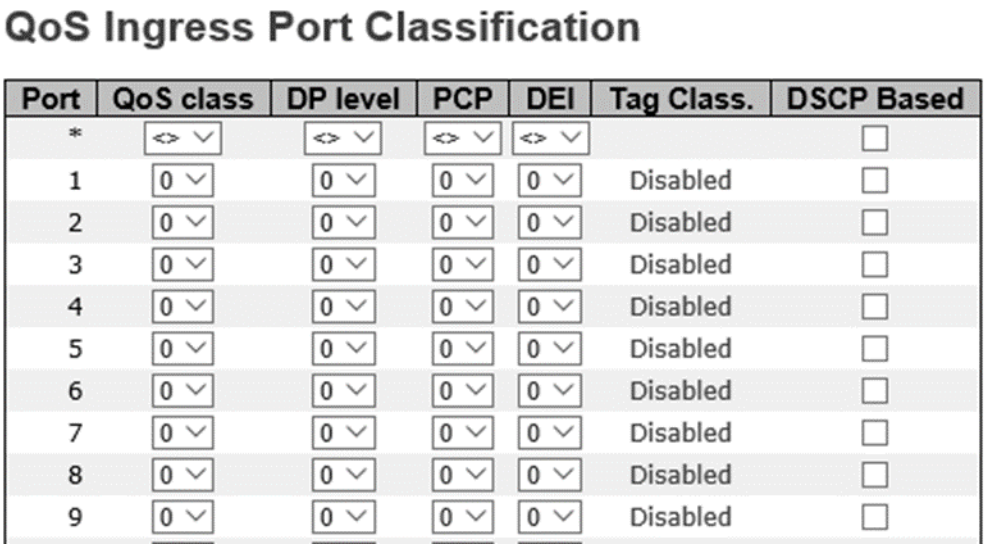


Label	Description
Frame Type	The settings in a particular row apply to the frame type listed here: **unicast**, **multicast**, or **broadcast**.
Status	Enable or disable the storm control status for the given frame type.
Rate	The rate unit is packet per second (pps), configure the rate as 1K, 2K, 4K, 8K, 16K, 32K, 64K, 128K, 256K, 512K, or 1024K. The 1 kpps is actually 1002.1 pps.

4.8.2 Port Classification

QoS is an acronym for Quality of Service. It is a method to achieve efficient bandwidth utilization between individual applications or protocols.

Figure 66:



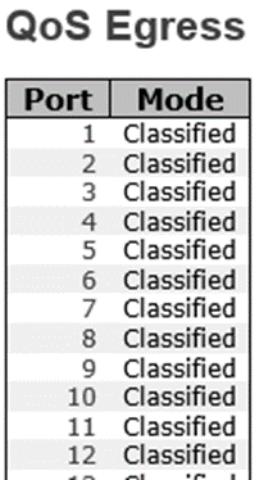
Label	Description
Port	The port number for which the configuration below applies
QoS Class	Controls the default QoS class All frames are classified to a QoS class. There is a one to one mapping between QoS class, queue, and priority. A QoS class of 0 (zero) has the lowest priority. If the port is VLAN aware and the frame is tagged, then the frame is classified to a QoS class that is based on the PCP value in the tag as shown below. Otherwise the frame is classified to the default QoS class. PCP value: 0 1 2 3 4 5 6 7 QoS class: 1 0 2 3 4 5 6 7 If the port is VLAN aware, the frame is tagged, and Tag Class is enabled, then the frame is classified to a QoS class that is mapped from the PCP and DEI value in the tag. Otherwise the frame is classified to the default QoS class. The classified QoS class can be overruled by a QCL entry. ***Note:*** *if the default QoS class has been dynamically changed, then the actual default QoS class is shown in parentheses after the configured default QoS class.*
DP level	Controls the default Drop Precedence Level All frames are classified to a DP level. If the port is VLAN aware and the frame is tagged, then the frame is classified to a DP level that is equal to the DEI value in the tag. Otherwise the frame is classified to the default DP level. If the port is VLAN aware, the frame is tagged, and Tag Class is enabled, then the frame is classified to a DP level that is mapped from the PCP and DEI value in the

Label	Description
	tag. Otherwise the frame is classified to the default DP level. The classified DP level can be overruled by a QCL entry.
PCP	Controls the default PCP value All frames are classified to a PCP value. If the port is VLAN aware and the frame is tagged, then the frame is classified to the PCP value in the tag. Otherwise the frame is classified to the default PCP value.
DEI	Controls the default DEI value All frames are classified to a DEI value. If the port is VLAN aware and the frame is tagged, then the frame is classified to the DEI value in the tag. Otherwise the frame is classified to the default DEI value.
Tag Class	Shows the classification mode for tagged frames on this port **Disabled**: Use default QoS class and DP level for tagged frames **Enabled**: Use mapped versions of PCP and DEI for tagged frames Click on the mode to configure the mode and/or mapping ***Note:*** *this setting has no effect if the port is VLAN unaware. Tagged frames received on VLAN-unaware ports are always classified to the default QoS class and DP level.*
DSCP Based	Click to enable DSCP Based QoS Ingress Port Classification

4.8.3 Port Tag Remaking

This page provides an overview of QoS Egress Port Tag Remarking for all switch ports.

Figure 67:



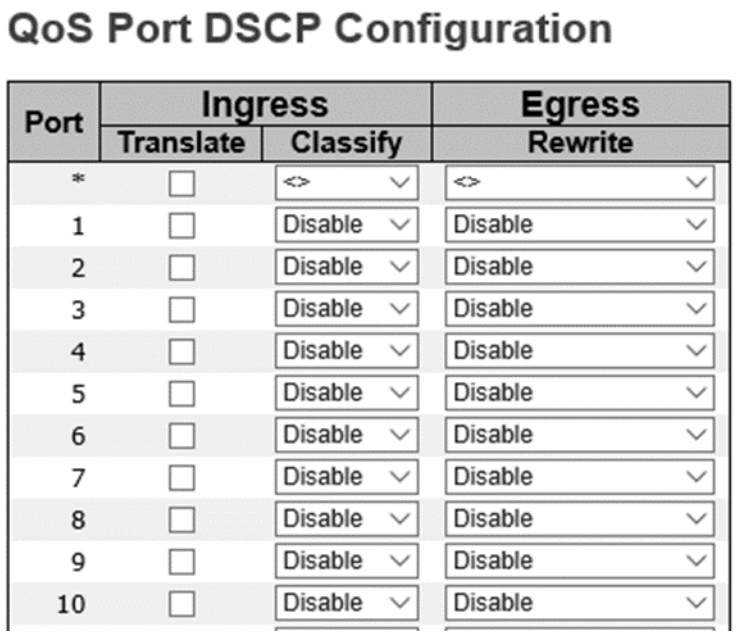
Label	Description
Port	The switch port number to which the following settings will be applied. Click on the port number to configure tag remarking
Mode	Shows the tag remarking mode for this port **Classified**: use classified PCP/DEI values **Default**: use default PCP/DEI values

	Mapped: use mapped versions of QoS class and DP level

4.8.4 Port DSCP

This page allows you to configure basic QoS Port DSCP settings for all switch ports.

Figure 68:



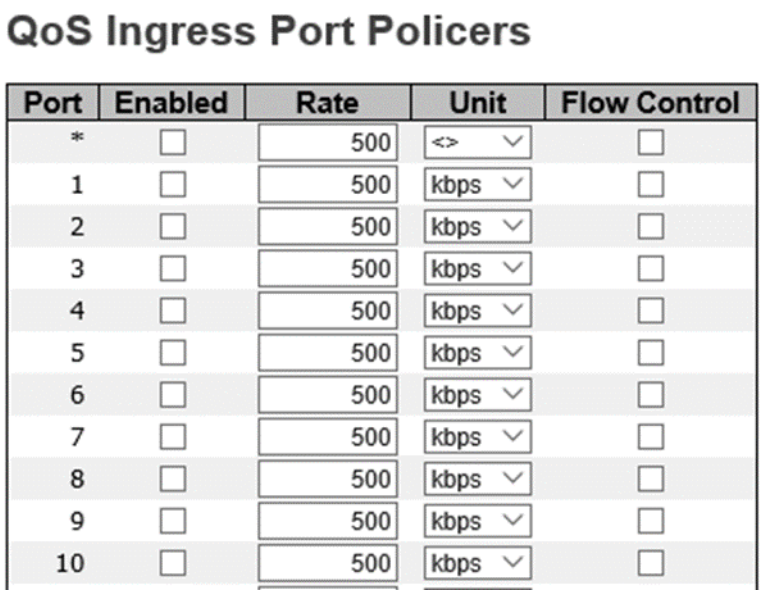
Label	Description
Port	Shows the list of ports for which you can configure DSCP Ingress and Egress settings.
Ingress	In **Ingress** settings you can change ingress translation and classification settings for individual ports. There are two configuration parameters available in Ingress: 1. **Translate** 2. **Classify**
1. Translate	Check to enable ingress translation
2. Classify	Classification has 4 different values. **Disable**: no Ingress DSCP classification **DSCP=0**: classify if incoming (or translated if enabled) DSCP is 0. **Selected**: classify only selected DSCP whose classification is enabled as specified in **DSCP Translation** window for the specific DSCP. **All**: classify all DSCP
Egress	Port egress rewriting can be one of the following options: **Disable**: no Egress rewrite **Enable**: rewrite enabled without remapping

Label	Description
	Remap DP Unaware: DSCP from the analyzer is remapped and the frame is remarked with a remapped DSCP value. The remapped DSCP value is always taken from the '**DSCP Translation->Egress Remap DP0**' table. **Remap DP Aware**: DSCP from the analyzer is remapped and the frame is remarked with a remapped DSCP value. Depending on the DP level of the frame, the remapped DSCP value is either taken from the '**DSCP Translation->Egress Remap DP0**' table or from the '**DSCP Translation->Egress Remap DP1**' table.

4.8.5 Port Policing

This page allows you to configure Policer settings for all switch ports.

Figure 69:

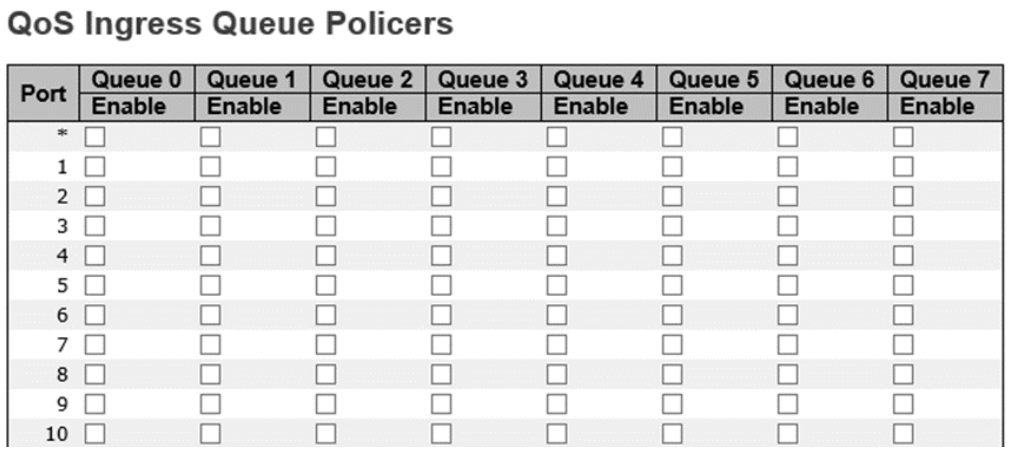


Label	Description
Port	The port number for which the configuration below applies
Enable	Check to enable the policer for individual switch ports
Rate	Configures the rate of each policer. The default value is **500**. This value is restricted to 100 to 1000000 when the **Unit** is **kbps** or **fps** and is restricted to 1 to 3300 when the **Unit** is **Mbps** or **kfps**.
Unit	Configures the unit of measurement for each policer rate as **kbps**, **Mbps**, **fps**, or **kfps**. The default value is **kbps**.
Flow Control	If **Flow Control** is enabled and the port is in **Flow Control** mode, then pause frames are sent instead of being discarded.

4.8.6 Queue Policing

This page allows you to configure Queue Policer settings for all switch ports.

Figure 70:



QoS Ingress Queue Policers

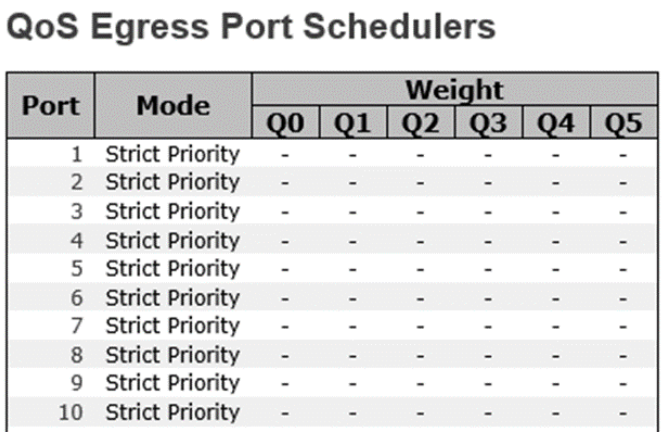
Port	Queue 0 Enable	Queue 1 Enable	Queue 2 Enable	Queue 3 Enable	Queue 4 Enable	Queue 5 Enable	Queue 6 Enable	Queue 7 Enable
*	☐	☐	☐	☐	☐	☐	☐	☐
1	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐
7	☐	☐	☐	☐	☐	☐	☐	☐
8	☐	☐	☐	☐	☐	☐	☐	☐
9	☐	☐	☐	☐	☐	☐	☐	☐
10	☐	☐	☐	☐	☐	☐	☐	☐

Label	Description
Port	The port number for which the configuration below applies.
Enable(E)	Check to enable queue policer for individual switch ports.
Rate	Configures the rate of each queue policer. The default value is **500**. This value is restricted to 100 to 1000000 when the **Unit** is **kbps** and is restricted to 1 to 3300 when the **Unit** is **Mbps**. This field is only shown if at least one of the queue policers is enabled.
Unit	Configures the unit of measurement for each queue policer rate as kbps or Mbps. The default value is **kbps**. This field is only shown if at least one of the queue policers is enabled.

4.8.7 Port Scheduler

This page allows you to configure Scheduler and Shapers for a specific port. Clicking the port number in this page will bring up another page with detailed settings for port priority.

Figure 71:



QoS Egress Port Schedulers

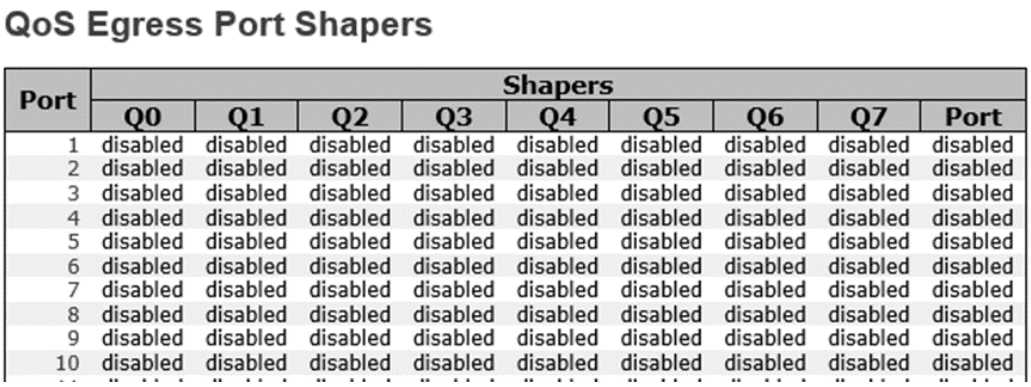
Port	Mode	Weight					
		Q0	Q1	Q2	Q3	Q4	Q5
1	Strict Priority	-	-	-	-	-	-
2	Strict Priority	-	-	-	-	-	-
3	Strict Priority	-	-	-	-	-	-
4	Strict Priority	-	-	-	-	-	-
5	Strict Priority	-	-	-	-	-	-
6	Strict Priority	-	-	-	-	-	-
7	Strict Priority	-	-	-	-	-	-
8	Strict Priority	-	-	-	-	-	-
9	Strict Priority	-	-	-	-	-	-
10	Strict Priority	-	-	-	-	-	-

Label	Description
Port	The switch port number to which the following settings will be applied. Click on the port number to configure the schedulers
Mode	Shows the scheduling mode for this port
Weight	Shows the weight for this queue and port

4.8.8 Port Shaping

This page provides an overview of QoS Egress Port Shapers for all switch ports.

Figure 72:



QoS Egress Port Shapers

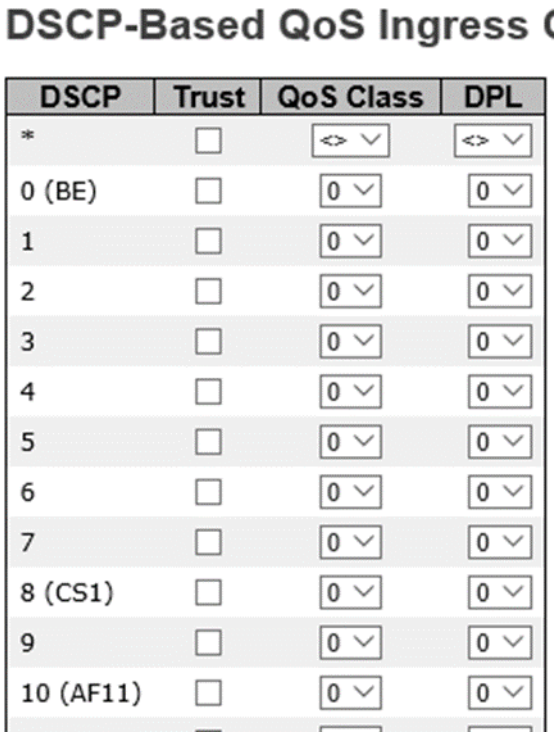
Port	Shapers								
	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Port
1	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
2	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
3	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
4	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
5	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
6	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
7	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
8	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
9	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled
10	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled	disabled

Label	Description
Port	The switch port number to which the following settings will be applied. Click on the port number to configure the shapers
Mode	Shows **disabled** or actual queue shaper rate - e.g. "800 Mbps"
Qn	Shows **disabled** or actual port shaper rate - e.g. "800 Mbps"

4.8.9 DSCP Based QoS

This page allows you to configure basic QoS DSCP-based QoS Ingress Classification settings for all switches.

Figure 73:

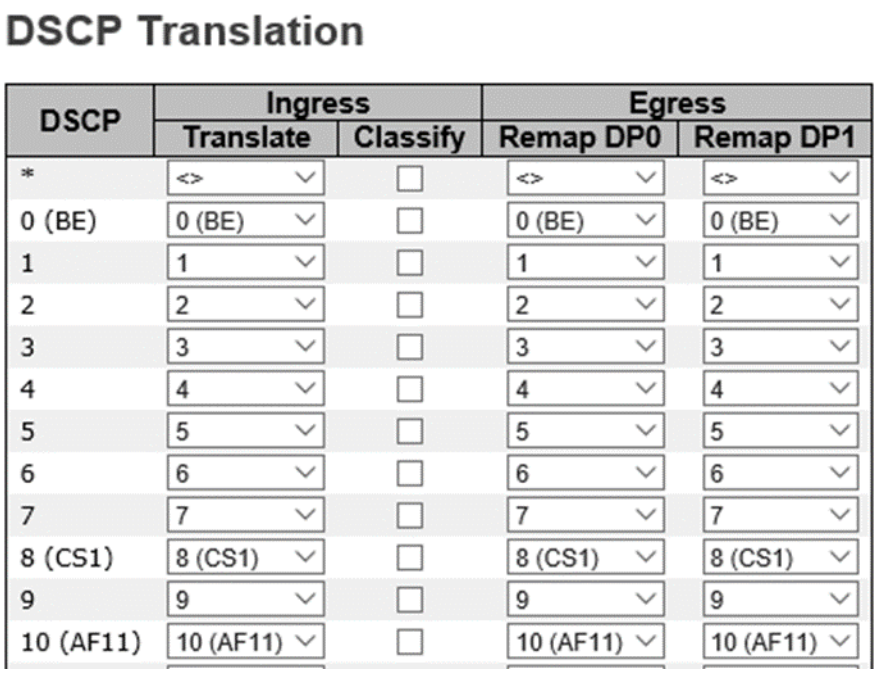


Label	Description
DSCP	Maximum number of supported DSCP values is 64
Trust	Check to trust a specific DSCP value. Only frames with trusted DSCP values are mapped to a specific QoS class and drop precedence level. Frames with untrusted DSCP values are treated as a non-IP frame.
QoS Class	QoS class value can be any number from 0-7.
DPL	Drop Precedence Level (0-1)

4.8.10 DSCP Translation

This page allows you to configure basic QoS DSCP translation settings for all switches. DSCP translation can be done in **Ingress** or **Egress**.

