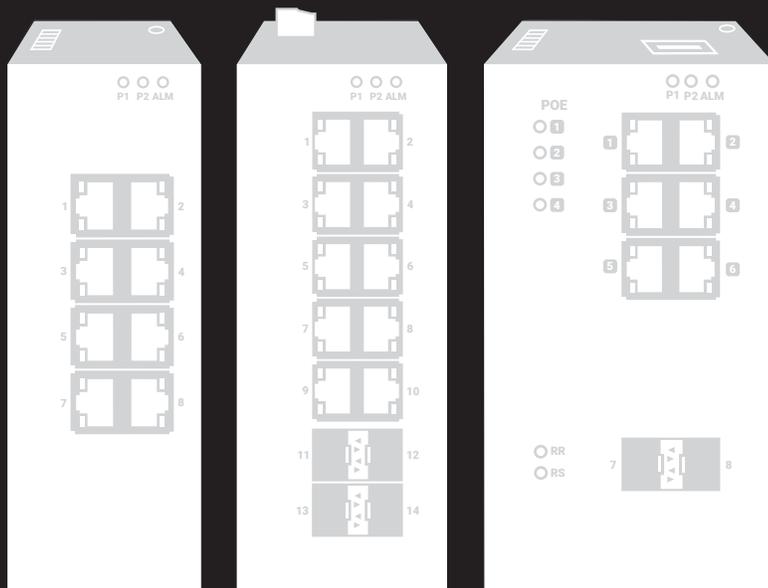


# USER MANUAL

LIG1014A, LIG1080A, LIG1082A, LIE1014A, LIE1080A, LIE1082A

# INDUSTRIAL ETHERNET SWITCHES

24/7 TECHNICAL SUPPORT AT 1.877.877.2269 OR VISIT [BLACKBOX.COM](http://BLACKBOX.COM)



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# SAFETY INSTRUCTIONS

## SAFETY WARNING

CAUTION: YOUR EYES MIGHT BE DAMAGED!

When a connector is removed during installation, testing, or servicing, or when an energized fiber is broken, a risk of ocular exposure to optical energy that may be potentially hazardous occurs, depending on the laser output power.

The primary hazards of exposure to laser radiation from an optical-fiber communication system are:

- ♦ Damage to the eye by accidental exposure to a beam emitted by a laser source.
- ♦ Damage to the eye from viewing a connector attached to a broken fiber or an energized fiber.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



# CHAPTER 1: SPECIFICATIONS

## 1.1 LIG1014A

| <b>INDUSTRIAL MANAGED GIGABIT ETHERNET SWITCH (LIG1014A)</b> |   |
|--|---|
| <b>APPROVALS</b>   |   |
| <b>STANDARDS</b>   | UL508/CSA C22, EN61010-1, CE, FCC Part 15, CISPR22 (EN55022) Class A, IEC60068-2-6, -27, -32 (Vibration, Shock, Free Fall), MTBF > 25 years, IEC61000-4-2, -3, -4, -5, -6 (Level 3)   |
| <b>FEATURES</b>  | Web, SNMP v1/v2c, Telnet, HTTPS, SSH, Radius, TFTP/FTP, Syslog, VLAN, Diagnostic Tools, RMON 1,2,3,9, DHCP, Client/Server/Snooping/Relay/Option82, QoS, IGMP Proxy/Snooping v1/v2, Filter Features, LLDP, STP, RSTP, MSTP, LACP |
| <b>FIRMWARE</b>  |   |
| <b>MAC ADDRESS</b>   | 8000 MAC Addresses  |
| <b>FRAME SIZE</b>  | 9000 Bytes (Jumbo frame capable)  |
| <b>BUFFER MEMORY</b>   | 512 kbytes  |
| <b>HARDWARE</b>  |   |
| <b>CHASSIS</b>   | IP30  |
| <b>CONNECTORS</b>  | (10) RJ-45, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover, (4) 100/1000BASE-SFP module slots, (1) RJ-45 console port  |
| <b>INDICATORS</b>  | (1) P1 LED, (1) P2 LED, (1) ALM LED, (10) RJ-45 Ethernet Port Link LEDs, (10) RJ-45 Ethernet Port Speed LEDs, (4) SFP Port Link LEDs, (4) SFP Port Speed LEDs   |
| <b>DIMENSIONS (WITHOUT DIN RAIL CLIP)</b>                    | 6.0"H x 2.4"W x 4.3"D (15.4 x 6 x 10.9 cm)  |
| <b>WEIGHT</b>  | 2.4 lb. (1.1 kg)  |
| <b>INSTALLATION OPTIONS</b>                                  | DIN-rail mounting;<br>Wallmounting  |
| <b>POWER</b>   |   |
| <b>POE</b>   | No  |
| <b>INPUT</b>   | Redundant input terminals, reverse power protection, 12 – 58 VDC  |
| <b>MAXIMUM POWER</b>   | 11 Watts  |
| <b>ENVIRONMENTAL</b>   |   |
| <b>OPERATING TEMPERATURE</b>                                 | -40 to +167° F (-40 to +75° C), cold startup at -40° C  |
| <b>STORAGE TEMPERATURE</b>                                   | -40 to +185° F (-40 to +85° C)  |
| <b>HUMIDITY</b>  | 5 to 95% RH (non-condensing)  |

# CHAPTER 1: SPECIFICATIONS

## 1.2 LIG1080A

| <b>INDUSTRIAL MANAGED GIGABIT ETHERNET SWITCH (LIG1080A)</b> |  |
|--|--|
| <b>APPROVALS</b>   |  |
| <b>STANDARDS</b>   | Agency Compliance: Vibration, shock & freefall, IEC60068-2-6, -27, -32<br>Certification compliance: CE/FCC; EN 50121-4<br>Electrical safety: CSA C22, EN61010-1, CE<br>EMC: FCC Part 15, CISPR 22 (EN55022) Class A, IEC61000-4-2, -3, -4, -5, -6<br>RoHS and WEEE: RoHS (Pb free) and WEEE compliant<br>MTBF: 463,158 Hours |
| <b>FEATURES</b>  | Web, SNMP v1/v2c, Telnet, HTTPS, SSH, Radius, TFTP/FTP, Syslog, VLAN, Diagnostic Tools, RMON 1,2,3,9, DHCP, Client/Server/Snooping/Relay/Option82, QoS, IGMP Proxy/Snooping v1/v2, Filter Features, LLDP, STP, RSTP, MSTP, LACP, v3 to SNMP, v3 to IGMP Proxy/Snooping   |
| <b>FIRMWARE</b>  |  |
| <b>MAC ADDRESS</b>   | 8000 MAC Addresses   |
| <b>FRAME SIZE</b>  | 9000 Bytes (Jumbo frame capable)   |
| <b>HARDWARE</b>  |  |
| <b>CHASSIS</b>   | IP30   |
| <b>CONNECTORS</b>  | (8) RJ-45, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover, (1) RJ-45 console port   |
| <b>INDICATORS</b>  | (1) P1 LED, (1) P2 LED, (1) ALM LED, (8) RJ-45 Ethernet Port Link LEDs, (8) RJ-45 Ethernet Port Speed LEDs   |
| <b>DIMENSIONS (WITHOUT DIN RAIL CLIP)</b>                    | 6.0"H x 4.3"W x 2.4"D (15.4 x 10.9 x 6.0 cm)   |
| <b>WEIGHT</b>  | 2.33 lbs. (1.06 kg)  |
| <b>INSTALLATION OPTIONS</b>                                  | DIN-rail mounting;<br>Wallmounting   |
| <b>POWER</b>   |  |
| <b>POE</b>   | No   |
| <b>INPUT</b>   | Redundant input terminals, reverse power protection, 12 – 58 VDC   |
| <b>MAXIMUM POWER</b>   | 10.5 Watts   |
| <b>ENVIRONMENTAL</b>   |  |
| <b>OPERATING TEMPERATURE</b>                                 | -40 to +167° F (-40 to +75° C), cold startup at -40° C   |
| <b>STORAGE TEMPERATURE</b>                                   | -40 to +185° F (-40 to +85° C)   |
| <b>HUMIDITY</b>  | 5 to 95% RH (non-condensing)   |



## CHAPTER 1: SPECIFICATIONS

## 1.3 LIG1082A

| INDUSTRIAL MANAGED GIGABIT ETHERNET SWITCH (LIG1082A) |  |
|---|--|
| APPROVALS   |  |
| STANDARDS   | Agency Compliance: Vibration, shock & freefall, IEC60068-2-6, -27, -32<br>Certification compliance: CE/FCC; EN 50121-4<br>Electrical safety: CSA C22, EN61010-1, CE<br>EMC: FCC Part 15, CISPR 22 (EN55022) Class A, IEC61000-4-2, -3, -4, -5, -6<br>RoHS and WEEE: RoHS (Pb free) and WEEE compliant<br>MTBF: 463,158 Hours |
| FEATURES  | Web, SNMP v1/v2c, Telnet, HTTPS, SSH, Radius, TFTP/FTP, Syslog, VLAN, Diagnostic Tools, RMON 1,2,3,9, DHCP, Client/Server/Snooping/Relay/Option82, QoS, IGMP Proxy/Snooping v1/v2, Filter Features, LLDP, STP, RSTP, MSTP, LACP, v3 to SNMP, v3 to IGMP Proxy/Snooping   |
| FIRMWARE  |  |
| MAC ADDRESS   | 8000 MAC Addresses   |
| FRAME SIZE  | 9000 Bytes (Jumbo frame capable)   |
| HARDWARE  |  |
| CHASSIS   | IP30   |
| CONNECTORS  | (6) RJ-45, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover, (2) 100/1000BASE-SFP module slots, (1) RJ-45 console port  |
| INDICATORS  | (1) P1 LED, (1) P2 LED, (1) ALM LED, (6) RJ-45 Ethernet Port Link LEDs, (6) RJ-45 Ethernet Port Speed LEDs, (2) SFP Port Link LEDs, (2) SFP Port Speed LEDs  |
| DIMENSIONS (WITHOUT DIN RAIL CLIP)                    | 6.0"H x 4.3"W x 2.4"D (15.4 x 10.9 x 6.0 cm)   |
| WEIGHT  | 2.33 lbs. (1.06 kg)  |
| INSTALLATION OPTIONS                                  | DIN-rail mounting;<br>Wallmounting   |
| POWER   |  |
| POE   | No   |
| INPUT   | Redundant input terminals, reverse power protection, 12 – 58 VDC   |
| MAXIMUM POWER   | 10.5 Watts   |
| ENVIRONMENTAL   |  |
| OPERATING TEMPERATURE                                 | -40 to +167° F (-40 to +75° C), cold startup at -40° C   |
| STORAGE TEMPERATURE                                   | -40 to +185° F (-40 to +85° C)   |
| HUMIDITY  | 5 to 95% RH (non-condensing)   |

# CHAPTER 1: SPECIFICATIONS

## 1.4 LIE1014A

| <b>INDUSTRIAL MANAGED POE GIGABIT ETHERNET SWITCH (LIE1014A)</b> |   |
|--|---|
| <b>APPROVALS</b>   |   |
| <b>STANDARDS</b>   | UL508/CSA C22, EN61010-1, CE, FCC Part 15, CISPR22 (EN55022) Class A, IEC60068-2-6, -27, -32 (Vibration, Shock, Free Fall), MTBF > 25 years, IEC61000-4-2, -3, -4, -5, -6 (Level 3)   |
| <b>FEATURES</b>  | Web, SNMP v1/v2c, Telnet, HTTPS, SSH, Radius, TFTP/FTP, Syslog, VLAN, Diagnostic Tools, RMON 1,2,3,9, DHCP, Client/Server/Snooping/Relay/Option82, QoS, IGMP Proxy/Snooping v1/v2, Filter Features, LLDP, STP, RSTP, MSTP, LACP |
| <b>FIRMWARE</b>  |   |
| <b>MAC ADDRESS</b>   | 8000 MAC Addresses  |
| <b>FRAME SIZE</b>  | 9000 Bytes (Jumbo frame capable)  |
| <b>BUFFER MEMORY</b>   | 512 kbytes  |
| <b>HARDWARE</b>  |   |
| <b>CHASSIS</b>   | IP30  |
| <b>CONNECTORS</b>  | (8) RJ-45, IEEE 802.3at PoE PSE ports, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover;<br>(4) 100/1000BASE-SFP module slot, (1) RJ-45 console port   |
| <b>INDICATORS</b>  | (1) P1 LED, (1) P2 LED, (1) ALM LED, (8) RJ-45 Ethernet Port Link LEDs, (8) RJ-45 Ethernet Port Speed LEDs, (4) SFP Port Link LEDs, (4) SFP Port Speed LEDs, (8) PoE Port LEDs  |
| <b>DIMENSIONS (WITHOUT DIN RAIL CLIP)</b>                        | 6.1"H x 3.0"W x 5.0"D (15.4 x 7.7 x 12.8 cm)  |
| <b>WEIGHT</b>  | 3.1 lb. (1.4 kg)  |
| <b>INSTALLATION OPTIONS</b>                                      | DIN-rail mounting;<br>Wallmounting  |
| <b>POWER</b>   |   |
| <b>POE</b>   | Yes   |
| <b>INPUT</b>   | Redundant input terminals, reverse power protection, 12 –58 VDC, 54–58 VDC for PoE+, 48–58 VDC for PoE  |
| <b>MAXIMUM POWER</b>   | Without PoE: 14 Watts,<br>With PoE: 265 Watts   |
| <b>ENVIRONMENTAL</b>   |   |
| <b>OPERATING TEMPERATURE</b>                                     | -40 to +167° F (-40 to +75° C), cold startup at -40° C  |
| <b>STORAGE TEMPERATURE</b>                                       | -40 to +185° F (-40 to +85° C)  |
| <b>HUMIDITY</b>  | 5 to 95% RH (non-condensing)  |



# CHAPTER 1: SPECIFICATIONS

## 1.5 LIE1080A

| <b>INDUSTRIAL MANAGED POE GIGABIT ETHERNET SWITCH (LIE1080A)</b> |   |
|--|---|
| <b>APPROVALS</b>   |   |
| <b>STANDARDS</b>   | Agency Compliance: Vibration, shock & freefall, IEC60068-2-6, -27, -32<br>Certification compliance: CE/FCC; EN 50121-4, NEMA TS-2<br>Electrical safety: CSA C22, UL60905, CE<br>EMC: FCC Part 15, CISPR 22 (EN55022) Class , IEC61000-4-2, -3, -4, -5, -6<br>RoHS and WEEE: RoHS (Pb free) and WEEE compliant<br>MTBF: > 25 years |
| <b>FEATURES</b>  | Web, SNMP v1/v2c, Telnet, HTTPS, SSH, Radius, TFTP/FTP, Syslog, VLAN, Diagnostic Tools, RMON 1,2,3,9, DHCP, Client/Server/Snooping/Relay/Option82, QoS, IGMP Proxy/Snooping v1/v2, Filter Features, LLDP, STP, RSTP, MSTP, LACP, v3 to SNMP, v3 to IGMP Proxy/Snooping  |
| <b>FIRMWARE</b>  |   |
| <b>MAC ADDRESS</b>   | 8000 MAC Addresses  |
| <b>FRAME SIZE</b>  | 9000 Bytes (Jumbo frame capable)  |
| <b>HARDWARE</b>  |   |
| <b>CHASSIS</b>   | IP30  |
| <b>CONNECTORS</b>  | (4) RJ-45 PoE, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover; (4) RJ-45, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover; (1) RJ-45 console port  |
| <b>INDICATORS</b>  | (1) P1 LED, (1) P2 LED, (1) ALM LED, (8) RJ-45 Ethernet Port Link LEDs, (8) RJ-45 Ethernet Port Speed LEDs, (4) PoE Port LEDs   |
| <b>DIMENSIONS (WITHOUT DIN RAIL CLIP)</b>                        | 6.1"H x 3.0"W x 5.0"D (15.4 x 7.7 x 12.8 cm)  |
| <b>WEIGHT</b>  | 3.1 lb. (1.4 kg)  |
| <b>INSTALLATION OPTIONS</b>                                      | DIN-rail mounting;<br>Wallmounting  |
| <b>POWER</b>   |   |
| <b>POE</b>   | Yes   |
| <b>INPUT</b>   | Redundant input terminals, reverse power protection, 12 –58 VDC, 54–58 VDC for PoE+, 48–58 VDC for PoE  |
| <b>MAXIMUM POWER</b>   | Without PoE: 14 Watts,<br>With PoE: 265 Watts   |
| <b>ENVIRONMENTAL</b>   |   |
| <b>OPERATING TEMPERATURE</b>                                     | -40 to +167° F (-40 to +75° C), cold startup at -40° C  |
| <b>STORAGE TEMPERATURE</b>                                       | -40 to +185° F (-40 to +85° C)  |
| <b>HUMIDITY</b>  | 5 to 95% RH (non-condensing)  |

# CHAPTER 1: SPECIFICATIONS

## 1.6 LIE1082A

| <b>INDUSTRIAL MANAGED POE GIGABIT ETHERNET SWITCH (LIE1082A)</b> |  |
|--|--|
| <b>APPROVALS</b>   |  |
| <b>STANDARDS</b>   | Agency Compliance: Vibration, shock & freefall, IEC60068-2-6, -27, -32<br>Certification compliance: CE/FCC; EN 50121-4, NEMA TS-2<br>Electrical safety: CSA C22, UL60905, CE<br>EMC: FCC Part 15, CISPR 22 (EN55022) Class A, IEC61000-4-2, -3, -4, -5, -6<br>RoHS and WEEE: RoHS (Pb free) and WEEE compliant<br>MTBF: > 25 yrs |
| <b>FEATURES</b>  | Web, SNMP v1/v2c, Telnet, HTTPS, SSH, Radius, TFTP/FTP, Syslog, VLAN, Diagnostic Tools, RMON 1,2,3,9, DHCP, Client/Server/Snooping/Relay/Option82, QoS, IGMP Proxy/Snooping v1/v2, Filter Features, LLDP, STP, RSTP, MSTP, LACP, v3 to SNMP, v3 to IGMP Proxy/Snooping   |
| <b>FIRMWARE</b>  |  |
| <b>MAC ADDRESS</b>   | 8000 MAC Addresses   |
| <b>FRAME SIZE</b>  | 9000 Bytes (Jumbo frame capable)   |
| <b>HARDWARE</b>  |  |
| <b>CHASSIS</b>   | IP30   |
| <b>CONNECTORS</b>  | (4) RJ-45 PoE, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover, (2) RJ-45, 10/100/1000 Mbps speed auto-negotiation, MDI-MDI-X auto-crossover, (2) 100/1000BASE-SFP module slot, (1) RJ-45 console port   |
| <b>INDICATORS</b>  | (1) P1 LED, (1) P2 LED, (1) ALM LED, (6) RJ-45 Ethernet Port Link LEDs, (6) RJ-45 Ethernet Port Speed LEDs, (2) SFP Port Link LEDs, (2) SFP Port Speed LEDs, (4) PoE Port LEDs   |
| <b>DIMENSIONS (WITHOUT DIN RAIL CLIP)</b>                        | 6.1"H x 3.0"W x 5.0"D (15.4 x 7.7 x 12.8 cm)   |
| <b>WEIGHT</b>  | 3.1 lb. (1.4 kg)   |
| <b>INSTALLATION OPTIONS</b>                                      | DIN-rail mounting;<br>Wallmounting   |
| <b>POWER</b>   |  |
| <b>POE</b>   | Yes  |
| <b>INPUT</b>   | Redundant input terminals, reverse power protection, 12 –58 VDC, 54–58 VDC for PoE+, 48–58 VDC for PoE   |
| <b>MAXIMUM POWER</b>   | Without PoE: 14 Watts,<br>With PoE: 265 Watts  |
| <b>ENVIRONMENTAL</b>   |  |
| <b>OPERATING TEMPERATURE</b>                                     | -40 to +167° F (-40 to +75° C), cold startup at -40° C   |
| <b>STORAGE TEMPERATURE</b>                                       | -40 to +185° F (-40 to +85° C)   |
| <b>HUMIDITY</b>  | 5 to 95% RH (non-condensing)   |



# CHAPTER 1: SPECIFICATIONS

## 1.7 SYSTEM STATISTICS

| SYSTEM STATISTICS          |                           |
|----------------------------|---------------------------|
| FUNCTION NAME              | SYSTEM MAXI-<br>MUM VALUE |
| VLAN ID                    | 4096                      |
| VLAN LIMITATION            | 1024                      |
| PRIVILEGE LEVEL OF USER    | <b>15</b>                 |
| RMON STATISTIC ENTRY       | 65535                     |
| RMON ALARM ENTRY           | 65                        |
| RMON EVENT ENTRY           | 65535                     |
| IPMC PROFILE               | <b>64</b>                 |
| IPMC RULE/ADDRESS ENTRY    | 128                       |
| ACE                        | 256                       |
| ICMP TYPE/CODE             | 255                       |
| RADIUS SERVER              | 5                         |
| TACACS+ SERVER             | 5                         |
| MAC-BASED VLAN ENTRY       | 256                       |
| IP SUBNET-BASED VLAN ENTRY | <b>128</b>                |
| PROTOCOL-BASED VLAN GROUP  | 125                       |
| VOICE VLAN OUI             | 16                        |
| QCE                        | 256                       |
| IP INTERFACE               | <b>8</b>                  |
| IP ROUTE                   | 32                        |
| SECURITY ACCESS MANAGEMENT | 16                        |
| MVR VLAN                   | 4                         |
| MAC LEARNING TABLE ADDRESS | 8K                        |
| IGMP GROUP                 | 256                       |

## CHAPTER 2: OVERVIEW

### 2.1 INTRODUCTION

The Industrial Managed and Unmanaged Gigabit Ethernet Switches include unmanaged switches that provide four (4) copper RJ-45 or RJ-45 PoE ports and one (1) multi-rate SFP slot and managed switches that provide six (6), eight (8) or ten (10) copper RJ-45 or RJ-45 PoE ports and two (2) or four (4) multi-rate SFP slots.

#### Power over Ethernet

The LIE1080A and LIE1082A switches support Power over Ethernet compliant to the IEEE 802.3af and IEEE 802.3at standard on four copper ports. The LIE1014A switch supports PoE on eight copper ports. Thus these switches can be used to power standard PoE PD devices with up to 30 watts per port along with the Ethernet data on standard Ethernet Cabling.

#### Multi-rate SFP slots

The benefit of having multi-rate SFP slots is to be able to use 100-Mbps and 1-Gbps SFP Modules for either multi- or single-mode in a mix and match as needed. If requirements change, just replace the SFP module and protect your switch investment.

#### Power

The switches are powered from 12- to 58-VDC. The PoE models need 48 VDC for 802.3af and a minimum of 53 VDC for 802.3at.

#### Extended temperature range

All models are tested and released for operating temperatures from -40° up to +75° Celsius. They passed shock, vibration and freefall test and comply with the IEC600068-2-6, -27 and -32 standards.

#### Management

The switches offer powerful features including Layer 3 routing and management with all advanced filter and multicast algorithms needed today to easily prioritize, partition, and organize a reliable high-speed network.

