User's Manual

iES28TG/iES28GF

Intelligent 28 Port Configurable Gigabit Ethernet Switch with 10G Uplink Ports /
Intelligent 28 Port Configurable Gigabit Ethernet Switch
IEC 61850, IEEE 1613, EN50155, and KEMA Certified Ed 2

iES28TG

iES28GF

https://is5com.com/products/

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CONTACT INFORMATION

iS5 Communications Inc.
5895 Ambler Drive, Mississauga, Ontario, L4W 5B7
Tel: + 905-670-0004
Website: www.iS5Com.com

Technical Support

E-mail: support@iS5Com.com

Sales Contact

E-mail: info@is5com.com

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1. GETTING STARTED

1.1 About iES28TG and iES28GF

iES28TG-L2

iES28GF-L2

The iES28TG and the iES28GF are similar in features. Both units are highly redundant and scalable Layer 2 with Basic Routing functionality managed Gigabit Ethernet switches. They have the first 3 slots supporting up to 24 ports of 10/100/1000Base (X) and 1 slot supporting up to 4x10GE ports (iES28TG only), and 4x1G (iES28GF only). Both switches are IEC 61850 Ed.2, IEEE 1613, and EN 50155 certified.

The iES28TG is a fully modular rack-mount Ethernet switch with 4x10GE Uplink ports and hot-swappable power supply modules. Modular chassis design makes network planning easy by providing flexibility as a network grows and by developing modules based on newer standards.

The iES28GF is also modular, but modules are fixed including the power supplies. iES28GF does not support 10GE uplinks.

The iES28 series switches features include advanced DOS/DDOS auto prevention. The robust switches are designed for power substation and rolling stock applications. The switches can protect mission-critical applications from network interruptions or temporary malfunctions with this fast recovery technology and support a wide- operating temperature of -40oC to +85oC.

They can be managed via the Web UI, iManage Software Suite, Telnet, and Console (CLI) / SSH v2.

1.2 References

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[2] Network Working Group, RFC 3768, Virtual Router Redundancy Protocol (VRRP), https://tools.ietf.org/html/rfc3768#section-5.3.6 Online, Accessed on Mar 29, 2019

[3] Network Working Group, RFC 4668, RADIUS Authentication Client MIB for IPv6, https://tools.ietf.org/html/rfc4668 , Online, Accessed on Apr 3, 2019

[4] Network Working Group, RFC 4670, RADIUS Accounting Client MIB for IPv6, https://tools.ietf.org/html/rfc4670 , Online, Accessed on Apr 3, 2019

[5] Network Working Group, RFC 3164, The BSD syslog Protocol, https://tools.ietf.org/html/rfc3748 , Online, Accessed on Apr 3, 2019

1.3 Acronyms

The following table shows all acronyms used in this document.

Acronym	Explanation
ACE	Access Control Entry
ACL	Access Control List
ARP	Address Resolution Protocol
BPDU	Bridge Protocol Data Unit
CLI	Command Line Interface
DCHP	Dynamic Host Configuration Protocol
DDM	Digital Diagnostic Monitoring
DEI	Discard Eligibility (subfield in *an IEEE 802.1Q frame header*)
DNS	Domain Name Server
DSAP	Destination Service Access Point
DSCP	Differentiated Services Code Point
DP	Drop Precedence
EAP	Extensible Authentication Protocol
EAPOL	EAP Over LAN
HLN	Hardware Address Length
HRD	hardware address space (i.e. ARP *hardware address* type (ar$*hrd*))

Acronym	Explanation
HSR	High-availability Seamless Redundancy
HTTPS	Hyper Text Transfer Protocol Secure or HTTP over SSL
ICMP	Internet Control Message Protocol
IP	Internet Protocol (IP)
IPMCv4	IPv4 MultiCast
LLDP	Link Layer Discovery Protocol
LLDP- MED	LLDP - Media Endpoint Discovery
LLDPDU	LLDP Data Unit
MIB	Management Information Base
MRP	Media Redundancy Protocol
MSTI	Multiple Spanning Tree Instances
MSTP	Multiple Spanning Tree Protocol
NTP	Network Time Protocol
OID	Object Identifier
OUI	Organizationally Unique Identifier (In Linux)
PDU	Protocol Data Unit
PID	Process Identifier
P2P	Point-To-Point (link)
PSH	Push Function (a value for the ACE)
PWR	Power
QCE	QoS Control Entry
QCL	QoS Control List
QoS	Quality of Service
RARP	Reverse Address Resolution Protocol (Reverse ARP)
RIP	Routing Information Protocol

Acronym	Explanation
RMON	Remote Monitoring
RSTP	Rapid Spanning Tree Protocol
SIP	Source IP
SMAC	Source MAC Address
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SSAP	Source Service Access Point
SSH	Secure Shel
TACACS	Terminal Access Controller Access Control System
TCN	Topology Change Notification
TCP	Transmission Control Protocol
THA	target Hardware Address
TLV	Type-Length-Value
TPID	Tag protocol identifier
TTL	Time to live
SSH	Secure Shell
UDP	User Datagram Protocol
URG	Urgent Pointer Field Significant (an ACE value)
USM	User-based Security Model
UTC	Coordinated Universal Time
VACM	View based Access Control Model
VCXO	Voltage Controlled Crystal Oscillator
VID	VLAN ID
VRIP	Virtual Router IP

1.4 Software Features

- Web or CLI based Management (Console or Telnet / SSH v2)
- DHCP Server / Relay
- VLAN (802.1Q) for segregating and securing network traffic
- Supports SNMPv1/v2/v3
- Traffic Prioritization—Storm Control and Quality of Service (QoS) including DSCP-Based QoS Ingress Port Classification
- Multicast traffic—IGMP Snooping (IGMP v1/v2 / v3) and unregistered IPMCv4 Flooding
- Warnings (Syslog and SMTP) and Fault Alarm (power failure)
- Monitoring and Diagnostics—MAC Table and Port Statistics (ports monitoring including for SFP ports, system information, issuing PING packets for troubleshooting IP connectivity issues)
- SNTP for synchronizing of clocks over network
- Supports standard IEC 62439-2 MRP (Media Redundancy Protocol) functionality
- Basic Routing
  - Static Routing
  - RIPv2
  - VRRP

1.5 Hardware Specifications

iES28TG

Description	Specification
Slot 1 - (Ports 1-8)	8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100 /1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 2 - (Ports 9-16)	8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100 /1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 3 - (Ports 17-24)	8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100 /1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 4 - (Ports 25-28)	2 or 4 X 1000Base-X SFP Ports, 2 or 4 X 1000LX/SX Ports, 2 or 4 X 10GBase-X SFP Ports
RS-232 Serial Console	RS-232 in RJ45 connector with console cable: 115200 bps, 8, N, 1
Warning / Monitoring System	Relay output for fault event alarming 2 alarm warning methods for system events supported: • SYSLOG with server / client structure; recording and viewing events in the System Event Log • SMTP for notification via email Event selection per port
Alarm	Relay output to carry the following capacity: • 1 A @ 120 VAC • 2 A @ 24 VDC • 0.15 A @ 125 VDC
Physical Characteristics	
Enclosure	IP-40 Galvanized Steel
Dimensions (W x D x H)	479.3 (W) x 363.7 (D) x 44.3 (H) mm (18.87 x 14.32 x 1.74 inches)

Description	**Specification**
Weight (g)	9000 g
Power	
Input Power	Redundant Power Supplies: Dual Input 9-36VDC, Dual Input 36-75VDC, or Dual Input 110-370VDC or 90-264VAC
Power Consumption	46 Watts max.
Overload Current	Present

iES28GF

Description	**Specification**
Slot 1 - (Ports 1-8)	8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 2 - (Ports 9-16)	8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 3 - (Ports 17-24)	8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 4 - (Ports 25-28)	2 or 4 X 1000Base-X SFP Ports, 2 or 4 X 1000LX/SX Ports
Fixed Module Slot 1-3 **(Ports 1-16)** **Note***: If this fixed module is selected, select Module for Slot 4**	16 ports module 16 X 100Base-FX Ports, 16 X 1000SX/LX Ports
Fixed Module Slot 2-4 (Ports 9-28) **Note***: If this fixed module is selected, select Module for Slot 1 only from the above (future**	16 ports module 16 X 100Base-FX Ports, 16 X 1000SX/LX Ports
RS-232 Serial Console Port	RS-232 in RJ45 connector with console cable: 115200 bps, 8, N, 1
Warning / Monitoring System	Relay output for fault event alarming 2 alarm warning methods for system events supported: • SYSLOG with server / client structure; recording and viewing events in the System Event Log • SMTP for notification via email Event selection per port
Alarm	Relay output to carry the following capacity: • 1 A @ 120 VAC • 2 A @ 24 VDC • 0.15 A @ 125 VDC
Physical Characteristics	
Enclosure	IP-40 Galvanized Steel
Dimensions (W x D x H)	479.3 (W) x 360 (D) x 44.3 (H) mm (18.87 x 14.17 x 1.74 inches)
Weight (g)	6600 g
Power	
Input Power	Redundant Power Supplies: Dual Input 9-36VDC, Dual Input 36-75VDC, or Dual Input 110-370VDC or 90-264VAC
Power Consumption (Typ.)	46 Watts max.
Overload Current Protection	Present

2. HARDWARE OVERVIEW

2.1 Front Panel

2.1.1 Port and Connectors (iES28TG)

The iES28TG switch provide one 10 Gigabit module slot and three 10/100/1000Base-X slots to enable different modular combinations based on your needs. The iES28TG includes the following models.

Models	Description
iES28TG-L2	IEC 61850-3 support and Layer 2 functionality

iS5 provides two 10G modules and six Gigabit Ethernet modules to meet your demand for high speed applications requiring long-distance data transmission. iS5 also provides several fiber transceivers to meet those requirements. Please refer to the following table for available modules.

⚠ All modules are not hot-swappable. Ensure turning off power before changing modules, otherwise the system will not detect newly inserted modules.

iS5Com #	Slots 1 - 3 Description
28L2-BLK	Blank Module Slot 1-3
28L2-8GRJ45	MODULE - 8 X 10/100/1000Base-T(X) RJ45
28L2-8GSFP	MODULE - 8 X 100/1000Base-X SFP (Blank no optical transceivers**)
28L2-2MMSC2	MODULE - 2 X 100FX Multimode SC, 2km, 1310nm
28L2-4MMSC2	MODULE - 4 X 100FX Multimode SC, 2km, 1310nm
28L2-2MMST2	MODULE - 2 X 100FX Multimode ST, 2km, 1310nm
28L2-4MMST2	MODULE - 4 X 100FX Multimode ST, 2km, 1310nm
28L2-2SMSC15	MODULE - 2 X 100FX Singlemode SC, 15km, 1310nm
28L2-4SMSC15	MODULE - 4 X 100FX Singlemode SC, 15km, 1310nm
28L2-2SMST15	MODULE - 2 X 100FX Singlemode ST, 15km, 1310nm
28L2-4SMST15	MODULE - 4 X 100FX Singlemode ST, 15km, 1310nm
28L2-2SMSC40	MODULE - 2 X 100FX Singlemode SC, 40km, 1310nm
28L2-4SMSC40	MODULE - 4 X 100FX Singlemode SC, 40km, 1310nm
28L2-2SMST40	MODULE - 2 X 100FX Singlemode ST, 40km, 1310nm
28L2-4SMST40	MODULE - 4 X 100FX Singlemode ST, 40km, 1310nm
28L2-2SMSC60	MODULE - 2 X 100FX Singlemode SC, 60km, 1310nm
28L2-4SMSC60	MODULE - 4 X 100FX Singlemode SC, 60km, 1310nm
28L2-2SMST60	MODULE - 2 X 100FX Singlemode ST, 60km, 1310nm
28L2-4SMST60	MODULE - 4 X 100FX Singlemode ST, 60km, 1310nm

iS5Com #	Slots 1 - 3 Description
28L2-2SMSC80	MODULE - 2 X 100FX Singlemode SC, 80km, 1550nm
28L2-4SMSC80	MODULE - 4 X 100FX Singlemode SC, 80km, 1550nm
28L2-2SMST80	MODULE - 2 X 100FX Singlemode ST, 80km, 1550nm
28L2-4SMST80	MODULE - 4 X 100FX Singlemode ST, 80km, 1550nm
28L2-2SMSC100	MODULE - 2 X 100FX Singlemode SC, 100km, 1550nm
28L2-4SMSC100	MODULE - 4 X 100FX Singlemode SC, 100km, 1550nm
28L2-2SMST100	MODULE - 2 X 100FX Singlemode ST, 100km, 1550nm
28L2-4SMST100	MODULE - 4 X 100FX Singlemode ST, 100km, 1550nm
28L2-2GMMSC	MODULE - 2 X 1000SX Multimode SC, 550m, 850nm
28L2-4GMMSC	MODULE - 4 X 1000SX Multimode SC, 550m, 850nm
28L2-2GMMST	MODULE - 2 X 1000SX Multimode ST, 550m, 850nm
28L2-4GMMST	MODULE - 4 X 1000SX Multimode ST, 550m, 850nm
28L2-2GSMSC10	MODULE - 2 X 1000LX Singlemode SC, 10km, 1310nm
28L2-4GSMSC10	MODULE - 4 X 1000LX Singlemode SC, 10km, 1310nm
28L2-2GSMST10	MODULE - 2 X 1000LX Singlemode ST, 10km, 1310nm
28L2-4GSMST10	MODULE - 4 X 1000LX Singlemode ST, 10km, 1310nm
28L2-2GSMSC40	MODULE - 2 X 1000LX Singlemode SC, 40km, 1310nm
28L2-4GSMSC40	MODULE - 4 X 1000LX Singlemode SC, 40km, 1310nm
28L2-2GSMST40	MODULE - 2 X 1000LX Singlemode ST, 40km, 1310nm
28L2-4GSMST40	MODULE - 4 X 1000LX Singlemode ST, 40km, 1310nm
28L2-2GSMSC70	MODULE - 2 X 1000LX Singlemode SC, 70km, 1550nm
28L2-4GSMSC70	MODULE - 4 X 1000LX Singlemode SC, 70km, 1550nm
28L2-2GSMST70	MODULE - 2 X 1000LX Singlemode ST, 70km, 1550nm
28L2-4GSMST70	MODULE - 4 X 1000LX Singlemode ST, 70km, 1550nm

iS5Com #	Slot 4 Description
28L2-BLK4	Blank Module Slot 4
28L2-2GSFP	MODULE - 2 X 1000Base-X SFP (Blank no optical transceivers**)
28L2-4GSFP	MODULE - 4 X 1000Base-X SFP (Blank no optical transceivers**)
28L2-2GMMSC	MODULE - 2 X 1000SX Multimode SC, 550m, 850nm
28L2-4GMMSC	MODULE - 4 X 1000SX Multimode SC, 550m, 850nm
28L2-2GMMST	MODULE - 2 X 1000SX Multimode ST, 550m, 850nm
28L2-4GMMST	MODULE - 4 X 1000SX Multimode ST, 550m, 850nm
28L2-2GSMSC10	MODULE - 2 X 1000LX Singlemode SC, 10km, 1310nm
28L2-4GSMSC10	MODULE - 4 X 1000LX Singlemode SC, 10km, 1310nm
28L2-2GSMST10	MODULE - 2 X 1000LX Singlemode ST, 10km, 1310nm

iS5Com #	**Slot 4 Description**
28L2-4GSMST10	MODULE - 4 X 1000LX Singlemode ST, 10km, 1310nm
28L2-2GSMSC40	MODULE - 2 X 1000LX Singlemode SC, 40km, 1310nm
28L2-4GSMSC40	MODULE - 4 X 1000LX Singlemode SC, 40km, 1310nm
28L2-2GSMST40	MODULE - 2 X 1000LX Singlemode ST, 40km, 1310nm
28L2-4GSMST40	MODULE - 4 X 1000LX Singlemode ST, 40km, 1310nm
28L2-2GSMSC70	MODULE - 2 X 1000LX Singlemode SC, 70km, 1550nm
28L2-4GSMSC70	MODULE - 4 X 1000LX Singlemode SC, 70km, 1550nm
28L2-2GSMST70	MODULE - 2 X 1000LX Singlemode ST, 70km, 1550nm
28L2-4GSMST70	MODULE - 4 X 1000LX Singlemode ST, 70km, 1550nm
28L2-2TGSFP	MODULE - 2 X 10GBase-X SFP (Blank no optical transceivers**)
28L2-4TGSFP	MODULE - 4 X 10GBase-X SFP (Blank no optical transceivers**)

*See Accessories List for SFP transceiver pricing.

2.1.2 Port and Connectors (iES28GF)

The iES28GF switches provide one dedicated, 1 Gigabit module slot (slot 4) and three 10/100/1000Base-X slots to enable different modular combinations based on your needs. The iES28GF includes the following models.

Models	**Description**
iES28GF-L2	Compliant IEC 61850-3 ed. 2 support and Layer 2 functionality

iS5 provides two 1G modules and various (TX, SFP, SC, ST) Gigabit Ethernet modules to meet the demand for high speed applications requiring long-distance data transmission. iS5 also provides several fiber transceivers to meet those requirements. Refer to the following table for available modules.

⚠ All modules are field replaceable by qualified personal only. Be sure to turn off power before changing modules; otherwise, the system will not detect newly inserted modules.

iES28GF-L2

iS5Com #	**Slots 1 - 3 Description**
XX	None
8GRJ45	8 X 10/100/1000Base-T(X) RJ45
8GSFP	8 X 100/1000Base-X SFP (Blank no SFP transceivers**)
2MMSC2	2 X 100FX Multimode SC, 2km, 1310nm
4MMSC2	4 X 100FX Multimode SC, 2km, 1310nm
2MMST2	2 X 100FX Multimode ST, 2km, 1310nm
4MMST2	4 X 100FX Multimode ST, 2km, 1310nm

iS5Com #	Slots 1 - 3 Description
2SMSC15	2 X 100FX Singlemode SC, 15km, 1310nm
4SMSC15	4 X 100FX Singlemode SC, 15km, 1310nm
2SMST15	2 X 100FX Singlemode ST, 15km, 1310nm
4SMST15	4 X 100FX Singlemode ST, 15km, 1310nm
2SMSC40	2 X 100FX Singlemode SC, 40km, 1310nm
4SMSC40	4 X 100FX Singlemode SC, 40km, 1310nm
2SMST40	2 X 100FX Singlemode ST, 40km, 1310nm
4SMST40	4 X 100FX Singlemode ST, 40km, 1310nm
2SMSC60	2 X 100FX Singlemode SC, 60km, 1310nm
4SMSC60	4 X 100FX Singlemode SC, 60km, 1310nm
2SMST60	2 X 100FX Singlemode ST, 60km, 1310nm
4SMST60	4 X 100FX Singlemode ST, 60km, 1310nm
2SMSC80	2 X 100FX Singlemode SC, 80km, 1550nm
4SMSC80	4 X 100FX Singlemode SC, 80km, 1550nm
2SMST80	2 X 100FX Singlemode ST, 80km, 1550nm
4SMST80	4 X 100FX Singlemode ST, 80km, 1550nm
2SMSC100	2 X 100FX Singlemode SC, 100km, 1550nm
4SMSC100	4 X 100FX Singlemode SC, 100km, 1550nm
2SMST100	2 X 100FX Singlemode ST, 100km, 1550nm
4SMST100	4 X 100FX Singlemode ST, 100km, 1550nm
2GMMSC	2 X 1000SX Multimode SC, 550m, 850nm
4GMMSC	4 X 1000SX Multimode SC, 550m, 850nm
2GMMST	2 X 1000SX Multimode ST, 550m, 850nm
4GMMST	4 X 1000SX Multimode ST, 550m, 850nm
2GSMSC10	2 X 1000LX Singlemode SC, 10km, 1310nm
4GSMSC10	4 X 1000LX Singlemode SC, 10km, 1310nm
2GSMST10	2 X 1000LX Singlemode ST, 10km, 1310nm
4GSMST10	4 X 1000LX Singlemode ST, 10km, 1310nm
2GSMSC40	2 X 1000LX Singlemode SC, 40km, 1310nm
4GSMSC40	4 X 1000LX Singlemode SC, 40km, 1310nm
2GSMST40	2 X 1000LX Singlemode ST, 40km, 1310nm
4GSMST40	4 X 1000LX Singlemode ST, 40km, 1310nm
2GSMSC70	2 X 1000LX Singlemode SC, 70km, 1550nm
4GSMSC70	4 X 1000LX Singlemode SC, 70km, 1550nm
2GSMST70	2 X 1000LX Singlemode ST, 70km, 1550nm
4GSMST70 16MMSC2	4 X 1000LX Singlemode ST, 70km, 1550nm 16 X 100FX Multimode SC, 2km, 1310nm
16MMST2	16 X 100FX Multimode ST, 2km, 1310nm
16SMSC15	16 X 100FX Singlemode SC, 15km, 1310nm
16SMST15	16 X 100FX Singlemode ST, 15km, 1310nm
16SMSC40	16 X 100FX Singlemode SC, 40km, 1310nm
16SMST40	16 X 100FX Singlemode ST, 40km, 1310nm
16SMSC60	16 X 100FX Singlemode SC, 60km, 1310nm

iS5Com #	Slots 1 - 3 Description
16SMST60	16 X 100FX Singlemode ST, 60km, 1310nm
16SMSC80	16 X 100FX Singlemode SC, 80km, 1550nm
16SMST80	16 X 100FX Singlemode ST, 80km, 1550nm
16SMSC100	16 X 100FX Singlemode SC, 100km, 1550nm
16SMST100	16 X 100FX Singlemode ST, 100km, 1550nm
16GMMSC	16 X 1000SX Multimode SC, 550m, 850nm
16GMMST	16 X 1000SX Multimode ST, 550m, 850nm
16GSMSC10	16 X 1000LX Singlemode SC, 10km, 1310nm
16GSMST10	16 X 1000LX Singlemode ST, 10km, 1310nm
16GSMSC40	16 X 1000LX Singlemode SC, 40km, 1310nm
16GSMST40	16 X 1000LX Singlemode ST, 40km, 1310nm
16GSMSC70	16 X 1000LX Singlemode SC, 70km, 1550nm
16GSMST70	16 X 1000LX Singlemode ST, 70km, 1550nm

iS5Com #	Slot 4 Description
XX	None
2GSFP	2 X 1000Base-X SFP (Blank no SFP transceivers**)
4GSFP	4 X 1000Base-X SFP (Blank no SFP transceivers**)
2GMMSC	2 X 1000SX Multimode SC, 550m, 850nm
4GMMSC	4 X 1000SX Multimode SC, 550m, 850nm
2GMMST	2 X 1000SX Multimode ST, 550m, 850nm
4GMMST	4 X 1000SX Multimode ST, 550m, 850nm
2GSMSC10	2 X 1000LX Singlemode SC, 10km, 1310nm
4GSMSC10	4 X 1000LX Singlemode SC, 10km, 1310nm
2GSMST10	2 X 1000LX Singlemode ST, 10km, 1310nm
4GSMST10	4 X 1000LX Singlemode ST, 10km, 1310nm
2GSMSC40	2 X 1000LX Singlemode SC, 40km, 1310nm
4GSMSC40	4 X 1000LX Singlemode SC, 40km, 1310nm
2GSMST40	2 X 1000LX Singlemode ST, 40km, 1310nm
4GSMST40	4 X 1000LX Singlemode ST, 40km, 1310nm
2GSMSC70	2 X 1000LX Singlemode SC, 70km, 1550nm
4GSMSC70	4 X 1000LX Singlemode SC, 70km, 1550nm
2GSMST70	2 X 1000LX Singlemode ST, 70km, 1550nm
4GSMST70	4 X 1000LX Singlemode ST, 70km, 1550nm
16MMSC2	16 X 100FX Multimode SC, 2km, 1310nm
16MMST2	16 X 100FX Multimode ST, 2km, 1310nm
16SMSC15	16 X 100FX Singlemode SC, 15km, 1310nm
16SMST15	16 X 100FX Singlemode ST, 15km, 1310nm
16SMSC40	16 X 100FX Singlemode SC, 40km, 1310nm
16SMST40	16 X 100FX Singlemode ST, 40km, 1310nm
16SMSC60	16 X 100FX Singlemode SC, 60km, 1310nm
16SMST60	16 X 100FX Singlemode ST, 60km, 1310nm

iS5Com #	Slot 4 Description
16SMSC80	16 X 100FX Singlemode SC, 80km, 1550nm
16SMST80	16 X 100FX Singlemode ST, 80km, 1550nm
16SMSC100	16 X 100FX Singlemode SC, 100km, 1550nm
16SMST100	16 X 100FX Singlemode ST, 100km, 1550nm
16GMMSC	16 X 1000SX Multimode SC, 550m, 850nm
16GMMST	16 X 1000SX Multimode ST, 550m, 850nm
16GSMSC10	16 X 1000LX Singlemode SC, 10km, 1310nm
16GSMST10	16 X 1000LX Singlemode ST, 10km, 1310nm
16GSMSC40	16 X 1000LX Singlemode SC, 40km, 1310nm
16GSMST40	16 X 1000LX Singlemode ST, 40km, 1310nm
16GSMSC70	16 X 1000LX Singlemode SC, 70km, 1550nm
16GSMST70	16 X 1000LX Singlemode ST, 70km, 1550nm

The slots descriptions for both product is as per the latest version of the configurator which at the time of writing of this manual is iS5Com Configurator v1.12.

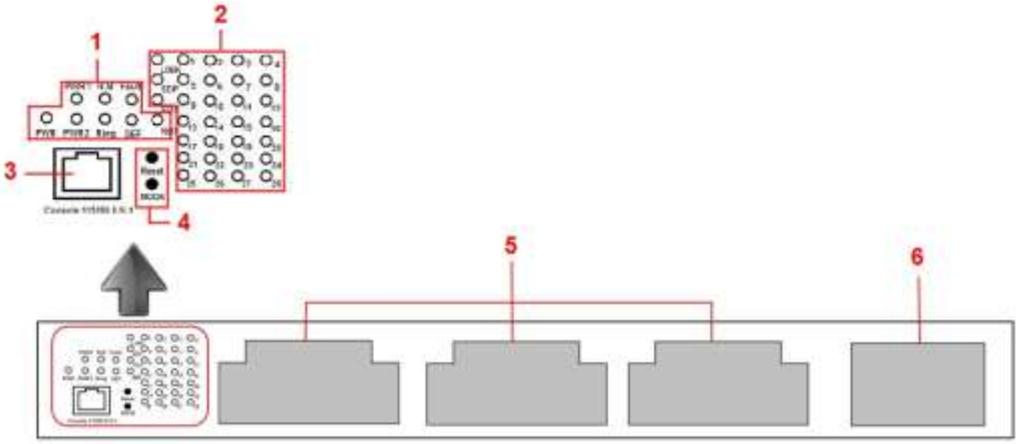


Figure 1 – Slots and LEDs

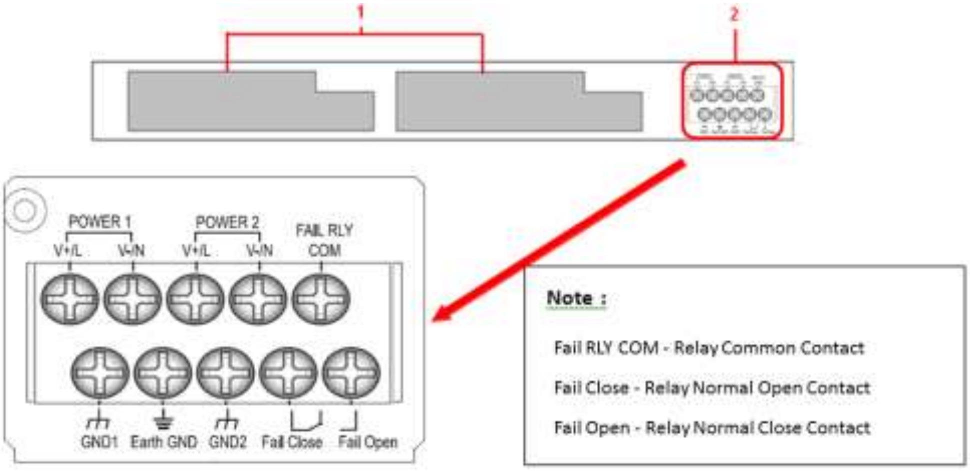
1. System LED's: PWR/PWR1/PWR2/R.M/Ring/Fault/DEF.
2. Port status LEDs: LINK/SPD/FDX/port number.
3. Console port.
4. Buttons: Rest/LED Mode (Press **Reset** for 3 seconds to reset and 5 seconds to return to factory default. To change port LED mode, press the **Mode** button)
5. Configurable module slots.
6. 10G SFP+ module slot.

2.1.3 LED

LED	Color	Status	Description
PWR	Green	On	System power on
	Green	Blinking	Upgrading firmware
PW1	Green	On	Power module 1 activated
PW2	Green	On	Power module 2 activated
Fault	Red	On	Errors (power failure or port malfunctioning)
DEF	Green	On	System reset to default
RMT	Green	On	Accessed remotely
LNK	Green	On	Port link up
SPD	Green	On	Ethernet connection running at 1000Mbps
	Amber	On	Ethernet connection running at 10/100Mbps
FDX	Amber	On	Port works under full duplex.

2.2 Rear Panel

The two slots at the rear of the switch are for the hot-swappable power supply modules. The power supply terminal block can be mounted in the front of the chassis or at the rear as shown. The terminal block includes two power input pairs for redundant power supplies.



Note :

Fail RLY COM - Relay Common Contact

Fail Close - Relay Normal Open Contact

Fail Open - Relay Normal Close Contact

Figure 2 – Rear Panel View

1. Power module slots
2. Terminal block

3. HARDWARE INSTALLATION

3.1 Rack-mount Installation for iES28GF

The switch can be rack-mounted using the hardware provided.

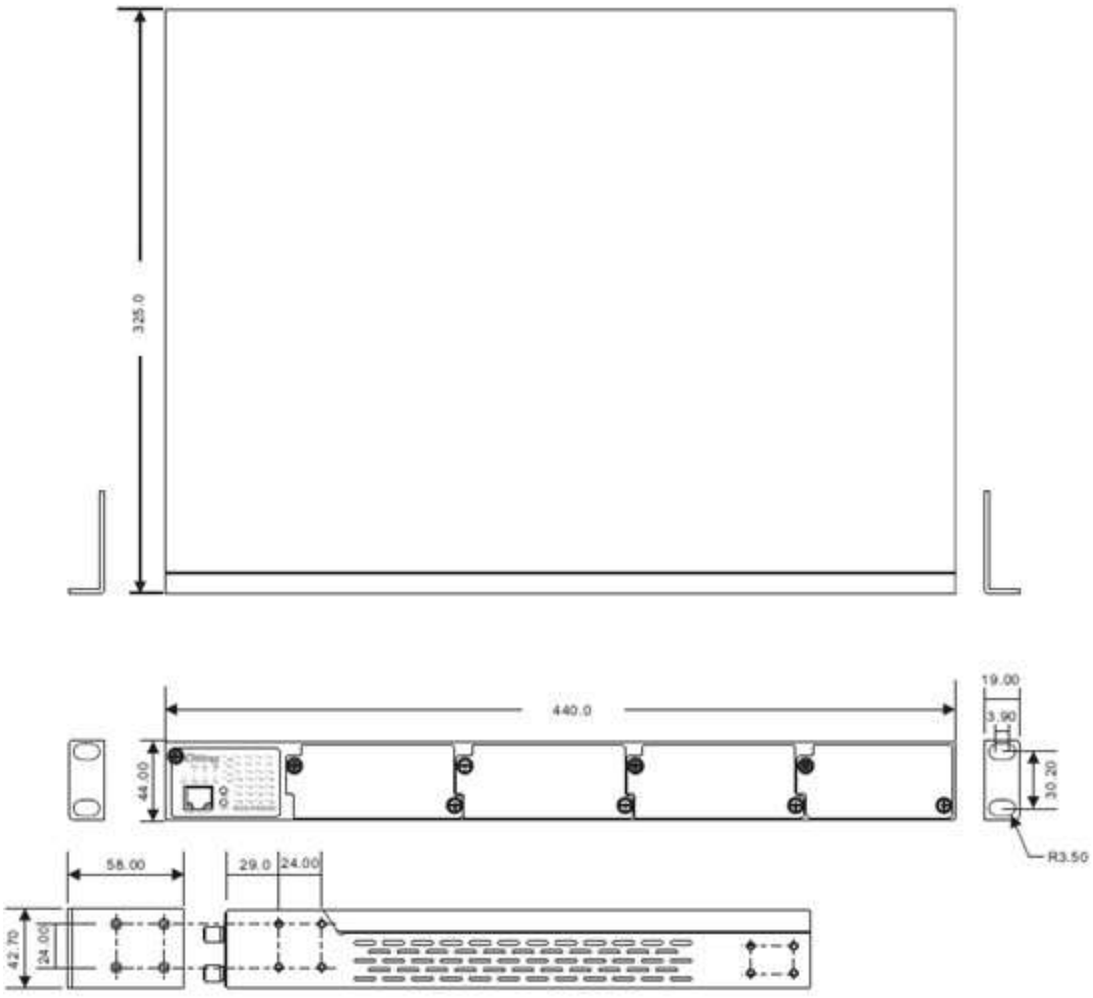


Figure 3 - Rack-mount Installation for iES28GF

To mount the switch:

Step 1: Install left and right front mounting brackets to the switch using 4 M3 screws on each side

(screws provided with the switch).

Step 2: Place the switch in the rack and mount to the rack using the rack screws.

Note: You can install the brackets either in the front or at the rear depending on your management requirements. Remember when installing the brackets at the front; use the four screw holes at the top and bottom. When installing the brackets on the back sides, use the four screw holes at the top and middle.

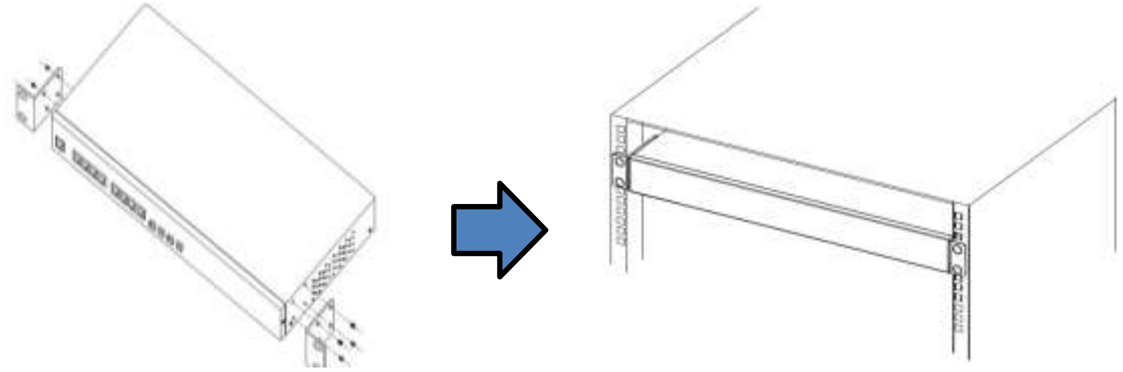


Figure 4 - Rack-mount Installation for iES28GF

3.2 Rack-mount Installation for iES28TG

The switch can be rack-mounted using the hardware provided.

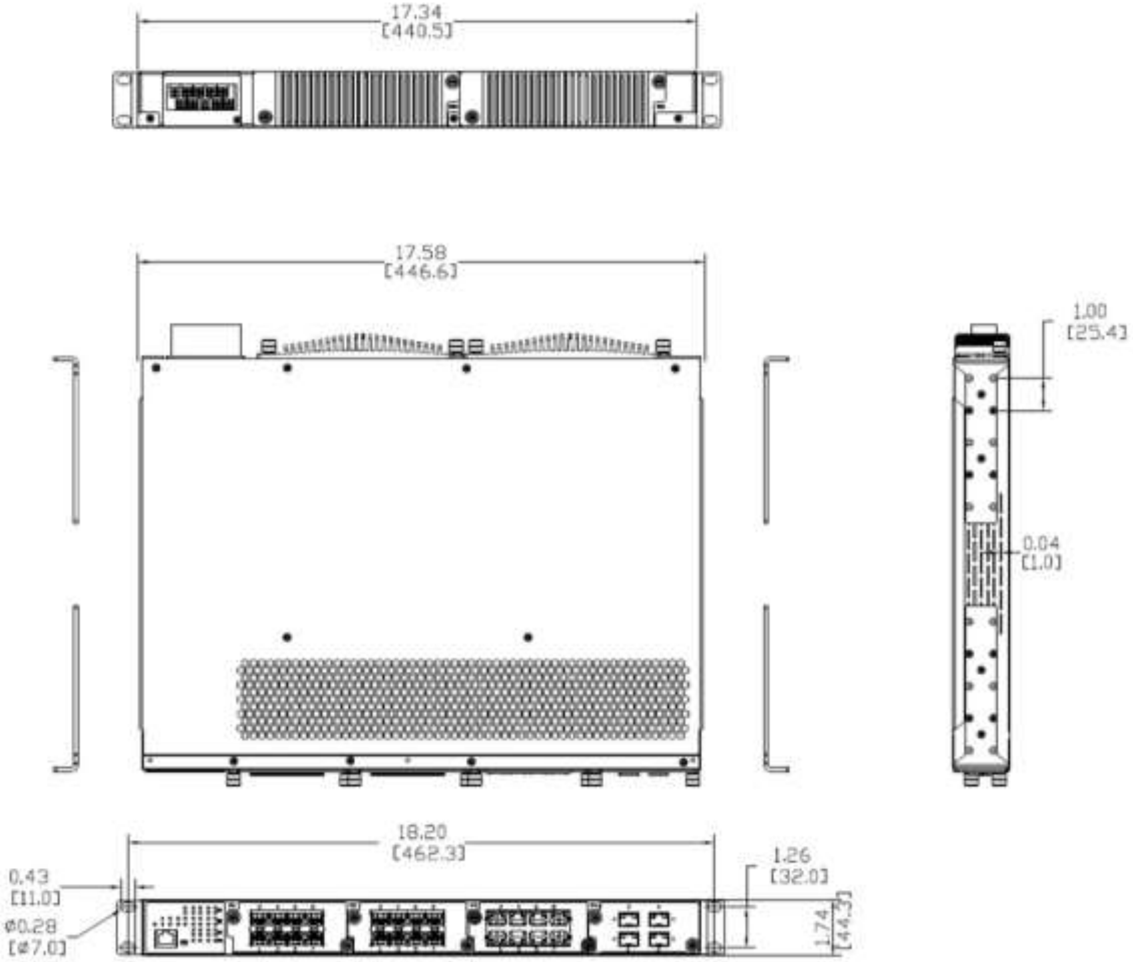


Figure 5 - Rack-mount Installation for iES28TG

To mount the switch:

Step 1: Install left and right front mounting brackets to the switch using 6 4-40 screws on each side (screws provided with the switch).

Step 2: Install left and right rear mounting brackets to the switch using 6 4-40 screws on each side (screws provided with the switch).

Step 3: Place the switch in the rack by tilting the switch on an angle so that the ears will clear the mounting rails. Mount to the rack using rack screws at the front and rear ears.

3.3 Module Installation (iES28TG only)

3.3.1 RJ-45 Module

The iES28TG supports maximum of 3 x 8x10/100/1000Base T(X) configurable modules. For installation, follow the steps below.

Step 1: Turn off the power to the switch.
Step 2: Insert the modules in Slot 1, 2, and 3 respectively.
Step 3: Turn on the power to the switch.

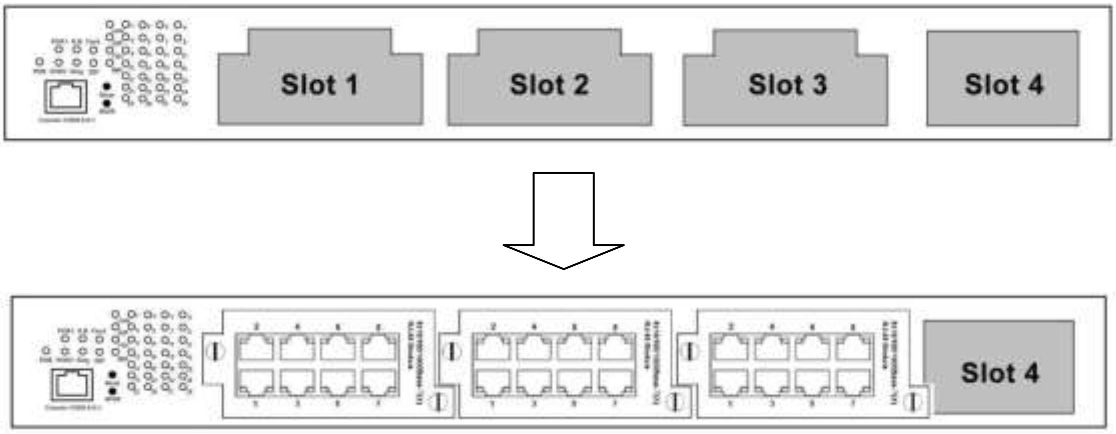


Figure 6 – RJ-45 Module Installation (iES28TG)

3.3.2 SFP Module

The iES28TG supports a maximum 3x100/1000base (X) SFP configurable modules. For installation, follow the steps below.

Step 1: Turn off power to the switch.
Step 2: Insert the modules in Slot 1, 2, and 3, respectively.
Step 3: Turn on the power to the switch.

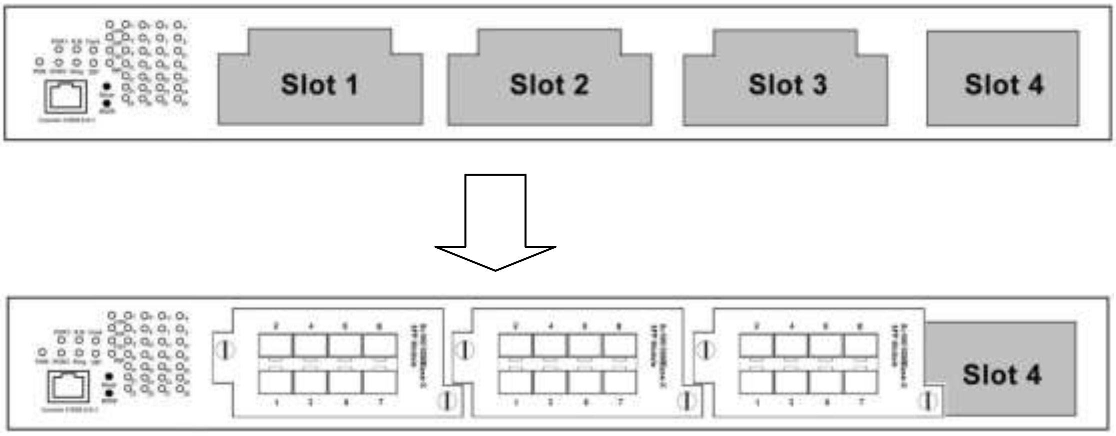


Figure 7 - SFP Module Installation (iES28TG)

3.3.3 10G SFP+ Module

The iES28TG supports one 10G SFP+ module, with a total of 4x10G ports. For installation, follow the steps below.

Follow the steps below for installation.

Step 1: Turn off the power to the switch.

Step 2: Insert the module in Slot 4.

Step 3: Turn on the power to the switch.

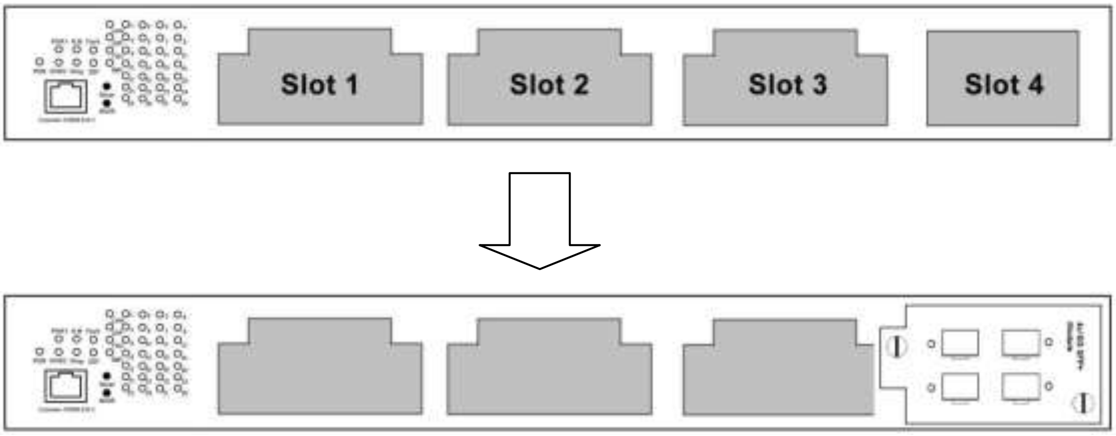


Figure 8 – 10 G SFP+ Module Installation (iES28TG)

1. The 10G slot can only accommodate a 10G module; therefore, do not insert non-10Gigabit modules in the 10G slot or insert the 10G module in other slots.
2. Removing and installing an Ethernet module can shorten its useful life. Do not remove and insert the modules more often than is absolutely necessary.

3.3.4 Power Module

The iES28TG supports a maximum of two power modules. For installation, follow the steps below.

Step 1: Turn off the power to the switch.

Step 2: Insert the modules in Power 1 and 2 slots, respectively.

Step 3: Turn on the power to the switch.

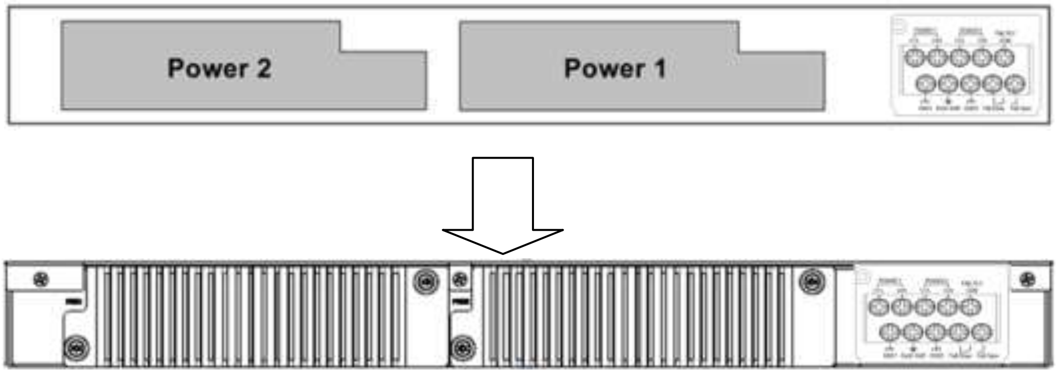


Figure 9 - Power Module Installation (iES28TG)

3.4 Wiring

WARNING

Do not disconnect modules or wires unless power has been turned off or the area is known to be non-hazardous. Ensure that the proper supply voltage is supplied as indicated on the power supply label.

ATTENTION

1. Be sure to disconnect the power cord before installing and/or wiring your switches.
2. 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.
3. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.
4. 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.
5. 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.
6. 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
7. You should separate input wiring from output wiring
8. It is advised to label the wiring to all devices in the system

3.4.1 Grounding

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

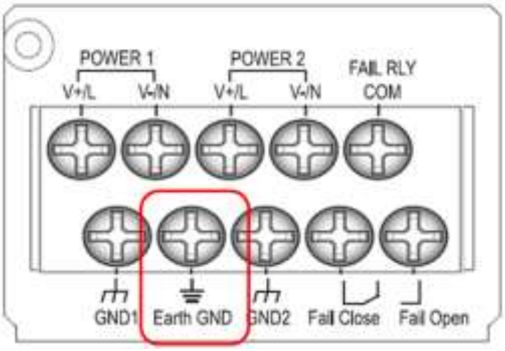


Figure 10 - Grounding

3.4.2 Power Inputs

The iES28TG supports dual redundant, hot swappable power supplies, Power Supply 1 (PWR1) and Power Supply 2 (PWR2). The connections for PWR1 and PWR2 are located on the terminal block.

To connect power, follow the steps below:

1. Remove the cover designed for protection from the terminal block.
2. Connect the ground from the first power source to GND1 terminal screw.
3. Connect the Positive or Live from the first power source to the POWER 1 V+/L terminal screw.
4. Connect the Negative or Neutral from the first power source to the POWER 1 V-/N terminal screw.
5. If a redundant power supply is required repeat steps 2 to 4 connecting the wires from the second power source to the POWER 2 terminal screws.
6. To keep the wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.
7. After wiring is completed, put the transparent cover back onto the terminal block

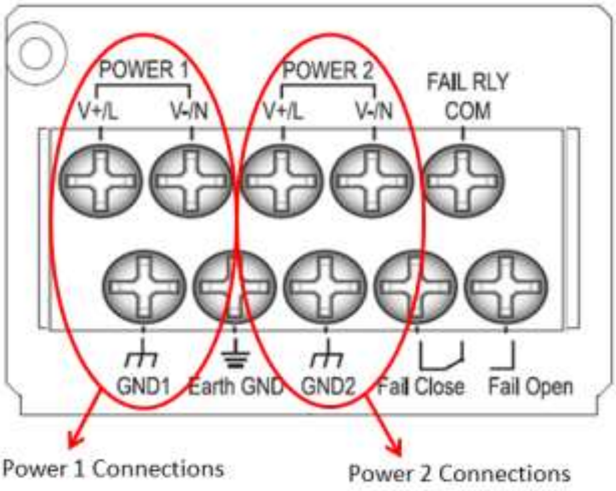


Figure 11 – Power Inputs

3.4.3 Fault Relay

The relay contact of the terminal block connector is used to detect user-configured events. The switch provides fail open and fail close options to form relay circuits based on requirements. The contacts are energized upon power-up of the unit and remain energized unless a critical error occurs. One common application for this output is to signal an alarm if a power failure or removal of control power occurs.

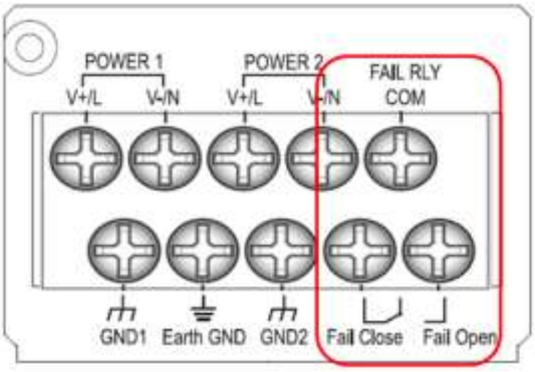


Figure 12 – Fault Relay

3.5 Connection

3.5.1 Ethernet Cables

The iES28TG/GF switches have standard Ethernet ports. According to the link type, the switches use CAT 3, 4, 5, and 5e UTP cables to connect to any other network device (e.g. PCs, servers, switches, routers, or hubs). For cable types and specifications, refer to the following table.

Table 1 – Port Numbering

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

3.5.2 Pin Assignments

With 10/100/1000BASE-T(X) cables, pins 1 and 2 are used for transmitting data, and pins 3 and 6 are used for receiving data. All pin assignments are as follows:

Table 2 – 10/100 Base-T(X) Line Pin Assignments

Pin Number	Assignment
1	TD+
2	TD-
3	RD+
4	Not used
5	Not used

Pin Number	Assignment
6	RD-
7	Not used
8	Not used

Table 3 – 1000 Base-T Line 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-

The iES28TG/GF supports Auto MDI/MDI- X operation. Use a cable to connect the switch to a PC.

Table 4 – 10/100 Base-T(X) MDI/MDI- X Pin Assignments

Pin Number	MDI port	MDI-X port
1	TD+(transmit)	RD+(receive)
2	TD-(transmit)	RD-(receive)
3	RD+(receive)	TD+(transmit)
4	Not used	Not used
5	Not used	Not used
6	RD-(receive)	TD-(transmit)
7	Not used	Not used
8	Not used	Not used

Table 5 – 1000 Base-T MDI/MDI- X Pin Assignments

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

Note: "+" and "-" signs represent the polarity of the wires that make up each wire pair.

3.5.3 SFP

The switches come with fiber optical ports that can connect to other devices using SFP modules. The fiber optical ports are multimode or singlemode with LC connectors. Remember that the TX port of Switch A should be connected to the RX port of Switch B.

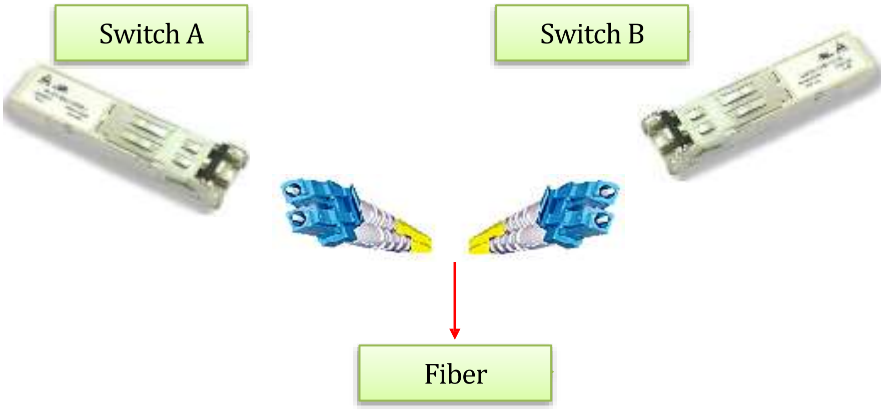


Figure 13 – SFPs

3.6 Console Cable

The switches can be managed via the console port (a RS-232 Serial interface) by a RS-232 cable supplied with the switch. Connect the port to a PC using the RS-232 cable with an RJ-45 connector to a DB-9 female connector. The DB-9 female connector of the RS-232 cable should be connected to the PC, while the other end of the cable (with the RJ-45 connector) should be connected to the console port of the switch (Standard Cisco Serial Cable supplied with iRBX6GF).

Table 6 – Signals and Pinouts from Console Port RJ-45 to DB-9 Serial Port Adapter

Console Port		PC COM Port	
RJ-45		DB-9	
Pins	Signals	Pins	Signals
1	NC[1]	—	—
2	NC[1]	—	—
3	TXD[2]	2	RXD[3]
4	GND[4]	5	GND[4]
5	GND[4]	5	GND[4]
6	RXD[3]	3	TXD[2]
7	NC[1]	—	—
8	NC[1]	—	—

1. NC indicates not connected.
2. TXD indicates transmit data
3. RXD indicates receive data
4. GND indicates ground

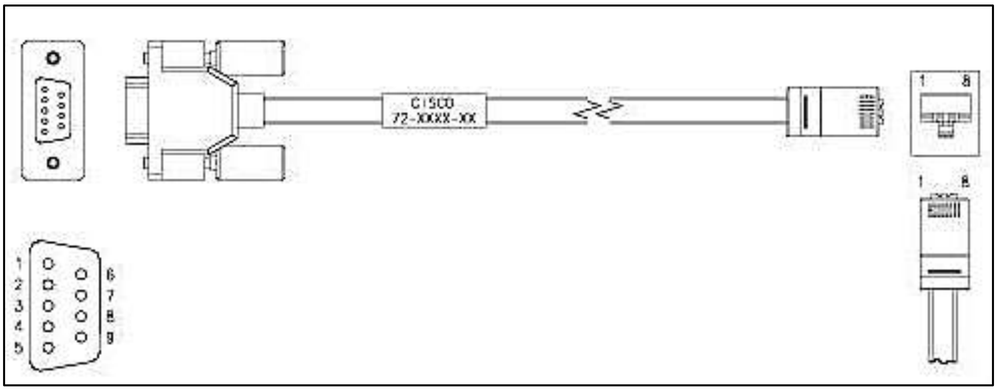


Figure 14 – Console Cable Connection

4. REDUNDANCY OVERVIEW

Using redundancy for minimizing system downtime is one of the most important concerns for industrial networking devices. The existing redundancy technologies widely used in commercial applications are STP, RSTP, and MSTP.