Figure 74:

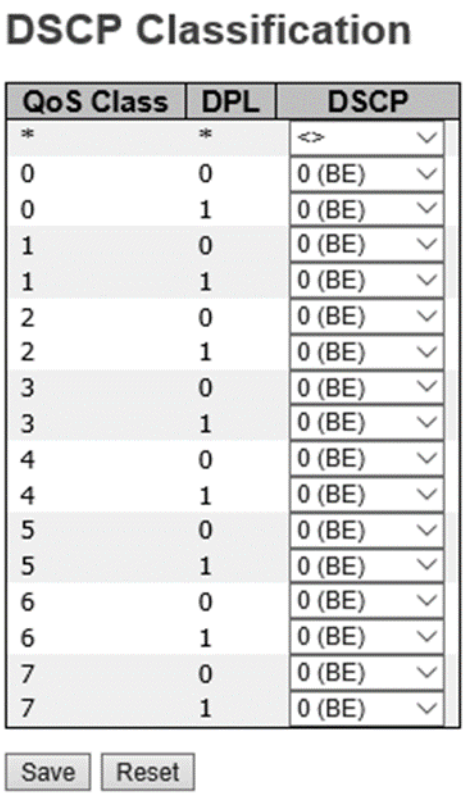


Label	Description
DSCP	Maximum number of supported DSCP values is 64 and valid DSCP value ranges from 0 to 63.
Ingress	Ingress DSCP can be first translated to new DSCP before using the DSCP for QoS class and DPL map. There are two configuration parameters for DSCP Translation - 1. **Translate:** DSCP can be translated to any of (0-63) DSCP values. 2. **Classify:** check to enable ingress classification
Egress	Configurable engress parameters include; **Remap DP0**: controls the remapping for frames with DP level 0. You can select the DSCP value from a selected menu to which you want to remap. DSCP value ranges from 0 to 63. **Remap DP1**: controls the remapping for frames with DP level 1. You can select the DSCP value from a selected menu to which you want to remap. DSCP value ranges from 0 to 63.

4.8.11 DSCP Classification

This page allows you to configure the mapping of QoS class and Drop Precedence Level to DSCP value.

Figure 75:

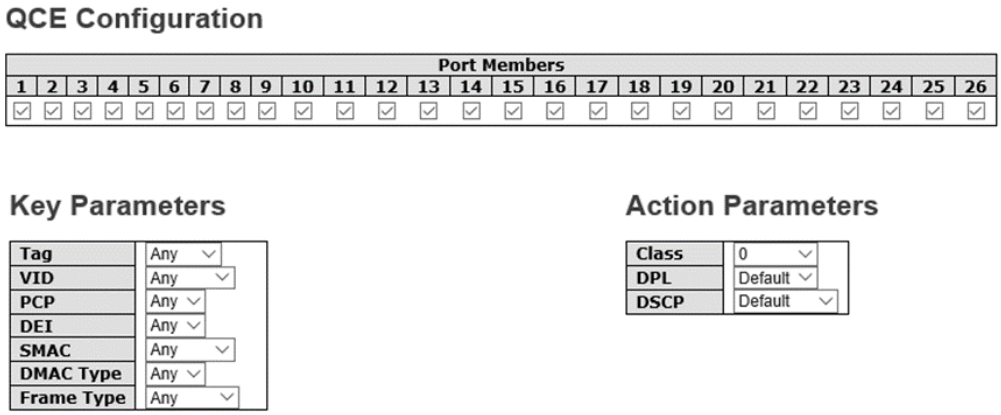


Label	Description
QoS Class	Actual QoS class
DPL	Actual Drop Precedence Level
DSCP	Select the classified DSCP value (0-63)

4.8.12 QoS Control List

This page allows you to edit or insert a single QoS control entry at a time. A QCE consists of several parameters. These parameters vary with the frame type you select.

Figure 76:



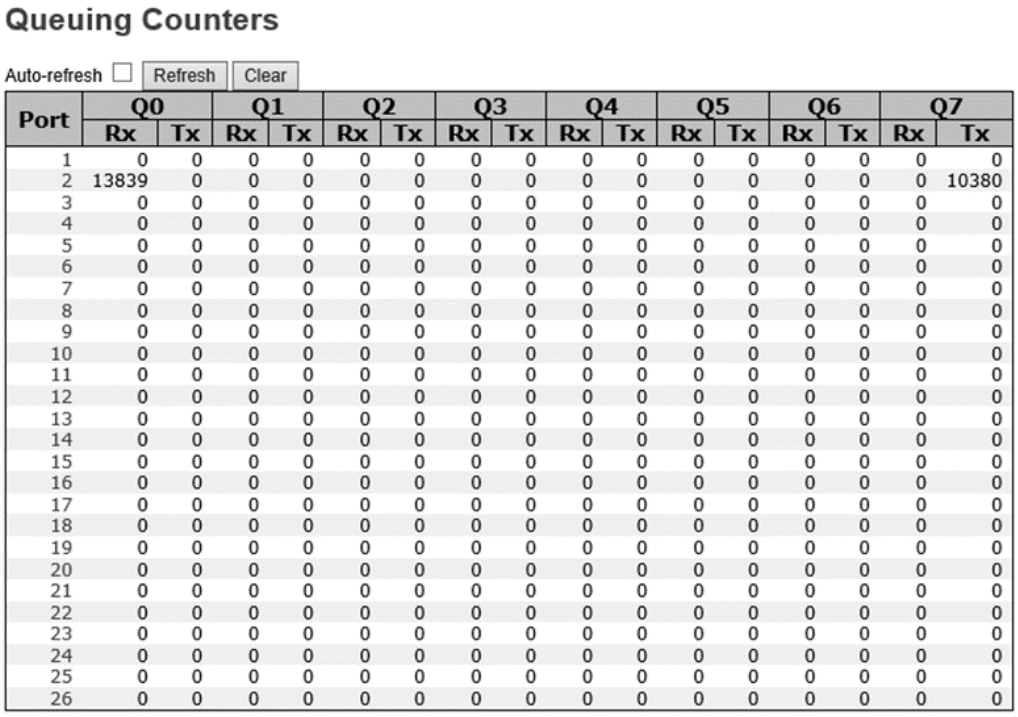
Label	Description
Port Members	Check to include the port in the QCL entry. By default, all ports are included.
Key Parameters	Key configurations include: **Tag**: value of tag, can be **Any**, **Untag** or **Tag**. **VID**: valid value of VLAN ID, can be any value from 1 to 4095 **Any**: user can enter either a specific value or a range of VIDs. **PCP**: Priority Code Point, can be specific numbers (0, 1, 2, 3, 4, 5, 6, 7), a range (0-1, 2-3, 4-5, 6-7, 0-3, 4-7) or **Any.** **DEI**: Drop Eligible Indicator, can be any of values between 0 and 1 or **Any** **SMAC**: Source MAC Address, can be 24 MS bits (OUI) or **Any.** **DMAC Type**: Destination MAC type, can be **unicast** (**UC**), **multicast** (**MC**), **broadcast** (**BC**) or **Any.** Frame Type can be the following values: **Any** **Ethernet** **LLC** **SNAP** **IPv4** **IPv6** *Note:* *all frame types are explained below.*
Any	Allow all types of frames
Ethernet	Valid Ethernet values can range from 0x600 to 0xFFFF or Any' but excluding 0x800(IPv4) and 0x86DD (IPv6). The default value is **Any**.
LLC	SSAP Address: valid SSAP (Source Service Access Point) values can range from 0x00 to 0xFF or **Any**. The default value is **Any**.

Label	Description
	DSAP Address: valid DSAP (Destination Service Access Point) values can range from 0x00 to 0xFF or **Any**. The default value is **Any**. Control Valid Control: valid values can range from 0x00 to 0xFF or **Any**. The default value is **Any**.
SNAP	PID: valid PID (a.k.a ethernet type) values can range from 0x00 to 0xFFFF or Any. The default value is Any.
IPv4	Protocol IP Protocol Number: (0-255, TCP or UDP) or **Any** Source IP: specific Source IP address in value/mask format or **Any**. IP and mask are in the format of x.y.z.w where x, y, z, and w are decimal numbers between 0 and 255. When the mask is converted to a 32-bit binary string and read from left to right, all bits following the first zero must also be zero. DSCP (Differentiated Code Point): can be a specific value, a range, or **Any**. DSCP values are in the range 0-63 including BE, CS1-CS7, EF or AF11-AF43. IP Fragment: Ipv4 frame fragmented options include **'yes'**, **'no'**, and **'any'**. Sport Source TCP/UDP Port: (0-65535) or **Any**, specific value or port range applicable for IP protocol UDP/TCP. Dport Destination TCP/UDP Port: (0-65535) or **Any**, specific value or port range applicable for IP protocol UDP/TCP.
IPv6	Protocol IP protocol number: (0-255, TCP or UDP) or **Any.** Source IP IPv6 source address: (a.b.c.d) or **Any**, 32 LS bits. DSCP (Differentiated Code Point): can be a specific value, a range, or **Any**. DSCP values are in the range 0-63 including BE, CS1-CS7, EF or AF11-AF43. Sport Source TCP/UDP port: (0-65535) or **Any**, specific value or port range applicable for IP protocol UDP/TCP. Dport Destination TCP/UDP port: (0-65535) or **Any**, specific value or port range applicable for IP protocol UDP/TCP.
Action Parameters	Class QoS class: (0-7) or **Default** Valid Drop Precedence Level value can be (0-1) or **Default**. Valid DSCP value can be (0-63, BE, CS1-CS7, EF or AF11-AF43) or **Default**. Default means that the default classified value is not modified by this QCE.

4.8.13 QoS Statisitics

This page provides the statistics of individual queues for all switch ports.

Figure 77:



Port	Q0		Q1		Q2		Q3		Q4		Q5		Q6		Q7	
	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx	Tx
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	13839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10380
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Label	Description
Port	The switch port number to which the following settings will be applied.
Qn	There are 8 QoS queues per port. Q0 is the lowest priority
Rx / Tx	The number of received and transmitted packets per queue

4.8.14 QCL Status

This page shows the QCL status by different QCL users. Each row describes the QCE that is defined. It is a conflict if a specific QCE is not applied to the hardware due to hardware limitations. The maximum number of QCEs is 256 on each switch.

Figure 78:

QoS Control List Status

User	QCE#	Frame Type	Port	Action			Conflict
				Class	DPL	DSCP	
No entries							

Label	Description
User	Indicates the QCL user
QCE#	Indicates the index of QCE
Frame Type	Indicates the type of frame to look for incoming frames. Possible frame types are: **Any**: the QCE will match all frame type. **Ethernet**: Only Ethernet frames (with Ether Type 0x600-0xFFFF) are allowed. **LLC**: Only (LLC) frames are allowed. **SNAP**: Only (SNAP) frames are allowed. **IPv4**: the QCE will match only IPV4 frames. **IPv6**: the QCE will match only IPV6 frames.
Port	Indicates the list of ports configured with the QCE.
Action	Indicates the classification action taken on ingress frame if parameters configured are matched with the frame's content. There are three action fields: **Class**, **DPL**, and **DSCP**. **Class**: Classified QoS; if a frame matches the QCE, it will be put in the queue. **DPL**: Drop Precedence Level; if a frame matches the QCE, then DP level will set to a value displayed under DPL column. **DSCP**: if a frame matches the QCE, then DSCP will be classified with the value displayed under DSCP column.
Conflict	Displays the conflict status of QCL entries. As hardware resources are shared by multiple applications, resources required to add a QCE may not be available. In that case, it shows conflict status as **Yes**, otherwise it is always **No**. Please note that conflict can be resolved by releasing the hardware resources required to add the QCL entry by pressing **Resolve Conflict** button.

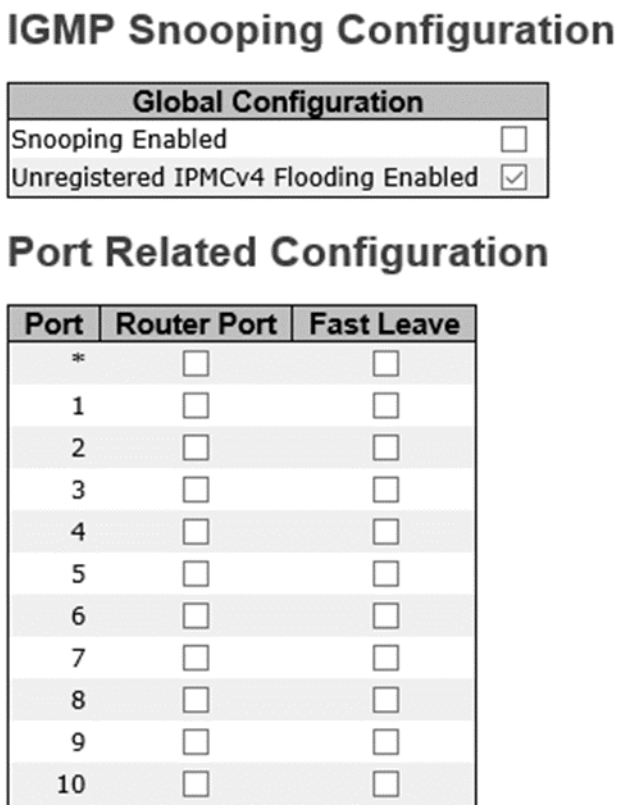
4.9 Multicast

4.9.1 IGMP Snooping

Basic Settings

This page provides IGMP Snooping related configurations.

Figure 79:



Label	Description
Snooping Enabled	Check to enable global IGMP snooping
Unregistered IPMCv4Flooding enabled	Check to enable unregistered IPMC traffic flooding
Router Port	Specifies which ports act as router ports. A router port is a port on the Ethernet switch that leads towards the Layer 3 multicast device or IGMP querier. If an aggregation member port is selected as a router port, the whole aggregation will act as a router port.
Fast Leave	Check to enable fast leave on the port

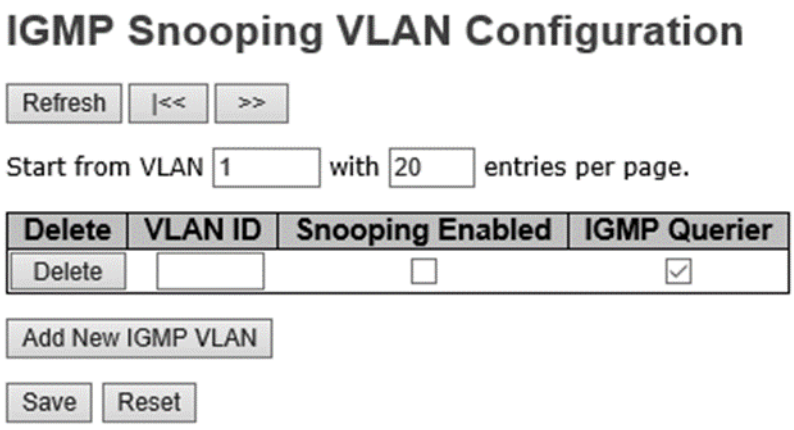
VLAN Configurations

Each page shows up to 99 entries from the VLAN table, with a default value of 20, selected by the **Entries Per Page** input field. When first visited, the web page will show the first 20 entries from the beginning of the VLAN Table. The first displayed will be the one with the lowest VLAN ID found in the VLAN Table.

The **VLAN** input field allows the user to select the starting point in the VLAN Table. Clicking the **Refresh** button will update the displayed table starting from that or the next closest VLAN Table match.

The >> will use the last entry of the currently displayed entry as a basis for the next lookup. When the end is reached, the text **No more entries** is shown in the displayed table. Use the |<< button to start over.

Figure 80:

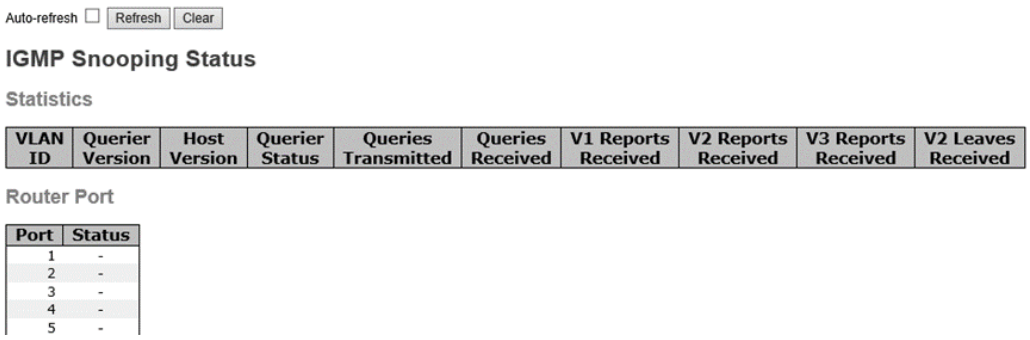


Label	Description
Delete	Check to delete the entry. The designated entry will be deleted during the next save.
VLAN ID	The VLAN ID of the entry
IGMP Snooping Enable	Check to enable IGMP snooping for individual VLAN. Up to 32 VLANs can be selected.
IGMP Querier	Check to enable the IGMP Querier in the VLAN

Status

This page provides IGMP snooping status.

Figure 81:

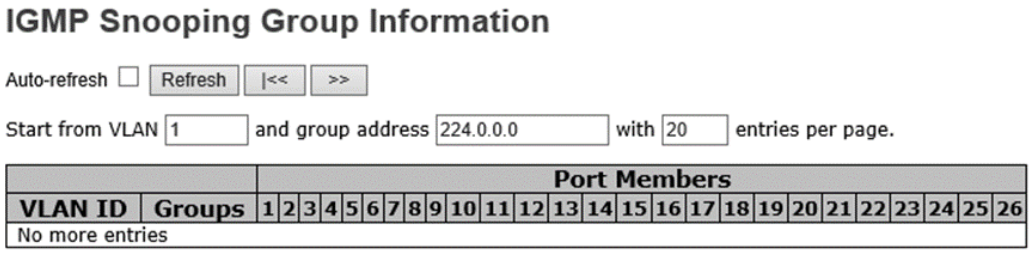


Label	Description
VLAN ID	The VLAN ID of the entry
Querier Version	Active Querier version
Host Version	Active Host version
Querier Status	Shows the Querier status as **ACTIVE** or **IDLE**
Querier Receive	The number of transmitted Querier
V1 Reports Receive	The number of received V1 reports
V2 Reports Receive	The number of received V2 reports
V3 Reports Receive	The number of received V3 reports
V2 Leave Receive	The number of received V2 leave packets
Refresh	Click to refresh the page immediately
Clear	Clear all statistics counters
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals
Port	Switch port number
Status	Indicates whether a specific port is a router port or not

Groups Information

Entries in the **IGMP Group Table** are shown on this page. The **IGMP Group Table** is sorted first by VLAN ID, and then by group.

Figure 82:



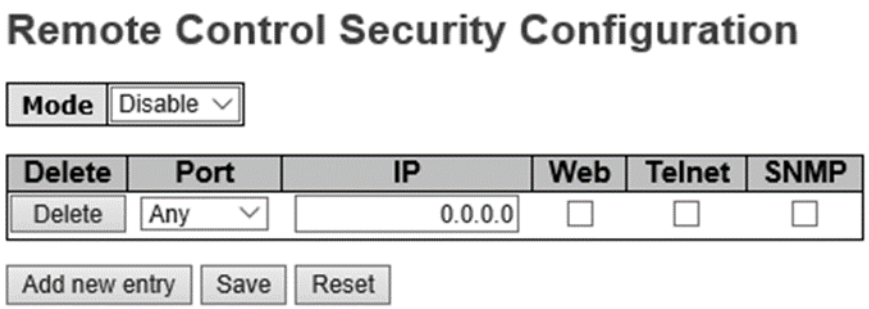
Label	Description
VLAN ID	The VLAN ID of the group
Groups	The group address of the group displayed
Port Members	Ports under this group

4.10 Security

4.10.1 Remote Control Security

Remote Control Security allows you to limit the remote access to the management interface. When enabled, requests of the client which is not in the allow list will be rejected.