### 2.2 AVAILABLE MODELS

Six models of the Industrial Gigabit Ethernet Switches are available:

- Industrial Gigabit Ethernet Switch - Managed, Extreme Temperature, (10) RJ-45, (4) SFP (LIG1014A)
- Industrial Gigabit Ethernet Managed L2+ Switch - Extreme Temperature, (8) RJ-45 (LIG1080A)
- Industrial Gigabit Ethernet Managed L2+ Switch - Extreme Temperature, (6) RJ-45, (2) SFP (LIG1082A)
- Industrial Gigabit Ethernet PoE+ Switch - Managed, (8) RJ-45, (4) SFP (LIE1014A)
- Industrial Gigabit Ethernet Managed L2+ Switch - PoE+, Extreme Temperature, (8) RJ-45 (LIE1080A)
- Industrial Gigabit Ethernet Managed L2+ Switch - PoE+, Extreme Temperature, (6) RJ-45, (2) SFP (LIE1082A)

| SPECIFICATION COMPARISON CHART |          |          |          |          |          |          |
|--------------------------------|----------|----------|----------|----------|----------|----------|
|                                | LIE1014A | LIE1080A | LIE1082A | LIG1014A | LIG1080A | LIG1082A |
| RJ-45 POE PORTS                | 8        | 4        | 4        | –        | –        | –        |
| RJ-45 PORTS                    | –        | 4        | 2        | 10       | 8        | 6        |
| SFP PORTS                      | 4        | NONE     | 2        | 4        | NONE     | 2        |
| P1 LED                         | 1        | NONE     | 1        | 1        | NONE     | 2        |
| P2 LED                         | 1        | 1        | 1        | 1        | 1        | 1        |
| ALM LED                        | 1        | 1        | 1        | 1        | 1        | 1        |
| ETHERNET PORT LINK LED         | 8        | 8        | 6        | 10       | 8        | 6        |
| ETHERNET PORT SPEED LED        | 8        | 8        | 6        | 10       | 8        | 6        |
| SFP PORT LINK LED              | 4        | NONE     | 2        | 4        | NONE     | 2        |
| SFP PORT SPEED LED             | 4        | NONE     | 2        | 4        | NONE     | 2        |
| MANAGED                        | YES      | YES      | YES      | YES      | YES      | YES      |

## CHAPTER 2: OVERVIEW

### 2.3 FEATURES

- ◆ CATx models reach distance up to 426 feet (130 m)
- ◆ Unmanaged models (LIE401A and LIG401A) offer (4) 10/100/1000 plus (1) multi-rate SFP
- ◆ Managed models (LIE1014A, LIE1080A, LIE1082A, LIG1014A, LIG1080A and LIG1082A) provide (6), (8) or (10) 10/100/1000 plus (2) or (4) multi-rate SFPs
- ◆ Models with Power over Ethernet Plus deliver 30 watts power per port to remote PD devices
- ◆ Extended temperature range: -40° to +75°C
- ◆ L2 wire speed switching
- ◆ 12 to 58V DC dual input, reverse polarity
- ◆ IP30 industrial design
- ◆ DIN-rail mountable
- ◆ Shock, vibration and freefall test to IEC60068-2-6, -27, -32
- ◆ EMC approval acc. to IEC61000-4-2, -3, -4, -5, -6 (Level 3)

### 2.4 WHAT'S INCLUDED

#### LIG1014A:

- ◆ (1) Industrial Managed Gigabit Ethernet Switch
- ◆ (2) Wallmount plates
- ◆ (1) DIN rail clip
- ◆ (1) DC power terminal block
- ◆ (10) RJ-45 port dust covers
- ◆ (4) SFP port dust covers
- ◆ (1) quick start guide

#### LIG1080A:

- ◆ (1) Industrial Managed Gigabit Ethernet Switch
- ◆ (2) Wallmount plates
- ◆ (1) DIN rail clip
- ◆ (1) DC power terminal block
- ◆ (8) RJ-45 port dust covers
- ◆ (1) quick start guide

## CHAPTER 2: OVERVIEW

### LIG1082A:

- ◆ (1) Industrial Managed Gigabit Ethernet Switch
- ◆ (2) Wallmount plates
- ◆ (1) DIN rail clip
- ◆ (1) DC power terminal block
- ◆ (6) RJ-45 port dust covers
- ◆ (2) SFP PORT DUST COVERS
- ◆ (1) quick start guide

### LIE1014A:

- ◆ (1) Industrial Managed Gigabit POE Ethernet Switch
- ◆ (2) Wallmount plates
- ◆ (1) DIN rail clip
- ◆ (1) DC power terminal block
- ◆ (8) RJ-45 port dust covers
- ◆ (4) SFP port dust covers
- ◆ (1) quick start guide

### LIE1080A:

- ◆ (1) Industrial Managed Gigabit POE Ethernet Switch
- ◆ (2) Wallmount plates
- ◆ (1) DIN rail clip
- ◆ (1) DC power terminal block
- ◆ (8) RJ-45 port dust covers
- ◆ (1) quick start guide

### LIE1082A:

- ◆ (1) Industrial Managed Gigabit POE Ethernet Switch
- ◆ (2) Wallmount plates
- ◆ (1) DIN rail clip
- ◆ (1) DC power terminal block
- ◆ (6) RJ-45 port dust covers
- ◆ (2) SFP port dust covers
- ◆ (1) quick start guide



# CHAPTER 2: OVERVIEW

## 2.5 HARDWARE DESCRIPTION

### 2.5.1 LIG1014A



FIGURE 2-1. LIG1014A TOP PANEL

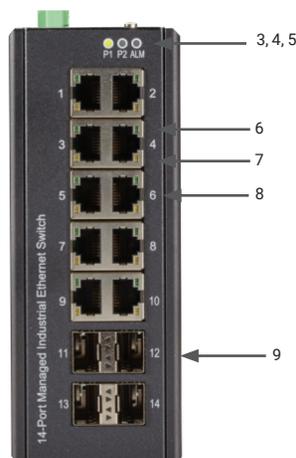


FIGURE 2-2. LIG1014A FRONT PANEL

TABLE 2-1. LIG1014A COMPONENTS

| NUMBER IN FIGURES 2-1 AND 2-2 | COMPONENT                | DESCRIPTION  |
|-------------------------------|--------------------------|--|
| 1                             | (1) RJ-45 connector      | Links to console for management                      |
| 2                             | (1) 6-pin terminal block | Power 1, Power 2 and Alarm connections               |
| 3                             | (1) P1 LED               | Lights when power to Power Supply 1 is ON            |
| 4                             | (1) P2 LED               | Lights when power to Power Supply 2 is ON            |
| 5                             | (1) Alarm LED            | Lights to indicate an alarm                          |
| 6                             | (10) Link/Activity LEDs  | Lights when there is activity on the respective port |
| 7                             | (10) Speed LEDs          | Lights when port is operating at 100 Mbps            |
| 8                             | (10) RJ-45 connectors    | Connect to devices                                   |
| 9                             | (4) SFP module cages     | Connect to fiber optic uplinks                       |

## 2.5.2 LIG1080A

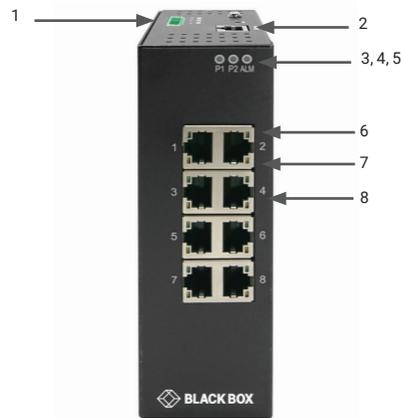


FIGURE 2-3. LIG1080A TOP AND FRONT PANELS

TABLE 2-2. LIG1080A COMPONENTS

| NUMBER IN FIGURE 2-3 | COMPONENT                | DESCRIPTION  |
|----------------------|--------------------------|--|
| 1                    | (1) 6-pin terminal block | Power 1, Power 2 and Alarm connections               |
| 2                    | (1) RJ-45 connector      | Links to console for management                      |
| 3                    | (1) P1 LED               | Lights when power to Power Supply 1 is ON            |
| 4                    | (1) P2 LED               | Lights when power to Power Supply 2 is ON            |
| 5                    | (1) Alarm LED            | Lights to indicate an alarm                          |
| 6                    | (8) Link/Activity LEDs   | Lights when there is activity on the respective port |
| 7                    | (8) Speed LEDs           | Lights when port is operating at 100 Mbps            |
| 8                    | (8) RJ-45 connectors     | Connect to devices                                   |

## 2.5.3 LIG1082A

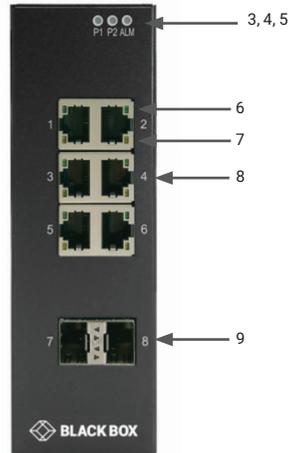


FIGURE 2-4. LIG1082A FRONT PANEL

TABLE 2-3. LIG1082A COMPONENTS

| NUMBER IN FIGURES 2-4 | COMPONENT                | DESCRIPTION  |
|-----------------------|--------------------------|--|
| 1 (not shown)         | (1) RJ-45 connector      | Links to console for management                      |
| 2 (not shown)         | (1) 6-pin terminal block | Power 1, Power 2 and Alarm connections               |
| 3                     | (1) P1 LED               | Lights when power to Power Supply 1 is ON            |
| 4                     | (1) P2 LED               | Lights when power to Power Supply 2 is ON            |
| 5                     | (1) Alarm LED            | Lights to indicate an alarm                          |
| 6                     | (6) Link/Activity LEDs   | Lights when there is activity on the respective port |
| 7                     | (6) Speed LEDs           | Lights when port is operating at 100 Mbps            |
| 8                     | (6) RJ-45 connectors     | Connect to devices                                   |
| 9                     | (2) SFP module cages     | Connect to fiber optic uplinks                       |

## 2.5.4 LIE1014A



FIGURE 2-5. LIE1014A TOP PANEL

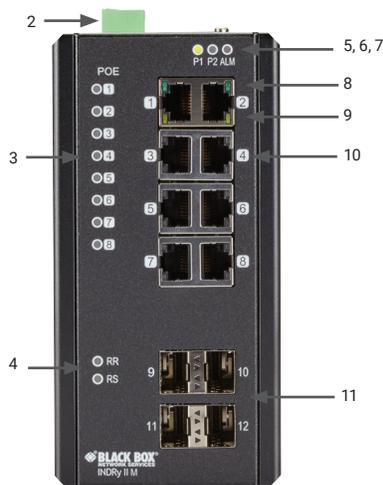


FIGURE 2-6. LIE1014A FRONT PANEL

**TABLE 2-4. LIE1014A COMPONENTS**

| NUMBER IN FIGURES 2-5 AND 2-6 | COMPONENT                | DESCRIPTION  |
|-------------------------------|--------------------------|--|
| 1                             | (1) RJ-45 connector      | Links to console for management                        |
| 2                             | (1) 6-pin terminal block | Power 1, Power 2 and Alarm connections                 |
| 3                             | (8) PoE LEDs             | Light when port is using Power over Ethernet (PoE)     |
| 4                             | (1) RR LED, (1) RS LED   | Ring Role, Ring Status (see Table 3-2 in Section 3.14) |
| 5                             | (1) P1 LED               | Lights when power to Power Supply 1 is ON              |
| 6                             | (1) P2 LED               | Lights when power to Power Supply 2 is ON              |
| 7                             | (1) Alarm LED            | Lights to indicate an alarm                            |
| 8                             | (8) Link/Activity LEDs   | Lights when there is activity on the respective port   |
| 9                             | (8) Speed LEDs           | Lights when port is operating at 100 Mbps              |
| 10                            | (8) RJ-45 PoE connectors | Connect to PoE devices                                 |
| 11                            | (4) SFP module cages     | Connect to fiber optic uplinks                         |

**CHAPTER 2: OVERVIEW**

## 2.5.5 LIE1080A

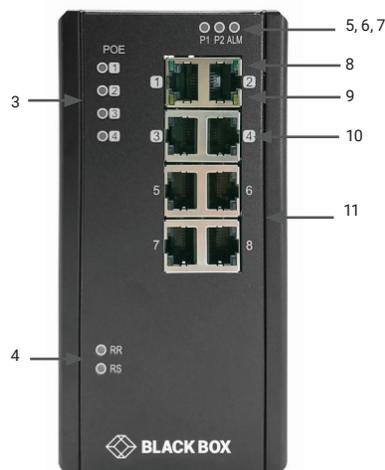


FIGURE 2-7. LIE1080A FRONT PANEL

**TABLE 2-5. LIE1080A COMPONENTS**

| NUMBER IN FIGURE 2-7 | COMPONENT                | DESCRIPTION  |
|----------------------|--------------------------|--|
| 1 (not shown)        | (1) RJ-45 connector      | Links to console for management                        |
| 2 (not shown)        | (1) 6-pin terminal block | Power 1, Power 2 and Alarm connections                 |
| 3                    | (4) PoE LEDs             | Light when port is using Power over Ethernet (PoE)     |
| 4                    | (1) RR LED, (1) RS LED   | Ring Role, Ring Status (see Table 3-2 in Section 3.14) |
| 5                    | (1) P1 LED               | Lights when power to Power Supply 1 is ON              |
| 6                    | (1) P2 LED               | Lights when power to Power Supply 2 is ON              |
| 7                    | (1) Alarm LED            | Lights to indicate an alarm                            |
| 8                    | (8) Link/Activity LEDs   | Lights when there is activity on the respective port   |
| 9                    | (8) Speed LEDs           | Lights when port is operating at 100 Mbps              |
| 10                   | (4) RJ-45 PoE connectors | Connect to PoE devices                                 |
| 11                   | (4) RJ-45 connectors     | Connect to RJ-45 devices                               |

## CHAPTER 2: OVERVIEW

## 2.5.6 LIE1082A

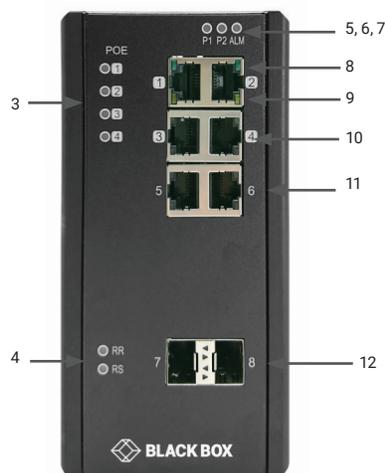


FIGURE 2-8. LIE1082A FRONT PANEL

TABLE 2-6. LIE1082A COMPONENTS

| NUMBER IN FIGURE 2-7 | COMPONENT                | DESCRIPTION  |
|----------------------|--------------------------|--|
| 1 (not shown)        | (1) RJ-45 connector      | Links to console for management                        |
| 2 (not shown)        | (1) 6-pin terminal block | Power 1, Power 2 and Alarm connections                 |
| 3                    | (4) PoE LEDs             | Light when port is using Power over Ethernet (PoE)     |
| 4                    | (1) RR LED, (1) RS LED   | Ring Role, Ring Status (see Table 3-2 in Section 3.14) |
| 5                    | (1) P1 LED               | Lights when power to Power Supply 1 is ON              |
| 6                    | (1) P2 LED               | Lights when power to Power Supply 2 is ON              |
| 7                    | (1) Alarm LED            | Lights to indicate an alarm                            |
| 8                    | (6) Link/Activity LEDs   | Lights when there is activity on the respective port   |
| 9                    | (6) Speed LEDs           | Lights when port is operating at 100 Mbps              |
| 10                   | (4) RJ-45 PoE connectors | Connect to PoE devices                                 |
| 11                   | (2) RJ-45 connectors     | Connect to twisted-pair devices                        |
| 12                   | (2) SFP module cages     | Link to fiber optic SFP modules                        |

## CHAPTER 3: INSTALLATION

### 3.1 DIN RAIL MOUNTING

Follow these steps to mount the switch on a DIN rail.

1. Screw the DIN-Rail bracket on with the bracket and screws in the accessory kit.

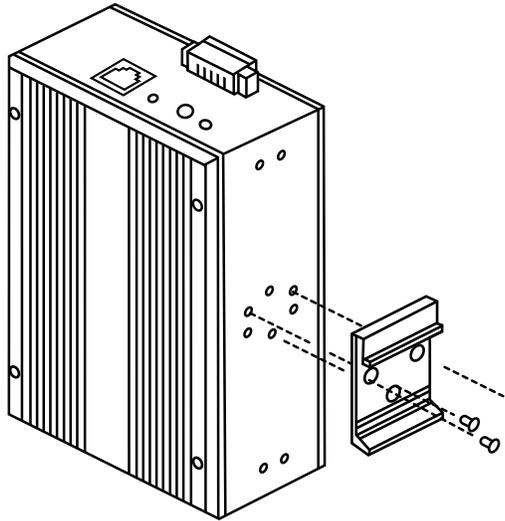


FIGURE 3-1. DIN RAIL MOUNTING STEP 1

2. Hook the unit over the DIN rail.
3. Push the bottom of the unit towards the DIN Rail until it snaps into place.

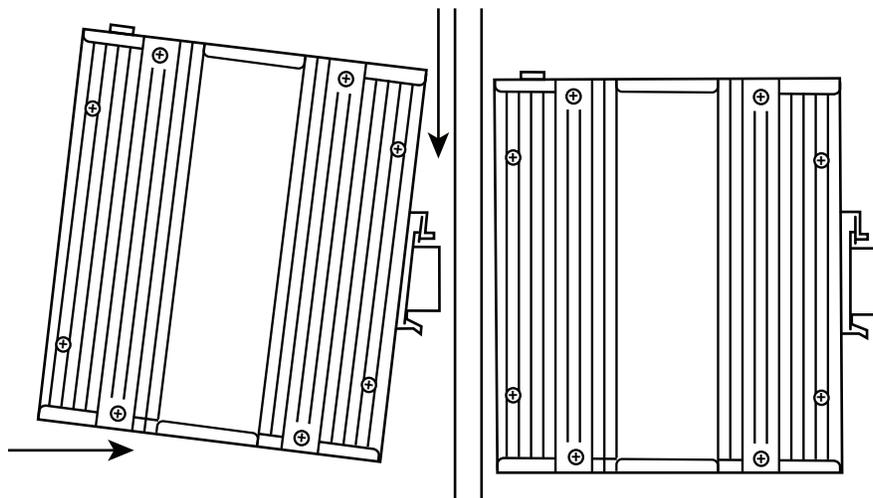


FIGURE 3-2. DIN RAIL MOUNTING STEPS 2 AND 3

## CHAPTER 3: INSTALLATION

### 3.2 WALLMOUNTING

Follow these steps to mount the switch on a wall.

1. Screw the wall-mount brackets on with screws in the accessory kit.

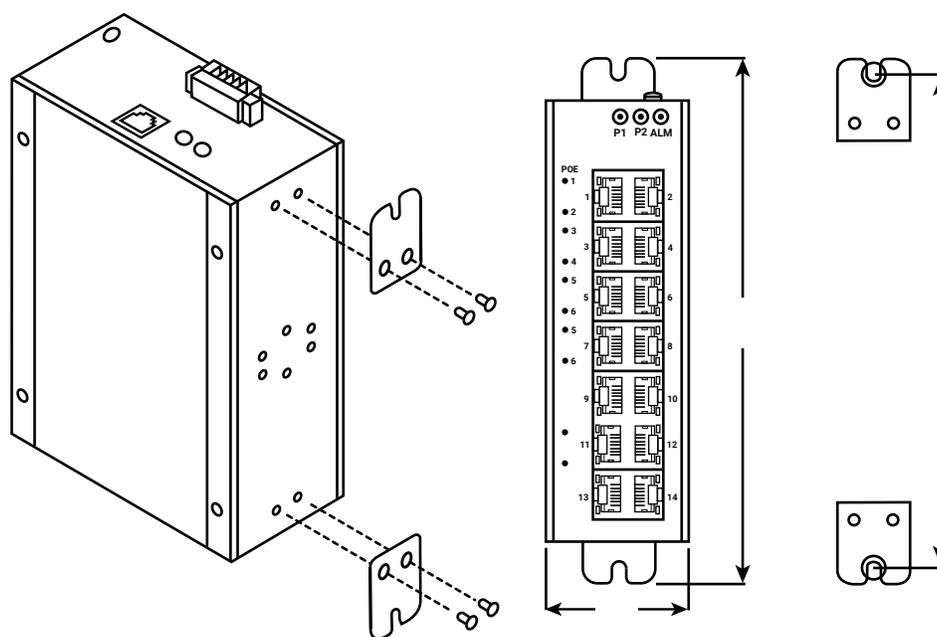


FIGURE 3-3. MOUNTING THE SWITCH ON A WALL

### 3.3 ALARM RELAY AND GROUND

The alarm relay output contacts are in the middle of the DC terminal block connector as shown in the next figure.

The alarm relay out is “Normal Open,” and it will be closed when the switch detects any predefined failure such as power failures or Ethernet link failures.

The relay output has a current carrying capacity of 0.5 A @ 24 VDC.

The switch must be properly grounded for optimum system performance.

# CHAPTER 3: INSTALLATION

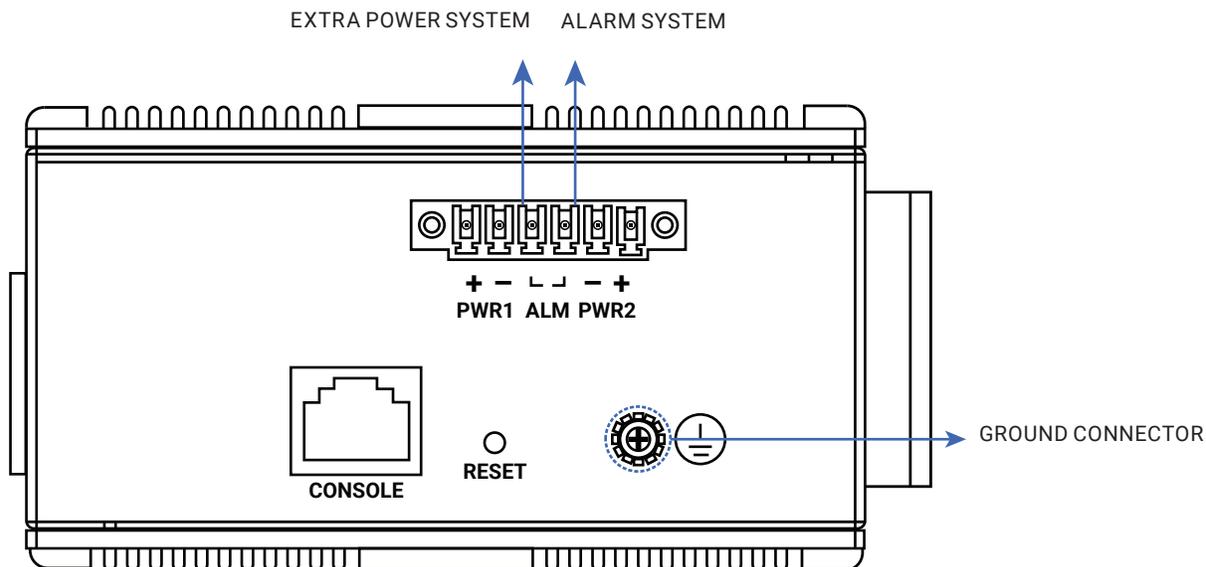


FIGURE 3-4. ALARM RELAY AND GROUND

## 3.4 CONNECTING THE ETHERNET INTERFACE (RJ-45 ETHERNET)

The switch provides two types of Ethernet interfaces: electrical (RJ-45) and optical (SFP) interfaces.

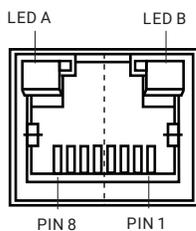
Connecting the Ethernet interface via RJ45:

To connect the switch to a PC, use straight-through or cross-over Ethernet cables,

To connect the switch to an Ethernet device, use UTP (Unshielded Twisted Pair) or STP (Shielded Twisted Pair) Ethernet cables.

The pin assignment of RJ-45 connector is shown in the following figure and table.

TABLE 3-1. RJ-45 PINOUT



| PIN  | ASSIGNMENT   | POE ASSIGNMENT<br>(FOR POE MANAGED SERIES ONLY) |
|------|--------------|---|
| 1, 2 | T/Rx+, T/Rx- | Positive VPort                                  |
| 3, 6 | T/Rx+, T/Rx- | Negative VPort                                  |
| 4, 5 | T/Rx+, T/Rx- | X   |
| 7, 8 | T/Rx+, T/Rx- | X   |

## CHAPTER 3: INSTALLATION

### 3.5 CONNECTING THE ETHERNET INTERFACE (FIBER, SFP)

For both 100/1000 Mbps fiber speed connections, the SFP slots are available. The SFP slot accepts the fiber transceivers that typically have an LC connector.

The fiber transceivers have options of multimode, single mode, long-haul or special-application transceivers.



FIGURE 3-5. FIBER OPTICS CABLE WITH LC DUPLEX CONNECTOR



FIGURE 3-6. CONNECT THE OPTICAL FIBER TO THE SFP SOCKET



#### DANGER:

Never attempt to view optical connectors that might be emitting laser energy.

Do not power up the laser product without connecting the laser to the optical fiber and putting the cover in position, as laser outputs will emit infrared laser light at this point.

### 3.6 POWER CONNECTION

The switch can be powered from two power supplies (input range 12V – 58V). Insert the positive and negative wires into V+ and V- contacts on the terminal block respectively and tighten the wire-clamp screws to prevent the wires from being loosened.



NOTE: The DC power should be connected to a well-fused power supply.

## MANAGED SERIES

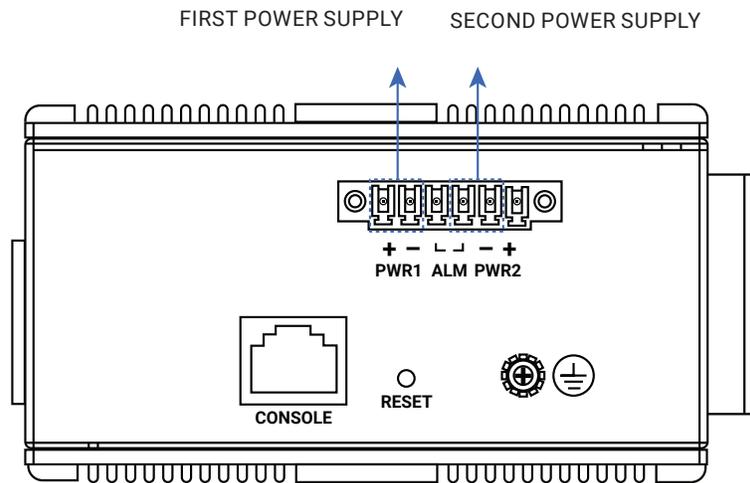


FIGURE 3-7. MANAGED SERIES

## POE MANAGED SERIES

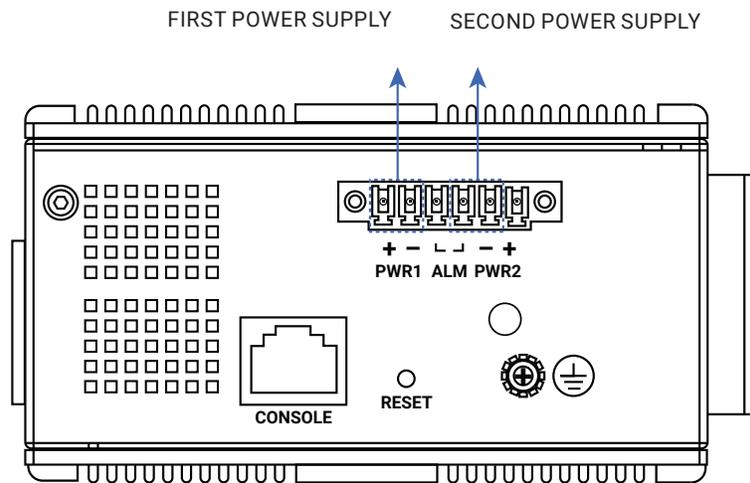


FIGURE 3-8. POE MANAGED SERIES

## CHAPTER 3: INSTALLATION

### 3.7 ALARM RELAY AND GROUND

The alarm relay output contacts are in the middle of the DC terminal block connector as shown in the figure below.

The alarm relay out is “Normal Open,” and it will be closed when the switch detects any predefined failure such as power failures or Ethernet link failures.

The relay output with current carrying capacity of 0.5A @ 24 VDC.

The switch must be properly grounded for optimum system performance.