4.1 STP/RSTP/MSTP

4.1.1 STP/RSTP

STP (Spanning Tree Protocol), and its advanced versions RSTP (Rapid Spanning Tree Protocol) and MSTP (Multiple Spanning Tree Protocol), are designed to prevent network loops and provide network redundancy. Network loops occur frequently in large networks when two or more paths run to the same destination, broadcast packets could get in to an infinite loop and cause congestion in the network. STP can identify the best path to the destination and block all other paths. The blocked links will stay connected but inactive. When the best path fails, the blocked links will be activated. Compared to STP which recovers a link in 30 to 50 seconds, RSTP can shorten the time to 5 to 6 seconds.

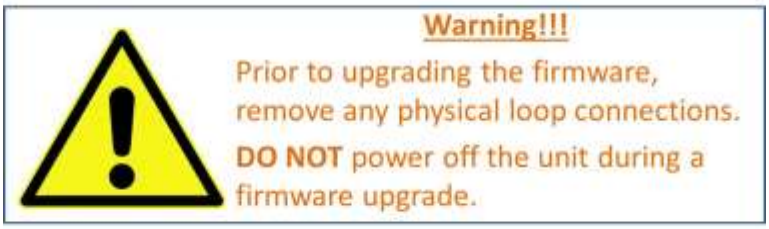
4.1.2 MSTP

MSTP was developed to improve recovery times since STP and RSTP takes seconds, which is not acceptable in some industrial applications. MSTP supports multiple spanning trees within a network by grouping and mapping multiple VLAN's into different spanning-tree instances, known as MSTI's, forming individual MST regions. Each switch is assigned an MST region. Each MST region consists of one or more MSTP switches with the same VLAN's, at least one MST instance, and the same MST region name. This allows the switches to use different paths in the network to effectively balance loads.

4.2 Fast Recovery

Fast recovery mode can be set to connect multiple ports to one or more switches. iES28GF/TG with fast recovery modes will provide redundant links. Only the first priority will be the active port, the other ports with different priorities will be backup ports.

5. Web Management



Warning!!!

Prior to upgrading the firmware, remove any physical loop connections.

DO NOT power off the unit during a firmware upgrade.

This section introduces configuration of the switch by a web browser.

An embedded HTML web site resides in the flash memory of the CPU board. It contains advanced management features that allow the user to manage the iRBX6GF switch from anywhere on the network via a standard web browser such as Microsoft Internet Explorer.

The Web Management function supports Internet Explorer 5.0 or later. It is based on Java Applets with an aim at reducing network bandwidth consumption and enhances access speed in a viewing screen.

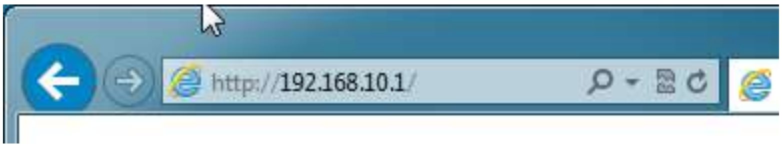
Note: By default, IE 5.0 or later versions do not allow Java Applets to open sockets. The browser settings need to be explicitly modified to enable Java Applets to be used on network ports.

The default values are as below:

- **IP Address:** *192.168.10.1*
- **Subnet Mask:** *255.255.255.0*
- **Default Gateway:** *192.168.10.254*
- **User Name:** *admin*
- **Password:** *admin*

To login, perform the following:

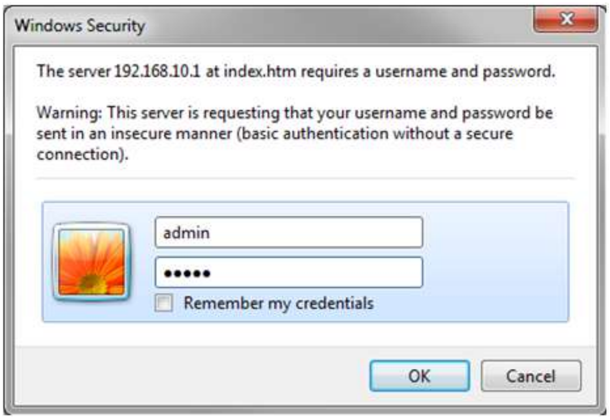
1. Launch Internet Explorer.
2. Type http:// and the switch's IP address (default is 192.168.10.1), and then press **Enter**.



http://192.168.10.1/

Figure 15 – Switch's IP Address Screen

3. The **Welcome to ....** screen appears. Click GET STARTED
4. The login screen appears (see Figure 16 – Login Screen).



Windows Security

The server 192.168.10.1 at index.htm requires a username and password.

Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

admin

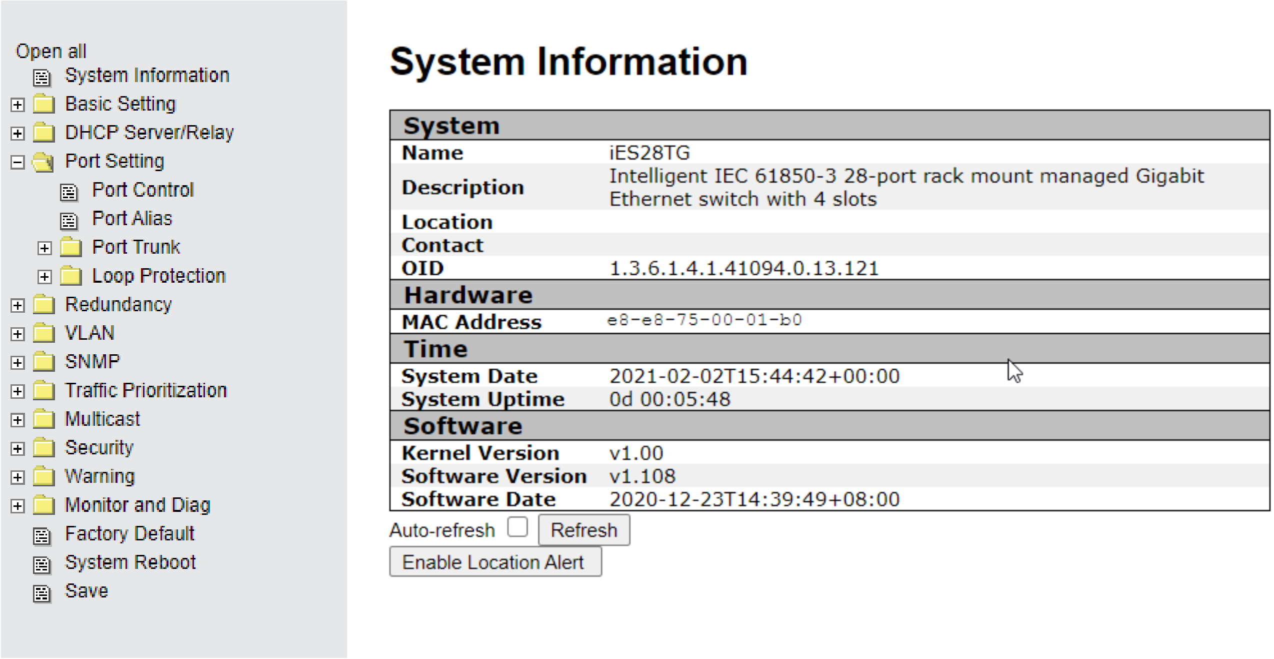
•••••

□ Remember my credentials

OK   Cancel

Figure 16 – Login Screen

5. Enter the username and password. The default username and password are "admin".
6. Click **OK**. The main interface of the Web Management appears (see Figure 17).



System Information

System	
Name	iES28TG
Description	Intelligent IEC 61850-3 28-port rack mount managed Gigabit Ethernet switch with 4 slots
Location	
Contact	
OID	1.3.6.1.4.1.41094.0.13.121
Hardware	
MAC Address	e8-e8-75-00-01-b0
Time	
System Date	2021-02-02T15:44:42+00:00
System Uptime	0d 00:05:48
Software	
Kernel Version	v1.00
Software Version	v1.108
Software Date	2020-12-23T14:39:49+08:00

Figure 17 – Main Interface or System Information tab

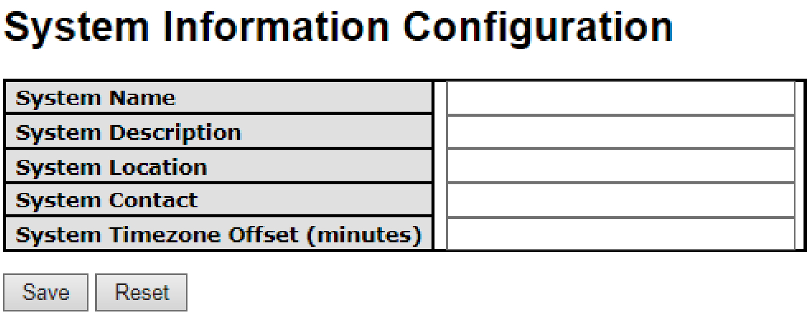
Note: Session timeout is 10 minutes.

On the left hand side, links to various settings are shown. Use them to access the different features of the switch.

5.1 Basic Setting

5.1.1 Basic Setting

This page allows the programming of the system information of the switch.



System Information Configuration

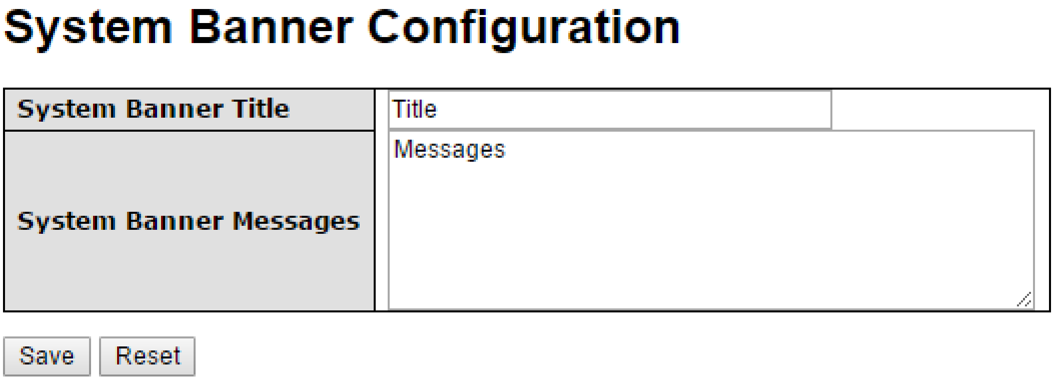
System Name	
System Description	
System Location	
System Contact	
System Timezone Offset (minutes)	

Figure 18 – System Information Configuration

Label	**Description**
System Name	An administratively assigned name for the managed node. By convention, this is the node's fully-qualified domain name. A domain name is a text string consisting of alphabets (A-Z, a-z), digits (0-9), and minus sign (-). Space is not allowed to be part of the name. The first character must be an alpha character. And the first or last character must not be a minus sign. The allowed string length is 0 to 255.
System Description	Description of the device
System Location	The physical location of the node (e.g., telephone closet, 3rd floor). The allowed string length is 0 to 255, and only ASCII characters from 32 to 126 are allowed.
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 only ASCII characters from 32 to 126 are allowed.
System Time zone offset (minutes)	Provides the time-zone offset from UTC/GMT. The offset is given in minutes east of GMT. The valid range is from -720 to 720 minutes.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.1.2 Banner

This page allows the user to configure the System Login Banner Title and System Banner Message. The Banner appears when you are trying to access the device through WebUI or CLI.



System Banner Configuration

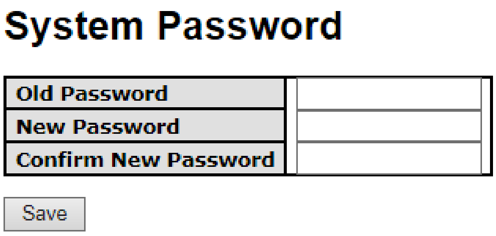
System Banner Title	Title
System Banner Messages	Messages

Figure 19 – System Banner Configuration

Label	**Description**
System Banner Title	The title of the Login Banner. Note: restricted to 0 – 64 characters
System Banner Message	The content of the Login Banner Message. Note: restricted to 0 – 512 characters
Save	Click to save changes.
Reset	Click to reset changes.

5.1.3 Admin Password

This page allows the user to configure the system admin password required to access the web interface or log in to the CLI.



System Password

Old Password	
New Password	
Confirm New Password	

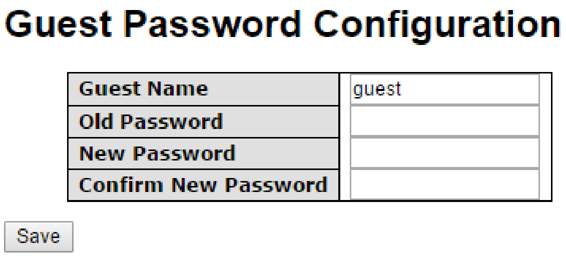
Figure 20 - System Password

Label	**Description**
Old Password	The existing password. If it is incorrect, a new password can't be set.
New Password	The new system password. The allowed string length is 0 to 31, and only ASCII characters from 32 to 126 are allowed.
Confirm New Password	Re-type the new password.

Save	Click to save changes.

5.1.4 Guest Password

This page allows the user to configure the system guest password required to access the web interface or log in to the CLI.



Guest Password Configuration

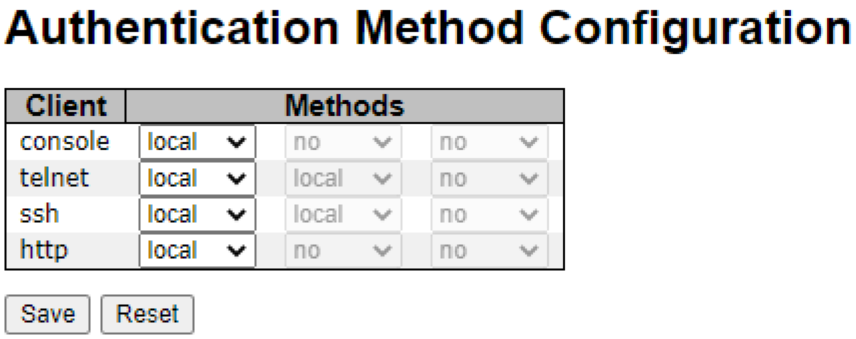
Guest Name	guest
Old Password	
New Password	
Confirm New Password	

Figure 21 – Guest Password Configuration

Label	Description
Guest name	The guest name should be used. Default guest name is *guest*
Old Password	The existing password. If this is incorrect, you cannot set the new password. Default guest password is *guest*
New Password	The new system password. The allowed string length is 0 to 31, and only ASCII characters from 32 to 126 are allowed.
Confirm New Password	Re-type the new password.
Save	Click to save changes.

5.1.5 Authentication Method

Configure how a user is authenticated when he/she logs into the switch via one of the management interfaces.



Authentication Method Configuration

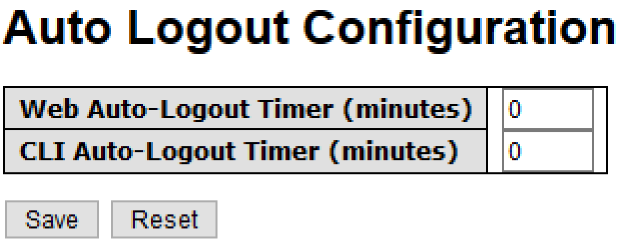
Client	Methods		
console	local	no	no
telnet	local	local	no
ssh	local	local	no
http	local	no	no

Figure 22 - Authentication Method Configuration

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 **(Remote Authentication Dial-In User Service)** server is used for authentication. **TACACS**: Terminal Access Controller Access Control System (TACACS) can be used for remote access.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values

5.1.6 Auto Logout

The Auto logout time for WebUI and CLI access can be defined by an user.



Auto Logout Configuration

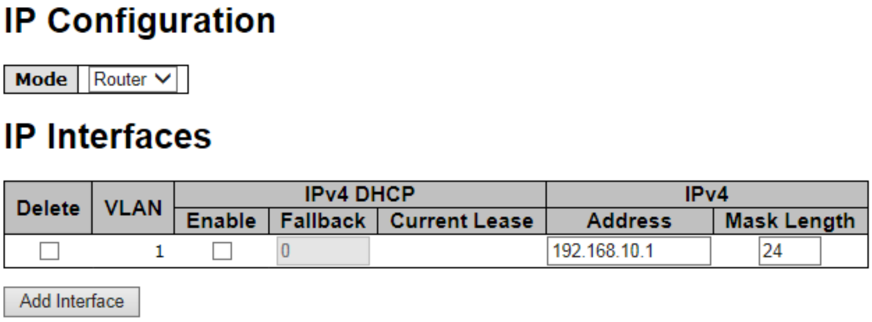
Web Auto-Logout Timer (minutes)	0
CLI Auto-Logout Timer (minutes)	0

Figure 23 - Auto Logout Configuration

Label	Description
Web Auto-Logout Timer (minutes)	Define the auto logout time for WebUI access Note: value 0-9999 min ; Default: 0 means 10 min
CLI Auto-Logout Timer (minutes)	Define the auto logout time for CLI access Note: value 0-9999 min ; Default: 0 means 10 min

5.1.7 IP Setting

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



IP Configuration

Mode: Router

IP Interfaces

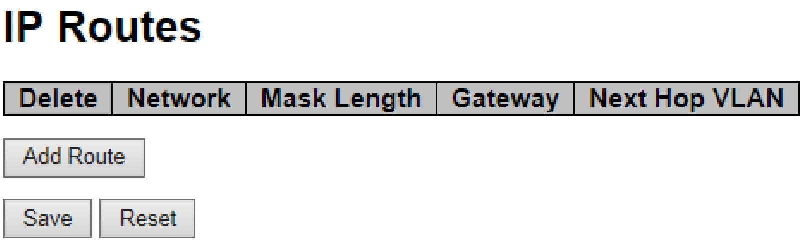
Delete	VLAN	IPv4 DHCP			IPv4	
		Enable	Fallback	Current Lease	Address	Mask Length
□	1	□	0		192.168.10.1	24

Figure 24 - IP Configuration

Label	Description
Mode	Configure whether the IP stack should act as a **Host** or a **Router**. In **Host** mode, IP traffic between interfaces will not be routed. In **Router** mode traffic is routed between all interfaces. Default: Router Mode.
Delete	Select this option to delete an existing IP interface.
VLAN	The VLAN associated with the IP interface. Only ports in this VLAN will be able to access the IP interface. This field is only available for input when creating a new interface.
IPv4 DHCP	
Enable	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.
Fallback	Fallback is the number of seconds needed for trying to obtain a DHCP lease. After this period expires, a configured IPv4 address will be used as IPv4 interface address. A value of zero disables the fallback mechanism, so that DHCP will keep retrying until a valid lease is obtained. Legal values are 0 to 4294967295 seconds.
Current Lease	For DHCP interfaces with an active lease, this column shows the current interface address, as provided by the DHCP server.
IPv4	
Address	Assigns the IP address of the network in use. If DHCP client function is enabled, there is no 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 192.168.10.1.
IPv4 Mask	The IPv4 network mask, in number of bits (prefix length). Valid values are between 0 and 30 bits for an IPv4 address. If **DHCP** is enabled, this field is not used. The field may also be left blank if IPv4 operation on the interface is not desired.
Add Interface	Click to add a new IP interface. A maximum of 128 interfaces are supported.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.1.7.1 IP Routes

Configure IP Routes information of the switch on the following page.



IP Routes

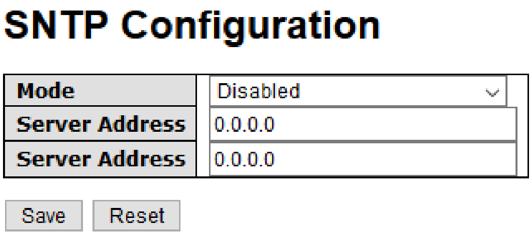
Delete	Network	Mask Length	Gateway	Next Hop VLAN

Figure 25 - IP Routes

Label	Description
Delete	Select this option to delete an existing IP route.
Network	The destination IP network or host address of this route. Valid format is dotted decimal notation. A default route can use the value 0.0.0.0.
Mask Length	The destination IP network or host mask, in number of bits (prefix length). It defines how much of a network address that must match, to qualify for this route. Valid values are between 0 and 32 bits. Only a default route will have a mask length of **0** (as it will match anything).
Gateway	The IP address of the IP gateway. Valid format is dotted decimal notation.
Next Hop VLAN	The VLAN ID (VID) of the specific IPv6 interface associated with the gateway. The given VID ranges from 1 to 4094 and will be effective only when the corresponding IPv6 interface is valid. If the IPv6 gateway address is link-local, it must specify the next hop VLAN for the gateway. If the IPv6 gateway address is not link-local, the system ignores the next hop VLAN for the gateway.
Add Route	Click to add a new IP interface. A maximum of 128 routes are supported.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values

5.1.8 SNTP Configuration (only for SNTP Version)

Configure SNTP on this page.



SNTP Configuration

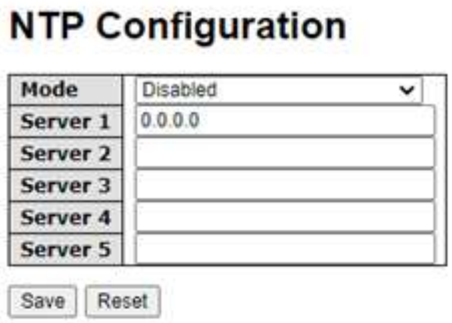
Mode	Disabled
Server Address	0.0.0.0
Server Address	0.0.0.0

Figure 26 - SNTP Configuration

Label	Description
Mode	Indicates the selected Simple Network Time Protocol (SNTP) mode. The modes include: **Enabled**: Enable SNTP client mode operation. **Disabled**: Disable SNTP client mode operation.
Server Address	Provide the IPv4 address of a SNTP server. There 2 cells so a dual SNTP server or active / active model is supported.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.1.9 NTP Configuration (only for NTP Version)

Configure NTP on this page.



NTP Configuration

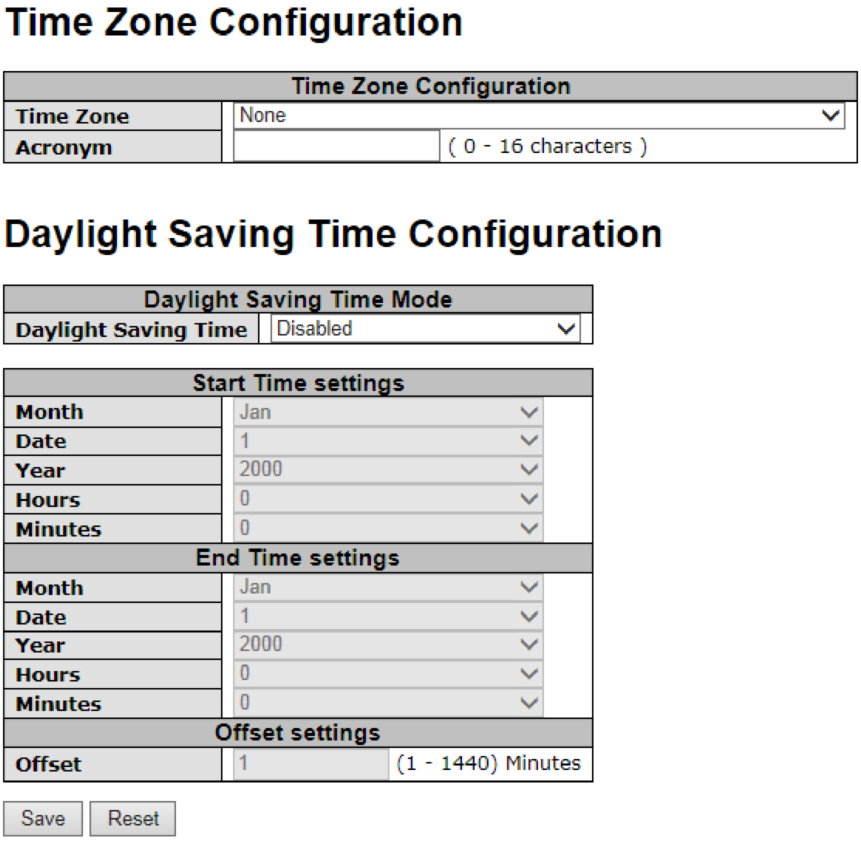
Mode	Disabled
Server 1	0.0.0.0
Server 2	
Server 3	
Server 4	
Server 5	

Figure 27 - NTP Configuration

Label	Description
Mode	Indicates the selected Network Time Protocol (NTP) mode. The modes include: **Enabled**: Enable NTP client mode operation. **Disabled**: Disable NTP client mode operation.
Server Address	Provide the IPv4 address of a NTP server. There 2 cells so a dual NTP server or active / active model is supported.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.1.10 Daylight Saving Time

This page allows the user to configure the Time Zone.



Time Zone Configuration

Time Zone Configuration	
Time Zone	None
Acronym	(0 - 16 characters)

Daylight Saving Time Configuration

Daylight Saving Time Mode	
Daylight Saving Time	Disabled

Start Time settings	
Month	Jan
Date	1
Year	2000
Hours	0
Minutes	0
End Time settings	
Month	Jan
Date	1
Year	2000
Hours	0
Minutes	0
Offset settings	
Offset	1 (1 - 1440) Minutes

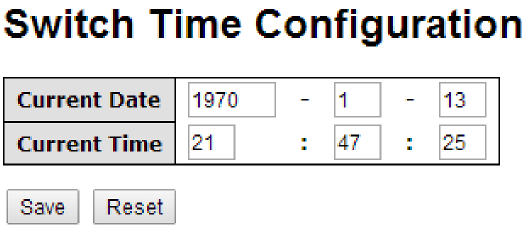
Figure 28 - Time Zone Configuration

Label	Description
Time Zone Configuration	Lists various time zones worldwide. Select appropriate **Time Zone** from the drop down and click **Save** to set.
Time Zone Acronym	The user can set the acronym of the time zone. This is a user configurable acronym to identify the time zone. Range : Up to 16 characters
Daylight Savings Time Mode	This is used to set the clock forward or backward according to the configurations set below for a defined Daylight Saving Time duration. Options include: **Disable:** to disable the Daylight Saving Time configuration. (Default) **Recurring:** The Daylight Saving Time duration configuration will be repeated every year. **Non-Recurring:** The Daylight Saving Time duration configuration will be for used once.
Start Time Settings	• **Week** - Select the starting week number. (Recurring) • **Day -** Select the starting day. (Recurring) • **Month** - Select the starting month. • **Date** - Select the starting date. (Non-Recurring) • **Year** - Select the starting year. (Non-Recurring) • **Hours** - Select the starting hour. • **Minutes** - Select the starting minute.

Label	Description
End Time Settings	• **Week** - Select the ending week number. (Recurring) • **Day -** Select the ending day. (Recurring) • **Month** - Select the ending month. • **Date** - Select the ending date. (Non-Recurring) • **Year** - Select the ending year. (Non-Recurring) • **Hours** - Select the ending hour.
Offset Settings	Enter the number of minutes to add during Daylight Saving Time. Range: 1 to 1440
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values

5.1.11 Switch Time Configuration

Configure date and time on this page.



Switch Time Configuration

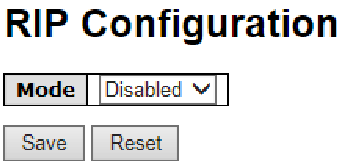
Current Date	1970	-	1	-	13
Current Time	21	:	47	:	25

Figure 29 – Switch Time Configuration

Mode	Description
Current Date	Modify **Current Date** in the following order according to your preference: Year – Month - Day
Current Time	Modify **Current Time** in the following order according to your preference: Hour : Minutes : Seconds
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previous saved values

5.1.12 RIP

Configure Routing Information Protocol (RIP) on this page. RIP is a dynamic routing protocol which uses hop count as a routing metric to find the best path between the source and the destination network.



RIP Configuration

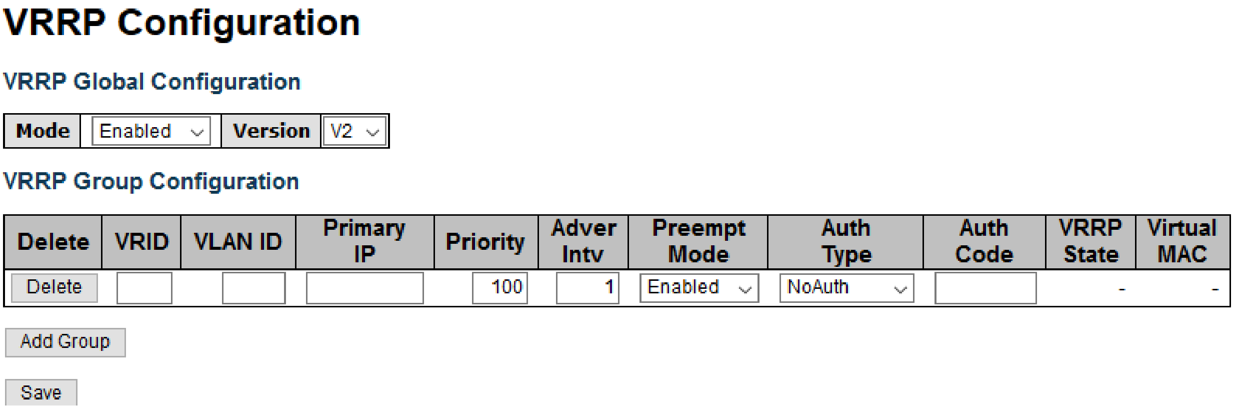
Mode: Disabled

Figure 30 - RIP Configuration

Label	Description
Mode	Indicate RIP operation mode. The options include: **Enabled**: Enable RIP mode operation. **Disabled**: Disable RIP mode operation.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.1.13 VRRP Configuration

Virtual Router Redundancy Protocol (VRRP) specifies an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. The VRRP router controlling the IP address(es) associated with a virtual router is called the Master, and forwards packets sent to these IP addresses. Configure VRRP on this page.



VRRP Configuration

VRRP Global Configuration

Mode	Enabled	Version	V2

VRRP Group Configuration

Delete	VRID	VLAN ID	Primary IP	Priority	Adver Intv	Preempt Mode	Auth Type	Auth Code	VRRP State	Virtual MAC
Delete				100	1	Enabled	NoAuth		-	-

Figure 31 - VRRP Configuration

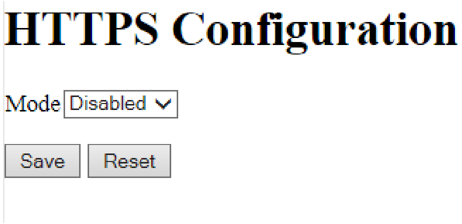
Label	Description
VRRP Global Configuration	For every VRRP Global Configuration, two options are provided: **Mode:** Disabled and Enabled. **Version:** V2 and V3. V3 adds support for IPv6, VRRP configuration and its preemption methodology
VRRP Group Configuration	For every VRRP Global Configuration, several options are provided: **Delete:** Delete an existing VRRP Group entry. **VRID:** Virtual Router ID, from 1 to 255 (as per RFC 3768) [2] There is no default. **VLAN ID:** VLAN id, from 0 to 4095. **Primary IP:** Primary IP associated with the VRRP Group. **Priority:** Priority value to be used by this VRRP router in Master election for this virtual router. Values are from 1 to 254. Default is 100 **Adver Intv:** Advertisement Interval is the Time interval between advertisements (in seconds). Default is 1 second. This field is used for troubleshooting of misconfigured routers. **Preemt Mode:** Controls whether a higher priority Backup router preempts a lower priority Master. Values are **Enabled** to allow preemption and **Disabled** for prohibiting it. Default is **Enabled**. **Auth Type:** Type of authentication being used. 2 options: **NoAuth** (No Authentication) or **Simple Text** **Auth Code:** A password containing of 8 characters. **VRRP State:** Shows the state of Virtual router. It can be: 1. Initial 2. Master 3. Backup **Virtual MAC:** A virtual MAC address is automatically generated by taking the last 8 bytes as the VRRP group number in hexadecimal. In VRRP, Mac address used is 0000.5e00.01xx. Here, xx is the VRRP group number in hexadecimal.

Label	Description
Add Group	Add a VRRP Group
Save	Click to save changes

5.1.14 HTTPS

HTTPS (HTTP over SSL or HTTP Secure) is the use of Secure Socket Layer (SSL) or Transport Layer Security (TLS) as a sublayer under regular HTTP application layering. HTTPS encrypts and decrypts user page requests as well as the pages that are returned by the Web server.

Configure HTTPS settings in the following page.



HTTPS Configuration

Mode: Disabled

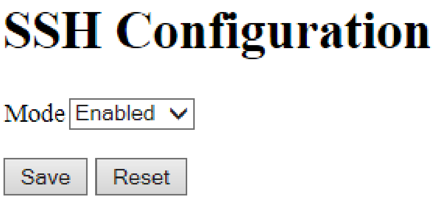
Figure 32 - HTTPS Configuration

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

5.1.15 SSH

Secure Shell (SSH) is a cryptographic network protocol for operating network services securely over an unsecured network. Typical applications include remote command-line login and remote command execution, but any network service can be secured with SSH.

Configure SSH settings in the following page.



SSH Configuration

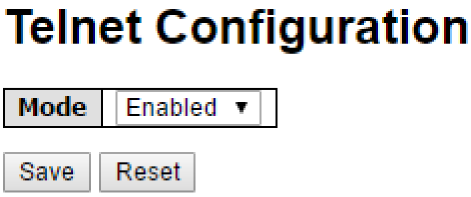
Mode: Enabled

Figure 33 - SSH Configuration

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.

5.1.16 Telnet

This page allows the user to enable or disable Telnet settings.



Telnet Configuration

Mode: Enabled

Figure 34 - Telnet Configuration

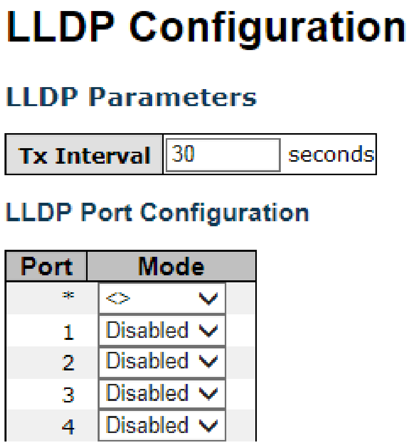
Label	Description
Mode	Indicates the selected Telnet mode. The modes include: **Enabled**: enable telnet. **Disabled**: disable Telnet.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.1.17 LLDP

5.1.17.1 LLDP Configurations

Link Layer Discovery Protocol (LLDP) is a vendor independent link layer or neighbor discovery protocol used by network devices for advertising their identity, capabilities to neighbors on a LAN segment. Enable LLDP globally to standardize network topology across all devices if you have a multi-vendor network.

This page allows the user to examine and configure LLDP port settings.



LLDP Configuration

LLDP Parameters

Tx Interval	30 seconds

LLDP Port Configuration

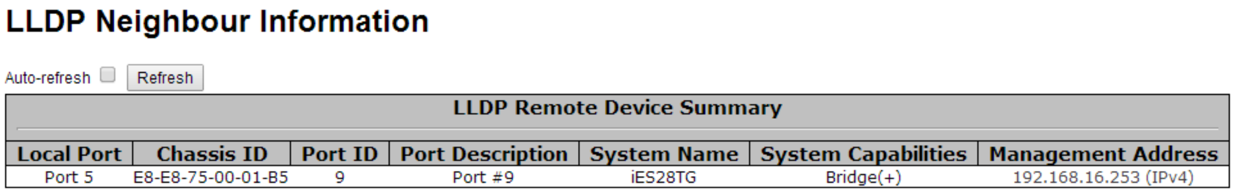
Port	Mode
*	<>
1	Disabled
2	Disabled
3	Disabled
4	Disabled

Figure 35 - LLDP Configuration

Label	Description
Port	The switch port number to which the following settings will be applied.
Mode	Indicates the selected LLDP mode. By default, LLDP is Enabled. **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.

5.1.17.2 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:



LLDP Neighbour Information

LLDP Remote Device Summary

Local Port	Chassis ID	Port ID	Port Description	System Name	System Capabilities	Management Address
Port 5	E8-E8-75-00-01-B5	9	Port #9	iES28TG	Bridge(+)	192.168.16.253 (IPv4)

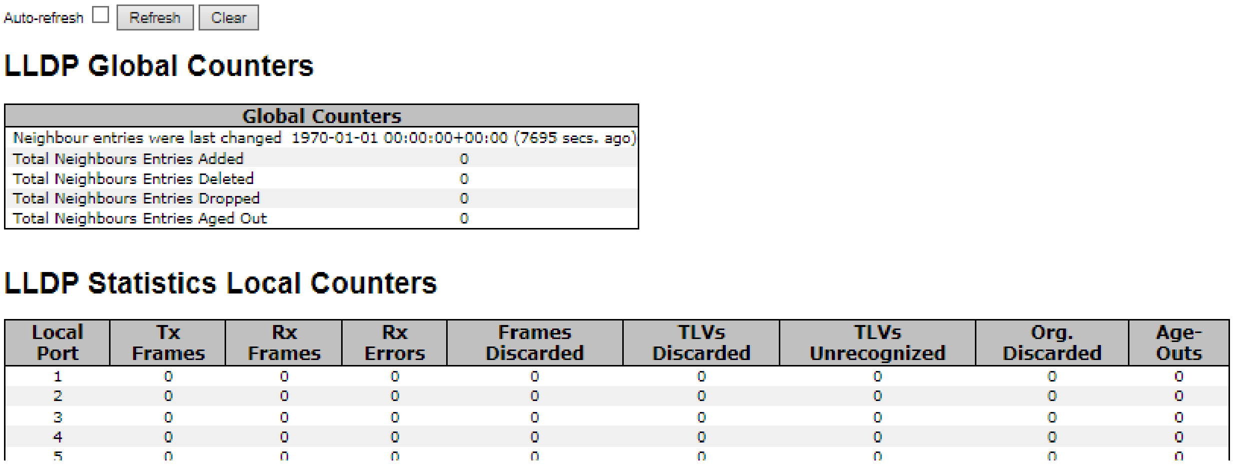
Figure 36 - LLDP Neighbor Information

Label	Description
Local Port	The port used to transmit and receive LLDP frames.
Chassis ID	The identification number of the neighbor sending out the LLDP frames.
Port ID	The identification of the neighbor port
Port	The description of the port advertised by the neighbor.
System Name	The name advertised by the neighbor.

Label	Description
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 is configured for 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

5.1.17.3 Port Statistics

This page provides an overview of all LLDP traffic. Two types of counters are shown. Global counters are counters that refer to the whole switch, while local counters refer to per port counters for the currently selected switch.



Auto-refresh □ Refresh Clear

LLDP Global Counters

Global Counters	
Neighbour entries were last changed	1970-01-01 00:00:00+00:00 (7695 secs. ago)
Total Neighbours Entries Added	0
Total Neighbours Entries Deleted	0
Total Neighbours Entries Dropped	0
Total Neighbours Entries Aged Out	0

LLDP Statistics Local Counters

Local Port	Tx Frames	Rx Frames	Rx Errors	Frames Discarded	TLVs Discarded	TLVs Unrecognized	Org. Discarded	Age-Outs
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0

Figure 37 - LLDP Global Counters

5.1.17.3.1 Global Counters

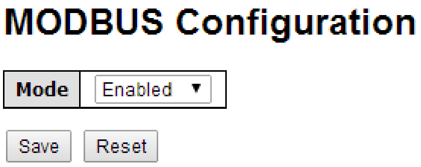
Label	Description
Neighbor entries were last changed at	Shows the time when the last entry was deleted or added. It also shows the time elapsed since the last change was detected.
Total Neighbors Entries Added	Shows the number of new entries added since switch reboot
Total Neighbors Entries Deleted	Shows 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

5.1.17.3.2 Local Counters

Label	Description
Local Port	The port on which LLDP frames are received or transmitted.
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 LLDP frame is received on a port, and the switch's internal table has run full, the LLDP frame is counted and discarded. This situation is known as "Too Many Neighbours" in the LLDP standard. LLDP frames require a new entry in the table when the Chassis ID or Remote Port ID is not already contained within the table. Entries are removed from the table when a given port's link is 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 TLV (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

5.1.18 Modbus TCP

This page shows Modbus TCP support of the switch. (For more information regarding Modbus, refer to http://www.modbus.org/).



MODBUS Configuration

Mode: Enabled

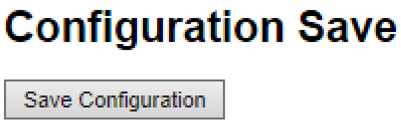
Figure 38 - MODBUS Configuration

Label	Description
Mode	Disable or enable Modbus function.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values.

Note: For Modbus commands, see Appendix A

5.1.19 Backup

This page allows the user to save/view switch configurations. The configuration file is in XML format.

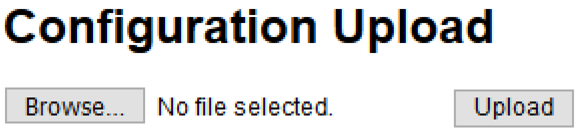


Configuration Save

Figure 39 – Configuration Save

5.1.20 Restore

This page allows the user to load a previously saved configuration to the switch.



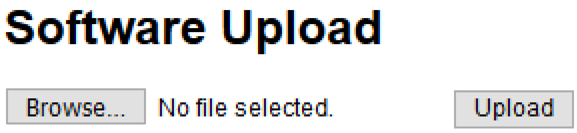
Configuration Upload

No file selected.

Figure 40 – Configuration Upload

5.1.21 Firmware Update

This page allows the user to update the firmware of the switch. Select the file to be load then press upload. After the software image is uploaded, a page announces that the firmware update is initiated. After about a minute, the firmware is updated and the switch restarts.



Software Upload

Figure 41 – Software Upload

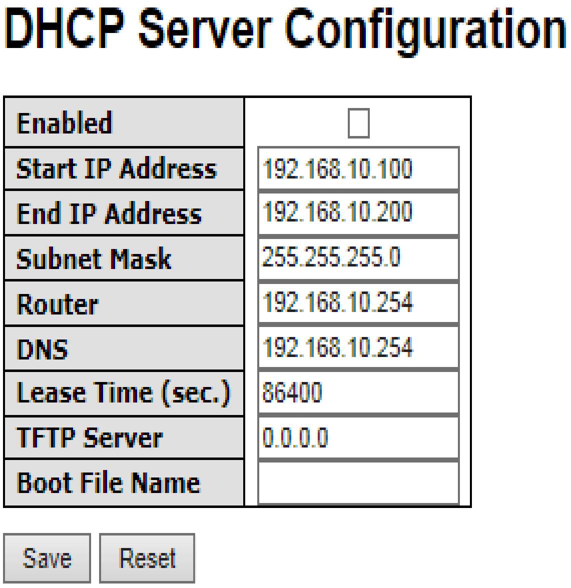
Warning: *While the firmware is being updated, Web access appears to be defunct. The front LED flashes Green/Off with a frequency of 10 Hz while the firmware update is in progress. Do not restart or power off the device at this time or the switch may fail to function afterwards. Upgrade takes 10 minutes or more based on connection bandwidth.*

5.2 DHCP Server/Relay

The switch provides dynamic host configuration protocol (DHCP) server functions. By enabling DHCP, the switch will become a DHCP server. A DHCP server automatically assigns an IP address, subnet mask, domain name server (DNS) address and other pertinent configuration parameters to DHCP client. A DHCP client is the endpoint that receives configuration information from a DHCP server.

5.2.1 Basic Settings

Enable DHCP in this page.



DHCP Server Configuration

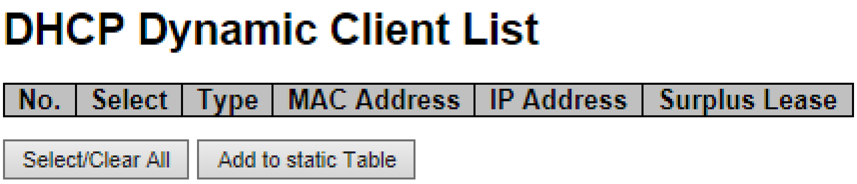
Enabled	□
Start IP Address	192.168.10.100
End IP Address	192.168.10.200
Subnet Mask	255.255.255.0
Router	192.168.10.254
DNS	192.168.10.254
Lease Time (sec.)	86400
TFTP Server	0.0.0.0
Boot File Name	

Figure 42 – DHCP Server Configuration

Label	Description
Enabled	Enable/Disable DHCP server.
Start IP Address	The first IP address of IP pool.
End IP Address	The Last IP address of IP pool.
Subnet Mask	The subnet mask.
Router	The IP address of the gateway.
DNS	The IP address of the Domain Name Server.
Lease Time	Lease timer counted in seconds.
TFTP Server	The IP address of the TFTP Sever (Option 66).
Boot File Name	The name of Boot File (Option 67).
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.2.2 DHCP Dynamic Client List

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



DHCP Dynamic Client List

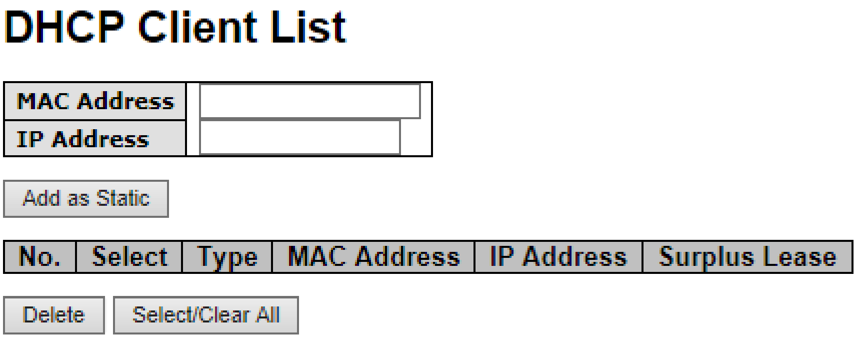
No.	Select	Type	MAC Address	IP Address	Surplus Lease

Figure 43 – DHCP Dynamic Client List

Label	Description
Type	The type of client (Dynamic or Static).
MAC Address	The MAC Address of client.
IP Address	The IP address of client.
Surplus Lease	The surplus Lease time.
Select/Clear All	Select or Clear all check boxes.
Add to Static Table	Add dynamic entry to static table.

5.2.3 DHCP Static Client List

DHCP server can automatically assign an IP address to DHCP client.



DHCP Client List

MAC Address	
IP Address	

No.	Select	Type	MAC Address	IP Address	Surplus Lease

Figure 44 – DHCP Static Client List

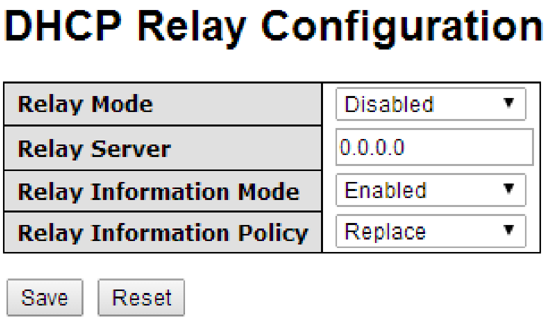
Label	Description
MAC Address	The MAC Address of client.
IP Address	The IP address of client
Surplus Lease	The surplus Lease time. The length of time for which a DHCP client holds the IP address information. When a lease expires, the client must renew it
Add as Static	Add dynamic entry to static table.
Type	The type of client (Dynamic or Static).
Delete	Delete selected entry.

Label	Description
Select/Clear All	Select or Clear all check boxes.

5.2.4 Relay Agent

Configure DHCP Relay on this page..

5.2.4.1 Relay



DHCP Relay Configuration

Relay Mode	Disabled
Relay Server	0.0.0.0
Relay Information Mode	Enabled
Relay Information Policy	Replace

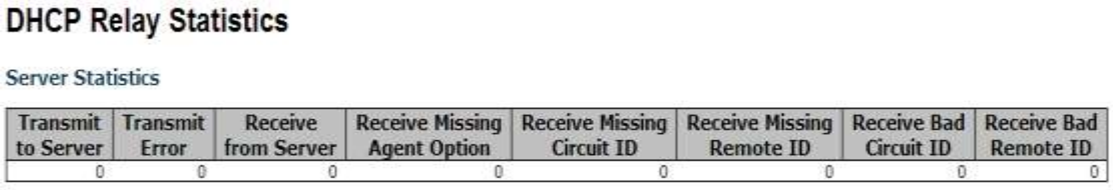
Figure 45 – DHCP Relay Configuration

Label	Description
Relay Mode	Indicates the existing DHCP relay mode. The modes include: **Enabled**: Enable DHCP relay mode operation. When DHCP relay mode operation is enabled, the agent forwards and transfers DHCP messages between the clients and the server when they are not in the same subnet domain. And the DHCP broadcast message won't be flooded for security considerations. **Disabled**: Disable DHCP relay mode operation
Relay Server	Indicates the DHCP relay server IP address. A DHCP relay agent is used to forward and transfer DHCP messages between the client and the server when they are not in the same subnet domain.
Relay Information Mode	Indicates the existing DHCP relay information mode. The format of DHCP option 82 circuit ID format is "[vlan_id][module_id][port_no]". The first four characters represent the VLAN ID, the fifth and sixth characters are the module ID. In stand-alone devices, the module ID always equals to 0; in stacked devices, it means switch ID. The last two characters are the port number. For example, "00030108" means the DHCP message received form VLAN ID 3, switch ID 1, and port No. 8. The option 82 remote ID value equals to the switch MAC address. The mode include: **Enabled**: activate DHCP relay information. When DHCP relay information is enabled, the agent inserts specific information (option 82) into a DHCP message when forwarding to a DHCP server, and removes it from a DHCP message when transferring to a DHCP client. It only works when the DHCP relay mode is enabled. **Disabled**: disable DHCP relay information
Relay Information Policy	Indicates the policies to be enforced when receiving DHCP relay information. When DHCP relay information mode is enabled, if the agent receives a DHCP message that already contains relay agent information, it will enforce the policy. The Replace option is invalid when relay information mode is disabled. The policy includes: **Replace**: replace the original relay information when a DHCP message containing the information is received. **Keep**: keep the original relay information when a DHCP message containing the information is received. **Drop**: drop the package when a DHCP message containing the information is received.

Label	Description
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values.

5.2.4.2 Relay Statistics

This page provides statistics for DHCP relay.



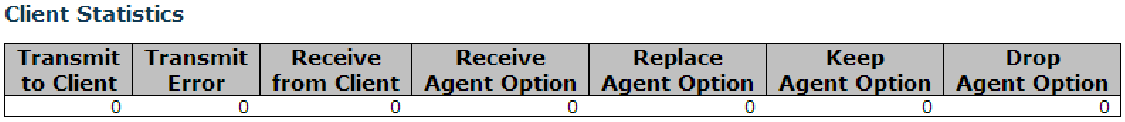
DHCP Relay Statistics

Server Statistics

Transmit to Server	Transmit Error	Receive from Server	Receive Missing Agent Option	Receive Missing Circuit ID	Receive Missing Remote ID	Receive Bad Circuit ID	Receive Bad Remote ID
0	0	0	0	0	0	0	0

Figure 46 – DHCP Relay Statics

Label	Description
Transmit to Sever	The number of packets relayed from the client to the server
Transmit Error	The number of packets with errors when being sent to clients
Receive from Server	The number of packets received from the server
Receive Missing Agent Option	The number of packets received without agent information
Receive Missing Circuit ID	The number of packets received with Circuit ID
Receive Missing Remote ID	The number of packets received with the Remote ID option missing.
Receive Bad Circuit ID	The number of packets whose Circuit ID do not match the known circuit ID
Receive Bad Remote ID	The number of packets whose Remote ID do not match the known Remote ID



Client Statistics

Transmit to Client	Transmit Error	Receive from Client	Receive Agent Option	Replace Agent Option	Keep Agent Option	Drop Agent Option
0	0	0	0	0	0	0

Figure 47 – Client Statics

Label	Description
Transmit to Client	The number of packets relayed from the server to the client
Transmit Error	The number of packets with errors when being sent to servers
Receive from Client	The number of packets received from the server
Receive Agent Option	The number of received packets with relay agent information option.
Replace Agent Option	The number of packets replaced when received messages contain relay agent information.
Keep Agent Option	The number of packets whose relay agent information is retained

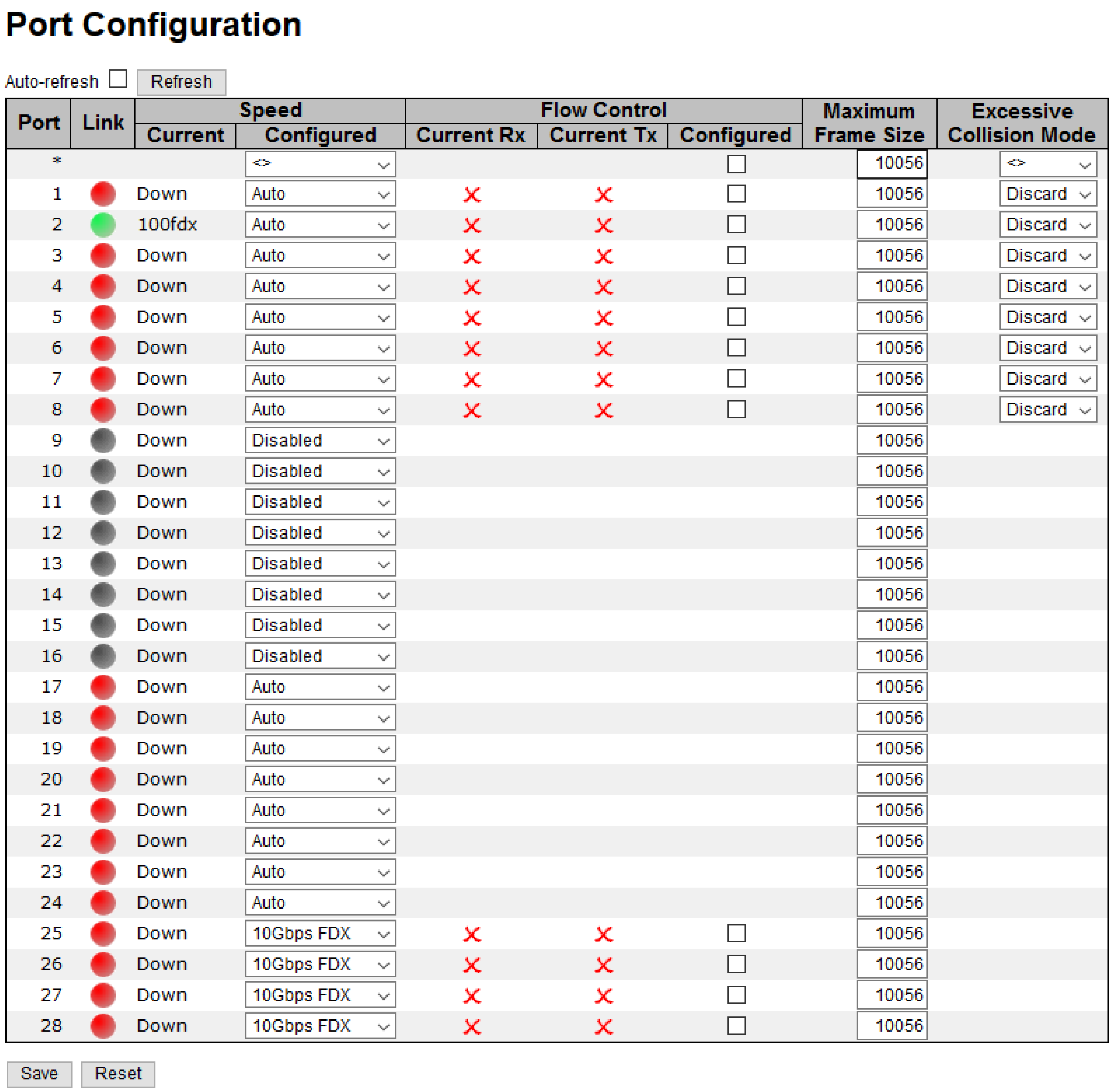
Label	**Description**
Drop Agent Option	The number of packets dropped when received messages contain relay agent information.
Auto-refresh ☑ :	Auto-refresh Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Refresh	Click to refresh the page immediately.
Clear	Clear all statistics.