Figure 83:



Label	Description
Port	Port number of the remote client
IP Address	IP address of the remote client. **0.0.0.0** means "any IP".
Web	Check to enable management via a Web interface
Telnet	Check to enable management via a Telnet interface
SNMP	Check to enable management via a SNMP interface
Delete	Check to delete entries

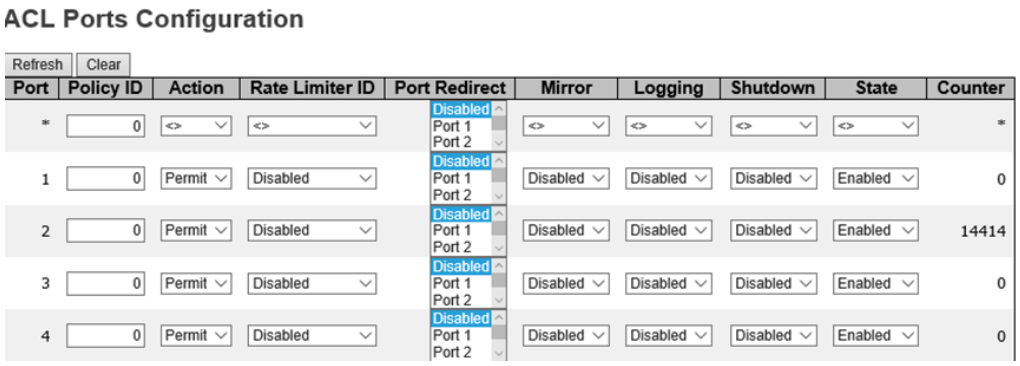
4.10.2 ACL

An ACL (Access Control List) is a list of permissions attached to an object. An ACL specifies which users or system processes are authorized to access the objects and what operations are allowed on given

Ports

This page allows you to configure the ACL parameters (ACE) of each switch port. These parameters will affect frames received on a port unless the frame matches a specific ACE.

Figure 84:

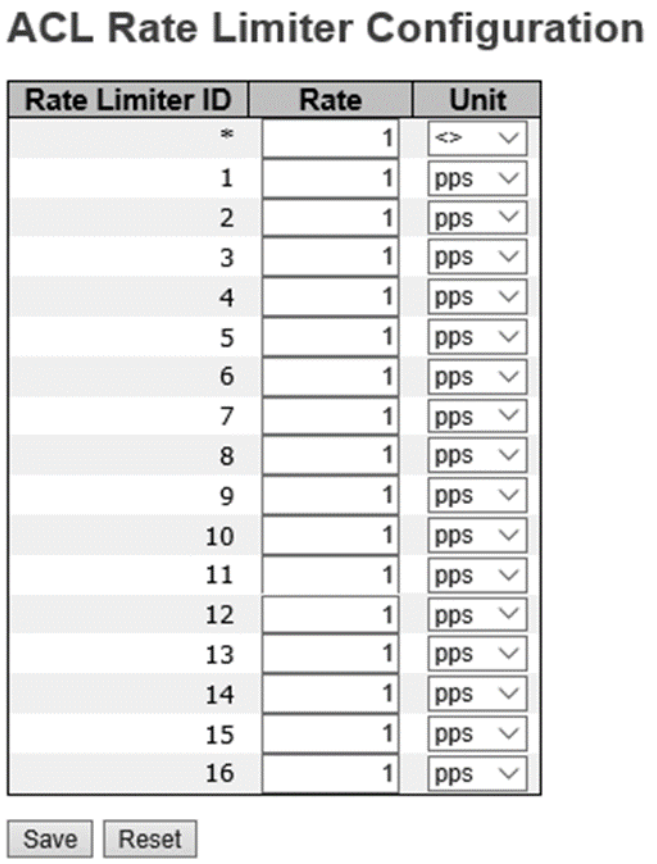


Label	Description
Port	The switch port number to which the following settings will be applied
Policy ID	Select to apply a policy to the port. The allowed values are 1 to 8. The default value is **1**.
Action	Select to **Permit** to permit or **Deny** to deny forwarding. The default value is **Permit**.
Rate Limiter ID	Select a rate limiter for the port. The allowed values are Disabled or numbers from 1 to 15. The default value is Disabled.
Port Redirect	Indicates the port redirect operation implemented by the ACE. Frames matching the ACE are redirected to the listed port.
Mirror	Select which port frames are copied to. The allowed values are **Disabled** or a specific port number. The default value is **Disabled**.
Logging	Specifies the logging operation of the port. The allowed values are: **Enabled**: frames received on the port are stored in the system log **Disabled**: frames received on the port are not logged. The default value is **Disabled**. Please note that system log memory capacity and logging rate is limited.
Shutdown	Specifies the shutdown operation of this port. The allowed values are: **Enabled**: if a frame is received on the port, the port will be disabled. **Disabled**: port shut down is disabled. The default value is **Disabled**.
Counter	Counts the number of frames that match this ACE.

Rate Limiters

This page allows you to configure the rate limiter for the ACL of the switch.

Figure 85:

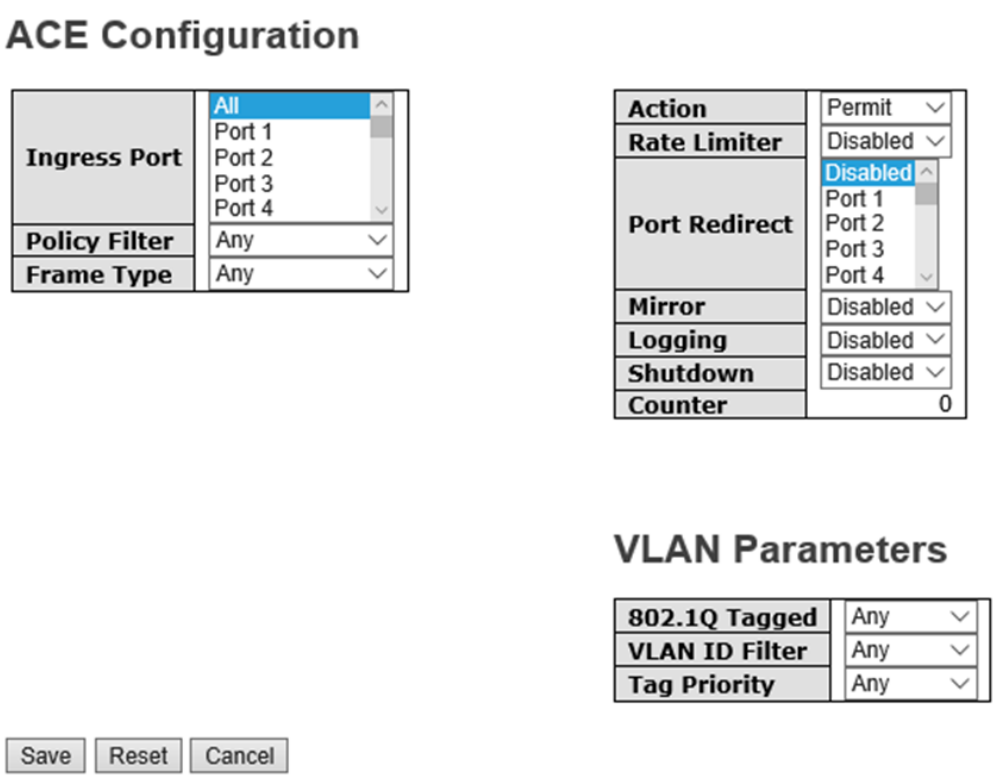


Label	Description
Rate Limiter ID	The rate limiter ID for the settings contained in the same row.
Rate	The rate unit is packet per second (pps), which can be configured as 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1K, 2K, 4K, 8K, 16K, 32K, 64K, 128K, 256K, 512K, or 1024K. The 1 kpps is actually 1002.1 pps.
Unit	Specify the unit for the rate.

ACL Control List

An ACE (Access Control Entry) is an element in an access control list (ACL). An ACL can have zero or more ACEs. Each ACE controls or monitors access to an object based on user-defined configurations. Each ACE consists of several parameters which vary with the frame type you have selected.

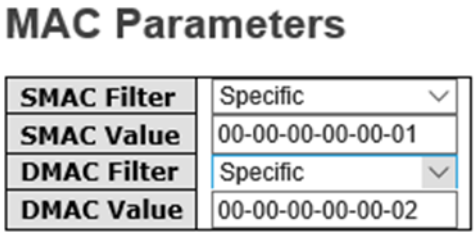
Figure 86:



Label	Description
Ingress Port	Indicates the ingress port to which the ACE will apply. **Any**: the ACE applies to any port. **Port n**: the ACE applies to this port number, where n is the number of the switch port. **Policy n**: the ACE applies to this policy number, where n can range from 1 to 8.
Policy Filter	Indicates the policy number filter for this ACE. Choose any will not specify any policy filter. Choose Specific will allow you to filter a specific policy with this ACE. You can enter an policy value and bitmask then.
Frame Type	Indicates the frame type of the ACE. These frame types are mutually exclusive. **Any**: any frame can match the ACE. **Ethernet Type**: only Ethernet type frames can match the ACE. The IEEE 802.3 descripts the value of length/types should be greater than or equal to 1536 decimal (equal to 0600 hexadecimal). **ARP**: only ARP frames can match the ACE. Notice the ARP frames will not match the ACE with Ethernet type.

Label	Description
	IPv4: only IPv4 frames can match the ACE. Notice the IPv4 frames will not match the ACE with Ethernet type.
Action	Specifies the action to take when a frame matches the ACE. Permit: takes action when the frame matches the ACE. Deny: drops the frame matching the ACE.
Rate Limiter	Specifies the rate limiter in number of base units. The allowed range is 1 to 15. **Disabled** means the rate limiter operation is disabled.
Port Redirect	Indicates the port redirect operation implemented by the ACE. Frames matching the ACE are redirected to the listed port.
Port Copy	Frames matching the ACE are copied to the port number specified here. The allowed range is the same as the switch port number range. Disabled means the port copy operation is disabled.
Logging	Specifies the logging operation of the ACE. The allowed values are: **Enabled**: frames matching the ACE are stored in the system log. **Disabled**: frames matching the ACE are not logged. Please note that system log memory capacity and logging rate is limited.
Shutdown	Specifies the shutdown operation of the ACE. The allowed values are: **Enabled**: if a frame matches the ACE, the ingress port will be disabled. **Disabled**: port shutdown is disabled for the ACE.
Counter	Indicates the number of times the ACE matched by a frame.

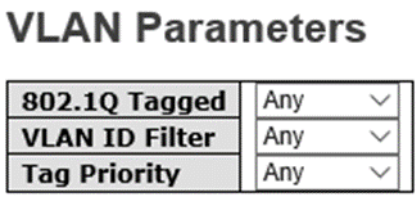
Figure 87:



Label	Description
SMAC Filter	(Only displayed when the frame type is Ethernet Type or ARP.) Specifies the source MAC filter for the ACE. **Any**: no SMAC filter is specified (SMAC filter status is "**don't-care**"). **Specific**: if you want to filter a specific source MAC address with the ACE, choose this value. A field for entering an SMAC value appears.
SMAC Value	When **Specific** is selected for the SMAC filter, you can enter a specific source MAC address. The legal format is "xx-xx-xx-xx-xx-xx". Frames matching the ACE will use this SMAC value.
DMAC Filter	Specifies the destination MAC filter for this ACE **Any**: no DMAC filter is specified (DMAC filter status is "**don't-care**").

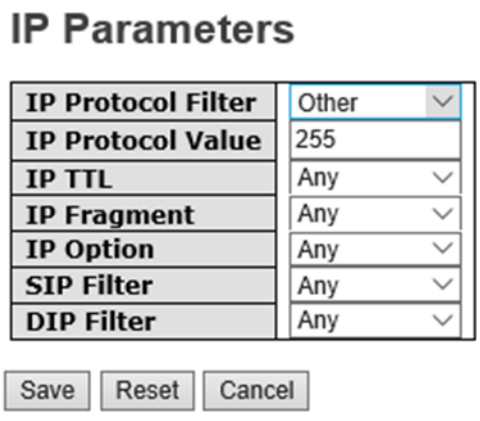
Label	Description
	MC: frame must be multicast. **BC**: frame must be broadcast. **UC**: frame must be unicast. **Specific**: If you want to filter a specific destination MAC address with the ACE, choose this value. A field for entering a DMAC value appears.
DMAC Value	When **Specific** is selected for the DMAC filter, you can enter a specific destination MAC address. The legal format is "xx-xx-xx-xx-xx-xx". Frames matching the ACE will use this DMAC value.

Figure 88:



Label	Description
VLAN ID Filter	Specifies the VLAN ID filter for the ACE **Any**: no VLAN ID filter is specified (VLAN ID filter status is "**don't-care**"). **Specific**: if you want to filter a specific VLAN ID with the ACE, choose this value. A field for entering a VLAN ID number appears.
VLAN ID	When **Specific** is selected for the VLAN ID filter, you can enter a specific VLAN ID number. The allowed range is 1 to 4095. Frames matching the ACE will use this VLAN ID value.
Tag Priority	Specifies the tag priority for the ACE. A frame matching the ACE will use this tag priority. The allowed number range is 0 to 7. **Any** means that no tag priority is specified (tag priority is "**don't-care**").

Figure 89:

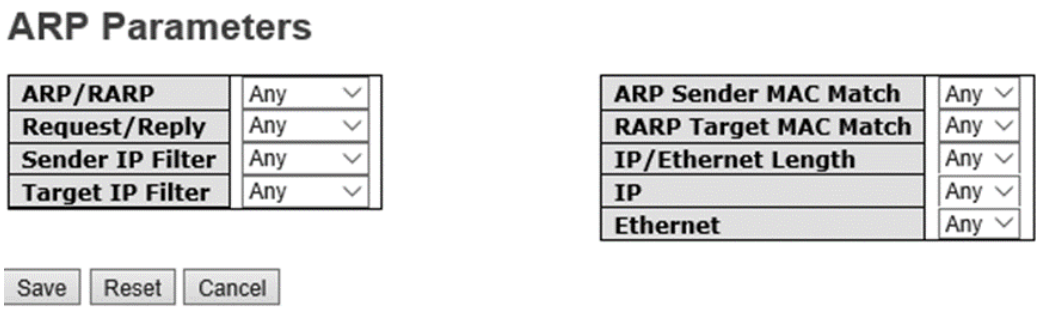


Label	Description
IP Protocol Filter	Specifies the IP protocol filter for the ACE

Label	Description
	Any: no IP protocol filter is specified ("**don't-care**"). **Specific**: if you want to filter a specific IP protocol filter with the ACE, choose this value. A field for entering an IP protocol filter appears. ICMP: selects ICMP to filter IPv4 ICMP protocol frames. Extra fields for defining ICMP parameters will appear. For more details of these fields, please refer to the help file. **UDP**: selects UDP to filter IPv4 UDP protocol frames. Extra fields for defining UDP parameters will appear. For more details of these fields, please refer to the help file. **TCP**: selects TCP to filter IPv4 TCP protocol frames. Extra fields for defining TCP parameters will appear. For more details of these fields, please refer to the help file.
IP Protocol Value	**Specific** allows you to enter a specific value. The allowed range is 0 to 255. Frames matching the ACE will use this IP protocol value.
IP TTL	Specifies the time-to-live settings for the ACE **Zero**: IPv4 frames with a time-to-live value greater than zero must not be able to match this entry. **Non-zero**: IPv4 frames with a time-to-live field greater than zero must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
IP Fragment	Specifies the fragment offset settings for the ACE. This includes settings of More Fragments (MF) bit and Fragment Offset (FRAG OFFSET) for an IPv4 frame. **No**: IPv4 frames whose MF bit is set or the FRAG OFFSET field is greater than zero must not be able to match this entry. **Yes**: IPv4 frames whose MF bit is set or the FRAG OFFSET field is greater than zero must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
IP Option	Specifies the options flag settings for the ACE **No**: IPv4 frames whose options flag is set must not be able to match this entry. **Yes**: IPv4 frames whose options flag is set must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
SIP Filter	Specifies the source IP filter for this ACE **Any**: no source IP filter is specified (Source IP filter is "**don't-care**"). **Host**: source IP filter is set to **Host**. Specify the source IP address in the **SIP Address** field that appears. **Network**: source IP filter is set to **Network**. Specify the source IP address and source IP mask in the **SIP Address** and **SIP Mask** fields that appear.
SIP Address	When **Host** or **Network** is selected for the source IP filter, you can enter a specific SIP address in dotted decimal notation.
SIP Mask	When **Network** is selected for the source IP filter, you can enter a specific SIP mask in dotted decimal notation.
DIP Filter	Specifies the destination IP filter for the ACE **Any**: no destination IP filter is specified (destination IP filter is "**don't-care**").

Label	Description
	Host: destination IP filter is set to **Host**. Specify the destination IP address in the **DIP Address** field that appears. **Network**: destination IP filter is set to **Network**. Specify the destination IP address and destination IP mask in the **DIP Address** and **DIP Mask** fields that appear.
DIP Address	When **Host** or **Network** is selected for the destination IP filter, you can enter a specific DIP address in dotted decimal notation.
DIP Mask	When **Network** is selected for the destination IP filter, you can enter a specific DIP mask in dotted decimal notation.

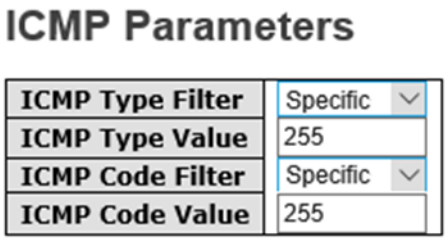
Figure 90:



Label	Description
ARP/RARP	Specifies the available ARP/RARP opcode (OP) flag for the ACE **Any**: no ARP/RARP OP flag is specified (OP is "**don't-care**"). **ARP**: frame must have ARP/RARP opcode set to ARP **RARP**: frame must have ARP/RARP opcode set to RARP. **Other**: frame has unknown ARP/RARP Opcode flag.
Request/Reply	Specifies the available ARP/RARP opcode (OP) flag for the ACE **Any**: no ARP/RARP OP flag is specified (OP is "**don't-care**"). **Request**: frame must have ARP Request or RARP Request OP flag set. **Reply**: frame must have ARP Reply or RARP Reply OP flag.
Sender IP Filter	Specifies the sender IP filter for the ACE **Any**: no sender IP filter is specified (sender IP filter is "**don't-care**"). **Host**: sender IP filter is set to **Host**. Specify the sender IP address in the **SIP Address** field that appears. **Network**: sender IP filter is set to **Network**. Specify the sender IP address and sender IP mask in the **SIP Address** and **SIP Mask** fields that appear.
Sender IP Address	When Host or Network is selected for the sender IP filter, you can enter a specific sender IP address in dotted decimal notation.
Sender IP Mask	When Network is selected for the sender IP filter, you can enter a specific sender IP mask in dotted decimal notation.
Target IP Filter	Specifies the target IP filter for the specific ACE **Any**: no target IP filter is specified (target IP filter is "**don't-care**").

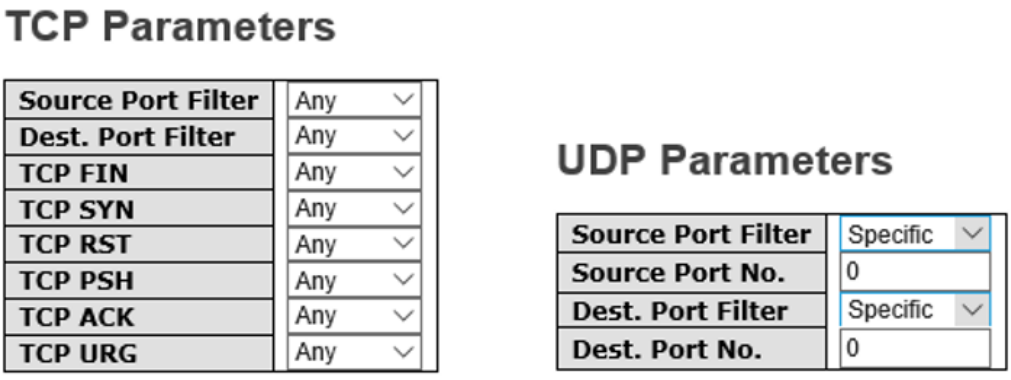
Label	Description
	Host: target IP filter is set to **Host**. Specify the target IP address in the **Target IP Address** field that appears. **Network**: target IP filter is set to **Network**. Specify the target IP address and target IP mask in the **Target IP Address** and **Target IP Mask** fields that appear.
Target IP Address	When **Host** or **Network** is selected for the target IP filter, you can enter a specific target IP address in dotted decimal notation.
Target IP Mask	When **Network** is selected for the target IP filter, you can enter a specific target IP mask in dotted decimal notation.
ARP SMAC Match	Specifies whether frames will meet the action according to their sender hardware address field (SHA) settings. **0**: ARP frames where SHA is not equal to the SMAC address **1**: ARP frames where SHA is equal to the SMAC address **Any**: any value is allowed ("**don't-care**").
RARP SMAC Match	Specifies whether frames will meet the action according to their target hardware address field (THA) settings. **0**: RARP frames where THA is not equal to the SMAC address **1**: RARP frames where THA is equal to the SMAC address **Any**: any value is allowed ("**don't-care**")
IP/Ethernet Length	Specifies whether frames will meet the action according to their ARP/RARP hardware address length (HLN) and protocol address length (PLN) settings. **0**: ARP/RARP frames where the HLN is equal to Ethernet (0x06) and the (PLN) is equal to IPv4 (0x04) must not match this entry. **1**: ARP/RARP frames where the HLN is equal to Ethernet (0x06) and the (PLN) is equal to IPv4 (0x04) must match this entry. **Any**: any value is allowed ("**don't-care**").
IP	Specifies whether frames will meet the action according to their ARP/RARP hardware address space (HRD) settings. **0**: ARP/RARP frames where the HLD is equal to Ethernet (1) must not match this entry. **1**: ARP/RARP frames where the HLD is equal to Ethernet (1) must match this entry. **Any**: any value is allowed ("**don't-care**").
Ethernet	Specifies whether frames will meet the action according to their ARP/RARP protocol address space (PRO) settings. **0**: ARP/RARP frames where the PRO is equal to IP (0x800) must not match this entry. **1**: ARP/RARP frames where the PRO is equal to IP (0x800) must match this entry. **Any**: any value is allowed ("**don't-care**").