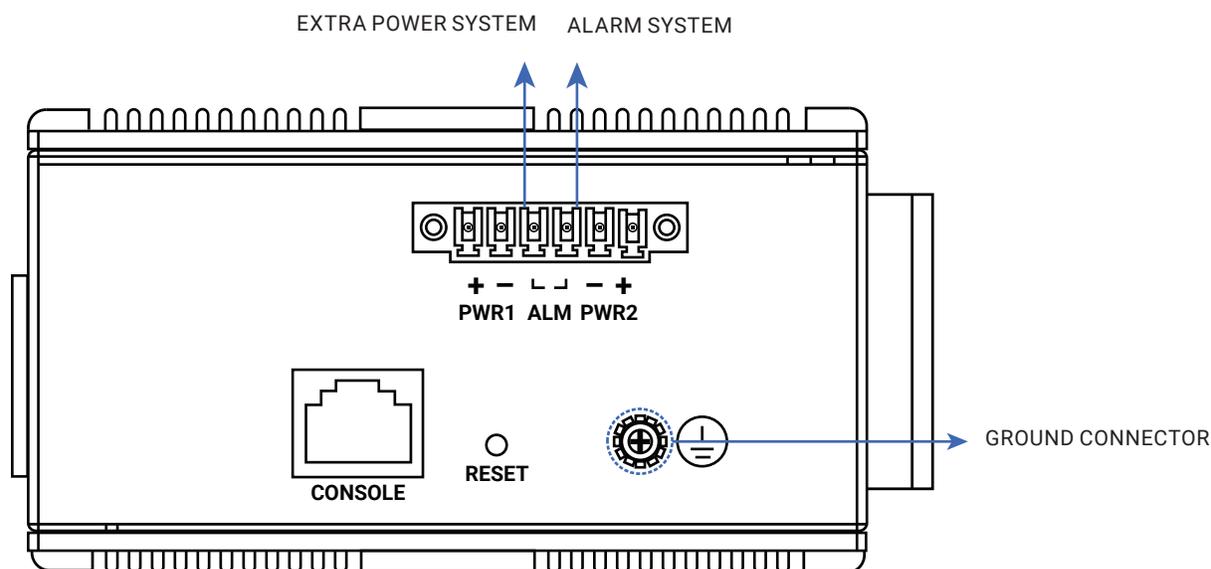


FIGURE 3-9. ALARM RELAY AND GROUND

### 3.8 SYSTEM RESET

The Reset button is provided to reboot the system without the need to remove power. Under normal circumstances, you will not have to use it. However, on rare occasions, the switch may not respond; then you may need to push the Reset button.

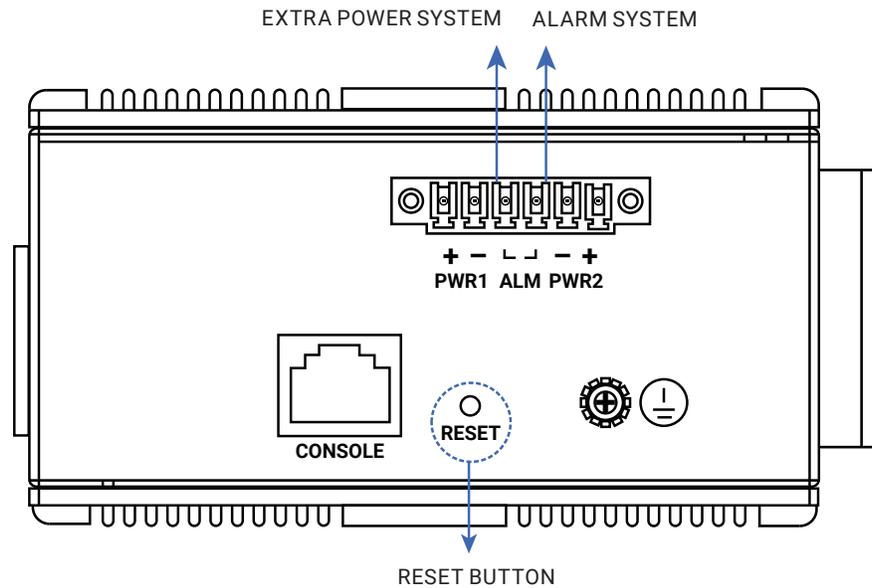


FIGURE 3-10. RESET BUTTON

## 3.9 CONSOLE CONNECTION

The Console port is for local management by using a terminal emulator or a computer with terminal emulation software. The DB9 connector connects to the computer's COM port.

- ◆ Baud rate = 115200 bps
- ◆ 8 data bits, 1 stop bit
- ◆ Priority = None
- ◆ Flow control = None

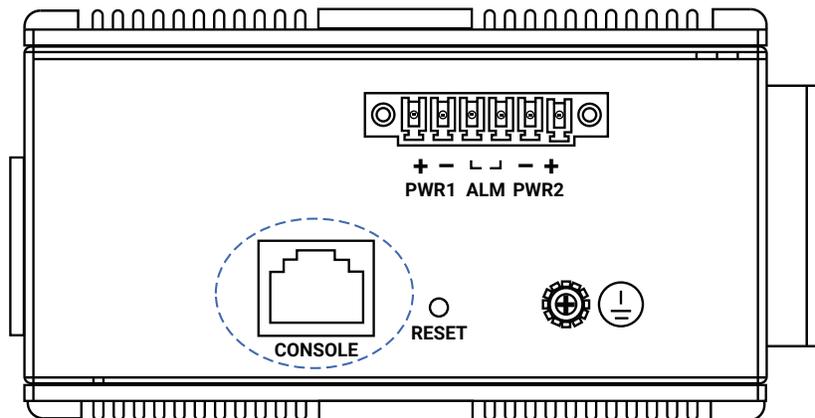


FIGURE 3-11. CONSOLE CONNECTOR

## CHAPTER 3: INSTALLATION

To connect the host PC to the Console port, an RJ-45 (male) connector-to-RS232 DB9 (female) connector cable is required. The RJ-45 connector of the cable is connected to the Console port of the switch; the DB9 connector of the cable is connected to the PC COM port. The pin assignment of the Console cable is shown below:

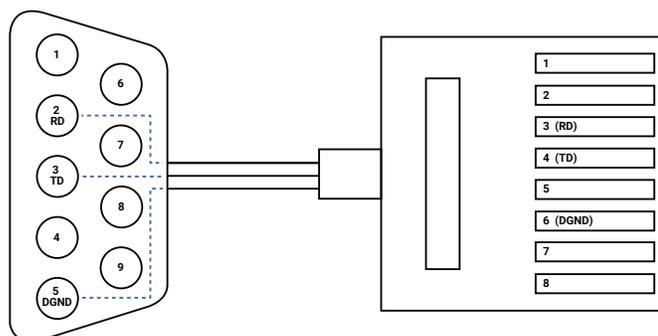


FIGURE 3-12. CONSOLE CABLE

### 3.10 WEB INTERFACE INITIALIZATION (OPTIONAL)

#### WEB BROWSER SUPPORT

IE 7 (or newer version) with the following default settings is recommended:

|                 |                 |
|-----------------|-----------------|
| Language script | Latin based     |
| Web page font   | Times New Roman |
| Plain text font | Courier New     |
| Encoding        | Unicode (UTF-8) |
| Text size       | Medium          |

Firefox with the following default settings is recommended:

|               |                 |
|---------------|-----------------|
| Web page font | Times New Roman |
| Encoding      | Unicode (UTF-8) |
| Text size     | 16              |

Google Chrome with the following default settings is recommended:

|               |                 |
|---------------|-----------------|
| Web page font | Times New Roman |
| Encoding      | Unicode (UTF-8) |
| Text size     | Medium          |

## CHAPTER 3: INSTALLATION

### CONNECT AND LOGIN

---

Connecting to the RJ-45 Ethernet port.

Factory default IP: 192.0.2.1

Login with default account and password.

Username: admin

Password: (none)

### 3.11 CLI INITIALIZATION AND CONFIGURATION (OPTIONAL)

1. Connect to the RJ-45 Ethernet port.
2. Type in the command under Telnet: telnet 192.0.2.1
3. Login with default account and password.

Username: admin

Password: (none)

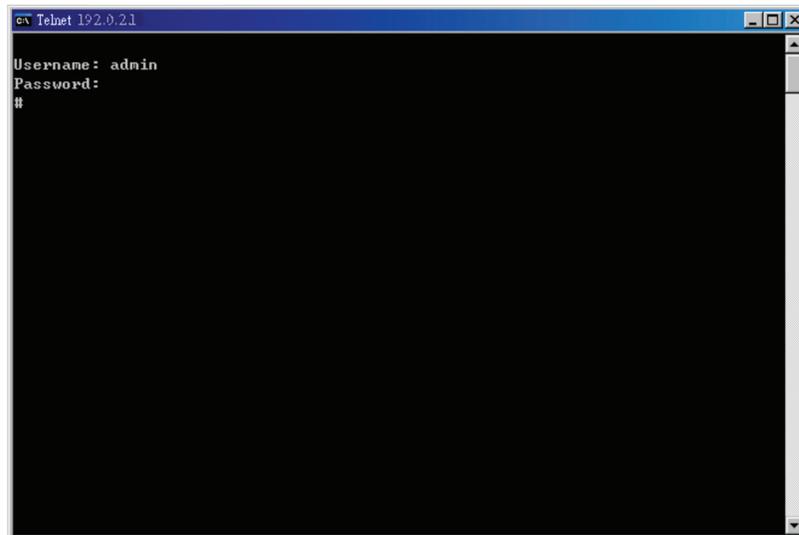


FIGURE 3-13. LOGIN TO COMMAND LINE INTERFACE (CLI)

4. Change the IP with the commands listed below:

```
enable
configure terminal
interface vlan 1
ip address xxx.xxx.xxx.xxx xxx.xxx.xxx.xxx
exit
```

FIGURE 3-14. CLI COMMAND

## CHAPTER 3: INSTALLATION

### 3.12 UPGRADE/DOWNGRADE SOFTWARE

1. In the Web UI, go to the Maintenance → Software → Upload page.
2. Select software file and click the Upload button.

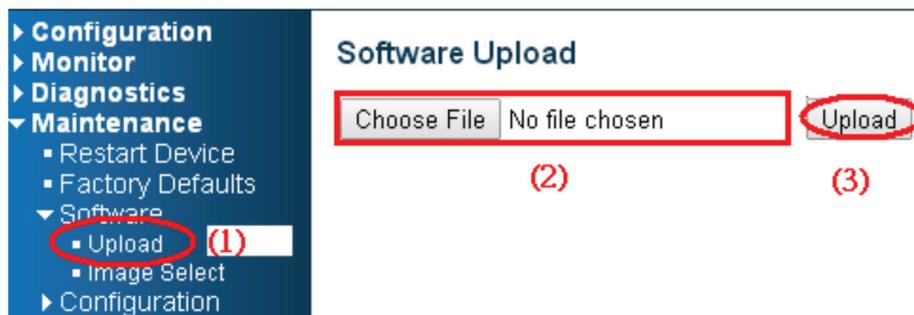


FIGURE 3-15. SOFTWARE UPLOAD BUTTON

3. After starting to upload the software to the device, do not restart the device; wait until it auto reboots and the upgrade finishes.



FIGURE 3-16. UPGRADE IN PROCESS SCREEN

### 3.13 RESET TO DEFAULT AND SAVE CONFIGURATION

#### CONFIGURATION VIA CLI COMMAND

To see what the current interface and IP address is and if the manager wants to reset the configuration to default but keep the management IP setting:

1. Execute this command: `reload defaults keep-ip`
2. Check the interface VLAN and IP address, confirm only if the management IP setting is kept.
3. Execute this command: `copy running-config startup-config`

## CHAPTER 3: INSTALLATION

```
# reload defaults keep-ip
% Reloading defaults, attempting to keep VLAN 1 IP address. Please stand by.
% If need reboot must wait for 3~5 seconds.
#
# show int vlan 1
VLAN1
LINK: 00-11-22-dd-0c-01 Mtu:1500 <UP BROADCAST RUNNING MULTICAST>
IPv6: fe80:2::211:22ff:fedd:c01/64 <ANYCAST TENTATIVE AUTOCONF>
IPv4: 192.168.0.1/24 192.168.0.255
# show int vlan 200
% VLAN interface 200 does not exist.
#
# show vlan
VLAN Name                Interfaces
-----
1    default                Gi 1/1-14
#
# show int vlan 1
VLAN1
LINK: 00-11-22-dd-0c-01 Mtu:1500 <UP BROADCAST RUNNING MULTICAST>
IPv6: fe80:2::211:22ff:fedd:c01/64 <ANYCAST TENTATIVE AUTOCONF>
IPv4: 192.168.0.1/24 192.168.0.255
#
# copy running-config startup-config
```

FIGURE 3-17. RESET CONFIGURATION BUT KEEP MANAGEMENT IP SETTING

To reset all configurations to default:

1. Execute this command: reload defaults
2. Check the interface VLAN and IP address, confirm that they all changed to the default setting.
3. Execute this command: copy running-config startup-config

```
# reload defaults
% Reloading defaults. Please stand by.
% If need reboot must wait for 3~5 seconds.
# show int vlan 1
VLAN1
LINK: 00-11-22-dd-0c-01 Mtu:1500 <UP BROADCAST RUNNING MULTICAST>
IPv4: 192.0.2.1/24 192.0.2.255
IPv6: fe80:2::211:22ff:fedd:c01/64 <ANYCAST TENTATIVE AUTOCONF>
# show vlan
VLAN Name                Interfaces
-----
1    default                Gi 1/1-14
# copy running-config startup-config
Building configuration...
% Saving 1357 bytes to flash:startup-config
% If need reboot must wait for 3~5 seconds.
#
```

FIGURE 3-18. RESET ALL CONFIGURATIONS

## CHAPTER 3: INSTALLATION

### CONFIGURATION VIA WEB UI

If the manager wants to reset the configuration to default but keep the management IP setting:

1. Go to Maintenance → Factory Defaults page and click the Yes button.



FIGURE 3-19. RESET TO FACTORY DEFAULTS SCREEN

2. Go to Maintenance → Configuration → Save startup-config pagination, then click the Save Configuration button, then reset.

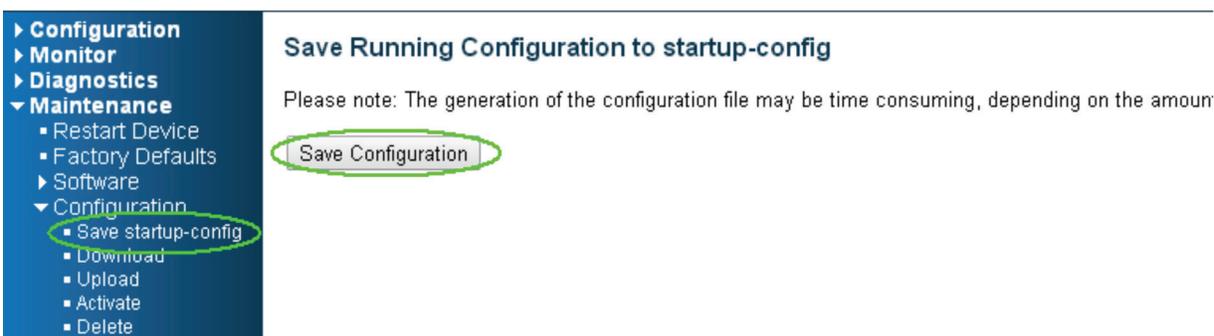


FIGURE 3-20. SAVE CONFIGURATION SCREEN

To reset all configurations to defaults:

1. Go to the Maintenance → Configuration → Activate page, select default-config, then click the Activate Configuration button.

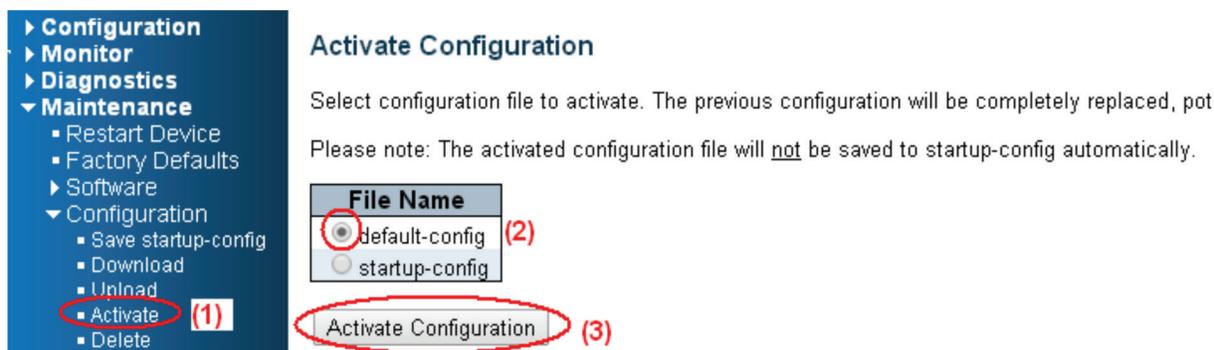


FIGURE 3-21. ACTIVATE CONFIGURATION SCREEN

## CHAPTER 3: INSTALLATION

2. Change the PC's IP address to an address in the 192.0.2.X network.
3. Change the Web's IP to 192.0.2.1 (default IP).
4. Go to the Maintenance → Configuration → Save startup-config page, then click the Save Configuration button to reset.

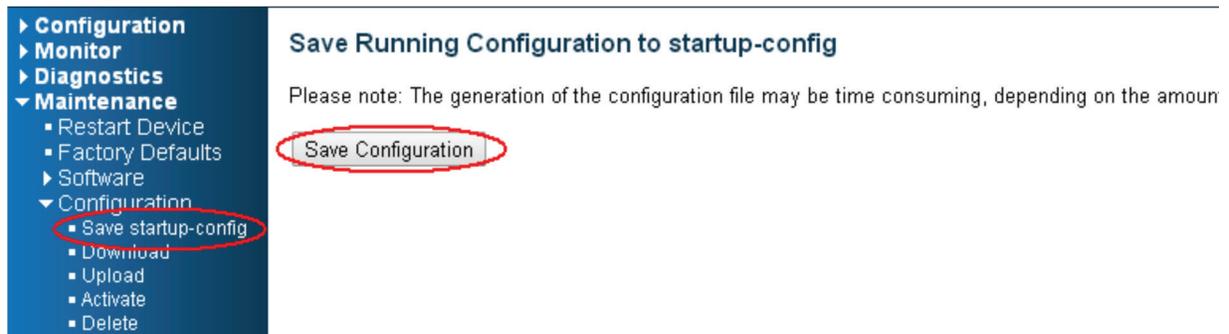


FIGURE 3-22. SAVE CONFIGURATION SCREEN

## CHAPTER 3: INSTALLATION

### 3.14 LED STATUS INDICATORS

**TABLE 3-2. LED STATUS INDICATORS**

| LED NAME                       | INDICATOR /COLOR | CONDITION   |
|--------------------------------|------------------|---|
| P1                             | On Green         | P1 power line has power                                     |
|                                | Off              | P1 power line is disconnected or does not have supply power |
| P2                             | On Green         | P2 power line has power                                     |
|                                | Off              | P2 power line is disconnected or does not have supply power |
| Alarm                          | On Red           | Alarm event occurs  |
|                                | Off              | No alarm  |
| Copper port Link/Act           | On Green         | Ethernet link up but no traffic is detected                 |
|                                | Flashing Green   | Ethernet link up and there is traffic detected              |
|                                | Off              | Ethernet link down  |
| Copper port Speed              | On Yellow        | A 100 Mbps or a 1000 Mbps connection is detected            |
|                                | Off              | No link or a 10 Mbps connection is detected                 |
| SFP port Link/Act              | On Green         | Ethernet link up  |
|                                | Off              | Ethernet link down  |
| SFP port Speed                 | On Yellow        | SFP port speed 1000 Mbps connection is detected.            |
|                                | Off              | No link or a SFP port speed 100 Mbps connection is detected |
| <b>POE MANAGED SERIES ONLY</b> |                  |   |
| RR (Ring Role)                 | On Green         | One of 3 Ring group is enabled and is Master role.          |
|                                | Off              | Ring is slave role  |
| RS (Ring Status)               | On Green         | Ring fail is detected                                       |
|                                | Off              | No ring fail detected                                       |
| PoE                            | On Yellow        | PoE is detected   |
|                                | Off              | No link   |

## CHAPTER 4: VLAN APPLICATION

This chapter describes how to configure Virtual LANs (VLANs) in the switch. The switch supports up to 2048 VLANs. Ports are grouped into broadcast domains by assigning them to the same VLAN. Frames received in on VLAN can only be forwarded within that VLAN, and multicast frames and unknown unicast frames are flooded only to ports in the same VLAN.

### 4.1 EXAMPLE 1: DEFAULT VLAN SETTINGS

Each port in the switch has a configurable default VLAN number, known as its PVID. This places all ports on the same VLAN initially, although each port PVID is configurable to any VLAN number between 1 and 4094.

The default configuration settings for switch have all ports set as untagged members of VLAN 1 with all ports configured as PVID=1. In the default configuration example shown in the following figure, all incoming packets are assigned to VLAN 1 by the default port VLAN identifier (PVID=1).

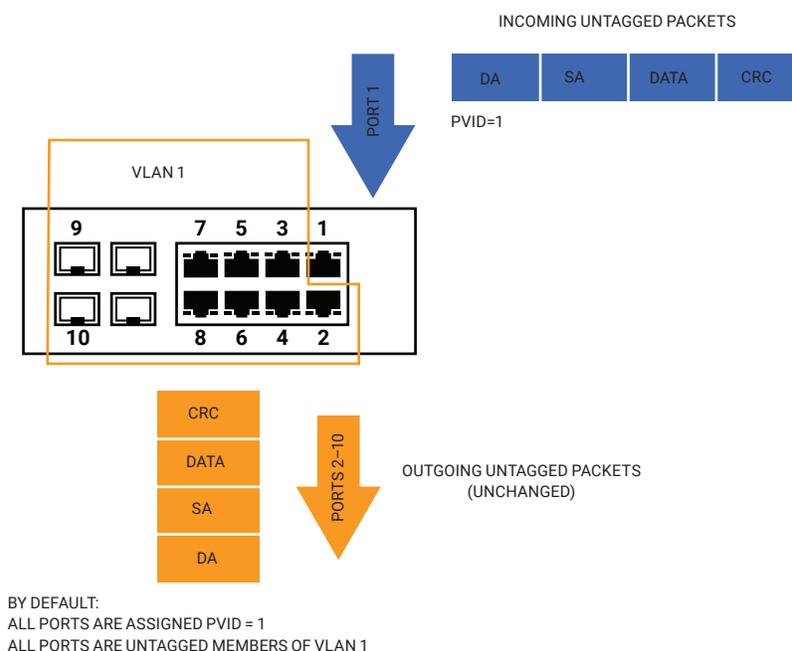


FIGURE 4-1. VLAN EXAMPLE 1

## CHAPTER 4: VLAN APPLICATION

### 4.2 EXAMPLE 2: PORT-BASED VLANS

When the switch receives an untagged VLAN packet, it will add a VLAN tag to the frame according to the PVID setting on a port. As shown in the following figure, the untagged packet is marked (tagged) as it leaves switch through Port 2, which is configured as a tagged member of VLAN100. The untagged packet remains unchanged as it leaves the switch through Port 7, which is configured as an untagged member of VLAN100.

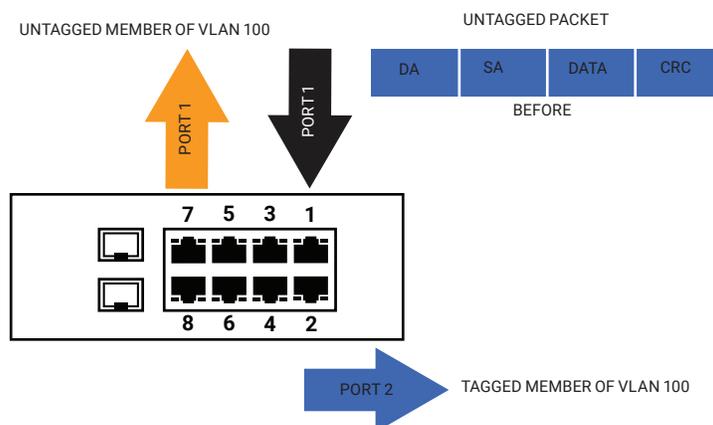


FIGURE 4-2. VLAN EXAMPLE 2

## CONFIGURATION

STEP 1: Go to Configuration -> VLANs -> Port VLAN configuration and configure PVID 100 on Port 1, Port 2 and Port 7.

| Port | Mode   | Port VLAN | Port Type | Ingress Filtering                   | Ingress Acceptance  | Egress Tagging  | Allowed VLANs | Forbidden VLANs |
|------|--------|-----------|-----------|-------------------------------------|---------------------|-----------------|---------------|-----------------|
| *    | <>     | 1         | <>        | <input type="checkbox"/>            | <>                  | <>              | 1             |                 |
| 1    | Trunk  | 100       | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1-4095        |                 |
| 2    | Trunk  | 100       | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1-4095        |                 |
| 3    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 4    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 5    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 6    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 7    | Trunk  | 100       | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1-4095        |                 |
| 8    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |

FIGURE 4-3. PORT-BASED VLAN CONFIGURATION

## CHAPTER 4: VLAN APPLICATION

STEP 2: Select Configuration -> VLAN -> Static VLAN. Create a VLAN with VLAN ID 100. Enter a VLAN name in the Name field.

STEP 3: Assign VLAN tag setting to or remove it from a port by toggling the check box under an individual port number. The tag settings determine if packets that are transmitted from the port tagged or untagged with the VLAN ID. The possible tag settings are:

|                 |   |
|-----------------|---|
| Tag All         | Specifies that the egress packet is tagged for the port.  |
| Untag port vlan | Specifies that the egress packet is untagged for the port.  |
| Untag All       | Specifies that all frames, whether classified to the Port VLAN or not, are transmitted without a tag. |

Here we set tagged VLAN100 on Port 1 and Port 2, untagged VLAN100 on Port7.