5.3 Port Setting

Port Setting allows managing of individual ports of the switch, including traffic, power, and trunks.

5.3.1 Port Control

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



Port Configuration

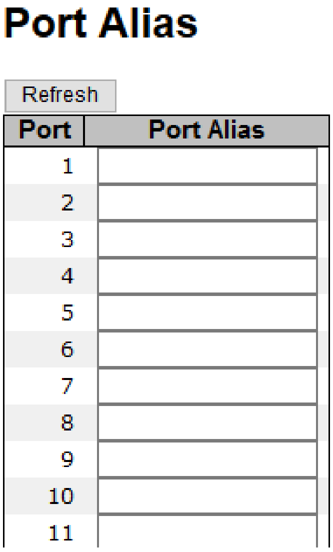
Auto-refresh □ Refresh

Port	Link	Speed		Flow Control			Maximum Frame Size	Excessive Collision Mode
		Current	Configured	Current Rx	Current Tx	Configured		
*			<>			□	10056	<>
1	🔴	Down	Auto	✗	✗	□	10056	Discard
2	🟢	100fdx	Auto	✗	✗	□	10056	Discard
3	🔴	Down	Auto	✗	✗	□	10056	Discard
4	🔴	Down	Auto	✗	✗	□	10056	Discard
5	🔴	Down	Auto	✗	✗	□	10056	Discard
6	🔴	Down	Auto	✗	✗	□	10056	Discard
7	🔴	Down	Auto	✗	✗	□	10056	Discard
8	🔴	Down	Auto	✗	✗	□	10056	Discard
9	⚫	Down	Disabled				10056	
10	⚫	Down	Disabled				10056	
11	⚫	Down	Disabled				10056	
12	⚫	Down	Disabled				10056	
13	⚫	Down	Disabled				10056	
14	⚫	Down	Disabled				10056	
15	⚫	Down	Disabled				10056	
16	⚫	Down	Disabled				10056	
17	🔴	Down	Auto				10056	
18	🔴	Down	Auto				10056	
19	🔴	Down	Auto				10056	
20	🔴	Down	Auto				10056	
21	🔴	Down	Auto				10056	
22	🔴	Down	Auto				10056	
23	🔴	Down	Auto				10056	
24	🔴	Down	Auto				10056	
25	🔴	Down	10Gbps FDX	✗	✗	□	10056	
26	🔴	Down	10Gbps FDX	✗	✗	□	10056	
27	🔴	Down	10Gbps FDX	✗	✗	□	10056	
28	🔴	Down	10Gbps FDX	✗	✗	□	10056	

Figure 48 – Port Configuration

Label	Description
Port	This is the logical port number for this row.
Link	The current link state is shown by different colors. Green indicates the link is up and red means that is down.
Current Link Speed	Indicates the current link speed of the port
Configured Link Speed	Selects any available link speed for the given switch port. Only speeds supported by the specific port is shown. Possible speeds are: **Disabled**—Disables the switch port operation. **Auto**— Port auto negotiating speed with the link partner and selects the highest speed that is compatible with the link partner. **10Mbps HDX**—Forces the cu port in 10Mbps half duplex mode. **10Mbps FDX**—Forces the cu port in 10Mbps full duplex mode. **100Mbps HDX**—Forces the cu port in 100Mbps half duplex mode. **100Mbps FDX**—Forces the cu port in 100Mbps full duplex mode. **1Gbps FDX**—Forces the port in 1Gbps full duplex
Flow Control	When **Auto Speed** is selected on a port, this section indicates the flow control capability that is advertised to the link partner. When a fixed-speed setting is selected, that is what is used. The **Current Rx** column indicates whether pause frames on the port are obeyed, and the **Current Tx** column indicates whether pause frames on the port are transmitted. The Rx and Tx settings are determined by the result of the last Auto-Negotiation. Check the **Configured** column to use flow control. This setting is related to the setting for Configured Link Speed.
Maximum Frame Size	Enter the maximum frame size allowed for the switch port, including Frame Check Sequence (FCS).
Excessive Collision Mode	Configure port transmit collision behavior. **Discard:** Discard frame after 16 collisions (default). **Restart:** Restart back off algorithm after 16 collisions.
Refresh	Click to refresh the page immediately.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.3.2 Port Alias



Port Alias

Refresh

Port	Port Alias
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

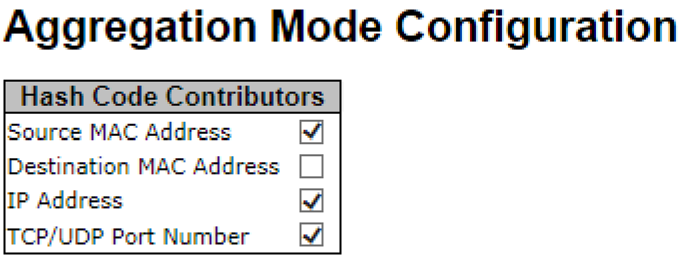
Figure 49 - Port Alias

Label	Description
Port	This is the logical port number for this row.
Port Alias	Port Alias is an identifier for the port.
Refresh	Click to refresh the page immediately.
Save	Click to save changes.
Clear	Clear all statistics.

5.3.3 Port Trunk

5.3.3.1 Configuration

This page is used to configure the static link aggregation hash mode and the aggregation group.



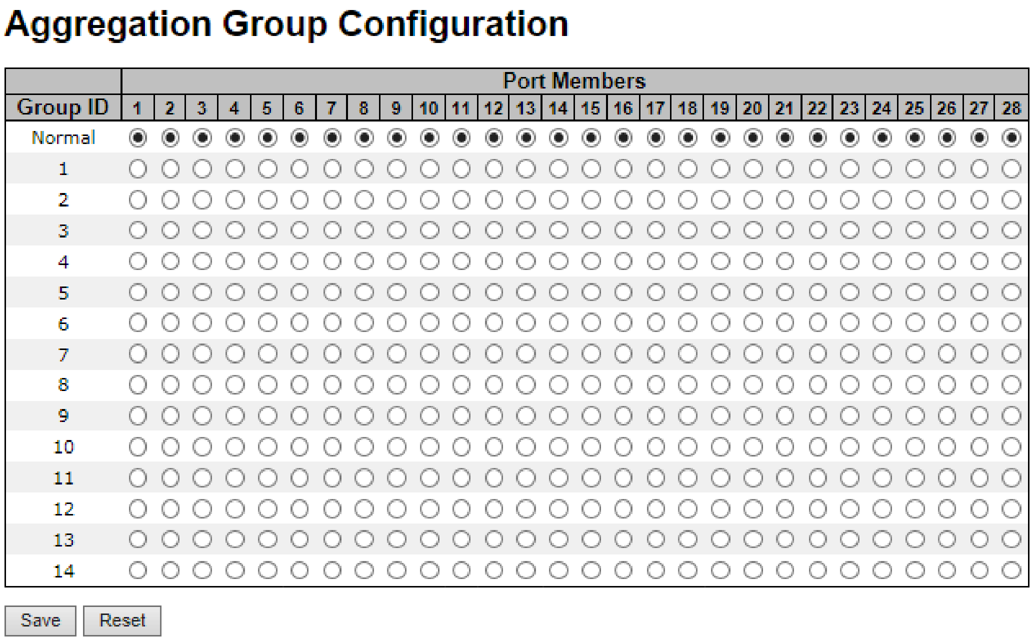
Aggregation Mode Configuration

Hash Code Contributors	
Source MAC Address	☑
Destination MAC Address	☐
IP Address	☑
TCP/UDP Port Number	☑

Figure 50 - Aggregation Mode Configuration

Label	Description
Source MAC Address	The Source MAC address can be used to calculate the destination port for the frame. Check to enable the use of the Source MAC address, or uncheck to disable. By default, **Source MAC Address** is enabled.

Label	Description
Destination MAC Address	The **Destination MAC Address** can be used to calculate the destination port for the frame. Check to enable the use of the **Destination MAC Address**, or uncheck to disable. By default, **Destination MAC Address** is disabled.
IP Address	The **IP address** can be used to calculate the destination port for the frame. Check to enable the use of the **IP Address**, or uncheck to disable. By default, **IP Address** is enabled.
TCP/UDP Port Number	The **TCP/UDP Port Number** can be used to calculate the destination port for the frame. Check to enable the use of the **TCP/UDP Port Number**, or uncheck to disable. By default, **TCP/UDP Port Number** is enabled.



Aggregation Group Configuration

	Port Members																											
Group ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Normal	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
14	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

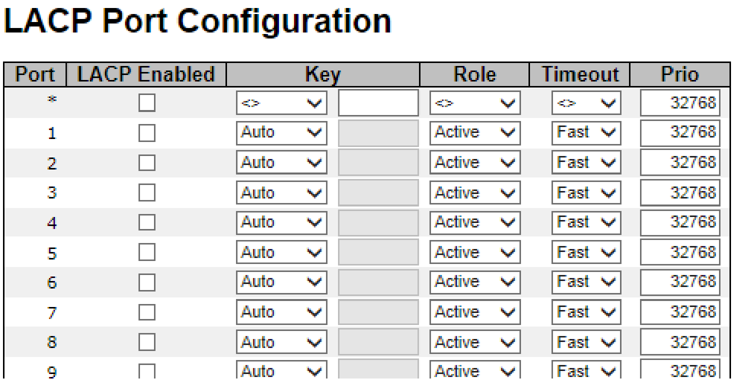
Figure 51 - Aggregation Group Configuration

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	Each switch port is listed 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 ports must be in the same speed in each group.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.3.3.2 LACP Port

The Link Aggregation Control Protocol (LACP), an IEEE 802.3ad standard protocol, allows bundling several physical ports together to form a single logical port.

This page allows the user to inspect the current LACP port configurations, and possibly change them as well. Note that at a time, a port can be configured for static or dynamic link aggregation but not for both.



LACP Port Configuration

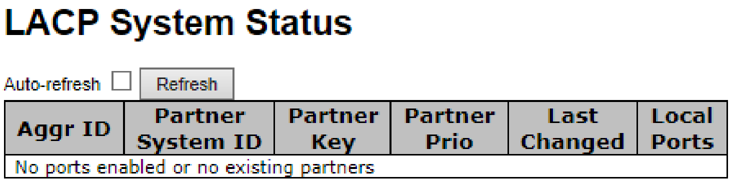
Port	LACP Enabled	Key		Role	Timeout	Prio
*	☐	<>		<>	<>	32768
1	☐	Auto		Active	Fast	32768
2	☐	Auto		Active	Fast	32768
3	☐	Auto		Active	Fast	32768
4	☐	Auto		Active	Fast	32768
5	☐	Auto		Active	Fast	32768
6	☐	Auto		Active	Fast	32768
7	☐	Auto		Active	Fast	32768
8	☐	Auto		Active	Fast	32768
9	☐	Auto		Active	Fast	32768

Figure 52 – LACP Port Configuration

Label	**Description**
Port	The switch port number.
LACP Enabled	Controls whether LACP is enabled on this switch port. LACP will form an aggregation when 2 or more ports are connected to the same partner. Up to 32 aggregations are supported (if stackable).
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 the user 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).
Timeout	The **Timeout** controls the period between BPDU transmissions. **Fast** will transmit LACP packets each second, while **Slow** will wait for 30 seconds before sending a LACP packet.
Prio	**Prio(rity)** controls the priority of the port. If the LACP partner wants to form a larger group than is supported by this device, then this parameter will control which ports will be active and which ports will be in a backup role. Lower number means greater priority.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.3.3.3 LACP System Status

This page provides a status overview for all LACP instances.



LACP System Status

Auto-refresh □ Refresh

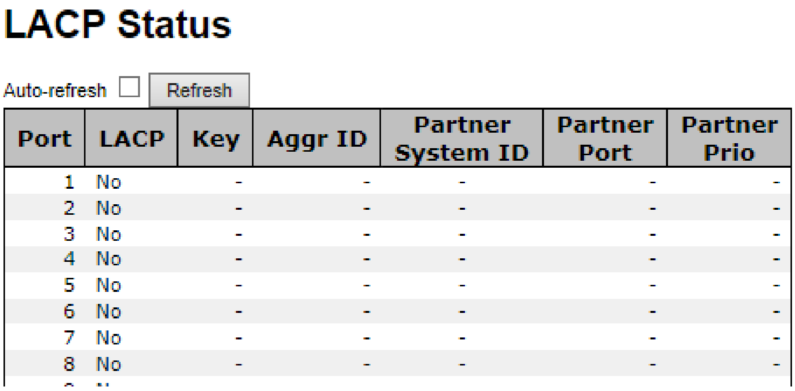
Aggr ID	Partner System ID	Partner Key	Partner Prio	Last Changed	Local Ports
No ports enabled or no existing partners					

Figure 53 – LACP System Status

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.
Partner Prio	The partner's port priority.
Last Changed	The time since this aggregation changed.
Local Ports	Shows which ports are a part of this aggregation for this switch.
Refresh	Click to refresh the page immediately.
Auto-refresh	Check to enable an automatic refresh of the page at regular Intervals.

5.3.3.4 LACP Port Status

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



LACP Status

Auto-refresh □ Refresh

Port	LACP	Key	Aggr ID	Partner System ID	Partner Port	Partner Prio
1	No	-	-	-	-	-
2	No	-	-	-	-	-
3	No	-	-	-	-	-
4	No	-	-	-	-	-
5	No	-	-	-	-	-
6	No	-	-	-	-	-
7	No	-	-	-	-	-
8	No	-	-	-	-	-

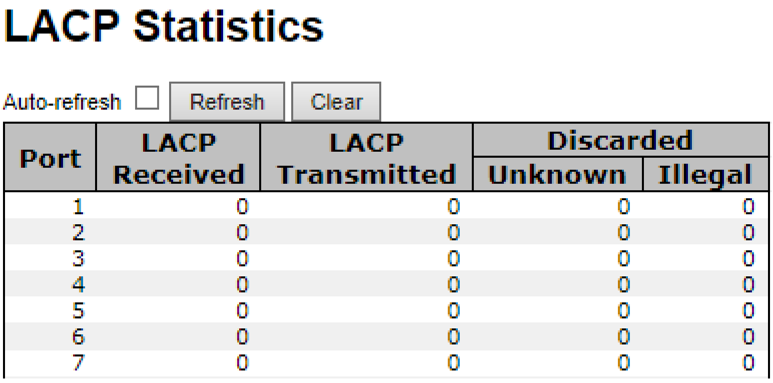
Figure 54 - LACP Status

Label	Description
Port	Switch port number.
LACP	**Yes** means LACP is enabled and the port link is up. **No** means that 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 and is in disabled LACP status.
Key	The key assigned to this port. Only ports with the same key can be aggregated.
Aggr ID	The aggregation ID assigned to the aggregation group.

Label	Description
Partner System ID	The partner's system ID (MAC address).
Partner Port	The partner's port number associated with the port.
Partner Prio	The partner's port priority.
Refresh	Click to refresh the page immediately.
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals.

5.3.3.5 LACP Port Statistics

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



LACP Statistics

Auto-refresh □ Refresh Clear

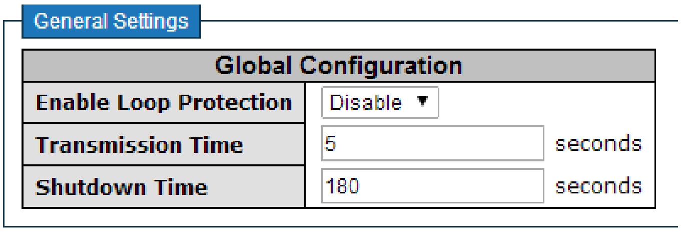
Port	LACP Received	LACP Transmitted	Discarded	
			Unknown	Illegal
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0

Figure 55 - LACP Statistics

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

5.3.4 Loop Protection

This feature prevents loop attack. When receiving loop packets, the port will be disabled automatically, preventing the loop attack from affecting other network devices.
This page allows the user to inspect the current Loop Protection configurations, and possibly change them as well.

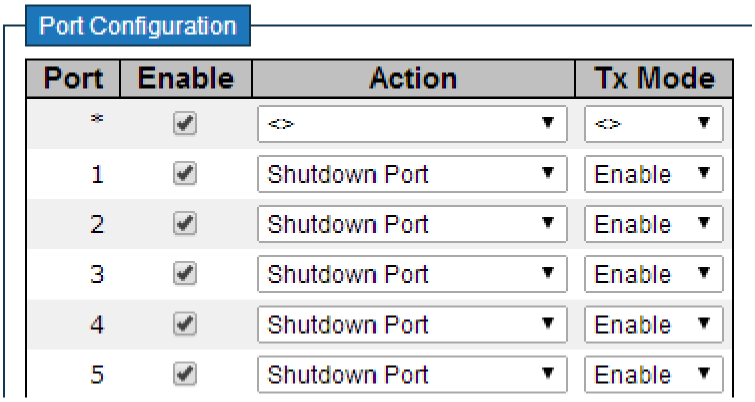


General Settings

Global Configuration	
Enable Loop Protection	Disable ▼
Transmission Time	5 seconds
Shutdown Time	180 seconds

Figure 56 – Loop Protection

Label	**Description**
Enable Loop Protection	Controls whether loop protections is enabled (as a whole).
Transmission Time	The interval between each loop protection PDU sent to each port. The value must be between 1 to 10 seconds.
Shutdown Time	The period (in seconds) for which a port will be kept disabled when a loop is detected (shutting down the port). The valid value is 0 to 604800 seconds (7 days). A value of zero will keep a port disabled permanently (until the device is restarted).



Port Configuration

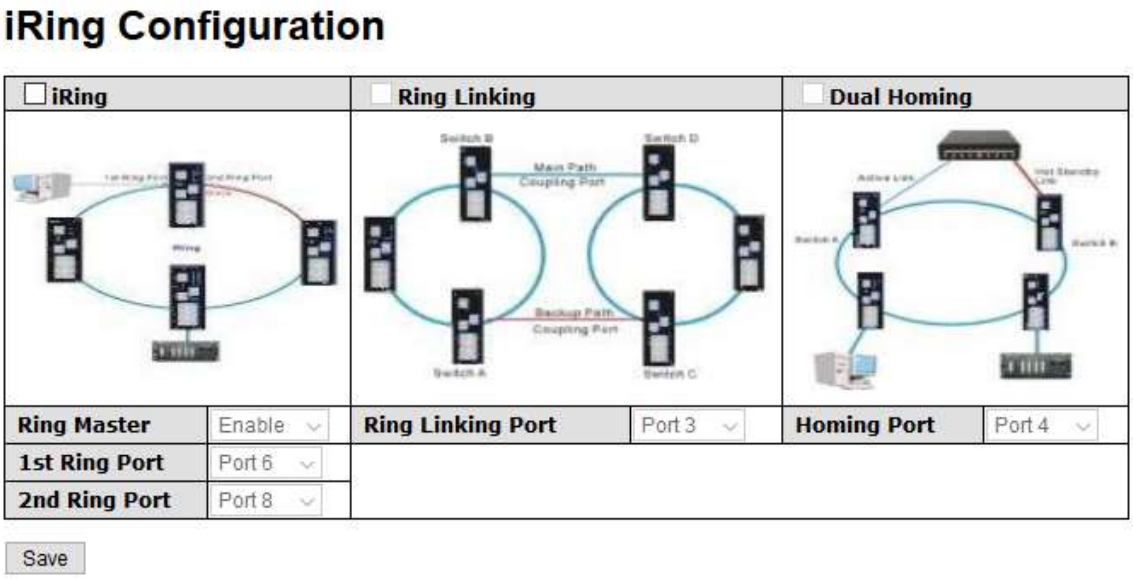
Port	Enable	Action	Tx Mode
*	☑	<> ▼	<> ▼
1	☑	Shutdown Port ▼	Enable ▼
2	☑	Shutdown Port ▼	Enable ▼
3	☑	Shutdown Port ▼	Enable ▼
4	☑	Shutdown Port ▼	Enable ▼
5	☑	Shutdown Port ▼	Enable ▼

Figure 57 - Port Configuration

Label	**Description**
Port	The switch port number of the port.
Enable	Controls whether loop protection is enabled on this switch port.
Action	Configures the action to take when a loop is detected. Valid values are **Shutdown Port, Shutdown Port** and **Log or Log Only**
Tx Mode	Controls whether the port is actively generating loop protection PDUs or only passively look for looped PDUs.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values

5.4 Redundancy

5.4.1 iRing Configuration



iRing Configuration

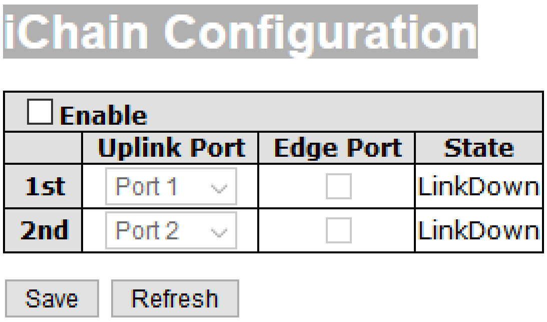
□ iRing		□ Ring Linking		□ Dual Homing	
Ring Master	Enable	Ring Linking Port	Port 3	Homing Port	Port 4
1st Ring Port	Port 6				
2nd Ring Port	Port 8				

Figure 58 - iRing Configuration

Label	Description
iRing	Check to enable iRing topology.
Ring Master	Only one ring master is allowed in a ring. However, if more than one switch is set to enable **Ring Master**, the switch with the lowest MAC address will be the active ring master and the others will be backup masters.
1st Ring Port	The primary ring port
2nd Ring Port	The backup ring port
Coupling Ring	Check to enable **Coupling Ring**. **Coupling Ring** can divide a big ring into two smaller rings to avoid network topology changes affecting all switches. It is a good method for connecting two rings.
Coupling Port	Used for connecting multiple rings. A coupling ring needs four switches to build an active and a backup link. Links formed by the coupling ports will run in active/backup mode.
Dual Homing	Check to enable **Dual Homing**. When Dual **Homing** is enabled, the ring will be connected to normal switches through two RSTP links (ex: backbone Switch). The two links work in active/backup mode, and connect each ring to the normal switches in RSTP mode.
Save	Click to apply the configurations.

5.4.2 iChain Configuration

iChain is an easy use and powerful network redundancy protocol. The recovery speed of iChain is very quickly. It provides the add-on network redundancy topology for any backbone network, the upper LAN could be iRing, iBridge, RSTP, Single Switch, or any backbone.



iChain Configuration

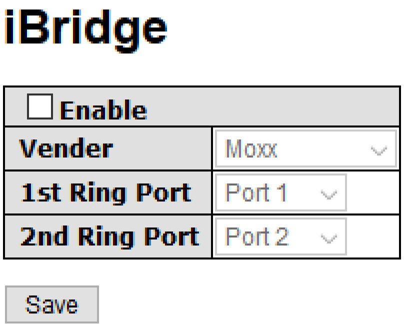
☐ Enable

	Uplink Port	Edge Port	State
1st	Port 1	☐	LinkDown
2nd	Port 2	☐	LinkDown

Figure 59 - iChain Configuration

Label	Description
Enable	Check to enable iChain function
Uplink Port	There are two uplink ports for every devices in the chain. The user must specify the ports according to topology of network.
Edge Port	Only the edge (head or tail) device needs to specify edge port. The user must specify the edge port according to topology of network.
State	There three states for uplink port: *Link Down, Blocking,* and *Forwarding*.
Save	Click to apply the configurations.
Refresh	Click to refresh the page immediately.

5.4.3 iBridge



iBridge

☐ Enable

Vender	Moxx
1st Ring Port	Port 1
2nd Ring Port	Port 2

Figure 60 – iBridge

Label	Description
Enable	Check to enable iBridge function
1st Ring Port	The first port connecting to the bridge
2nd Ring Port	The second port connecting to the bridge
Vender	The list of the supported vendors is: • Moxx • Advantexx • Hitshmaxx • Soltexx

Label	Description
Save	Click to apply the configurations.

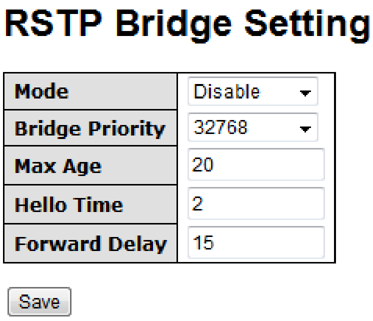
5.4.4 RSTP

The Rapid Spanning Tree Protocol (RSTP) is an evolution of the Spanning Tree Protocol (STP). It provides faster convergence of spanning tree after a topology change. The system also supports STP and will detect a connected device that is running STP or RSTP protocol automatically. RSTP is enabled by default.

This page allows a user to configure STP system settings. The settings are used by all STP Bridge instances in the switch.

5.4.4.1 RSTP Bridge Setting

The RSTP function can be disabled, STP or RSTP and parameters set for each port via the RSTP Setting interface.



RSTP Bridge Setting

Mode	Disable
Bridge Priority	32768
Max Age	20
Hello Time	2
Forward Delay	15

Figure 61 - RSTP Bridge Setting interface

The following table describes the labels for the RSTP Setting screen.

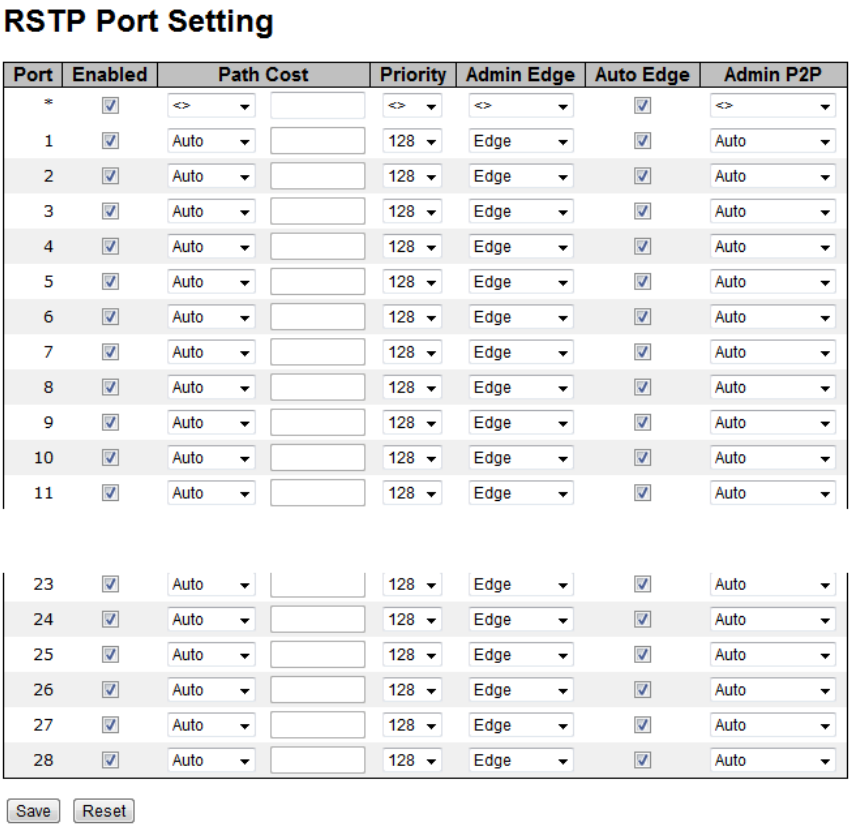
Label	Description
Mode	The RSTP function must be enabled or disabled before configuring any of the related parameters. Valid values are **Disable**, **STP**, and **RSTP**.
Bridge Priority (0-61440)	Controls the bridge priority. Lower numeric values have better priority. The bridge priority plus the MSTI instance number, concatenated with the 6-byte MAC address of the switch forms a *Bridge Identifier*. For MSTP operation, this is the priority of the CIST. Otherwise, this is the priority of the STP/RSTP bridge.
Max Age (6-40)	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
Hello Time (1-10)	The time that the Control Switch sends out the BPDU (Bridge Protocol Data Unit) packet to verify the current status of RSTP. Enter a value from 1 and 10.
Forwarding Delay (4-30)	The delay used by STP Bridges to transit Root and Designated Ports to Forwarding (used in STP compatible mode). Valid values are in the range 4 to 30 seconds.

NOTE: Follow this rule to configure the MAX Age, Hello Time, and Forward Delay Time:

2 x (Forward Delay Time value –1) ≥ Max Age value ≥ 2 x (Hello Time value +1)

5.4.4.2 RSTP Port Setting

This page allows the user to configure the current RSTP port configurations, and change them as well. This page contains settings for physical and aggregated ports.



RSTP Port Setting

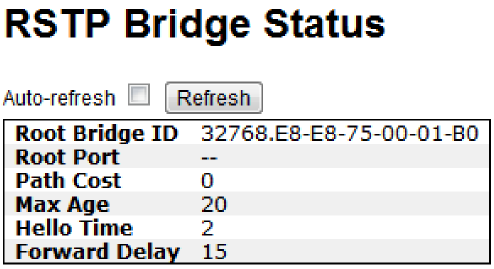
Port	Enabled	Path Cost		Priority	Admin Edge	Auto Edge	Admin P2P
*	☑	<>		<>	<>	☑	<>
1	☑	Auto		128	Edge	☑	Auto
2	☑	Auto		128	Edge	☑	Auto
3	☑	Auto		128	Edge	☑	Auto
4	☑	Auto		128	Edge	☑	Auto
5	☑	Auto		128	Edge	☑	Auto
6	☑	Auto		128	Edge	☑	Auto
7	☑	Auto		128	Edge	☑	Auto
8	☑	Auto		128	Edge	☑	Auto
9	☑	Auto		128	Edge	☑	Auto
10	☑	Auto		128	Edge	☑	Auto
11	☑	Auto		128	Edge	☑	Auto
23	☑	Auto		128	Edge	☑	Auto
24	☑	Auto		128	Edge	☑	Auto
25	☑	Auto		128	Edge	☑	Auto
26	☑	Auto		128	Edge	☑	Auto
27	☑	Auto		128	Edge	☑	Auto
28	☑	Auto		128	Edge	☑	Auto

Figure 62 - RSTP Port Setting

Label	Description
Port	The switch port number of the logical RSTP port
Enabled	It shows whether RSTP is enabled on this switch port.
Path Cost	The **Auto** setting will set the path cost as appropriate by the physical link speed, using the 802.1D 2004 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 (0-240)	Enter which port should be blocked by setting the priority on the LAN. Enter a number between 0 and 240. The value of priority must be a multiple of 16.
Admin Edge	Admin Edge is the port which is directly connected to end stations. Controls whether the *operEdge* flag should start as set or cleared. (The initial *operEdge* state when a port is initialized).
Auto Edge	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.
Admin P2P	Controls whether the port connects to a point-to-point LAN rather than to 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 apply the configurations.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.4.4.3 RSTP Bridge Status

This page provides detailed information on a single RSTP bridge instance.



RSTP Bridge Status

Auto-refresh □ Refresh

Root Bridge ID	32768.E8-E8-75-00-01-B0
Root Port	--
Path Cost	0
Max Age	20
Hello Time	2
Forward Delay	15

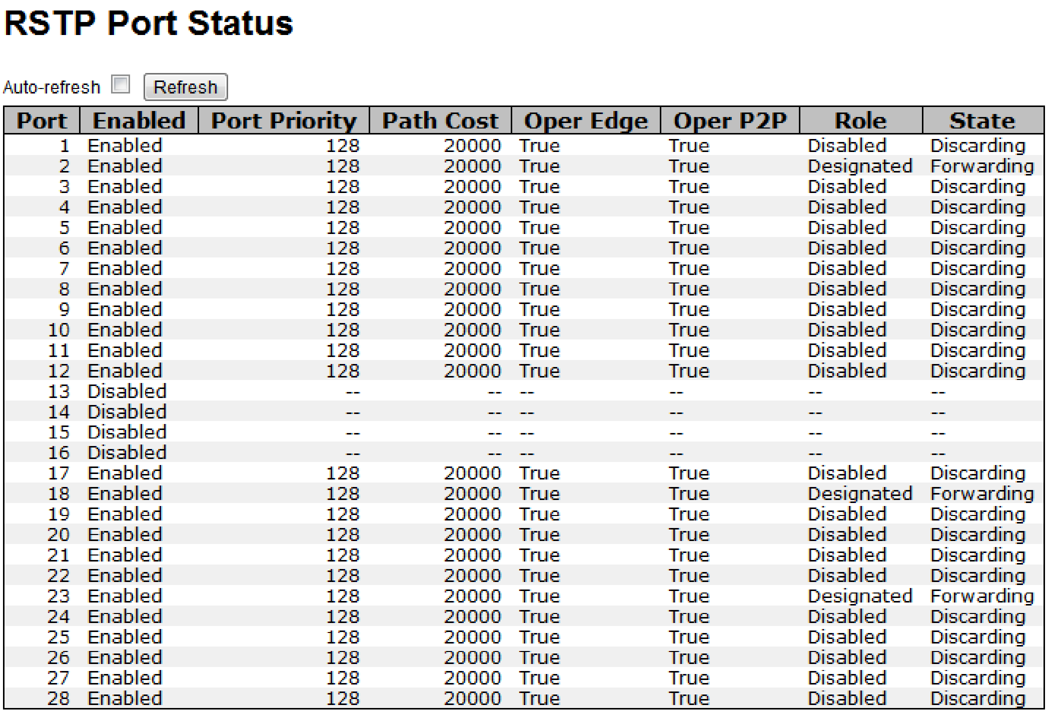
Figure 63 - RSTP Bridge Status

The following table describes the labels for the RSTP Bridge Status screen.

Label	Description
Auto-refresh	Check this box to enable an automatic refresh of the page at regular intervals.
Refresh	Click to refresh the page immediately.
Root Bridge ID	The Bridge ID of this Bridge instance.
Root Port	The switch port currently assigned the root port role.
Path 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.
Max Age	The maximum age of information defined in this device..
Hello Time	The time that the Control Switch sends out the BPDU (Bridge Protocol Data Unit).
Forward Delay	The delay used by STP Bridges to transit Root and Designated Ports to Forwarding (used in STP compatible mode).

5.4.4.4 RSTP Port Status

This page displays the RSTP port status for physical ports of the switch.



RSTP Port Status

Auto-refresh □ Refresh

Port	Enabled	Port Priority	Path Cost	Oper Edge	Oper P2P	Role	State
1	Enabled	128	20000	True	True	Disabled	Discarding
2	Enabled	128	20000	True	True	Designated	Forwarding
3	Enabled	128	20000	True	True	Disabled	Discarding
4	Enabled	128	20000	True	True	Disabled	Discarding
5	Enabled	128	20000	True	True	Disabled	Discarding
6	Enabled	128	20000	True	True	Disabled	Discarding
7	Enabled	128	20000	True	True	Disabled	Discarding
8	Enabled	128	20000	True	True	Disabled	Discarding
9	Enabled	128	20000	True	True	Disabled	Discarding
10	Enabled	128	20000	True	True	Disabled	Discarding
11	Enabled	128	20000	True	True	Disabled	Discarding
12	Enabled	128	20000	True	True	Disabled	Discarding
13	Disabled	--	--	--	--	--	--
14	Disabled	--	--	--	--	--	--
15	Disabled	--	--	--	--	--	--
16	Disabled	--	--	--	--	--	--
17	Enabled	128	20000	True	True	Disabled	Discarding
18	Enabled	128	20000	True	True	Designated	Forwarding
19	Enabled	128	20000	True	True	Disabled	Discarding
20	Enabled	128	20000	True	True	Disabled	Discarding
21	Enabled	128	20000	True	True	Disabled	Discarding
22	Enabled	128	20000	True	True	Disabled	Discarding
23	Enabled	128	20000	True	True	Designated	Forwarding
24	Enabled	128	20000	True	True	Disabled	Discarding
25	Enabled	128	20000	True	True	Disabled	Discarding
26	Enabled	128	20000	True	True	Disabled	Discarding
27	Enabled	128	20000	True	True	Disabled	Discarding
28	Enabled	128	20000	True	True	Disabled	Discarding

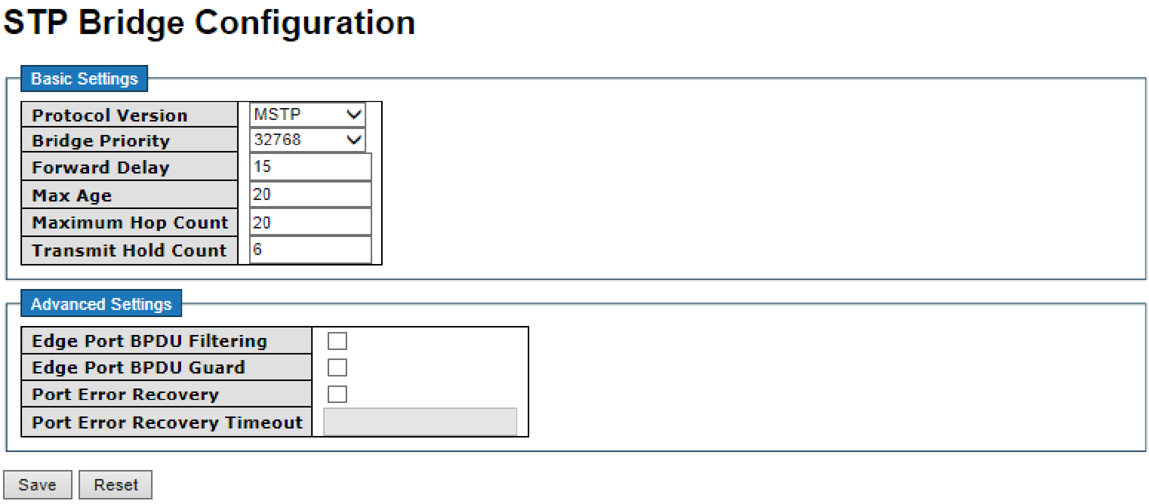
Figure 64 - RSTP Port Status

Label	Description
Auto-refresh	Check this box to enable an automatic refresh of the page at regular intervals.
Refresh	Click to refresh the page immediately.
Port	The switch port number of the logical RSTP port
Enabled	It shows whether RSTP is enabled or disabled on this switch port.
Port Priority	Which ports should be blocked by priority in LAN. A number 0 through 240. The value of priority must be the multiple of 16.
Path Cost	The cost of the path to the other bridge from this transmitting bridge at the specified port. A number 1 through 200000000.
OperEdge	When True, OperEdge is enabled, the port is configured as an edge port and directly connected to an end station and cannot create a bridging loop. False means OperEdge disabled.
OperP2P	Some of the rapid state transactions that are possible within RSTP are dependent upon whether the port concerned can only be connected to exactly one other bridge (i.e. It is served by a point-to-point LAN segment), or it can be connected to two or more bridges (i.e. It is served by a shared medium LAN segment). OperP2P shows the P2P status of the link to be manipulated administratively. True means P2P enabling. False means P2P disabling.
Role	The Role of each port is Disabled or Designated.
State	The State of each port is Discarding or Forwarding.

5.4.5 MSTP

5.4.5.1 Bridge Settings

This page allows the user to configure STP system settings. The settings are used by all STP Bridge instances in the switch.



STP Bridge Configuration

Basic Settings

Protocol Version	MSTP
Bridge Priority	32768
Forward Delay	15
Max Age	20
Maximum Hop Count	20
Transmit Hold Count	6

Advanced Settings

Edge Port BPDU Filtering	□
Edge Port BPDU Guard	□
Port Error Recovery	□
Port Error Recovery Timeout	

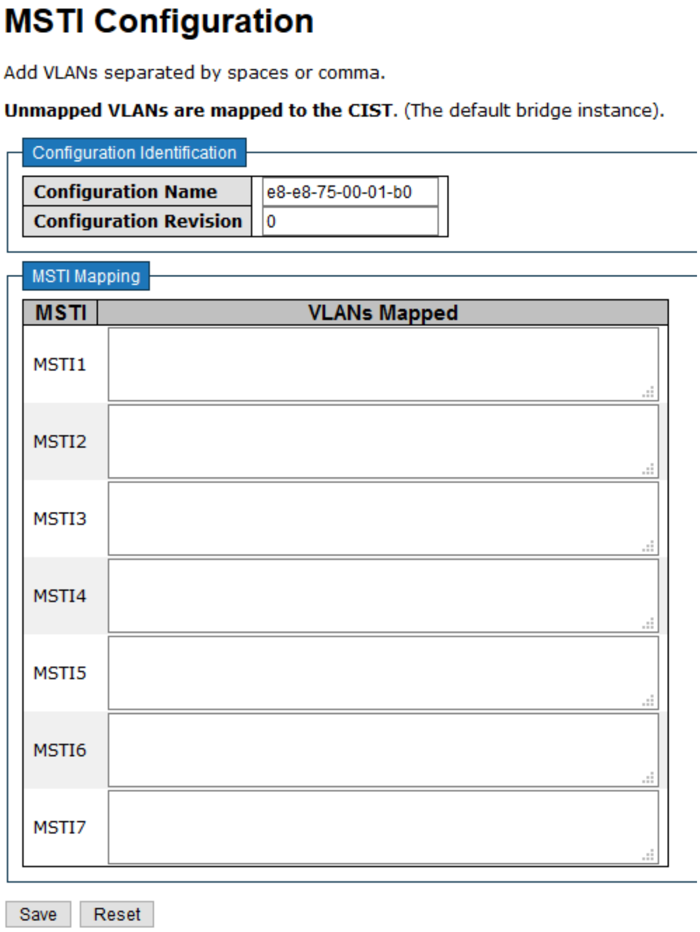
Figure 65 - STP Bridge Configuration

Label	**Description**
Protocol Version	The version of the STP protocol. Valid values include STP, RSTP and MSTP.
Bridge Priority	Controls the bridge priority. Lower numeric 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*. For MSTP operation, this is the priority of the CIST. Otherwise, this is the priority of the STP/RSTP bridge.
Forward Delay	The delay used by STP bridges to transit root and designated ports to forwarding (used in STP compatible mode). The range of valid values is 4 to 30 seconds.
Max Age	The maximum time the information transmitted by the root bridge is considered valid. The range of valid values is 6 to 40 seconds, and **Max Age** must be <= (FwdDelay-1)*2.
Maximum Hop Count	This defines the initial value of remaining hops for MSTI information generated at the boundary of an MSTI region. It defines how many bridges a root bridge can distribute its BPDU information to. The range of valid values is 4 to 30 seconds, and MaxAge must be <= (FwdDelay-1)*2.
Transmit Hold Count	The number of BPDUs a bridge port can send per second. When exceeded, transmission of the next BPDU will be delayed. The range of valid values is 1 to 10 BPDUs per second.
Advanced Settings	
Edge Port BPDU Filtering	Controls 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.

Label	Description
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.

5.4.5.2 MSTI Mapping

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



MSTI Configuration

Add VLANs separated by spaces or comma.

Unmapped VLANs are mapped to the CIST. (The default bridge instance).

Configuration Identification

Configuration Name	e8-e8-75-00-01-b0
Configuration Revision	0

MSTI Mapping

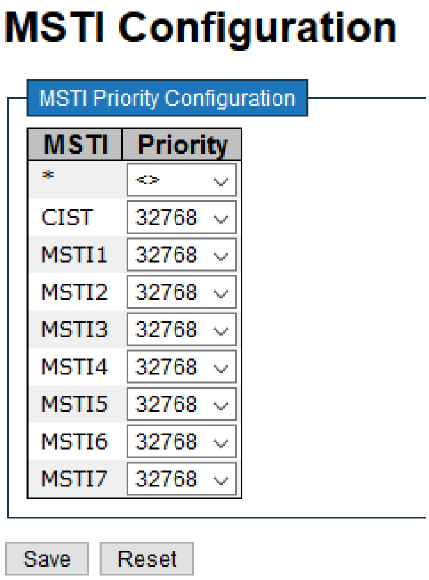
MSTI	VLANs Mapped
MSTI1	
MSTI2	
MSTI3	
MSTI4	
MSTI5	
MSTI6	
MSTI7	

Figure 66 - MSTI Configuration

Label	Description
Configuration Name	The name which identifies the VLAN to MSTI mapping. Bridges must share the name and revision (see below), as well as the VLAN-to-MSTI mapping configurations in order to share spanning trees for MSTI's (intra-region). The name should not exceed 32 characters.
Configuration Revision	Revision of the MSTI configuration named above. This must be an integer between 0 and 65535.
MSTI Mapping	
MSTI	The bridge instance. The CIST is not available for explicit mapping, as it will receive the VLANs not explicitly mapped.
VLANS Mapped	The list of VLANs mapped to the MSTI. The VLANs can be given as a single (**xx**, xx being between 1 and 4094) VLAN, or a range **(xx-yy)**, each of which 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.) Example: `2,5,20-40`.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.4.5.3 MSTI Priorities

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



MSTI Configuration

MSTI Priority Configuration

MSTI	Priority
*	<>
CIST	32768
MSTI1	32768
MSTI2	32768
MSTI3	32768
MSTI4	32768
MSTI5	32768
MSTI6	32768
MSTI7	32768

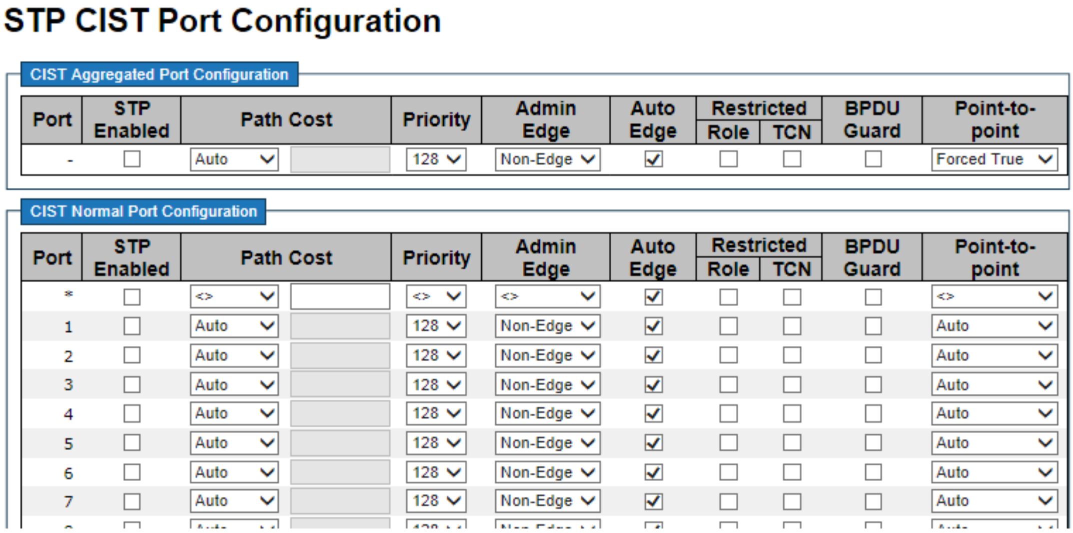
Figure 67 - MSTI Configuration

Label	Description
MSTI	The bridge instance. CIST is the default instance, which is always active.
Priority	Indicates bridge priority. The lower the value, the higher the priority. The bridge priority, MSTI instance number, and 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

5.4.5.4 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.



STP CIST Port Configuration

CIST Aggregated Port Configuration

Port	STP Enabled	Path Cost		Priority	Admin Edge	Auto Edge	Restricted		BPDU Guard	Point-to-point
							Role	TCN		
-	□	Auto		128	Non-Edge	☑	□	□	□	Forced True

CIST Normal Port Configuration

Port	STP Enabled	Path Cost		Priority	Admin Edge	Auto Edge	Restricted		BPDU Guard	Point-to-point
							Role	TCN		
*	□	<>		<>	<>	☑	□	□	□	<>
1	□	Auto		128	Non-Edge	☑	□	□	□	Auto
2	□	Auto		128	Non-Edge	☑	□	□	□	Auto
3	□	Auto		128	Non-Edge	☑	□	□	□	Auto
4	□	Auto		128	Non-Edge	☑	□	□	□	Auto
5	□	Auto		128	Non-Edge	☑	□	□	□	Auto
6	□	Auto		128	Non-Edge	☑	□	□	□	Auto
7	□	Auto		128	Non-Edge	☑	□	□	□	Auto

Figure 68 – STP MSTI Port Configuration

Label	Description
Port	The switch port number of the logical STP port
STP Enabled	Check to enable STP for the port
Path Cost	Configures the path cost incurred by the port. **Auto** will set the path cost according to the physical link speed by using the 802.1D-recommended values. **Specific** allows the user to enter a user-defined value. The path cost is used when establishing an active topology for the network. Lower path cost ports are chosen as forwarding ports in favor of higher path cost ports. The range of valid values is 1 to 200000000.
Priority	Configures the priority for ports having identical port costs. (See above).
Admin Edge	Configures the operEdge flag should start as set or cleared.(the initial operEdge stated when a port is initialized).

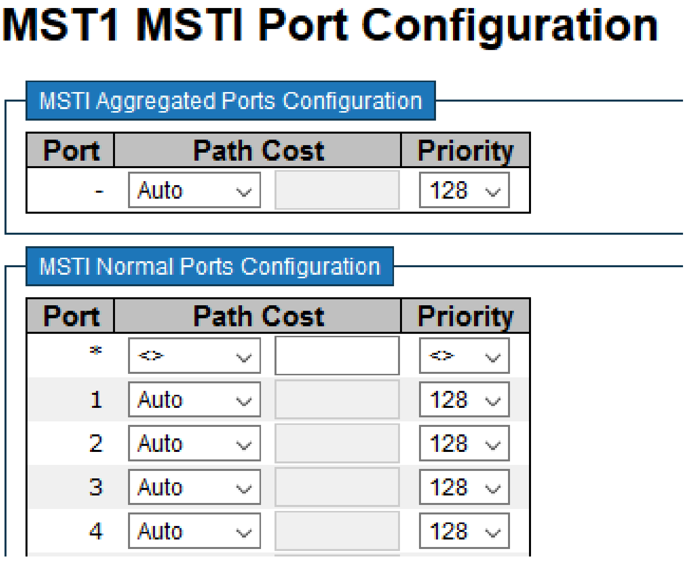
Label	Description
AutoEdge	Check to enable the bridge to detect edges at the bridge port automatically. This allows **operEdge** to be derived from whether BPDUs are received on the port or not.
Restricted	
Role	When enabled, the port will not be selected as root port for CIST or any MSTI, even if it 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, spanning trees will lose connectivity. It can be set by a network administrator to prevent bridges outside a core region of the network from influencing the active spanning tree topology because those bridges are not under the full control of the administrator. This feature is also known as Root Guard.
TCN	When enabled, the port will not propagate received topology change notifications and topology changes to other ports. If set, it will cause temporary disconnection after changes in an active spanning trees topology as a result of persistent incorrectly learned station location information. It is set by a network administrator to prevent bridges outside a core region of the network from causing address flushing in that region because those bridges are not under the full control of the administrator or is the physical link state for the attached LANs transitions frequently.
BPDU Guard	If enabled, causes the port to disable itself upon receiving valid BPDU's. Contrary to the similar bridge setting, the port **Edge** status does not effect this setting. A port entering error-disabled state due to this setting is subject to the bridge Port Error Recovery setting as well.
Point-to-Point	Configures whether the port connects to a point-to-point LAN rather than a shared medium. This can be configured automatically or set to true or false manually. Transiting to 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.

5.4.5.5 MSTI Ports

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

An MSTI port is a virtual port, which is instantiated separately for each active CIST (physical) port for each MSTI instance configured on and applicable to 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.



MST1 MSTI Port Configuration

MSTI Aggregated Ports Configuration

Port	Path Cost		Priority
-	Auto		128

MSTI Normal Ports Configuration

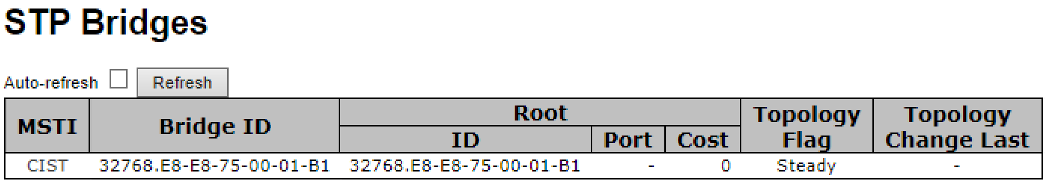
Port	Path Cost		Priority
*	<>		<>
1	Auto		128
2	Auto		128
3	Auto		128
4	Auto		128

Figure 69 – MSTI Port Configuration

Label	Description
Port	The switch port number of the corresponding STP CIST (and MSTI) port
Path Cost	Configures the path cost incurred by the port. **Auto** will set the path cost according to the physical link speed by using the 802.1D-recommended values. **Specific** allows the user to enter a user-defined value. The path cost is used when establishing an active topology for the network. Lower path cost ports are chosen as forwarding ports in favor of higher path cost ports. The range of valid values is 1 to 200000000.
Priority	Configures the priority for ports having identical port cost. (See above).
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.4.5.6 Bridge Status

This page shows the status for all STP bridge instances.



STP Bridges

Auto-refresh □ Refresh

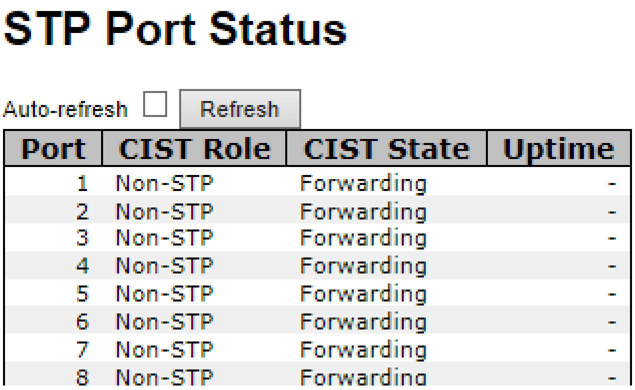
MSTI	Bridge ID	Root			Topology Flag	Topology Change Last
		ID	Port	Cost		
CIST	32768.E8-E8-75-00-01-B1	32768.E8-E8-75-00-01-B1	-	0	Steady	-

Figure 70 - STP Bridges

Label	Description
MSTI	The bridge instance. Can also be linked to the STP detailed bridge status.
Bridge ID	The bridge ID of this bridge instance.
Root ID	The bridge ID of the currently selected root bridge.
Root Port	The switch port currently assigned the root port role.
Root Cost	Root path cost. For a root bridge, this is zero. For other bridges, it is the sum of port path costs on the least cost path to the Root Bridge.
Topology Flag	The current state of the Topology Change Flag for the bridge instance.
Topology Change Last	The time since last Topology Change occurred.
Refresh	Click to refresh the page immediately.
Auto-refresh	Check this box to enable an automatic refresh of the page at regular intervals.

5.4.5.7 Port Status

This page displays the STP port status for the currently selected switch.