Figure 91:



Label	Description
ICMP Type Filter	Specifies the ICMP filter for the ACE **Any**: no ICMP filter is specified (ICMP filter status is "**don't-care**"). **Specific**: if you want to filter a specific ICMP filter with the ACE, you can enter a specific ICMP value. A field for entering an ICMP value appears.
ICMP Type Value	When **Specific** is selected for the ICMP filter, you can enter a specific ICMP value. The allowed range is 0 to 255. A frame matching the ACE will use this ICMP value.
ICMP Code Filter	Specifies the ICMP code filter for the ACE **Any**: no ICMP code filter is specified (ICMP code filter status is "**don't-care**"). **Specific**: if you want to filter a specific ICMP code filter with the ACE, you can enter a specific ICMP code value. A field for entering an ICMP code value appears.
ICMP Code Value	When **Specific** is selected for the ICMP code filter, you can enter a specific ICMP code value. The allowed range is 0 to 255. A frame matching the ACE will use this ICMP code value.

Figure 92:



Label	Description
TCP/UDP Source Filter	Specifies the TCP/UDP source filter for the ACE **Any**: no TCP/UDP source filter is specified (TCP/UDP source filter status is "**don't-care**"). **Specific**: if you want to filter a specific TCP/UDP source filter with the ACE, you can enter a specific TCP/UDP source value. A field for entering a TCP/UDP source value appears. **Range**: if you want to filter a specific TCP/UDP source range filter with the ACE, you can enter a specific TCP/UDP source range. A field for entering a TCP/UDP source value appears.
TCP/UDP Source No.	When **Specific** is selected for the TCP/UDP source filter, you can enter a specific TCP/UDP source value. The allowed range is 0 to 65535. A frame matching the ACE will use this TCP/UDP source value.
TCP/UDP Source Range	When **Range** is selected for the TCP/UDP source filter, you can enter a specific TCP/UDP source range value. The allowed range is 0 to 65535. A frame matching the ACE will use this TCP/UDP source value.
TCP/UDP Destination Filter	Specifies the TCP/UDP destination filter for the ACE **Any**: no TCP/UDP destination filter is specified (TCP/UDP destination filter status is "**don't-care**"). **Specific**: if you want to filter a specific TCP/UDP destination filter with the ACE, you can enter a specific TCP/UDP destination value. A field for entering a TCP/UDP destination value appears. **Range**: if you want to filter a specific range TCP/UDP destination filter with the ACE, you can enter a specific TCP/UDP destination range. A field for entering a TCP/UDP destination value appears.
TCP/UDP Destination Number	When **Specific** is selected for the TCP/UDP destination filter, you can enter a specific TCP/UDP destination value. The allowed range is 0 to 65535. A frame matching the ACE will use this TCP/UDP destination value.
TCP/UDP Destination Range	When **Range** is selected for the TCP/UDP destination filter, you can enter a specific TCP/UDP destination range value. The allowed range is 0 to 65535. A frame matching the ACE will use this TCP/UDP destination value.
TCP FIN	Specifies the TCP FIN ("no more data from sender") value for the ACE. **0**: TCP frames where the FIN field is set must not be able to match this entry. **1**: TCP frames where the FIN field is set must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
TCP SYN	Specifies the TCP SYN ("synchronize sequence numbers") value for the ACE **0**: TCP frames where the SYN field is set must not be able to match this entry. **1**: TCP frames where the SYN field is set must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
TCP PSH	Specifies the TCP PSH ("push function") value for the ACE

Label	Description
	0: TCP frames where the PSH field is set must not be able to match this entry. **1**: TCP frames where the PSH field is set must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
TCP ACK	Specifies the TCP ACK ("acknowledgment field significant") value for the ACE **0**: TCP frames where the ACK field is set must not be able to match this entry. **1**: TCP frames where the ACK field is set must be able to match this entry. **Any**: any value is allowed ("**don't-care**").
TCP URG	Specifies the TCP URG ("urgent pointer field significant") value for the ACE **0**: TCP frames where the URG field is set must not be able to match this entry. **1**: TCP frames where the URG field is set must be able to match this entry. **Any**: any value is allowed ("**don't-care**").

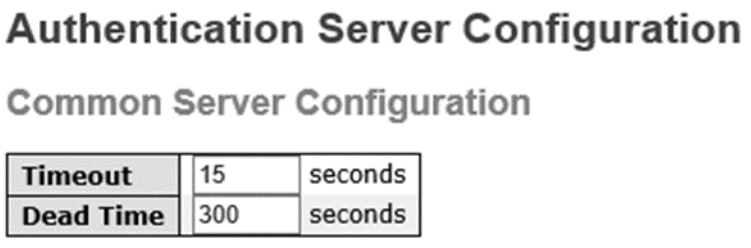
4.10.3 AAA

An AAA server is an application that provides authentication, authorization, and accounting services for attempted access to a network. A AAA server can reside in a dedicated computer, an Ethernet switch, an access point or a network access server. The current standard by which devices or applications communicate with a AAA server is RADIUS (Remote Authentication Dial-In User Service). RADIUS is a protocol used between the switch and the authentication server. This page allows you to configure common settings for an authentication server.

Configurations

This page allows you to configure authentication servers.

Figure 93:



Label	Description
Timeout	The timeout, which can be set to a number between 3 and 3600 seconds, is the maximum time to wait for a reply from a server.

Label	Description
	If the server does not reply within this time frame, we will consider it to be dead and continue with the next enabled server (if any). RADIUS servers are using the UDP protocol, which is unreliable by design. In order to cope with lost frames, the timeout interval is divided into 3 subintervals of equal length. If a reply is not received within the subinterval, the request is transmitted again. This algorithm causes the RADIUS server to be queried up to 3 times before it is considered to be dead.
Dead Time	The dead time, which can be set to a number between 0 and 3600 seconds, is the period during which the switch will not send new requests to a server that has failed to respond to a previous request. This will stop the switch from continually trying to contact a server that it has already determined as dead. Setting the dead time to a value greater than 0 (zero) will enable this feature, but only if more than one server has been configured.

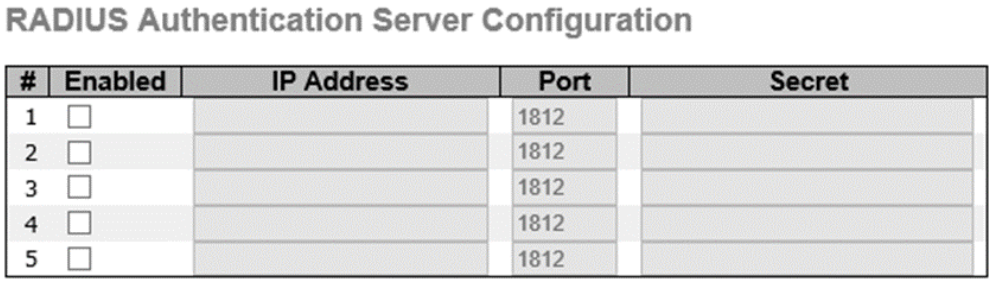
RADIUS Overview

Authentication and Accounting Server Configurations

When a user requests network connection, a RADIUS client which receives the request will perform an initial access negotiation with the user to obtain identity/password information. The client then passes the information to a RADIUS server as part of an authentication/authorization request.

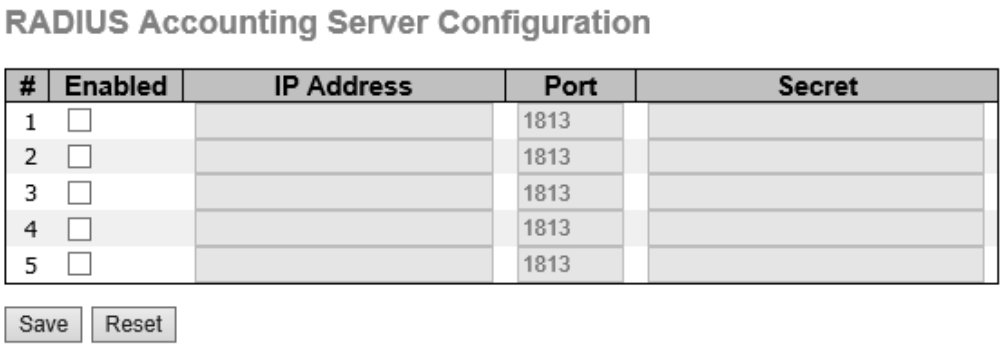
The RADIUS server matches data from the authentication/authorization request with information in a trusted database. If a match is found and the user's credentials are correct, the RADIUS server sends an accept message to the client to grant access. If a match is not found or a problem is found with the user's credentials, the server returns a reject message to deny access. The NAD then establishes or terminates the user's connection. The NAD may then forward accounting information to the RADIUS server to document the transaction; the RADIUS server may store or forward this information as needed to support billing for the services provided.

Figure 94:



Label	Description
#	The RADIUS authentication server number for which the configuration below applies.
Enabled	Check to enable the RADIUS authentication server.
IP Address	The IP address or hostname of the RADIUS authentication server. IP address is expressed in dotted decimal notation.
Port	The UDP port to use on the RADIUS authentication server. If the port is set to **0** (zero), the default port (1812) is used on the RADIUS authentication server.
Secret	The secret - up to 29 characters long - shared between the RADIUS authentication server and the switch stack.

Figure 95:

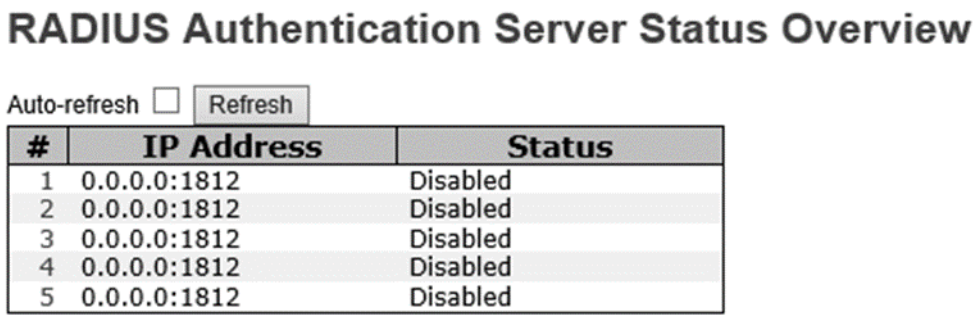


Label	Description
#	The RADIUS accounting server number for which the configuration below applies.
Enabled	Check to enable the RADIUS accounting server
IP Address	The IP address or hostname of the RADIUS accounting server. IP address is expressed in dotted decimal notation.
Port	The UDP port to use on the RADIUS accounting server. If the port is set to **0** (zero), the default port (1813) is used on the RADIUS accounting server.
Secret	The secret - up to 29 characters long - shared between the RADIUS accounting server and the switch stack.

Authentication Server Status Overview

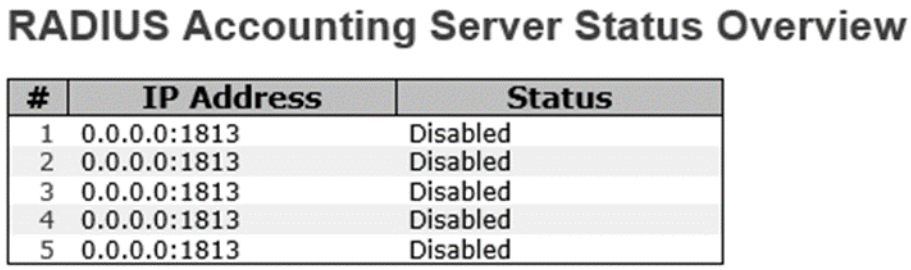
This page provides an overview of the status of the RADIUS servers configurable on the authentication configuration page.

Figure 96:



Label	Description
#	The RADIUS server number. Click to navigate to detailed statistics of the server
IP Address	The IP address and UDP port number (in <IP Address>:<UDP Port> notation) of the server
Status	The current status of the server. This field has one of the following values: **Disabled**: the server is disabled. **Not Ready**: the server is enabled, but IP communication is not yet up and running. **Ready**: the server is enabled, IP communications are built, and the RADIUS module is ready to accept access attempts. **Dead** (X seconds left): access attempts are made to this server, but it does not reply within the configured timeout. The server has temporarily been disabled but will be re-enabled when the dead-time expires. The number of seconds left before this occurs is displayed in parentheses. This state is only reachable when more than one server is enabled.

Figure 97:



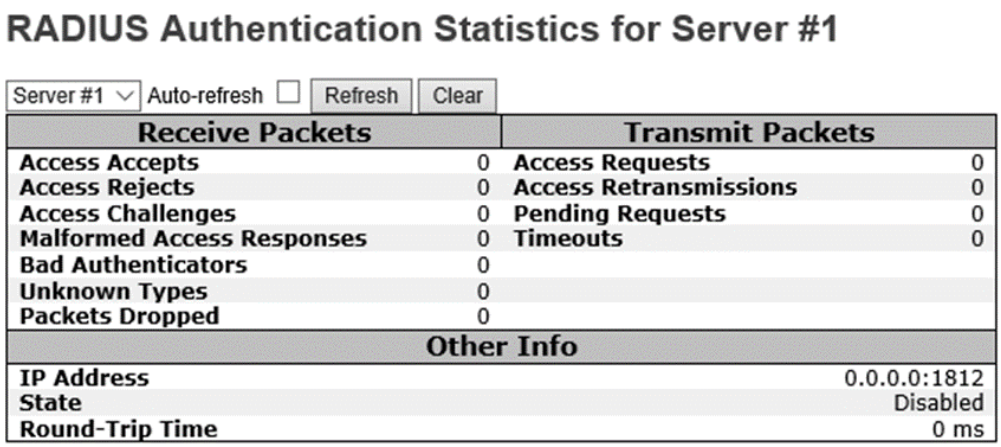
Label	Description
#	The RADIUS server number. Click to navigate to detailed statistics of the server
IP Address	The IP address and UDP port number (in <IP Address>:<UDP Port> notation) of the server
Status	The current status of the server. This field has one of the following values: Disabled: the server is disabled. **Not Ready**: the server is enabled, but IP communication is not yet up and running. **Ready**: the server is enabled, IP communication is up and running, and the RADIUS module is ready to accept accounting attempts. **Dead (X seconds left)**: accounting attempts are made to this server, but it does not reply within the configured timeout. The server has temporarily been disabled but will be re-enabled when the dead-time expires. The number of seconds left before this occurs is displayed in parentheses. This state is only reachable when more than one server is enabled.

RADIUS Details

The statistics map closely to those specified in RFC4668 - RADIUS Authentication Client MIB.

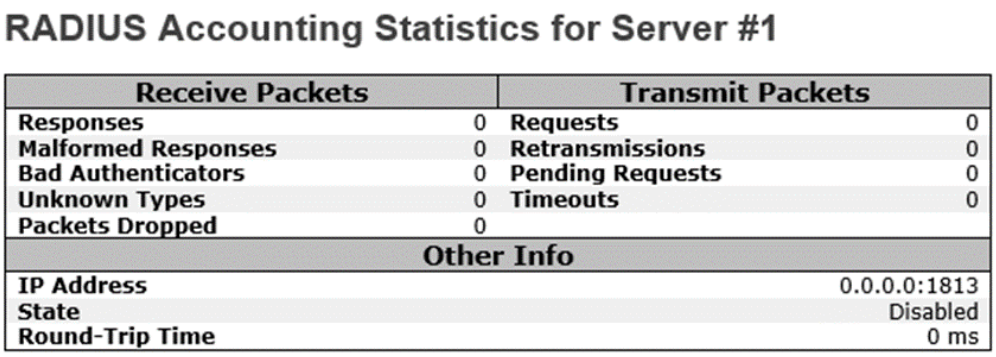
Use the server drop-down list to switch between the backend servers to show related details.

Figure 98:



Label	Description
Packet Counters	RADIUS authentication server packet counters. There are seven ‘receive’ and four ‘transmit’ counters.
Other Info	This section contains information about the state of the server and the latest round-trip time.

Figure 99:



RADIUS Accounting Statistics for Server #1

Receive Packets		Transmit Packets	
Responses	0	Requests	0
Malformed Responses	0	Retransmissions	0
Bad Authenticators	0	Pending Requests	0
Unknown Types	0	Timeouts	0
Packets Dropped	0		
Other Info			
IP Address			0.0.0.0:1813
State			Disabled
Round-Trip Time			0 ms

Label	Description
Packet Counters	RADIUS accounting server packet counters. There are five 'receive' and four 'transmit' counters.
Other Info	This section contains information about the state of the server and the latest round-trip time.

4.10.4 NAS (802.1x)

This page allows you to configure the IEEE 802.1X and MAC-based authentication system and port settings.

The IEEE 802.1X standard defines a port-based access control procedure that prevents unauthorized access to a network by requiring users to first submit credentials for authentication. One or more central servers (the backend servers) determine whether the user is allowed access to the network. These backend (RADIUS) servers are configured on the authentication configuration page.

MAC-based authentication allows for authentication of more than one user on the same port and does not require the users to have special 802.1X software installed on their system. The switch uses the users' MAC addresses to authenticate against the backend server. As intruders can create counterfeit MAC addresses, MAC-based authentication is less secure than 802.1X authentication.

Overview of 802.1X (Port-Based) Authentication

In an 802.1X network environment, the user is called the supplicant, the switch is the authenticator, and the RADIUS server is the authentication server. The switch acts as the man-in-the-middle, forwarding requests and responses between the supplicant and the authentication server. Frames sent between the supplicant and the switch are special 802.1X frames, known as EAPOL (EAP Over LANs) frames which encapsulate EAP PDUs (RFC3748). Frames sent between the switch and the RADIUS server are RADIUS packets. RADIUS packets also encapsulate EAP PDUs together with other attributes like the switch's IP address, name, and the supplicant's port number on the switch. EAP is very flexible as it allows for different authentication methods, like MD5-Challenge, PEAP, and TLS. The important thing is that the authenticator (the switch) does not need to know which

authentication method the supplicant and the authentication server are using, or how many information exchange frames are needed for a particular method. The switch simply encapsulates the EAP part of the frame into the relevant type (EAPOL or RADIUS) and forwards it.

When authentication is complete, the RADIUS server sends a special packet containing a success or failure indication. Besides forwarding the result to the supplicant, the switch uses it to open up or block traffic on the switch port connected to the supplicant.

Note: *in an environment where two backend servers are enabled, the server timeout is configured to X seconds (using the authentication configuration page), and the first server in the list is currently down (but not considered dead), if the supplicant retransmits EAPOL Start frames at a rate faster than X seconds, it will never be authenticated because the switch will cancel on-going backend authentication server requests whenever it receives a new EAPOL Start frame from the supplicant. Since the server has not failed (because the X seconds have not expired), the same server will be contacted when the next backend authentication server requests from the switch. This scenario will loop forever. Therefore, the server timeout should be smaller than the supplicant's EAPOL Start frame retransmission rate.*

Overview of MAC-Based Authentication

Unlike 802.1X, MAC-based authentication is not a standard, but merely a best-practices method adopted by the industry. In MAC-based authentication, users are called clients, and the switch acts as the supplicant on behalf of clients. The initial frame (any kind of frame) sent by a client is snooped by the switch, which in turn uses the client's MAC address as both username and password in the subsequent EAP exchange with the RADIUS server. The 6-byte MAC address is converted to a string in the following form "xx-xx-xx-xx-xx-xx", that is, a dash (-) is used as separator between the lower-cased hexadecimal digits. The switch only supports the MD5-Challenge authentication method, so the RADIUS server must be configured accordingly.