**Global VLAN Configuration**

Allowed Access VLANs: 1,100  
Ethertype for Custom S-ports: 88A8

**Port VLAN Configuration**

| Port | Mode   | Port VLAN | Port Type | Ingress Filtering                   | Ingress Acceptance  | Egress Tagging  | Allowed VLANs | Forbidden VLANs |
|------|--------|-----------|-----------|-------------------------------------|---------------------|-----------------|---------------|-----------------|
| *    | <>     | 100       | <>        | <input checked="" type="checkbox"/> | <>                  | <>              | 1-4095        |                 |
| 1    | Trunk  | 100       | C-Port    | <input checked="" type="checkbox"/> | Tagged Only         | Tag All         | 1,100         |                 |
| 2    | Trunk  | 100       | C-Port    | <input checked="" type="checkbox"/> | Tagged Only         | Tag All         | 1,100         |                 |
| 3    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 4    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 5    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 6    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 7    | Trunk  | 100       | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1,100         |                 |
| 8    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |

Save Reset

FIGURE 4-4. SET TAGGED AND UNTAGGED VLANS

STEP 4: Transmit untagged unicast packets from Port 1 to Port 2 and Port 7. The switch should tag it with VID 100. The packet has access to Port2 and Port 7. The outgoing packet is stripped of its tag to leave Port 7 as an untagged packet. For Port 2, the outgoing packet leaves as a tagged packet with VID 100.

STEP 5: Transmit untagged unicast packets from Port 2 to Port 1 and Port 7. The switch should tag it with VID 100. The packet has access to Port1 and Port 7. The outgoing packet is stripped of its tag to leave Port 7 as an untagged packet. For Port 1, the outgoing packet leaves as a tagged packet with VID 100.

STEP 6: Transmit untagged unicast packets from Port 7 to Port 1 and Port 2. The switch should tag it with VID 100. The packet has access to Port1 and Port 2. For Port 1 and Port 2, the outgoing packet leaves as a tagged packet with VID 100.

STEP 7: Repeat step 4 using broadcast and multicast packets.

## CHAPTER 4: VLAN APPLICATION

### CLI COMMAND

---

```
vlan 1
vlan 100

interface GigabitEthernet 1/1
switchport access vlan 100
switchport trunk native vlan 100
switchport trunk allowed vlan 1,100
switchport trunk vlan tag native
switchport mode trunk
exit
interface GigabitEthernet 1/2
switchport access vlan 100
switchport trunk native vlan 100
switchport trunk allowed vlan 1,100
switchport trunk vlan tag native
switchport mode trunk
exit
interface GigabitEthernet 1/7
switchport access vlan 100
switchport trunk native vlan 100
switchport trunk allowed vlan 1,100
switchport mode trunk
exit
```



## CHAPTER 4: VLAN APPLICATION

### 4.3 EXAMPLE 3: IEEE 802.1Q TAGGING

The switch is able to construct a layer-2 broadcast domain by identifying VLAN ID specified by IEEE 802.1Q. It forwards a frame between bridge ports assigned to the same VLAN ID and can set multiple VLANs on each bridge port.

In the following figure, the tagged incoming packets are assigned directly to VLAN 100 and VLAN 200 because of the tag assignment in the packet. Port 2 is configured as a tagged member of VLAN 100, and Port 7 is configured as an untagged member of VLAN 200. Hosts in the same VLAN communicate with each other as if they in a LAN. Hosts in different VLANs cannot communicate with each other directly.

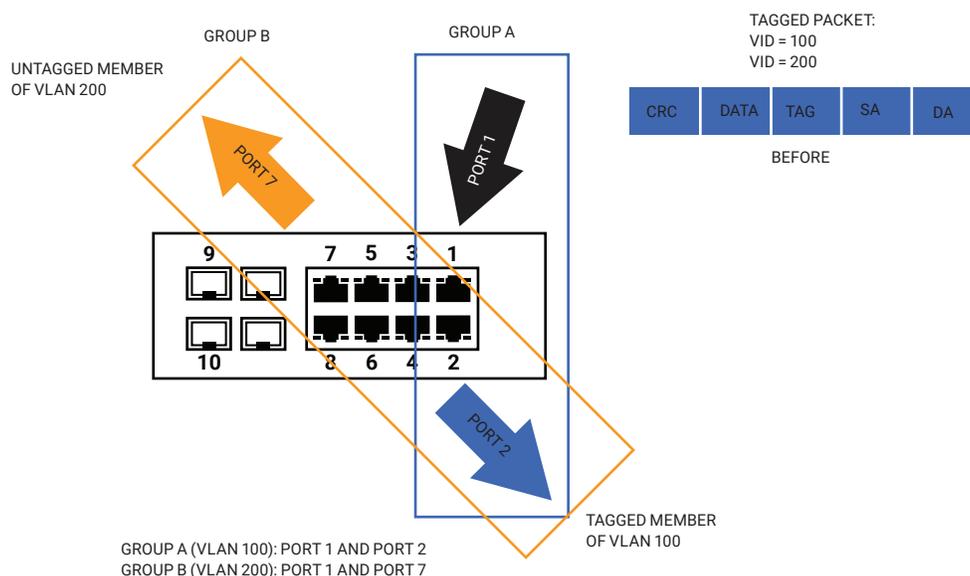


FIGURE 4-5. IEEE 802.1Q TAGGING EXAMPLE

In this case:

1. The hosts from Group A can communicate with each other.
2. The hosts from Group B can communicate with each other.
3. The hosts of Group A and Group B can't communicate with each other.
4. Both the Group A and Group B can go to Internet through the switch.

## CHAPTER 4: VLAN APPLICATION

## CONFIGURATION

STEP 1: Go to C configuration -> VLANs -> Port VLAN configuration page specify the VLAN membership as follows:

**Global VLAN Configuration**

|                              |           |
|------------------------------|-----------|
| Allowed Access VLANs         | 1,100,200 |
| Ethertype for Custom S-ports | 88A8      |

**Port VLAN Configuration**

| Port | Mode   | Port VLAN | Port Type | Ingress Filtering                   | Ingress Acceptance  | Egress Tagging  | Allowed VLANs | Forbidden VLANs |
|------|--------|-----------|-----------|-------------------------------------|---------------------|-----------------|---------------|-----------------|
| *    | <>     | 1         | <>        | <input checked="" type="checkbox"/> | <>                  | <>              | 1             |                 |
| 1    | Trunk  | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged Only         | Tag All         | 1,100,200     |                 |
| 2    | Trunk  | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged Only         | Tag All         | 1,100         |                 |
| 3    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 4    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 5    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 6    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |
| 7    | Trunk  | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged Only         | Tag All         | 1,200         |                 |
| 8    | Access | 1         | C-Port    | <input checked="" type="checkbox"/> | Tagged and Untagged | Untag Port VLAN | 1             |                 |

Save Reset

FIGURE 4-6. EXAMPLE 3 CONFIGURATION SCREEN

STEP 2: Transmit unicast packets with VLAN tag 100 from Port 1 to Port 2 and Port 7. The switch should tag it with VID 100. The packet only has access to Port 2. For Port 2, the outgoing packet leaves as a tagged packet with VID 100.

STEP 3: Transmit unicast packets with VLAN tag 200 from Port 1 to Port 2 and Port 7. The switch should tag it with VID 200. The packet only has access to Port 7. The outgoing packet on Port 7 is stripped of its tag as an untagged packet.

STEP 4: Transmit unicast packets with VLAN tag 100 from Port 2 to Port 1 and Port 7. The switch should tag it with VID 100. The packet only has access to Port 1. For Port 1, the outgoing packet leaves as a tagged packet with VID 100.

STEP 5: Transmit unicast packets with VLAN tag 200 from Port 7 to Port 1 and Port 2. The switch should tag it with VID 200. The packet only has access to Port 1. The outgoing packet on Port 1 will leave as a tagged packet with VID 200.

STEP 6: Repeat the above steps using broadcast and multicast packets.

## CHAPTER 4: VLAN APPLICATION

### CLI COMMAND

---

vlan 100

vlan 200

```
interface GigabitEthernet 1/1
switchport access vlan 100
switchport trunk allowed vlan 1,100,200
switchport trunk vlan tag native
switchport mode trunk
exit
```

```
interface GigabitEthernet 1/1
switchport access vlan 100
switchport trunk allowed vlan 1,100
switchport trunk vlan tag native
switchport mode trunk
exit
```

```
interface GigabitEthernet 1/7
switchport access vlan 100
switchport trunk allowed vlan 1,200
switchport trunk vlan tag native
switchport mode trunk
exit
```

## CHAPTER 5: SECURITY APPLICATION

ACL function supports access control security for MAC address, IP address, Layer4 Port, and Type of Service. Each has five actions: Deny, Permit, Queue Mapping, CoS Marking, and Copy Frame. The user can set the default ACL rule to Permit or Deny.

**TABLE 5-1. ACL FUNCTIONS**

| DEFAULT ACL RULE | ACTIONS |        |               |             |            |
|------------------|---------|--------|---------------|-------------|------------|
|                  | DENY    | PERMIT | QUEUE MAPPING | COS MARKING | COPY FRAME |
| Permit           | (a)     | (b)    | (c)           | (d)         | (e)        |
| Deny             | (f)     | (g)    | (h)           | (i)         | (j)        |

Brief descriptions of the table above:

- (a): Permit all frames, but deny frames set in ACL entry.
- (b): Permit all frames.
- (c): Permit all frames, and do queue mapping of the transmitting frames.
- (d): Permit all frames, and change CoS value of the transmitting frames.
- (e): Permit all frames, and copy frame set in an ACL entry to a defined GE port.
- (f): Deny all frames.
- (g): Deny all frames, but permit frames set in an ACL entry.
- (h): Deny all frames.
- (i): Deny all frames.
- (j): Deny all frames, but copy frame set in an ACL entry to a defined GE port.

### 5.1 CASE 1: ACL FOR MAC ADDRESS

For MAC address ACL, the switch can filter on source MAC address, destination MAC address, or both. When it filters on both MAC address, packets coinciding with both rules will take effect. In other words, it does not filter if it only coincides with one rule.

To filter only one directional MAC address, set the other MAC address to all zeroes. Besides MAC address, the switch also supports VLAN and Ether type for filter additionally. Certain VLAN or Ether type under these MAC address will take effect. If the user doesn't care if the switch uses VLAN or Ether type, he can just set to zero values. Following are examples:

#### CASE 1A

User can set default ACL Rule of the GE port as "Permit," then bind a suitable profile with "deny" action for ACL. It means GE port can pass through all packets but not the ACL entry of the profile binding.

One directional MAC address with one VLAN deny filtering.

STEP 1: Create a new ACL Profile. (Profile Name: DenySomeMac)



# CHAPTER 5: SECURITY APPLICATION



FIGURE 5-1. CREATE A NEW ACL PROFILE SCREEN

STEP 2: Create a new ACL Entry rule under this ACL profile. (Deny MAC: 11 and VLAN: 4)

STEP 3: Bind this ACL profile to a GE port. (PORT-4)

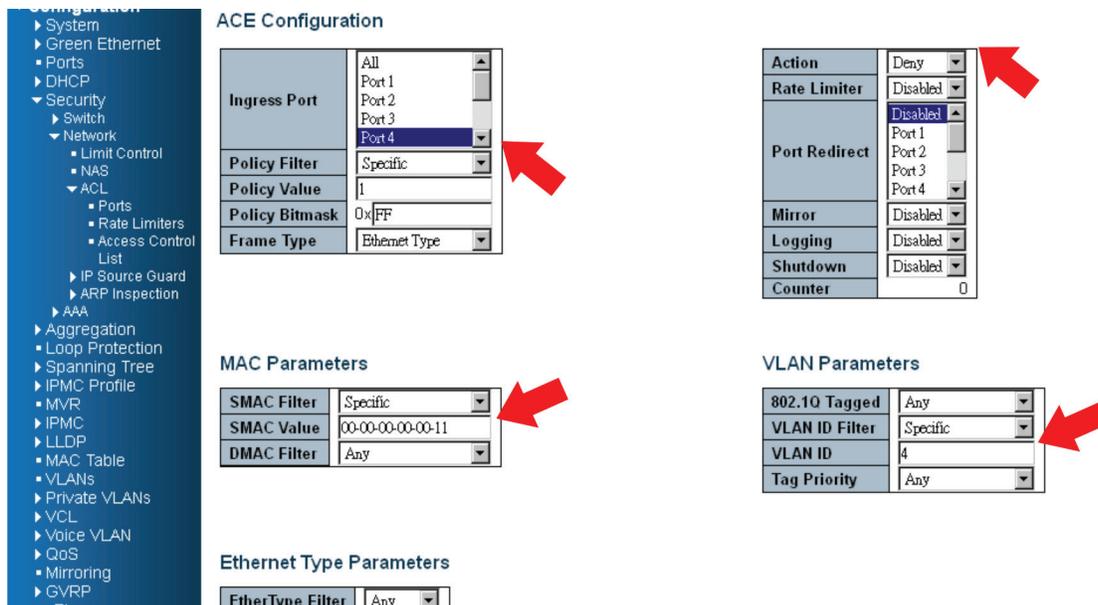


FIGURE 5-2. BIND ACL PROFILE SCREEN

## CHAPTER 5: SECURITY APPLICATION

STEP 4: Send frames between PORT-3 and PORT-4, and see the test result.

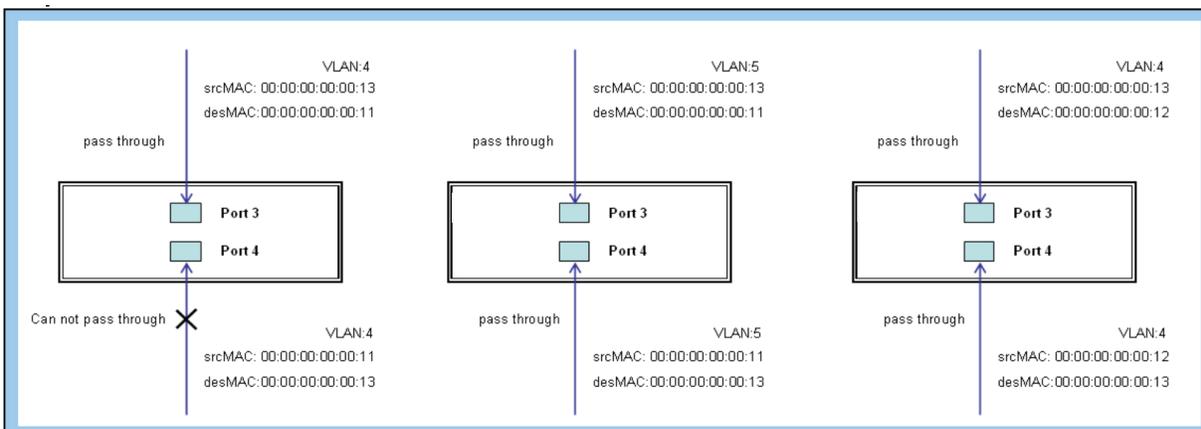


FIGURE 5-3. TEST RESULT SCREEN

### CLI COMMAND

```
access-list ace 2 ingress interface GigabitEthernet 1/3 policy 0 frametype etype smac 00-00-00-00-00-13 dmac 00-00-00-00-00-11 action deny
exit
interface GigabitEthernet 1/3
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
!
interface GigabitEthernet 1/4
switchport trunk allowed vlan 4,5
switchport trunk vlan tag nativevlan 4
exit
```

## CHAPTER 5: SECURITY APPLICATION

Two directional MAC address with all VLANs denying filtering.

STEP 1: Create a new ACL Profile. (Profile Name: DenySomeMac)

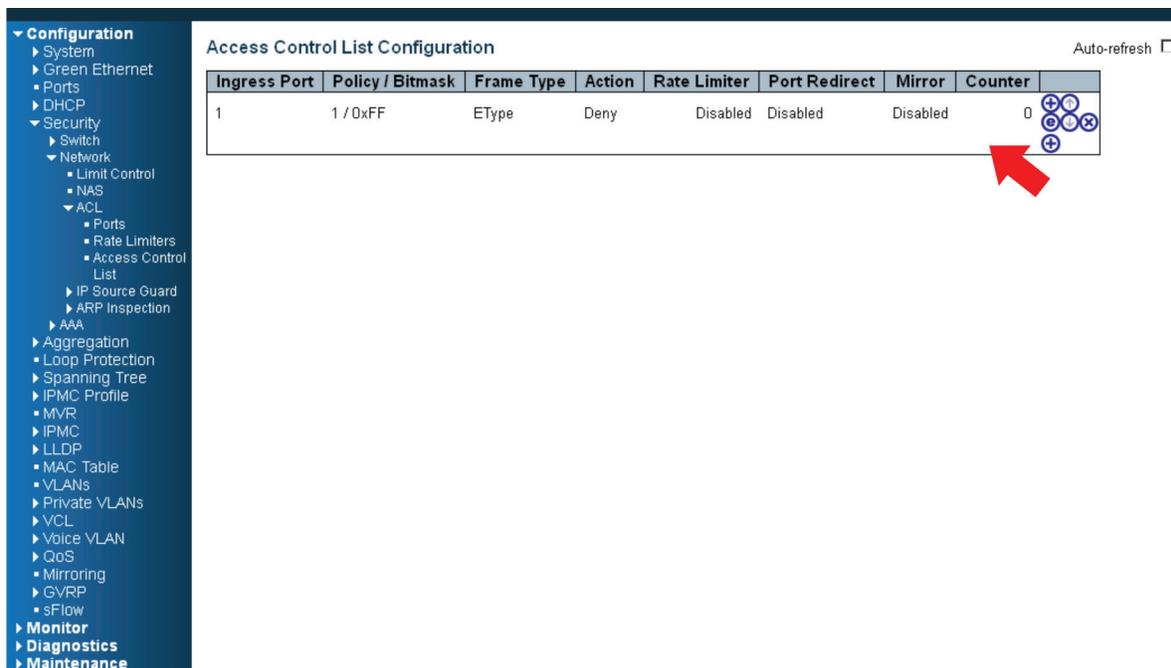


FIGURE 5-4. ACL CONFIGURATION SCREEN

STEP 2: Create a new ACL Entry rule under this ACL profile. (Deny SrcMAC: 13 and DesMAC: 11)

STEP 3: Bind this ACL profile to a GE port. (PORT-3)

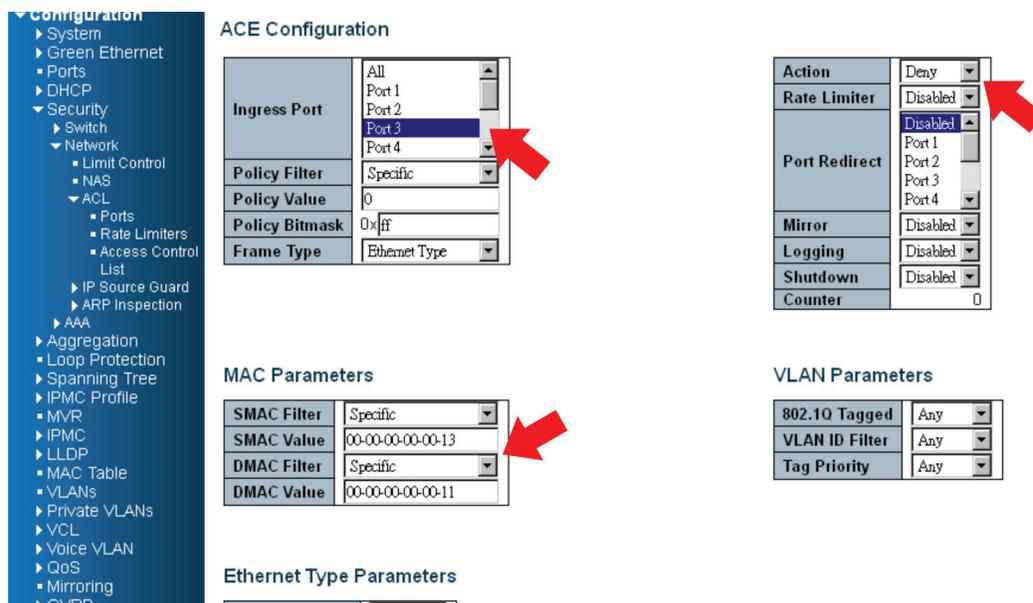


FIGURE 5-5. BIND ACL PROFILE TO GE PORT SCREEN

## CHAPTER 5: SECURITY APPLICATION

Step 4: Send frames between PORT-3 and PORT-4, and see test result.

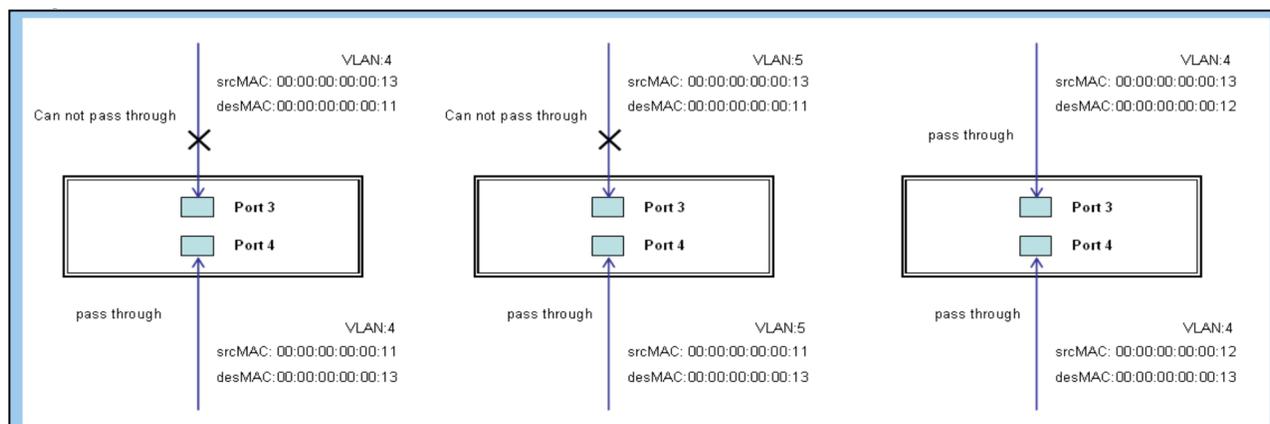


FIGURE 5-6. TEST RESULT

### CLI COMMAND

```
access-list ace 2 ingress interface GigabitEthernet 1/3 policy 0 frametype etype smac 00-00-00-00-00-13 dmac 00-00-00-00-00-11 action deny
exit
interface GigabitEthernet 1/3
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
!
interface GigabitEthernet 1/4
switchport trunk allowed vlan 4,5
switchport trunk vlan tag nativevlan 4
exit
```

### CASE 1B

This case acts as no ACL function. It means all frames will pass through.

### CASE 1C

User can set the default ACL Rule of GE port as "Permit", then bind a suitable profile with "Queue Mapping" action for some ACL function. It means GE port can do queue mapping 0-7 of the frame received from this port.

# CHAPTER 5: SECURITY APPLICATION

## CASE 1D

User can set default ACL Rule of GE port as “Permit”, then bind a suitable profile with “CoS Marking” action for some ACL function. It means the GE port can remark CoS of the VLAN frame received from this port.

One directional MAC address with CoS Marking action. (one VLAN, and don't care Ether Type)

STEP 1: Create a new ACL Profile. (Profile Name: CoSMarkingTest)

STEP 2: Create a new ACL Entry rule under this ACL profile. (Filter SrcMAC: 11 and VLAN ID: 4 frame to CoS: 2)

STEP 3: Bind this ACL profile to a GE port. (PORT-4)

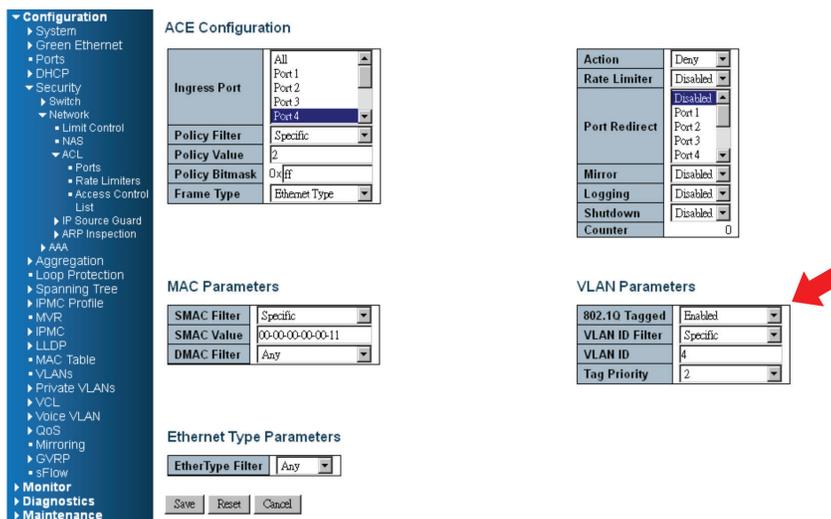


FIGURE 5-7. CASE 1D SCREEN

STEP 4: Send frames between PORT-3 and PORT-4, and see the test result.

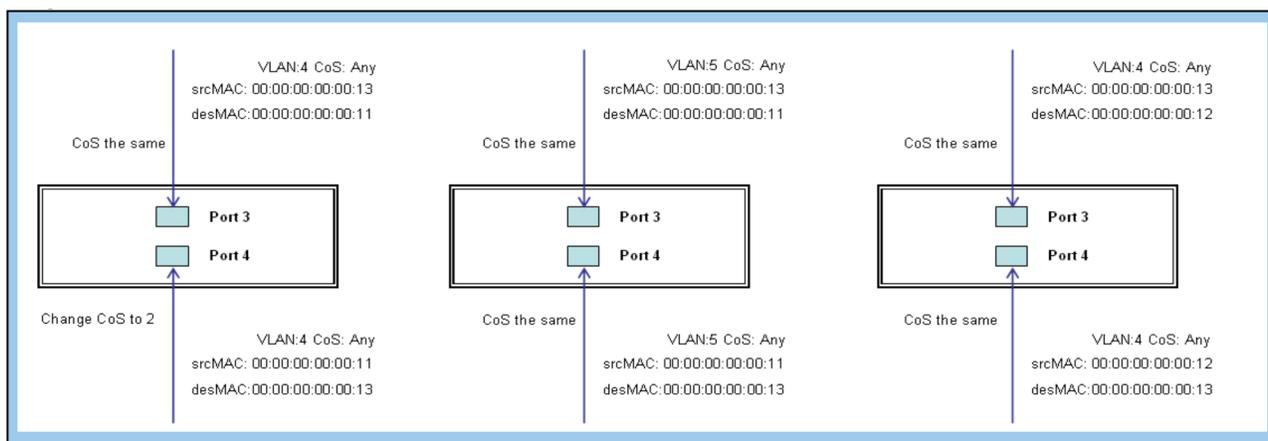


FIGURE 5-8. TEST RESULT

## CHAPTER 5: SECURITY APPLICATION

### CLI COMMAND

```
access-list ace 1 next 2 ingress interface GigabitEthernet 1/4 policy 1 vid 4 frametype etype smac 00-00-00-00-00-11 action deny
```

```
exit
```

```
interface GigabitEthernet 1/3
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
```

```
!
```

```
interface GigabitEthernet 1/4
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
exit
```

### CASE 1E

The User can set the default ACL Rule of a GE port as "Permit", then bind a suitable profile with "Copy Frame" action for mirror analyzer used. It means the system will copy frames from a binding GE Port to an analyzer port.