STP Port Status

Auto-refresh □ Refresh

Port	CIST Role	CIST State	Uptime
1	Non-STP	Forwarding	-
2	Non-STP	Forwarding	-
3	Non-STP	Forwarding	-
4	Non-STP	Forwarding	-
5	Non-STP	Forwarding	-
6	Non-STP	Forwarding	-
7	Non-STP	Forwarding	-
8	Non-STP	Forwarding	-

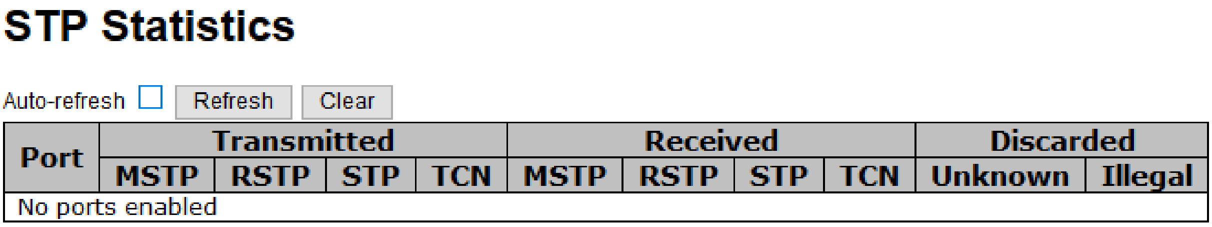
Figure 71 - STP Port Status

Label	Description
Port	The switch port number to which the following settings will be applied.
CIST Role	The current STP port role of the CIST port. The values include: **AlternatePort**, **BackupPort**, **RootPort**, **DesignatedPort**, and **Non-STP**.

Label	Description
CIST State	The current STP port state of the CIST port. The values include: **Blocking**, **Learning**, and **Forwarding**.
Uptime	The time since the bridge port was last initialized
Refresh	Click to refresh the page immediately.
Auto-	Check this box to enable an automatic refresh of the page at regular intervals.

5.4.5.8 Port Statistics

This page displays the STP port statistics for the currently selected switch.



STP Statistics

Auto-refresh □ Refresh Clear

Port	Transmitted				Received				Discarded	
	MSTP	RSTP	STP	TCN	MSTP	RSTP	STP	TCN	Unknown	Illegal
No ports enabled										

Figure 72 - STP Statistics

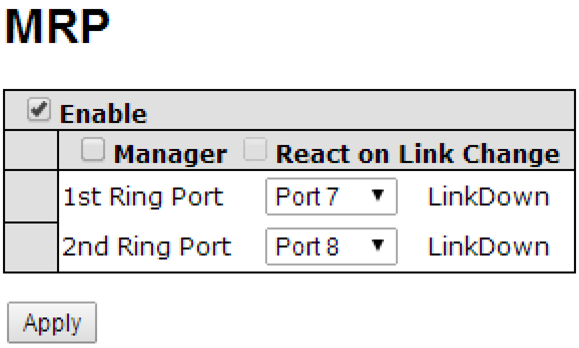
Label	Description
Port	The switch port number to which the following settings will be applied.
MSTP	The number of MSTP configuration BPDU's received/transmitted on the port.
RSTP	The number of RSTP configuration BPDU's received/transmitted on the port
STP	The number of legacy STP configuration BPDU's received/transmitted on the port
TCN	The number of (legacy) topology change notifications BPDU's received/transmitted on the port.
Discarded Unknown	The number of unknown spanning tree BPDUs received (and discarded) on the port.
Discarded Illegal	The number of illegal spanning tree BPDU's received (and discarded) on the port.
Refresh	Click to refresh the page immediately.
Auto-refresh	Check to enable an automatic refresh of the page at regular Intervals.

5.4.6 MRP

5.4.6.1 Introduction

MRP (Media Redundancy Protocol) is an industry standard for high-availability Ethernet networks. MRP allows Ethernet switches in ring configuration to recover from failure rapidly to ensure seamless data transmission. A MRP ring (IEC 62439) can support up to 50 devices and will enable a back-up link in 80ms (adjustable to max. 200ms/500ms).

5.4.6.2 Configuration



MRP

☑ Enable

☐ Manager ☐ React on Link Change

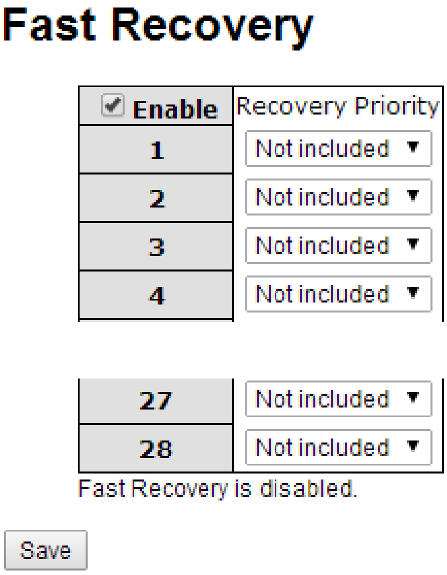
1st Ring Port	Port 7	LinkDown
2nd Ring Port	Port 8	LinkDown

Figure 73 - MRP

Label	Description
Enable	Enables the MRP function.
Manager	Every MRP topology needs a MRP manager, and can only have one manager. If two or more switches are set to be Managers at the same time, the MRP topology will fail.
React on Link Change (Advanced mode)	Faster mode. Enabling this function will ensure MRP topology a more rapid converge. This function only can be set by the MRP manager switch.
1st Ring Port	Chooses the port that connects to the MRP ring.
2nd Ring Port	Chooses the port that connects to the MRP ring.

5.4.7 Fast Recovery

Fast Recovery is a function for port redundancy. The port has the highest recovery priority (the lowest number) will be the active port, others will be blocked (if included).



Fast Recovery

☑ Enable	Recovery Priority
1	Not included ▼
2	Not included ▼
3	Not included ▼
4	Not included ▼
27	Not included ▼
28	Not included ▼

Fast Recovery is disabled.

Figure 74 - Fast Recovery

Label	Description
Enable	Enables fast recovery mode
Recovery Priority	The port has the highest recovery priority (the lowest number) will be the active port, others will be blocked (if included).
Save	Click to save the configurations.

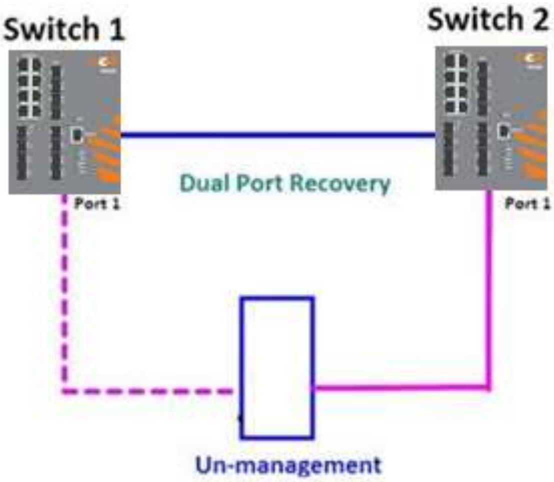
5.4.8 Dual Port Recovery

Dual Port Recovery mode is defined to work with unmanaged devices/switches or ring of switches. This feature can be set to on single port of switches on both sides of unmanaged ring. The iES22GF with Dual Port Recovery mode will provide redundant links.

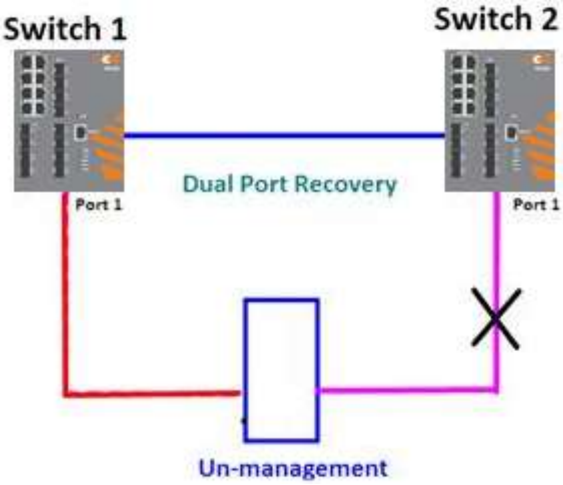
5.4.8.1 Introduction

Dual Port Recovery is an iS5 Communication Proprietary solution for interoperability issues with unmanaged devices like unmanaged switches. Dual Port Recovery allows Ethernet switches in ring configuration with unmanaged devices to recover from failure rapidly to ensure seamless data transmission. A dual port recovery ring can support up to 5 unmanaged devices and will enable a back-up link in 40ms (adjustable to min 20ms (recommended is 40ms).

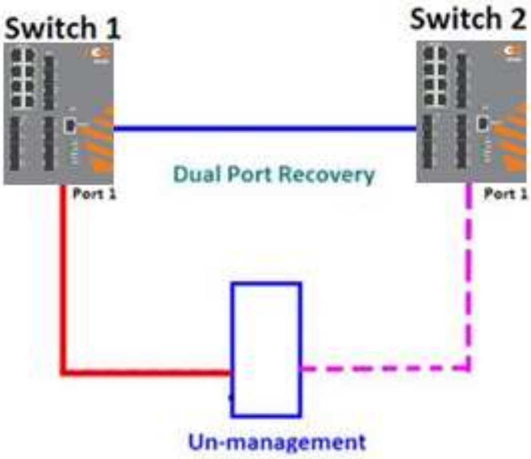
This protocol is based on sending specific messages (BPDU format) from each port on both sides of unmanaged chain. The Dual Port Recovery feature can be executed with other redundancy protocols on same device.



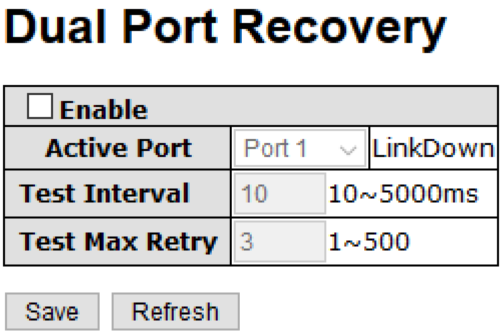
In Dual Port Recovery function if link of port in "Forwarding" state goes down, the "backup" port is changing its state to be forwarding, like in picture below. The disconnected port changes its status to "No Link"



When link of port 1 on switch 2 returns back to be link up, the switch 1 port 1 is in "forwarding" state and in this case the "No Link" port is changing its status to be "Blocking" port.



5.4.8.2 Configuration



Dual Port Recovery

□ Enable		
Active Port	Port 1	LinkDown
Test Interval	10	10~5000ms
Test Max Retry	3	1~500

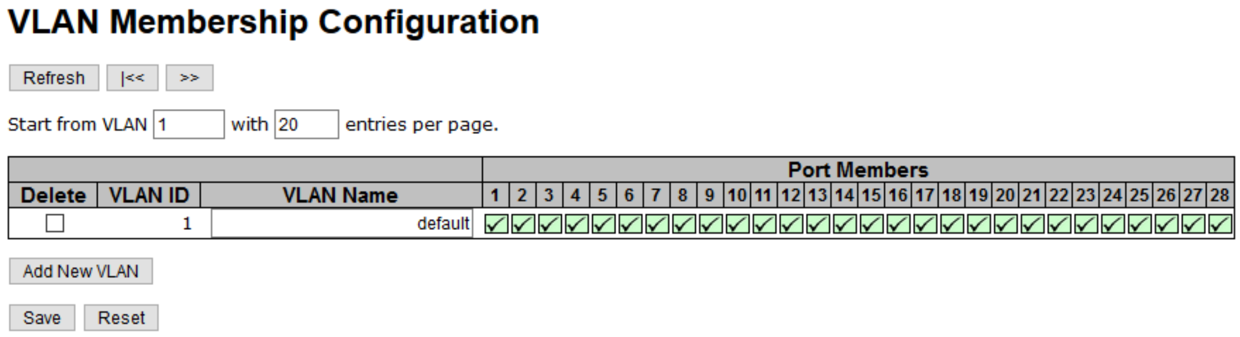
Figure 75 – Dual Port Recovery

Label	Description
Enable	Activate the Dual Port Recovery mode.
Active Port	Choosing the port which connects to the unmanaged switch/ring of switches. Note: User need to select one port to be Active Port on each of two devices of each side.
Test Interval	Setting Interval time for sending keep alive messages (10-5000 ms default 10) Note: Test interval should be the same on both sides.
Test Max Retry	Set the maximum number of lost frames to start Dual Port Recovery mechanism (1-500 retries default 3)Note: Test Max Retry should be the same on both sides.
Apply	Click **Apply** to activate the configurations.

5.5 VLAN

5.5.1 VLAN Membership

The VLAN membership configuration for the switch can be monitored and modified here. Up to 4096 VLANs are supported. This page allows for adding and deleting VLAN's as well as adding and deleting port members of each VLAN.



VLAN Membership Configuration

Start from VLAN 1 with 20 entries per page.

			Port Members																											
Delete	VLAN ID	VLAN Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	1	default	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Figure 76 -VLAN Membership Configuration

5.5.1.1 Navigating the VLAN Table

Each page shows up to 99 entries from the VLAN table, with default being 20 as selected through 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 fields allow the user to select the starting point in the VLAN Table. Clicking **Refresh** will update the displayed table starting from that or the closest next VLAN Table match.

The **>>** will use the last entry of the currently displayed VLAN entry as a basis for the next lookup. When the end is reached the text "No more entries" is shown in the displayed table.

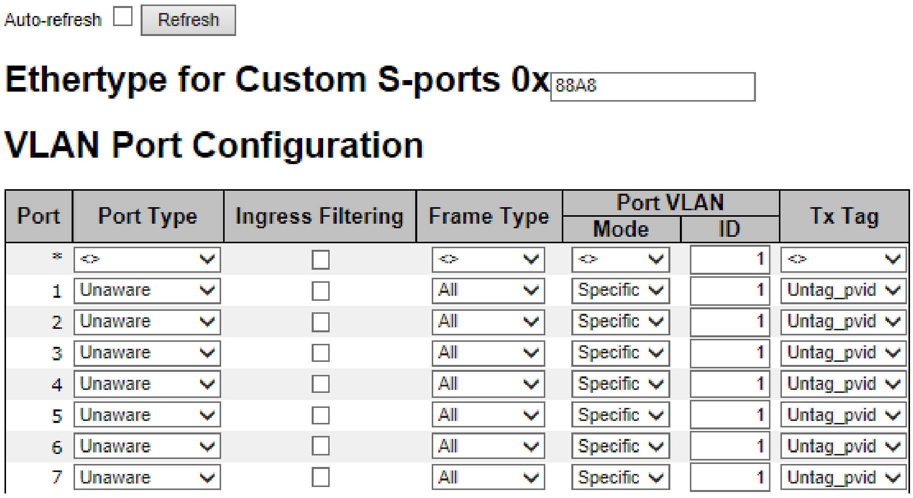
Use **I <<** to start over.

Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
VLAN ID	Indicates the ID of this particular VLAN.
VLAN Name	Indicates the name of the VLAN. Maximum length of the VLAN Name String is 32. VLAN Name can be null. If it is not null, it must contain alphabets or numbers. At least one alphabet must be present in a non-null VLAN name. VLAN name can be edited for the existing VLAN entries or it can be added to the new entries.
Port Members	A row of check boxes for each port is displayed for each VLAN ID. To include a port in a VLAN, check the box as ✓. To include a port in a forbidden port list, check the box as shown ✗. To remove or exclude the port from the VLAN, make sure the box is unchecked as shown . By default, no ports are members, and for every new VLAN entry all boxes are unchecked.

Label	**Description**
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.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.5.2 Ports Configuration

This page is used for configuring the switch port VLAN.



Auto-refresh □ Refresh

Ethertype for Custom S-ports 0x 88A8

VLAN Port Configuration

Port	Port Type	Ingress Filtering	Frame Type	Port VLAN		Tx Tag
				Mode	ID	
*	<>	□	<>	<>	1	<>
1	Unaware	□	All	Specific	1	Untag_pvid
2	Unaware	□	All	Specific	1	Untag_pvid
3	Unaware	□	All	Specific	1	Untag_pvid
4	Unaware	□	All	Specific	1	Untag_pvid
5	Unaware	□	All	Specific	1	Untag_pvid
6	Unaware	□	All	Specific	1	Untag_pvid
7	Unaware	□	All	Specific	1	Untag_pvid

Figure 77 - VLAN Port Configuration

Label	**Description**
Ethertype for custom S-Ports	This field specifies the Ether type used for custom S-ports. This is a global setting for all custom S-ports.
Port	This is the logical port number of this row.
Port type	Port can be one of the following types: **Unaware**, **Custom** (**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.
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).

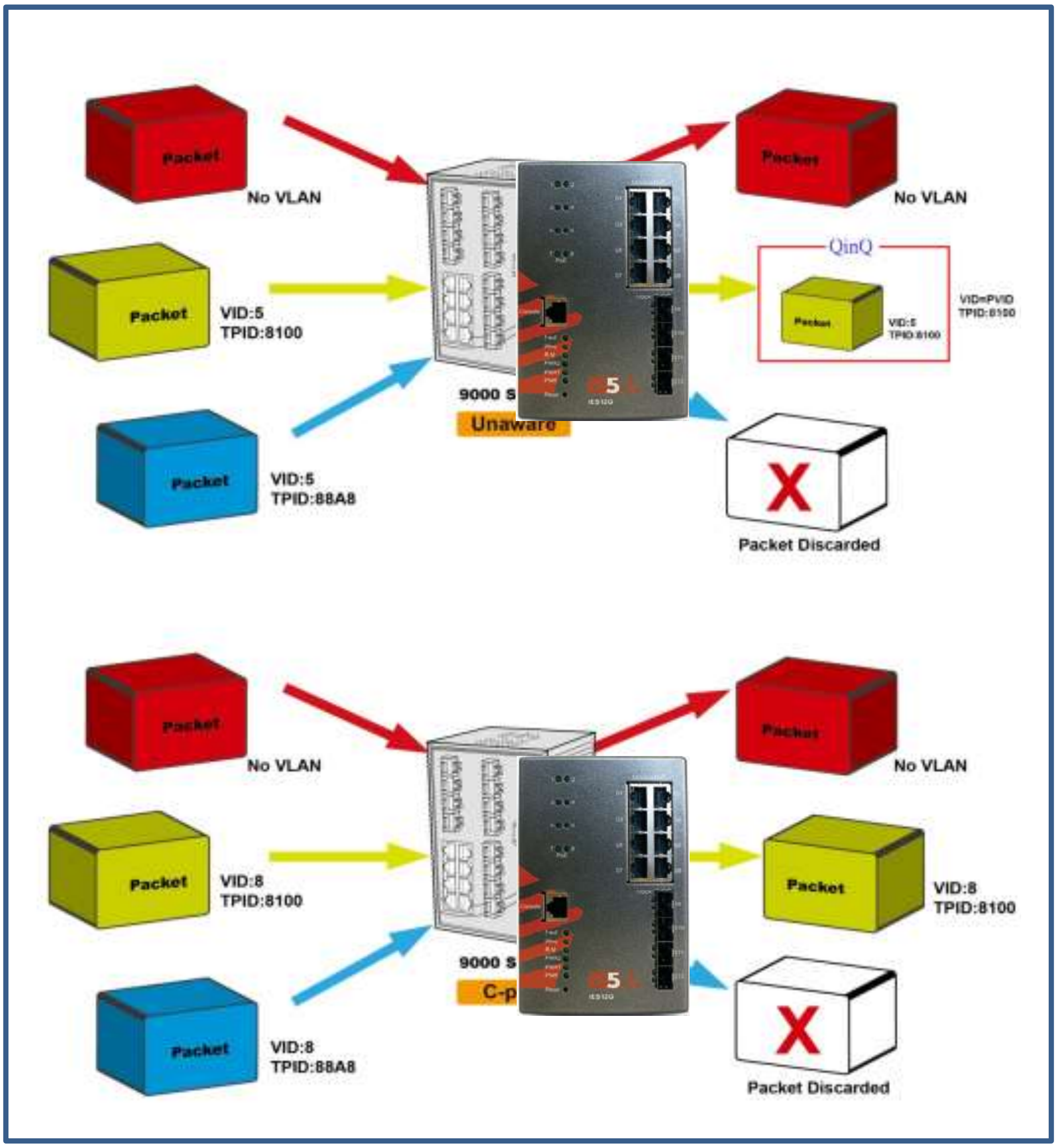
Label	Description
Frame Type	Determines whether the port accepts **All** frames or only **Tagged/Untagged** frames. This parameter affects VLAN ingress processing. If the port only accepts tagged frames, untagged frames received on the port will be discarded. By default, the field is set to **All**.
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.
ID	Configures the VLAN identifier for the port. The allowed range of the values is 1 through 4095. The default value is 1. Note: The port must be a member of the same VLAN as the port VLAN ID.
Tx Tag	Determines egress tagging of a port. The options are: **Untag_pvid**: all VLANs except the configured PVID will be tagged. **Tag_all**: all VLANs are tagged. **Untag_all**: all VLANs are untagged.

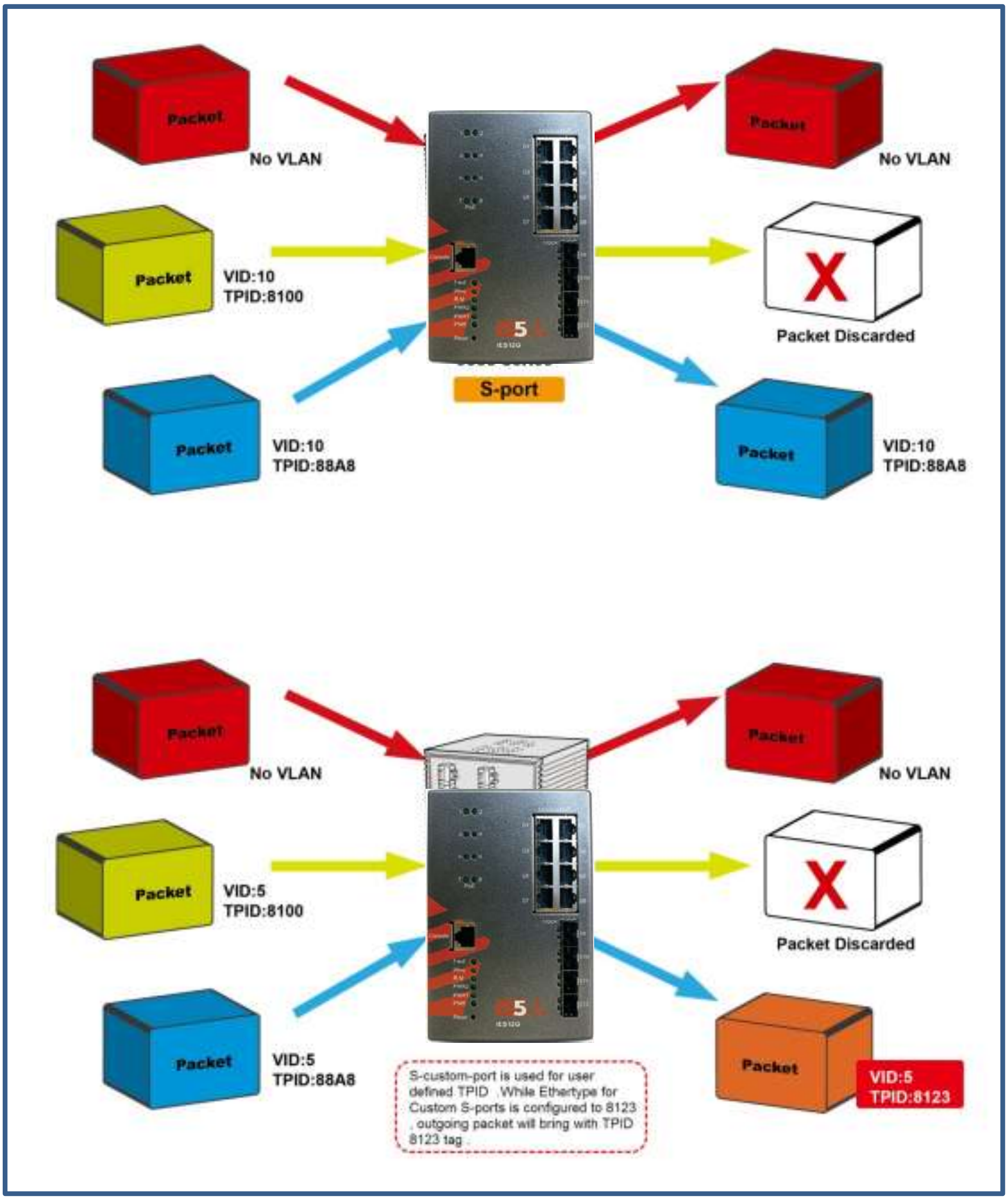
5.5.2.1 Port Types

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 Tag protocol identifier (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.

	Ingress action	**Egress action**
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: 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.	The TPID of a frame transmitted by C-port will be set to 0x8100.
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: If the tagged frame contains a TPID of 0x8100, it will be forwarded. 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.**

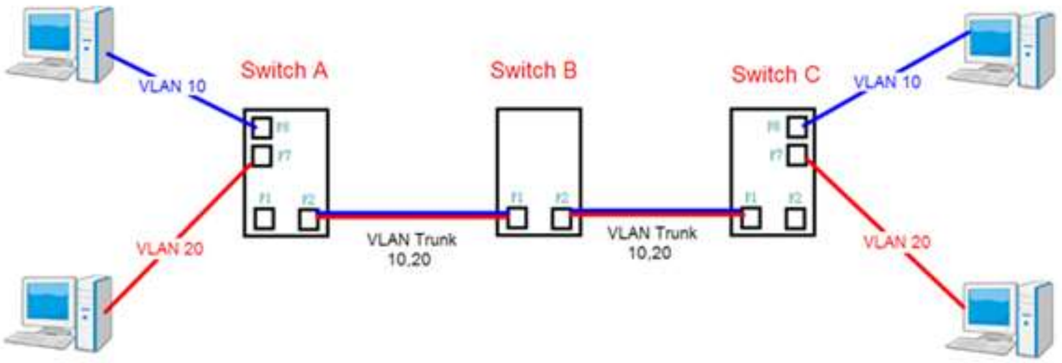

Packet
No VLAN
Packet
VID:5
TPID:8100
Packet
VID:5
TPID:88A8
9000 S
Unaware
Packet
No VLAN
QinQ
Packet
VID:5
TPID:8100
VID=PVID
TPID:8100
Packet Discarded
Packet
No VLAN
Packet
VID:8
TPID:8100
Packet
VID:8
TPID:88A8
9000 S
C-p
Packet
No VLAN
Packet
VID:8
TPID:8100
Packet Discarded



S-custom-port is used for user defined TPID . While Ethertype for Custom S-ports is configured to 8123 , outgoing packet will bring with TPID 8123 tag .

5.5.2.2 Examples of VLAN Settings

VLAN Access Mode:

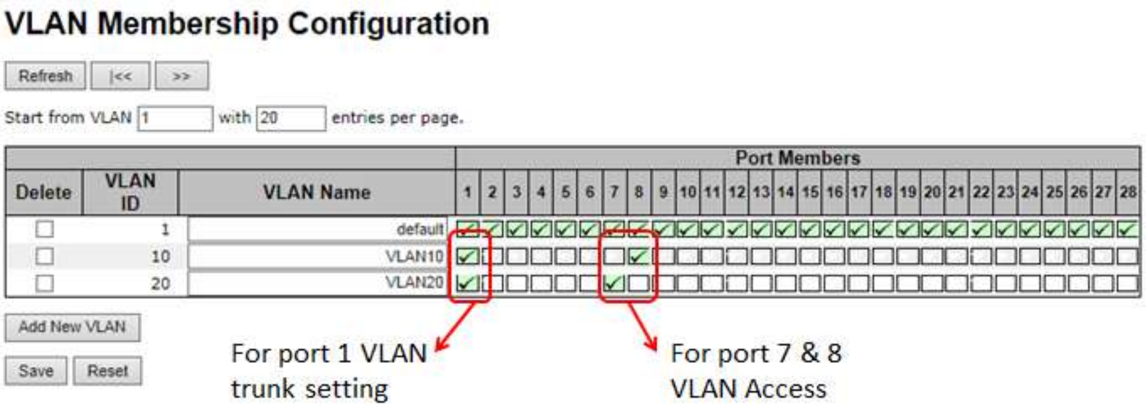


Switch A,

Port 7 is VLAN Access mode = Untagged 20

Port 8 is VLAN Access mode = Untagged 10

Below are the switch settings.



VLAN Membership Configuration

Refresh | |<< | >>

Start from VLAN 1 with 20 entries per page.

Delete	VLAN ID	VLAN Name	Port Members																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	1	default	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
□	10	VLAN10	☑	□	□	□	□	□	□	☑	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
□	20	VLAN20	☑	□	□	□	□	□	☑	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

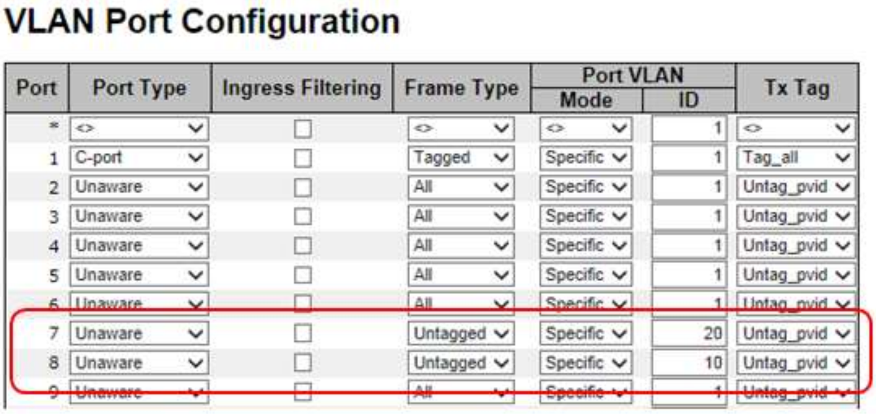
Add New VLAN

Save | Reset

For port 1 VLAN trunk setting

For port 7 & 8 VLAN Access

Figure 78 - VLAN Membership Configuration

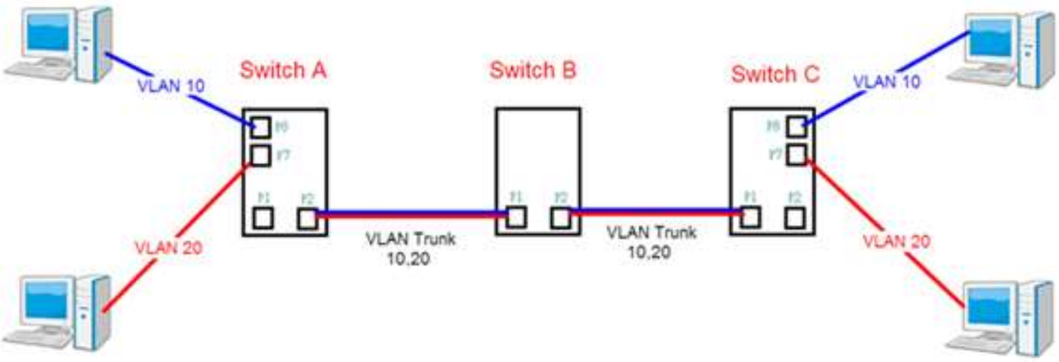


VLAN Port Configuration

Port	Port Type	Ingress Filtering	Frame Type	Port VLAN Mode	Port VLAN ID	Tx Tag
*	<>	□	<>	<>	1	<>
1	C-port	□	Tagged	Specific	1	Tag_all
2	Unaware	□	All	Specific	1	Untag_pvid
3	Unaware	□	All	Specific	1	Untag_pvid
4	Unaware	□	All	Specific	1	Untag_pvid
5	Unaware	□	All	Specific	1	Untag_pvid
6	Unaware	□	All	Specific	1	Untag_pvid
7	Unaware	□	Untagged	Specific	20	Untag_pvid
8	Unaware	□	Untagged	Specific	10	Untag_pvid
9	Unaware	□	All	Specific	1	Untag_pvid

Figure 79 - VLAN Port Configuration

VLAN 1Q Trunk Mode:

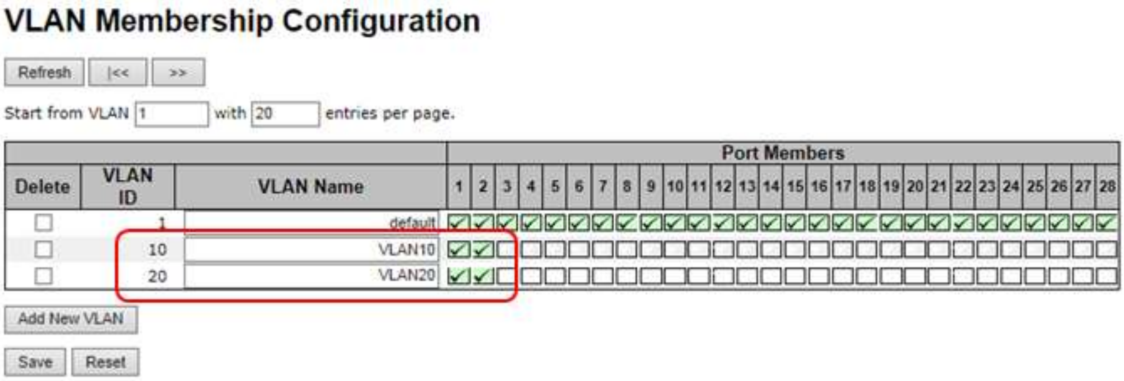


Switch B,

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

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

Below are the switch settings.



VLAN Membership Configuration

Refresh | |<< | >>

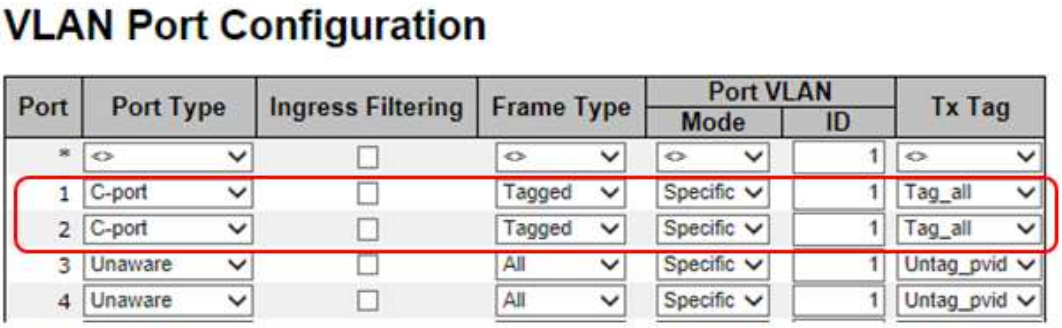
Start from VLAN 1 with 20 entries per page.

			Port Members																												
Delete	VLAN ID	VLAN Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	1	default	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
□	10	VLAN10	☑	☑	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
□	20	VLAN20	☑	☑	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

Add New VLAN

Save | Reset

Figure 80 - VLAN Membership Configuration



VLAN Port Configuration

Port	Port Type	Ingress Filtering	Frame Type	Port VLAN		Tx Tag
				Mode	ID	
*	<>	□	<>	<>	1	<>
1	C-port	□	Tagged	Specific	1	Tag_all
2	C-port	□	Tagged	Specific	1	Tag_all
3	Unaware	□	All	Specific	1	Untag_pvid
4	Unaware	□	All	Specific	1	Untag_pvid

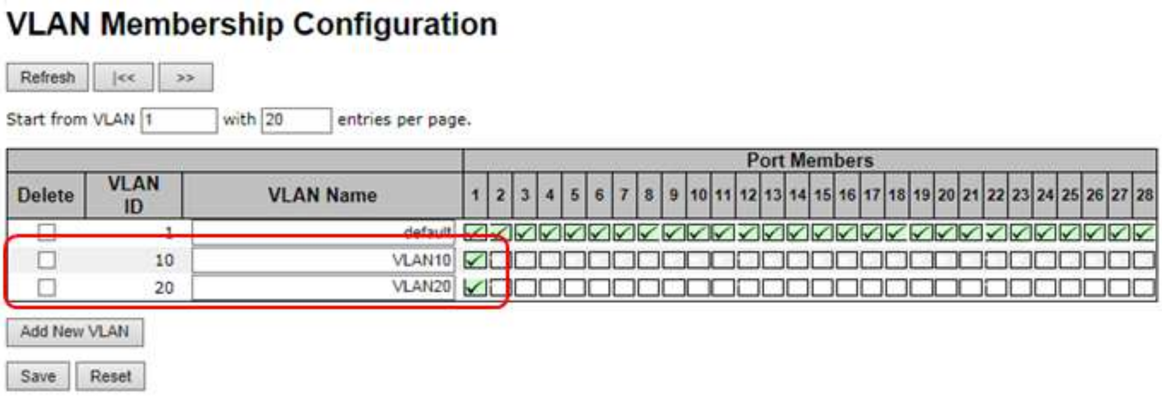
Figure 81 - VLAN Port Configuration

VLAN Hybrid Mode:

Port 1 VLAN Hybrid mode = untagged 10

Tagged 10, 20

Below are the switch settings.

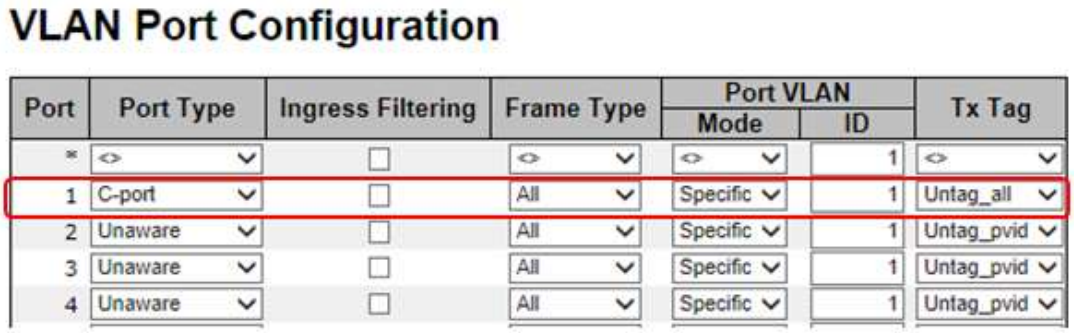


VLAN Membership Configuration

Start from VLAN 1 with 20 entries per page.

Delete	VLAN ID	VLAN Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	1	default	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
□	10	VLAN10	✓	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
□	20	VLAN20	✓	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

Figure 82 - VLAN Membership Configuration



VLAN Port Configuration

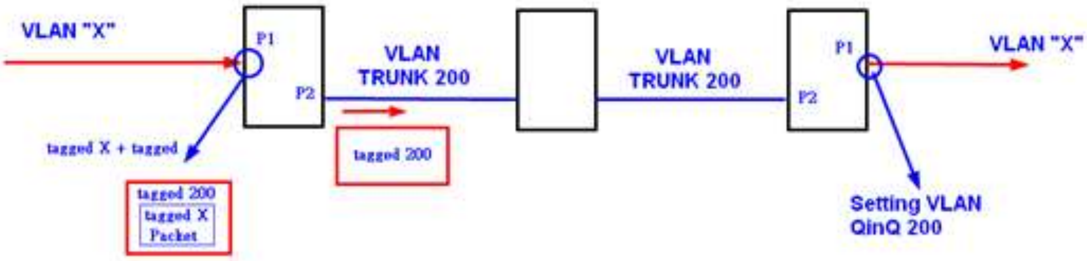
Port	Port Type	Ingress Filtering	Frame Type	Port VLAN Mode	Port VLAN ID	Tx Tag
*	<>	□	<>	<>	1	<>
1	C-port	□	All	Specific	1	Untag_all
2	Unaware	□	All	Specific	1	Untag_pvid
3	Unaware	□	All	Specific	1	Untag_pvid
4	Unaware	□	All	Specific	1	Untag_pvid

Figure 83 - VLAN Port Configuration

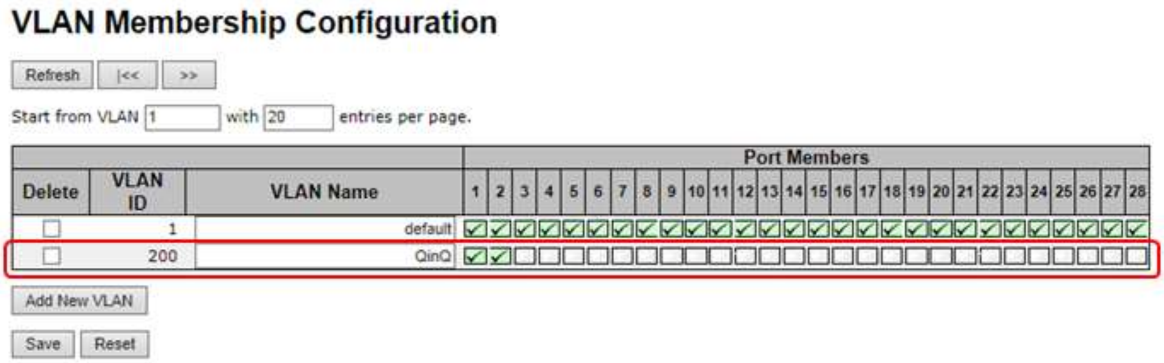
VLAN QinQ Mode:

VLAN QinQ mode is usually adopted when there are unknown VLANs, as shown in the figure below.

VLAN "X" = Unknown VLAN



iES28TG Port 1 VLAN Settings:

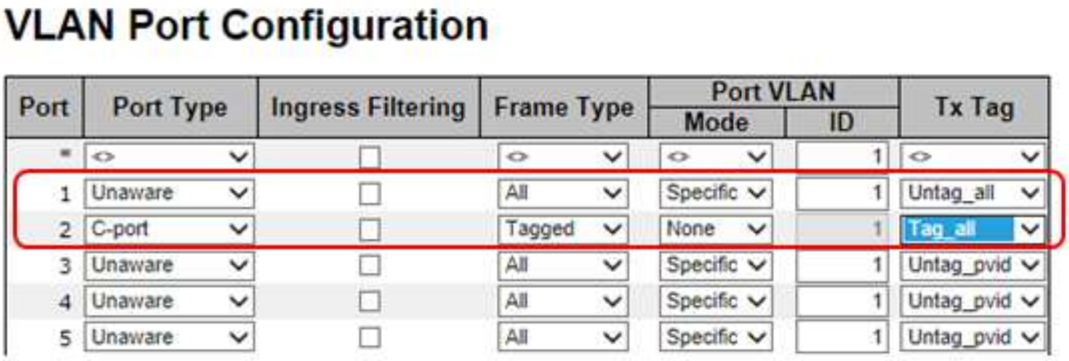


VLAN Membership Configuration

Start from VLAN 1 with 20 entries per page.

			Port Members																											
Delete	VLAN ID	VLAN Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	1	default	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
□	200	QinQ	☑	☑	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

Figure 84 - VLAN Membership Configuration



VLAN Port Configuration

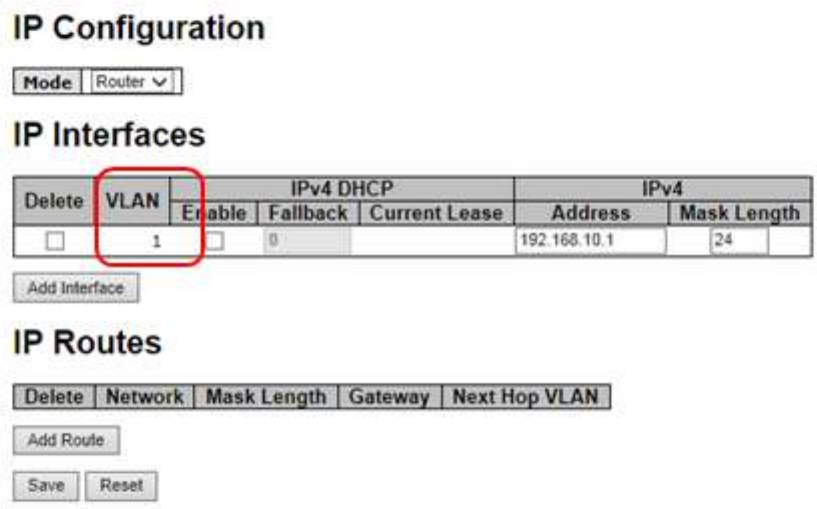
Port	Port Type	Ingress Filtering	Frame Type	Port VLAN		Tx Tag
				Mode	ID	
*	<>	□	<>	<>	1	<>
1	Unaware	□	All	Specific	1	Untag_all
2	C-port	□	Tagged	None	1	Tag_all
3	Unaware	□	All	Specific	1	Untag_pvid
4	Unaware	□	All	Specific	1	Untag_pvid
5	Unaware	□	All	Specific	1	Untag_pvid

Figure 85 - VLAN Port Configuration

VLAN ID Settings

When setting the management VLAN, only the same VLAN ID port can be used to control the switch.

iES28TG VLAN Settings:



IP Configuration

Mode | Router

IP Interfaces

Delete	VLAN	IPv4 DHCP			IPv4	
		Enable	Fallback	Current Lease	Address	Mask Length
□	1	□	0		192.168.10.1	24

Add Interface

IP Routes

Delete	Network	Mask Length	Gateway	Next Hop VLAN

Add Route

Save Reset

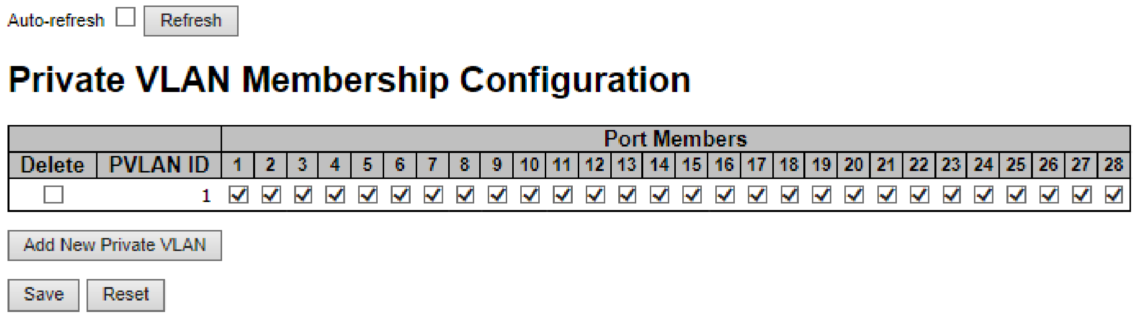
Figure 86 – IP Configuration

5.5.3 Private VLAN

This page is used for configuring the private VLAN membership configuration.

5.5.3.1 Private VLAN Membership Configuration

Private VLANs can be added or deleted, and 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.



Auto-refresh □ Refresh

Private VLAN Membership Configuration

		Port Members																											
Delete	PVLAN ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	1	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

Add New Private VLAN

Save Reset

Figure 87 – Private VLAN Membership Configuration

A VLAN-unaware port can only be a member of one VLAN, but it can be a member of multiple private VLANS.

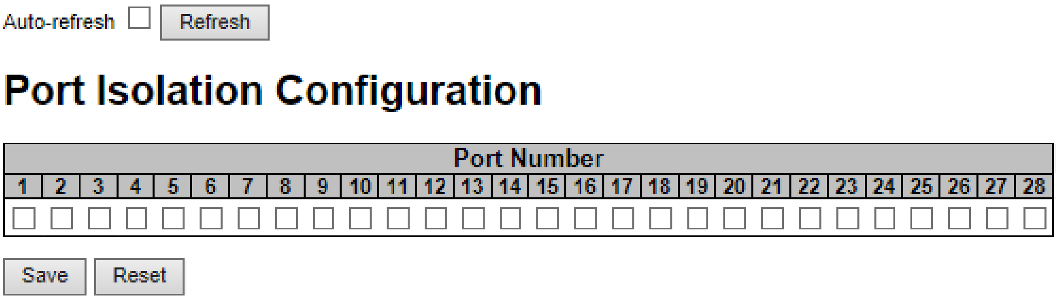
Label	Description
Delete	Check to delete the entry. It will be deleted during the next save.
Private VLAN ID	Indicates the ID of this particular private VLAN.

Label	**Description**
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 a New Private VLAN	Click **Add new Private VLAN** 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.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.
Auto-refresh □	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Refresh	Click to refresh the page immediately

5.5.3.2 Port Isolation Configuration

This page is used for enabling or disabling port isolation on ports in a Private VLAN (PVLAN). An isolated port cannot communicate with other ports within the same PVLAN.

A port member of a VLAN can be isolated from other isolated ports on the same VLAN and Private VLAN.



Port Isolation Configuration

Port Number																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

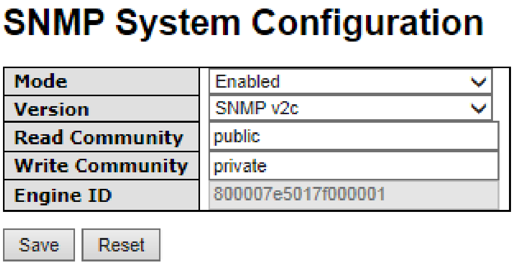
Figure 88 – Port Isolation Configuration

Label	**Description**
Port Number	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.
Refresh	Click to refresh the page immediately.
Auto-refresh □	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.6 SNMP

5.6.1 SNMP System Configurations

Configure SNMP on this page.



SNMP System Configuration

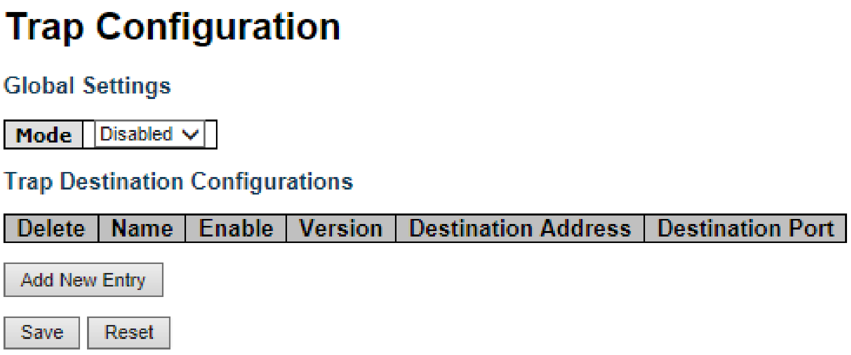
Mode	Enabled
Version	SNMP v2c
Read Community	public
Write Community	private
Engine ID	800007e5017f000001

Figure 89 – SNMP System Configuration

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 for permitting access to SNMP agent. The allowed string length is 0 to 255, and only ASCII characters from 33 to 126 are allowed. The field is applicable only when SNMP version is SNMPv1 or SNMPv2c. SNMPv3 uses User-based Security Model (USM) for authentication and privacy, and the community string will be associated with SNMPv3 communities table. It provides more flexibility to configure security name than a SNMPv1 or SNMPv2c community string. In addition to community string, a particular range of source addresses can be used to restrict source subnet.
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.

5.6.2 SNMP Trap Configuration

Configure SNMP on this page.



Trap Configuration

Global Settings

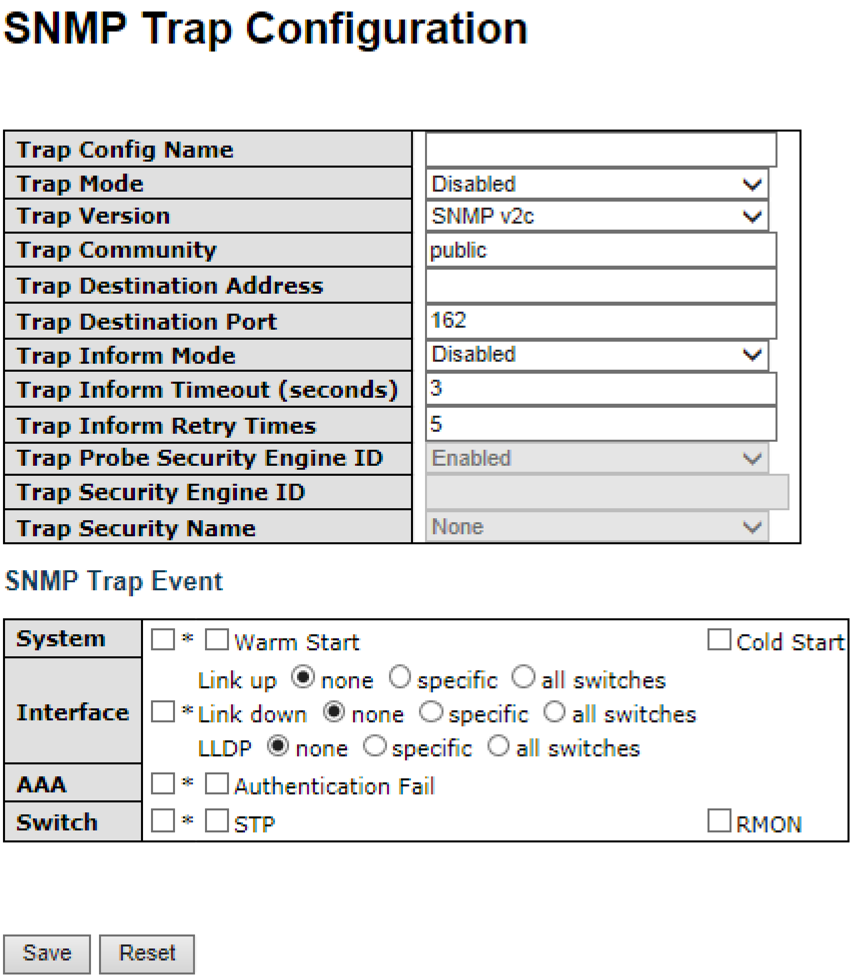
Mode	Disabled

Trap Destination Configurations

Delete	Name	Enable	Version	Destination Address	Destination Port

Figure 90 – Trap Configuration

Click **Add New Entry** to see the screen below.