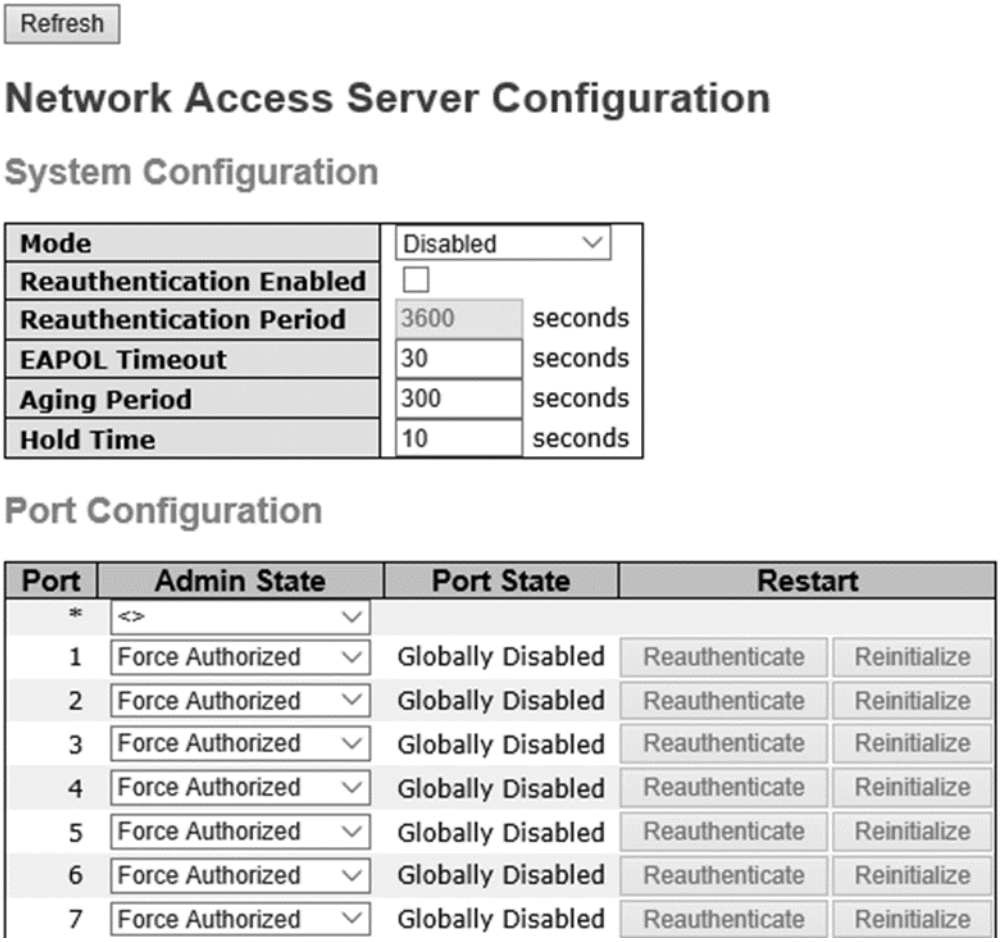
When authentication is complete, the RADIUS server sends a success or failure indication, which in turn causes the switch to open up or block traffic for that particular client, using static entries into the MAC Table. Only then will frames from the client be forwarded on the switch. There are no EAPOL frames involved in this authentication, and therefore, MAC-based authentication has nothing to do with the 802.1X standard.

The advantage of MAC-based authentication over 802.1X is that several clients can be connected to the same port (e.g. through a 3rd party switch or a hub) and still require individual authentication, and that the clients do npt need special supplicant software to authenticate. The disadvantage is that MAC addresses can be spoofed by malicious users, equipment whose MAC address is a valid RADIUS user can be used by anyone, and only the MD5-Challenge method is supported.

802.1X and MAC-Based authentication configurations consist of two sections: system- and port-wide.

Configuration

Figure 100:



Label	Description
Mode	Indicates if 802.1X and MAC-based authentication is globally enabled or disabled on the switch. If globally disabled, all ports are allowed to forward frames.
Reauthentication Enabled	If checked, clients are reauthenticated after the interval specified by the Reauthentication Period. Reauthentication for 802.1X-enabled ports can be used to detect if a new device is plugged into a switch port. For MAC-based ports, reauthentication is only useful if the RADIUS server configuration has changed. It does not involve communication between the switch and the client, and therefore does not imply that a client is still present on a port (see Age Period below).
Reauthentication Period	Determines the period, in seconds, after which a connected client must be re-authenticated. This is only active if the **Reauthentication Enabled** checkbox is checked. Valid range of the value is 1 to 3600 seconds.

Label	Description
EAPOL Timeout	Determines the time for retransmission of Request Identity EAPOL frames. Valid range of the value is 1 to 65535 seconds. This has no effect for MAC-based ports.
Age Period	This setting applies to the following modes, i.e. modes using the **Port Security** functionality to secure MAC addresses: **MAC-Based Auth.**: When the NAS module uses the Port Security module to secure MAC addresses, the Port Security module needs to check for activity on the MAC address in question at regular intervals and free resources if no activity is seen within a given period of time. This parameter controls exactly this period and can be set to a number between 10 and 1000000 seconds. For ports in **MAC-based Auth.** mode, reauthentication does not cause direct communications between the switch and the client, so this will not detect whether the client is still attached or not, and the only way to free any resources is to age the entry.
Hold Time	This setting applies to the following modes, i.e. modes using the **Port Security** functionality to secure MAC addresses: **MAC-Based Auth.**: If a client is denied access - either because the RADIUS server denies the client access or because the RADIUS server request times out (according to the timeout specified on the "**Configuration→Security →AAA**" page) - the client is put on hold in Unauthorized state. The hold timer does not count during an on-going authentication. The switch will ignore new frames coming from the client during the hold time. The hold time can be set to a number between 10 and 1000000 seconds.
Port	The port number for which the configuration below applies
Admin State	If NAS is globally enabled, this selection controls the port's authentication mode. The following modes are available: **Force Authorized** In this mode, the switch will send one EAPOL Success frame when the port link is up, and any client on the port will be allowed network access without authentication. **Force Unauthorized** In this mode, the switch will send one EAPOL Failure frame when the port link is up, and any client on the port will be disallowed network access. **Port-based 802.1X** In an 802.1X network environment, the user is called the supplicant, the switch is the authenticator, and the RADIUS server is the authentication server. The authenticator acts as the man-in-the-

Label	Description
	middle, forwarding requests and responses between the supplicant and the authentication server. Frames sent between the supplicant and the switch are special 802.1X frames, known as EAPOL (EAP Over LANs) frames which encapsulate EAP PDUs (RFC3748). Frames sent between the switch and the RADIUS server is RADIUS packets. RADIUS packets also encapsulate EAP PDUs together with other attributes like the switch's IP address, name, and the supplicant's port number on the switch. EAP is very flexible as it allows for different authentication methods, like MD5-Challenge, PEAP, and TLS. The important thing is that the authenticator (the switch) does not need to know which authentication method the supplicant and the authentication server are using, or how many information exchange frames are needed for a particular method. The switch simply encapsulates the EAP part of the frame into the relevant type (EAPOL or RADIUS) and forwards it. When authentication is complete, the RADIUS server sends a special packet containing a success or failure indication. Besides forwarding the result to the supplicant, the switch uses it to open up or block traffic on the switch port connected to the supplicant. ***Note:*** *in an environment where two backend servers are enabled, the server timeout is configured to X seconds (using the authentication configuration page), and the first server in the list is currently down (but not considered dead), if the supplicant retransmits EAPOL Start frames at a rate faster than X seconds, it will never be authenticated because the switch will cancel on-going backend authentication server requests whenever it receives a new EAPOL Start frame from the supplicant. Since the server has not failed (because the X seconds have not expired), the same server will be contacted when the next backend authentication server request from the switch This scenario will loop forever. Therefore, the server timeout should be smaller than the supplicant's EAPOL Start frame retransmission rate.* **a. Single 802.1X** In port-based 802.1X authentication, once a supplicant is successfully authenticated on a port, the whole port is opened for network traffic. This allows other clients connected to the port (for instance through a hub) to piggy-back on the successfully authenticated client and get network access even though they are not authenticated individually. To overcome this security breach, use the Single 802.1X variant. Single 802.1X is not yet an IEEE standard, but features many of the same characteristics as port-based 802.1X. In Single 802.1X, at most one supplicant can get authenticated on the port at a time. Normal EAPOL frames are used in the communications between the supplicant and the switch. If more than one supplicant is connected to a port, the one that comes first when the port's link is connected will be the first one considered. If that supplicant does not provide valid credentials within a certain amount of time, the chance will be

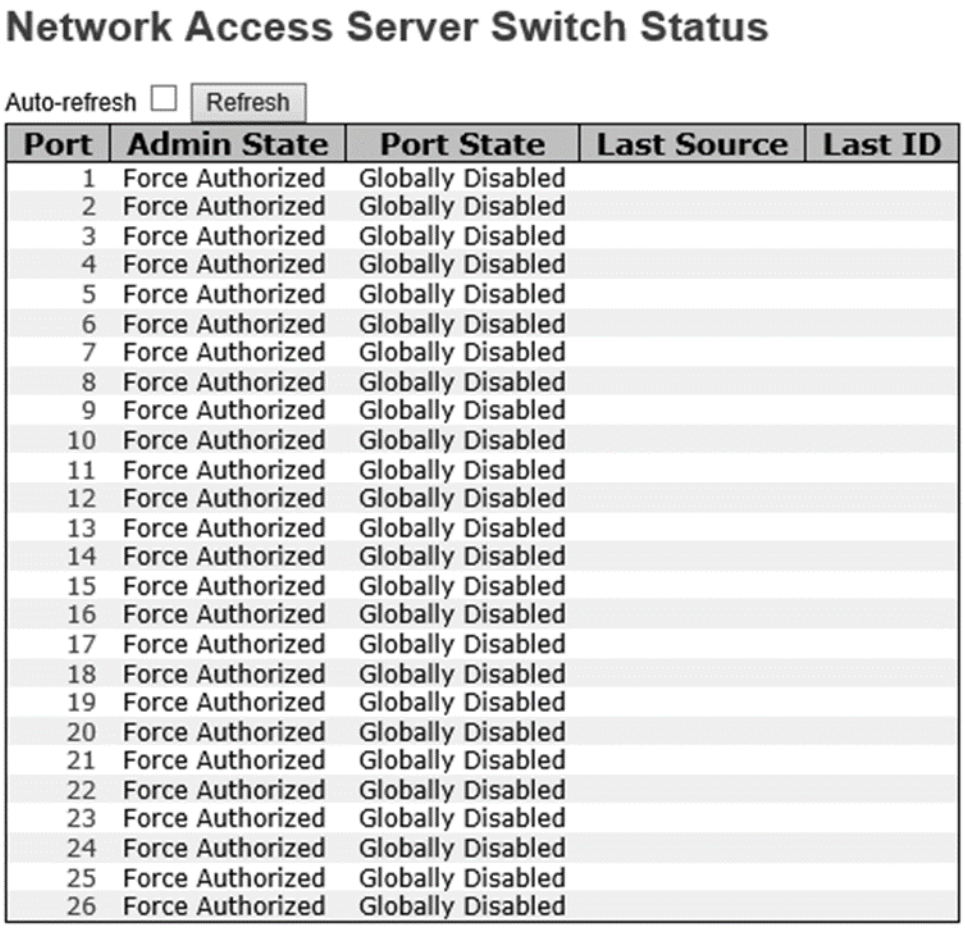
Label	Description
	given to another supplicant. Once a supplicant is successfully authenticated, only that supplicant will be allowed access. This is the most secure of all the supported modes. In this mode, the Port Security module is used to secure a supplicant's MAC address once successfully authenticated. **b. Multi 802.1X** In port-based 802.1X authentication, once a supplicant is successfully authenticated on a port, the whole port is opened for network traffic. This allows other clients connected to the port (for instance through a hub) to piggy-back on the successfully authenticated client and get network access even though they are not authenticated individually. To overcome this security breach, use the Multi 802.1X variant. Multi 802.1X is not yet an IEEE standard, but features many of the same characteristics as port-based 802.1X. In Multi 802.1X, one or more supplicants can be authenticated on the same port at the same time. Each supplicant is authenticated individually and secured in the MAC table using the Port Security module. In Multi 802.1X it is not possible to use the multicast BPDU MAC address as the destination MAC address for EAPOL frames sent from the switch to the supplicant, since that would cause all supplicants attached to the port to reply to requests sent from the switch. Instead, the switch uses the supplicant's MAC address, which is obtained from the first EAPOL Start or EAPOL Response Identity frame sent by the supplicant. An exception to this is when no supplicants are attached. In this case, the switch sends EAPOL Request Identity frames using the BPDU multicast MAC address as destination - to wake up any supplicants that might be on the port. The maximum number of supplicants that can be attached to a port can be limited using the Port Security Limit Control functionality. **MAC-based Auth.** Unlike port-based 802.1X, MAC-based authentication is not a standard, but merely a best-practices method adopted by the industry. In MAC-based authentication, users are called clients, and the switch acts as the supplicant on behalf of clients. The initial frame (any kind of frame) sent by a client is snooped by the switch, which in turn uses the client's MAC address as both username and password in the subsequent EAP exchange with the RADIUS server. The 6-byte MAC address is converted to a string in the following form "xx-xx-xx-xx-xx-xx", that is, a dash (-) is used as separator between the lower-cased hexadecimal digits. The switch only supports the MD5-Challenge authentication method, so the RADIUS server must be configured accordingly. When authentication is complete, the RADIUS server sends a success or failure indication, which in turn causes the switch to open up or block traffic for that particular client, using the Port Security module. Only then will frames from the client be forwarded on the switch. There are no EAPOL frames involved in this authentication, and

Label	Description
	therefore, MAC-based authentication has nothing to do with the 802.1X standard. The advantage of MAC-based authentication over port-based 802.1X is that several clients can be connected to the same port (e.g. through a 3rd party switch or a hub) and still require individual authentication, and that the clients don't need special supplicant software to authenticate. The advantage of MAC-based authentication over 802.1X-based authentication is that the clients do not need special supplicant software to authenticate. The disadvantage is that MAC addresses can be spoofed by malicious users - equipment whose MAC address is a valid RADIUS user can be used by anyone. Also, only the MD5-Challenge method is supported. The maximum number of clients that can be attached to a port can be limited using the Port Security Limit Control functionality.
Port State	The current state of the port. It can undertake one of the following values: **Globally Disabled**: NAS is globally disabled. **Link Down**: NAS is globally enabled, but there is no link on the port. **Authorized**: the port is in Force Authorized or a single-supplicant mode and the supplicant is authorized. **Unauthorized:** the port is in Force Unauthorized or a single-supplicant mode and the supplicant is not successfully authorized by the RADIUS server. **X Auth/Y Unauth**: the port is in a multi-supplicant mode. Currently X clients are authorized, and Y are unauthorized.
Restart	Two buttons are available for each row. The buttons are only enabled when authentication is globally enabled, and the port's Admin State is in an EAPOL-based or MAC-based mode. Clicking these buttons will not cause settings changed on the page to take effect. **Reauthenticate**: schedules a reauthentication whenever the quiet-period of the port runs out (EAPOL-based authentication). For MAC-based authentication, reauthentication will be attempted immediately. The button only has effect on successfully authenticated clients on the port and will not cause the clients to be temporarily unauthorized. **Reinitialize**: forces a reinitialization of the clients on the port and hence a reauthentication immediately. The clients will transfer to the unauthorized state while the reauthentication is in progress.

Switch

This page provides an overview of the current NAS port states.

Figure 101:



Network Access Server Switch Status

Auto-refresh ☐ Refresh

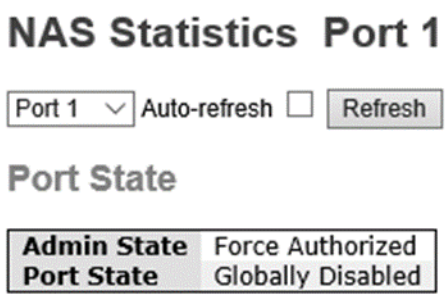
Port	Admin State	Port State	Last Source	Last ID
1	Force Authorized	Globally Disabled		
2	Force Authorized	Globally Disabled		
3	Force Authorized	Globally Disabled		
4	Force Authorized	Globally Disabled		
5	Force Authorized	Globally Disabled		
6	Force Authorized	Globally Disabled		
7	Force Authorized	Globally Disabled		
8	Force Authorized	Globally Disabled		
9	Force Authorized	Globally Disabled		
10	Force Authorized	Globally Disabled		
11	Force Authorized	Globally Disabled		
12	Force Authorized	Globally Disabled		
13	Force Authorized	Globally Disabled		
14	Force Authorized	Globally Disabled		
15	Force Authorized	Globally Disabled		
16	Force Authorized	Globally Disabled		
17	Force Authorized	Globally Disabled		
18	Force Authorized	Globally Disabled		
19	Force Authorized	Globally Disabled		
20	Force Authorized	Globally Disabled		
21	Force Authorized	Globally Disabled		
22	Force Authorized	Globally Disabled		
23	Force Authorized	Globally Disabled		
24	Force Authorized	Globally Disabled		
25	Force Authorized	Globally Disabled		
26	Force Authorized	Globally Disabled		

Label	Description
Port	The switch port number. Click to navigate to detailed 802.1X statistics of each port.
Admin State	The port's current administrative state. Refer to **NAS Admin State** for more details regarding each value.
Port State	The current state of the port. Refer to **NAS Port State** for more details regarding each value.
Last Source	The source MAC address carried in the most recently received EAPOL frame for EAPOL-based authentication, and the most recently received frame from a new client for MAC-based authentication.
Last ID	The username (supplicant identity) carried in the most recently received Response Identity EAPOL frame for EAPOL-based authentication, and the source MAC address from the most recently received frame from a new client for MAC-based authentication.

Port

This page provides detailed IEEE 802.1X statistics for a specific switch port using port-based authentication. For MAC-based ports, only selected backend server (RADIUS Authentication Server) statistics is showed. Use the port drop-down list to select which port details to be displayed.

Figure 102:



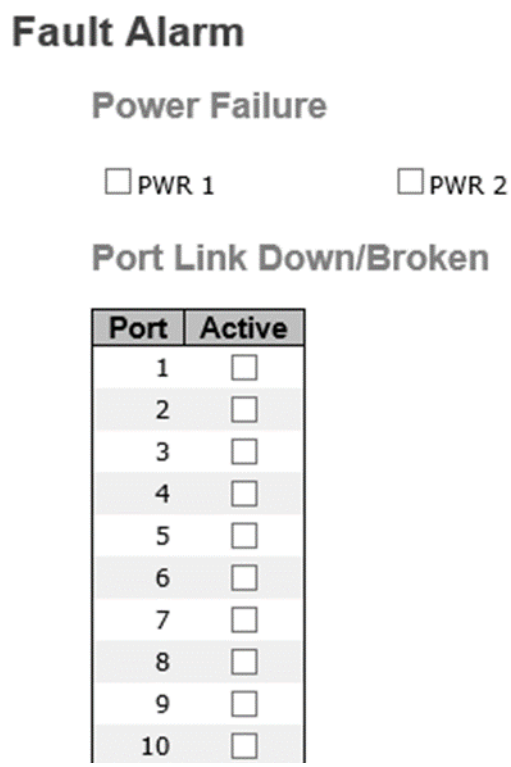
Label	Description
Admin State	The port's current administrative state. Refer to **NAS Admin State** for more details regarding each value.
Port State	The current state of the port. Refer to **NAS Port State** for more details regarding each value.
EAPOL Counters	These supplicant frame counters are available for the following administrative states: • **Force Authorized** • **Force Unauthorized** • 802.1X
Backend Server Counters	These backend (RADIUS) frame counters are available for the following administrative states: • **802.1X** • **MAC-based Auth.**
Last Supplicant/Client Info	Information about the last supplicant/client that attempts to authenticate. This information is available for the following administrative states: • **802.1X** • **MAC-based Auth.**

4.11 Warning

4.11.1 Fault Alarm

When any selected fault event happens, the Fault LED on the switch panel will light up and the electric relay will signal at the same time.