Two directional MAC address with Copy Frame action. (Don't care VLAN ID, Ether Type)

STEP 1: Create a new ACL Profile. (Profile Name: CopyFrameTest)

STEP 2: Create a new ACL Entry rule under this ACL profile. (SrcMAC: 13 and DesMAC: 11)

STEP 3: Set analyzer port to enable and mirror analyzer port.

STEP 4: Bind this ACL profile to a GE port. (PORT-3)

The screenshot displays the 'ACE Configuration' window with a navigation tree on the left. The 'ACE Configuration' section includes:

- Ingress Port:** A list box with 'Port 3' selected.
- Policy Filter:** 'Specific'
- Policy Value:** '0'
- Policy Bitmask:** '0xFFF'
- Frame Type:** 'Ethernet Type'

The 'MAC Parameters' section includes:

- SMAC Filter:** 'Specific'
- SMAC Value:** '00-00-00-00-00-13'
- DMAC Filter:** 'Specific'
- DMAC Value:** '00-00-00-00-00-11'

The 'Ethernet Type Parameters' section includes:

- EtherType Filter:** 'Any'

At the bottom are 'Save', 'Reset', and 'Cancel' buttons.

On the right, there are three sections:

- Action:** 'Deny'
- Rate Limiter:** 'Disabled'
- Port Redirect:** A list box with 'Port 5' selected, indicated by a red arrow.
- Mirror:** 'Enabled'
- Logging:** 'Disabled'
- Shutdown:** 'Disabled'
- Counter:** '0'

Below these are 'VLAN Parameters':

- 802.1Q Tagged:** 'Any'
- VLAN ID Filter:** 'Any'
- Tag Priority:** 'Any'

FIGURE 5-9. CASE 1E SCREEN

## CHAPTER 5: SECURITY APPLICATION

STEP 5: Send frames between PORT-3 and PORT-4, and see test result.

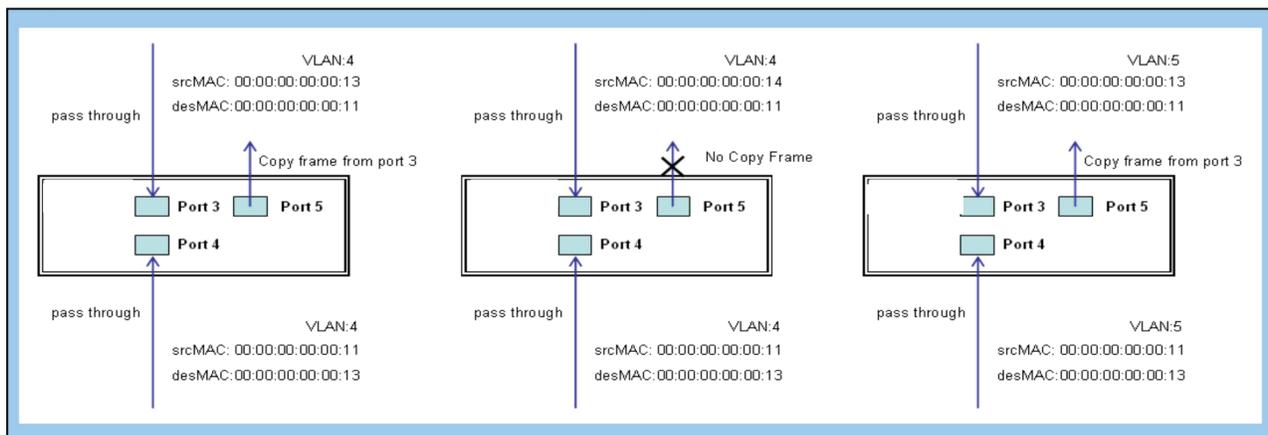


FIGURE 5-10. TEST RESULT

### CLI COMMAND

```
access-list ace 2 next 3 ingress interface GigabitEthernet 1/3 policy 0 frametype etype smac 00-00-00-00-00-13
dmac 00-00-00-00-00-11 action deny mirror redirect interface GigabitEthernet 1/5
exit
interface GigabitEthernet 1/3
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
!
interface GigabitEthernet 1/4
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
exit
```

### CASE 1F

This case means all frames will not pass through.

# CHAPTER 5: SECURITY APPLICATION

## CASE 1G

User can set default ACL Rule of GE port as “Deny”, then bind a suitable profile with “Permit” action for ACL. It means the GE port cannot pass through all packets but the ACL entry of the profile binding.

One directional MAC address with one VLAN permit filtering.

STEP 1: Create a new ACL Profile. (Profile Name: AllowSomeMac)

STEP 2: Create a new ACL Entry rule under this ACL profile. (Allow MAC: 11 and VLAN: 4)

STEP 3: Bind this ACL profile to a GE port. (PORT-4)

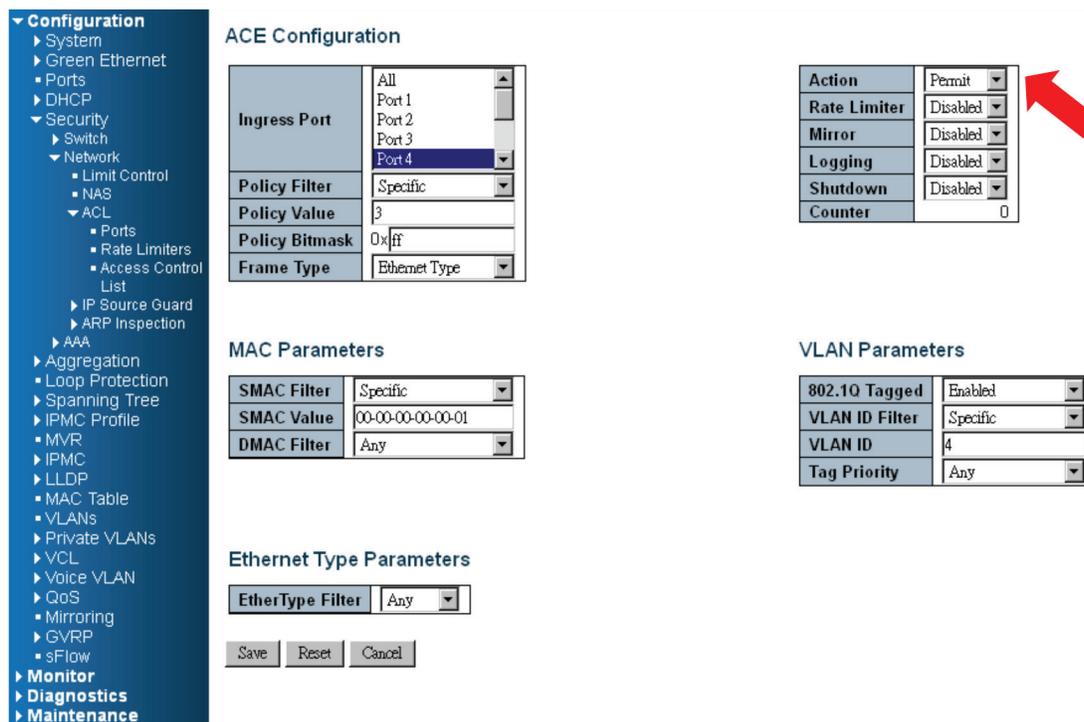


FIGURE 5-11. ACL PROFILE BINDING

STEP 4: Send frames between PORT-3 and PORT-4, and see test result.

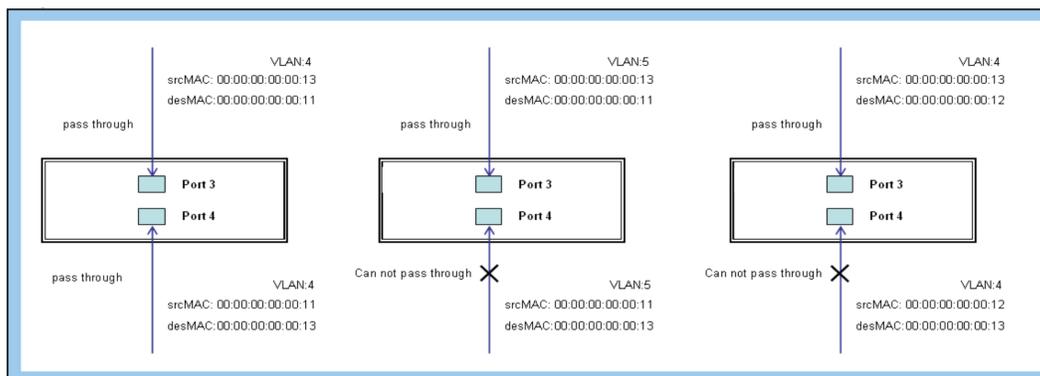


FIGURE 5-12. TEST RESULT

## CHAPTER 5: SECURITY APPLICATION

### CLI COMMAND

```
access-list ace 4 ingress interface GigabitEthernet 1/4 policy 3 tag tagged vid 4 frametype etype smac 00-00-00-00-00-11
```

```
exit
```

```
interface GigabitEthernet 1/3
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
```

```
!
```

```
interface GigabitEthernet 1/4
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
exit
```

Two directional MAC address with all VLAN permit filtering.

STEP 1: Create a new ACL Profile. (Profile Name: AllowSomeMac)

STEP 2: Create a new ACL Entry rule under this ACL profile. (Allow SrcMAC: 13 and DesMAC: 11)

STEP 3: Bind this ACL profile to a GE port. (PORT-3)

The screenshot displays the configuration interface for an ACE (Access Control Entry). On the left is a navigation tree with 'Configuration' expanded to 'Security' > 'ACL'. The main area is titled 'ACE Configuration' and contains several sections:

- ACE Configuration:**
  - Ingress Port: Port 3 (selected)
  - Policy Filter: Specific
  - Policy Value: 5
  - Policy Bitmask: 0x1f
  - Frame Type: Ethernet Type
- MAC Parameters:**
  - SMAC Filter: Specific
  - SMAC Value: 00-00-00-00-00-13
  - DMAC Filter: Specific
  - DMAC Value: 00-00-00-00-00-11
- Ethernet Type Parameters:**
  - EtherType Filter: Any
- VLAN Parameters:**
  - 802.1Q Tagged: Any
  - VLAN ID Filter: Any
  - Tag Priority: Any
- Action and Other Settings:**
  - Action: Permit
  - Rate Limiter: Disabled
  - Mirror: Disabled
  - Logging: Disabled
  - Shutdown: Disabled
  - Counter: 0

Buttons for 'Save', 'Reset', and 'Cancel' are located at the bottom of the configuration area.

FIGURE 5-13.

## CHAPTER 5: SECURITY APPLICATION

STEP 4: Send frames between PORT-3 and PORT-4, see test result.

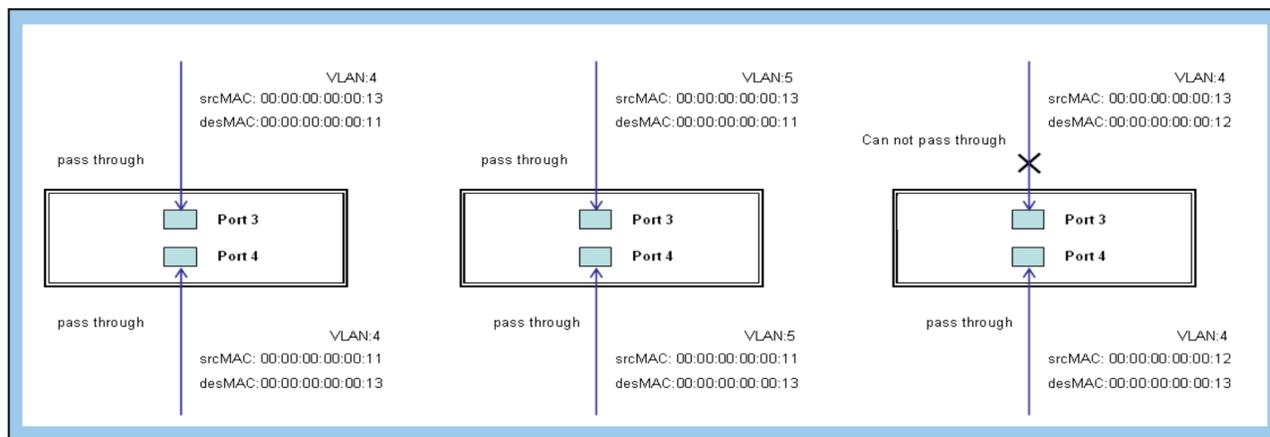


FIGURE 5-14.

### CLI COMMAND

```
access-list ace 5 ingress interface GigabitEthernet 1/3 policy 5 frametype etype smac 00-00-00-00-00-13 dmac
00-00-00-00-00-11
exit
interface GigabitEthernet 1/3
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
!
interface GigabitEthernet 1/4
switchport trunk allowed vlan 4,5
switchport trunk vlan tag native
exit
```

### CASE 1H

Because the default ACL Rule of GE port is "Deny", Queue Mapping action does not apply. We do not do this case.

### CASE 1I

Because the default ACL Rule of GE port is "Deny", CoS Marking action has no sense. We do not do this case.

## CHAPTER 5: SECURITY APPLICATION

### CASE 1J

User can set default ACL Rule of GE port as “Deny”, then bind a suitable profile with “Copy Frame” action for mirror analyzer used. It means the system will copy frames from the binding GE Port to the analyzer port. No frames are received from the denied GE port but the mirror analyzer port.

One directional MAC address with Copy Frame action. (Don't case VLAN, Ether Type)

STEP 1: Create a new ACL Profile. (Profile Name: CopyFrameTest)

STEP 2: Create a new ACL Entry rule under this ACL profile. (SrcMAC: 13 and DesMAC: 11)

The screenshot displays the configuration interface for an ACE (Access Control Entry) rule. On the left is a navigation tree with categories like Configuration, System, Green Ethernet, Ports, DHCP, Security, Network, AAA, Aggregation, Loop Protection, Spanning Tree, IPMC Profile, MVR, IPMC, LLDP, MAC Table, VLANs, Private VLANs, VCL, Voice VLAN, QoS, Mirroring, GVRP, sFlow, Monitor, Diagnostics, and Maintenance. The main area is titled 'ACE Configuration' and contains several sections:

- ACE Configuration:** A table with fields: Ingress Port (dropdown menu with options: All, Port 1, Port 2, Port 3, Port 4; Port 3 is selected), Policy Filter (Specific), Policy Value (4), Policy Bitmask (0xfff), and Frame Type (Ethernet Type).
- MAC Parameters:** A table with fields: SMAC Filter (Specific), SMAC Value (00-00-00-00-13), DMAC Filter (Specific), and DMAC Value (00-00-00-00-11).
- Ethernet Type Parameters:** A table with field: EtherType Filter (Any).
- Action Parameters:** A table with fields: Action (Permit), Rate Limiter (Disabled), Mirror (Enabled), Logging (Disabled), Shutdown (Disabled), and Counter (0).
- VLAN Parameters:** A table with fields: 802.1Q Tagged (Any), VLAN ID Filter (Any), and Tag Priority (Any).

At the bottom of the ACE Configuration section are 'Save', 'Reset', and 'Cancel' buttons.

FIGURE 5-15.

STEP 3: Bind this ACL profile to a GE port. (PORT-3)

STEP 4: Set the analyzer port to enable and mirror analyzer port.

# CHAPTER 5: SECURITY APPLICATION

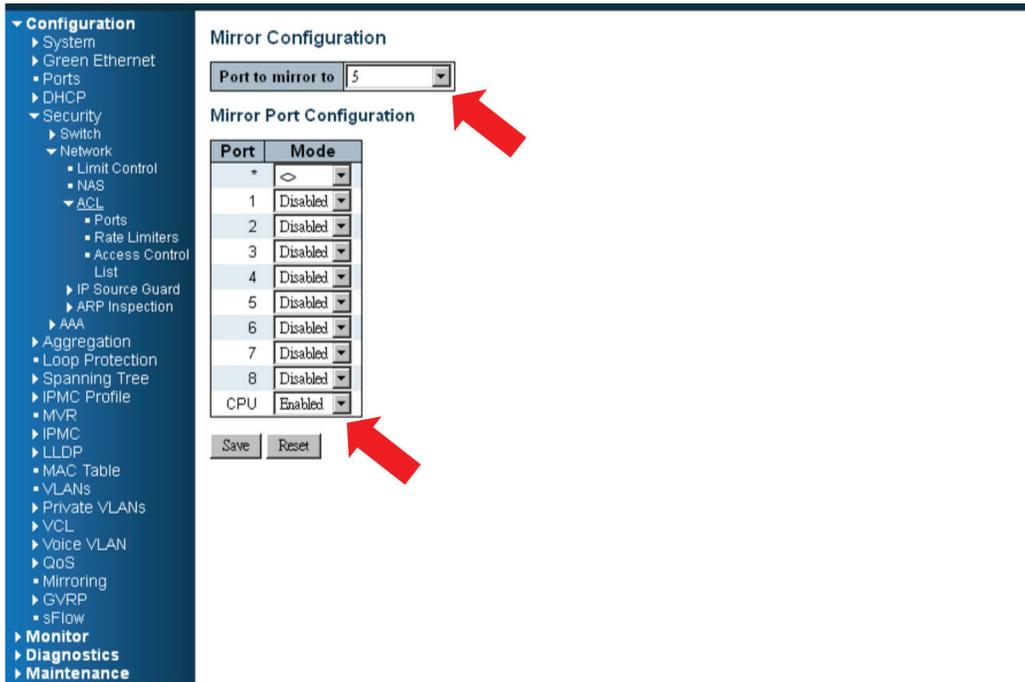


FIGURE 5-16.

STEP 5: Send frames between PORT-3 and PORT-4, see test result.

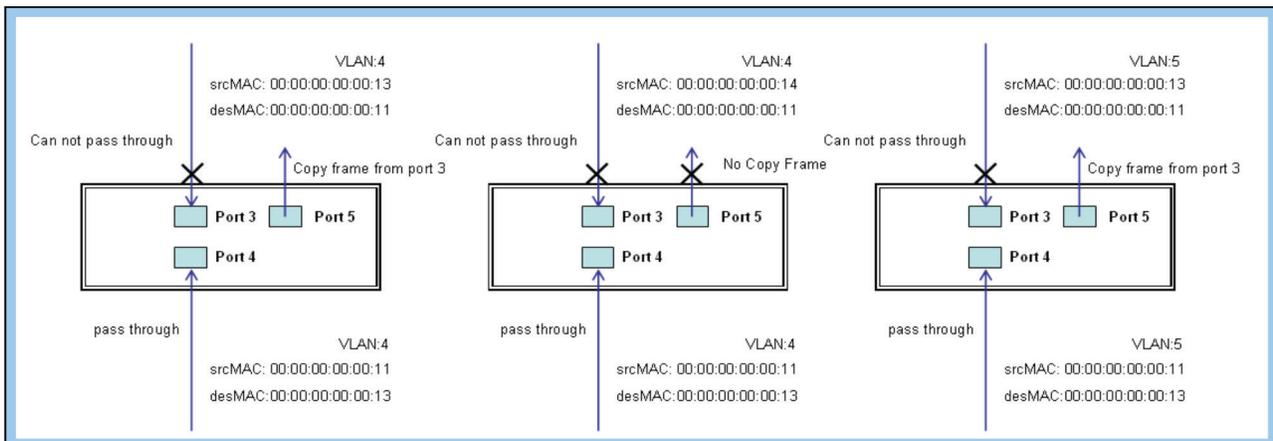


FIGURE 5-17. TEST RESULT

## CHAPTER 5: SECURITY APPLICATION

### CLI COMMAND

```
access-list ace 5 next 6 ingress interface GigabitEthernet 1/3 policy 5 frametype etype smac 00-00-00-00-00-13
dmac 00-00-00-00-00-11
Exit
monitor destination interface GigabitEthernet 1/5
monitor source cpu both
exit
interface GigabitEthernet 1/3
  switchport trunk allowed vlan 4,5
  switchport trunk vlan tag native
!
interface GigabitEthernet 1/4
  switchport trunk allowed vlan 4,5
  switchport trunk vlan tag native
exit
```

### 5.2 CASE 2: ACL FOR IP ADDRESS

For IP address ACL, the switch can filter on source IP address, destination IP address, or both. It also supports setting the IP range ACL. When it filters on both IP address, packets that coincide with both rules will take effect. In other words, it does not filter if it only coincides with one rule.

To filter only one directional IP address, set the other IP address to all zero. This means don't care. In addition to IP address, the switch also supports Protocol filtering. (TCP=6, UDP=17, etc.) Certain Protocols under these IP addresses will take effect. If the user prefers doesn't care Protocol, he can just set this value to zero. The detailed testing, refer to MAC ACL.

### 5.3 CASE 3: ACL FOR L4 PORT

For Layer4 port ACL, the switch can filter on (1) source IP address, (2) source L4 port, (3) destination IP address, (4) destination L4 port, and (5) UDP or TCP Protocol. Users can select to filter on (1)~(4) for all or some specific values, but you should select exactly one Protocol from UDP or TCP.

When the switch filters on both directional IP address and L4 port, packets that coincide with both rules will take effect. In other words, the switch does not filter if it only coincides with one rule.

If user wants to filter only one directional IP address or L4 port, set the other IP address and L4 port to all zeroes. This means don't care. For detailed testing, refer to MAC ACL.

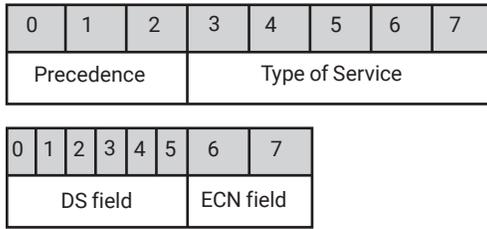
### 5.4 CASE 3: ACL FOR TOS

For Type of Service (ToS) ACL, the switch can filter on (1) source IP address with ToS type, or (2) destination IP address with ToS type, or (3) both, or (4) both not (just filter ToS). When it filters on both IP address, packets that coincide with both rules will take effect. In other words, it does not filter if it only coincides with one rule.

To filter only one directional IP address, set the other IP address to all zeroes. It means don't care. For detailed testing, refer to case 1 MAC ACL.

Valid Values: Precedence: 0-7, ToS: 0-15, DSCP: 0-63

# CHAPTER 5: SECURITY APPLICATION



The value (7) is reserved and set to 0.

- Ex: Pre (001) means 1
- Pre (100) means 4
- ToS (00010) means 1
- ToS (10000) means 8
- DSCP (000001) means 1
- DSCP (100000) means 32

FIGURE 5-18. TYPE OF SERVICE ACL



## CHAPTER 6: RING VERSION2 APPLICATION

For a reliable network industrial Ethernet applications, the switch provides a mini-second grade failover ring protection; this feature offers a seamless working network even if encountering some issues with connections. This works with twisted-pair and fiber cable.

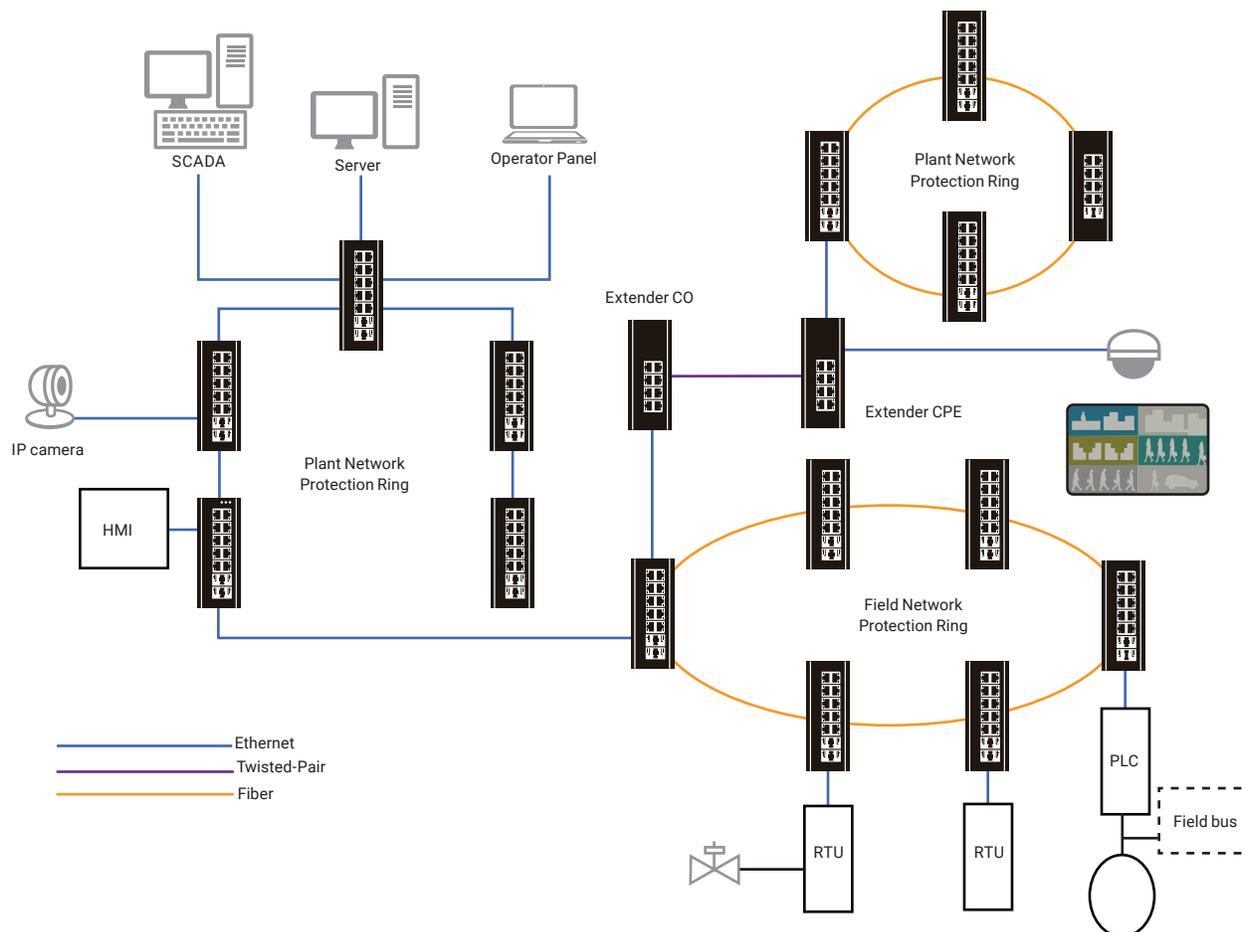


FIGURE 6-1.