SNMP Trap Configuration

Trap Config Name	
Trap Mode	Disabled
Trap Version	SNMP v2c
Trap Community	public
Trap Destination Address	
Trap Destination Port	162
Trap Inform Mode	Disabled
Trap Inform Timeout (seconds)	3
Trap Inform Retry Times	5
Trap Probe Security Engine ID	Enabled
Trap Security Engine ID	
Trap Security Name	None

SNMP Trap Event

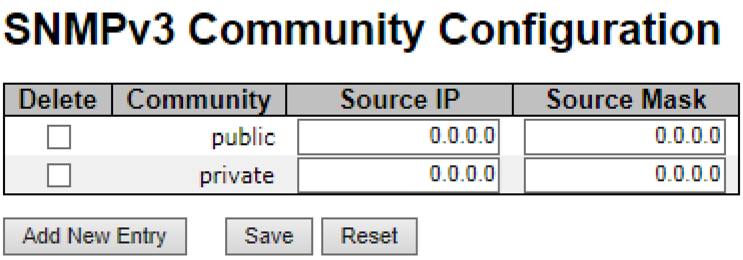
System	□ * □ Warm Start	□ Cold Start
Interface	Link up ● none ○ specific ○ all switches □ * Link down ● none ○ specific ○ all switches LLDP ● none ○ specific ○ all switches	
AAA	□ * □ Authentication Fail	
Switch	□ * □ STP	□ RMON

Figure 91 – SNMP Trap Configuration

Label	**Description**
Global Settings: Mode	Indicates existing SNMP trap mode. Possible modes include: **Enabled**: enable SNMP trap mode. **Disabled**: disable SNMP trap mode.
Trap Destination Configurations	
Delete	Check to delete the entry. It will be deleted during the next save.
Name	Indicates the trap Configuration's name. The allowed string length is 0 to 255, and the allowed content is ASCII characters from 33 to 126.
Enable	Indicates the trap destination mode operation. Possible modes are: **Enabled:** Enable SNMP trap mode operation. **Disabled:** Disable SNMP trap mode operation.
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
Destination Address	Indicates the SNMP trap destination address. It allow a valid IP address in dotted decimal notation ('x.y.z.w').
Destination Port	Indicates the SNMP trap destination port. SNMP Agent will send SNMP message via this port, the port range is 1~65535.
Add New Entry	Click to add a new user.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.6.3 SNMP Community Configurations

This page allows the user to configure SNMPv3 community table. The entry index key is **Community.**



SNMPv3 Community Configuration

Delete	Community	Source IP	Source Mask
□	public	0.0.0.0	0.0.0.0
□	private	0.0.0.0	0.0.0.0

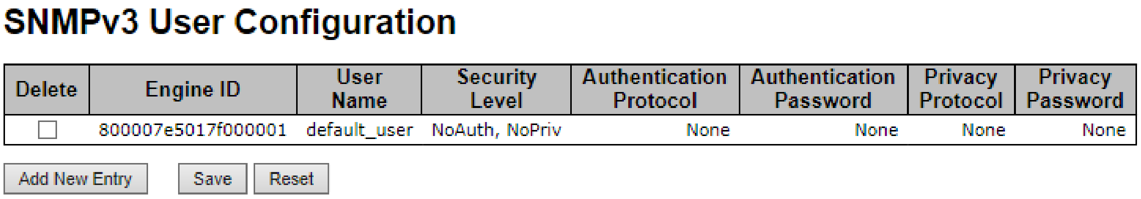
Figure 92 – SNMPv3 Community Configuration

Label	**Description**
Delete	Check to delete the entry. It will be deleted during the next save.

Label	Description
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. The community string will be treated as security name and map a SNMPv1 or SNMPv2c community string.
Source IP	Indicates the SNMP source address.
Source Mask	Indicates the SNMP source address mask.
Add New Entry	Click to add a new community configuration.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.6.4 SNMP User Configurations

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



SNMPv3 User Configuration

Delete	Engine ID	User Name	Security Level	Authentication Protocol	Authentication Password	Privacy Protocol	Privacy Password
□	800007e5017f000001	default_user	NoAuth, NoPriv	None	None	None	None

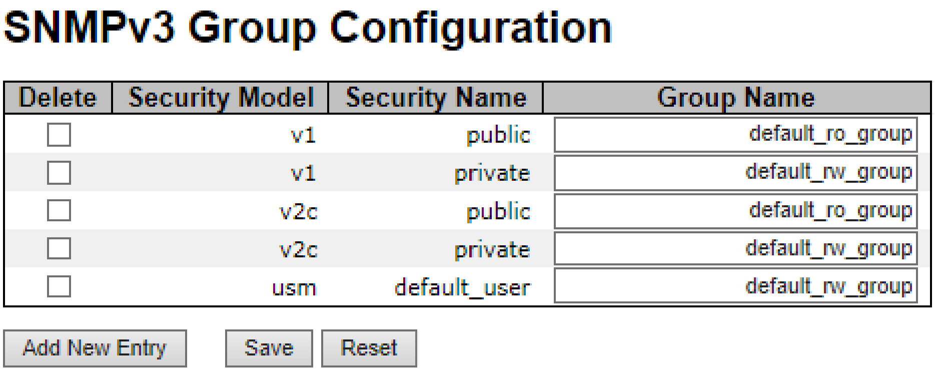
Figure 93 – SNMPv3 User Configuration

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(in hexadecimal format) with number of digits between 10 and 64, but all-zeros and all-'F's are not allowed. The SNMPv3 architecture uses the User-based Security Model (USM) for message security and the View-based Access Control Model (VACM) for access control. For the USM entry, the usmUserEngineID and usmUserName are the entry's 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 equal 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 the allowed content is ASCII characters from 33 to 126.

Label	Description
Security Level	Indicates the security model that this entry should belong to. Possible security models include: **NoAuth, NoPriv**: no authentication and none privacy **Auth, NoPriv**: Authentication and no privacy **Auth, Priv**: Authentication and 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 **AES**: An optional flag to indicate that this user uses AES 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.

5.6.5 SNMP Group Configurations

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



SNMPv3 Group Configuration

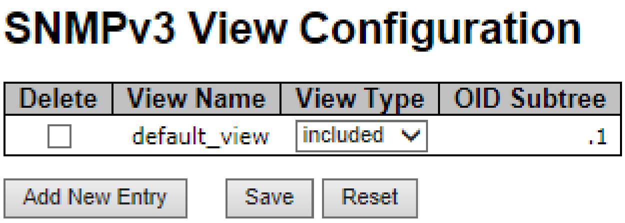
Delete	Security Model	Security Name	Group Name
□	v1	public	default_ro_group
□	v1	private	default_rw_group
□	v2c	public	default_ro_group
□	v2c	private	default_rw_group
□	usm	default_user	default_rw_group

Figure 94 – SNMPv3 Group Configuration

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.
Add New Entry	Click to add a new group configuration.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.6.6 SNMP View Configurations

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



SNMPv3 View Configuration

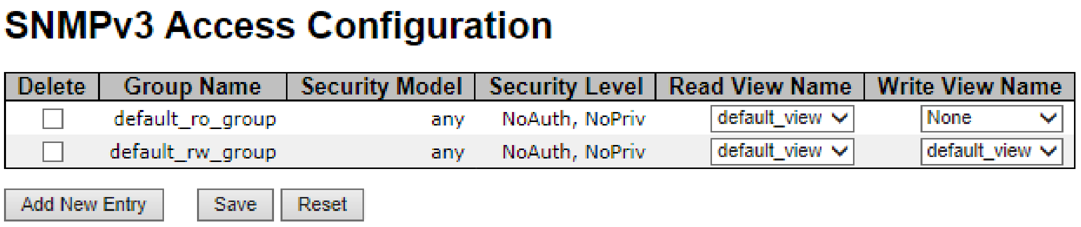
Delete	View Name	View Type	OID Subtree
□	default_view	included	.1

Figure 95 – SNMPv3 View Configuration

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 in 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 (*).
Add New Entry	Click to add a new view configuration.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.6.7 SNMP Access Configurations

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



SNMPv3 Access Configuration

Delete	Group Name	Security Model	Security Level	Read View Name	Write View Name
□	default_ro_group	any	NoAuth, NoPriv	default_view	None
□	default_rw_group	any	NoAuth, NoPriv	default_view	default_view

Figure 96 – SNMPv3 Access Configuration

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).

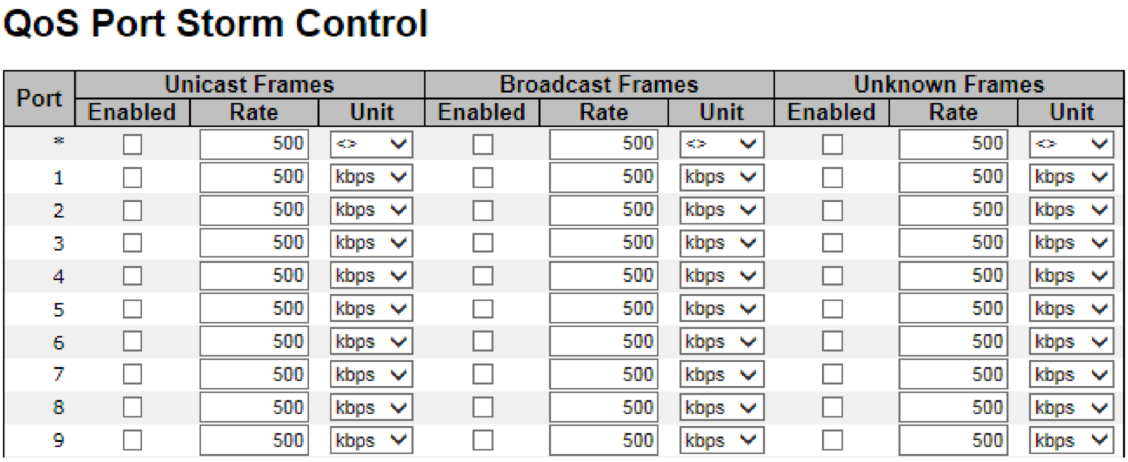
Label	Description
Security Level	Indicates the security model that this entry should belong to. Possible security models include: **NoAuth, NoPriv**: no authentication and no privacy **Auth, NoPriv**: Authentication and no privacy **Auth, Priv**: Authentication and privacy
Read View Name	The names of the MIB view define the MIB objects for which this request may request the current values. The allowed string length is1 to 32, and only ASCII characters from 33 to 126 are allowed.
Write View Name	The names 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.
Add New Entry	Click to add a new access configuration.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7 Traffic Prioritization

5.7.1 Storm Control

This page allows the user to configure the storm control settings for all switch ports.

There is a storm rate control for unicast frames, broadcast frames, and unknown (flooded) frames.



QoS Port Storm Control

Port	Unicast Frames			Broadcast Frames			Unknown Frames		
	Enabled	Rate	Unit	Enabled	Rate	Unit	Enabled	Rate	Unit
*	□	500	<>	□	500	<>	□	500	<>
1	□	500	kbps	□	500	kbps	□	500	kbps
2	□	500	kbps	□	500	kbps	□	500	kbps
3	□	500	kbps	□	500	kbps	□	500	kbps
4	□	500	kbps	□	500	kbps	□	500	kbps
5	□	500	kbps	□	500	kbps	□	500	kbps
6	□	500	kbps	□	500	kbps	□	500	kbps
7	□	500	kbps	□	500	kbps	□	500	kbps
8	□	500	kbps	□	500	kbps	□	500	kbps
9	□	500	kbps	□	500	kbps	□	500	kbps

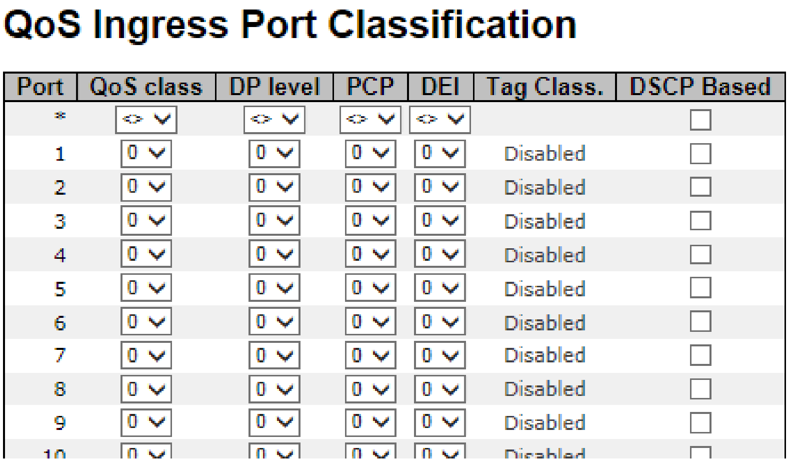
Figure 97 - QoS Port Storm Control

Label	**Description**
Port	The port number for which the configuration below applies.
Enabled	Check this box to enable the storm control status for the given frame type and port.
Rate	Controls the rate for the storm control. The default value is 500. This value is restricted to 100-1000000 when the "Unit" is "kbps" or "fps", and it is restricted to 1-13200 when the "Unit" is "Mbps" or "kfps".
Unit	Controls the unit of measure for the storm control rate as kbps, Mbps, fps or kfps . The default value is "kbps".
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.2 Port Classification

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

This page allows the user to configure the basic QoS Ingress Classification settings for all switch ports.



QoS Ingress Port Classification

Port	QoS class	DP level	PCP	DEI	Tag Class.	DSCP Based
*	<>	<>	<>	<>		□
1	0	0	0	0	Disabled	□
2	0	0	0	0	Disabled	□
3	0	0	0	0	Disabled	□
4	0	0	0	0	Disabled	□
5	0	0	0	0	Disabled	□
6	0	0	0	0	Disabled	□
7	0	0	0	0	Disabled	□
8	0	0	0	0	Disabled	□
9	0	0	0	0	Disabled	□
10	0	0	0	0	Disabled	□

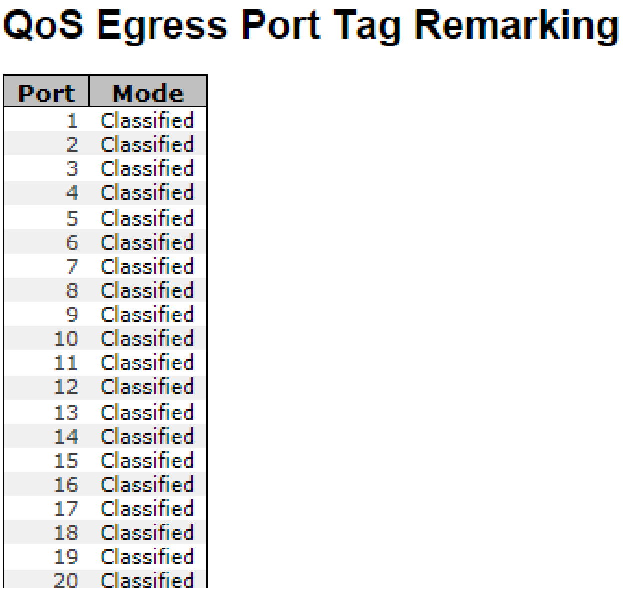
Figure 98 - QoS Ingress Port Classification

Label	**Description**
Port	The port number for which the configuration below applies
QoS Class	Controls the default QoS class Every incoming frame is 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. [1]
DP level	Controls the default Drop Precedence (DP) 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 tag. Otherwise the frame is classified to the default DP level. The classified DP level can be overruled by a (QoS Control List) QCL entry.

Label	Description
PCP	Controls the default PCP value. PCP is an acronym for Priority Code Point. It is a 3-bit field storing the priority level for the 802.1Q frame. It is also known as User Priority. 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. DEI is an acronym for Drop Eligible Indicator. It is a 1-bit field in the VLAN tag. 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
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.3 Port Tag Remarking

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



QoS Egress Port Tag Remarking

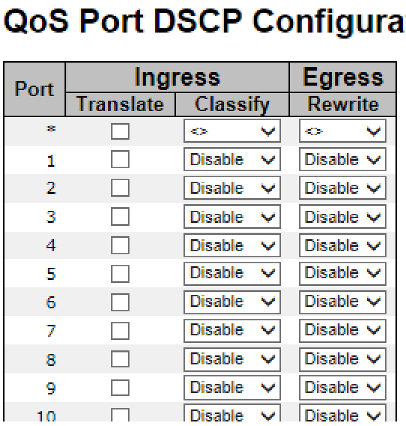
Port	Mode
1	Classified
2	Classified
3	Classified
4	Classified
5	Classified
6	Classified
7	Classified
8	Classified
9	Classified
10	Classified
11	Classified
12	Classified
13	Classified
14	Classified
15	Classified
16	Classified
17	Classified
18	Classified
19	Classified
20	Classified

Figure 99 - QoS Egress Port Tag Remarking

Label	**Description**
Port	The logical port for the settings contained in the same row. 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.

5.7.4 Port DSCP

This page allows the user to configure basic QoS Port DSCP Configuration settings for all switch ports.



QoS Port DSCP Configuration

Port	Ingress		Egress
	Translate	Classify	Rewrite
*	□	<>	<>
1	□	Disable	Disable
2	□	Disable	Disable
3	□	Disable	Disable
4	□	Disable	Disable
5	□	Disable	Disable
6	□	Disable	Disable
7	□	Disable	Disable
8	□	Disable	Disable
9	□	Disable	Disable
10	□	Disable	Disable

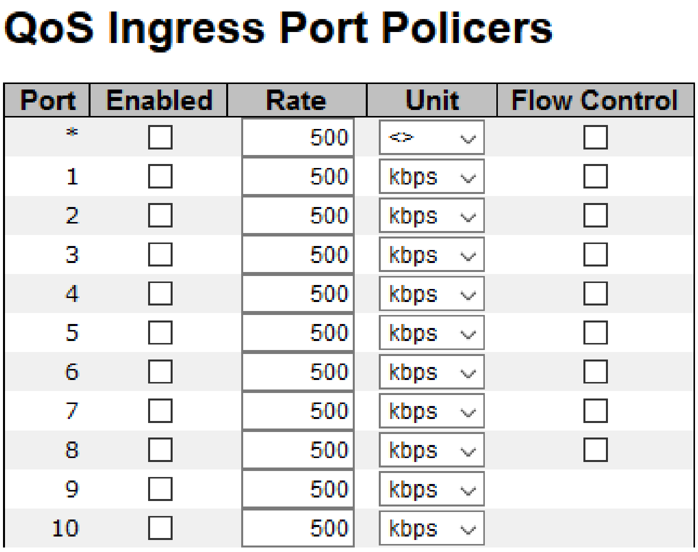
Figure 100 - QoS Port DSCP Configuration

Label	**Description**
Port	Shows the list of ports for which you can configure DSCP Ingress and Egress settings.

Label	Description
Ingress	**Ingress** settings allow you to change ingress translation and classification settings for individual ports. There are two configuration parameters available in Ingress: 1. **Translate** 2. **Classify**
Translate	Check to enable ingress translation
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. **Remap:**DSCP from the analyzer is remapped and the frame is remarked with remapped DSCP value.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.5 Port Policing

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



QoS Ingress Port Policers

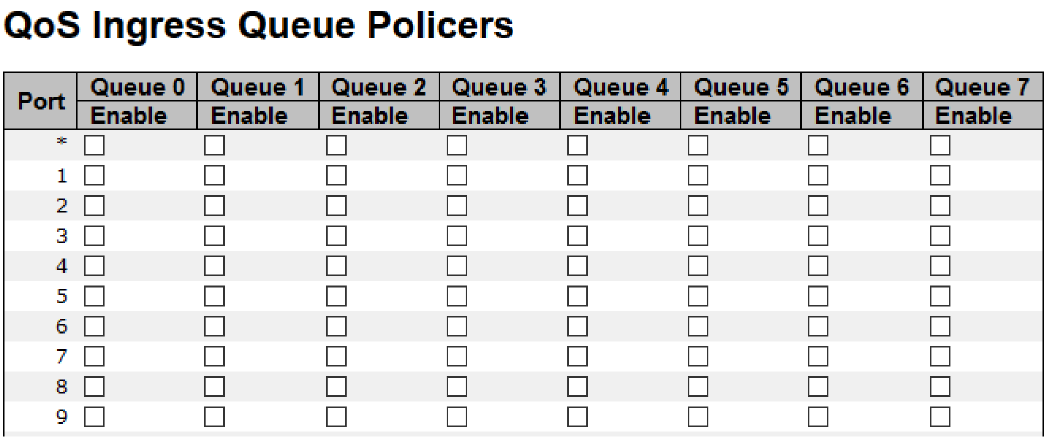
Port	Enabled	Rate	Unit	Flow Control
*	□	500	<>	□
1	□	500	kbps	□
2	□	500	kbps	□
3	□	500	kbps	□
4	□	500	kbps	□
5	□	500	kbps	□
6	□	500	kbps	□
7	□	500	kbps	□
8	□	500	kbps	□
9	□	500	kbps	
10	□	500	kbps	

Figure 101 - QoS Ingress Port Policers

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 it is restricted to 1-13200 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 discarding frames.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.6 Queue Policing

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



QoS Ingress Queue Policers

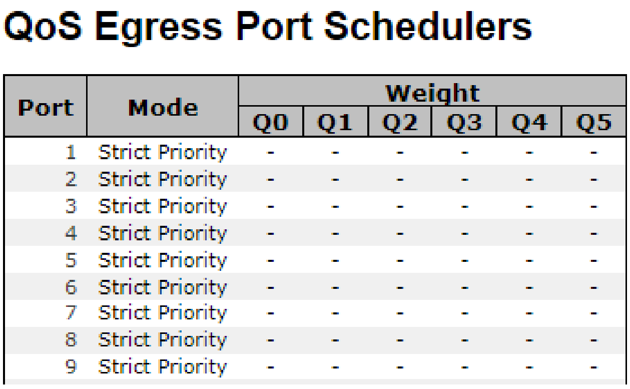
Port	Queue 0 Enable	Queue 1 Enable	Queue 2 Enable	Queue 3 Enable	Queue 4 Enable	Queue 5 Enable	Queue 6 Enable	Queue 7 Enable
*	□	□	□	□	□	□	□	□
1	□	□	□	□	□	□	□	□
2	□	□	□	□	□	□	□	□
3	□	□	□	□	□	□	□	□
4	□	□	□	□	□	□	□	□
5	□	□	□	□	□	□	□	□
6	□	□	□	□	□	□	□	□
7	□	□	□	□	□	□	□	□
8	□	□	□	□	□	□	□	□
9	□	□	□	□	□	□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

Figure 102 - QoS Ingress Queue Policers

Label	**Description**
Port	The port number for which the configuration below applies.
Enabled	Check to enable queue policer for individual switch ports
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.7 Port Schedulers

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



QoS Egress Port Schedulers

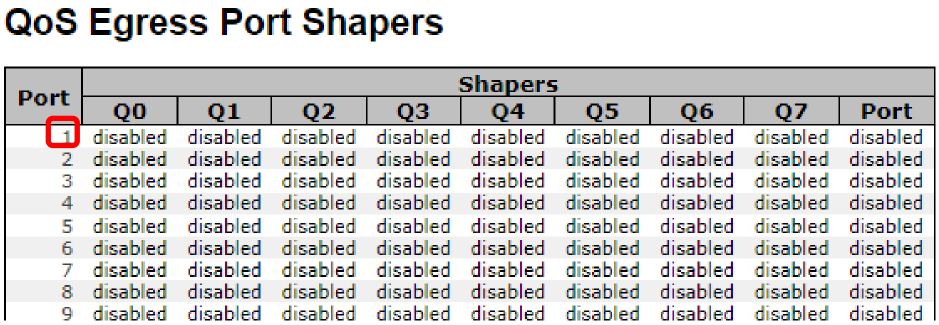
Port	Mode	Weight					
		Q0	Q1	Q2	Q3	Q4	Q5
1	Strict Priority	-	-	-	-	-	-
2	Strict Priority	-	-	-	-	-	-
3	Strict Priority	-	-	-	-	-	-
4	Strict Priority	-	-	-	-	-	-
5	Strict Priority	-	-	-	-	-	-
6	Strict Priority	-	-	-	-	-	-
7	Strict Priority	-	-	-	-	-	-
8	Strict Priority	-	-	-	-	-	-
9	Strict Priority	-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

Figure 103 - QoS Egress Port Policers

Label	**Description**
Port	The logical port for the settings contained in the same row. Click the port number to configure the schedulers. Details for configuration can be found in the QoS Egress Port Scheduler and Shapers section.
Mode	Shows the scheduling mode for this port.
Weight	Shows the weight for this queue and port.

5.7.8 Port Shaping

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



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

Figure 104 - QoS Egress Port Shapers

Label	Description
Port	The logical port for the settings contained in the same row. Click on the port number to configure the shapers. Details for configuration can be found in the QoS Egress Port Scheduler and Shapers section.
Shapers Qn	Shows **disabled** or actual port shaper rate - e.g. "800 Mbps"

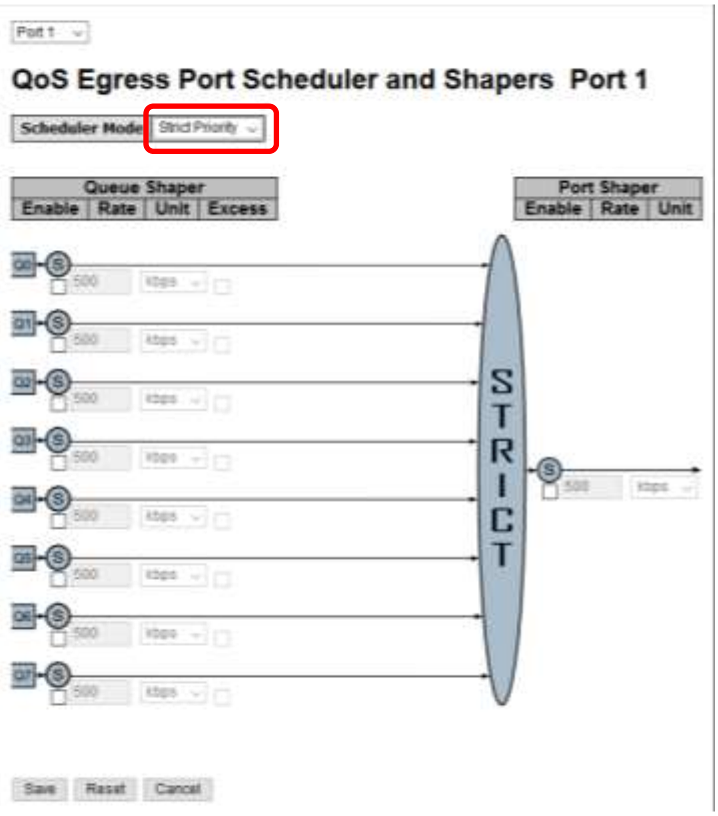
5.7.8.1 QoS Egress Port Scheduler and Shapers

This page allows the user to configure Scheduler and Shapers for a specific port.

This is accessed by clicking specific port on the Port Scheduler or Shaping screen (Port 1 shown).

5.7.8.1.1 Strict Priority

In the **Scheduler Mode**, from the drop-down list, select **Strict Priority**.



Port 1

QoS Egress Port Scheduler and Shapers Port 1

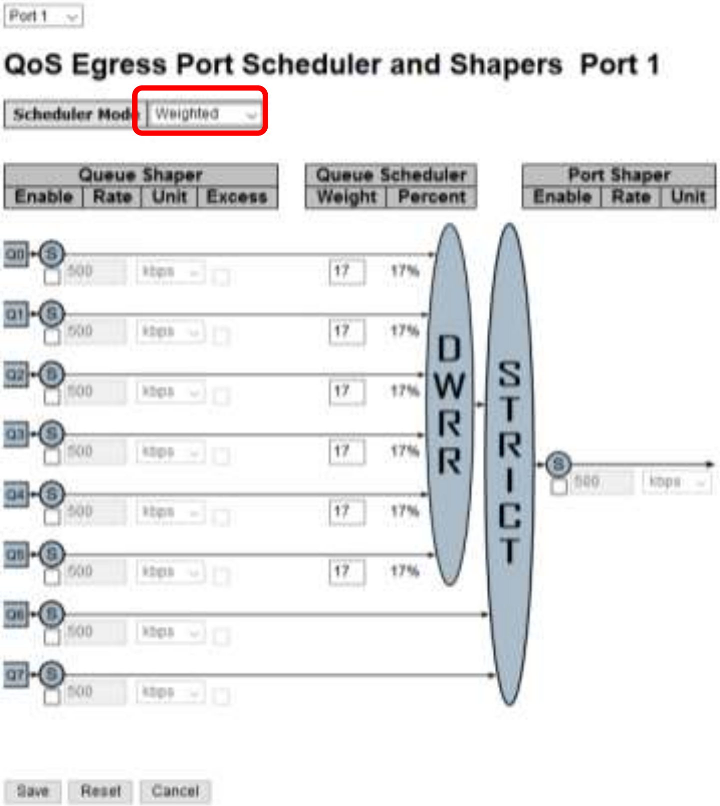
Scheduler Mode: Strict Priority

Figure 105 - QoS Ingress Port Scheduler and Shapers Port 1- Strict Priority

Label	**Description**
Scheduler Mode	Controls whether the scheduler mode is **Strict Priority** or **weighted** on this switch port
Queue Shaper Enable	Check to enable queue shaper for individual switch ports.
Queue Shaper Rate	Configures the rate of each queue shaper. The default value is **500** kbps**.** This value is restricted to: • 100 to 1000000 when the **Unit** is **kbps**, and to • 1 to 3300 when the **Unit** is **Mbps**.
Queues Shaper Unit	Configures the rate for each queue shaper. The default value is **500**. This value is restricted to 100 to 1000000 when the **Unit** is **kbps**, and it is restricted to 1 to 3300 when the **Unit** is **Mbps**.
Queue Shaper Excess	Allows the queue to use excess bandwidth.
Port Shaper Enable	Check to enable port shaper for individual switch ports.
Port Shaper Rate	Configures the rate of each port shaper. The default value is 500 kbps**.** This value is restricted to: • 100 to 1000000 when the **Unit** is **kbps**, and to • 1 to 3300 when the **Unit** is **Mbps**.
Port Shaper Unit	Configures the unit of measurement for each port shaper rate as **kbps** or **M bps**. The default unit is **kbps**.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to the saved values.
Cancel	Click to undo any changes made locally and return to the previous page.

5.7.8.1.2Weighted

In the **Scheduler Mode**, from the drop-down list, select **Weighted**.



QoS Egress Port Scheduler and Shapers Port 1

Scheduler Mode: Weighted

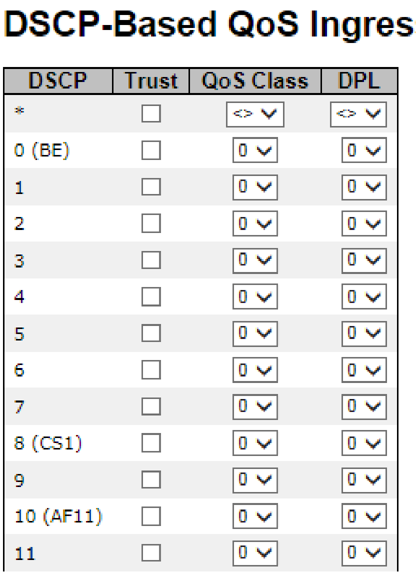
Figure 106 - QoS Egress Port Scheduler and Shapers Port 1 – Scheduler Mode Weighted

Label	Description
Scheduler Mode	Controls whether the scheduler mode is Strict Priority or Weighted on this switch port.
Queue Shaper Enable	Check to enable queue shaper for individual switch ports.
Queue Shaper Rate	Configures the rate of each queue shaper. The default value is 500. This value is restricted to 100 to 1000000 when the Unit is kbps, and it is restricted to 1 to 3300 when the Unit is Mbps.
Queues Shaper Unit	Configures the rate of each queue shaper. The default value is 500. This value is restricted to 100 to 1000000 when the Unit" is kbps, and it is restricted to 1 to 3300 when the Unit is Mbps.
Queue Shaper Excess	Allows the queue to use excess bandwidth
Queue Scheduler Weight	Configures the weight of each queue. The default value is 17. This value is restricted to 1 to 100. This parameter is only shown if Scheduler Mode is set to Weighted.
Queue Scheduler Percent	Shows the weight of the queue in percentage. This parameter is only shown if Scheduler Mode is set to Weighted.
Port Shaper Enable	Check to enable port shaper for individual switch ports

Label	Description
Port Shaper Rate	Configures the rate of each port shaper. The default value is 500. This value is restricted to 100 to 1000000 when the Unit is kbps, and it is restricted to 1 to 3300 when the Unit is Mbps.
Port Shaper Unit	Configures the unit of measurement for each port shaper rate as kbps or M bps. The default value is kbps.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.
Cancel	Click to undo any changes made locally and return to the previous page.

5.7.9 DSCP-Based QoS

This page allows the user to configure basic QoS DSCP-Based QoS Ingress Classification settings for all switches.



DSCP-Based QoS Ingress Classification

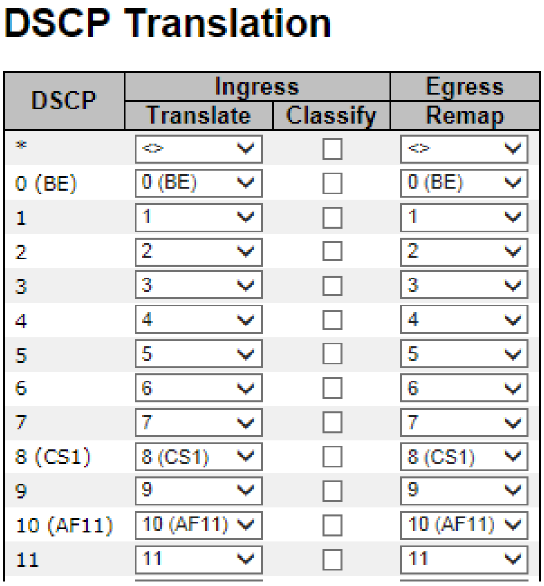
DSCP	Trust	QoS Class	DPL
*	□	<>	<>
0 (BE)	□	0	0
1	□	0	0
2	□	0	0
3	□	0	0
4	□	0	0
5	□	0	0
6	□	0	0
7	□	0	0
8 (CS1)	□	0	0
9	□	0	0
10 (AF11)	□	0	0
11	□	0	0

Figure 107 - QoS DSCP-Based QoS Ingress Classification

Label	Description
DSCP	Maximum number of supported DSCP values is 64
Trust	Controls whether a specific DSCP value is trusted. 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 (0-3)
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.10 DSCP Translation

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



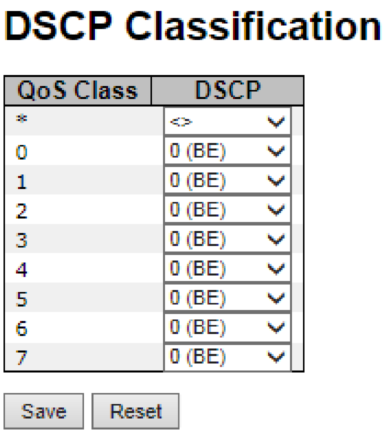
DSCP Translation

DSCP	Ingress		Egress
	Translate	Classify	Remap
*	<>	□	<>
0 (BE)	0 (BE)	□	0 (BE)
1	1	□	1
2	2	□	2
3	3	□	3
4	4	□	4
5	5	□	5
6	6	□	6
7	7	□	7
8 (CS1)	8 (CS1)	□	8 (CS1)
9	9	□	9
10 (AF11)	10 (AF11)	□	10 (AF11)
11	11	□	11

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 egress parameters include: **Remap:** controls the remapping for frames. You can select the DSCP value from a selected menu to which you want to remap. DSCP value ranges from 0 to 63.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.7.11 DSCP Classification

This page allows the user to configure the mapping of QoS class to DSCP value.



DSCP Classification

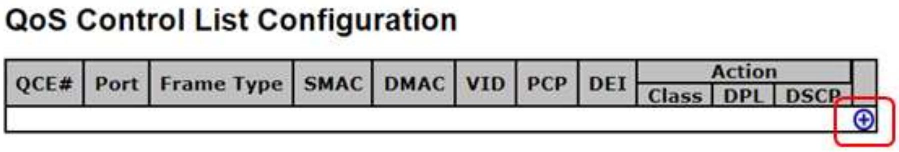
QoS Class	DSCP
*	<>
0	0 (BE)
1	0 (BE)
2	0 (BE)
3	0 (BE)
4	0 (BE)
5	0 (BE)
6	0 (BE)
7	0 (BE)

Figure 108 - DSCP Classification

Label	Description
QoS Class	Actual QoS class. A QoS class of 0 (zero) has the lowest priority.
DSCP	Select the classified DSCP value (0-63)
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

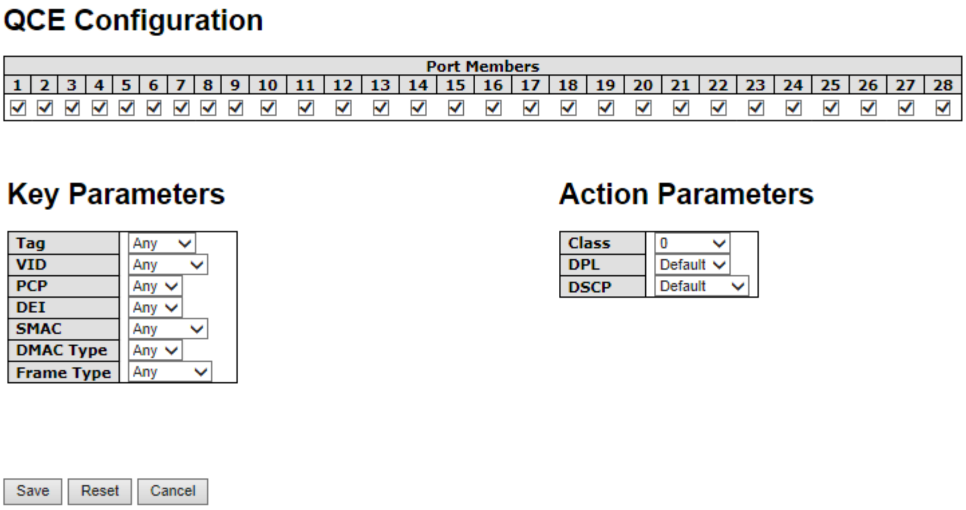
5.7.12 QoS Control List

This page shows the QoS Control List (QCL), which is made up of the QCEs. Each row describes a QCE that is defined. The maximum number of QCEs is 256 on each switch. Click on the lowest plus sign to add a new QCE to the list.



QoS Control List Configuration

QCE#	Port	Frame Type	SMAC	DMAC	VID	PCP	DEI	Action			
								Class	DPL	DSCP	
											⊕



QCE Configuration

Port Members																											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

Key Parameters

Tag	Any
VID	Any
PCP	Any
DEI	Any
SMAC	Any
DMAC Type	Any
Frame Type	Any

Action Parameters

Class	0
DPL	Default
DSCP	Default

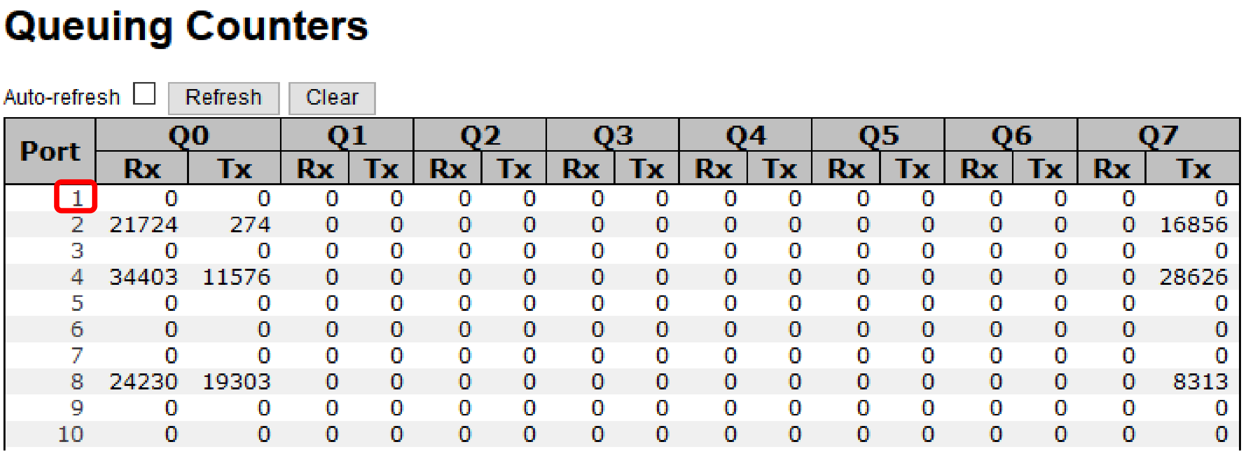
Figure 109 - QoS Control List Configuration

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 or **Any,** a specific value **(Specific)** 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 **0, 1** or **Any** **SMAC**: Source MAC Address, can be **specific** (xx-xx-xx, 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 values such as **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. **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.

Label	Description
SNAP	**PID**: valid PID (aka 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. **IP Fragmen**t: Ipv4 frame fragmented options include 'yes', 'no', and 'any'. **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.
IPv6	**Protocol IP protocol number**: Other (0-255), TCP, 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.
Action Parameters	**Class** QoS class: (0-7) or Default Valid **Drop Precedence Level** value can be (0-3) 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.

5.7.13 QoS Statistics

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



Queuing Counters

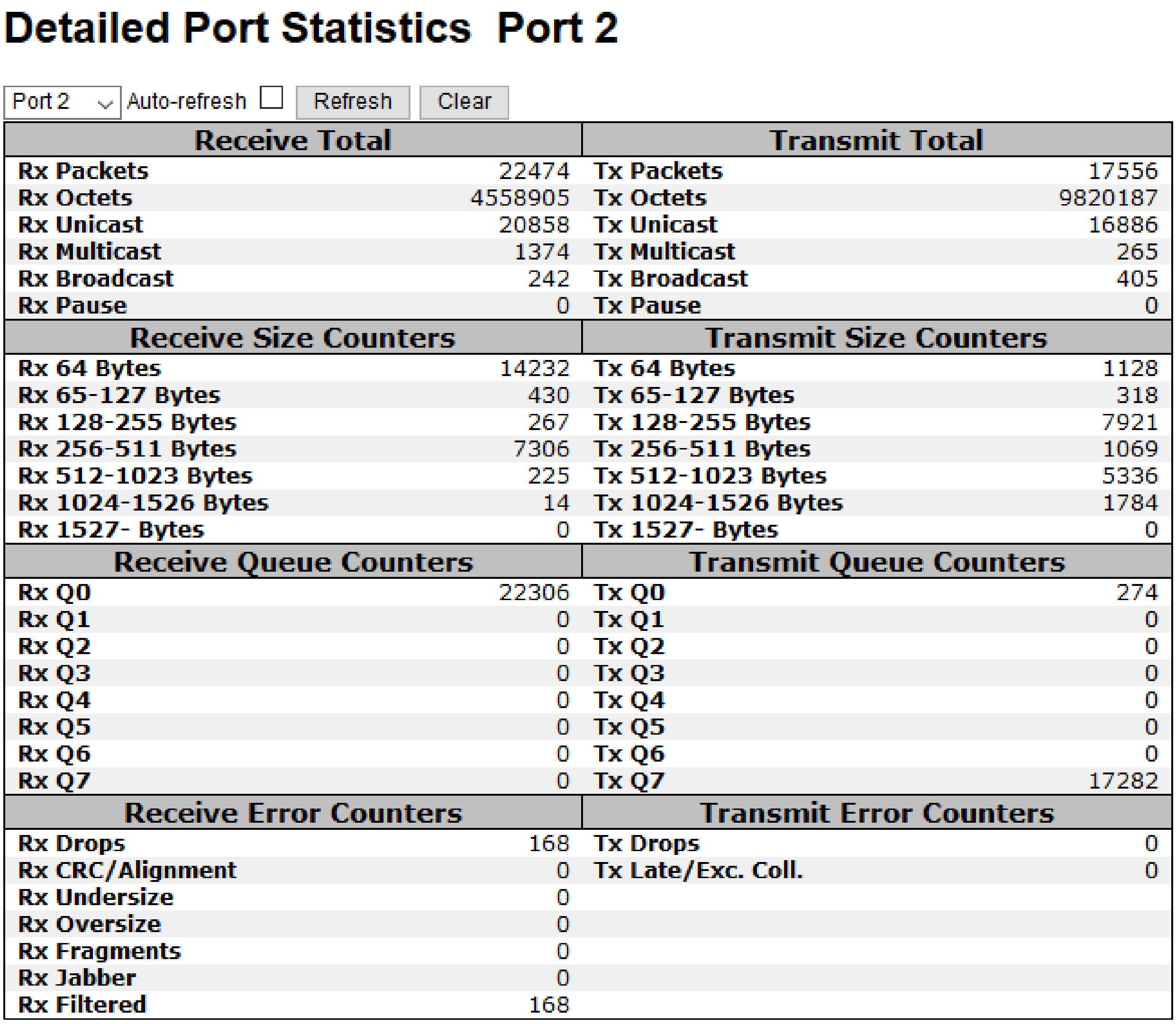
Auto-refresh □ Refresh Clear

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	21724	274	0	0	0	0	0	0	0	0	0	0	0	0	0	16856
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	34403	11576	0	0	0	0	0	0	0	0	0	0	0	0	0	28626
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	24230	19303	0	0	0	0	0	0	0	0	0	0	0	0	0	8313
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

Figure 110 - QoS Statistics

Label	Description
Port	The logical port number for the statistics displayed. Click a port number to see detailed port statistics. See 5.7.13.1 for an example of Detailed Port Statistics Port
Qn	There are 8 QoS queues per port. Q0 is the lowest priority.
Rx / Tx	The number of received and transmitted packets per queue.
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.

5.7.13.1 Detailed Port Statistics Port 2



Detailed Port Statistics Port 2

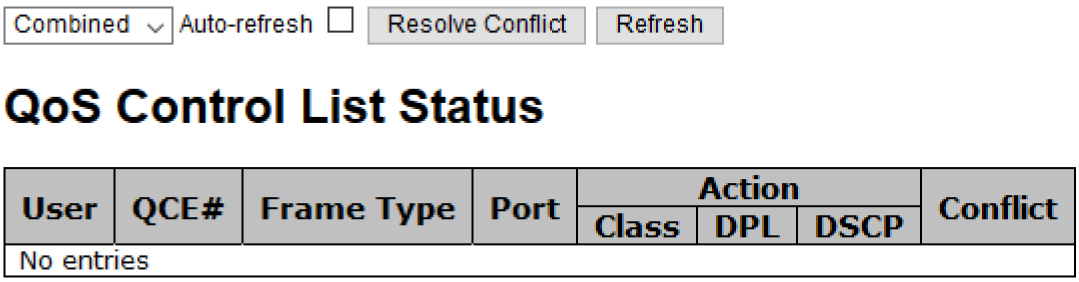
Port 2 Auto-refresh □ Refresh Clear

Receive Total		Transmit Total	
Rx Packets	22474	Tx Packets	17556
Rx Octets	4558905	Tx Octets	9820187
Rx Unicast	20858	Tx Unicast	16886
Rx Multicast	1374	Tx Multicast	265
Rx Broadcast	242	Tx Broadcast	405
Rx Pause	0	Tx Pause	0
Receive Size Counters		**Transmit Size Counters**	
Rx 64 Bytes	14232	Tx 64 Bytes	1128
Rx 65-127 Bytes	430	Tx 65-127 Bytes	318
Rx 128-255 Bytes	267	Tx 128-255 Bytes	7921
Rx 256-511 Bytes	7306	Tx 256-511 Bytes	1069
Rx 512-1023 Bytes	225	Tx 512-1023 Bytes	5336
Rx 1024-1526 Bytes	14	Tx 1024-1526 Bytes	1784
Rx 1527- Bytes	0	Tx 1527- Bytes	0
Receive Queue Counters		**Transmit Queue Counters**	
Rx Q0	22306	Tx Q0	274
Rx Q1	0	Tx Q1	0
Rx Q2	0	Tx Q2	0
Rx Q3	0	Tx Q3	0
Rx Q4	0	Tx Q4	0
Rx Q5	0	Tx Q5	0
Rx Q6	0	Tx Q6	0
Rx Q7	0	Tx Q7	17282
Receive Error Counters		**Transmit Error Counters**	
Rx Drops	168	Tx Drops	0
Rx CRC/Alignment	0	Tx Late/Exc. Coll.	0
Rx Undersize	0		
Rx Oversize	0		
Rx Fragments	0		
Rx Jabber	0		
Rx Filtered	168		

Figure 111 - Detailed Port Statistics Port 2

5.7.14 QCL Status

This page shows the QoS Control List (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.



Combined Auto-refresh □ Resolve Conflict Refresh

QoS Control List Status

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

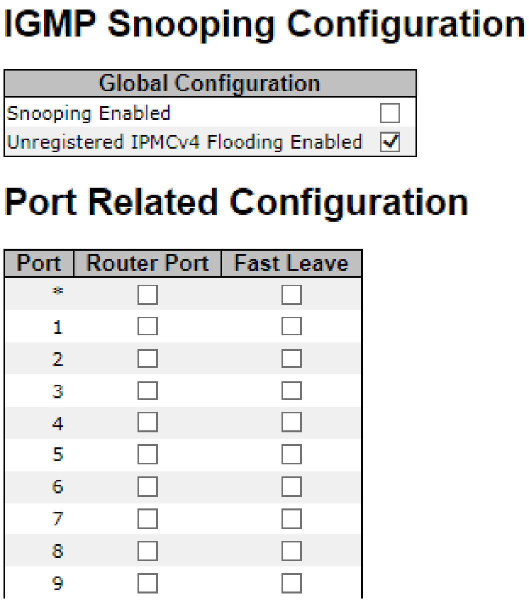
Figure 112 - QoS Control List Status

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 be 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.
QCL status	Select one of the following to be displayed: **Combined**: Show both static and conflict entries. **Static:** Show static entries. **Conflict:** Show conflict entries.
Clear	Clear all statistics counters.
Auto-refresh	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Refresh	Click to refresh the page.

5.8 Multicast

5.8.1 IGMP Snooping Basic Configuration

This page provides IGMP Snooping related configurations.



IGMP Snooping Configuration

Global Configuration	
Snooping Enabled	□
Unregistered IPMCv4 Flooding Enabled	☑

Port Related Configuration

Port	Router Port	Fast Leave
*	□	□
1	□	□
2	□	□
3	□	□
4	□	□
5	□	□
6	□	□
7	□	□
8	□	□
9	□	□

Figure 113 - IGMP Snooping Configuration

Label	**Description**
Snooping Enabled	Check to enable global IGMP snooping
Unregistered IPMCv4 Flooding enabled	Check to enable unregistered IPv4 MultiCast (IPMCv4) traffic flooding. The flooding control takes effect only when IGMP Snooping is enabled. When IGMP Snooping is disabled, unregistered IPMCv4 traffic flooding is always active in spite of this setting.
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
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

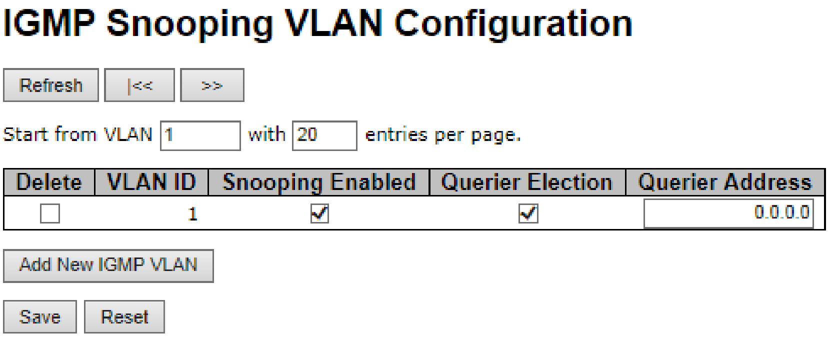
5.8.2 IGMP Snooping VLAN Configurations

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.



IGMP Snooping VLAN Configuration

Start from VLAN 1 with 20 entries per page.

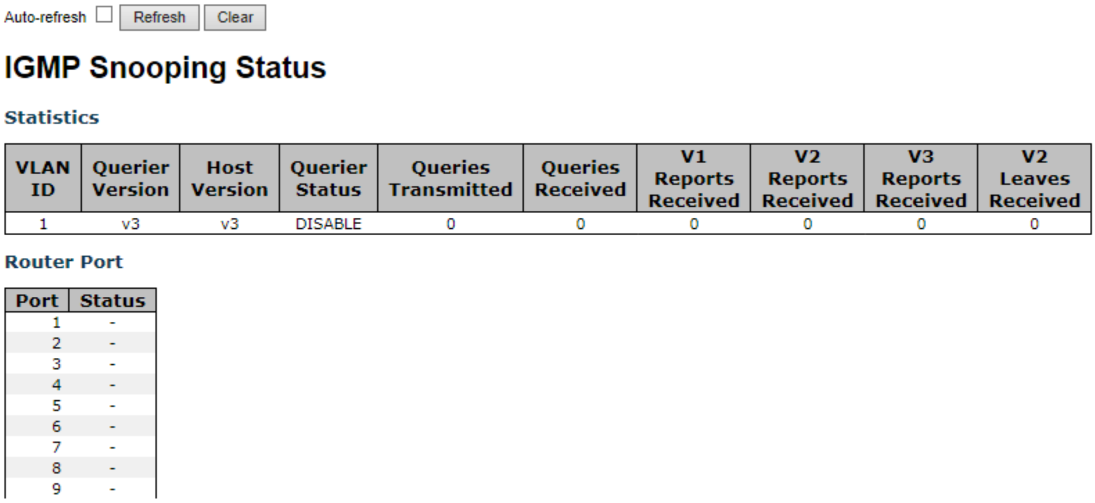
Delete	VLAN ID	Snooping Enabled	Querier Election	Querier Address
□	1	☑	☑	0.0.0.0

Figure 114 - IGMP Snooping VLAN Configuration

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 Enabled	Check to enable IGMP snooping for individual VLAN. Up to 32 VLAN's can be selected.
Querier Election	Add a checkmark to enable joining IGMP Querier election in the VLAN. Disable to act as an IGMP Non-Querier.
Querier Address	Define the IPv4 address as source address used in IP header for IGMP Querier election. When the Querier address is not set, system uses IPv4 management address of the IP interface associated with this VLAN. When the IPv4 management address is not set, system uses the first available IPv4 management address. Otherwise, system uses a pre-defined value. By default, this value will be 192.0.2.1.
Add New IGMP VLAN	Click to add a new entry into the table.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.8.3 IGMP Snooping Status

This page provides IGMP snooping status.



IGMP Snooping Status

Statistics

VLAN ID	Querier Version	Host Version	Querier Status	Queries Transmitted	Queries Received	V1 Reports Received	V2 Reports Received	V3 Reports Received	V2 Leaves Received
1	v3	v3	DISABLE	0	0	0	0	0	0

Router Port

Port	Status
1	-
2	-
3	-
4	-
5	-
6	-
7	-
8	-
9	-

Figure 115 - IGMP Snooping Status

Label	Description
VLAN ID	The VLAN ID of the entry.
Querier Version	Active Querier version.
Host Version	Active Host version.
Queries Status	Shows the Querier status as **ACTIVE** or **DISABLE.**
Querier Transmitted	The number of transmitted Queries.
Queries Received	The number of Received Queries.
V1 Reports Received	The number of received V1 reports.
V2 Reports Received	The number of received V2 reports.
V3 Reports Received	The number of received V3 reports.
V2 Leaves Received	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.
Router Port	Port number on the switch.
Router Port Status	Indicates whether a specific port is a router port or not

5.8.4 IGMP Snooping Group Information

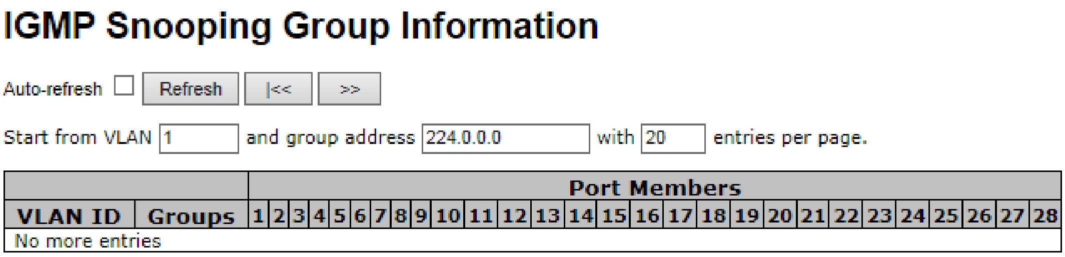
Entries in the IGMP Group Table are shown on this page. The IGMP Group Table is sorted first by VLAN ID, and then by group.

Each page shows up to 99 entries from the IGMP Group table, default being 20, selected through the "entries per page" input field. When first visited, the web page will show the first 20 entries from the beginning of the IGMP Group Table.

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

The **>>** button will use the last entry of the currently displayed table 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.



IGMP Snooping Group Information

Auto-refresh □ Refresh |<< >>

Start from VLAN 1 and group address 224.0.0.0 with 20 entries per page.