Figure 103:

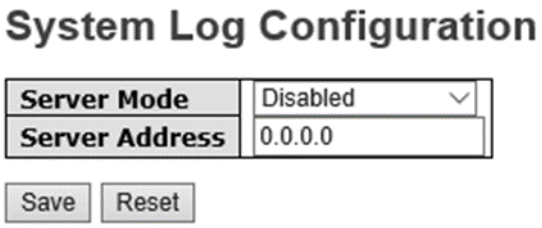


4.11.2 System Warning

SYSLOG Setting

The SYSLOG is a protocol that transmits event notifications across networks. For more details, please refer to RFC 3164 - The BSD SYSLOG Protocol.

Figure 104:

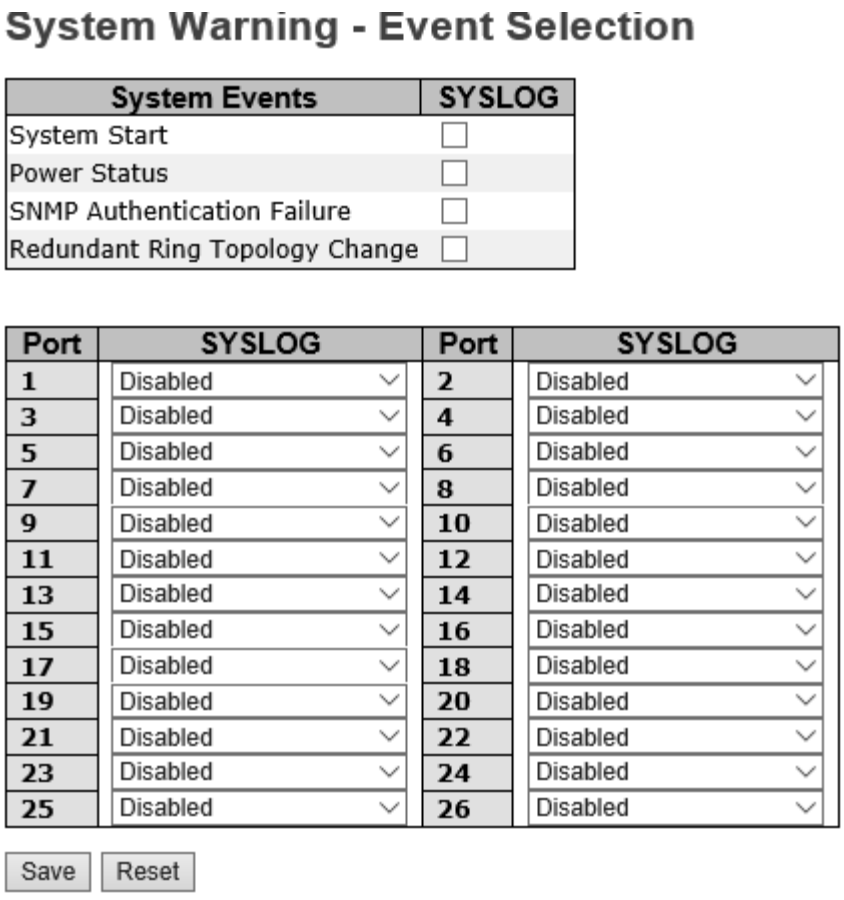


Label	Description
Server Mode	Indicates existing server mode. When the mode operation is enabled, the syslog message will be sent to syslog server. The syslog protocol is based on UDP communications and received on UDP port 514 and the syslog server will not send acknowledgments back to the sender since UDP is a connectionless protocol and it does not provide acknowledgments. The syslog packet will always be sent even if the syslog server does not exist. Possible modes are: **Enabled**: enable server mode **Disabled**: disable server mode
SYSLOG Server IP Address	Indicates the IPv4 host address of syslog server. If the switch provides DNS functions, it also can be a host name.

Event Selection

SYSLOG is warning method supported by the system. Check the corresponding box to enable the system event warning method you want. Please note that the checkbox cannot be checked when SYSLOG is disabled.

Figure 105:



Label	Description
System Cold Start	Sends out alerts when the system is restarted
Power Status	Sends out alerts when power is up or down
SNMP Authentication Failure	Sends out alert when SNMP authentication fails
Redundant Ring Topology Change	Sends out alerts when Ring topology changes
Port Event SYSLOG	• Disable • Link Up • Link Down • Link Up & Link Down

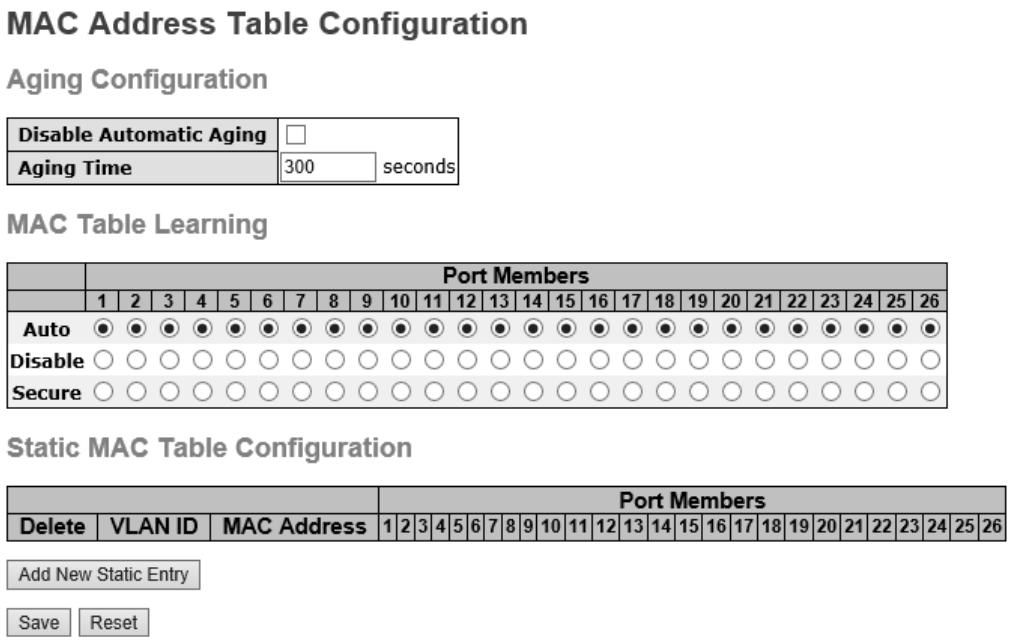
4.12 Monitor and Diag

4.12.1 MAC Table

MAC Address Table Configuration

The MAC address table can be configured on this page. You can set timeouts for entries in the dynamic MAC table and configure the static MAC table here.

Figure 106:



Aging Configuration

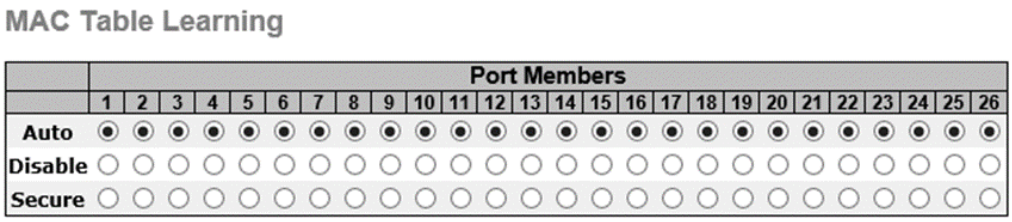
By default, dynamic entries are removed from the MAC after 300 seconds. This removal is called aging. You can configure aging time by entering a value in the box of Age Time. The allowed range is 10 to 1000000 seconds. You can also disable the automatic aging of dynamic entries by checking Disable Automatic Aging.

MAC Table Learning

If the learning mode for a given port is grayed out, it means another module is in control of the mode, and thus the user cannot change the configurations. An example of such a module is MAC-Based authentication under 802.1X.

You can configure the port to dynamically learn the MAC address based upon the following settings:

Figure 107:

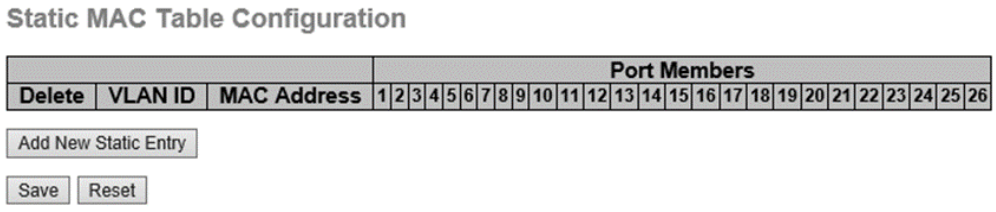


Label	Description
Auto	Learning is done automatically as soon as a frame with unknown SMAC is received.
Disable	No learning is done.
Secure	Only static MAC entries are learned, all other frames are dropped. ***Note:*** *make sure the link used for managing the switch is added to the static Mac table before changing to secure learning mode, otherwise the management link will be lost and can only be restored by using another non-secure port or by connecting to the switch via the serial interface.*

Static MAC Table Configurations

The static entries in the MAC table are shown in this table. The static MAC table can contain up to 64 entries. The entries are for the whole stack, not for individual switches. The MAC table is sorted first by VLAN ID and then by MAC address.

Figure 108:



Label	Description
Delete	Check to delete an entry. It will be deleted during the next save.
VLAN ID	The VLAN ID for the entry
MAC Address	The MAC address for the entry
Port Members	Checkmarks indicate which ports are members of the entry. Check or uncheck to modify the entry.

Label	Description
Adding New Static Entry	Click to add a new entry to the static MAC table. You can specify the VLAN ID, MAC address, and port members for the new entry. Click **Save** to save the changes.

MAC Table

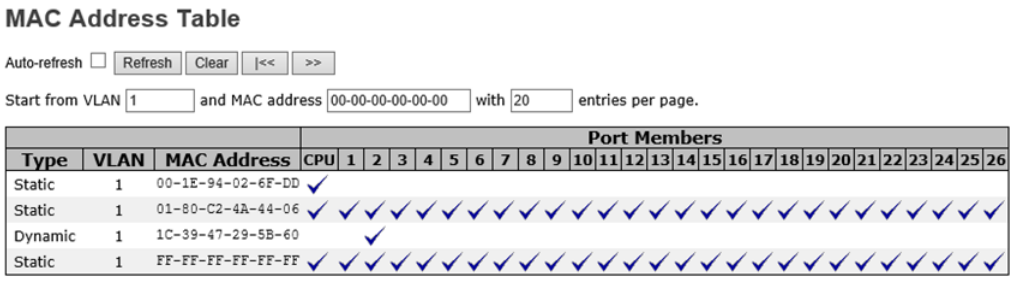
Each page shows up to 999 entries from the MAC table, with a default value of 20, selected by the **Entries Per Page** input field. When first visited, the web page will show the first 20 entries from the beginning of the MAC Table. The first displayed will be the one with the lowest VLAN ID and the lowest MAC address found in the MAC Table.

Each page shows up to 999 entries from the MAC table, with a default value of 20, selected by the **Entries Per Page** input field. When first visited, the web page will show the first 20 entries from the beginning of the MAC Table. The first displayed will be the one with the lowest VLAN ID and the lowest MAC address found in the MAC Table.

The **Start from MAC address** and **VLAN** fields allow the user to select the starting point in the MAC table. Clicking the **Refresh** button will update the displayed table starting from that or the closest next MAC table match. In addition, the two input fields will – upon clicking **Refresh** - assume the value of the first displayed entry, allows for continuous refresh with the same start address.

The >> will use the last entry of the currently displayed VLAN/MAC address pairs as a basis for the next lookup. When it reaches the end, the text "**no more entries**" is shown in the displayed table. Use the |<< button to start over.

Figure 109:



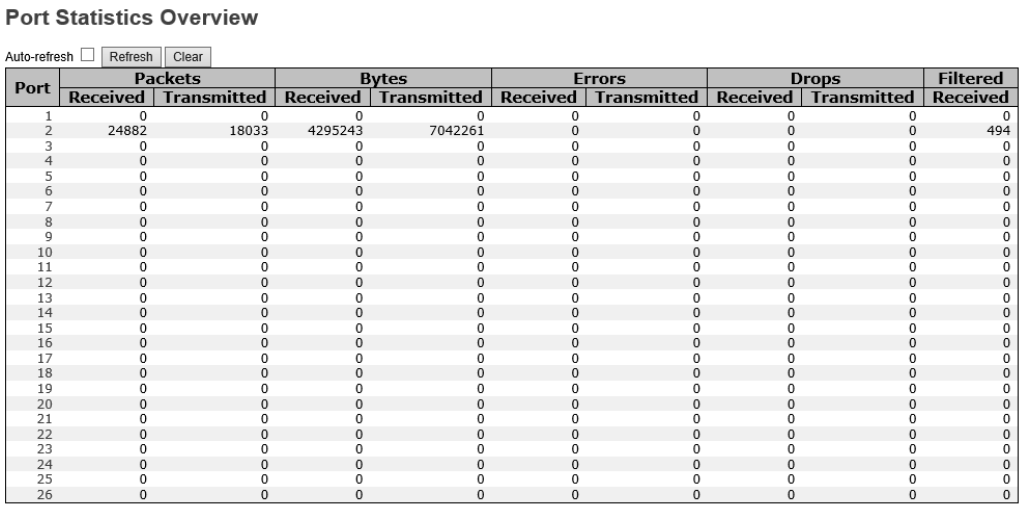
Label	Description
Type	Indicates whether the entry is a static or dynamic entry
MAC address	The MAC address of the entry
VLAN	The VLAN ID of the entry
Port Members	The ports that are members of the entry.

4.12.2 Port Statistics

Traffic Overview

This page provides an overview of general traffic statistics for all switch ports.

Figure 110:



Port	Packets		Bytes		Errors		Drops		Filtered
	Received	Transmitted	Received	Transmitted	Received	Transmitted	Received	Transmitted	Received
1	0	0	0	0	0	0	0	0	0
2	24882	18033	4295243	7042261	0	0	0	0	494
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0

Label	Description
Port	The switch port number to which the following settings will be applied.
Packets	The number of received and transmitted packets per port.
Bytes	The number of received and transmitted bytes per port.
Errors	The number of frames received in error and the number of incomplete transmissions per port.
Drops	The number of frames discarded due to ingress or egress congestion.
Filtered	The number of received frames filtered by the forwarding process.
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals.
Refresh	Updates the counter entries, starting from the current entry ID.
Clear	Flushes all counters entries.

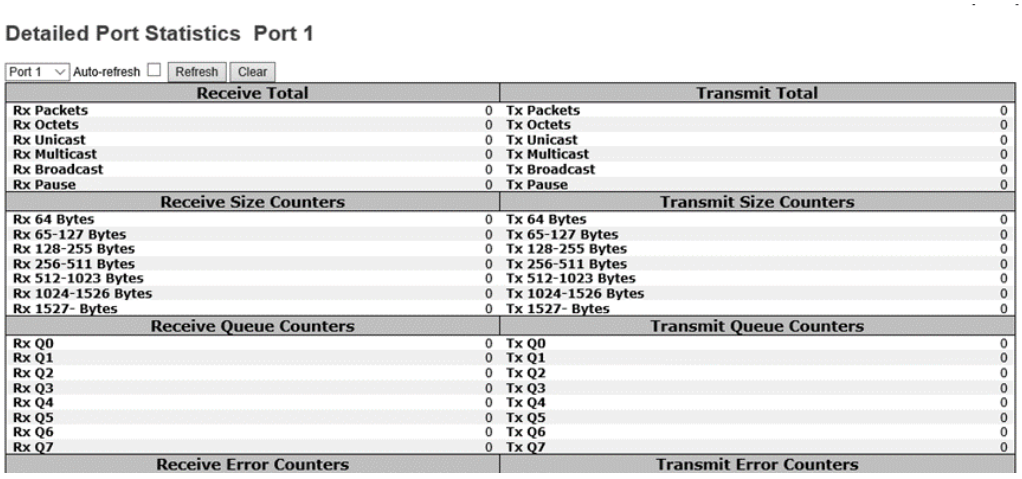
Detailed Statistics

This page provides detailed traffic statistics for a specific switch port. Use the port drop-down list to decide the details of which switch port to be displayed.

The displayed counters include the total number for receive and transmit, the size for receive and transmit, and the errors for receive and transmit.

Detailed Statistics – Total Receive & Transmit

Figure 111:



Label	Description
Rx and Tx Packets	The number of received and transmitted (good and bad) packets
Rx and Tx Octets	The number of received and transmitted (good and bad) bytes, including FCS, except framing bits
Rx and Tx Unicast	The number of received and transmitted (good and bad) unicast packets
Rx and Tx Multicast	The number of received and transmitted (good and bad) multicast packets
Rx and Tx Broadcast	The number of received and transmitted (good and bad) broadcast packets
Rx and Tx Pause	The number of MAC Control frames received or transmitted on this port that have an opcode indicating a PAUSE operation
Rx Drops	The number of frames dropped due to insufficient receive buffer or egress congestion
Rx CRC/Alignment	The number of frames received with CRC or alignment errors
Rx Undersize	The number of short[1] frames received with a valid CRC
Rx Oversize	The number of long[2] frames received with a valid CRC
Rx Fragments	The number of short[1] frames received with an invalid CRC
Rx Jabber	The number of long[2] frames received with an invalid CRC
Rx Filtered	The number of received frames filtered by the forwarding process
Tx Drops	The number of frames dropped due to output buffer congestion
Tx Late / Exc.Coll.	The number of frames dropped due to excessive or late collisions

1. Short frames are frames smaller than 64 bytes.
2. Long frames are frames longer than the maximum frame length configured for this port.

4.12.3 Port Mirroring

You can configure port mirroring on this page.

To solve network problems, selected traffic can be copied, or mirrored, to a mirror port where a frame analyzer can be attached to analyze the frame flow.

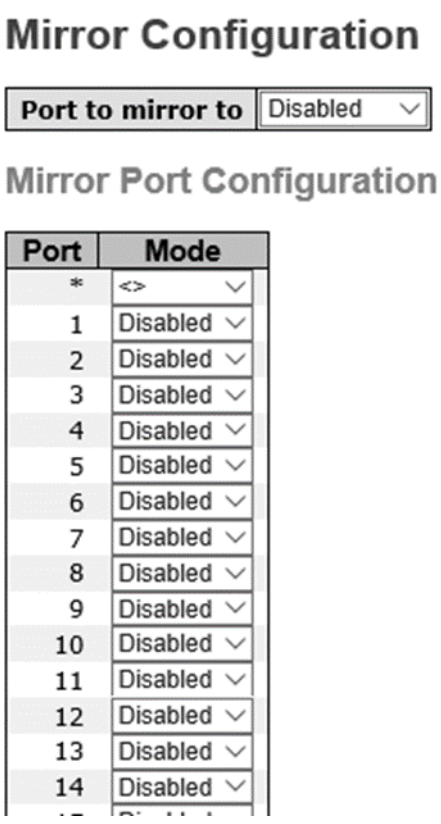
The traffic to be copied to the mirror port is selected as follows:

All frames received on a given port (also known as ingress or source mirroring).

All frames transmitted on a given port (also known as egress or destination mirroring).

Port to mirror is also known as the mirror port. Frames from ports that have either source (rx) or destination (tx) mirroring enabled are mirrored to this port. Disabled option disables mirroring.

Figure 112:



Label	Description
Port	The switch port number to which the following settings will be applied.
Mode	Drop-down list for selecting a mirror mode. **Rx only**: only frames received on this port are mirrored to the mirror port. Frames transmitted are not mirrored. **Tx only**: only frames transmitted from this port are mirrored to the mirror port. Frames received are not mirrored. **Disabled**: neither transmitted nor received frames are mirrored. **Enabled**: both received and transmitted frames are mirrored to the mirror port. Note: for a given port, a frame is only transmitted once. Therefore, you cannot mirror Tx frames to the mirror port. In this case, mode for the selected mirror port is limited to **Disabled** or **Rx nly**.

4.12.4 System Log Information

This page provides switch system log information.