### 6.1 RING VERSION2 FEATURE

Group 1 - This supports the option of ring-master and ring-slave.

- ◆ Ring - This could be master or slave.
- ◆ When the role is ring master, one ring port is forward port and another is block port. The block port is a redundant port. It is blocked in normal state.
- ◆ When the role is ring/slave, both ring ports are forward port.

## CHAPTER 6: RING VERSION2 APPLICATION

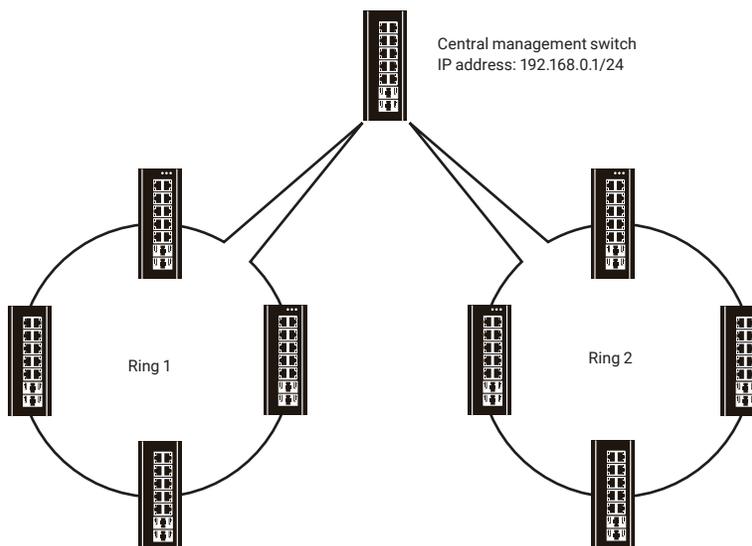


FIGURE 6-2. RING MASTER AND RING SLAVE SUPPORTED

Group 2 - This supports configuration of the ring, coupling and dual-homing.

- ◆ Ring - It could be master or slave.
- ◆ Coupling - It could be primary and backup.

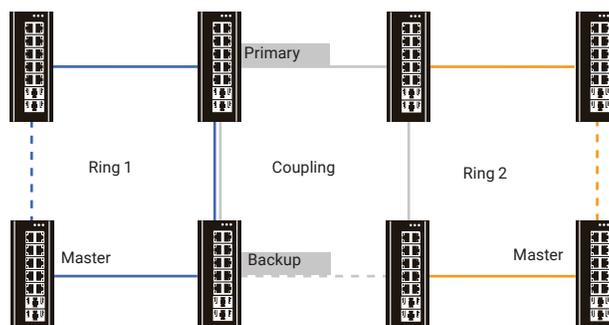


FIGURE 6-3. RING CONFIGURATION, COUPLING AND DUAL HOMING SUPPORTED

- ◆ When role is coupling/primary, only one ring port named primary port is configured.
- ◆ When role is coupling/backup, only one ring port named backup port is configured. This backup port is a redundant port. In a normal state, it is blocked.

## CHAPTER 6: RING VERSION2 APPLICATION

### Dual-Homing

When the role is dual-homing, one ring port is the primary port and another is the backup port. This backup port is a redundant port. In normal state, it is blocked.

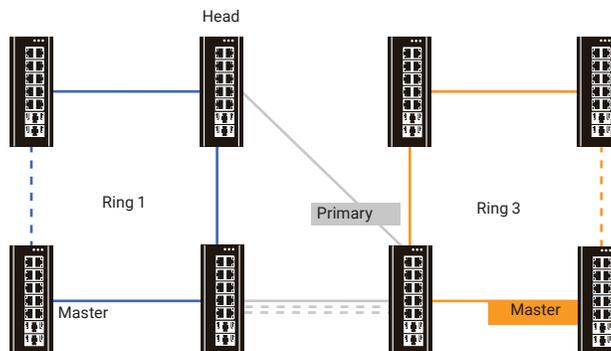


FIGURE 6-4. DUAL HOMING

Group 3 - This supports configuration of the chain and balancing-chain.

Chain - The switch can be head, tail or member.

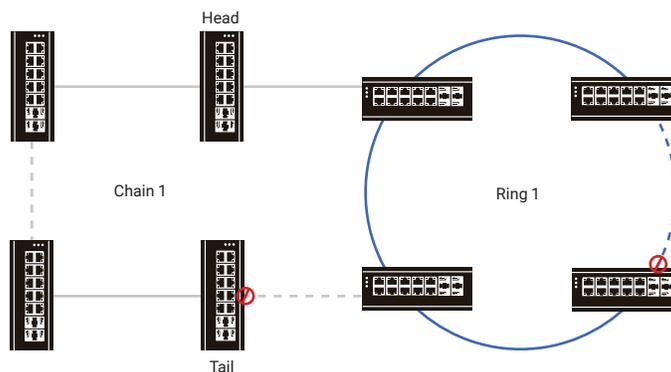


FIGURE 6-5. CHAIN CONFIGURATION

- ◆ When the role is chain/head, one ring port is the head port and another is a member port. Both ring ports are forwarded in normal state.
- ◆ When the role is chain/tail, one ring port is the tail port and another is a member port. The tail port is a redundant port. It is blocked in normal state.
- ◆ When the role is chain/member, both ring ports are member ports. Both ring ports are forwarded in normal state.

## CHAPTER 6: RING VERSION2 APPLICATION

Balancing Chain - The switch can be central-block, terminal-1/2 or member.

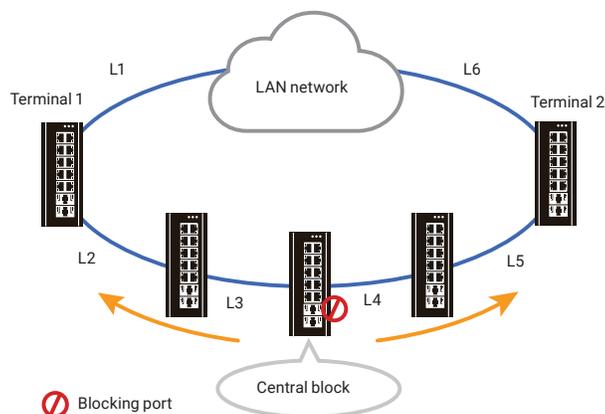


FIGURE 6-6. BALANCING CHAIN

- ◆ When the role is balancing-chain/central-block, one ring port is a member port and another is a block port. The block port is a redundant port. It is blocked in normal state.
- ◆ When the role is balancing-chain/terminal-1/2, one ring port is a terminal port and another is a member port. Both ring ports are forwarded in normal state.
- ◆ When the role is balancing-chain/member, both ring ports are member ports. Both ring ports are forwarded in normal state.

NOTE 1: It must enable group1 before configure group2 as coupling.

NOTE 2: When group1 or group2 is enabled, the configuration of group3 is invisible.

NOTE 3: When group3 is enabled, the configuration of group1 and group3 is invisible.

## 6.2 HOW TO CONFIGURE RINGV2

### CONFIGURATION (CONSOLE)

To configure the ring protection in the switch:

1. Log in as "admin" account in the console.
2. Go to Configure mode by "configure terminal."
3. Go to configure ring protection group by command "ringv2 protect group1."
4. Before configuring, disable ring protection status using the "mode disable" command.
5. Set all necessary parameters:
  - ◆ Node 1 and Node 2, choose the ports to connect to the other switch.
  - ◆ For example, choose PORT-1 and PORT-2 to connect to the other switch.
  - ◆ Then choose one of the ring connection devices to be "Master" on which the "Node 2 port" can be a blocking port.

```
node1 interface GigabitEthernet 1/1
node2 interface GigabitEthernet 1/2
role ring-master
```

## CHAPTER 6: RING VERSION2 APPLICATION

To finish the configuration, enable ring protection status using the “mode enable” command.

NOTE: Please pay attention to the status of “Previous Command Result” after every action.

```
configure terminal
ring protect group1
```

```
mode disable
node1 interface GigabitEthernet 1/1
node2 interface GigabitEthernet 1/2
role ring-master
mode enable
```

```
exit
```

### CONFIGURATION (WEB UI)

In the switch’s current Ringv2 design, one device supports 3 ring indexes, including Ring & Chain (single ring, dual ring, coupling, dual-homing, chain, and balancing-chain.)

| Index | Mode    | Role          | Ring Port(s)   |
|-------|---------|---------------|--|
| 1     | Disable | Ring(Master)  | Forward Port : Port-1<br>Block Port : Port-2                           |
| 2     | Disable | Ring(Slave)   | Forward Port : Port-5<br>Forward Port : Port-6<br>Member Port : Port-1 |
| 3     | Disable | Chain(Member) | Member Port : Port-2   |

Save Reset

FIGURE 6-7. RING CONFIGURATION SCREEN

NOTE 1: You must enable group1 before configuring group2 as coupling.

NOTE 2: When group1 or group2 is enabled, the configuration of group3 is invisible.

NOTE 3: When group3 is enabled, the configuration of group1 and group3 is invisible.

# CHAPTER 6: RING VERSION2 APPLICATION

## STEP 1: Disable RSTP on All Ring Ports

1. Go to "Configuration -> Spanning Tree -> CIST ports" Web page.

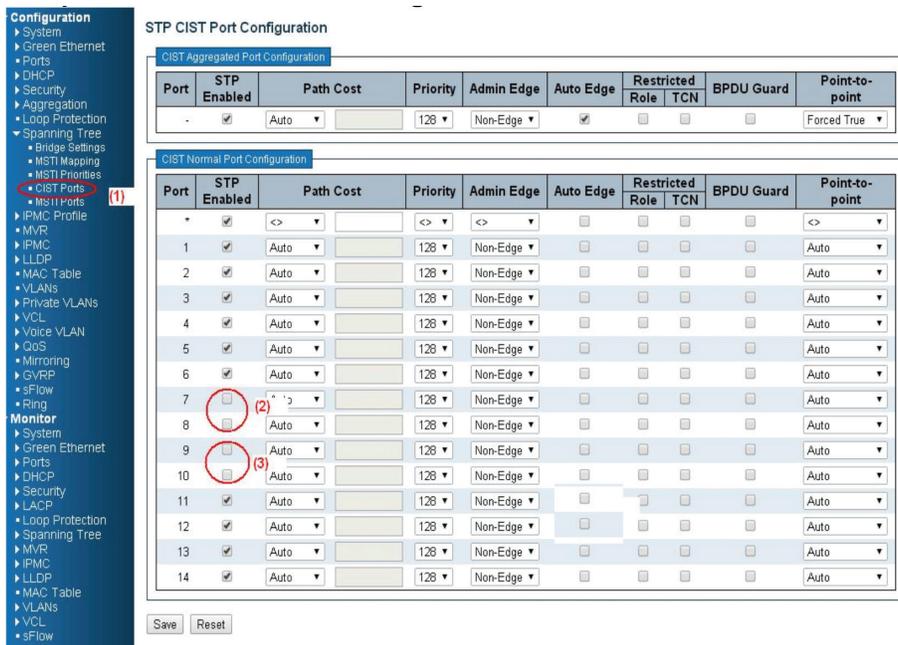


FIGURE 6-8. STP CIST PORT CONFIGURATION SCREEN

2. Do not enable STP global.
3. Click the "Save" button.

## RING MASTER

1. Go to "Configuration -> RingV2" Web page.
2. Enable Index1, and Select Role as Ring(Master).
3. Select one port as a "Forward Port", another as "Block Port."

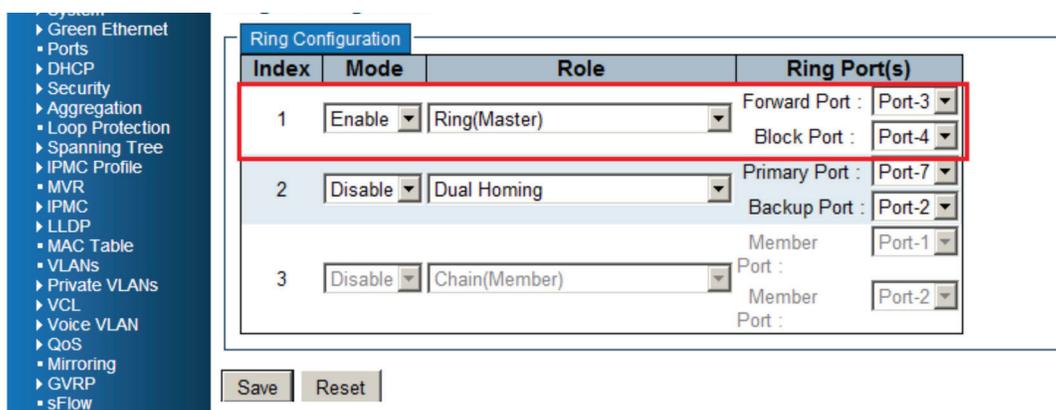


FIGURE 6-9. RING MASTER CONFIGURATION SCREEN



## CHAPTER 6: RING VERSION2 APPLICATION

### RING SLAVE

1. Go to "Configuration → "RingV2" Web page.
2. Enable Index1, and Select Role as Ring(Slave)
3. Select two ports as "Forward Port."

The screenshot shows the "Ring Configuration" interface. It features a table with columns for Index, Mode, Role, and Ring Port(s). Index 1 is highlighted with a red box, showing Mode: Enable, Role: Ring(Slave), and Forward Ports: Port-3 and Port-4. Below the table are "Save" and "Reset" buttons, with the "Save" button circled in red.

| Index | Mode    | Role          | Ring Port(s)                                   |
|-------|---------|---------------|--|
| 1     | Enable  | Ring(Slave)   | Forward Port : Port-3<br>Forward Port : Port-4 |
| 2     | Disable | Dual Homing   | Primary Port : Port-1<br>Backup Port : Port-2  |
| 3     | Disable | Chain(Member) | Member Port : Port-1<br>Member Port : Port-2   |

Save Reset

FIGURE 6-10. RING SLAVE CONFIGURATION SCREEN

### COUPLING PRIMARY

1. Go to "Configuration → "RingV2" Web page.
2. Enable Index1, and Select Role as Ring(Slave).
3. Select two ports as "Forward Port."
4. Enable Index2, and Select Role as "Coupling(Primary)."
5. Select one port as a "Primary Port."

The screenshot shows the "Ring Configuration" interface. Index 1 is highlighted with a red box, showing Mode: Enable, Role: Ring(Slave), and Forward Ports: Port-3 and Port-4. Index 2 is also highlighted with a red box, showing Mode: Enable, Role: Coupling(Primary), and Primary Port: Port-6. Below the table are "Save" and "Reset" buttons.

| Index | Mode    | Role              | Ring Port(s)                                   |
|-------|---------|-------------------|--|
| 1     | Enable  | Ring(Slave)       | Forward Port : Port-3<br>Forward Port : Port-4 |
| 2     | Enable  | Coupling(Primary) | Primary Port : Port-6                          |
| 3     | Disable | Chain(Member)     | Member Port : Port-1<br>Member Port : Port-2   |

Save Reset

FIGURE 6-11. COUPLING PRIMARY CONFIGURATION SCREEN

## CHAPTER 6: RING VERSION2 APPLICATION

### COUPLING BACKUP

1. Go to "Configuration → "RingV2" Web page.
2. Enable Index1, and Select Role as Ring(Slave).
3. Select two ports as a "Forward Port."
4. Enable Index2, and Select Role as "Coupling(Backup)."
5. Select one port as a "Backup Port."

| Index | Mode    | Role             | Ring Port(s)                                   |
|-------|---------|------------------|--|
| 1     | Enable  | Ring(Slave)      | Forward Port : Port-3<br>Forward Port : Port-4 |
| 2     | Enable  | Coupling(Backup) | Backup Port : Port-5                           |
| 3     | Disable | Chain(Member)    | Member Port : Port-1<br>Member Port : Port-2   |

Save Reset

FIGURE 6-12. COUPLING BACKUP CONFIGURATION SCREEN

### DUAL HOMING

1. Go to "Configuration → "RingV2" Web page.
2. Enable Index1, and Select Role as Ring(Slave).
3. Select two ports as a "Forward Port."
4. Enable Index2, and Select Role as "Dual Homing."
5. Select one port as a "Primary Port," and the other is "Backup Port."

| Index | Mode    | Role          | Ring Port(s)                                  |
|-------|---------|---------------|---|
| 1     | Enable  | Ring(Master)  | Forward Port : Port-3<br>Block Port : Port-4  |
| 2     | Enable  | Dual Homing   | Primary Port : Port-5<br>Backup Port : Port-6 |
| 3     | Disable | Chain(Member) | Member Port : Port-1<br>Member Port : Port-2  |

Save Reset

FIGURE 6-13. DUAL HOMING CONFIGURATION SCREEN

# CHAPTER 6: RING VERSION2 APPLICATION

## CHAIN CONFIGURATION

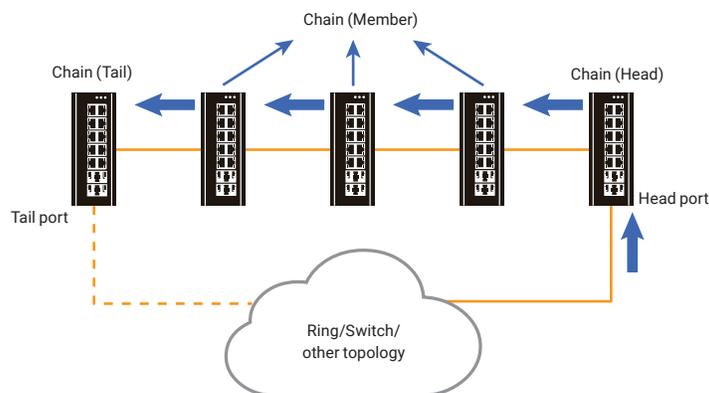


FIGURE 6-14. CHAIN CONFIGURATION

## CHAIN - MEMBER

1. Go to "Configuration -> "RingV2" Web page.
2. Disable Index1 and Index2, then enable Index3.
3. Select Role to "Chain(Member)."
4. Select two member ports for this chain member switch.

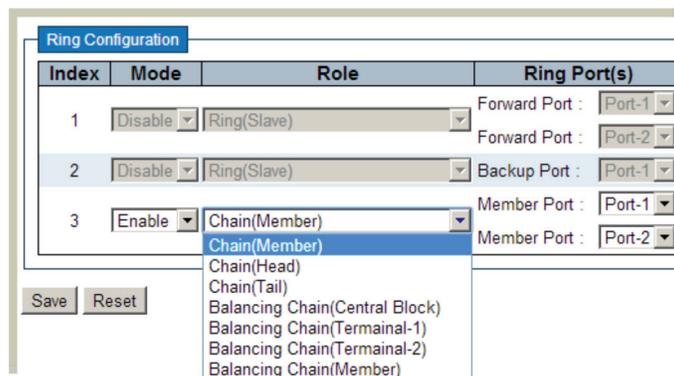


FIGURE 6-15. CHAIN MEMBER SCREEN

## CHAPTER 6: RING VERSION2 APPLICATION

### CHAIN - HEAD

1. Go to "Configuration -> "RingV2" Web page.
2. Disable Index1 and Index2, then enable Index3.
3. Select Role to "Chain(Head)."
4. Select a member port and a head port for this chain head switch.

| Index | Mode    | Role        | Ring Port(s)                                   |
|-------|---------|-------------|--|
| 1     | Disable | Ring(Slave) | Forward Port : Port-1<br>Forward Port : Port-2 |
| 2     | Disable | Ring(Slave) | Backup Port : Port-1                           |
| 3     | Enable  | Chain(Head) | Member Port : Port-1<br>Head Port : Port-2     |

Save Reset

FIGURE 6-16. CHAIN HEAD SCREEN

### CHAIN - TAIL

1. Go to "Configuration -> "RingV2" Web page.
2. Disable Index1 and Index2, then enable Index3.
3. Select Role to "Chain(Tail)."
4. Select a member port and a tail port for this chain tail switch.

| Index | Mode    | Role        | Ring Port(s)                                   |
|-------|---------|-------------|--|
| 1     | Disable | Ring(Slave) | Forward Port : Port-1<br>Forward Port : Port-2 |
| 2     | Disable | Ring(Slave) | Backup Port : Port-1                           |
| 3     | Enable  | Chain(Tail) | Member Port : Port-1<br>Tail Port : Port-2     |

Save Reset

FIGURE 6-17. CHAIN TAIL SCREEN

# CHAPTER 6: RING VERSION2 APPLICATION

## BALANCE CHAIN CONFIGURATION

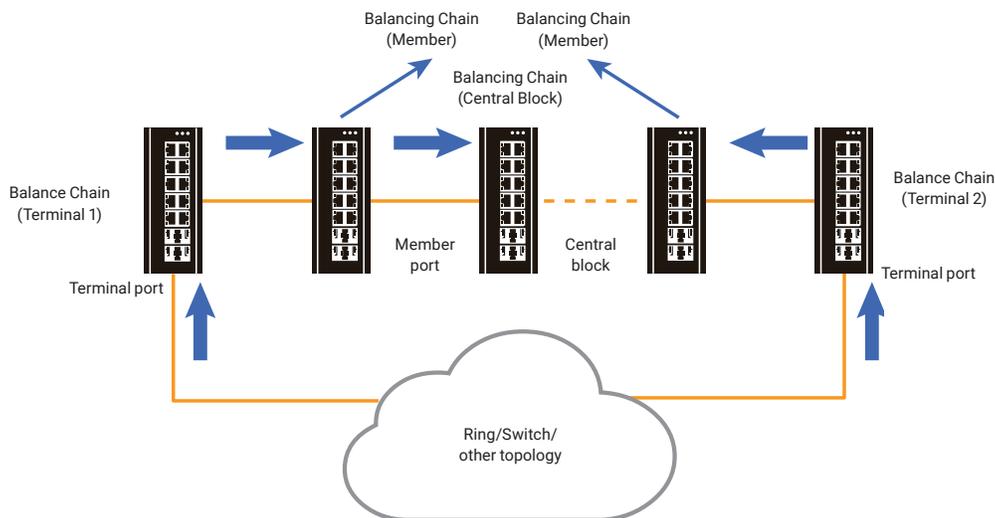


FIGURE 6-18. BALANCE CHAIN CONFIGURATION

## BALANCE CHAIN - CENTRAL BLOCK

1. Go to "Configuration -> "RingV2" Web page.
2. Disable Index1 and Index2, then enable Index3.
3. Select Role to "Balancing Chain(Central Block)."
4. Select a member port and a block port for this central block switch.

| Ring Configuration |         |                                |   |
|--------------------|---------|--------------------------------|---|
| Index              | Mode    | Role                           | Ring Port(s)                                  |
| 1                  | Disable | Ring(Slave)                    | Forward Port : Port-1<br>Block Port : Port-2  |
| 2                  | Disable | Ring(Slave)                    | Primary Port : Port-3<br>Backup Port : Port-4 |
| 3                  | Enable  | Balancing Chain(Central Block) | Member Port : Port-1<br>Block Port : Port-2   |

Save Reset

FIGURE 6-19. BALANCE CHAIN CENTRAL BLOCK SCREEN

## CHAPTER 6: RING VERSION2 APPLICATION

### BALANCE CHAIN - TERMINAL 1 AND 2

1. Go to "Configuration -> "RingV2" Web page.
2. Disable Index1 and Index2, then enable Index3.
3. Select Role to "Balancing Chain(Terminal-1 or -2)."
4. Select a member port and a terminal port for this balancing chain terminal switch.

The screenshot shows the "Ring Configuration" web interface. It features a table with four columns: Index, Mode, Role, and Ring Port(s). Below the table are "Save" and "Reset" buttons. A dropdown menu is open under the Role column for Index 3, showing several options, with "Balancing Chain(Terminal-1)" selected.

| Index | Mode    | Role                        | Ring Port(s)                                   |
|-------|---------|-----------------------------|--|
| 1     | Disable | Ring(Slave)                 | Forward Port : Port-1<br>Forward Port : Port-2 |
| 2     | Disable | Ring(Slave)                 | Backup Port : Port-1                           |
| 3     | Enable  | Balancing Chain(Terminal-1) | Member Port : Port-1<br>Terminal Port : Port-2 |

Save Reset

- Chain(Member)
- Chain(Head)
- Chain(Tail)
- Balancing Chain(Central Block)
- Balancing Chain(Terminal-1)
- Balancing Chain(Terminal-2)
- Balancing Chain(Member)

FIGURE 6-20. BALANCE CHAIN - TERMINAL 1 AND 2 SCREEN

# CHAPTER 7: QOS APPLICATION

Quality of Service (QoS) features allow you to allocate network resources to mission-critical applications at the expense of applications that are less sensitive to such factors as time delays or network congestion. You can configure your network to prioritize specific types of traffic, ensuring that each type receives the appropriate Quality of Service (QoS) level.