		Port Members																											
VLAN ID	Groups	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
No more entries																													

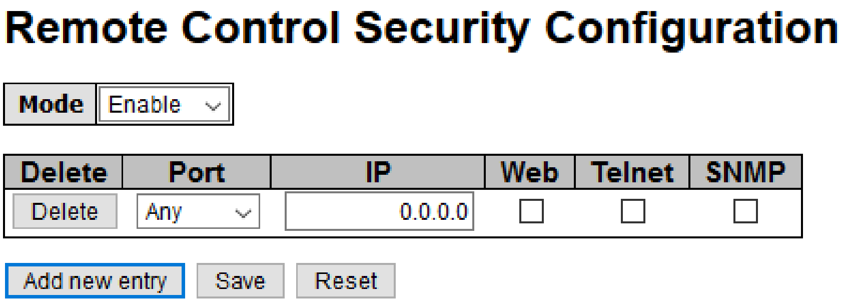
Figure 116 - IGMP Snooping Group Information

Label	Description
VLAN ID	The VLAN ID of the group.
Groups	The group address of the group displayed.
Port Members	Selected ports under this group.
Auto-refresh ☑	Automatic refresh occurs every 3 seconds.
Refresh	Refreshes the displayed table starting from the input fields.
|<<	Updates the table, starting with the first entry in the IGMP Group Table.
>>	Updates the table, starting with the entry after the last entry currently

5.9 Security

5.9.1 Remote Control Security Configuration

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



Remote Control Security Configuration

Mode: Enable

Delete	Port	IP	Web	Telnet	SNMP
Delete	Any	0.0.0.0	□	□	□

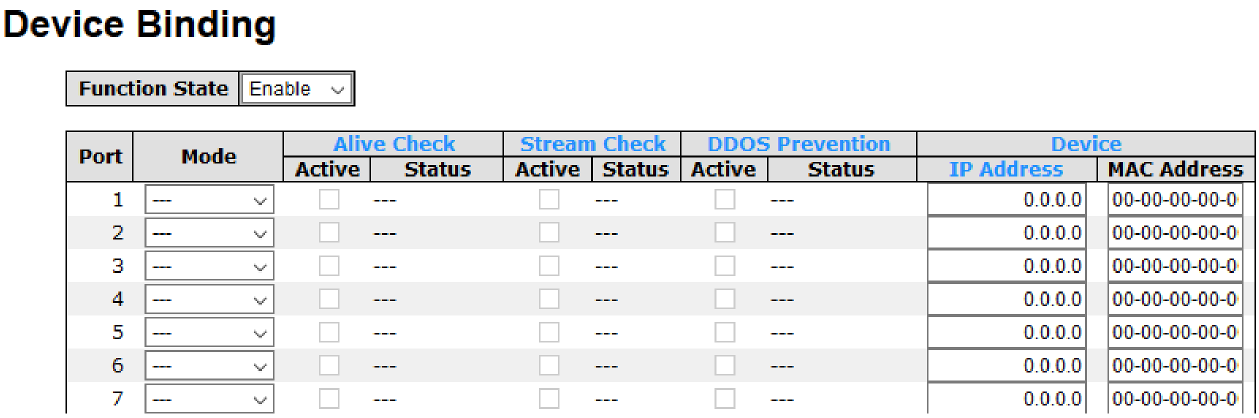
Figure 117 - Remote Control Security Configuration

Label	Description
Delete	Check to delete the entry. The designated entry will be deleted during the next save.
Port	Port number of the device connecting to remote client. The options are **Any** or **Port 1, Port2**, etc.
IP	IP address of remote client. Keep this field "0.0.0.0" —it means "Any IP".
Web	Check this item to enable Web management interface..
Telnet	Check this item to enable Telnet management interface.
SNMP	Check this item to enable SNMP management interface.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.
Add new entry	Click to add a new entry

5.9.2 Device Binding

Device Binding effectively binds the IP/MAC address of the device connected with the switch port. If the IP/MAC address of the connecting device does not match the switch port binding information, the device will be blocked for security. Additionally, the bound device also benefits from a collection of active network traffic protection and maintenance tools — alive check, stream check, and DoS/DDoS auto-prevention.

This page provides Device Binding related configuration.



Device Binding

Function State: Enable

Port	Mode	Alive Check		Stream Check		DDOS Prevention		Device	
		Active	Status	Active	Status	Active	Status	IP Address	MAC Address
1	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0
2	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0
3	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0
4	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0
5	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0
6	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0
7	---	☐	---	☐	---	☐	---	0.0.0.0	00-00-00-00-0

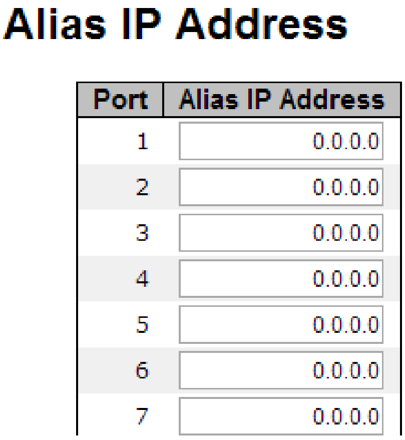
Figure 118 - Device Binding

Label	**Description**
Function State	Enable/Disable Device Binding.
Port	Port number of remote client.
Mode	Indicates the per-port Device Binding operation. Possible modes are: **---:** Disable. **Scan**: Scan IP/MAC automatically, but no binding function. **Binding**: Enable binding function. Under this mode, any IP/MAC not matching the entry will not be allowed to access the network. **Shutdown**: Shutdown of the port (No Link).
Alive Check Active	Enable/Disable Alive Check. When enabled, switch will ping the device continually.
Alive Check Status	Indicates the Alive Check status. Possible options are: ---: Disable. **Got Reply**: Got ping reply from device, that means the device is still alive. **Lost Reply**: Lost ping reply from device, that means the device might have been not available.
Alive Check Status	Indicates the Alive Check status. Possible options are: ---: Disable. **Got Reply**: Got ping reply from device, that means the device is still alive. **Lost Reply**: Lost ping reply from device, that means the device might have been not available.
Stream Check Active	Enable/Disable Stream Check. When enabled, switch will detect the stream change(getting low) from device.
DDOS Prevention Active	Enable/Disable DDOS Prevention. When enabled, switch will monitor the device for DDOS attack (from device).
DDOS Prevention Status	Indicates the DDOS Prevention status. Possible options are: ---: Disable. **Analysing**: Analyse the packet throughput for initialization. **Running**: Function ready. **Attacked**: DDOS attack happened.
Save	Click to save changes.

5.9.2.1 Advanced Configurations

5.9.2.1.1Alias IP Address

This page provides Alias IP Address configuration. Some devices might have more than one IP addresses. You could specify the other IP address here.



Alias IP Address

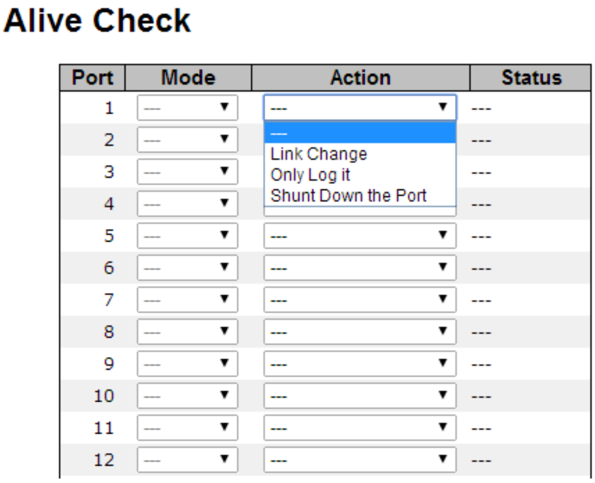
Port	Alias IP Address
1	0.0.0.0
2	0.0.0.0
3	0.0.0.0
4	0.0.0.0
5	0.0.0.0
6	0.0.0.0
7	0.0.0.0

Figure 119 - Alias IP Address

Label	Description
Alias IP Address	Specifies alias IP address. Keep **0.0.0.0** if the device does not have an alias IP address.

5.9.2.1.2 Alive Check

You can use ping commands to check port link status. If port link fails, you can set actions from the list.



Alive Check

Port	Mode	Action	Status
1	---	---	---
2	---		---
3	---		---
4	---		---
5	---	---	---
6	---	---	---
7	---	---	---
8	---	---	---
9	---	---	---
10	---	---	---
11	---	---	---
12	---	---	---

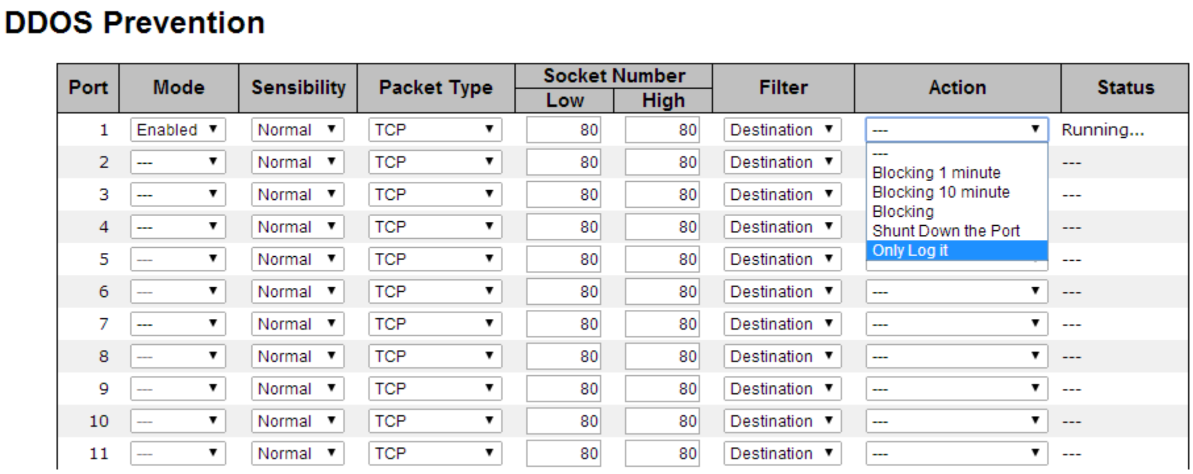
Figure 120 - Alive Check

Label	Description
Mode	Enable/Disable Alive Check of the port.
Action	Indicates the action when alive check failed. Possible actions are:
---	Do nothing.

Label	Description
Link Change	Disables or enables the port
Only log it	Simply sends logs to the log server
Shunt Down the port	Disables the port
Only Log it	Just log the event.
Status	Indicates the Alive Check status. Possible statuses are: ---: Disable. Analysing: Analyse the packet throughput for initialization. Running: Function ready. Attacked: DDOS attack happened.

5.9.2.1.3 DDOS Prevention

This page provides DDOS Prevention configurations. The switch can monitor ingress packets, and perform actions when DDOS attack occurred on this port. You can configure the setting to achieve maximum protection.



DDOS Prevention

Port	Mode	Sensibility	Packet Type	Socket Number		Filter	Action	Status
				Low	High			
1	Enabled	Normal	TCP	80	80	Destination	---	Running...
2	---	Normal	TCP	80	80	Destination		---
3	---	Normal	TCP	80	80	Destination		---
4	---	Normal	TCP	80	80	Destination		---
5	---	Normal	TCP	80	80	Destination		---
6	---	Normal	TCP	80	80	Destination	---	---
7	---	Normal	TCP	80	80	Destination	---	---
8	---	Normal	TCP	80	80	Destination	---	---
9	---	Normal	TCP	80	80	Destination	---	---
10	---	Normal	TCP	80	80	Destination	---	---
11	---	Normal	TCP	80	80	Destination	---	---

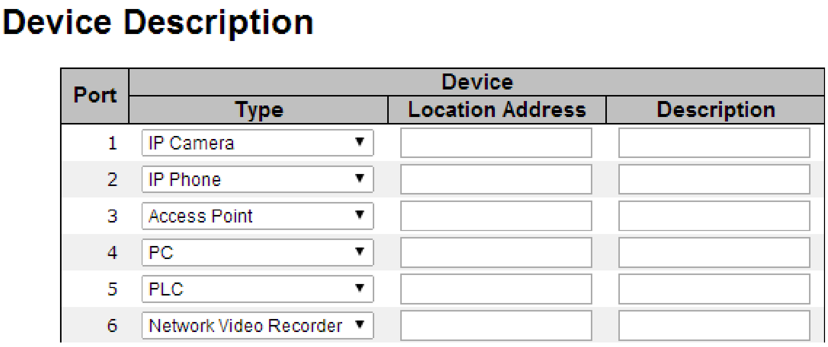
Figure 121 - DDoS Prevention

Label	Description
Mode	Enables or disables DDOS prevention of the port
Sensibility	Indicates the level of DDOS detection. Possible levels are: **Low**: low sensibility **Normal**: normal sensibility **Medium**: medium sensibility **High**: high sensibility

Label	**Description**
Packet Type	Indicates the types of DDoS attack packets to be monitored. Possible types are: **RX Total**: all ingress packets **RX Unicast**: unicast ingress packets **RX Multicast**: multicast ingress packets **RX Broadcast**: broadcast ingress packets **TCP**: TCP ingress packets **UDP**: UDP ingress packets
Socket Number	If packet type is UDP (or TCP), please specify the socket number here. The socket number can be a range of numbers, from low to high, or a single number. In this case, please insert the same number.
Filter	If packet type is UDP (or TCP), please choose the socket direction (Destination/Source).
Action	Indicates the action to take when DDOS attacks occur. Possible actions are: **---**: no action **Blocking 1 minute**: blocks forwarding for 1 minute and logs the event **Blocking 10 minute**: blocks forwarding for 10 minutes and logs the event **Blocking**: blocks and logs the event **Shunt Down the Port**: shuts down the port (No Link) and logs the event **Only Log it**: simply logs the event **Reboot Device**: if PoE is supported, the device can be rebooted. The event will be logged.
Status	Indicates the DDOS prevention status. Possible statuses are: **---**: disables DDOS prevention **Analyzing**: analyzes packet throughput for initialization **Running**: analysis completes and ready for next move **Attacked**: DDOS attacks occur

5.9.2.1.4 Device Description

This page allows the user to configure device description settings.



Device Description

Port	Device		
	Type	Location Address	Description
1	IP Camera ▼		
2	IP Phone ▼		
3	Access Point ▼		
4	PC ▼		
5	PLC ▼		
6	Network Video Recorder ▼		

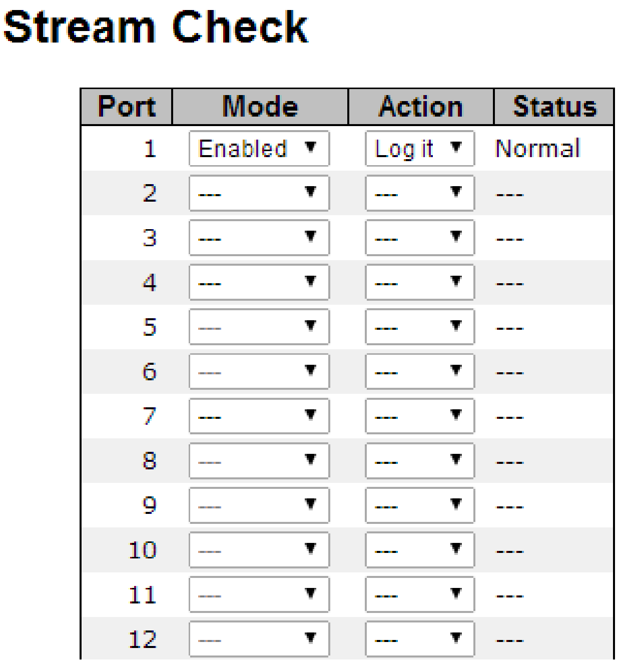
Figure 122 - Device Description

Label	**Description**
Device Type	Indicates device types. Possible types are: **---** (no specification), **IP Camera**, **IP Phone**, **Access Point**, **PC**, **PLC**, and **Network Video Recorder**

Location Address	Indicates location information of the device. The information can be used for Google Mapping.
Description	Device descriptions

5.9.2.1.5 Stream Check

This page allows the user to configure stream check settings.



Stream Check

Port	Mode	Action	Status
1	Enabled ▼	Log it ▼	Normal
2	--- ▼	--- ▼	---
3	--- ▼	--- ▼	---
4	--- ▼	--- ▼	---
5	--- ▼	--- ▼	---
6	--- ▼	--- ▼	---
7	--- ▼	--- ▼	---
8	--- ▼	--- ▼	---
9	--- ▼	--- ▼	---
10	--- ▼	--- ▼	---
11	--- ▼	--- ▼	---
12	--- ▼	--- ▼	---

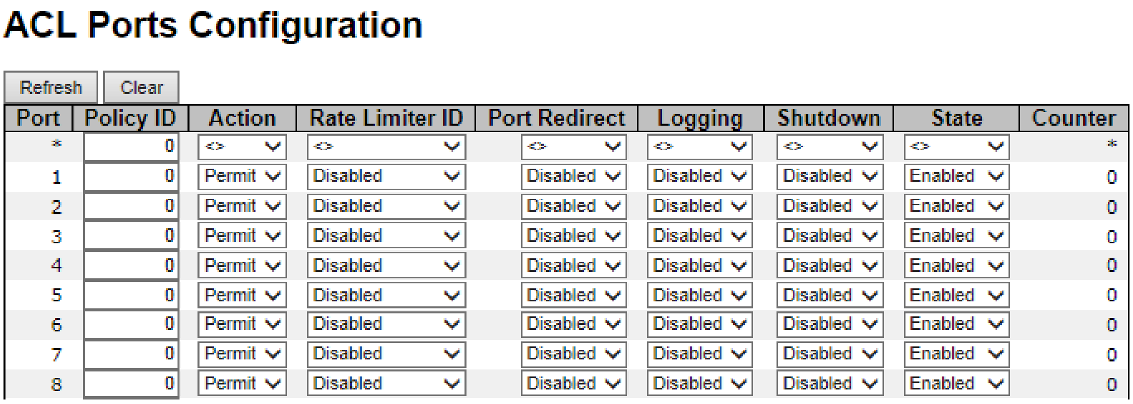
Figure 123 - Steam Check

Label	**Description**
Mode	Enables or disables stream monitoring of the port
Action	Indicates the action to take when the stream gets low. Possible actions are: **---**: no action **Log it**: simply logs the event

5.9.3 ACL

5.9.3.1 Ports

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



ACL Ports Configuration

Port	Policy ID	Action	Rate Limiter ID	Port Redirect	Logging	Shutdown	State	Counter
*	0	<>	<>	<>	<>	<>	<>	*
1	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
2	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
3	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
4	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
5	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
6	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
7	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0
8	0	Permit	Disabled	Disabled	Disabled	Disabled	Enabled	0

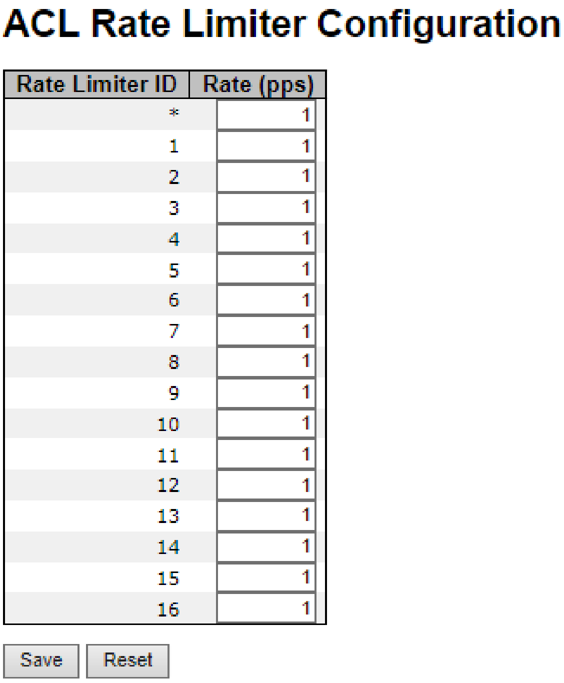
Figure 124 - ACL Ports Configuration

Label	**Description**
Port	The logical port for the settings contained in the same row.
Policy ID	Select the policy to apply to this port. The allowed values are 0 through 255. The default value is 0.
Action	Select to **Permit** or **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 16**. The default value is Disabled.
Port Redirect	Select which port frames are redirected on. The allowed values are **Disabled** or a specific port number and it can't be set when action is permitted. 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**.

Label	Description
State	Specify the state of this port. The allowed values are: **Enabled**: To re-open ports by changing the volatile port configuration of the ACL user module. **Disabled**: To close ports by changing the volatile port configuration of the ACL user module. The default value is **Enabled**.
Counter	Counts the number of frames that match this ACE.
Refresh	Click to refresh the page immediately.
Clear	Clear all statistics counters.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.9.3.2 Rate Limiter

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



ACL Rate Limiter Configuration

Rate Limiter ID	Rate (pps)
*	1
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1

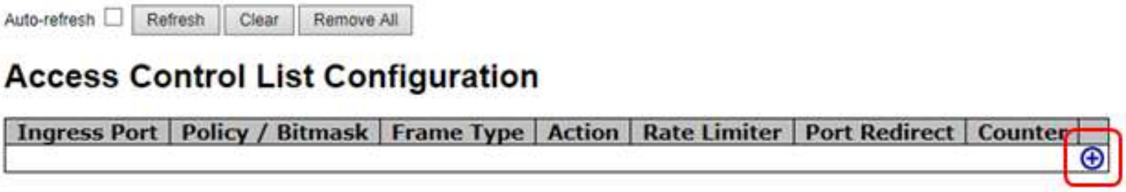
Figure 125 - ACL Rate Limiter Configuration

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). The allowed range is 0-131071 pps.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.9.3.3 Access Control List

This page shows the Access Control List (ACL), which is made up of the ACEs defined on this switch.

Each row describes an ACE that is defined. The maximum number of ACEs is 512 on each switch. Click on the lowest plus sign to add a new ACE to the list. The reserved ACEs used for internal protocol, cannot be edited or deleted, the order sequence cannot be changed and the priority is highest.



Auto-refresh □ Refresh Clear Remove All

Access Control List Configuration

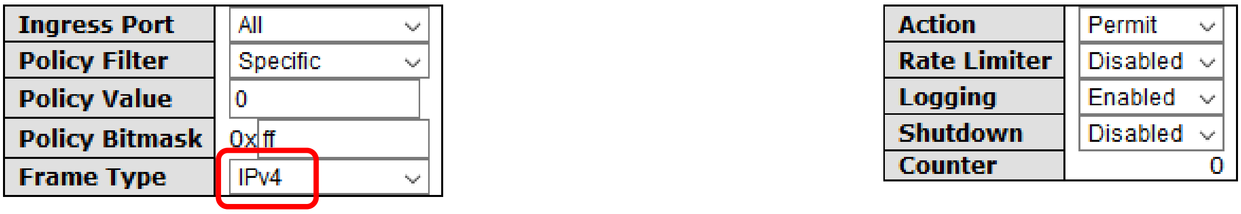
Ingress Port	Policy / Bitmask	Frame Type	Action	Rate Limiter	Port Redirect	Counter	⊕

Figure 126 - ACL Control List Configuration

An ACE consists of several parameters. These parameters vary with the frame type you have selected. First select the ingress port for the ACE, and then the frame type. Different parameter options are displayed according to the frame type you have selected.

An ACE consists of several parameters. These parameters vary according to the selected frame type t First select the Ingress Port for the ACE, and then select the frame type. Different parameter options are displayed depending on the frame type selected.

A frame that hits this ACE matches the configuration that is defined here.



Ingress Port	All
Policy Filter	Specific
Policy Value	0
Policy Bitmask	0xff
Frame Type	IPv4

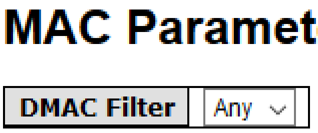
Action	Permit
Rate Limiter	Disabled
Logging	Enabled
Shutdown	Disabled
Counter	0

Figure 127 - ACE Configuration

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 Filter	Specify the policy number filter for this ACE. **Any:** No policy filter is specified. (policy filter status is "don't-care".) **Specific:** If you want to filter a specific policy with this ACE, choose this value. Two fields —policy value and bitmask appear. • **Policy Value**: Enter a range between 0 and 255. • **Policy Bitmask**: Enter a range between 0x0 and 0xff.

Label	Description
Frame Type	Indicates the frame type for this 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 describes 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. **IPv4**: only IPv4 frames can match the ACE. Notice the IPv4 frames will not match the ACE with Ethernet type. **IPv6:** Only IPv6 frames can match this ACE. Notice the IPv6 frames won't match the ACE with Ethernet type.
Action	Specifies the action to taken 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 16. **Disabled** means the rate limiter 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.

5.9.3.3.1 MAC Parameters



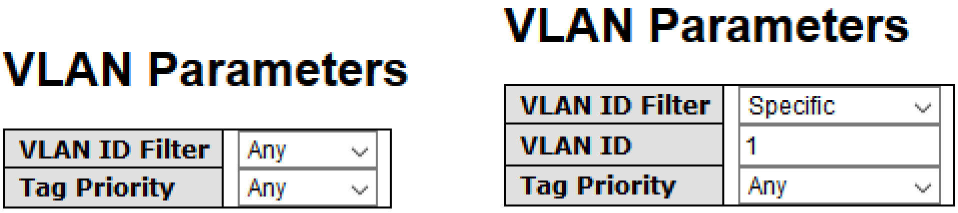
MAC Parameters

DMAC Filter: Any

Figure 128 - MAC Parameters

Label	Description
DMAC Filter	Specifies the destination MAC filter for this ACE **Any**: no DMAC filter is specified (DMAC filter status is "**don't-care**"). **MC**: frame must be multicast. **BC**: frame must be broadcast. **UC**: frame must be unicast.

5.9.3.3.2 VLAN Parameters



VLAN Parameters

VLAN ID Filter	Any
Tag Priority	Any

or

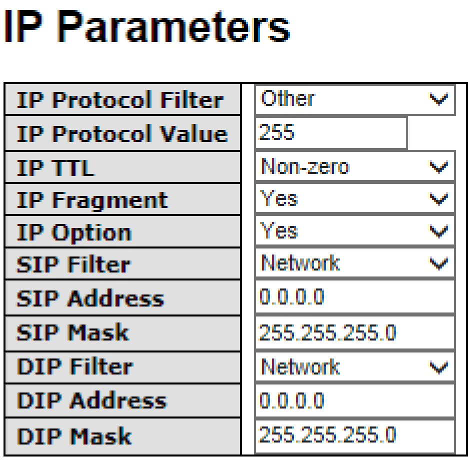
VLAN Parameters

VLAN ID Filter	Specific
VLAN ID	1
Tag Priority	Any

Figure 129 - VLAN Parameters

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, the user 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 numbers are in the range from 0 to 7 or range 0-1, 2-3, 4-5, 6-7, 0-3, and 4-7 **Any** means that no tag priority is specified (tag priority is "**don't-care**").

5.9.3.3.3 IP Parameters



IP Parameters

IP Protocol Filter	Other
IP Protocol Value	255
IP TTL	Non-zero
IP Fragment	Yes
IP Option	Yes
SIP Filter	Network
SIP Address	0.0.0.0
SIP Mask	255.255.255.0
DIP Filter	Network
DIP Address	0.0.0.0
DIP Mask	255.255.255.0

Figure 130 - IP Parameters

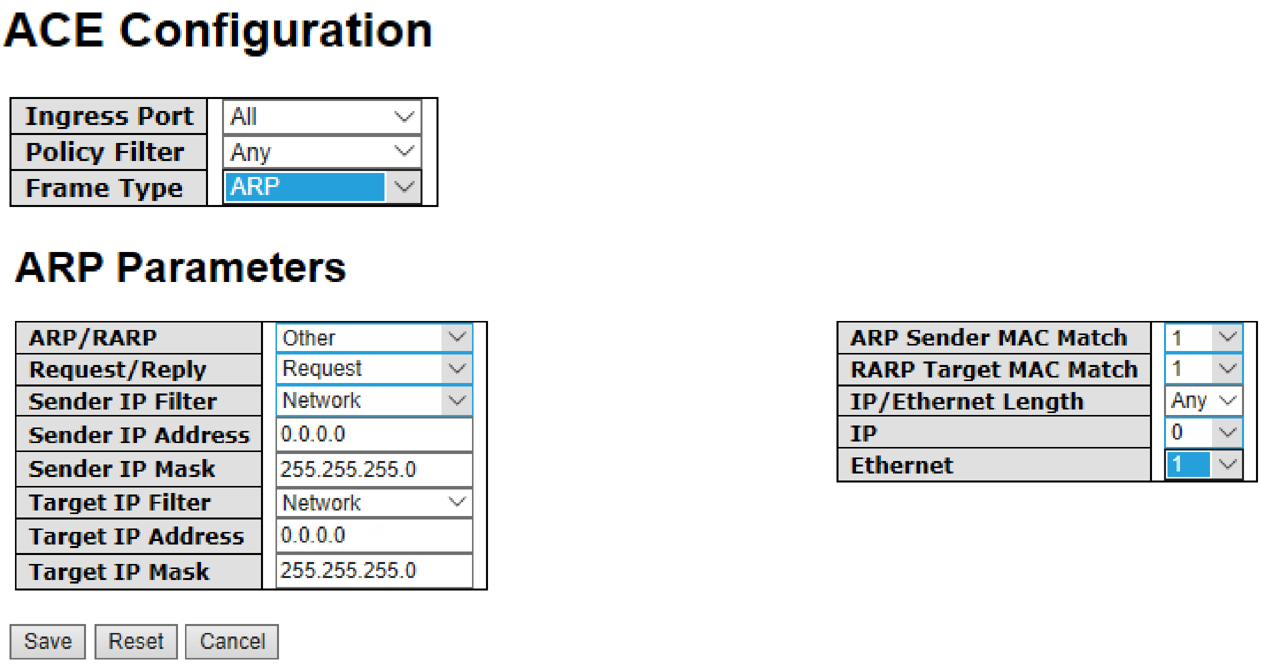
The IP parameters can be configured when Frame Type of IPv4 is selected (see Figure 127 - ACE Configuration).

Label	Description
IP Protocol Filter	Specifies the IP protocol filter for the ACE **Any:** no IP protocol filter is specified ("**don't-care**"). **Other:** 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, go to the Help file.
IP Protocol Value	**Other** allows the user 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 (TTL) 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 (SIP) 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.

Label	Description
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**"). **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.

5.9.3.3.4 ARP Parameters

The ARP parameters can be configured when Frame Type of ARP is selected (see below).



ACE Configuration

Ingress Port	All
Policy Filter	Any
Frame Type	ARP

ARP Parameters

ARP/RARP	Other
Request/Reply	Request
Sender IP Filter	Network
Sender IP Address	0.0.0.0
Sender IP Mask	255.255.255.0
Target IP Filter	Network
Target IP Address	0.0.0.0
Target IP Mask	255.255.255.0

ARP Sender MAC Match	1
RARP Target MAC Match	1
IP/Ethernet Length	Any
IP	0
Ethernet	1

Figure 131 - ARP Parameters

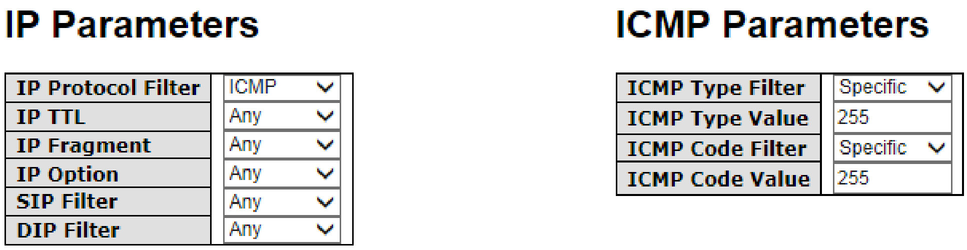
Label	Description
ARP/RARP	Specifies the available ARP/RARP opcode (OP) flag for the ACE **Any**: no ARP/RARP OP flag is specified (OP is "**don't-care**"). **ARP**: frame must have ARP/RARP opcode set to ARP **RARP**: frame must have ARP/RARP opcode set to RARP. **Other**: frame has unknown ARP/RARP 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. Dotted Decimal Notation refers to a method of writing IP addresses using decimal numbers and dots as separators between octets. An IPv4 dotted decimal address has the form x.y.z.w, where x, y, z, and w are decimal numbers between 0 and 255.
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**"). **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 Sender MAC 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**").

Label	Description
RARP Target 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 target MAC address **1**: RARP frames where THA is equal to the target MAC 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**").

5.9.3.3.5 ICMP Parameters

ICMP Parameters can be configured when:

- Frame Type is IPv4
- IP Protocol Filter is Internet Control Message Protocol ()



IP Parameters

IP Protocol Filter	ICMP
IP TTL	Any
IP Fragment	Any
IP Option	Any
SIP Filter	Any
DIP Filter	Any

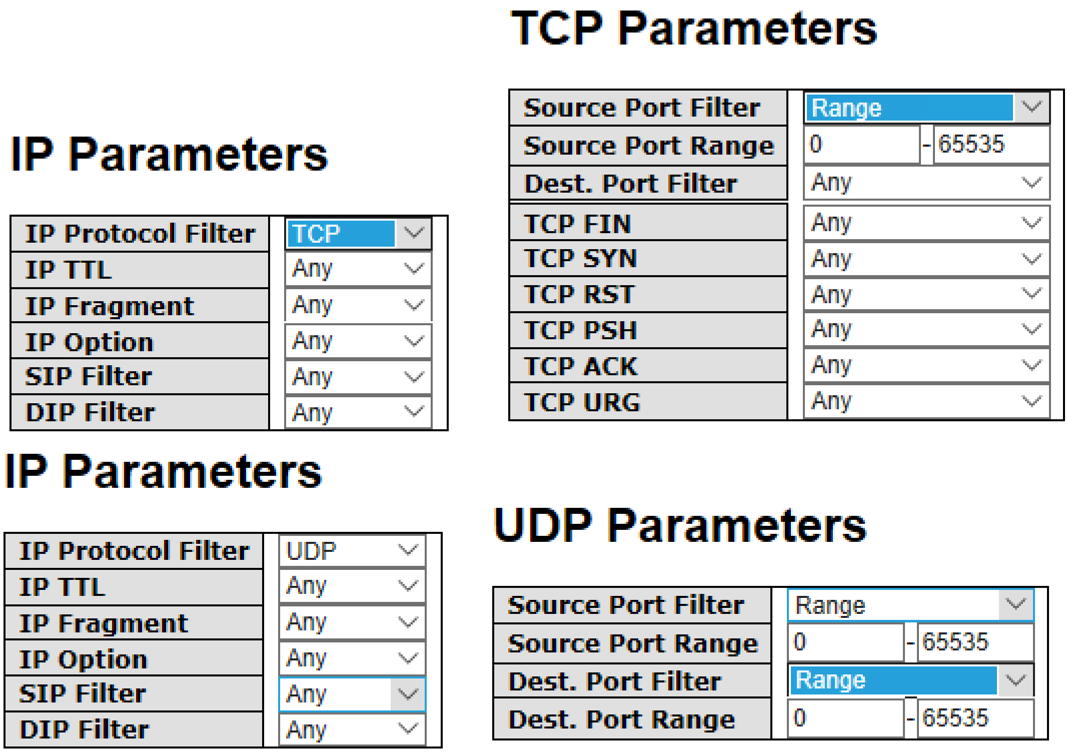
ICMP Parameters

ICMP Type Filter	Specific
ICMP Type Value	255
ICMP Code Filter	Specific
ICMP Code Value	255

Figure 132 - ICMP Parameters

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.

5.9.3.3.6 TCP /UDP Parameters



TCP Parameters

Source Port Filter	Range
Source Port Range	0 - 65535
Dest. Port Filter	Any
TCP FIN	Any
TCP SYN	Any
TCP RST	Any
TCP PSH	Any
TCP ACK	Any
TCP URG	Any

IP Parameters

IP Protocol Filter	TCP
IP TTL	Any
IP Fragment	Any
IP Option	Any
SIP Filter	Any
DIP Filter	Any

IP Parameters

IP Protocol Filter	UDP
IP TTL	Any
IP Fragment	Any
IP Option	Any
SIP Filter	Any
DIP Filter	Any

UDP Parameters

Source Port Filter	Range
Source Port Range	0 - 65535
Dest. Port Filter	Range
Dest. Port Range	0 - 65535

Figure 133 - TCP / UDP Parameters

TCP Parameters can be configured when IP Protocol Filter is set to TCP.

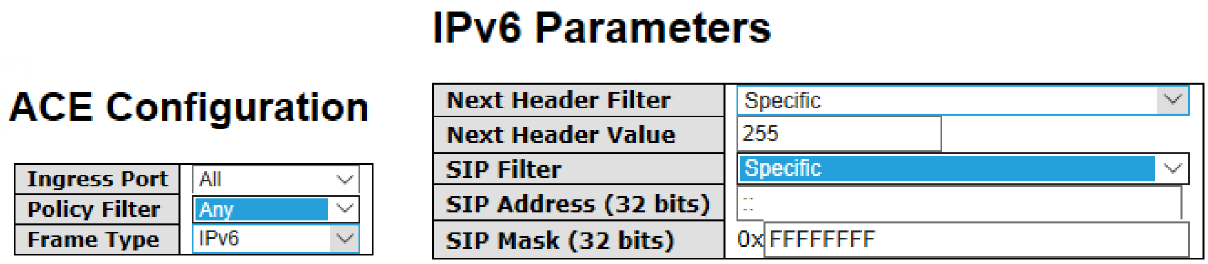
Similarly, UDP Parameters can be configured when IP Protocol Filter is set to UDP.

Label	Description
TCP/UDP Source Port 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 Port 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 range.
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 range.
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**").

Label	Description
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 **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**").

5.9.3.3.7 IPv6 Parameters

The IPv6 parameters can be configured when Frame Type "IPv6" is selected.



IPv6 Parameters

ACE Configuration

Ingress Port	All
Policy Filter	Any
Frame Type	IPv6

Next Header Filter	Specific
Next Header Value	255
SIP Filter	Specific
SIP Address (32 bits)	::
SIP Mask (32 bits)	0x FFFFFFFF

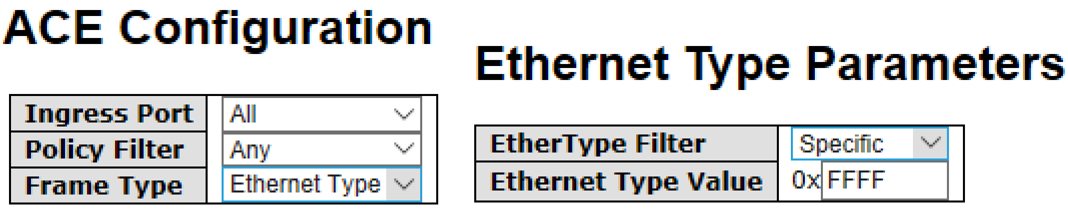
Figure 134 - IPv6 Parameters

Label	Description
Next Header Filter	Specify the IPv6 next header filter for this ACE. **Any**: No IPv6 next header filter is specified ("don't-care"). **Specific**: If you want to filter a specific IPv6 next header filter with this ACE, choose this value. A field for entering an IPv6 next header filter appears.
Next Header Value	When Specific is selected for the IPv6 next header value, you can enter a specific value. The allowed range is **0** to **255**. A frame that hits this ACE matches this IPv6 protocol value.
SIP Filter	Specify the source IPv6 filter for this ACE. **Any**: No source IPv6 filter is specified. (Source IPv6 filter is "don't-care".) **Specific**: Source IPv6 filter is set to Network. Specify the source IPv6 address and source IPv6 mask in the SIP Address fields that appear.

Label	Description
SIP Address (32 bits)	When **Specific** is selected for the source IPv6 filter, you can enter a specific SIPv6 address.
SIP Mask (32 bits)	When **Specific** is selected for the source IPv6 filter, you can enter a specific SIPv6 mask.

5.9.3.3.8 Ethernet Type Parameters

The Ethernet Type parameters can be configured when Frame Type "Ethernet Type" is selected.



ACE Configuration

Ingress Port	All
Policy Filter	Any
Frame Type	Ethernet Type

Ethernet Type Parameters

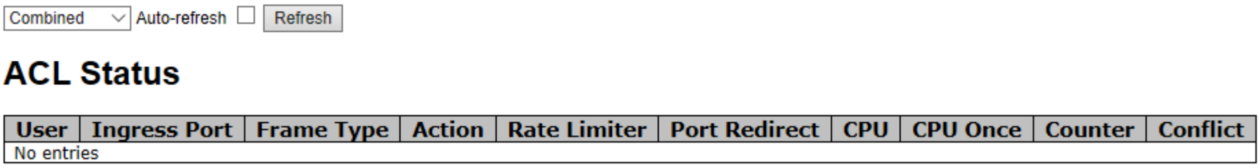
EtherType Filter	Specific
Ethernet Type Value	0x FFFF

Figure 135 - Ethernet Type Parameters

Label	Description
EtherType Filter	Specify the Ethernet type filter for this ACE. **Any**: No EtherType filter is specified (EtherType filter status is "don't-care"). **Specific**: If you want to filter a specific EtherType filter with this ACE, you can enter a specific EtherType value. A field for entering a EtherType value appears.
Ethernet Type Value	When **Specific** is selected for the EtherType filter, you can enter a specific EtherType value. The allowed range is **0x600** to **0xFFFF** but excluding 0x800(IPv4), 0x806(ARP) and 0x86DD(IPv6). A frame that hits this ACE matches this EtherType value.

5.9.3.4 ACL Status

This page shows the ACL status by different ACL users. Each row describes the ACE that is defined. It is a conflict if a specific ACE is not applied to the hardware due to hardware limitations. The maximum number of ACEs is 512 on each switch.



ACL Status

User	Ingress Port	Frame Type	Action	Rate Limiter	Port Redirect	CPU	CPU Once	Counter	Conflict
No entries									

Figure 136 - ACL Status

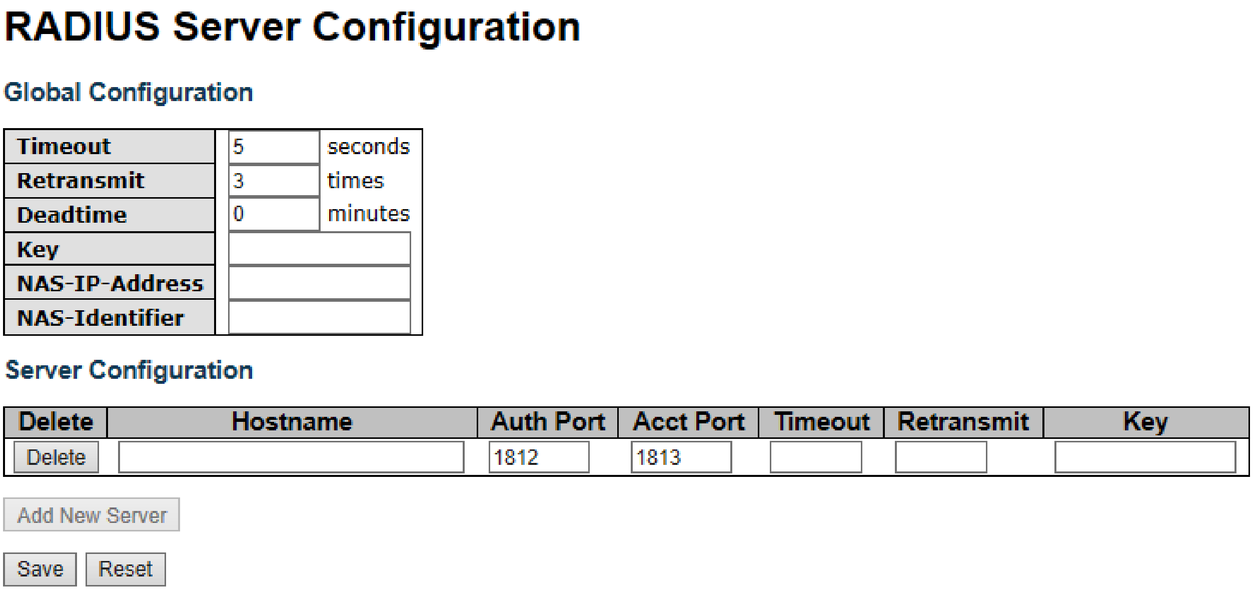
Label	Description
User	Indicates the ACL user.
Ingress Port	Indicates the ingress port to which the ACE will apply. **All**: the ACE will match all ports. **Port n**: the ACE applies to this port number, where n is the number of the switch port.

Label	Description
Frame Type	Indicates the frame type of the ACE. **Any**: The ACE will match any frame type. **EType**: The ACE will match Ethernet Type frames. Note that an Ethernet Type based ACE will not get matched by IP and ARP frames. **ARP**: The ACE will match ARP/RARP frames. **IPv4**: The ACE will match all IPv4 frames. **IPv4/ICMP:** The ACE will match IPv4 frames with ICMP protocol. **IPv4/UDP**: The ACE will match IPv4 frames with UDP protocol. **IPv4/TCP**: The ACE will match IPv4 frames with TCP protocol. **IPv4/Other**: The ACE will match IPv4 frames, which are not ICMP/UDP/TCP. **IPv6**: The ACE will match all IPv6 standard frames.
Action	Indicates the forwarding action of the ACE. **Permit**: Frames matching the ACE may be forwarded and learned. **Deny**: Frames matching the ACE are dropped.
Rate Limiter	Indicates the rate limiter number of the ACE. The allowed range is 1 to 16. When **Disabled** is displayed, the rate limiter operation is disabled.
Port Redirect	Frames that match the ACE are copied to the port number specified here. The allowed range is the same as the switch port number range. Disabled indicates that the port copy operation is disabled.
CPU	Forwards packet that matches the specific ACE to CPU.
CPU Once	Forwards first packet that matches the specific ACE to CPU.
Counter	The counter indicates the number of times the ACE was hit by a frame.
Conflict	Indicates the hardware status of the specific ACE. The specific ACE is not applied to the hardware due to hardware limitations.
Select ACL	Select one of the following to be displayed: **Combined**: Shows both static and conflict entries in the ACL. **Static:** Shows static entries in the ACL. **IPMC:** Shows IPv4 MultiCast (IPMC)entries in the ACL. **DHCP:** Shows DHCP entries in the ACL **Loop Protect:** Shows Loop-protect entries in the ACL. Loop protect feature can prevent Layer2 loops by sending loop protect protocol packets and shutting down interfaces in case they receive loop protect packets originated from themselves. The feature works by checking source MAC address of received loop protect packet against MAC addresses of loop protect enabled interfaces. If the match is found, loop protect disables the interface which received the loop protect packet. Log message warns about this event and interface is marked with a loop protect comment by system. **Conflict:** Show conflict entries in the ACL.
Refresh	Click to refresh the page.
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals.

5.9.4 AAA

5.9.4.1 AAA – Radius Server Configuration

This page allows the user to configure RADIUS servers.



RADIUS Server Configuration

Global Configuration

Timeout	5	seconds
Retransmit	3	times
Deadtime	0	minutes
Key		
NAS-IP-Address		
NAS-Identifier		

Server Configuration

Delete	Hostname	Auth Port	Acct Port	Timeout	Retransmit	Key
Delete		1812	1813			

Figure 137 - Radius Server Configuration

Label	Description
Timeout	Timeout is the number of seconds, in the range 1 to 1000, to wait for a reply from a RADIUS server before retransmitting the request. 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.
Retransmit	Retransmit is the number of times, in the range 1 to 1000, a RADIUS request is retransmitted to a server that is not responding. If the server has not responded after the last retransmit it is considered to be dead.
Dead Time	Deadtime, which can be set to a number between 0 to 1440 minutes, and 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 Deadtime to a value greater than 0 (zero) will enable this feature, but only if more than one server has been configured.
Key	The secret key - up to 63 characters long - shared between the RADIUS server and the switch.
NAS-IP-Address	The IPv4 address to be used as attribute 4 in RADIUS Access-Request packets. If this field is left blank, the IP address of the outgoing interface is used.
NAS-Identifier	The identifier - up to 255 characters long - to be used as attribute 32 in RADIUS Access-Request packets. If this field is left blank, the NAS-Identifier is not included in the packet.
Server Configuration	
Delete	To delete a RADIUS server entry, check this box. The entry will be deleted during the next Save.

Label	Description
Hostname	The IP address of the RADIUS server.
Auth Port	The UDP port to use on the RADIUS server for authentication. It's shown as 1813.
Acct Port	The UDP port to be used on the RADIUS server for accounting. It's shown as 1812.
Timeout	This optional setting overrides the global timeout value. Leaving it blank will use the global timeout value.
Retransmit	This optional setting overrides the global retransmit value. Leaving it blank will use the global retransmit value.
Key	This optional setting overrides the global key. Leaving it blank will use the global key.
Add New Server	Click "Add New Server" to add a new RADIUS server. An empty row is added to the table, and the RADIUS server can be configured as needed. Up to 5 servers are supported.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

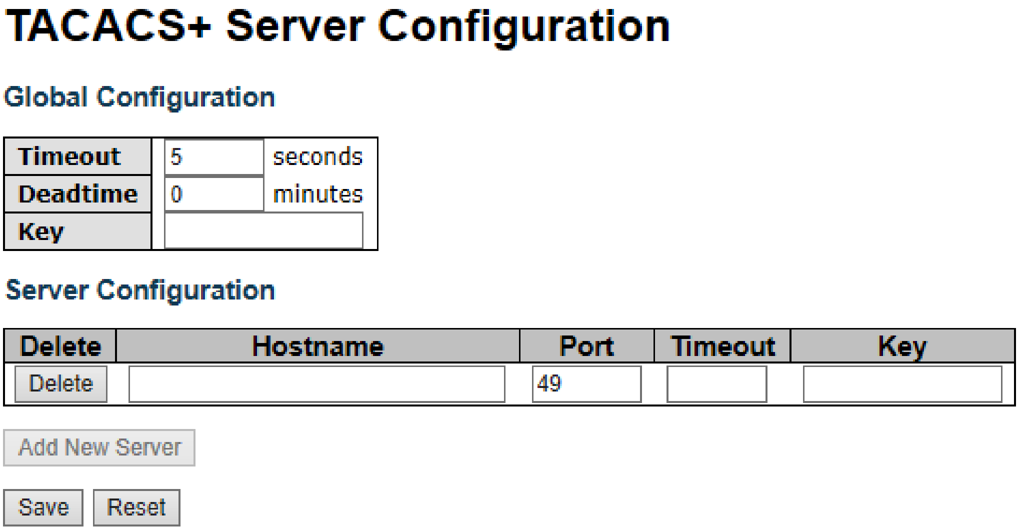
5.9.4.2 TACACS+ Server Configuration

TACACS+ is an acronym for Terminal Access Controller Access Control System Plus. It is a networking protocol which provides access control for routers, network access servers and other networked computing devices via one or more centralized servers. TACACS+ provides separate authentication, authorization, and accounting services.

This page allows the user to configure the TACACS+ servers.

Global Configuration

These setting are common for all of the TACACS+ servers.



TACACS+ Server Configuration

Global Configuration

Timeout	5	seconds
Deadtime	0	minutes
Key		

Server Configuration

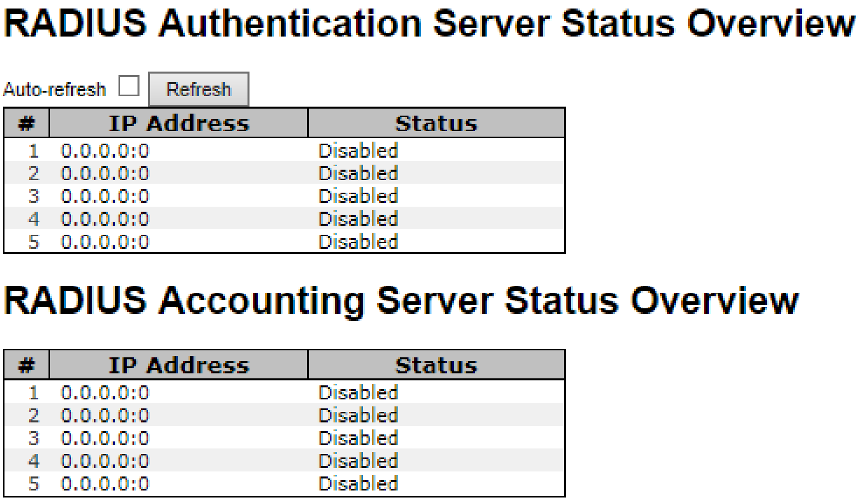
Delete	Hostname	Port	Timeout	Key
Delete		49		

Figure 138 - TACACS+ Server Configuration

Label	Description
Timeout	Timeout is the number of seconds, in the range 1 to 1000, to wait for a reply from a TACACS+ server before it is considered to be dead. TACACS+ uses TCP (while RADIUS operates over UDP). Since TACACS+ uses the authentication, authorization, and accounting (AAA) architecture, these separate components of the protocol can be segregated and handled on separate servers. RADIUS encrypts only the users' password as it travels from the RADIUS client to RADIUS server. TACACS+ encrypts the username, authorization, and accounting in addition to user's password, and therefore does not have the vulnerabilities present in the RADIUS protocol.
Dead Time	Deadtime, which can be set to a number between 0 to 1440 minutes, 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 Deadtime to a value greater than 0 (zero) will enable this feature, but only if more than one server has been configured
Key	The secret key (up to 63 characters long) shared between the TACACS+ server and the switch.
Server Configuration The table has a row for each TACACS+ server and a number of columns, which are:	
Delete	To delete a TACACS+ server entry, check this box. The entry will be deleted during the next **Save**.
Hostname	The IP address of the TACACS+ server..
Port	The TCP port to use on the TACACS+ server for authentication.
Timeout	This optional setting overrides the global timeout value. Leaving it blank will use the global timeout value.
Key	This optional setting overrides the global key. Leaving it blank will use the global key.
Add new Server	Click to add a new TACACS+ server. An empty row is added to the table, and the TACACS+ server can be configured as needed. Up to 5 servers are supported.
Delete	The button can be used to undo the addition of the new server.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.9.4.3 RADIUS Overview

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



RADIUS Authentication Server Status Overview

Auto-refresh □ Refresh

#	IP Address	Status
1	0.0.0.0:0	Disabled
2	0.0.0.0:0	Disabled
3	0.0.0.0:0	Disabled
4	0.0.0.0:0	Disabled
5	0.0.0.0:0	Disabled

RADIUS Accounting Server Status Overview

#	IP Address	Status
1	0.0.0.0:0	Disabled
2	0.0.0.0:0	Disabled
3	0.0.0.0:0	Disabled
4	0.0.0.0:0	Disabled
5	0.0.0.0:0	Disabled

Figure 139 - Radius Authentication and Accounting Server Status Configuration

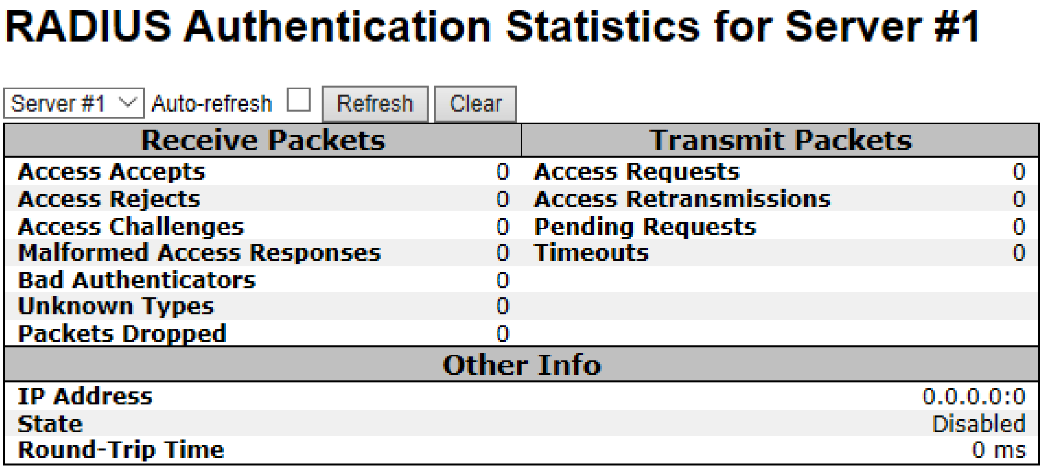
Label	Description
#	The RADIUS server number. Click to navigate to detailed statistics of the server.
IP Address	The IP address and UDP port number (in <IP Address>: <UDP Port> notation) of the server.
Status	The current status of the server. This field takes one of the following values: **Disabled:** 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 access attempts. **Dead** (X seconds left): Access attempts were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get 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.
#	The RADIUS server number. Click to navigate to detailed statistics for this server.
IP Address	The IP address and UDP port number (in <IP Address>:<UDP Port> notation) of this server.
Status	The current status of the server. This field takes 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 were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get 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.