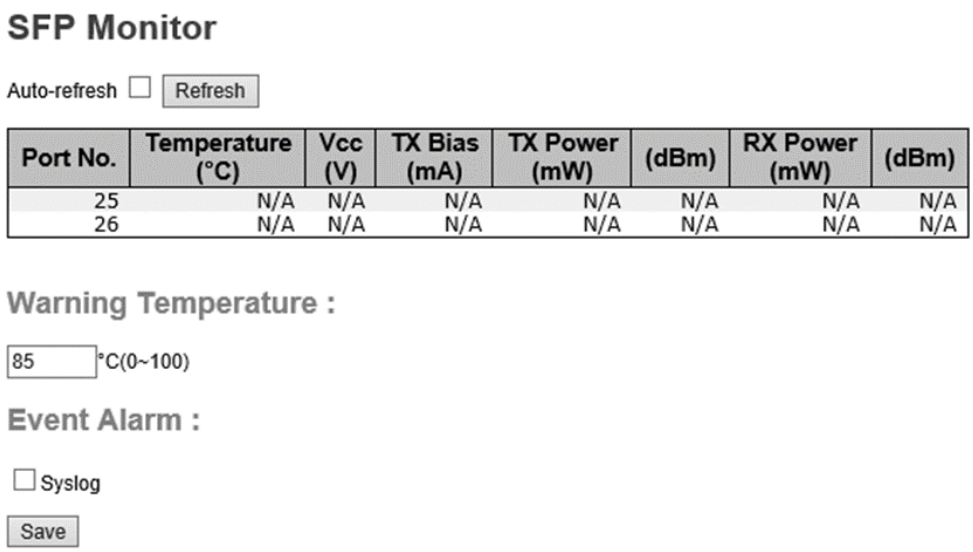
Figure 113:

Label	Description
ID	The ID (>= 1) of the system log entry
Time	The time of the system log entry.
Message	The MAC address of the switch.
Auto-refresh	Check this box to enable an automatic refresh of the page at regular intervals.
Refresh	Updates system log entries, starting from the current entry ID.
Clear	Flushes all system log entries.
|<<	Updates system log entries, starting from the first available entry ID.
<<	Updates system log entries, ending at the last entry currently displayed.
>>	Updates system log entries, starting from the last entry currently displayed.
>>|	Updates system log entries, ending at the last available entry ID.

4.12.5 SFP Monitor

SFP modules with DDM (Digital Diagnostic Monitoring) function can measure the temperature of the apparatus, helping you monitor the status of connection and detect errors immediately. You can manage and set up event alarms through DDM Web interface.

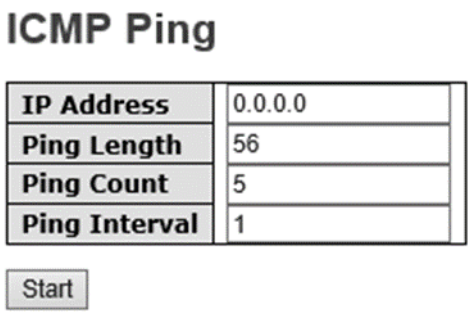
Figure 114:



4.12.6 Ping

This command sends ICMP echo request packets to another node on the network. Using the ping command, you can see if another site on the network can be reached.

Figure 115:



After you press **Start**, five ICMP packets will be transmitted, and the sequence number and roundtrip time will be displayed upon reception of a reply. The page refreshes automatically until responses to all packets are received, or until a timeout occurs.

PING6 server ::10.10.132.20

64 bytes from ::10.10.132.20: icmp_seq=0, time=0ms

64 bytes from ::10.10.132.20: icmp_seq=1, time=0ms

64 bytes from ::10.10.132.20: icmp_seq=2, time=0ms

64 bytes from ::10.10.132.20: icmp_seq=3, time=0ms

64 bytes from ::10.10.132.20: icmp_seq=4, time=0ms

Sent 5 packets, received 5 OK, 0 bad

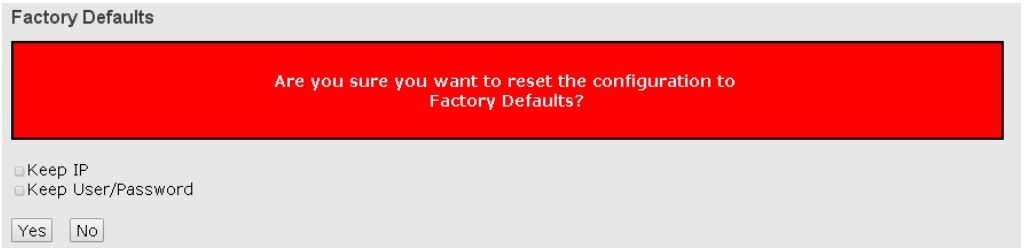
You can configure the following properties of the issued ICMP packets:

Label	Description
IP Address	The destination IP Address
Ping Length	The payload size of the ICMP packet. Values range from 8 to 1400 bytes.
Ping Count	The number of ICMP packets to be sent.
Ping Interval	The interval at which ICMP packets will be sent.

4.13 Factory Defaults

You can reset the configuration of the stack switch on this page. Only the IP configuration is retained.

Figure 116:

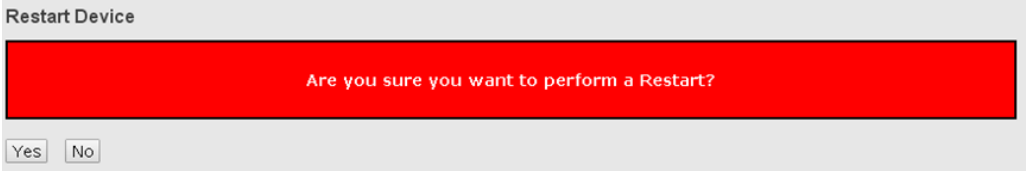


Label	Description
Keep IP	Check the box if you want the device to keep the IP address after restoring to factory settings
Keep User/Password	Check the box if you want the device to keep the username and password after restoring to factory settings
Yes	Click to reset the configuration to factory defaults
No	Click to return to the Port State page without resetting

4.14 System Reboot

You can reset the stack switch on this page. After reset, the system will boot normally as if you have powered on the devices.

Figure 117:



Label	Description
Yes	Click to reboot device
No	Click to return to the **Port State** page without rebooting

Chapter 5: Command Line Interface Management

Besides Web-based management, the device also support CLI management. You can use console or SSH to manage the switch by CLI.

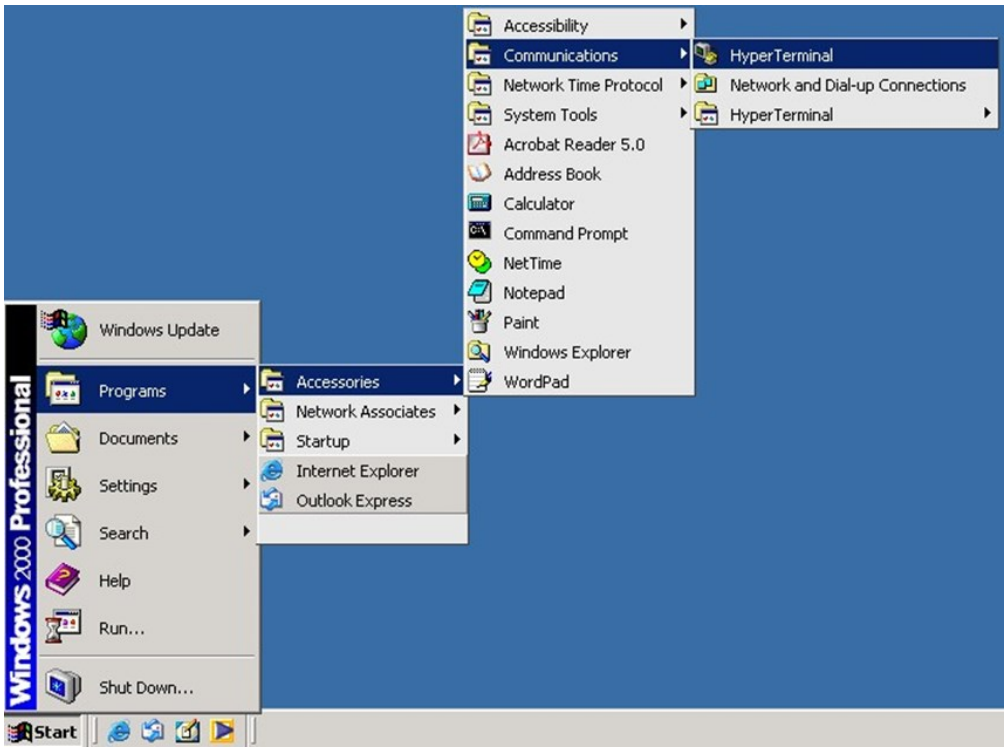
CLI Management by RS-232 Serial Console (115200, 8, none, 1, none)

Before configuring RS-232 serial console, connect the RS-232 port of the switch to your PC Com port using a RJ45 to DB9-F cable.

Follow the steps below to access the console via RS-232 serial cable.

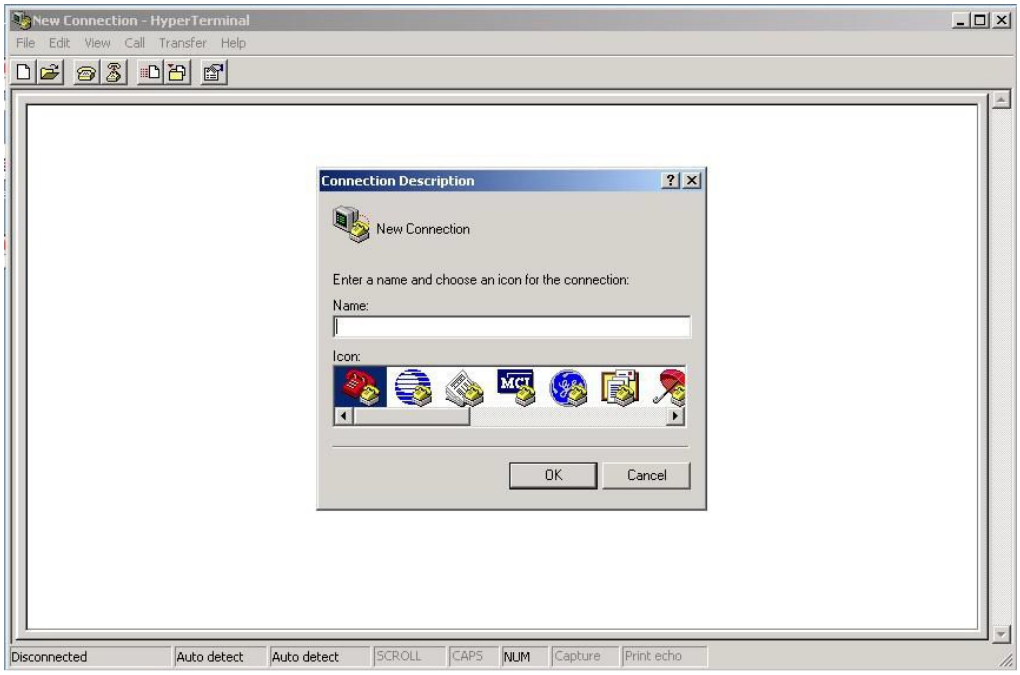
Step 1: On Windows desktop, click on **Start -> Programs -> Accessories -> Communications -> Hyper Terminal**

Figure 118:



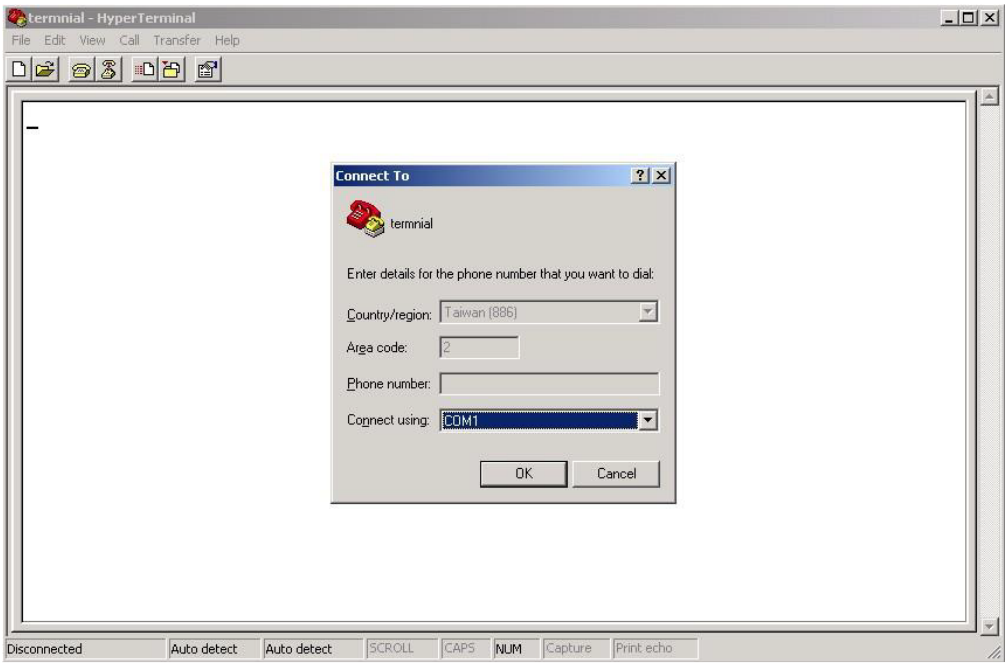
Step 2: Input a name for the new connection.

Figure 119:



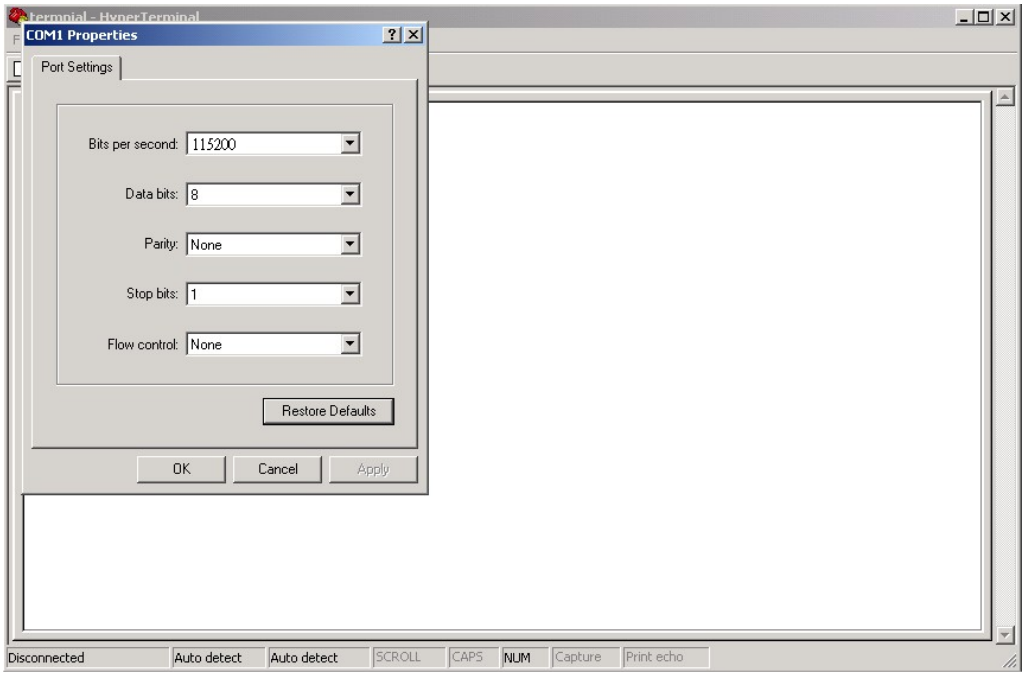
Step 3: Select a COM port in the drop-down list.

Figure 120:



Step 4: A pop-up window that indicates COM port properties appears, including bits per second, data bits, parity, stop bits, and flow control.

Figure 121:



Step 5: The console login screen will appear. Use the keyboard to enter the Username and Password (same as the password for Web browsers), then press **Enter.**

Figure 122:

```
          SLM242

   Command Line Interface



  Username :

  Password :
```

CLI Management by SSH

You can can use SSH to configure the switch. The default values are:

IP Address: **192.168.0.100**

Subnet Mask: **255.255.255.0**

Default Gateway: **192.168.0.254**

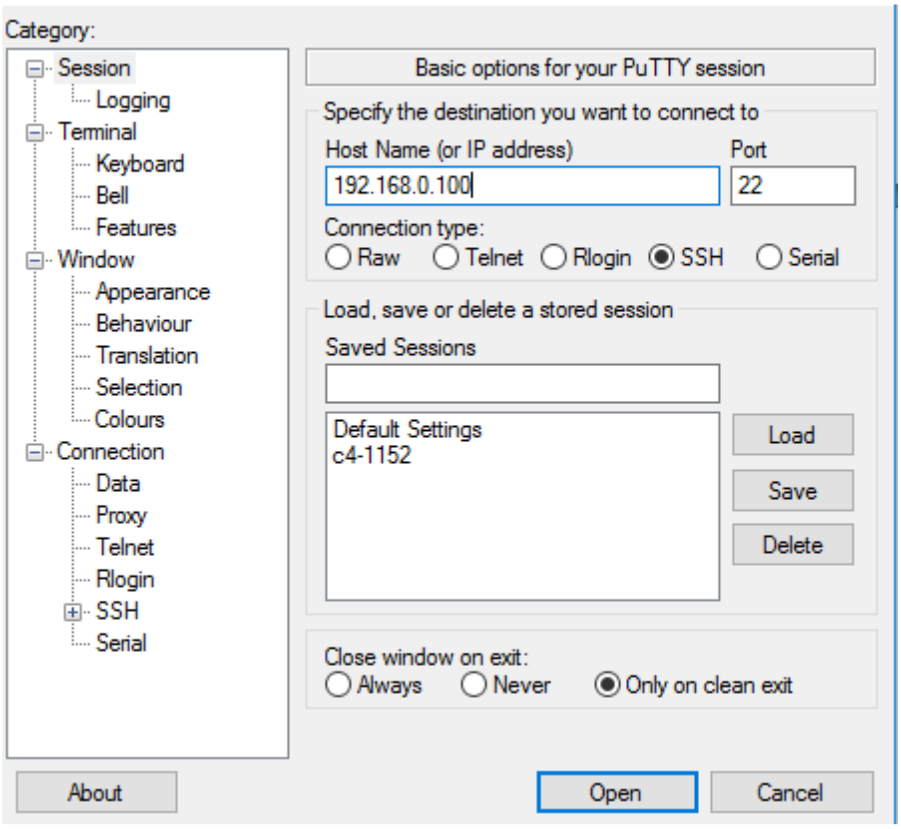
User Name: **admin**

Password: **admin**

Follow the steps below to access console via SSH

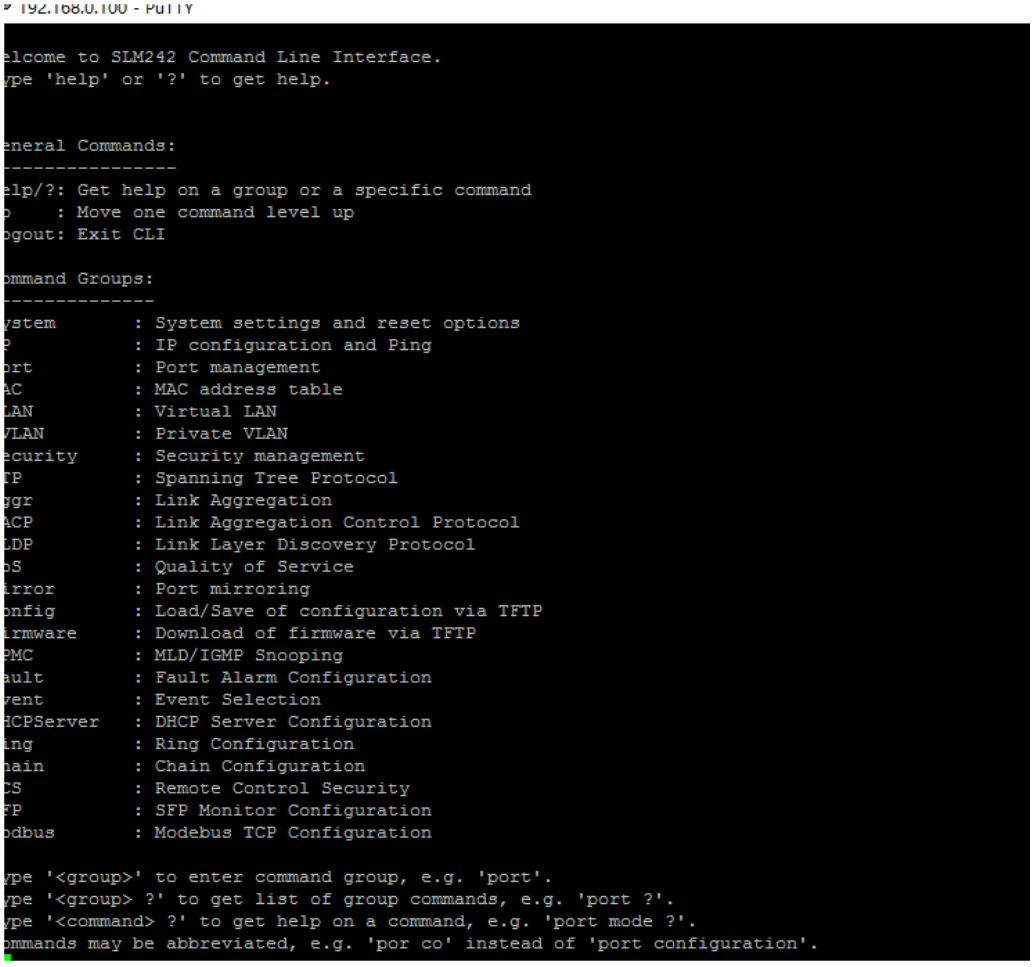
Step 1:Use “Putty” Tool , Input the switch IP address, click “Open”