## 7.1 SP/SPWRR

The switch can be configured to have 8 output Class of Service (CoS) queues (Q0–Q7) per port, into which each packet is placed. Q0 is the highest priority Queue. Each packet’s 802.1p priority determines its CoS queue. The user needs to bind VLAN priority/queue mapping profile to each port, and for every VLAN priority the user needs to assign a traffic descriptor for it. The traffic descriptor defines the shape parameter on every VLAN priority for the Ethernet interface. Currently the switch supports Strict Priority and SP+WRR (Weighted Round Robin) scheduling methods on each port.

**TABLE 7-1. DEFAULT PRIORITY AND QUEUE MAPPING VALUES**

| PRIORITY0 | PRIORITY1 | PRIORITY2 | PRIORITY3 | PRIORITY4 | PRIORITY5 | PRIORITY6 | PRIORITY7 |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Queue0    | Queue1    | Queue2    | Queue3    | Queue4    | Queue5    | Queue6    | Queue7    |
| SPQ       |

### Application Examples

Following we provide several examples for various QoS combinations. You can configure QoS using the Web-based management system, CLI (Command Line Interface) or SNMP.

## 7.2 EXAMPLE 1: SPQ WITHOUT SHAPING (DEFAULT PROFILE)

We send 2 Streams (Stream0, Stream1) from PORT-1 to PORT-2. Both Streams each have 100 Mbps. Stream0 includes VLAN Priority0, Stream1 includes VLAN Priority7. Set PORT-2 link speed to 100 Mbps.

### Expected Result:

We expect that PORT-2 only can receive 100 Mbps of Stream1, and Stream0 will be discarded. This explains how SPQ works on the switch.

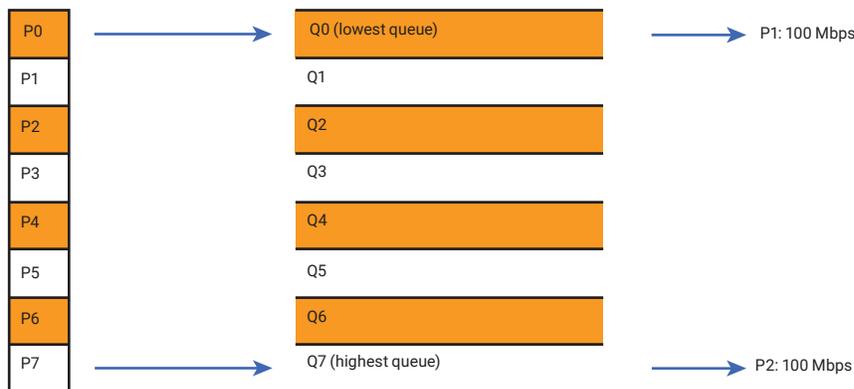


FIGURE 7-1. GIGABIT PORT VLAN PRIORITY & QUEUE MAPPING.

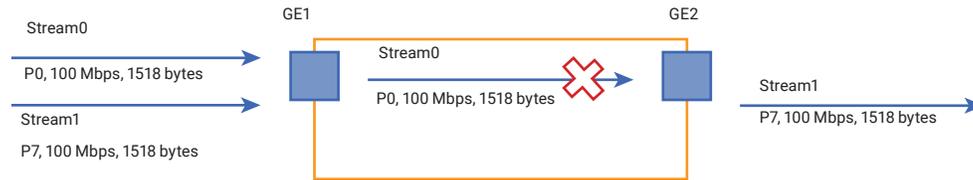


FIGURE 7-2.

- ◆ Stream0:  
Dst Mac: 00:00:00:00:20:01  
Src Mac: 00:00:00:00:10:01  
Vlan: 100  
Vlan prio: 0  
Send rate: 100 Mbps  
Packet length: 1518 bytes
- ◆ Stream1:  
Dst Mac: 00:00:00:00:20:02  
Src Mac: 00:00:00:00:10:02  
Vlan: 100  
Vlan prio: 7  
Send rate: 100 Mbps  
Packet length: 1518 bytes

## WEB MANAGEMENT

STEP 1: Go to Configuration → Ports → set port 2 link speed to 100 Mbps full duplex.

| Port | Link   | Current     | Speed   |            | Flow Control |            | Maximum Frame Size | Excessive Collision Mode |
|------|--------|-------------|---------|------------|--------------|------------|--------------------|--------------------------|
|      |        |             | Current | Configured | Current Rx   | Current Tx |                    |                          |
| *    |        |             |         |            |              |            | 9600               |                          |
| 1    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 2    | 100fdx | 100Mbps FDX | Auto    | X          | X            |            | 9600               | Discard                  |
| 3    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 4    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 5    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 6    | 100fdx | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 7    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 8    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 9    | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 10   | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 11   | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 12   | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 13   | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |
| 14   | Down   | Auto        | Auto    | X          | X            |            | 9600               | Discard                  |

FIGURE 7-3.

STEP 2: Select Configuration → VLANs → Create a VLAN with VLAN ID 100. Enter a VLAN name in the Name field. Here we set tagged VLAN100 on PORT-1 and PORT-2.

| Port | Mode   | Port VLAN | Port Type | Ingress Filtering | Ingress Acceptance  | Egress Tagging  | Allowed VLANs | Forbidden VLANs |
|------|--------|-----------|-----------|-------------------|---------------------|-----------------|---------------|-----------------|
| *    |        | 1         |           |                   |                     |                 | 1             |                 |
| 1    | Trunk  | 100       | C-Port    |                   | Tagged Only         | Tag All         | 1,100         |                 |
| 2    | Trunk  | 100       | C-Port    |                   | Tagged Only         | Tag All         | 1,100         |                 |
| 3    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 4    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 5    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 6    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 7    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 8    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 9    | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 10   | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 11   | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 12   | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 13   | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |
| 14   | Access | 1         | C-Port    |                   | Tagged and Untagged | Untag Port VLAN |               |                 |

FIGURE 7-4.

## CHAPTER 7: QOS APPLICATION

### CLI CONFIGURATION COMMAND

```

interface GigabitEthernet 1/1
switchport trunk native vlan 100
switchport trunk allowed vlan 1,100
switchport trunk vlan tag native
switchport mode trunk
!
interface GigabitEthernet 1/2
switchport trunk native vlan 100
switchport trunk allowed vlan 1,100
switchport trunk vlan tag native
switchport mode trunk

```

### 7.2 EXAMPLE 2: SPQ WITH SHAPING

We send 2 Streams (Stream0, Stream1) from PORT-1 to PORT-2. Both Streams each have 100 Mbps. Stream0 includes VLAN Priority0, Stream1 includes VLAN Priority7. Stream 3 and Stream 4 are only for learning to prevent the traffic from flooding.

Expected Result:

We expect that PORT-2 only can receive 20 Mbps of Stream1 and 80 Mbps of Stream2. This explains how SPQ works on the switch.

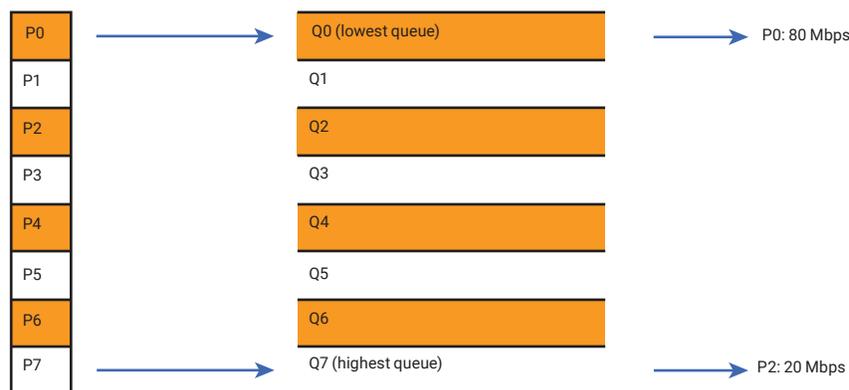


FIGURE 7-5. VDSL PORT VLAN PRIORITY AND QUEUE MAPPING



FIGURE 7-6.

## CHAPTER 7: QOS APPLICATION

- ◆ Stream0:
  - Dst Mac: 00:00:00:00:20:01
  - Src Mac: 00:00:00:00:10:01
  - Vlan: 100
  - Vlan prio: 0
  - Send rate: 100 Mbps
  - Packet length: 1518 bytes
  
- ◆ Stream1:
  - Dst Mac: 00:00:00:00:20:02
  - Src Mac: 00:00:00:00:10:02
  - Vlan: 100
  - Vlan prio: 7
  - Send rate: 100 Mbps
  - Packet length: 1518 bytes
  
- ◆ Stream3 (for learning):
  - Dst Mac: 00:00:00:00:10:01
  - Src Mac: 00:00:00:00:20:01
  - Vlan: 100
  - Vlan prio: 0
  - Send rate: 10 Mbps
  - Packet length: 1518 bytes
  
- ◆ Stream4 (for learning):
  - Dst Mac: 00:00:00:00:10:02
  - Src Mac: 00:00:00:00:20:02
  - Vlan: 100
  - Vlan prio: 0
  - Send rate: 10 Mbps
  - Packet length: 1518 bytes

# CHAPTER 7: QOS APPLICATION

## WEB MANAGEMENT

STEP 1: Go to Configuration → Qos → Port Shaping, to create a Qos profile on Port-2.

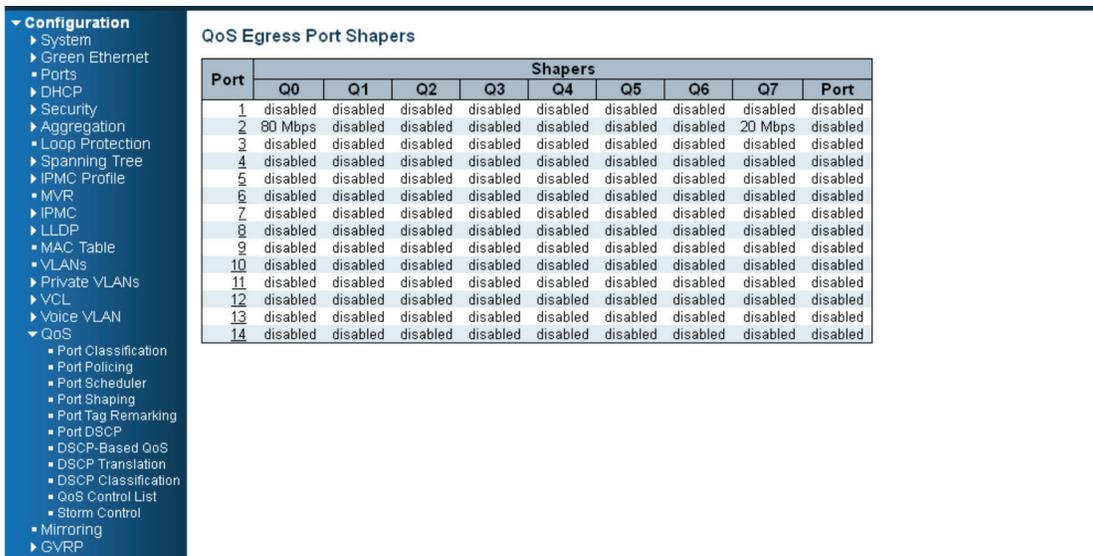


FIGURE 7-7.

STEP 2: Select schedule mode to be “Strict Priority” and set shaping rate for queue 0 and queue 7 as below.

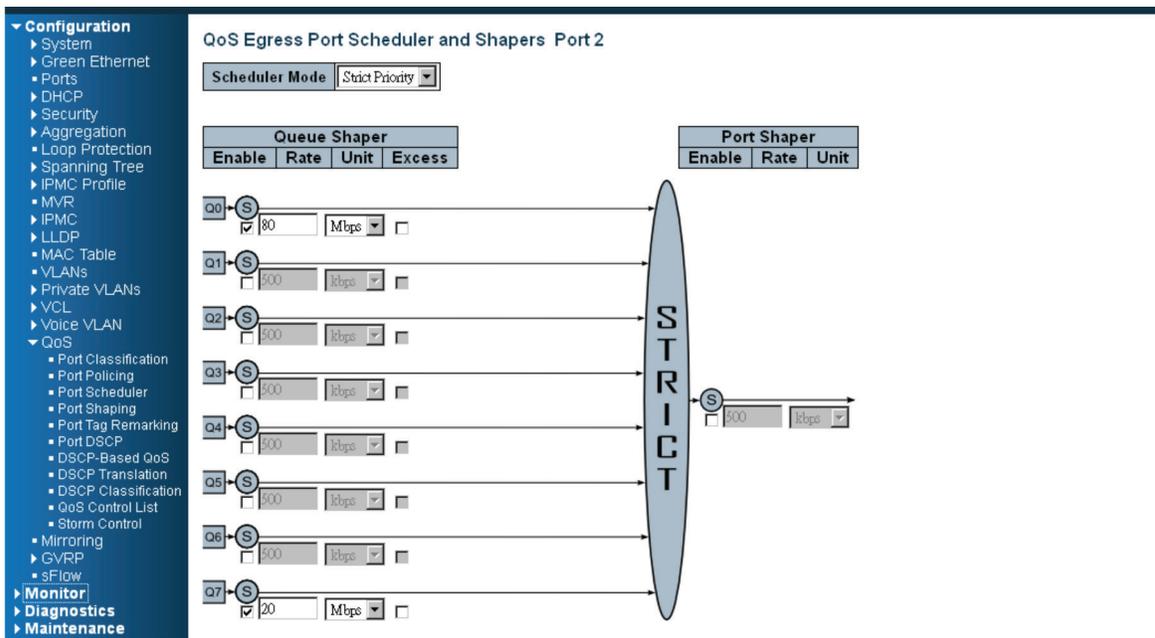


FIGURE 7-8.

## CHAPTER 7: QOS APPLICATION

### CLI CONFIGURATION COMMAND

```
interface GigabitEthernet 1/2
switchport trunk native vlan 100
switchport trunk allowed vlan 1,100
switchport trunk vlan tag native
switchport mode trunk
qos queue-shaper queue 0 80000
qos queue-shaper queue 7 20000
```

## CHAPTER 8: IGMP APPLICATION

IGMP is an acronym for Internet Group Management Protocol. It is a communications protocol used to manage the membership of Internet Protocol multicast groups. IGMP is used by IP hosts and adjacent multicast routers to establish multicast group memberships. It is an integral part of the IP multicast specification, like ICMP for unicast connections. IGMP can be used for online video and gaming, and allows more efficient use of resources when supporting these uses.

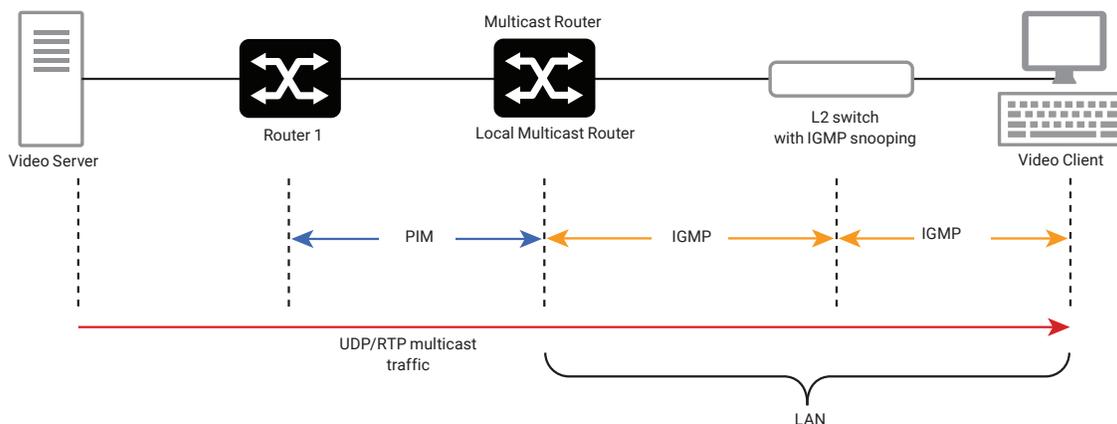


FIGURE 8-1. IGMP INSTALLATION

### 8.1 EXAMPLE 1

To configure every client to get a multicast stream, go to “Configuration → IPMC → Basic Configuration” and select the “Snooping Enable” check box.

▼ **Configuration**

- ▶ System
- ▶ Green Ethernet
- Ports
- ▶ DHCP
- ▶ Security
- ▶ Aggregation
- Loop Protection
- ▶ Spanning Tree
- ▶ IPMC Profile
- MVR
- ▼ IPMC
  - ▼ IGMP Snooping
    - Basic Configuration
    - VLAN Configuration
    - Port Filtering Profile
    - ▶ MLD Snooping

#### IGMP Snooping Configuration

| Global Configuration                 |                                     |
|--------------------------------------|-------------------------------------|
| Snooping Enabled                     | <input checked="" type="checkbox"/> |
| Unregistered IPMCv4 Flooding Enabled | <input checked="" type="checkbox"/> |
| IGMP SSM Range                       | 232.0.0.0 / 8                       |
| Leave Proxy Enabled                  | <input type="checkbox"/>            |
| Proxy Enabled                        | <input type="checkbox"/>            |

#### Port Related Configuration

| Port | Router Port              | Fast Leave               | Throttling  |
|------|--------------------------|--------------------------|-------------|
| *    | <input type="checkbox"/> | <input type="checkbox"/> | <> ▼        |
| 1    | <input type="checkbox"/> | <input type="checkbox"/> | unlimited ▼ |
| 2    | <input type="checkbox"/> | <input type="checkbox"/> | unlimited ▼ |
| 3    | <input type="checkbox"/> | <input type="checkbox"/> | unlimited ▼ |

FIGURE 8-2. SNOOPING ENABLED CHECKBOX

# CHAPTER 8: IGMP APPLICATION

## 8.2 EXAMPLE 2

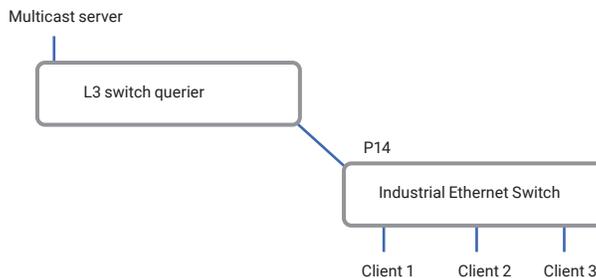


FIGURE 8-3. EXAMPLE 2

1. Go to “Configuration → IPMC → Basic Configuration” to select the “Snooping Enable” check box.
2. Un-select the “Unregistered IPMCv4 Flooding Enabled” check box.
3. If Multicast stream is from an L3 switch, then the uplink port will have to be the “Router Port”.

NOTE: If an aggregation member port is selected as a router port, the whole aggregation will act as a router port.

- ▼ Configuration
  - ▶ System
  - ▶ Green Ethernet
  - Ports
  - ▶ DHCP
  - ▶ Security
  - ▶ Aggregation
  - Loop Protection
  - ▶ Spanning Tree
  - ▶ IPMC Profile
  - MVR
  - ▼ IPMC
    - ▼ IGMP Snooping (1)
      - Basic Configuration
      - VLAN Configuration
      - Port Filtering Profile
      - ▶ MLD Snooping
    - ▶ LLDP
    - MAC Table
    - VLANs
    - ▶ Private VLANs
    - ▶ VCL
    - ▶ Voice VLAN
    - ▶ QoS
    - Mirroring
    - ▶ GVRP
    - sFlow
    - Ring
  - ▶ Monitor
  - ▶ Diagnostics
  - ▶ Maintenance

### IGMP Snooping Configuration

| Global Configuration                 |   |
|--------------------------------------|---|
| Snooping Enabled                     | <input checked="" type="checkbox"/> (2) |
| Unregistered IPMCv4 Flooding Enabled | <input type="checkbox"/>                |
| IGMP SSM Range                       | 232.0.0.0 / 8                           |
| Leave Proxy Enabled                  | <input type="checkbox"/>                |
| Proxy Enabled                        | <input type="checkbox"/>                |

### Port Related Configuration

| Port | Router Port                             | Fast Leave               | Throttling |
|------|---|--------------------------|------------|
| *    | <input type="checkbox"/>                | <input type="checkbox"/> | <>         |
| 1    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 2    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 3    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 4    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 5    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 6    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 7    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 8    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 9    | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 10   | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 11   | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 12   | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 13   | <input type="checkbox"/>                | <input type="checkbox"/> | unlimited  |
| 14   | <input checked="" type="checkbox"/> (3) | <input type="checkbox"/> | unlimited  |

FIGURE 8-4.

# CHAPTER 8: IGMP APPLICATION

4. Go to "Configuration -> IPMC -> VLAN Configuration" to select the "Snooping Enable" check box and set the VLAN ID of port14.

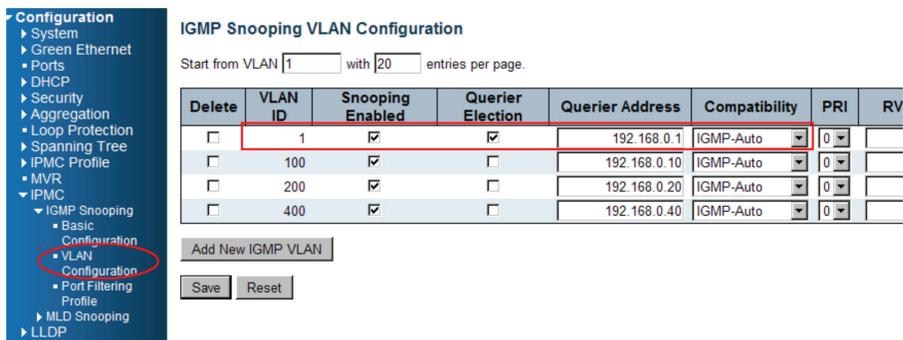


FIGURE 8-5.

## 8.3 EXAMPLE 3

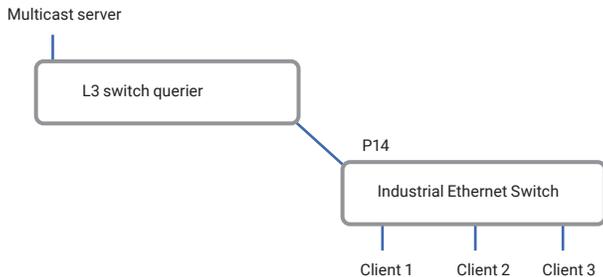


FIGURE 8-6. EXAMPLE 3

In this scenario, these clients belong to multiple VLANs, so you have to create more one VLAN to be the agent for all client VLANs.

1. To create a VLAN: go to "Configuration -> VLANs -> Allow Access VLANs", then set port 14 to be a vlan200 member port.

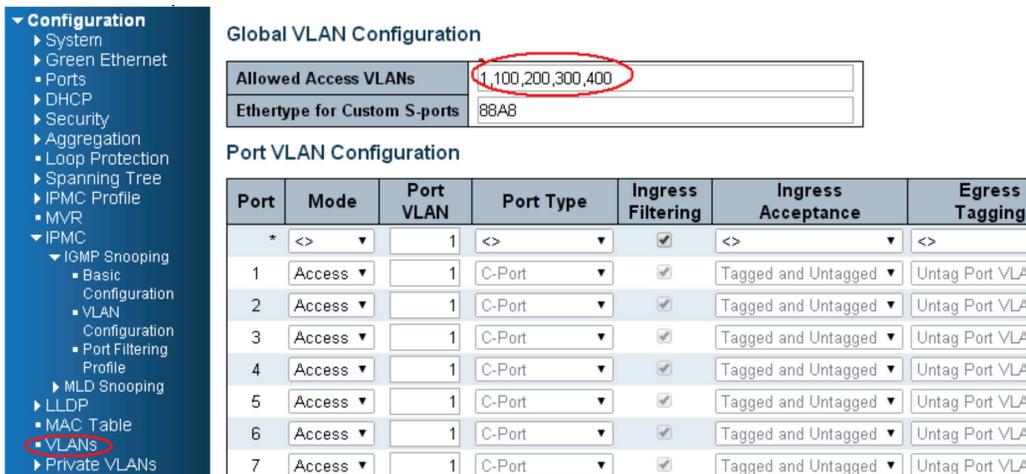


FIGURE 8-7.

## CHAPTER 8: IGMP APPLICATION

2. Go to “Configuration → IPMC → VLAN Configuration” to select the “Snooping Enable” check box and set the VLAN ID of port14.

**Configuration**

- System
- Green Ethernet
- Ports
- DHCP
- Security
- Aggregation
- Loop Protection
- Spanning Tree
- IPMC Profile
- MVR
- IPMC
  - IGMP Snooping
    - Basic Configuration
    - VLAN Configuration**
    - Port Filtering Profile
  - MLD Snooping

**IGMP Snooping VLAN Configuration**

Start from VLAN 1 with 20 entries per page.

| Delete                   | VLAN ID | Snooping Enabled                    | Querier Election         | Querier Address | Compatibility | PRI | RV |
|--------------------------|---------|-------------------------------------|--------------------------|-----------------|---------------|-----|----|
| <input type="checkbox"/> | 200     | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 0.0.0.0         | IGMP-Auto     | 0   |    |

Add New IGMP VLAN

Save Reset

FIGURE 8-8.

3. If there is no querier on the L3 switch, you have to select “Querier Election”, and set the “Querier Address.” The IP address is in the same network as uplink interface.

4. Select the IGMP version as server.

**Configuration**

- System
- Green Ethernet
- Ports
- DHCP
- Security
- Aggregation
- Loop Protection
- Spanning Tree
- IPMC Profile
- MVR
- IPMC
  - IGMP Snooping
    - Basic Configuration
    - VLAN Configuration**
    - Port Filtering Profile
  - MLD Snooping
  - LLDP

**IGMP Snooping VLAN Configuration**

Start from VLAN 1 with 20 entries per page.

| Delete                   | VLAN ID | Snooping Enabled                    | Querier Election                    | Querier Address | Compatibility | PRI | RV |
|--------------------------|---------|-------------------------------------|-------------------------------------|-----------------|---------------|-----|----|
| <input type="checkbox"/> | 1       | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 192.168.0.1     | IGMP-Auto     | 0   |    |
| <input type="checkbox"/> | 100     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | 192.168.0.10    | IGMP-Auto     | 0   |    |
| <input type="checkbox"/> | 200     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | 192.168.0.20    | IGMP-Auto     | 0   |    |
| <input type="checkbox"/> | 400     | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | 192.168.0.40    | IGMP-Auto     | 0   |    |

Add New IGMP VLAN

Save Reset

FIGURE 8-9.