Label	Description
Refresh	Click to refresh the page immediately.
Auto-refresh	Check to enable an automatic refresh of the page at regular intervals.

5.9.4.4 RADIUS Details

This page provides detailed statistics for a particular RADIUS server.

The statistics map closely to those specified in RFC4668 - RADIUS Authentication Client MIB. [3] Use the server select box to switch between the backend servers to show details for.



RADIUS Authentication Statistics for Server #1

Server #1 Auto-refresh □ Refresh Clear

Receive Packets		Transmit Packets	
Access Accepts	0	Access Requests	0
Access Rejects	0	Access Retransmissions	0
Access Challenges	0	Pending Requests	0
Malformed Access Responses	0	Timeouts	0
Bad Authenticators	0		
Unknown Types	0		
Packets Dropped	0		

Other Info	
IP Address	0.0.0.0:0
State	Disabled
Round-Trip Time	0 ms

Figure 140 - Radius Authentication Statistics for Server #1

Label	Description
Server #n ↓	The server select drop down box determines which server's information is shown by selecting server #n. Where 'n' is a server, 1 to 5.
Auto-refresh	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Refresh	Click to refresh the page immediately.
Clear	Clears the counters for the selected server. The "Pending Requests" counter will not be cleared by this operation.

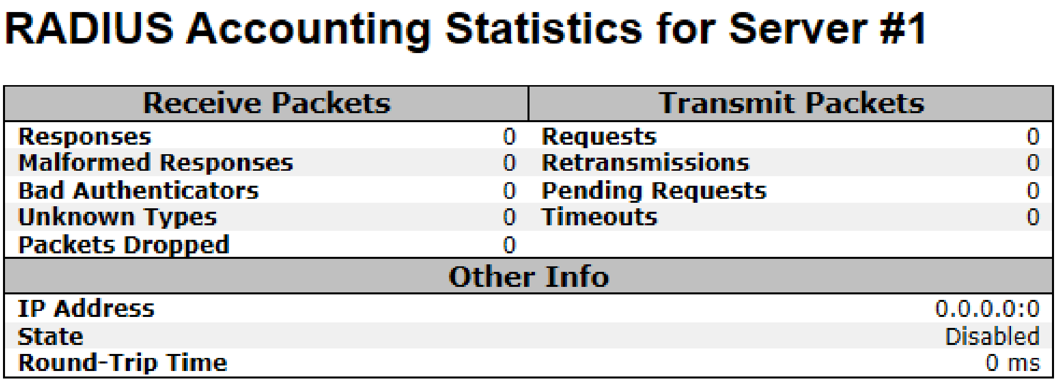
Packet Counters: RADIUS authentication server packet counter. There are seven receive and four transmit counters (see below for details).

Rx/Tx	Name	RFC4668 Name [3]	Description
Rx	**Access Accepts**	radiusAuthClientExtAccessAccepts	The number of RADIUS Access-Accept packets (valid or invalid) received from the server.
Rx	**Access Rejects**	radiusAuthClientExtAccessRejects	The number of RADIUS Access-Reject packets (valid or invalid) received from the server.

Rx/Tx	Name	RFC4668 Name [3]	Description
Rx	**Access Challenges**	radiusAuthClientExtAccessChallenges	The number of RADIUS Access-Challenge packets (valid or invalid) received from the server.
Rx	**Malformed Access Responses**	radiusAuthClientExtMalformedAccessResponses	The number of malformed RADIUS Access-Response packets received from the server. Malformed packets include packets with an invalid length. Bad authenticators or Message Authenticator attributes or unknown types are not included as malformed access responses.
Rx	**Bad Authenticators**	radiusAuthClientExtBadAuthenticators	The number of RADIUS Access-Response packets containing invalid authenticators or Message Authenticator attributes received from the server.
Rx	**Unknown Types**	radiusAuthClientExtUnknownTypes	The number of RADIUS packets that were received with unknown types from the server on the authentication port and dropped.
Rx	**Packets Dropped**	radiusAuthClientExtPacketsDropped	The number of RADIUS packets that were received from the server on the authentication port and dropped for some other reason.
Tx	**Access Requests**	radiusAuthClientExtAccessRequests	The number of RADIUS Access-Request packets sent to the server. This does not include retransmissions.
Tx	**Access Retransmissions**	radiusAuthClientExtAccessRetransmissions	The number of RADIUS Access-Request packets retransmitted to the RADIUS authentication server.
Tx	**Pending Requests**	radiusAuthClientExtPendingRequests	The number of RADIUS Access-Request packets destined for the server that have not yet timed out or received a response. This variable is incremented when an Access-Request is sent and decremented due to receipt of an Access-Accept, Access-Reject, Access-Challenge, timeout, or retransmission.
Tx	**Timeouts**	radiusAuthClientExtTimeouts	The number of authentication timeouts to the server. After a timeout, the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout.

Other info: This section contains information about the state of the server and the latest round-trip time.

Name	RFC4668 Name [4]	Description
IP Address	-	IP address and UDP port for the authentication server in question.
State	-	Shows the state of the server. It takes one of the following values: **Disabled**: The selected 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 access attempts. **Dead** (X seconds left): Access attempts were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get 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.
Round-Trip Time	radiusAuthClientExtRoundTripTime	The time interval (measured in milliseconds) between the most recent Access-Reply/Access-Challenge and the Access-Request that matched it from the RADIUS authentication server. The granularity of this measurement is 100 ms. A value of 0 ms indicates that there hasn't been round-trip communication with the server yet.



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	0.0.0.0:0
State	Disabled
Round-Trip Time	0 ms

Figure 141 - Radius Accounting Statistics for Server #1

The statistics map closely to those specified in RFC4670 - RADIUS Accounting Client MIB. [4]

Use the server select box to switch between the backend servers to show details for.

Packet Counters: RADIUS accounting server packet counter. There are five receive and four transmit counters.

Rx/Tx	Name	RFC4670 Name [4]	Description
Rx	Responses	radiusAccClientExtResponses	The number of RADIUS packets (valid or invalid) received from the server.
Rx	Malformed	radiusAccClientExtMalformedResponses	The number of malformed

Rx/Tx	Name	RFC4670 Name [4]	Description
	Responses		RADIUS packets received from the server. Malformed packets include packets with an invalid length. Bad authenticators or unknown types are not included as malformed access responses.
Rx	Bad Authenticators	radiusAcctClientExtBadAuthenticators	The number of RADIUS packets containing invalid authenticators received from the server.
Rx	Unknown Types	radiusAccClientExtUnknownTypes	The number of RADIUS packets of unknown types that were received from the server on the accounting port.
Rx	Packets Dropped	radiusAccClientExtPacketsDropped	The number of RADIUS packets that were received from the server on the accounting port and dropped for some other reason.
Tx	Requests	radiusAccClientExtRequests	The number of RADIUS packets sent to the server. This does not include retransmissions.
Tx	Retransmissions	radiusAccClientExtRetransmissions	The number of RADIUS packets retransmitted to the RADIUS accounting server.
Tx	Pending Requests	radiusAccClientExtPendingRequests	The number of RADIUS packets destined for the server that have not yet timed out or received a response. This variable is incremented when a Request is sent and decremented due to receipt of a Response, timeout, or retransmission.
Tx	Timeouts	radiusAccClientExtTimeouts	The number of accounting timeouts to the server. After a timeout, the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout.

Other info: This section contains information about the state of the server and the latest round-trip time.

Name	RFC4668 Name	Description [4]
IP Address	-	IP address and UDP port for the authentication server in question.
State	-	Shows the state of the server. It takes one of the following values:

Name	RFC4668 Name	Description [4]
		Disabled: The selected 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 were made to this server, but it did not reply within the configured timeout. The server has temporarily been disabled, but will get 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.
Round-Trip Time	radiusAccClientExt RoundTripTime	The time interval (measured in milliseconds) between the most recent Response and the Request that matched it from the RADIUS accounting server. The granularity of this measurement is 100 ms. A value of 0 ms indicates that there hasn't been round-trip communication with the server yet.

Label	Description
Auto-refresh□	Check this box to refresh the page automatically. Automatic refresh occurs
Refresh	Click to refresh the page immediately.
Clear	Clears the counters for the selected server. The "Pending Requests" counter will not be cleared by this operation.

5.9.5 NAS (802.1x)

5.9.5.1 Network Access Server Configuration

This page allows the user to configure the IEEE 802.1X and MAC-based authentication system and port settings. Network Access Server stands for NAS.

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. They are configured at "Security → AAA → AAA" 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, which makes MAC-based authentication is less secure than 802.1 X authentications.

5.9.5.1.1 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 [2] (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 back-end 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.

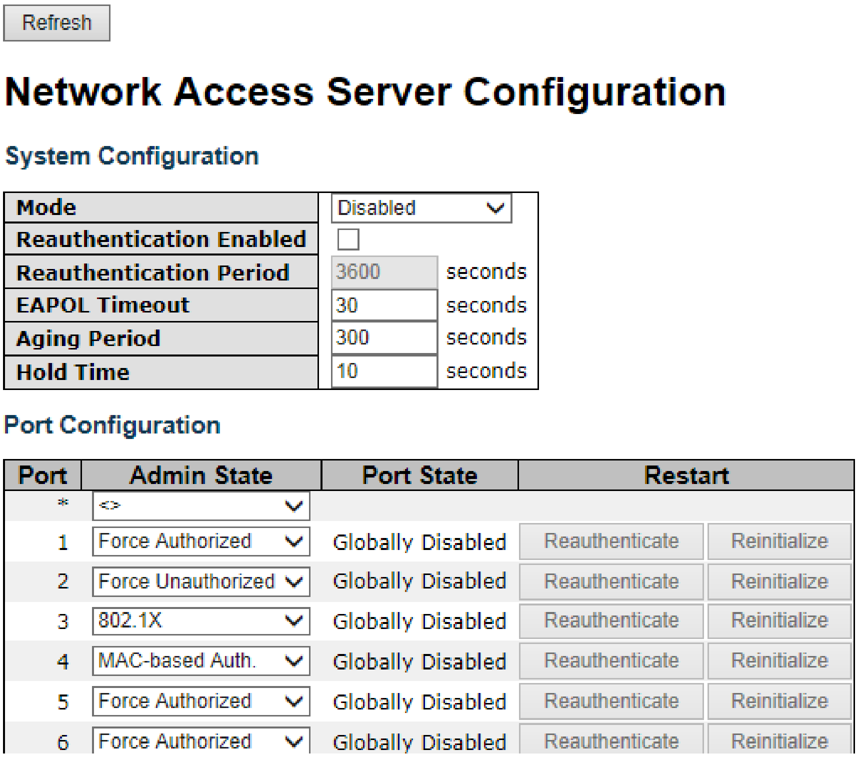
5.9.5.1.2 Overview of MAC-Based Authentication

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 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, and only the MD5-Challenge method is supported.

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



Network Access Server Configuration

System Configuration

Mode	Disabled
Reauthentication Enabled	□
Reauthentication Period	3600 seconds
EAPOL Timeout	30 seconds
Aging Period	300 seconds
Hold Time	10 seconds

Port Configuration

Port	Admin State	Port State	Restart	
*	<>			
1	Force Authorized	Globally Disabled	Reauthenticate	Reinitialize
2	Force Unauthorized	Globally Disabled	Reauthenticate	Reinitialize
3	802.1X	Globally Disabled	Reauthenticate	Reinitialize
4	MAC-based Auth.	Globally Disabled	Reauthenticate	Reinitialize
5	Force Authorized	Globally Disabled	Reauthenticate	Reinitialize
6	Force Authorized	Globally Disabled	Reauthenticate	Reinitialize

Figure 142 - Network Access Server Configuration

5.9.5.1.3System Configuration

Label	Description
Mode	Indicates if NAS is globally enabled or disabled on the switch. If globally disabled, all ports are allowed to forward frames.
Reauthentication Enabled	If checked, clients are re-authenticated after the interval specified by the Re-authentication Period. Re-authentication for 802.1X-enabled ports can be used to detect if a new device is plugged into a switch port. For MAC-based ports, re-authentication 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 **Re-authentication is Enabled**. Valid range of the value is 1 to 3600 seconds.
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.

Label	Description
Aging 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 "**Security→AAA→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.

5.9.5.1.4Port Configuration

The table has one row for each port on the switch and a number of columns, which are:

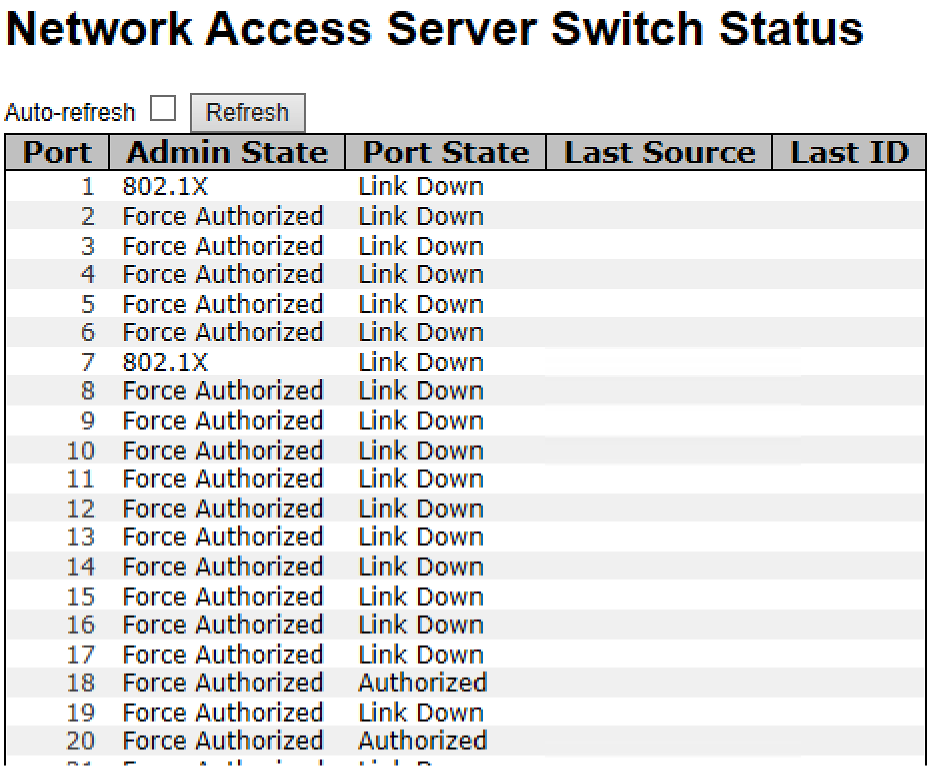
Label	Description
Port	The port number for which the configuration below applies.
Admin State	If NAS is globally enabled, this selection controls the port's authentication mode. The following modes are available: 1. **Force Authorized** 2. **Force Unauthorized** 3. **802.1X** 4. **MAC-based Auth.** All modes are explained below.
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.
802.1X	In the 802.1X-world, 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-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. EAPOL frames encapsulate EAP PDUs [2]. 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, in that it allows for different authentication methods, like MD5-Challenge, PEAP, and TLS. The important thing is that the authenticator (the switch) doesn't 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 this decision to the supplicant, the switch uses it to open up or block traffic on the switch port connected to the supplicant. Note: Suppose two backend servers are enabled and that the server timeout is configured to X seconds (using the AAA configuration page), and suppose that the first server in the list is currently down (but not considered dead). Now, if the supplicant retransmits EAPOL Start

Label	Description
	frames at a rate faster than X seconds, then it will never get authenticated, because the switch will cancel on-going backend authentication server requests whenever it receives a new EAPOL Start frame from the supplicant. And since the server hasn't yet failed (because the X seconds haven't expired), the same server will be contacted upon 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.
MAC-based Auth.	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 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 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 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

Label	Description
	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.

5.9.5.2 NAS Switch

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



Network Access Server Switch Status

Auto-refresh ☐ Refresh

Port	Admin State	Port State	Last Source	Last ID
1	802.1X	Link Down		
2	Force Authorized	Link Down		
3	Force Authorized	Link Down		
4	Force Authorized	Link Down		
5	Force Authorized	Link Down		
6	Force Authorized	Link Down		
7	802.1X	Link Down		
8	Force Authorized	Link Down		
9	Force Authorized	Link Down		
10	Force Authorized	Link Down		
11	Force Authorized	Link Down		
12	Force Authorized	Link Down		
13	Force Authorized	Link Down		
14	Force Authorized	Link Down		
15	Force Authorized	Link Down		
16	Force Authorized	Link Down		
17	Force Authorized	Link Down		
18	Force Authorized	Authorized		
19	Force Authorized	Link Down		
20	Force Authorized	Authorized		

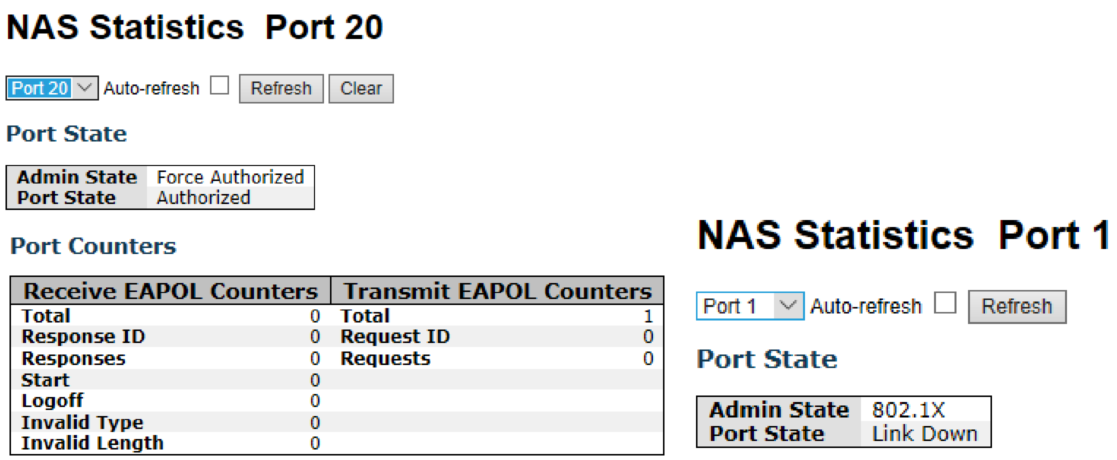
Figure 143 - Network Access Server Switch Status

Label	Description
Port	The switch port number. Click a port number to navigate to detailed NAS 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 user name (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.

5.9.5.3 NAS 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 are shown. Use the port drop-down list to select which port details to be displayed.

Note that Port counters are shown only for ports with Authorized port state such Port 20 (refer to Figure 143- Network Access Server Switch Status). Port 1 does not show Port counters.



NAS Statistics Port 20

Port State

Admin State	Force Authorized
Port State	Authorized

Port Counters

Receive EAPOL Counters		Transmit EAPOL Counters	
Total	0	Total	1
Response ID	0	Request ID	0
Responses	0	Requests	0
Start	0		
Logoff	0		
Invalid Type	0		
Invalid Length	0		

NAS Statistics Port 1

Port State

Admin State	802.1X
Port State	Link Down

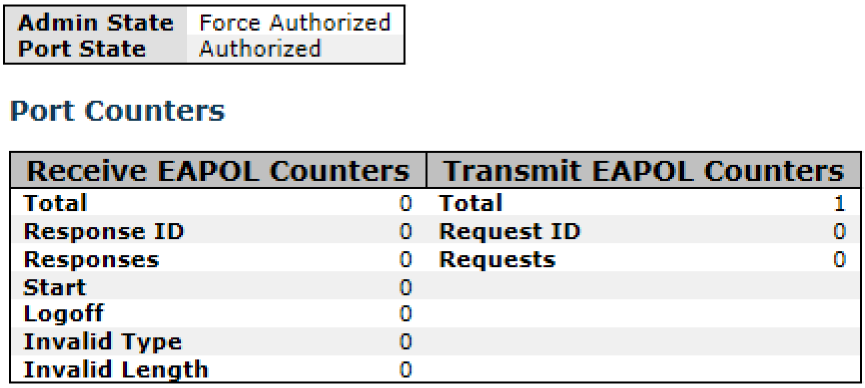
Figure 144 - NAT Statistics Admin State Force Authorized

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.
Port n ↓	The port select drop down box determines which port's information is shown by selecting port 'n'. Where 'n' is a valid port number.
Auto-refresh	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Refresh	Click to refresh the page immediately.
Clear	This button is available in the following modes: • Force Authorized • Force Unauthorized • 802.1X Click to clear the counters for the selected port

5.9.5.3.1 EAPOL Counters

These supplicant frame counters are available for the following administrative states:

- **Force Authorized**
- **Force Unauthorized**
- **802.1X**



Admin State	Force Authorized
Port State	Authorized

Port Counters

Receive EAPOL Counters		Transmit EAPOL Counters	
Total	0	**Total**	1
Response ID	0	**Request ID**	0
Responses	0	**Requests**	0
Start	0		
Logoff	0		
Invalid Type	0		
Invalid Length	0		

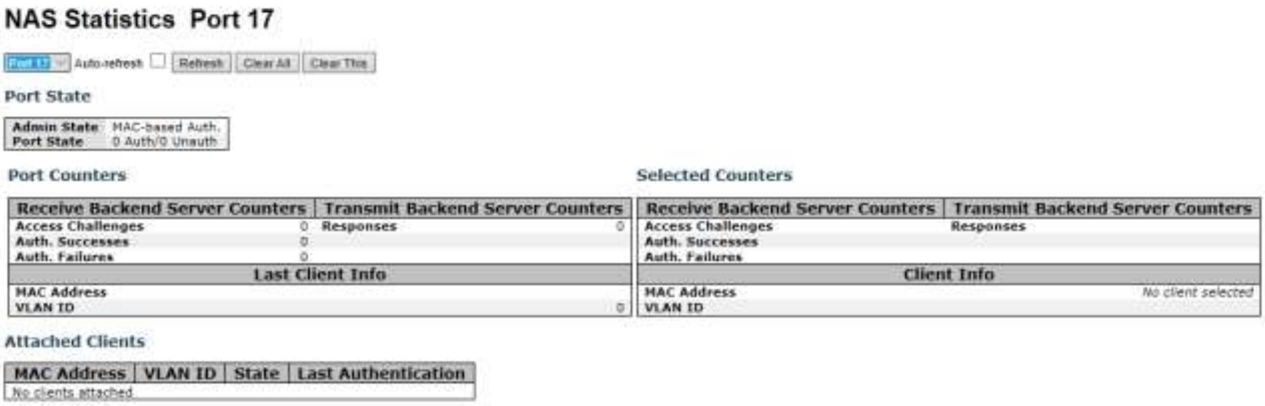
Figure 145 – EAPOL Counters Admin State Force Authorized

Rx/Tx	Name	IEEE Name	Description
Rx	**Total**	dot1xAuthEapolFramesRx	The number of valid EAPOL frames of any type that have been received by the switch.
Rx	**Response ID**	dot1xAuthEapolRespIdFramesRx	The number of valid EAPOL Response Identity frames that have been received by the switch.
Rx	**Responses**	dot1xAuthEapolRespFramesRx	The number of valid EAPOL response frames (other than Response Identity frames) that have been received by the switch.
Rx	**Start**	dot1xAuthEapolStartFramesRx	The number of EAPOL Start frames that have been received by the switch.
Rx	**Logoff**	dot1xAuthEapolLogoffFramesRx	The number of valid EAPOL Logoff frames that have been received by the switch.
Rx	**Invalid Type**	dot1xAuthInvalidEapolFramesRx	The number of EAPOL frames that have been received by the switch in which the frame type is not recognized.
Rx	**Invalid Length**	dot1xAuthEapLengthErrorFramesRx	The number of EAPOL frames that have been received by the switch in which the Packet Body Length field is invalid.
Tx	**Total**	dot1xAuthEapolFramesTx	The number of EAPOL frames of any type that have been transmitted by the switch.
Tx	**Request ID**	dot1xAuthEapolReqIdFramesTx	The number of EAPOL Request Identity frames that have been transmitted by the switch.
Tx	**Requests**	dot1xAuthEapolReqFramesTx	The number of valid EAPOL Request frames (other than Request Identity frames) that have been transmitted by the switch.

5.9.5.3.2Backend Server Counters

These backend (RADIUS) frame counters are available for the following administrative states:

- **802.1X**
- **MAC-based Auth.**



NAS Statistics Port 17

Port State

Admin State	MAC-based Auth.
Port State	0 Auth/0 Unauth

Port Counters

Receive Backend Server Counters		Transmit Backend Server Counters	
Access Challenges	0	Responses	0
Auth. Successes	0		
Auth. Failures	0		
Last Client Info			
MAC Address			
VLAN ID			0

Selected Counters

Receive Backend Server Counters		Transmit Backend Server Counters	
Access Challenges		Responses	
Auth. Successes			
Auth. Failures			
Client Info			
MAC Address			No client selected
VLAN ID			

Attached Clients

MAC Address	VLAN ID	State	Last Authentication
No clients attached			

Figure 146 - NAT Statistics Admin MAC-based Auth.

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.
Port n ↓	The port select drop down box determines which port's information is shown by selecting port 'n'. Where 'n' is a valid port number.
Auto-refresh	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
Refresh	Click to refresh the page immediately.
Clear	This button is available in the following modes: • Force Authorized • Force Unauthorized • 802.1X Click to clear the counters for the selected port
Clear All	This button is available in the following modes: • MAC-based Auth.X Click to clear both the port counters and all of the attached client's counters. The "Last Client" will not be cleared, however.
Clear This	This button is available in the following modes: • MAC-based Auth.X Click to clear only the currently selected client's counters.

Backend (RADIUS) Frame Counters table

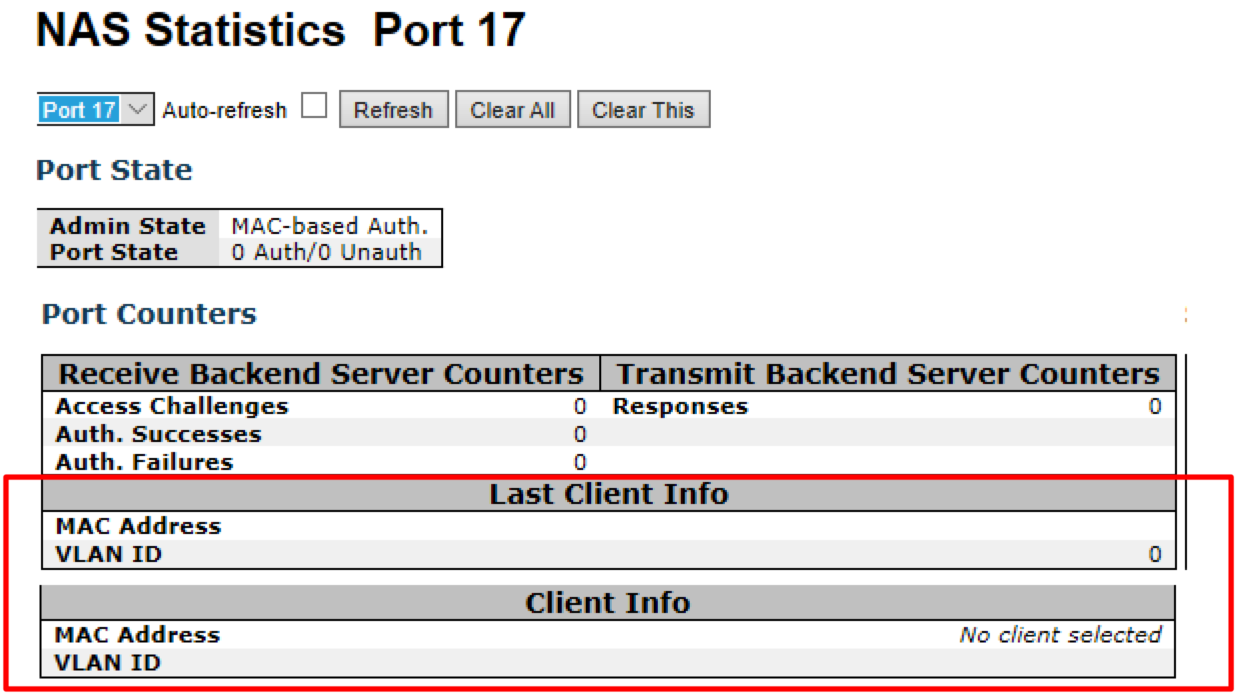
Rx/Tx	Name	IEEE Name	Description
Rx	**Access Challenges**	dot1xAuthBackend AccessChallenges	**802.1X-based**: Counts the number of times that the switch receives the first request from the backend server following the first response from the supplicant.

Rx/Tx	Name	IEEE Name	Description
			Indicates that the backend server has communication with the switch. **MAC-based**: Counts all Access Challenges received from the backend server for this port (left-most table) or client (right-most table).
Rx	**Other Requests**	dot1xAuthBackendOtherRequestsToSupplicant	**802.1X-based**: Counts the number of times that the switch sends an EAP Request packet following the first to the supplicant. Indicates that the backend server chose an EAP-method. **MAC-based**: Not applicable.
Rx	**Auth. Successes**	dot1xAuthBackendAuthSuccesses	**802.1X- and MAC-based**: Counts the number of times that the switch receives a success indication. Indicates that the supplicant/client has successfully authenticated to the backend server.
Rx	**Auth. Failures**	dot1xAuthBackendAuthFails	**802.1X- and MAC-based**: Counts the number of times that the switch receives a failure message. This indicates that the supplicant/client has not authenticated to the backend server.
Tx	**Responses**	dot1xAuthBackendResponses	**802.1X-based:** Counts the number of times that the switch attempts to send a supplicant's first response packet to the backend server. Indicates the switch attempted communication with the backend server. Possible retransmissions are not counted. **MAC-based:** Counts all the backend server packets sent from the switch towards the backend server for a given port (left-most table) or client (right-most table). Possible retransmissions are not counted.

5.9.5.3.3Last Supplicant/ Client Info

Information about the last supplicant/client that attempted to authenticate. This information is available for the following administrative states:

- **802.1X**
- **MAC-based Auth.**



NAS Statistics Port 17

Port State

Admin State	MAC-based Auth.
Port State	0 Auth/0 Unauth

Port Counters

Receive Backend Server Counters		Transmit Backend Server Counters	
Access Challenges	0	Responses	0
Auth. Successes	0		
Auth. Failures	0		

Last Client Info	
MAC Address	
VLAN ID	0

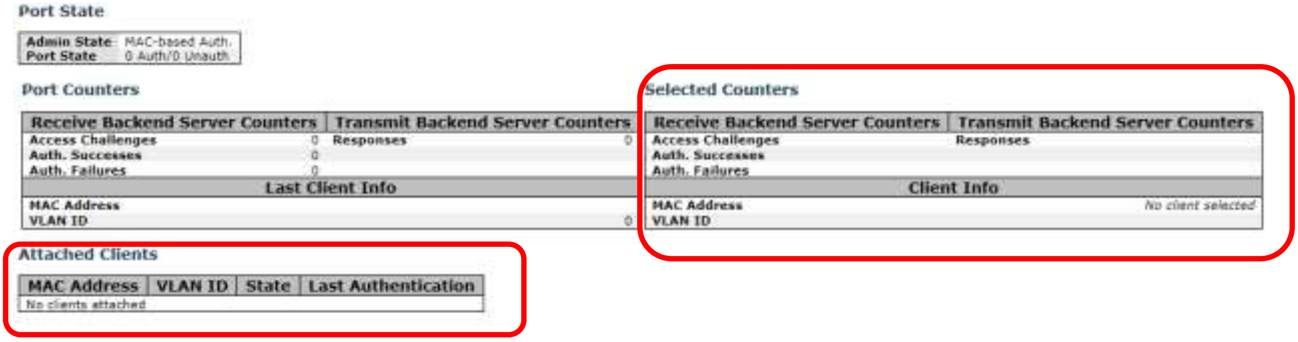
Client Info	
MAC Address	*No client selected*
VLAN ID	

Figure 147 - Last Supplicant/ Client Info Admin State MAC-based Auth.

Name	IEEE Name	Description
MAC Address	dot1xAuthLastEapolFrameSource	The MAC address of the last supplicant/client.
VLAN ID	-	The VLAN ID on which the last frame from the last supplicant/client was received.
Version	dot1xAuthLastEapolFrameVersion	**802.1X-based**: The protocol version number carried in the most recently received EAPOL frame. **MAC-based**: Not applicable (as shown on Figure 147)
Identity	-	**802.1X-based**: The user name (supplicant identity) carried in the most recently received Response Identity EAPOL frame. **MAC-based**: Not applicable (as shown on Figure 147).

5.9.5.3.4Selected Counters and Attached Clients

The Selected Counters table is visible when the port is in the MAC-based Auth. state. The table is identical to and is placed next to the Port Counters table, and it will be empty if no MAC address is currently selected. To populate the table, select one of the attached MAC Addresses (shown as Attached Clients) from the table below.



Port State

Admin State	MAC-based Auth.
Port State	0 Auth/0 Unauth

Port Counters

Receive Backend Server Counters		Transmit Backend Server Counters	
Access Challenges	0	Responses	0
Auth. Successes	0		
Auth. Failures	0		
Last Client Info			
MAC Address			
VLAN ID			0

Selected Counters

Receive Backend Server Counters		Transmit Backend Server Counters	
Access Challenges		Responses	
Auth. Successes			
Auth. Failures			
Client Info			
MAC Address			No client selected
VLAN ID			

Attached Clients

MAC Address	VLAN ID	State	Last Authentication
No clients attached			

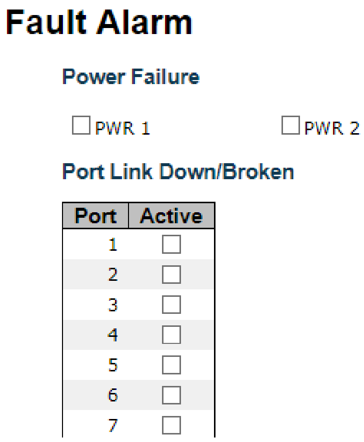
Figure 148 – Selected Counters / Attached Clients

Label	Description
MAC Address	For MAC-based Auth., this column holds the MAC address of the attached client. Clicking the link causes the client's Backend Server counters to be shown in the Selected Counters table. If no clients are attached, it shows "No clients attached".
VLAN ID	This column holds the VLAN ID of the corresponding client that is currently secured through the Port Security module.
State	The client can either be authenticated or unauthenticated. In the authenticated state, it is allowed to forward frames on the port, and in the unauthenticated state, it is blocked. As long as the backend server hasn't successfully authenticated the client, it is unauthenticated. If an authentication fails for one or the other reason, the client will remain in the unauthenticated state for Hold Time seconds.
Last Authentication	Shows the date and time of the last authentication of the client (successful as well as unsuccessful).

5.10 Warning

5.10.1 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. Select the events to cause the fault alarm, then click **Save**, to save the changes.



Fault Alarm

Power Failure

□ PWR 1 □ PWR 2

Port Link Down/Broken

Port	Active
1	□
2	□
3	□
4	□
5	□
6	□
7	□

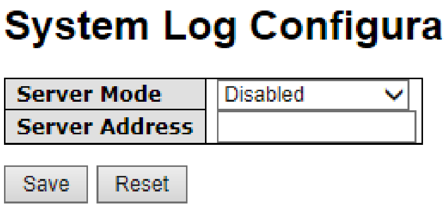
Figure 149 - Fault Alarm

Label	Description
Power Failure	Fault alarm when any selected power failure. This switch support dual powers.
Port Link Down/Broken	Fault alarm when any selected port link down/broken.
Save	Click to save changes.

5.10.2 System Warning

5.10.2.1 SYSLOG Setting

The SYSLOG is a protocol that transmits event notifications across networks. For more details, refer to RFC 3164 - The BSD SYSLOG Protocol [5].



System Log Configuration

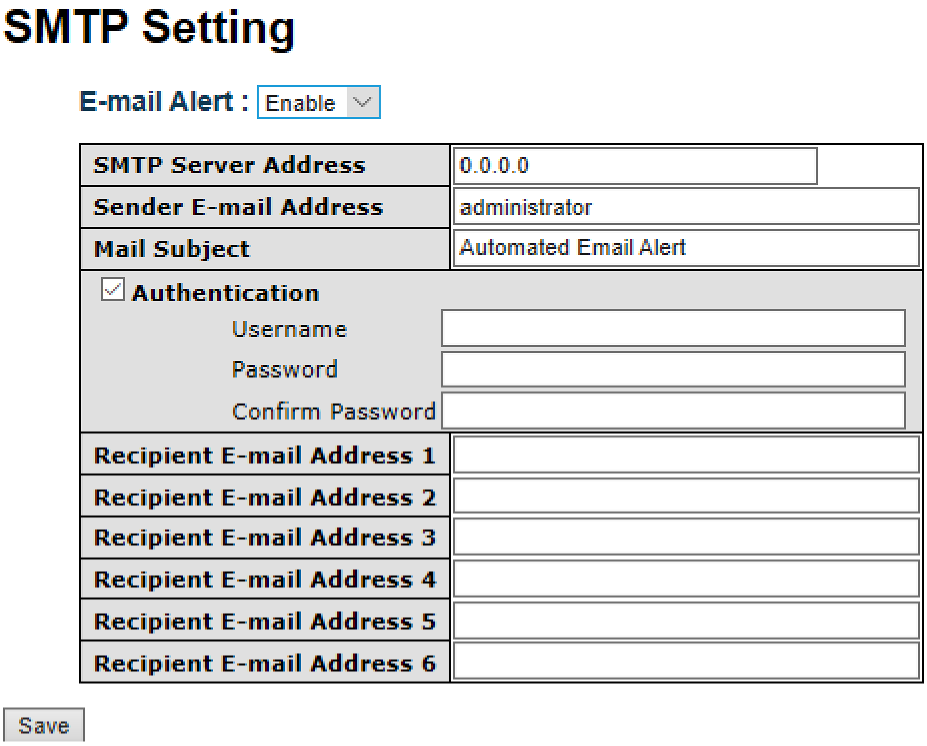
Server Mode	Disabled
Server Address	

Figure 150 - System Log Configuration

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. 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:

Label	Description
	Enabled: enable server mode **Disabled**: disable server mode
Server Address	Indicates the IPv4 host address of syslog server. If the switch provides DNS functions, it also can be a host name.
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.10.2.2 SMTP Settings



SMTP Setting

E-mail Alert : Enable

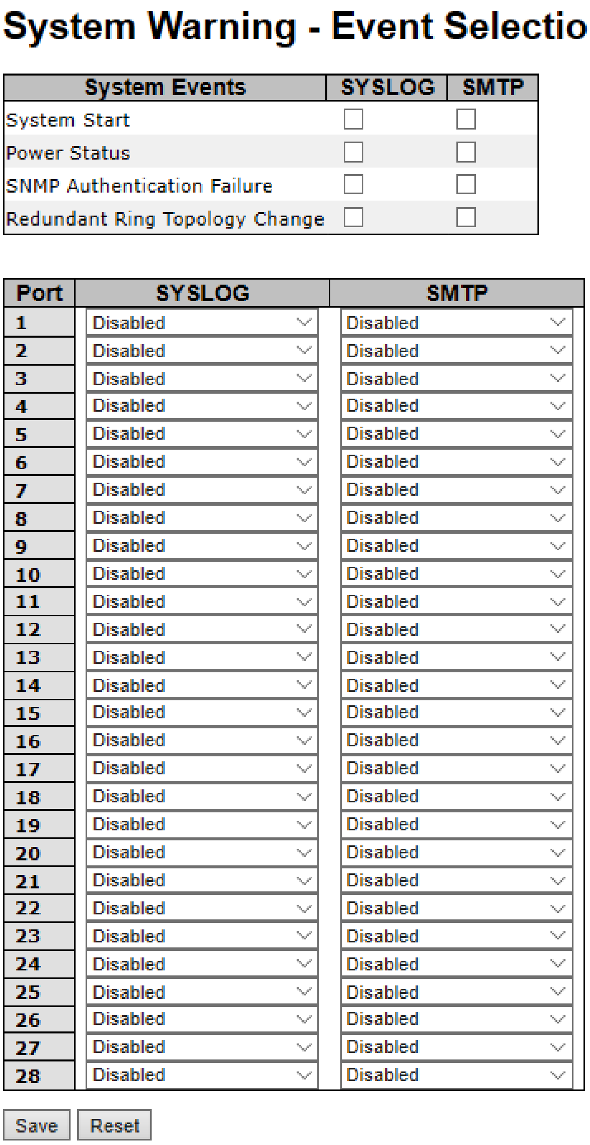
SMTP Server Address	0.0.0.0
Sender E-mail Address	administrator
Mail Subject	Automated Email Alert
☑ Authentication	
Username	
Password	
Confirm Password	
Recipient E-mail Address 1	
Recipient E-mail Address 2	
Recipient E-mail Address 3	
Recipient E-mail Address 4	
Recipient E-mail Address 5	
Recipient E-mail Address 6	

Figure 151 - SMTP Settings

Label	Description
E-mail Alarm	Enables or disables transmission of system warnings by e-mail.
SMTP Server Address	The SMTP server IP address(or domain name address).
Sender E-mail Address	Sender email address
Mail Subject	Subject of the mail
Authentication	**Username**: the authentication username **Password**: the authentication password **Confirm Password**: re-enter password
Recipient E-mail Address	The recipient's e-mail address, allows a total number of six recipients.
Save	Click to save changes

5.10.2.3 Event Selection

SYSLOG is the 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.



System Warning - Event Selection

System Events	SYSLOG	SMTP
System Start	□	□
Power Status	□	□
SNMP Authentication Failure	□	□
Redundant Ring Topology Change	□	□

Port	SYSLOG	SMTP
1	Disabled	Disabled
2	Disabled	Disabled
3	Disabled	Disabled
4	Disabled	Disabled
5	Disabled	Disabled
6	Disabled	Disabled
7	Disabled	Disabled
8	Disabled	Disabled
9	Disabled	Disabled
10	Disabled	Disabled
11	Disabled	Disabled
12	Disabled	Disabled
13	Disabled	Disabled
14	Disabled	Disabled
15	Disabled	Disabled
16	Disabled	Disabled
17	Disabled	Disabled
18	Disabled	Disabled
19	Disabled	Disabled
20	Disabled	Disabled
21	Disabled	Disabled
22	Disabled	Disabled
23	Disabled	Disabled
24	Disabled	Disabled
25	Disabled	Disabled
26	Disabled	Disabled
27	Disabled	Disabled
28	Disabled	Disabled

Figure 152 - System Warning - Event Selection

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

Label	Description
System Start	Alerts when the system is restarted.
Power Status	Alerts when power is up or down.
SNMP Authentication Failure	Alerts when SNMP authentication fails.

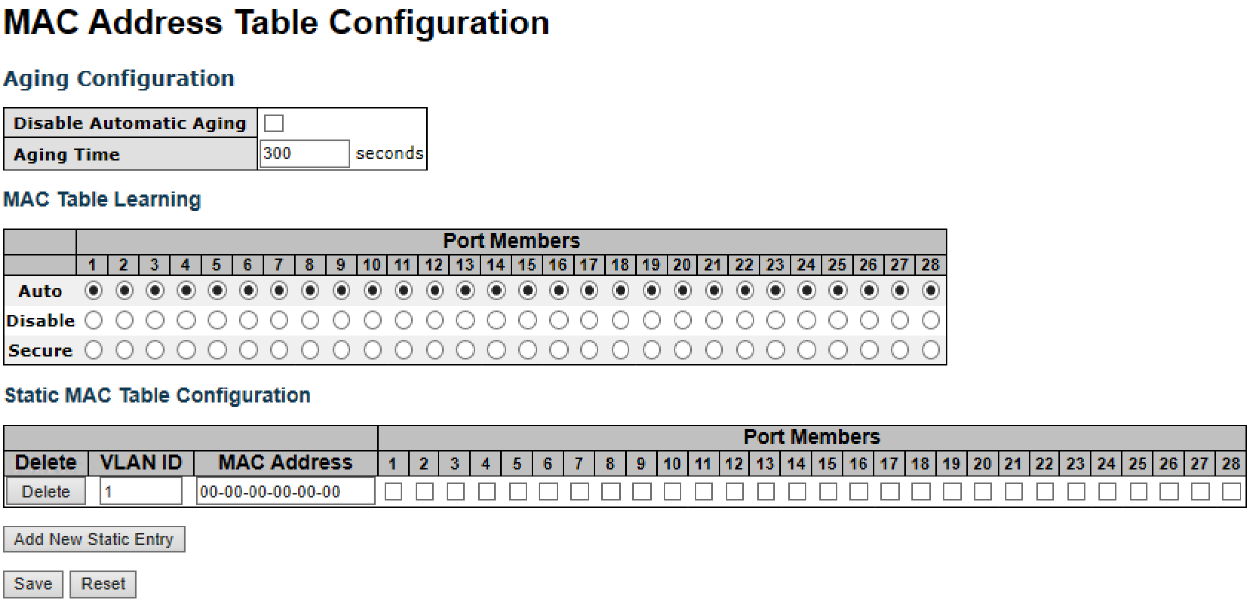
Label	Description
Redundant Ring Topology	Alerts when there is a ring topology change.
SYSLOG **Port Event**	Select the SYSLOG event for a specific port number. Options are: • Disable • Link Up • Link Down • Link Up & Link Down
SMTP **Port Event**	Select the SMTP event for a specific port number. Options are: • Disable • Link Up • Link Down • Link Up & Link Down
Save	Click to save changes.
Reset	Click to undo any changes made locally and revert to previously saved values.

5.11 Monitor and Diagnostic

5.11.1 MAC Table

5.11.1.1 MAC Address Table Configuration

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



MAC Address Table Configuration

Aging Configuration

Disable Automatic Aging	☐	
Aging Time	300	seconds

MAC Table Learning

	Port Members																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Auto	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Disable	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Secure	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Static MAC Table Configuration

			Port Members																											
Delete	VLAN ID	MAC Address	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Delete	1	00-00-00-00-00-00	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Figure 153 - MAC Address Table Configuration

5.11.1.1.1 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**.

5.11.1.1.2 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.

The port can be configures to learn dynamically the MAC address based upon the following settings:

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.

5.11.1.1.3 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.

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

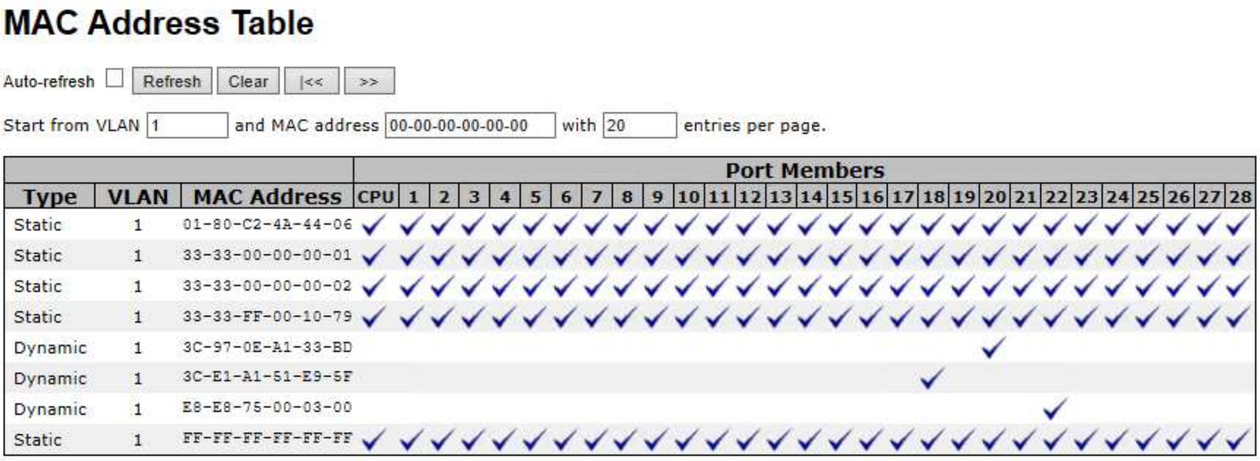
5.11.1.2 MAC Address Table

Entries in the MAC Table are shown on this page. The MAC Address Table contains up to 8192 entries, and is sorted first by VLAN ID, then by MAC address.

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.



MAC Address Table

Auto-refresh □ Refresh Clear |<< >>

Start from VLAN 1 and MAC address 00-00-00-00-00-00 with 20 entries per page.

			Port Members																												
Type	VLAN	MAC Address	CPU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Static	1	01-80-C2-4A-44-06	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	1	33-33-00-00-00-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	1	33-33-00-00-00-02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Static	1	33-33-FF-00-10-79	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dynamic	1	3C-97-0E-A1-33-BD																					✓								
Dynamic	1	3C-E1-A1-51-E9-5F																			✓										
Dynamic	1	E8-E8-75-00-03-00																							✓						
Static	1	FF-FF-FF-FF-FF-FF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

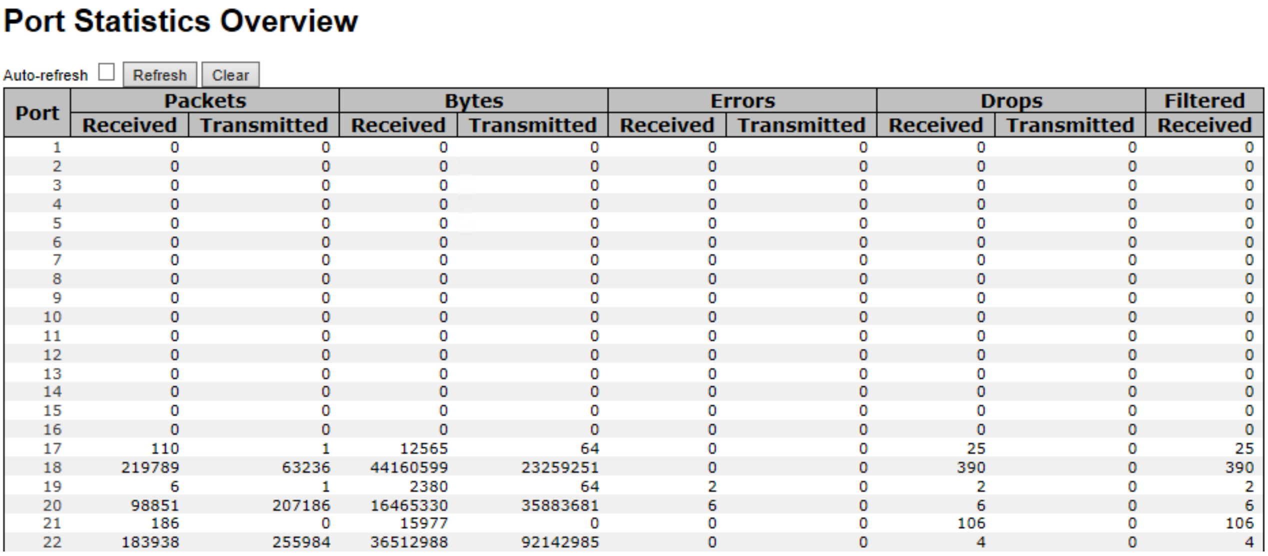
Figure 154 - MAC Address Table

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.
Auto-refresh □	Automatic refresh occurs every 3 seconds.
Clear	Flushes all dynamic entries
|<<	Updates the table starting from the first entry in the MAC Table, i.e. the entry with the lowest VLAN ID and MAC address.
>>	Updates the table, starting with the entry after the last entry currently displayed.

5.11.2 Port Statistics

5.11.2.1 Traffic Overview

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



Port Statistics Overview

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	0	0	0	0	0	0	0	0	0
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	110	1	12565	64	0	0	25	0	25
18	219789	63236	44160599	23259251	0	0	390	0	390
19	6	1	2380	64	2	0	2	0	2
20	98851	207186	16465330	35883681	6	0	6	0	6
21	186	0	15977	0	0	0	106	0	106
22	183938	255984	36512988	92142985	0	0	4	0	4

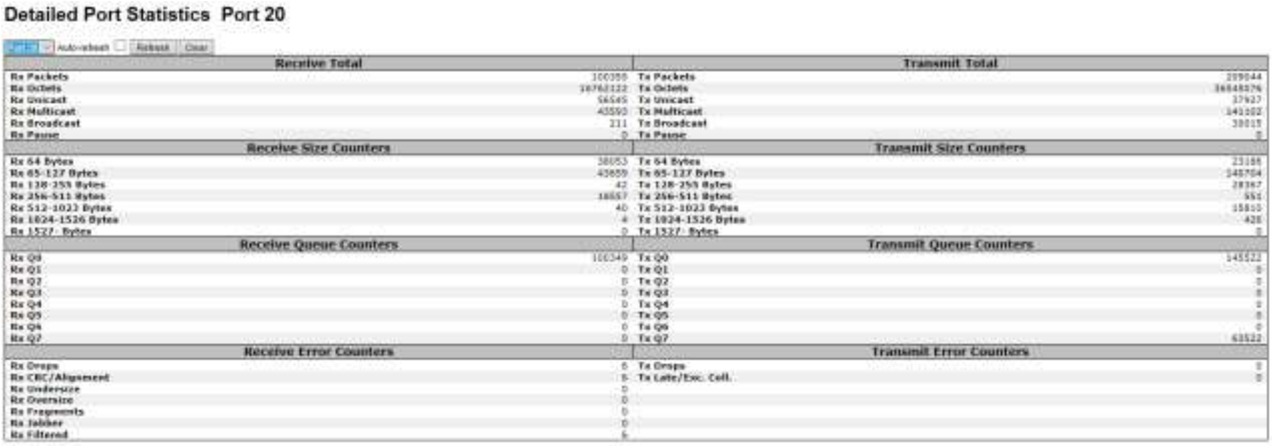
Figure 155 - Port Statistics Overview

Label	Description
Port	The logical port for the settings contained in the same row. Click on a port to go to that ports Detailed Statistics page.
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. Automatic refresh occurs every 3 seconds at regular intervals.
Refresh	Click to refresh the page immediately.
Clear	Clears the counters for all ports.