Figure 123:



Step 2: The Login screen will appear. Use the keyboard to enter the Username and Password (same as the password for Web browser), and then press **Enter.**

Figure 124:



System

System>	Configuration [all] [<port_list>]
	Reboot
	Restore Default [keep_ip]
	Contact [<contact>]
	Name [<name>]
	Location [<location>]
	Description [<description>]
	Password <password>
	Username [<username>]
	Timezone [<offset>]
	Log [<log_id>] [all|info|warning|error] [clear]

IP

IP>	Configuration
	DHCP [enable|disable]
	Setup [<ip_addr>] [<ip_mask>] [<ip_router>] [<vid>]
	Ping <ip_addr_string> [<ping_length>]
	SNTP [<ip_addr_string>]

Port

port>	Configuration [<port_list>] [up|down]
	Mode [<port_list>] [auto|10hdx|10fdx|100hdx|100fdx|1000fdx|sfp_auto_ams]
	Flow Control [<port_list>] [enable|disable]
	State [<port_list>] [enable|disable]
	MaxFrame [<port_list>] [<max_frame>]
	Power [<port_list>] [enable|disable|actiphy|dynamic]
	Excessive [<port_list>] [discard|restart]
	Statistics [<port_list>] [<command>] [up|down]
	VeriPHY [<port_list>]
	SFP [<port_list>]

MAC

MAC>	Configuration [<port_list>]
	Add <mac_addr> <port_list> [<vid>]
	Delete <mac_addr> [<vid>]
	Lookup <mac_addr> [<vid>]
	Agetime [<age_time>]
	Learning [<port_list>] [auto|disable|secure]
	Dump [<mac_max>] [<mac_addr>] [<vid>]
	Statistics [<port_list>]
	Flush

VLAN

VLAN>	Configuration [<port_list>]
	PVID [<port_list>] [<vid>|none]
	FrameType [<port_list>] [all|tagged|untagged]
	IngressFilter [<port_list>] [enable|disable]
	tx_tag [<port_list>] [untag_pvid|untag_all|tag_all]
	PortType [<port_list>] [unaware|c-port|s-port|s-custom-port]
	EtypeCustomSport [<etype>]
	Add <vid>|<name> [<ports_list>]
	Forbidden Add <vid>|<name> [<port_list>]
	Delete <vid>|<name>
	Forbidden Delete <vid>|<name>
	Forbidden Lookup [<vid>] [(name <name>)]
	Lookup [<vid>] [(name <name>)] [combined|static|nas|all]
	Name Add <name> <vid>
	Name Delete <name>
	Name Lookup [<name>]
	Status [<port_list>] [combined|static|nas|mstp|all|conflicts]

Private VLAN

Private VLAN	Private VLAN
	Private VLAN
	Private VLAN
	Private VLAN
	Private VLAN

Security

Security >	Switch Switch security setting
	Network Network security setting
	AAA Authentication, Authorization and Accounting setting

Security Switch

Security/switch>	Password <password>
	Auth Authentication
	SSH Secure Shell
	HTTPS Hypertext Transfer Protocol over Secure Socket Layer
	RMON Remote Network Monitoring

Security Switch Authentication

Security/switch/auth>	Configuration
	Method [console|telnet|ssh|web] [none|local|radius] [enable|disable]

Security Switch SSH

Security/switch/ssh>	Configuration
	Mode [enable | disable]

Security Switch HTTPS

Security/switch/ssh>	Configuration
	Mode [enable | disable]

Security Switch RMON

Security/switch/rmon>	Statistics Add <stats_id> <data_source>
	Statistics Delete <stats_id>
	Statistics Lookup [<stats_id>]
	History Add <history_id> <data_source> [<interval>] [<buckets>]
	History Delete <history_id>
	History Lookup [<history_id>]
	Alarm Add <alarm_id> <interval> <alarm_variable> [absolute | delta]<rising_threshold> <rising_event_index> <falling_threshold> <falling_event_index> [rising | falling | both]
	Alarm Delete <alarm_id>
	Alarm Lookup [<alarm_id>]

Security Network

Security/Network>	Psec Port Security Status
	NAS Network Access Server (IEEE 802.1X)
	ACL Access Control List
	DHCP Dynamic Host Configuration Protocol

Security Network Psec

Security/Network/Psec>	Switch [<port_list>]
	Port [<port_list>]

Security Network NAS

Security/Network/NAS>	Configuration [<port_list>]
	Mode [enable | disable]
	State [<port_list>] [auto | authorized | unauthorized | macbased]
	Reauthentication [enable | disable]
	ReauthPeriod [<reauth_period>]
	EapolTimeout [<eapol_timeout>]
	Agetime [<age_time>]
	Holdtime [<hold_time>]
	Authenticate [<port_list>] [now]
	Statistics [<port_list>] [clear | eapol | radius]

Security Network ACL

Security/Network/ACL>	Configuration [<port_list>]
	Action [<port_list>] [permit|deny] [<rate_limiter>][<port_redirect>] [<mirror>] [<logging>] [<shutdown>]
	Policy [<port_list>] [<policy>]
	Rate [<rate_limiter_list>] [<rate_unit>] [<rate>]
	Add [<ace_id>] [<ace_id_next>][(port <port_list>)] [(policy <policy> <policy_bitmask>)][<tagged>] [<vid>] [<tag_prio>] [<dmac_type>][(etype [<etype>] [<smac>] [<dmac>]) | (arp [<sip>] [<dip>] [<smac>] [<arp_opcode>] [<arp_flags>]) | (ip [<sip>] [<dip>] [<protocol>] [<ip_flags>]) | (icmp [<sip>] [<dip>] [<icmp_type>] [<icmp_code>] [<ip_flags>]) | (udp [<sip>] [<dip>] [<sport>] [<dport>] [<ip_flags>]) | (tcp [<sip>] [<dip>] [<sport>] [<dport>] [<ip_flags>] [<tcp_flags>])] [permit|deny] [<rate_limiter>] [<port_redirect>] [<mirror>] [<logging>][<shutdown>]
	Delete <ace_id>
	Lookup [<ace_id>]
	Clear
	Status [combined|static|loop_protect|dhcp|ptp|ipmc|conflicts]
	Port State [<port_list>] [enable|disable]

Security Network DHCP

Security/Network/DHCP>	Configuration
	Mode [enable|disable]
	Server [<ip_addr>]
	Information Mode [enable|disable]
	Information Policy [replace|keep|drop]
	Statistics [clear]

Security Network AAA

Security/Network/AAA>	Configuration
	Timeout [<timeout>]
	Deadtime [<dead_time>]
	RADIUS [<server_index>] [enable|disable] [<ip_addr_string>] [<secret>] [<server_port>]
	ACCT_RADIUS [<server_index>] [enable|disable] [<ip_addr_string>] [<secret>] [<server_port>]
	Statistics [<server_index>]

STP

STP>	Configuration
	Version [<stp_version>] Non-certified release, v
	Txhold [<holdcount>]lt 15:15:15, Dec 6 2007
	MaxAge [<max_age>]
	FwdDelay [<delay>]
	bpduFilter [enable|disable]
	bpduGuard [enable|disable]
	recovery [<timeout>]
	CName [<config-name>] [<integer>]
	Status [<msti>] [<port_list>]
	Msti Priority [<msti>] [<priority>]
	Msti Map [<msti>] [clear]
	Msti Add <msti> <vid>
	Port Configuration [<port_list>]
	Port Mode [<port_list>] [enable|disable]
	Port Edge [<port_list>] [enable|disable]
	Port AutoEdge [<port_list>] [enable|disable]
	Port P2P [<port_list>] [enable|disable|auto]
	Port RestrictedRole [<port_list>] [enable|disable]
	Port RestrictedTcn [<port_list>] [enable|disable]
	Port bpduGuard [<port_list>] [enable|disable]
	Port Statistics [<port_list>]
	Port Mcheck [<port_list>]
	Msti Port Configuration [<msti>] [<port_list>]
	Msti Port Cost [<msti>] [<port_list>] [<path_cost>]
	Msti Port Priority [<msti>] [<port_list>] [<priority>]

Aggr

Aggr>	Configuration
	Add <port_list> [<aggr_id>]
	Delete <aggr_id>
	Lookup [<aggr_id>]
	Mode [smac | dmac | ip | port] [enable | disable]

LACP

LACP>	Configuration [<port_list>]
	Mode [<port_list>] [enable | disable]
	Key [<port_list>] [<key>]
	Role [<port_list>] [active | passive]
	Status [<port_list>]
	Statistics [<port_list>] [clear]

LLDP

LLDP>	Configuration [<port_list>]
	Mode [<port_list>] [enable | disable]
	Statistics [<port_list>] [clear]
	Info [<port_list>]

QoS

QoS>	DSCP Map [<dscp_list>] [<class>] [<dpl>]
	DSCP Translation [<dscp_list>] [<trans_dscp>]
	DSCP Trust [<dscp_list>] [enable | disable]
	DSCP Classification Mode [<dscp_list>] [enable | disable]
	DSCP Classification Map [<class_list>] [<dpl_list>] [<dscp>]
	DSCP EgressRemap [<dscp_list>] [<dpl_list>] [<dscp>]
	Storm Unicast [enable | disable] [<packet_rate>]
	Storm Multicast [enable | disable] [<packet_rate>]
	Storm Broadcast [enable | disable] [<packet_rate>]
	QCL Add [<qce_id>] [<qce_id_next>] [<port_list>] [<tag>] [<vid>] [<pcp>] [<dei>] [<smac>] [<dmac_type>] [(etype [<etype>]) | (LLC [<DSAP>] [<SSAP>] [<control>]) | (SNAP [<PID>]) | (ipv4 [<protocol>] [<sip>] [<dscp>] [<fragment>] [<sport>] [<dport>]) | (ipv6 [<protocol>] [<sip_v6>] [<dscp>] [<sport>] [<dport>])] [<class>] [<dp>] [<classified_dscp>]
	QCL Delete <qce_id>
	QCL Lookup [<qce_id>]

	QCL Status [combined | static | conflicts]
	QCL Refresh

Mirror

Mirror>	Configuration [<port_list>]
	Port [<port> | disable]
	Mode [<port_list>] [enable | disable | rx | tx]

Dot1x

Dot1x>	Configuration [<port_list>]
	Mode [enable | disable]
	State [<port_list>] [macbased | auto | authorized | unauthorized]
	Authenticate [<port_list>] [now]
	Reauthentication [enable | disable]
	Period [<reauth_period>]
	Timeout [<eapol_timeout>]
	Statistics [<port_list>] [clear | eapol | radius]
	Clients [<port_list>] [all | <client_cnt>]
	Agetime [<age_time>]
	Holdtime [<hold_time>]

IGMP

IGMP>	Configuration [<port_list>]
	Mode [enable | disable]
	State [<vid>] [enable | disable]
	Querier [<vid>] [enable | disable]
	Fastleave [<port_list>] [enable | disable]
	Router [<port_list>] [enable | disable]
	Flooding [enable | disable]
	Groups [<vid>]
	Status [<vid>]

ACL

ACL>	Configuration [<port_list>]
	Action [<port_list>] [permit|deny] [<rate_limiter>] [<port_copy>] [<logging>] [<shutdown>] Policy [<port_list>] [<policy>]
	Rate [<rate_limiter_list>] [<packet_rate>]
	Add [<ace_id>] [<ace_id_next>] [switch | (port <port>) | (policy <policy>)] [<vid>] [<tag_prio>] [<dmac_type>] [(etype [<etype>] [<smac>] [<dmac>]) | (arp [<sip>] [<dip>] [<smac>] [<arp_opcode>] [<arp_flags>]) | (ip [<sip>] [<dip>] [<protocol>] [<ip_flags>]) | (icmp [<sip>] [<dip>] [<icmp_type>] [<icmp_code>] [<ip_flags>]) | (udp [<sip>] [<dip>] [<sport>] [<dport>] [<ip_flags>]) | (tcp [<sip>] [<dip>] [<sport>] [<dport>] [<ip_flags>] [<tcp_flags>])] [permit|deny] [<rate_limiter>] [<port_copy>] [<logging>] [<shutdown>] Delete <ace_id>
	Lookup [<ace_id>]
	Clear

Mirror

Mirror>	Configuration [<port_list>]
	Port [<port>|disable]
	Mode [<port_list>] [enable|disable|rx|tx]

Config

Config>	Save <ip_server> <file_name>
	Load <ip_server> <file_name> [check]

Firmware

Firmware>	Load <ip_addr_string> <file_name>

SNMP

SNMP>	Trap Inform Retry Times [<retries>]
	Trap Probe Security Engine ID [enable|disable]
	Trap Security Engine ID [<engineid>]
	Trap Security Name [<security_name>]
	Engine ID [<engineid>]
	Community Add <community> [<ip_addr>] [<ip_mask>]
	Community Delete <index>
	Community Lookup [<index>]
	User Add <engineid> <user_name> [MD5|SHA] [<auth_password>] [DES] [<priv_password>]
	User Delete <index>
	User Changekey <engineid> <user_name> <auth_password> [<priv_password>]
	User Lookup [<index>]
	Group Add <security_model> <security_name> <group_name>
	Group Delete <index>
	Group Lookup [<index>]
	View Add <view_name> [included|excluded] <oid_subtree>
	View Delete <index>
	View Lookup [<index>]
	Access Add <group_name> <security_model> <security_level> [<read_view_name>] [<write_view_name>] Access Delete <index>
	Access Lookup [<index>]

Firmware

Firmware>	Load <ip_addr_string> <file_name>

IPMC

IPMC>	Configuration [igmp]
	Mode [igmp] [enable|disable]
	Flooding [igmp] [enable|disable]
	VLAN Add [igmp] <vid>
	VLAN Delete [igmp] <vid>
	State [igmp] [<vid>] [enable|disable]
	Querier [igmp] [<vid>] [enable|disable]

	Fastleave [igmp] [<port_list>] [enable|disable]
	Router [igmp] [<port_list>] [enable|disable]
	Status [igmp] [<vid>]
	Groups [igmp] [<vid>]
	Version [igmp] [<vid>]

Fault

Fault>	Alarm PortLinkDown [<port_list>] [enable|disable]
	Alarm PowerFailure [pwr1|pwr2|pwr3] [enable|disable]

Event

Event>	Configuration
	Syslog SystemStart [enable|disable]
	Syslog PowerStatus [enable|disable]
	Syslog SnmpAuthenticationFailure [enable|disable]
	Syslog RingTopologyChange [enable|disable]
	Syslog Port [<port_list>] [disable|linkup|linkdown|both]

DHCPServer

DHCPServer>	Mode [enable|disable]
	Setup [<ip_start>] [<ip_end>] [<ip_mask>] [<ip_router>] [<ip_dns>] [<ip_tftp>] [<lease>] [<bootfile>]

Ring

Ring>	Mode [enable|disable]
	Master [enable|disable]
	1stRingPort [<port>]
	2ndRingPort [<port>]
	Couple Mode [enable|disable]
	Couple Port [<port>]
	Dualhoming Mode [enable|disable]
	Dualhoming Port [<port>]

RCS

RCS>	Mode [enable|disable]
	Add [<ip_addr>] [<port_list>] [web_on|web_off] [telnet_on|telnet_off] [snmp_on|snmp_off]
	Del <index>
	Configuration

SFP

SFP>	syslog [enable | disable]
	temp [<temperature>]
	Info

Modbus

Modbus>	Status
	Mode [enable | disable]

Chapter 6: Technical Specifications

Switch Model	SLM242
Physical Ports	
10/100Base-T(X) with RJ45 Auto MDI/MDIX	24
10/100/1000Base-T(X) RJ45 and 100/1000Base-X SFP with combo port	2
Technology	
Ethernet Standards	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX IEEE 802.3ab for 1000Base-T IEEE 802.3z for 1000Base-X IEEE 802.3x for Flow control IEEE 802.3ad for LACP (Link Aggregation Control Protocol) IEEE 802.1p for COS (Class of Service) IEEE 802.1Q for VLAN Tagging IEEE 802.1w for RSTP (Rapid Spanning Tree Protocol) IEEE 802.1s for MSTP (Multiple Spanning Tree Protocol) IEEE 802.1x for Authentication IEEE 802.1AB for LLDP (Link Layer Discovery Protocol)
MAC Table	8k
Priority Queues	8
Processing	Store-and-Forward
Switch Properties	Switching latency: 7 us Switching bandwidth: 8.8Gbps Max. Number of Available VLANs: 4095 VLAN ID Range: VID 1 to 4094 IGMP multicast groups: 256 for each VLAN Port rate limiting: User Define
Security Features	Device Binding security feature Enable/disable ports, MAC based port security Port based network access control (802.1x) Single 802.1x and Multiple 802.1x MAC-based authentication QoS assignment MAC address limit TACACS+ VLAN (802.1Q) to segregate and secure network traffic Radius centralized password management SNMPv3 encrypted authentication and access security Https / SSH enhance network security Web and CLI authentication and authorization
Software Features	IEEE 802.1D Bridge, auto MAC address learning/aging and MAC address (static) MSTP (RSTP/STP compatible) Redundant Ring with recovery time less than 10ms over 250 units TOS/Diffserv supported Quality of Service (802.1p) for real-time traffic VLAN (802.1Q) with VLAN tagging IGMP v2/v3 Snooping IP-based bandwidth management Application-based QoS management Port configuration, status, statistics, monitoring, security DHCP Server/Client DHCP Relay NTP server
Network Redundancy	Redundant Ring, Redundant Chain ,MSTP (RSTP/STP compatible)
RS-232 Serial Console Port	RS-232 in DB-9 connector with console cable. 115200bps, 8, N, 1

LED indicators	
Power Indicator	Green : Power indicator x 2
Ring Master Indicator (R.M.)	Green : Indicates that the system is operating in Ring Master mode
Ring Indicator (Ring)	Green : Indicates that the system operating in Ring mode Green Blinking : Indicates that the Ring is broken.
Fault Indicator (Fault)	Amber : Indicate unexpected event occurred
10/100Base-T(X) RJ45 Port Indicator	Green for Link/Act indicator. Green for speed indicator ~ On for 100Mbps / Off for 10Mbps
10/100/1000Base-T(X) RJ45 Port With Combo Port Indicator	Green for Link/Act indicator. Green for speed indicator ~ On for 100/1000Mbps / Off for 10Mbps
100/1000Base-X SFP Port With Combo Port Indicator	Green for port Link/Act.
Power	
Power Inputs	Dual redundant 100 ~ 240VAC with power cord
Power consumption (Typ.)	15.2 watts
Overload current protection	Present
Physical Characteristic	
Enclosure	19 inches rack mountable
Dimension (W x D x H)	440 x 200 x 44 mm (17.32 x 7.87 x 1.73 inch)
Weight (g)	2695 g
Environmental	
Storage Temperature	-40 to 85°C (-40 to 185°F)
Operating Temperature	-40 to 75°C (-40 to 167°F)
Operating Humidity	5% to 95% Non-condensing
Regulatory approvals	
EMI	FCC Part 15, CISPR (EN55022) class B
EMS	EN61000-4-2 (ESD) EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge), EN61000-4-6 (CS), EN61000-4-8, EN61000-4-11
Shock	IEC60068-2-27
Free Fall	IEC60068-2-32
Vibration	IEC60068-2-6
Safety	EN60950-1 (compliant, certification pending)
Warranty	**5 years**

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Technical support & Contact Information

Home link: http://www.Emerson.com/Industrial-Automation-Controls

Knowledge Base: https://www.emerson.com/Industrial-Automation-Controls/support

Note: If the product is purchased through an Authorized Channel Partner, please contact the seller directly for any support.

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