### 8.4 HOW TO CONFIGURE VLC

#### VLC CONFIGURATION ON AN IGMP SERVER

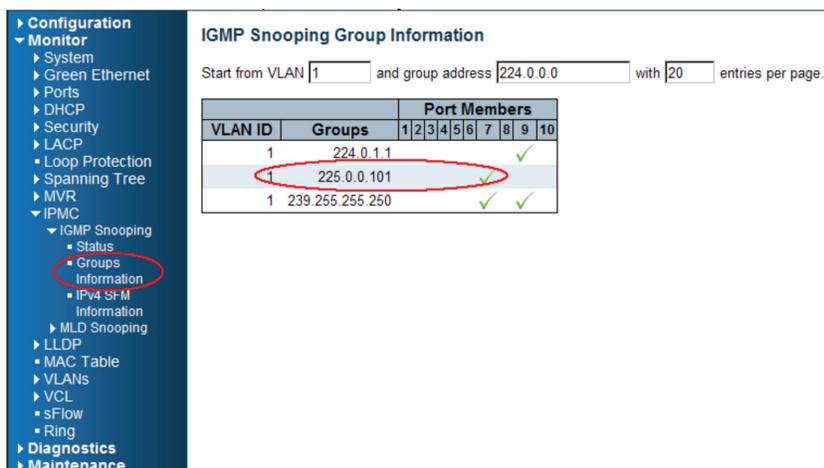
1. In the Media area of the top tool bar select “Stream.”
2. Select a video or audio file to play.
3. Confirm that the file is correct, then click “Next” twice.
4. Select the stream type as “UDP” and click the “Add” button.
5. Set the stream IP; the range is 224.0.0.1 to 239.255.255.254, and the protocol port is 1234.
6. Select “Sort out all stream” and click then “Stream” button, then the stream will start sending to the switch.

## CHAPTER 8: IGMP APPLICATION

### VLC CONFIGURATION ON AN IGMP CLIENT

1. In the Media area of the top tool bar, select open network stream.
2. Set the stream IP and protocol port to be the same as the previous setting on the server. The protocol type is "UDP." Then click the "PLAY" button.

Return to the managed switch. Go to "Monitor → IPMC → Groups Information", and you will see the stream IP in the table.



Configuration  
▼ Monitor  
  ▶ System  
  ▶ Green Ethernet  
  ▶ Ports  
  ▶ DHCP  
  ▶ Security  
  ▶ LACP  
  ▶ Loop Protection  
  ▶ Spanning Tree  
  ▶ MVR  
  ▼ IPMC  
    ▼ IGMP Snooping  
      ▶ Status  
      ▶ **Groups Information** (circled in red)  
      ▶ IPv4 SFM Information  
    ▶ MLD Snooping  
  ▶ LLDP  
  ▶ MAC Table  
  ▶ VLANs  
  ▶ VCL  
  ▶ sFlow  
  ▶ Ring  
  ▶ Diagnostics  
  ▶ Maintenance

#### IGMP Snooping Group Information

Start from VLAN  and group address  with  entries per page.

| VLAN ID | Groups          | Port Members |   |   |   |   |   |   |   |   |    |
|---------|-----------------|--------------|---|---|---|---|---|---|---|---|----|
|         |                 | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1       | 224.0.1.1       |              |   |   |   |   |   |   |   |   | ✓  |
| 1       | 225.0.0.101     |              |   |   |   |   |   |   |   |   | ✓  |
| 1       | 239.255.255.250 |              |   |   |   |   |   |   |   |   | ✓  |

FIGURE 8-10. VIEW STREAM IP IN TABLE

## CHAPTER 9: 802.1X AUTHENTICATION APPLICATION

IEEE 802.1x derives keys that can be used to provide per-packet authentication, integrity and confidentiality. It is typically used along with well-known key derivation algorithms (e.g. TLS, SRP, MD5-Challenge, etc.). The Industrial Ethernet Switch supports 802.1x authentication function per port (port1–port10). Enable the 802.1x function and choose the ports and type you want to apply. If you enable 802.1x authentication control for certain Ethernet port in the switch, this port should be authenticated before using any services from the network.

### 9.1 802.X TIMER IN THE SWITCH

TABLE 9-1. 802.X TIMER FUNCTIONS

| PARAMETER          | DESCRIPTION  |
|--------------------|--|
| ReAuth Period      | The switch will restart authentication after each Reauth-Period when the ReAuth option is enabled                                |
| Quiet Period       | The switch will wait QuietPeriod to restart the authentication process again when authentication failed.                         |
| Tx Period          | The switch will send an EAP-request to Supplicant every TxPeriod when authentication is running and Quiet Period is not running. |
| Supplicant Timeout | The switch will wait the SupplicantTimeout to receive a response from the Supplicant.  |
| Server Timeout     | The switch will wait the ServerTimeout to receive a response from the RADIUS server.   |

### 9.2 RADIUS SERVER CONFIGURATION

STEP 1: Prepare a Linux PC with a RADIUS server installed.

STEP 2: Edit the secret key for the RADIUS server.

Setting:

```
client 20.20.20.0/24 {
  secret = a12b3c4d
}
```

STEP 3: Edit the user name and password for the supplicant to authenticate with the server.

Setting:

|         |                                 |
|---------|---------------------------------|
| test123 | Cleartext-Password := "test123" |
| aaaa    | Cleartext-Password := "aaaa"    |

Diagram illustrating the configuration for a supplicant to authenticate with the server. The configuration is shown in a box with two columns. The first column contains the user name and password, and the second column contains the corresponding Cleartext-Password. Arrows point from the labels "User name" and "User password" to the respective fields in the configuration.

STEP 4: Set a static IP address for this Radius Server.

Setting: 20.20.20.20

STEP 5: Start Radius Server

## CHAPTER 9: 802.1X AUTHENTICATION APPLICATION

## 9.3 EXAMPLE

Here we take an example of 802.1x Authentication via the Industrial Ethernet Switch to be authenticated by RADIUS server. In a basic example, we take port 1 as a testing port which enables 802.1x in the switch.

With the default configuration, use the following Web UI setting .

STEP 1: Go to Configuration → Security → Networks → NAS.

Select “Enable” mode to enable authentication, and set port-1, port-2 to be “Port Base 802.1x”.

**Network Access Server Configuration**

System Configuration

|                                |                                     |
|--------------------------------|-------------------------------------|
| Mode                           | Enabled                             |
| Reauthentication Enabled       | <input checked="" type="checkbox"/> |
| Reauthentication Period        | 3600 seconds                        |
| EAPOL Timeout                  | 30 seconds                          |
| Aging Period                   | 300 seconds                         |
| Hold Time                      | 10 seconds                          |
| RADIUS-Assigned QoS Enabled    | <input type="checkbox"/>            |
| RADIUS-Assigned VLAN Enabled   | <input type="checkbox"/>            |
| Guest VLAN Enabled             | <input type="checkbox"/>            |
| Guest VLAN ID                  |                                     |
| Max. Reauth. Count             |                                     |
| Allow Guest VLAN if EAPOL Seen | <input type="checkbox"/>            |

Port Configuration

| Port | Admin State       | RADIUS-Assigned QoS Enabled | RADIUS-Assigned VLAN Enabled | Guest VLAN Enabled       | Port State | Restart            |
|------|-------------------|-----------------------------|------------------------------|--------------------------|------------|--------------------|
| 1    | Port-based 802.1X | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 2    | Port-based 802.1X | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 3    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 4    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 5    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 6    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 7    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 8    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 9    | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Authorized | Restart Initialize |
| 10   | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 11   | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 12   | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 13   | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |
| 14   | Force Authorized  | <input type="checkbox"/>    | <input type="checkbox"/>     | <input type="checkbox"/> | Link Down  | Restart Initialize |

Save Reset

FIGURE 9-1. NAS SCREEN

STEP 2: Go to Configuration → Security → AAA → Radius.

Click “Add New Server,” input “20.20.20.20” for server, and “a1b2c3d4” for secret key. Then click the “Save” button.

**RADIUS Server Configuration**

Global Configuration

|                  |           |
|------------------|-----------|
| Timeout          | 5 seconds |
| Retransmit       | 3 times   |
| Deadtime         | 0 minutes |
| Key              | a1b2c3d4  |
| NAS-IP-Address   |           |
| NAS-IPv6-Address |           |
| NAS-Identifier   |           |

Server Configuration

| Delete                   | Hostname     | Auth Port | Acct Port | Timeout | Retransmit | Key      |
|--------------------------|--------------|-----------|-----------|---------|------------|----------|
| <input type="checkbox"/> | 10.10.10.199 | 1812      | 1813      | 5       | 3          | a1b2c3d4 |

Add New Server

Save Reset

FIGURE 9-2. RADIUS SCREEN

## CHAPTER 9: 802.1X AUTHENTICATION APPLICATION

### CLI COMMAND

```
Configure ter
interface vlan 1
ip address 20.20.20.120 255.0.0.0
exit
exit
radius-server host 20.20.20.20 timeout 5 retransmit 3 key a1b2c3d4
dot1x re-authentication
dot1x system-auth-control
interface GigabitEthernet 1/1
dot1x port-control auto
```

### CONFIGURATION

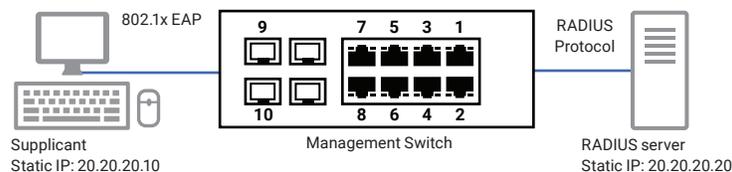


FIGURE 9-3. RADIUS SERVER CONFIGURATION

#### Supplicant's NIC Setting

STEP 1: Configure a static IP address 20.20.20.10 and net mask 255.255.255.0 for supplicant. (If there is a DHCP server to assign IP address for supplicant, this step can be ignored.)

STEP 2: Select the IEEE802.1X Authentication Enable check box, then configure the EAP type to MD5-Challenge.

After setting this function in the NIC, the supplicant should enter a correct pair of account and password to use this Ethernet port service from the switch.

## CHAPTER 9: 802.1X AUTHENTICATION APPLICATION

### Authentication Behavior

The supplicant should pass the authentication process in order to use any service. After the supplicant enters a correct account and password stored in RADIUS server, it can be authenticated successfully.

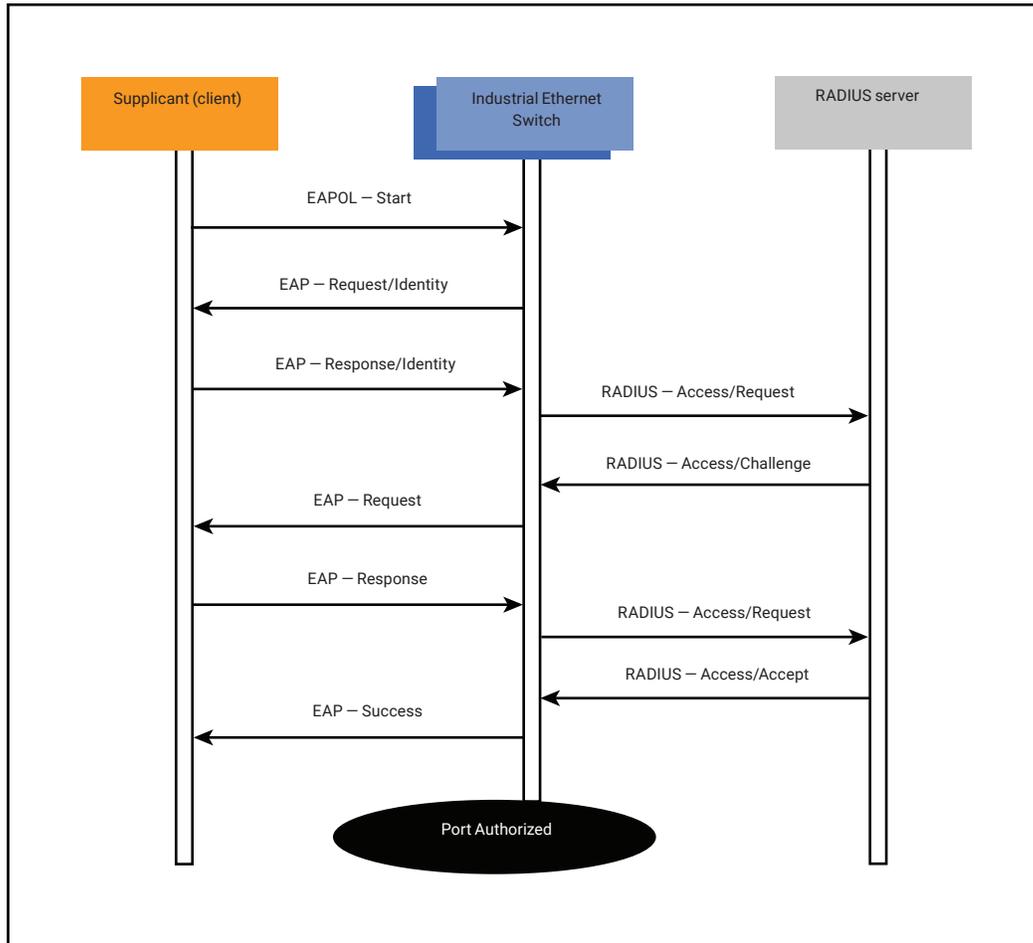


FIGURE 9-4. AUTHENTICATION PROCESS

## CHAPTER 10: POWER OVER ETHERNET APPLICATION

**NOTE:** This chapter applies only to PoE managed models (LIE401A, LIE1014A, LIE1080A and LIE1082A).

These switches support the PoE function for connected powered devices. The operation mode contains 802.3af (15.4W), 802.3at (30W), and 802.3at with 4 pair used (60W). 60 watts only can be applied for port 1 and 2. Each port has 5 classes for selection, class 0–4. The total power budget of the system is up to 240 watts.

The PoE switches support power scheduler for each PoE port. Each time interval is 30 minutes from Sunday to Saturday. You can select which interval to set PoE on or PoE off. The switch also supports a PoE reset function to power off, then power on the PoE function on a port at certain time. A maximum of five times can be created in a week.

### 10.1 RESERVED POWER DETERMINATION

There are three modes for configuring how the ports/PDs may reserve power.

1. **Class mode:** In this mode each port automatically determines how much power to reserve according to the class the connected PD belongs to, and reserves the power accordingly. Five different port classes exist and one for 4, 7, 15.4 or 30 Watts.
2. **Allocated mode:** In this mode, the user allocates the amount of power that each port may reserve. The allocated/reserved power for each port/PD is specified in the Maximum Power fields.
3. **LLDP-MED mode:** This mode is similar to the Class mode except that each port determines the amount power it reserves by exchanging PoE information using the LLDP protocol and reserves power accordingly. If no LLDP information is available for a port, the port will reserve power using the class mode

**NOTE:** For all modes: If a port uses more power than the reserved power for the port, the port is shut down.

### 10.2 POWER MANAGEMENT MODE

There are 2 modes for configuring when to shut down the ports:

1. **Actual Consumption:** In this mode, the ports are shut down when the actual power consumption for all ports exceeds the amount of power that the power supply can deliver or if the actual power consumption for a given port exceeds the reserved power for that port. The ports are shut down according to the ports priority. If two ports have the same priority, the port with the highest port number is shut down.

Port Priority: Critical > High > Low.

When priorities are the same, the lower number port has higher priority.

2. **Reserved Power:** In this mode, the ports are shut down when total reserved powered exceeds the amount of power that the power supply can deliver. In this mode, the port power is not turned on if the PD requests more power than available from the power supply.

## CHAPTER 10: POWER OVER ETHERNET APPLICATION

### 10.3 OTHER SETTINGS

- PoE Power Supply:** To determine the amount of power the PD may use, you must define what amount of power a power source can deliver. Valid values are in the range 0 to 240 Watts.
  - PoE Mode:** The PoE Mode represents the PoE operating mode for the port.
    - ◆ Disable: PoE disabled for the port.
    - ◆ Enable: Enables PoE for the port.
    - ◆ Schedule: Enables PoE for the port by scheduling.
  - Operation Mode:** The Operation Mode represents the PoE power operating protocol for the port.
    - ◆ 802.3af : Sets PoE protocol to IEEE 802.3af.
    - ◆ 802.3at : Sets PoE protocol to IEEE 802.3at.
  - 4 Pair:** The 4 Pairs represent the 60 W power supply for the port. The option is only available when following rules are applied.
    - ◆ High power switch model supports.
    - ◆ Only port1 or port2 supports.
    - ◆ Current operation mode is 802.3at.
    - ◆ Enable: Enable 4Pairs to support 60 W.
    - ◆ Disable: Disable 4Pairs to limit 30W of power.
  - PoE Priority:** The Priority represents the ports priority. There are three levels of power priority named Low, High and Critical. The priority is used in the case where the remote devices require more power than the power supply can deliver. In this case, the port with the lowest priority will turn off starting from the port with the highest port number.
  - Maximum Power:** The Maximum Power value contains a numerical value that indicates the maximum power in watts that can be delivered to a remote device.
- For ports that support 4Pairs mode, the maximum allowed value is 60 W; others are 30 W.

### 10.4 POE POWER SCHEDULING AND RESET

The power scheduling is used to control the power alive interval on PoE port. You can set the specific interval to schedule power on/off in one week.

The current scheduling state is displayed graphically during the week. Green indicates the power is on and red that it is off. Directly change checkmarks to indicate which day are members of the time interval. Check or uncheck as needed to modify the scheduling table.

PoE Power Scheduling Control on Port 1

Power Scheduling Interval Configuration

| Day                      | Interval                 | Action                   |                          |                          |                          |                          |               |   |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|---|
| Sun.                     | Mon.                     | Tue.                     | Wed.                     | Thu.                     | Fri.                     | Sat.                     | Start - End   |   |
| <input type="checkbox"/> | 00:00 - 00:29 | <input checked="" type="radio"/> Power ON <input type="radio"/> Power OFF |

Apply

Power Scheduling During 00:00 - 05:59

| Time Interval | Sun. | Mon. | Tue. | Wed. | Thu. | Fri. | Sat. |
|---------------|------|------|------|------|------|------|------|
| 00:00 - 00:29 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 00:30 - 00:59 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 01:00 - 01:29 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 01:30 - 01:59 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 02:00 - 02:29 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 02:30 - 02:59 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 03:00 - 03:29 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 03:30 - 03:59 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 04:00 - 04:29 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 04:30 - 04:59 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 05:00 - 05:29 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |
| 05:30 - 05:59 | ●    | ●    | ●    | ●    | ●    | ●    | ●    |

FIGURE 10-1. POE SCHEDULING AND RESET

# CHAPTER 10: POWER OVER ETHERNET APPLICATION

- Day: Checkmarks indicate which day are members of the set. From Sunday to Saturday.
- Interval: Start - Select the start hour and minute. End - Select the end hour and minute. There are 48 time intervals in one day. Each interval has 30 minutes.
- Action:
  - Power On - Select the radio button to apply power on during the interval.
  - Power Off - Select the radio button to apply power off during the interval.
- PoE Power Reset: The entry is used to control the power reset time on PoE port. You can create at maximum 5 entries for each PoE port.

| Delete                   | Day                                 |                          |                          |                          |                          |                          |                          | Time (hh:mm) |      |
|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------|------|
|                          | Sun.                                | Mon.                     | Tue.                     | Wed.                     | Thu.                     | Fri.                     | Sat.                     | 23           | : 00 |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 23           | : 00 |

FIGURE 10-2. POE POWER RESET CONTROL ON PORT 1

## 10.5 EXAMPLE 1

- Parameter Setting:
  - Reserved Power determined: Class
  - Power Management Mode: Actual Consumption
  - Primary Power Supply: 6W
- Test Port
  - Port 1: 802.3at with critical priority
  - Port 2: 802.3af with high priority
  - Port 3: 802.3af with low priority
- PD Power Consumption
  - Port 1: 1.3 watt (PoE Splitter)
  - Port 2: 1.3 watt (PoE VoIP Phone)
  - Port 3: 3.8 watt (PoE WiFi AP)
- Web Configuration

**Configuration**

- System
- Green Ethernet
- Ports
- DHCP
- Security
- Aggregation
- Loop Protection
- Spanning Tree
- IPMC Profile
- MVR
- IPMC
- LLDP
- PoE
  - PoE**
  - Power Scheduler
  - Power Reset
  - MAC Table
  - VLANs
  - Private VLANs
  - VCL
  - Voice VLAN
  - QoS
  - Mitigation

**Power Over Ethernet Configuration**

Reserved Power determined by  Class  Allocation  LLDP-MED

Power Management Mode  Actual Consumption  Reserved Power

**PoE Power Supply Configuration**

Primary Power Supply [W]

**PoE Port Configuration**

| Port | Mode    | Operation | 4Pairs  | Priority | Maximum Power [W] |
|------|---------|-----------|---------|----------|-------------------|
| 1    | Enable  | 802.3at   | Disable | Critical | 15.4              |
| 2    | Enable  | 802.3af   | Disable | High     | 15.4              |
| 3    | Enable  | 802.3af   | Disable | Low      | 15.4              |
| 4    | Disable | 802.3af   | Disable | Low      | 15.4              |
| 5    | Disable | 802.3af   | Disable | Low      | 15.4              |
| 6    | Disable | 802.3af   | Disable | Low      | 15.4              |

FIGURE 10-3. WEB CONFIGURATION

## CHAPTER 10: POWER OVER ETHERNET APPLICATION

5. Test Result: PoE port status can be monitored by Web: Monitor → PoE

The following table shows that if the system budget is not enough for all PoE devices, the port with higher priority port will be fed power first. The last priority port (port 3) will not be powered.

| Local Port | PD class | Power Requested | Power Allocated | Power Used | Current Used | Priority | Port Status                       |
|------------|----------|-----------------|-----------------|------------|--------------|----------|-----------------------------------|
| 1          | 4        | 30 [W]          | 30 [W]          | 1.3 [W]    | 27 [mA]      | Critical | PoE turned ON                     |
| 2          | 3        | 15.4 [W]        | 15.4 [W]        | 1.3 [W]    | 30 [mA]      | High     | PoE turned ON                     |
| 3          | 0        | 15.4 [W]        | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OFF - Power budget exc |
| 4          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OFF - PoE disable      |
| 5          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OFF - PoE disable      |
| 6          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OFF - PoE disable      |
| 7          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OFF - PoE disable      |
| 8          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OFF - PoE disable      |
| Total      |          | 60.8 [W]        | 45.4 [W]        | 2.6 [W]    | 57 [mA]      |          |                                   |

FIGURE 10-4. TEST RESULT

### 10.6 EXAMPLE 2

#### 1. Parameter Setting:

- ◆ Reserved Power determined: Allocation
- ◆ Power Management Mode: Reserved Power
- ◆ Primary Power Supply: 138 W (> all ports reserved power)

#### 2. Port Maximum Power

- ◆ Port 1: 30 W
- ◆ Port 2– Port 8: 15.4 W
- ◆ Total: 137.8 W

#### 3. PD Power Consumption

- ◆ Port 1: 1.3 watt (PoE Splitter)
- ◆ Port 2: 1.3 watt (PoE VoIP Phone)
- ◆ Port 3: 3.8 watt (PoE WiFi AP)

# CHAPTER 10: POWER OVER ETHERNET APPLICATION

## 4. Web Configuration

**Power Over Ethernet Configuration**

Reserved Power determined by:  Class  Allocation  LLDP-MED

Power Management Mode:  Actual Consumption  Reserved Power

**PoE Power Supply Configuration**

Primary Power Supply [W]: 138

**PoE Port Configuration**

| Port | Mode    | Operation | 4Pairs  | Priority | Maximum Power [W] |
|------|---------|-----------|---------|----------|-------------------|
| *    | <>      | <>        | <>      | <>       | 30                |
| 1    | Enable  | 802.3at   | Disable | Critical | 30                |
| 2    | Enable  | 802.3af   | Disable | High     | 15.4              |
| 3    | Enable  | 802.3af   | Disable | Low      | 15.4              |
| 4    | Disable | 802.3af   | Disable | Low      | 15.4              |
| 5    | Disable | 802.3af   | Disable | Low      | 15.4              |
| 6    | Disable | 802.3af   | Disable | Low      | 15.4              |
| 7    | Disable | 802.3af   | Disable | Low      | 15.4              |
| 8    | Disable | 802.3af   | Disable | Low      | 15.4              |

FIGURE 10-5. WEB CONFIGURATION

## 5. Test Result: PoE port status can be monitored by Web: Monitor → PoE

Since power is reserved for each port in advance, each powered device can use the power budget of its corresponding port without exceeding its maximum power.

**Power Over Ethernet Status**

| Local Port | PD class | Power Requested | Power Allocated | Power Used | Current Used | Priority | Port          |
|------------|----------|-----------------|-----------------|------------|--------------|----------|---------------|
| 1          | 4        | 30 [W]          | 30 [W]          | 1.3 [W]    | 27 [mA]      | Critical | PoE tu        |
| 2          | 3        | 15.4 [W]        | 15.4 [W]        | 1.3 [W]    | 29 [mA]      | High     | PoE tu        |
| 3          | 0        | 15.4 [W]        | 15.4 [W]        | 3.8 [W]    | 81 [mA]      | Low      | PoE tu        |
| 4          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OF |
| 5          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OF |
| 6          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OF |
| 7          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OF |
| 8          | -        | 0 [W]           | 0 [W]           | 0 [W]      | 0 [mA]       | Low      | PoE turned OF |
| Total      |          | 60.8 [W]        | 60.8 [W]        | 6.4 [W]    | 137 [mA]     |          |               |

FIGURE 10-6. TEST RESULT

## APPENDIX A: REGULATORY INFORMATION

### A.1 FCC STATEMENT

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.



## APPENDIX A: REGULATORY INFORMATION

### A.2 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

## APPENDIX B: DISCLAIMER/TRADEMARKS

### B.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

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