5.11.2.2 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 Port Statistics Port 20

Receive Total		Transmit Total	
Rx Packets	100358	Tx Packets	209044
Rx Octets	16762122	Tx Octets	36848276
Rx Unicast	56545	Tx Unicast	37927
Rx Multicast	43593	Tx Multicast	141102
Rx Broadcast	211	Tx Broadcast	30015
Rx Pause	0	Tx Pause	0
Receive Size Counters		**Transmit Size Counters**	
Rx 64 Bytes	38053	Tx 64 Bytes	23185
Rx 65-127 Bytes	43659	Tx 65-127 Bytes	148704
Rx 128-255 Bytes	42	Tx 128-255 Bytes	28367
Rx 256-511 Bytes	18557	Tx 256-511 Bytes	551
Rx 512-1023 Bytes	40	Tx 512-1023 Bytes	15815
Rx 1024-1526 Bytes	4	Tx 1024-1526 Bytes	428
Rx 1527- Bytes	0	Tx 1527- Bytes	0
Receive Queue Counters		**Transmit Queue Counters**	
Rx Q0	100349	Tx Q0	145522
Rx Q1	0	Tx Q1	0
Rx Q2	0	Tx Q2	0
Rx Q3	0	Tx Q3	0
Rx Q4	0	Tx Q4	0
Rx Q5	0	Tx Q5	0
Rx Q6	0	Tx Q6	0
Rx Q7	0	Tx Q7	63522
Receive Error Counters		**Transmit Error Counters**	
Rx Drops	6	Tx Drops	0
Rx CRC/Alignment	6	Tx Late/Exc. Coll.	0
Rx Undersize	0		
Rx Oversize	0		
Rx Fragments	0		
Rx Jabber	0		
Rx Filtered	6		

Figure 156 - Detailed Post Statistics

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 and Tx Size Counters	The number of received and transmitted (good and bad) packets split into categories based on their respective frame sizes.
Rx and Tx Queue Counters	The number of received and transmitted packets per input and output queue.
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.

5.11.3 Port Monitoring

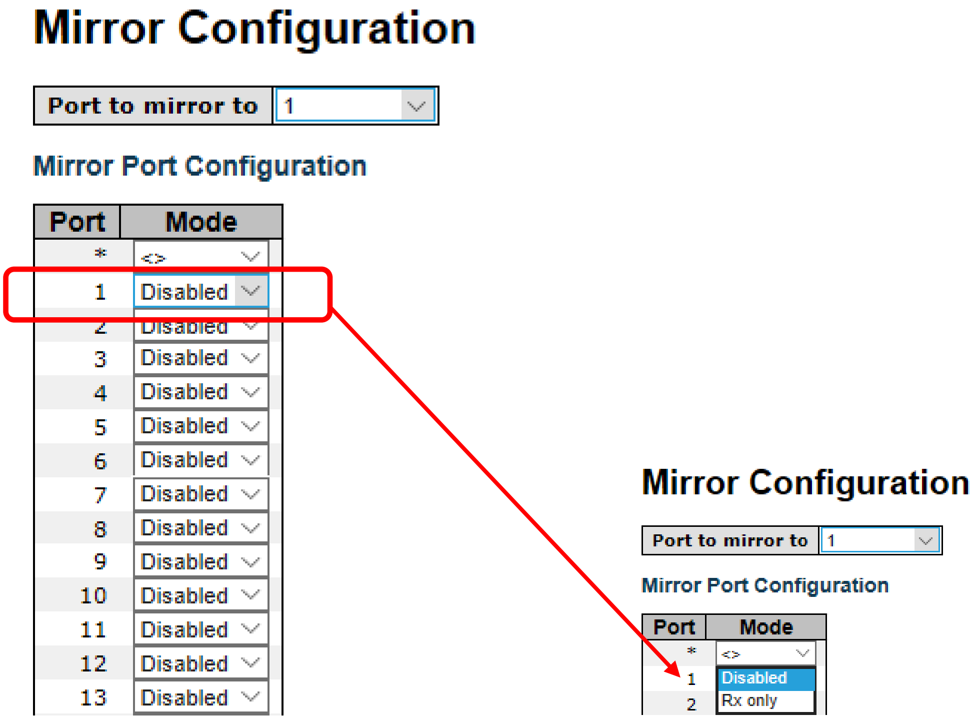
You can configure port mirroring on this page. To solve network problems, selected traffic can be copied, or mirrored, to a mirror port where a frame analyzer can be attached to analyze the frame flow.

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.



Mirror Configuration

Port to mirror to: 1

Mirror Port Configuration

Port	Mode
*	<>
1	Disabled
2	Disabled
3	Disabled
4	Disabled
5	Disabled
6	Disabled
7	Disabled
8	Disabled
9	Disabled
10	Disabled
11	Disabled
12	Disabled
13	Disabled

Mirror Configuration

Port to mirror to: 1

Mirror Port Configuration

Port	Mode
*	<>
1	Disabled
2	Rx only

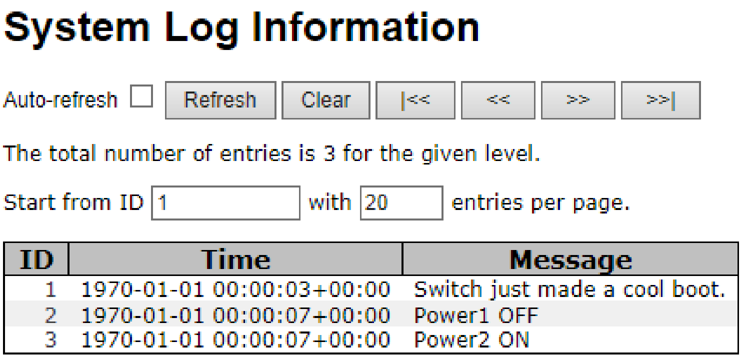
Figure 157 - Mirror Configuration

Label	Description
Port	The logical port for the settings contained in the same row.
Mode	Select mirror mode. **Disabled**—neither frames transmitted nor frames received are mirrored **Rx only**—Frames received on this port are mirrored on the mirror port. Frames transmitted are not mirrored. **Tx only**—Frames transmitted on this port are mirrored on the mirror port. Frames received are not mirrored. **Enabled**—Frames received and frames transmitted are mirrored on the mirror port.
Save	Click to save changes
Reset	Click to undo any changes made locally and revert to previously saved values.

Note: For a given port, a frame is only transmitted once. It is therefore not possible to mirror **port** Tx frames. Because of this, the **Mode** for the selected **mirror port** (which in the Figure above is Port 1) is limited to **Disabled** or **Rx only**.

5.11.4 System Log Information

This page provides switch system log information.



System Log Information

Auto-refresh □ Refresh Clear |<< << >> >>|

The total number of entries is 3 for the given level.

Start from ID 1 with 20 entries per page.

ID	Time	Message
1	1970-01-01 00:00:03+00:00	Switch just made a cool boot.
2	1970-01-01 00:00:07+00:00	Power1 OFF
3	1970-01-01 00:00:07+00:00	Power2 ON

Figure 158 - System Log Information

Label	Description
ID	The ID (>= 1) of the system log entry
Message	The message of the system log entry.
Auto-refresh	Check this box to refresh the page automatically. Automatic refresh occurs every 3 seconds.
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.

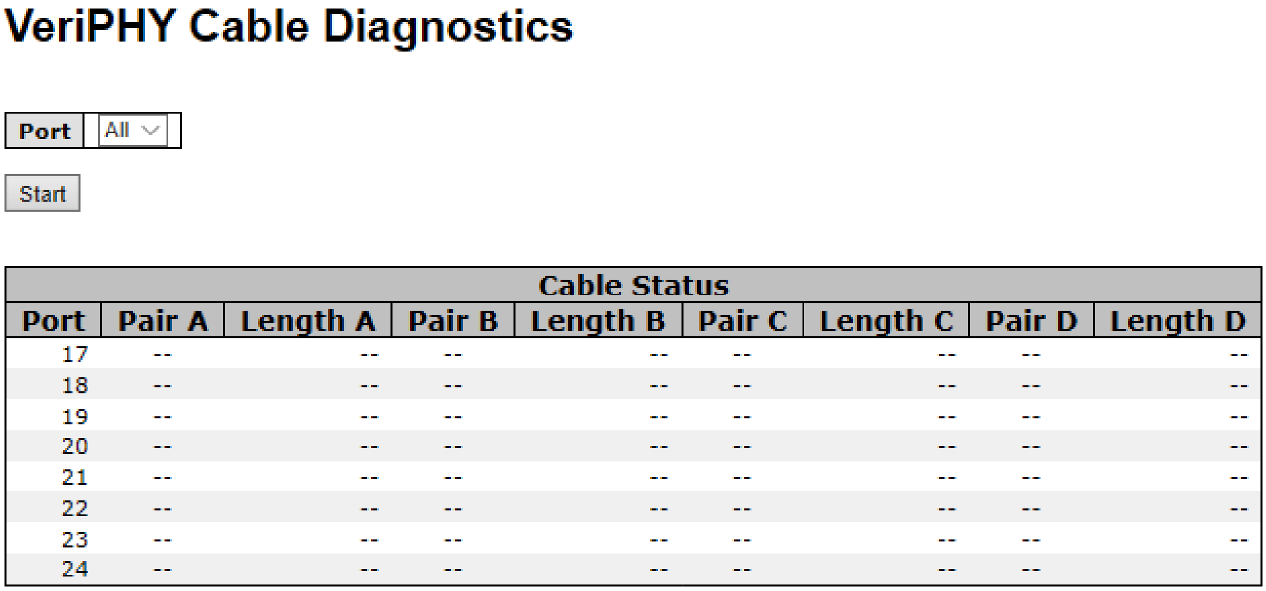
5.11.5 VeriPHY Cable Diagnostics

This page is used for running the VeriPHY Cable Diagnostics for 10/100 and 1G copper ports.

Click **Start** to run the diagnostics. This will take approximately 5 seconds. If all ports are selected, this can take approximately 15 seconds. When completed, the page refreshes automatically, and you can view the cable diagnostics results in the cable status table. Note that VeriPHY is only accurate for cables of length 7 - 140 meters.

10 and 100 Mbps ports will be linked down while running VeriPHY. Therefore, running VeriPHY on a 10 or 100 Mbps management port will cause the switch to stop responding until VeriPHY is complete.

This page allows the user to perform VeriPHY cable diagnostics.



VeriPHY Cable Diagnostics

Cable Status								
Port	Pair A	Length A	Pair B	Length B	Pair C	Length C	Pair D	Length D
17	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--

Figure 159 - VeriPHY Cable Diagnostics

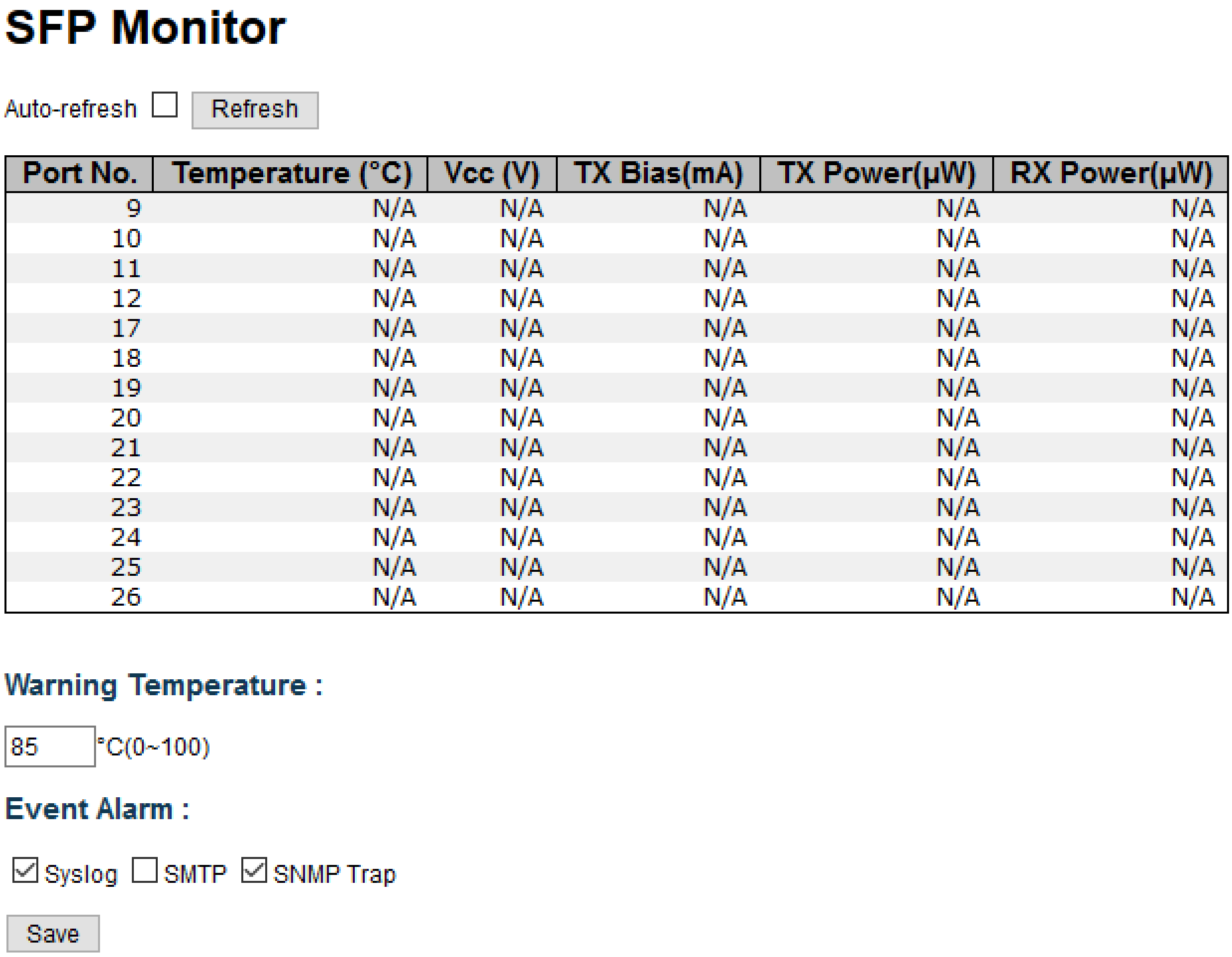
Press **Start** to run the diagnostics. This will take approximately 5 seconds. If all ports are selected, this can take approximately 15 seconds. When completed, the page refreshes automatically. Results can be viewed in the cable status table. Note that VeriPHY diagnostics is only accurate for cables 7 - 140 meters long.

10 and 100 Mbps ports will be disconnected while running VeriPHY diagnostics. Therefore, running VeriPHY on a 10 or 100 Mbps management port will cause the switch to stop responding until VeriPHY is complete.

Label	Description
Port	The port for which VeriPHY Cable Diagnostics is requested
Cable Status	Port: port number Pair: the status of the cable pair • OK - Correctly terminated pair • Open - Open pair • Short - Shorted pair • Short A - Cross-pair short to pair A • Short B - Cross-pair short to pair B • Short C - Cross-pair short to pair C • Short D - Cross-pair short to pair D • Cross A - Abnormal cross-pair coupling with pair A • Cross B - Abnormal cross-pair coupling with pair B • Cross C - Abnormal cross-pair coupling with pair C • Cross D - Abnormal cross-pair coupling with pair D Length: the length (in meters) of the cable pair

5.11.7 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. through DDM Web interface, event alarms can be managed and set up.



SFP Monitor

Auto-refresh □ Refresh

Port No.	Temperature (°C)	Vcc (V)	TX Bias(mA)	TX Power(μW)	RX Power(μW)
9	N/A	N/A	N/A	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	N/A	N/A	N/A	N/A	N/A
22	N/A	N/A	N/A	N/A	N/A
23	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A	N/A	N/A
25	N/A	N/A	N/A	N/A	N/A
26	N/A	N/A	N/A	N/A	N/A

Warning Temperature :

85 °C(0~100)

Event Alarm :

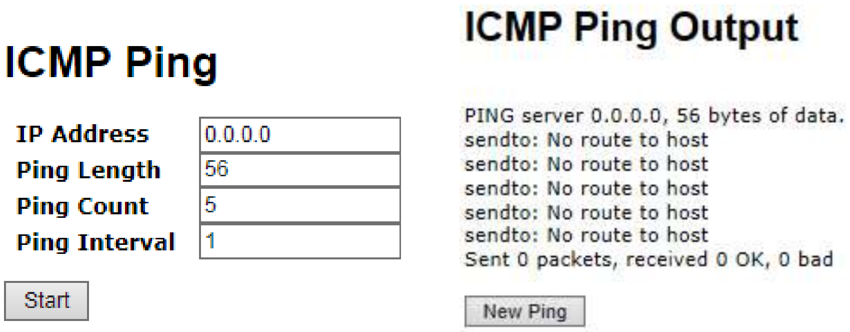
☑ Syslog □ SMTP ☑ SNMP Trap

Save

Figure 160 - SFP Monitor

5.11.8 Ping

This page allows the user to issue ICMP PING packets to troubleshoot IP connectivity issues.



ICMP Ping

IP Address	0.0.0.0
Ping Length	56
Ping Count	5
Ping Interval	1

Start

ICMP Ping Output

```
PING server 0.0.0.0, 56 bytes of data.
sendto: No route to host
sendto: No route to host
sendto: No route to host
sendto: No route to host
sendto: No route to host
Sent 0 packets, received 0 OK, 0 bad
```

New Ping

Figure 161 - ICMP Ping

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 (see the second part of the figure above).

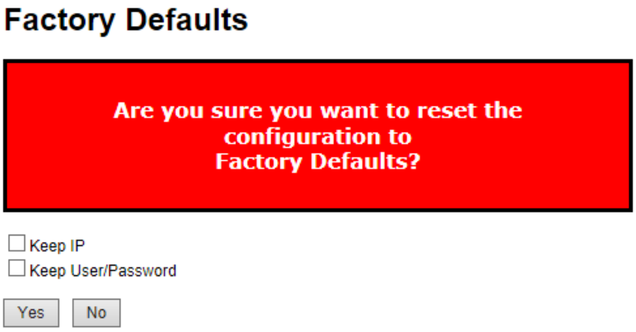
Click **New Ping** to return to **ICMP Ping** screen.

The following properties of the issued ICMP packets can be configured:

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 count of the ICMP packet. Values range from 1 time to 60 times.
Ping Interval	The interval of the ICMP packet. Values range from 0 second to 30 seconds.

5.12 Factory Defaults

You can reset the configuration of the stack switch on this page. The IP configuration and/or User/Password are retained only if the respective boxes are checked when the switch is restored to factory defaults.



Factory Defaults

Are you sure you want to reset the configuration to Factory Defaults?

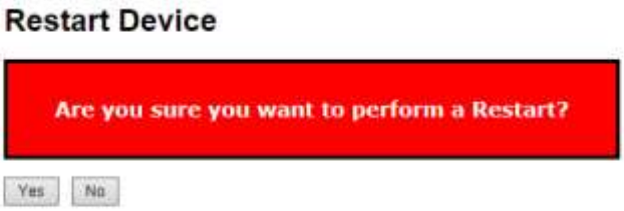
□ Keep IP
□ Keep User/Password

Figure 162 - Factory Defaults

Label	**Description**
Yes	Click to reset the configuration to factory defaults.
No	Click to return to the **System Information** page without resetting.

5.13 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.



Restart Device

Are you sure you want to perform a Restart?

Figure 163 - System Reboot - Restart Device

Label	Description
Yes	Click to reboot device.
No	Click to return to the **System Information** page without rebooting.

5.14 Save Configuration to Flash

To save the configuration to flash, click **Save**.

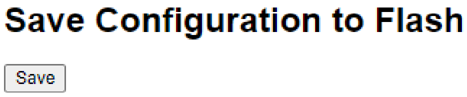

Save Configuration to Flash

Figure 164 – Save Configuration to Flash

Label	Description
Save	Click to save the configuration to flash.

6. CLI MANAGEMENT

6.1 Command Line Interface Setup

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

1. Start **Tara Term VT** (or other terminal emulator) application.

or the app from Command Prompt

2. Go to **Setup** menu and select **Serial Port**.

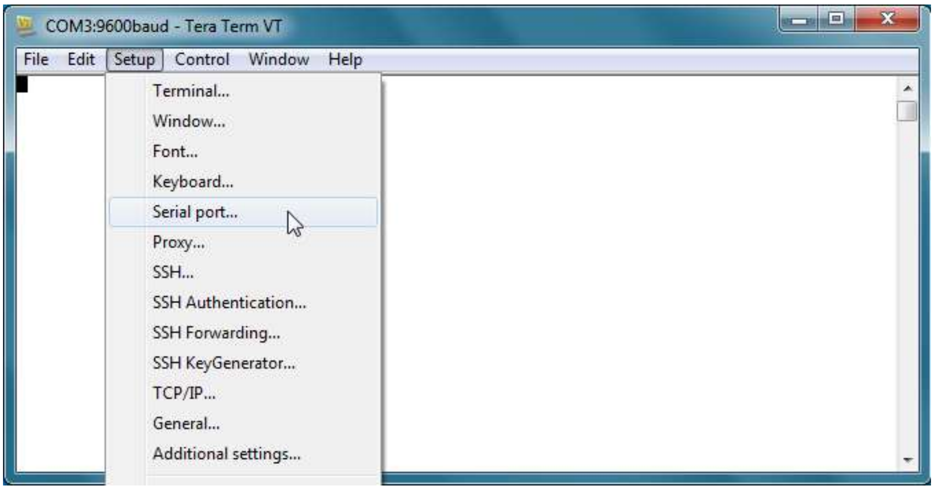
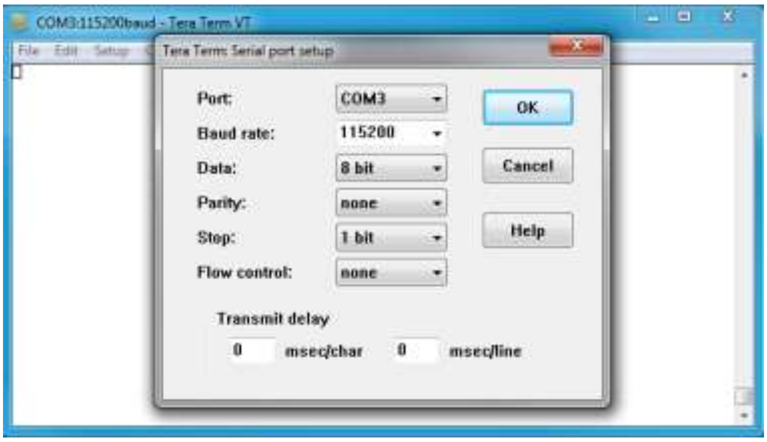


Figure 165 – Tera Term VT, Setup Menu

3. Select the COM Port used by your PC to connect to the Console Port. Set the rest of the properties to **115200 for Baud rate, 8 for Data bits, None for Parity, 1 bit for Stop and none for Flow control**. Then, click **OK**.



Port: COM3

Baud rate: 115200

Data: 8 bit

Parity: none

Stop: 1 bit

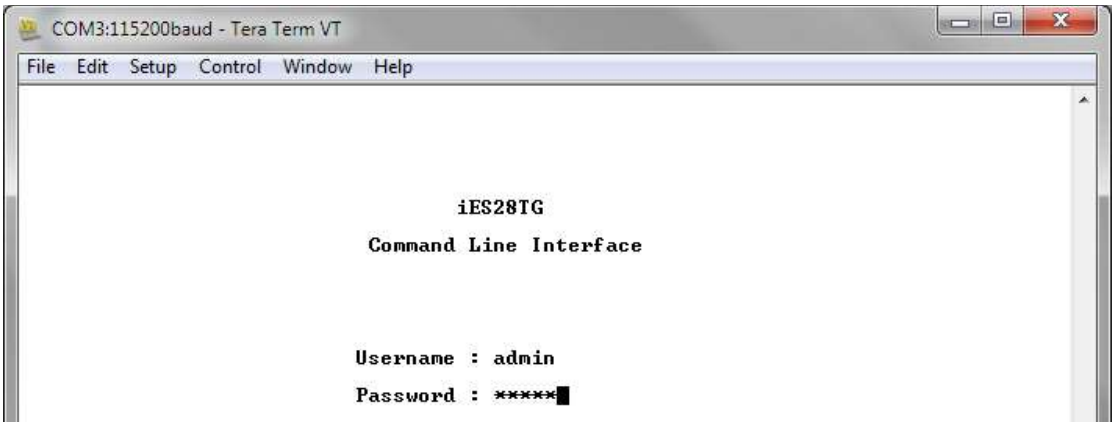
Flow control: none

Transmit delay

0 msec/char 0 msec/line

Figure 166 – Tera Term VT, Serial port setup

4. Press "**Enter**" for the Console login screen to appear. Use the keyboard to enter the Console Username and Password which is same as for Web management (**admin** for both), then press "**Enter**".


COM3:115200baud - Tera Term VT
File Edit Setup Control Window Help

```
iES28TG
Command Line Interface

Username : admin
Password : *****
```

Figure 167 - iES28TG Command Line Interface - Tera Term VT

6.1.2 CLI Management by Telnet

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

IP Address: **192.168.10.1**

Subnet Mask: **255.255.255.0**

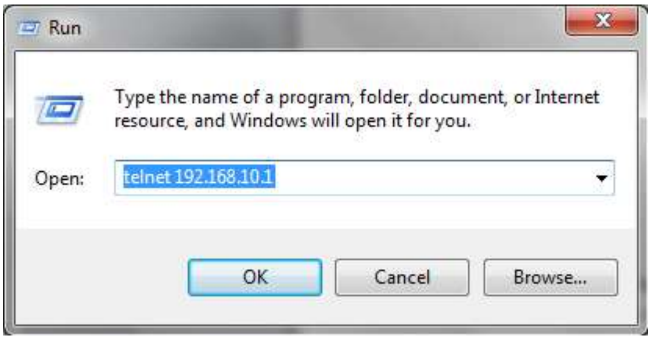
Default Gateway: **192.168.10.254**

User Name: **admin**

Password: **admin**

Follow the steps below to access the console via Telnet.

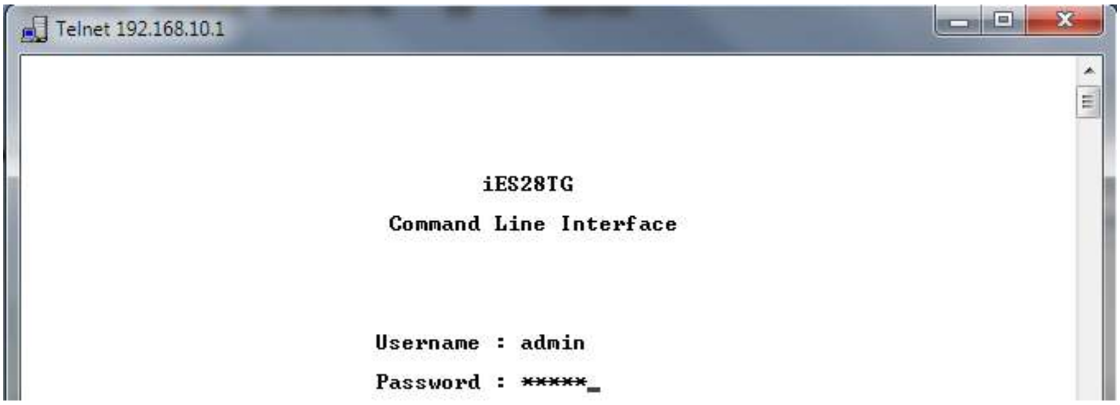
1. Connect your PC to one of the Ethernet ports of the switch via an Ethernet cable.
2. Telnet to the IP address of the switch from the Windows "**Run**" command (or from the MS-DOS prompt).


Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
OK
Cancel
Browse...

```
telnet 192.168.10.1
```

Figure 168 - Telnet Command Prompt

3. The Console login screen appears. Use the keyboard to enter the Console Username and Password, then press "Enter". This is the same as the Web Browser password. The default Username is "admin" and the default Password is "admin".



```
                    iES28TG
             Command Line Interface


           Username : admin
           Password : *****_
```

Figure 169 - iES28TG Command Line Interface - Telnet

6.1.3 Command Groups

```
Welcome to iES28TG Command Line Interface.
Type 'help' or '?' to get help.
>
General Commands:
-----------------
Help/?: Get help on a group or a specific command
Up    : Move one command level up
Logout: Exit CLI

Command Groups:
---------------
System              : System settings and reset options
IP                  : IP configuration and Ping
Port        : Port management
MAC         : MAC address table
VLAN        : Virtual LAN
PVLAN       : Private VLAN
Security    : Security management
STP         : Spanning Tree Protocol
Aggr        : Link Aggregation
LACP        : Link Aggregation Control Protocol
LLDP        : Link Layer Discovery Protocol
QoS         : Quality of Service
Mirror      : Port mirroring
Config      : Load/Save of configuration via TFTP
Firmware    : Download of firmware via TFTP
Loop Protect : Loop Protection
IPMC        : MLD/IGMP Snooping
Fault       : Fault Alarm Configuration
Event       : Event Selection
DHCPServer   : DHCP Server Configuration
RIP         : Routing Information Protocol
iRing       : iRing Configuration
iChain      : iChain Configuration
iBridge     : iBridge Configuration
RCS         : Remote Control Security
Fastrecovery : Fast-Recovery Configuration
DualPort     : Dual Port Recovery Configuration
SFP         : SFP Monitor Configuration
DeviceBinding: Device Binding Configuration
MRP         : MRP Configuration
Modbus       : Modbus TCP Configuration
RSTP        : RSTP Configuration
Auto-Logout  : Auto-Logout Timer Configuration
Show        : Show Configuration

Type '<group>' to enter command group, e.g. 'port'.
Type '<group> ?' to get list of group commands, e.g. 'port ?'.
Type '<command> ?' to get help on a command, e.g. 'port mode ?'.
Commands may be abbreviated, e.g. 'por co' instead of 'port configuration'.
>
```

Figure 170 - Command Groups Printout

6.1.3.1 System

```
>system ?
Available Commands:
System Configuration [all | (port <port_list>)]
System Log Configuration
System Timezone Configuration
System Version
System Log Server Mode [enable|disable]
System Name [<name>]
System Timezone Offset [<offset>]
System Contact [<contact>]
System Log Server Address [<ip_addr_string>]
System Timezone Acronym [<acronym>]
System Description [<description>]
System DST Configuration
System Log Level [info|warning|error]
System DST Mode [disable|recurring|non-recurring]
System Location [<location>]
System DST start <week> <day> <month> <date> <year> <hour> <minute>
System Log Lookup [<log_id>] [all|info|warning|error]
System DST end <week> <day> <month> <date> <year> <hour> <minute>
System Log Clear [all|info|warning|error]
System DST Offset [<dst_offset>]
System Reboot
System Restore Default [keep_ip]
System Load
System INTP [enable|disable]
System Banner Title [<title>]
System Banner message [<message>]
```

6.1.3.2 IP

```
>IP ?
Available Commands:

IP Address <vlan> <ip_ifaddr>
IP Address Delete <vlan> <ip_ifaddr>
IP Configuration
IP DHCP <vlan> [enable|disable]
IP DHCP fallback timeout <vlan> [<value>]
IP DHCP retry <vlan>
IP Interface add <vlan_list>
IP Interface delete [<vlan_list>]
IP Interface list [<vlan_list>]
IP Mode [host|router]
IP Neighbour Clear
IP Neighbour List
IP Ping <ip_target> [(Length <ping_length>)] [(Count <ping_count>)] [(Interval <ping_interval>)]
IP Route Add <ip_net> <ip_gateway>
IP Route Delete <ip_net> <ip_gateway>
IP Route List
IP SNTP Configuration
IP SNTP Mode [enable|disable]
IP SNTP Server1 Add <ip_addr_string>
IP SNTP Server1 Delete
IP SNTP Server2 Add <ip_addr_string>
IP SNTP Server2 Delete
```

6.1.3.3 Port

```
>port ?
Available Commands:

Port Configuration [<port_list>] [up|down]
Port Mode [<port_list>] [auto|10hdx|10fdx|100hdx|100fdx|1000fdx|10gfdx]
Port Flow Control [<port_list>] [enable|disable]
Port State [<port_list>] [enable|disable]
Port MaxFrame [<port_list>] [<max_frame>]
Port Excessive [<port_list>] [discard|restart]
Port Statistics [<port_list>] [<command>] [up|down]
Port VeriPHY [<port_list>]
```

6.1.3.4 MAC

```
>mac ?
Available Commands:

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

6.1.3.5 VLAN

```
>vlan ?
Available Commands:

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

6.1.3.6 Private VLAN (PVLAN)

```
>pvlan ?
Available Commands:

PVLAN Configuration [<port_list>]
PVLAN Add <pvlan_id> [<port_list>]
PVLAN Delete <pvlan_id>
PVLAN Lookup [<pvlan_id>]
PVLAN Isolate [<port_list>] [enable|disable]
```

6.1.3.7 Security

```
>security ?

Command Groups:
---------------
Switch    : Switch security
Network   : Network security
AAA       : Authentication, Authorization and Accounting

Type '<group>' to enter command group
Type '<group> ?' to get group help

>security
Type 'up' to move up one level or '/' to go to root level
```

6.1.3.7.1Security Switch

```
Security>switch ?

Command Groups:
---------------
Security Switch Password : System password
Security Switch Privilege: Privilege level
Security Switch Auth     : Authentication
Security Switch SSH      : Secure Shell
Security Switch TELNET   : Telnet management
Security Switch HTTPS    : Hypertext Transfer Protocol over Secure Socket Layer
Security Switch RMON     : Remote Network Monitoring

Type '<group>' to enter command group
Type '<group> ?' to get list of group commands
Type '<group> <command> ?' to get help on a command
```

6.1.3.7.1.1 Security Switch Password

```
Security/Switch>password ?
Description:
------------
Set the system password.

Syntax:
-------
Security Switch Password <username> <password>

Parameters:
-----------
<username>: Username string.
<password>: System password string.Use 'clear' or "" to clear the string
Security/Switch>
```

6.1.3.7.1.2 Security Switch Privilege

```
Available Commands:
```

```
Security Switch Privilege Level Configuration
Security Switch Privilege Level Group <group_name>
        [<cro>] [<crw>] [<sro>] [<srw>]
Security Switch Privilege Level Current
Security/Switch>
```

6.1.3.7.1.3 Switch Authentication

```
Security>switch
Type 'up' to move up one level or '/' to go to root level
Security/Switch>auth
Type 'up' to move up one level or '/' to go to root level
Security/Switch/Auth>?
Available Commands:

Security Switch Auth Configuration
Security Switch Auth Console [no|local|radius|tacacs] [local|radius|tacacs] [local|radius|tacacs]
Security Switch Auth Telnet [no|local|radius|tacacs] [local|radius|tacacs] [local|radius|tacacs]
Security Switch Auth SSH [no|local|radius|tacacs] [local|radius|tacacs] [local|radius|tacacs]
Security Switch Auth HTTP [no|local|radius|tacacs] [local|radius|tacacs] [local|radius|tacacs]
Security/Switch/Auth>
```

6.1.3.7.1.4 Security Switch SSH

```
Security/Switch/Auth>up
Security/Switch>ssh ?
Available Commands:

Security Switch SSH Configuration
Security Switch SSH Mode [enable|disable]
Security/Switch>
```

6.1.3.7.1.5 Security Switch HTTPS

```
Security/Switch/HTTPS>?
Available Commands:

Security Switch HTTPS Configuration
Security Switch HTTPS Mode [enable|disable]
Security Switch HTTPS Redirect [enable|disable]
Security/Switch/HTTPS>
```

6.1.3.7.1.6 Security Switch RMON

```
Security/Switch>rmon ?
Available Commands:

Security Switch RMON Statistics Add <stats_id> <data_source>
Security Switch RMON Statistics Delete <stats_id>
Security Switch RMON Statistics Lookup [<stats_id>]
Security Switch RMON History Add <history_id> <data_source> [<interval>] [<buckets>]
Security Switch RMON History Delete <history_id>
Security Switch RMON History Lookup [<history_id>]
Security Switch RMON Alarm Add <alarm_id> <interval> <alarm_variable> [absolute|delta]
        <rising_threshold> <rising_event_index> <falling_threshold>
        <falling_event_index> [rising|falling|both]
Security Switch RMON Alarm Delete <alarm_id>
Security Switch RMON Alarm Lookup [<alarm_id>]
Security Switch RMON Event Add <event_id> [none|log|trap|log_trap] [<community>]
```

```
        [<description>]
Security Switch RMON Event Delete <event_id>
Security Switch RMON Event Lookup [<event_id>]
Security/Switch>
```

6.1.3.7.2 Security Network

```
Security>network ?

Command Groups:
---------------
Security Network Psec    : Port Security Status
Security Network NAS     : Network Access Server (IEEE 802.1X)
Security Network ACL     : Access Control List
Security Network DHCP    : Dynamic Host Configuration Protocol
```

6.1.3.7.1.1 Security Network Psec

```
Security/Network>psec ?
Available Commands:

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

6.1.3.7.1.2 Security Network NAS

```
Security/Network>nas ?
Available Commands:

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

6.1.3.7.1.3 Security Network ACL

```
Security/Network>acl ?
Available Commands:

Security Network ACL Configuration [<port_list>]
Security Network ACL Action [<port_list>] [permit|deny] [<rate_limiter>]
       [<port_redirect>] [<logging>] [<shutdown>]
Security Network ACL Policy [<port_list>] [<policy>]
Security Network ACL Rate [<rate_limiter_list>] [<rate>]
Security Network ACL Add [<ace_id>] [<ace_id_next>]
       [(port <port>)] [(policy <policy> <policy_bitmask>)]
       [<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>]) |
     (ipv6_std [<next_header>] [<sip_v6>] [<sip_v6_mask>])]
    [permit|deny] [<rate_limiter>] [<port_redirect>] [<logging>] [<shutdown>]
Security Network ACL Delete <ace_id>
Security Network ACL Lookup [<ace_id>]
Security Network ACL Clear
Security Network ACL Status [combined|static|loop_protect|dhcp|ipmc|conflicts]
Security Network ACL Port State [<port_list>] [enable|disable]
Security/Network>
```

6.1.3.7.1.4 Security Network DHCP

```
Security/Network>DHCP ?
Available Commands:

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

6.1.3.7.3Security AAA

```
Security> AAA ?
Available Commands:

Security AAA Configuration
Security AAA radius-server timeout [<timeout>]
Security AAA radius-server retransmit [<retransmit>]
Security AAA radius-server deadtime [<deadtime>]
Security AAA radius-server key [<key>]
Security AAA radius-server nas-ip-address [<ipv4_addr>|disable]
Security AAA radius-server nas-identifier [<id>]
Security AAA radius-server host add <ip_addr_string> [<auth_port>] [<acct_port>] [<timeout>]
[<retransmit>] [<key>]
Security AAA radius-server host delete <ip_addr_string> [<auth_port>] [<acct_port>]
Security AAA radius-server host show
Security AAA radius-server statistics [<host_index>]
Security AAA tacacs-server timeout [<timeout>]
Security AAA tacacs-server deadtime [<deadtime>]
Security AAA tacacs-server key [<key>]
Security AAA tacacs-server host add <ip_addr_string> [<port>] [<timeout>] [<key>]
Security AAA tacacs-server host delete <ip_addr_string> [<port>]
Security AAA tacacs-server host show
Security>
```

6.1.3.8 STP

```
>stp ?
Available Commands:

STP Configuration
STP Version [<stp_version>]
STP Txhold [<holdcount>]
STP MaxHops [<maxhops>]
STP MaxAge [<max_age>]
STP FwdDelay [<delay>]
STP CName [<config-name>] [<integer>]
STP bpduFilter [enable|disable]
STP bpduGuard [enable|disable]
STP recovery [<timeout>]
STP Status [<msti>] [<stp_port_list>]
STP Msti Priority [<msti>] [<priority>]
STP Msti Map [<msti>] [clear]
STP Msti Add <msti> <vid-range>
STP Port Configuration [<stp_port_list>]
STP Port Mode [<stp_port_list>] [enable|disable]
STP Port Edge [<stp_port_list>] [enable|disable]
STP Port AutoEdge [<stp_port_list>] [enable|disable]
STP Port P2P [<stp_port_list>] [enable|disable|auto]
STP Port RestrictedRole [<stp_port_list>] [enable|disable]
STP Port RestrictedTcn [<stp_port_list>] [enable|disable]
STP Port bpduGuard [<stp_port_list>] [enable|disable]
STP Port Statistics [<stp_port_list>] [clear]
STP Port Mcheck [<stp_port_list>]
STP Msti Port Configuration [<msti>] [<stp_port_list>]
STP Msti Port Cost [<msti>] [<stp_port_list>] [<path_cost>]
STP Msti Port Priority [<msti>] [<stp_port_list>] [<priority>]
```

6.1.3.9 Aggr

```
>aggr ?
Available Commands:

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

6.1.3.10 LACP

```
>lacp ?
Available Commands:

LACP Configuration [<port_list>]
LACP Mode [<port_list>] [enable|disable]
LACP Key [<port_list>] [<key>]
LACP Prio [<port_list>] [<prio>]
LACP System Prio [<sysprio>]
LACP Role [<port_list>] [active|passive]
LACP Status [<port_list>]
LACP Statistics [<port_list>] [clear]
LACP Timeout [<port_list>] [fast|slow]
```

6.1.3.11 LLDP

```
>lldp ?
Available Commands:

LLDP Configuration [<port_list>]
LLDP Mode [<port_list>] [enable|disable|rx|tx]
LLDP Optional_TLV [<port_list>] [port_descr|sys_name|sys_descr|sys_capa|mgmt_addr]
[enable|disable]
LLDP Interval [<interval>]
LLDP Hold [<hold>]
LLDP Delay [<delay>]
LLDP Reinit [<reinit>]
LLDP Statistics [<port_list>] [clear]
LLDP Info [<port_list>]
```

6.1.3.12 QoS

```
>qos ?
Available Commands:

QoS Configuration [<port_list>]
QoS Port Classification Class [<port_list>] [<class>]
QoS Port Classification DPL [<port_list>] [<dpl>]
QoS Port Classification PCP [<port_list>] [<pcp>]
QoS Port Classification DEI [<port_list>] [<dei>]
QoS Port Classification Tag [<port_list>] [enable|disable]
QoS Port Classification Map [<port_list>] [<pcp_list>] [<dei_list>] [<class>] [<dpl>]
QoS Port Classification DSCP [<port_list>] [enable|disable]
QoS Port Policer Mode [<port_list>] [enable|disable]
QoS Port Policer Rate [<port_list>] [<rate>]
QoS Port Policer Unit [<port_list>] [kbps|fps]
QoS Port Policer FlowControl [<port_list>] [enable|disable]
QoS Port QueuePolicer Mode [<port_list>] [<queue_list>] [enable|disable]
QoS Port QueuePolicer Rate [<port_list>] [<queue_list>] [<bit_rate>]
QoS Port Scheduler Mode [<port_list>] [strict|weighted]
QoS Port Scheduler Weight [<port_list>] [<queue_list>] [<weight>]
QoS Port Shaper Mode [<port_list>] [enable|disable]
QoS Port Shaper Rate [<port_list>] [<bit_rate>]
QoS Port QueueShaper Mode [<port_list>] [<queue_list>] [enable|disable]
QoS Port QueueShaper Rate [<port_list>] [<queue_list>] [<bit_rate>]
QoS Port QueueShaper Excess [<port_list>] [<queue_list>] [enable|disable]
QoS Port TagRemarking Mode [<port_list>] [classified|default|mapped]
QoS Port TagRemarking PCP [<port_list>] [<pcp>]
QoS Port TagRemarking DEI [<port_list>] [<dei>]
QoS Port TagRemarking DPL [<port_list>] [<dpl>] [<dpl>] [<dpl>] [<dpl>]
QoS Port TagRemarking Map [<port_list>] [<class_list>] [<dpl_list>] [<pcp>] [<dei>]
QoS Port DSCP Translation [<port_list>] [enable|disable]
QoS Port DSCP Classification [<port_list>] [none|zero|selected|all]
QoS Port DSCP EgressRemark [<port_list>] [disable|enable|remap]
QoS DSCP Map [<dscp_list>] [<class>] [<dpl>]
QoS DSCP Translation [<dscp_list>] [<trans_dscp>]
QoS DSCP Trust [<dscp_list>] [enable|disable]
QoS DSCP Classification Mode [<dscp_list>] [enable|disable]
QoS DSCP Classification Map [<class_list>] [<dscp>]
QoS DSCP EgressRemap [<dscp_list>] [<dscp>]
QoS Port Storm Unicast [<port_list>] [enable|disable] [<rate>] [kbps|fps]
QoS Port Storm Broadcast [<port_list>] [enable|disable] [<rate>] [kbps|fps]
QoS Port Storm Unknown [<port_list>] [enable|disable] [<rate>] [kbps|fps]
QoS WRED [<queue_list>] [enable|disable] [<min_th>] [<mdp_1>] [<mdp_2>] [<mdp_3>]
QoS 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>]
QoS QCL Delete <qce_id>
QoS QCL Lookup [<qce_id>]
QoS QCL Status [combined|static|conflicts]
QoS QCL Refresh
```

6.1.3.13 Mirror

```
>mirror ?
Available Commands:

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

6.1.3.14 Config

```
>config ?
Available Commands:

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

6.1.3.15 SNMP

```
>snmp ?
Available Commands:

SNMP Configuration
SNMP Mode [enable|disable]
SNMP Version [1|2c|3]
SNMP Read Community [<community>]
SNMP Write Community [<community>]
SNMP Engine ID [<engineid>]
SNMP Community Add <community> [<ip_addr>] [<ip_mask>]
SNMP Community Delete <index>
SNMP Community Lookup [<index>]
SNMP User Add <engineid> <user_name> [MD5|SHA]
    [<auth_password>] [DES|AES] [<priv_password>]
SNMP User Delete <index>
SNMP User Changekey <engineid> <user_name>
    <auth_password> [<priv_password>]
SNMP User Lookup [<index>]
SNMP Group Add <security_model> <security_name> <group_name>
SNMP Group Delete <index>
SNMP Group Lookup [<index>]
SNMP View Add <view_name> [included|excluded] <oid_subtree>
SNMP View Delete <index>
SNMP View Lookup [<index>]
SNMP Access Add <group_name> <security_model> <security_level>
    [<read_view_name>] [<write_view_name>]
SNMP Access Delete <index>
SNMP Access Lookup [<index>]
SNMP Trap Mode [enable|disable]
SNMP Trap Lookup [<conf_name>]
SNMP Trap Add <conf_name>
    [enable|disable]
    [(dip <ipv4v6_addr>)] [(dport <udp_port>)]
    [((1) [(community <comm>)]) |
     (((2c) [(community <comm>)]) [(trap) | (informs [<retries>] [<timeout>])])] |
     ((3) [(trap) | (informs [<retries>] [<timeout>])] [(probe) | (engine <engineid>)] [(security
<security_name>)])]
SNMP Trap Delete <conf_name>
SNMP Trap Event Lookup [<conf_name>]
SNMP Trap Event System Warm-start [<conf_name>] [enable|disable]
SNMP Trap Event System Cold-start [<conf_name>] [enable|disable]
SNMP Trap Event Interface Link-up [<conf_name>] [<port_list>] [enable|disable]
SNMP Trap Event Interface Link-down [<conf_name>] [<port_list>] [enable|disable]
SNMP Trap Event Interface LLDP [<conf_name>] [enable|disable]
SNMP Trap Event AAA Authentication-Failure [<conf_name>] [enable|disable]
SNMP Trap Event Switch STP [<conf_name>] [enable|disable]
SNMP Trap Event Switch RMON [<conf_name>] [enable|disable]
```

6.1.3.16 Firmware

```
>firmware ?
Available Commands:

Firmware Load <ip_addr_string> <file_name>
Firmware NetLoad <url>
Firmware Information
Firmware Swap
```

6.1.3.17 Loop Protect

```
>loop protect ?
Available Commands:

Loop Protect Configuration
Loop Protect Mode [enable|disable]
Loop Protect Transmit [<transmit-time>]
Loop Protect Shutdown [<shutdown-time>]
Loop Protect Port Configuration [<port_list>]
Loop Protect Port Mode [<port_list>] [enable|disable]
Loop Protect Port Action [<port_list>] [shutdown|shut_log|log]
Loop Protect Port Transmit [<port_list>] [enable|disable]
Loop Protect Status [<port_list>]
```

6.1.3.18 IPMC

```
>ipmc ?
Available Commands:

IPMC Configuration [igmp]
IPMC Mode [igmp] [enable|disable]
IPMC Flooding [igmp] [enable|disable]
IPMC VLAN Add [igmp] <vid>
IPMC VLAN Delete [igmp] <vid>
IPMC State [igmp] [<vid>] [enable|disable]
IPMC Querier [igmp] [<vid>] [enable|disable]
IPMC Fastleave [igmp] [<port_list>] [enable|disable]
IPMC Router [igmp] [<port_list>] [enable|disable]
IPMC Status [igmp] [<vid>]
IPMC Groups [igmp] [<vid>]
IPMC Version [igmp] [<vid>]
```

6.1.3.19 Fault

```
>fault ?
Available Commands:
Fault Alarm PortLinkDown [<port_list>] [enable|disable]
Fault Alarm PowerFailure [pwr1|pwr2|pwr3] [enable|disable]
```

6.1.3.20 Event

```
>event ?
Available Commands:

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

6.1.3.21 DHCPServer

```
DHCPServer> ?
Available Commands:

DHCPServer Mode [enable|disable]
DHCPServer Setup [<ip_start>] [<ip_end>] [<ip_mask>] [<ip_router>] [<ip_dns>] [<ip_tftp>]
[<lease>] [<bootfile>]
DHCPServer Client List
DHCPServer Client AddStatic <mac_addr> <ip_addr>
DHCPServer Client Delete <no.>
DHCPServer Client SetStatic <no.>
```

6.1.3.22 RIP

```
>rip ?
Available Commands:

RIP Configuration
RIP Mode [enable|disable]
```

6.1.3.23 iRing

```
>iring ?
Available Commands:

iRing Mode [enable|disable]
iRing Master [enable|disable]
iRing 1stRingPort [<port>]
iRing 2ndRingPort [<port>]
iRing Ring-Linking Mode [enable|disable]
iRing Ring-Linking Port [<port>]
iRing Dual-Homing Mode [enable|disable]
iRing Dual-Homing Port [<port>]
```

6.1.3.24 iChain

```
>ichain ?
Available Commands:

iChain Configuration
iChain Mode [enable|disable]
iChain 1stUplinkPort [<port>]
iChain 2ndUplinkPort [<port>]
iChain EdgePort [1st|2nd|none]
```

6.1.3.25 iBridge

```
>ibridge ?
Available Commands:

iBridge Configuration
iBridge Mode [enable|disable]
iBridge 1stRingPort [<port>]
iBridge 2ndRingPort [<port>]
iBridge Vender [moxx|advantexx|hirschmaxx]
```

6.1.3.26 RCS

```
>rcs ?
Available Commands:

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

6.1.3.27 FastRecovery

```
>fastrecovery ?
Available Commands:

Fastrecovery Mode [enable|disable]
Fastrecovery Port [<port_list>] [<fr_priority>]
```

6.1.3.28 DualPort

```
>dualport ?
Available Commands:

DualPort Configuration [enable|disable]
DualPort Port <port>
DualPort Interval <integer>
DualPort Retry <integer>
DualPort TimeoutDelay <integer>
DualPort DebugMessage [enable|disable]
```

6.1.3.29 SFP

```
>sfp ?
Available Commands:

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

6.1.3.30 Device Binding

```
>devicebinding ?
Available Commands:

DeviceBinding Mode [enable|disable]
DeviceBinding Port Mode [<port_list>] [disable|scan|binding|shutdown]
DeviceBinding Port DDOS Mode [<port_list>] [enable|disable]
DeviceBinding Port DDOS Sensibility [<port_list>] [low|normal|medium|high]
DeviceBinding Port DDOS Packet [<port_list>]
[rx_total|rx_unicast|rx_multicast|rx_broadcast|tcp|udp]
DeviceBinding Port DDOS Low [<port_list>] [<socket_number>]
DeviceBinding Port DDOS High [<port_list>] [<socket_number>]
DeviceBinding Port DDOS Filter [<port_list>] [source|destination]
DeviceBinding Port DDOS Action [<port_list>]
[do_nothing|block_1_min|block_10_mins|block|shutdown|only_log]
DeviceBinding Port DDOS Status [<port_list>]
DeviceBinding Port Alive Mode [<port_list>] [enable|disable]
DeviceBinding Port Alive Action [<port_list>] [do_nothing|link_change|shutdown|only_log]
DeviceBinding Port Alive Status [<port_list>]
DeviceBinding Port Stream Mode [<port_list>] [enable|disable]
DeviceBinding Port Stream Action [<port_list>] [do_nothing|only_log]
DeviceBinding Port Stream Status [<port_list>]
DeviceBinding Port Addr [<port_list>] [<ip_addr>] [<mac_addr>]
DeviceBinding Port Alias [<port_list>] [<ip_addr>]
DeviceBinding Port DeviceType [<port_list>] [unknown|ip_cam|ip_phone|ap|pc|plc|nvr]
DeviceBinding Port Location [<port_list>] [<device_location>]
DeviceBinding Port Description [<port_list>] [<device_description>]
```

6.1.3.31 MRP

```
>mrp ?
Available Commands:

MRP Configuration
MRP Mode [enable|disable]
MRP Manager [enable|disable]
MRP React [enable|disable]
MRP 1stRingPort [<mrp_port>]
MRP 2ndRingPort [<mrp_port>]
MRP Parameter MRP_TOPchgT [<value>]
MRP Parameter MRP_TOPNRmax [<value>]
MRP Parameter MRP_TSTshortT [<value>]
MRP Parameter MRP_TSTdefaultT [<value>]
MRP Parameter MRP_TSTNRmax [<value>]
MRP Parameter MRP_LNKdownT [<value>]
MRP Parameter MRP_LNKupT [<value>]
MRP Parameter MRP_LNKNRmax [<value>]
>
```

6.1.3.32 Modbus

```
>modbus ?
Available Commands:

Modbus Status
Modbus Mode [enable|disable]
```

6.1.3.33 RSTP

```
>RSTP ?
Available Commands:

RSTP Configuration
RSTP Mode [<rstp_mode>]
RSTP BridgePriority [<priority>]
RSTP HelloTime [<hello>]
RSTP MaxAge [<max_age>]
RSTP FwdDelay [<delay>]
RSTP Status [<stp_port_list>]
RSTP Port Configuration [<stp_port_list>]
RSTP Port Mode [<stp_port_list>] [enable|disable]
RSTP Port Edge [<stp_port_list>] [enable|disable]
RSTP Port AutoEdge [<stp_port_list>] [enable|disable]
RSTP Port P2P [<stp_port_list>] [enable|disable|auto]
RSTP Port Cost [<stp_port_list>] [<path_cost>]
RSTP Port Priority [<stp_port_list>] [<priority>]
```

6.1.3.34 Auto-Logout

```
>auto-logout ?
Available Commands:

Auto-Logout CLI [<timer>]
Auto-Logout Web [<timer>]
```

6.1.3.35 Save

```
>save
```

6.1.3.36 Show

```
>show ?
Available Commands:

Show Configuration Switch
Show Configuration Port <port_list>
```

7. APPENDIX A: IES28TG/GF MODBUS INFORMATION

*Device ID/PLC is 1
*04 Read Input Register (3x) should be used.
*The returned values are in hex format

Address	Description
16	VendorName
48	ProductName
81	Version
85	MacAddress
256	SysName
512	SysDescription
768	SysLocation
1024	SysContact
4096	PortStatus: Port :1~VTSS_PORTS Value :0x0000 Link down 0x0001 Link up 0x0002 Disable 0xffff NoPort
4352	PortSpeed: Port :1~VTSS_PORTS Value :0x0000 10M-Half 0x0001 10M-Full 0x0002 100M-Half 0x0003 100M-Full 0x0004 1G-Half 0x0005 1G-Full 0xffff NoPort
4608	PortFlowCtrl : Port :1~VTSS_PORTS Value :0x0000 Off 0x0001 On 0xffff NoPort